

Hornsby Shire Council

Hornsby Quarry Rehabilitation works including bulk earthworks (and associated civil works including construction of access tracks, drainage and retaining walls), site remediation, tree removal, revegetation work and site rehabilitation

Response to Submissions and Revised Project Scope

VOLUME 2 – APPENDICES A to H

November 2019

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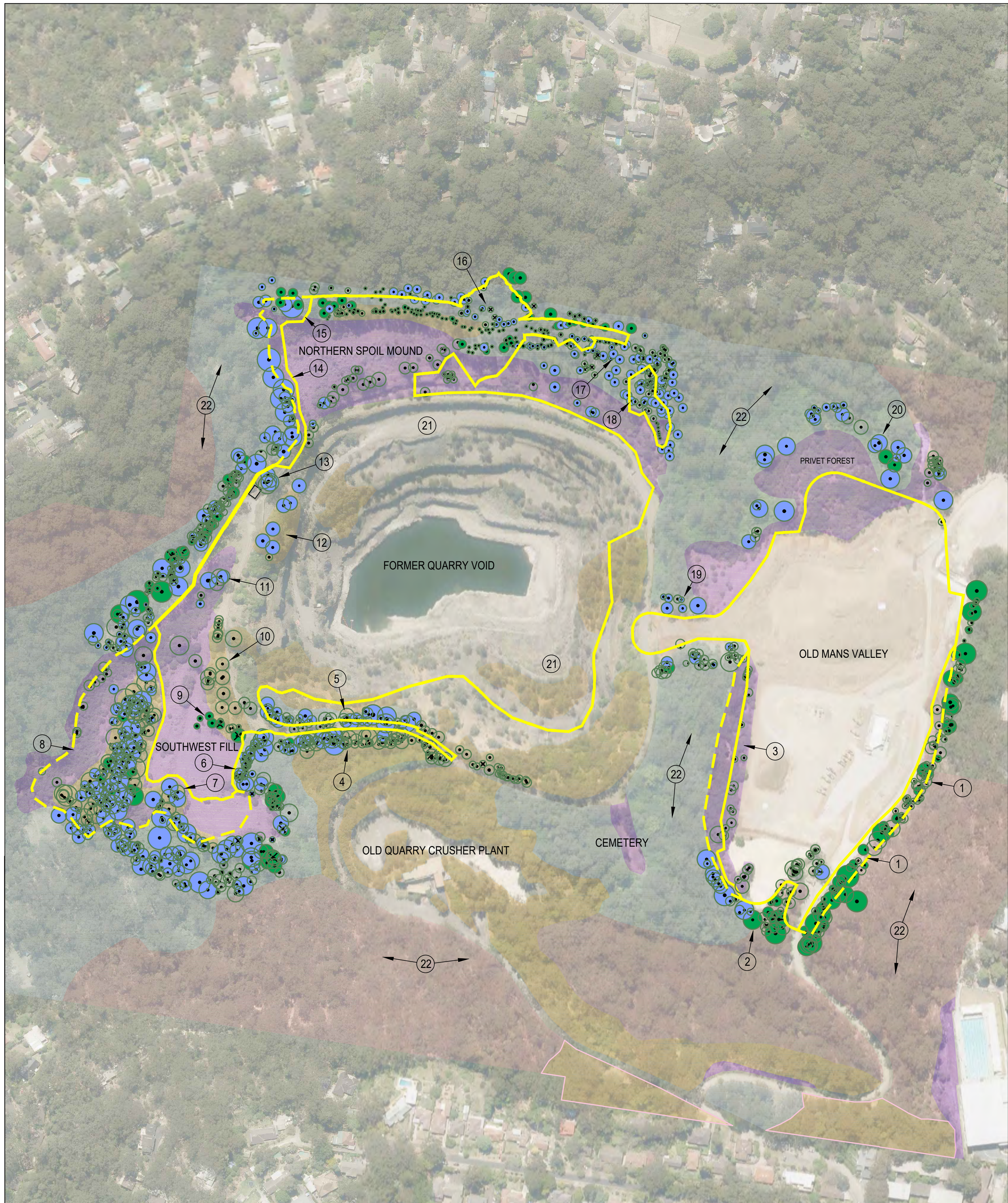
Appendix A – Figures



NOTES - VEGETATION AND EXTENT OF WORKS

1. **Old Mans Valley (eastern edge area)**
Significant trees and vegetation in this area are being protected. The Extent of Works line has been adjusted to protect Blackbutt Gully Forest. It is noted that the root zone of most trees here sit on a rock shelf high above the area of works.

2. **Old Mans Valley (south area)**
Design adjustments have been made to protect a Blue Gum tree in this vicinity.

3. **Old Mans Valley (west area)**
The limit of works line has been adjusted to protect vegetation this area. Substantial rehabilitation and restoration of natural vegetation is planned for this area.

4. **Quarry South Track (upper side)**
Very steep slopes with unconsolidated soils exist in this area. Significant native trees in this area will be retained and protected, as they are outside the Extent of Works. Some trees in this area have fallen due to extreme slope and unconsolidated soils. Trees that pose an unreasonable risk will be removed.

5. **Quarry South Track (lower side and Quarry Void slope)**
Essential engineering works will be carried out to stabilise this track. Trackside vegetation protection will be prioritised in design and works. Extremely steep unstable slopes of the southern quarry walls will require detailed assessment. Depending on findings, works along the top of the cliff may require the removal of unstable trees that are vulnerable to failure and may contribute to further slope instability.

6. **South West Area (east side)**
Blue Gum and Blackbutt vegetation in this area will be protected and enhanced over time.

7. **South West Area (south side)**
The Extent of Works has been amended here to ensure protection of quality vegetation, including Blue Gum and Blackbutt trees in this area.

8. **South West Area (west side)**
The Extent of Works has been amended here to ensure protection of quality vegetation, including Blue Gum and Blackbutt trees in this area.

9. **South West Area (central area)**
Due to the need to regrade this area, it is likely that 5 Blackbutt trees in this area will require removal. Substantial planting, rehabilitation and restoration of natural vegetation is planned for this area.

10. **South West Area (central area)**
Due to the need to regrade this area, it is likely that some non-endemic Casuarina trees will require removal. Substantial planting, rehabilitation and restoration of natural vegetation is planned for this area.

11. **South West Area (north area)**
Due to the need to substantially regrade and stabilise this area, it is likely that 3 Blue Gums in this area will be removed. Substantial planting, rehabilitation and restoration of natural vegetation is planned for this area.

12. **Quarry Void (western edge)**
While every effort will be made to retain trees in this area, due to stabilisation and regrading works it is likely Blue Gum trees growing on the quarry void edge will require removal. Substantial planting, rehabilitation and restoration of natural vegetation is planned for this area.

13. **Fuel Tank Area**
Protection of Blue Gum trees in this area is a high priority in design and works.

14. **Northern Spoil Mound (western edge)**
Significant forest trees and vegetation in this area is being protected. The Extent of Works line has been adjusted to ensure protection of Blue Gum trees in this area.

15. **Northern Spoil Mound (north-west)**
The Extent of Works line has been adjusted to ensure protection of Blue Gum trees in this area.

16. **Northern Spoil Mound (central area)**
Due to an identified high risk of potential slope failure, this area will be subject to essential regrading, drainage rectification and remediation. As a result, tree vegetation in this area will need to be removed. With the works providing improved conditions for revegetation, substantial planting and restoration of natural forest vegetation is planned for this area. Adjacent areas outside the Extent of Works line will be protected.

17. **Northern Spoil Mound**
This area is outside the Extent of Works line. Regrading and drainage rectification works required in parts of the Northern Spoil Mound (central area), will ensure the long-term stability of this vegetated embankment.

18. **Northern Spoil Mound (north works area)**
Due to an identified high risk of potential slope failure, this area will be subject to essential regrading and remediation. As a result, tree vegetation within the Extent of Works line will need to be removed. With the works providing improved conditions for revegetation, substantial planting and restoration of natural forest vegetation is planned for this area. Adjacent areas out of the limit of works line will be protected.

19. **Quarry Access Track**
The trees in this area are outside the Extent of Works. They will be protected.

20. **Old Mans Valley (north)**
The trees in this area are outside the Extent of Works. They will be protected.

21. **Quarry Void Walls and Ramps**
Geotechnical advice will further inform retention or removal of primarily non-endemic vegetation in these areas. Planting and restoration are planned for some areas within the Quarry Void to enhance habitat and amenity of the area.

22. **Hornsby Park Areas Generally**
The preliminary Vegetation Management Plan (VMP) is a key component of the overall environmental 'Offsets Package' for the Hornsby Park proposal. It will guide the development of a final detailed VMP for the sites' natural forest environment restoration and rehabilitation. The Offsets Package will include the final VMP to guide ongoing management of the site's biodiversity values in perpetuity.

LEGEND

- Blue Gum (*Eucalyptus saligna*)
- Blackbutt (*Eucalyptus pilularis*)
- Other surveyed trees
- Dead Tree
- Former extent of works line
- Revised extent of works line
- CEEC Blue Gum High Diatreme Forest areas
- Blackbutt Gully Forest (good quality/ regeneration)
- Blackbutt Gully Forest (moderate/ poor quality/ regeneration)
- Blackbutt Gully Forest (poor quality/ regeneration)

Hornsby Shire Council
Major Projects Branch

TELEPHONE: (02) 9847 6666
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Authorised for release - Landscape Coordinator
Name: R. MINTER Signed: Date:

Designer: HSC	Design Checked-Landscape Co-ordinator Signed:	
Drawn: HSC	Drawing Checked Signed:	
Surveyor: HSC	- Field Book	- Level Book	AHD Datum

Project Identifier\-\CAD File Name: Hornsby Park Project - Vegetation and EOW
TRIM Document Number: -

Issue	Description	Name	Initial	Date
A	FOR INFORMATION - REVISED EXTENT OF WORKS AND VEG MAPPING	JAMES FRAWLEY	JF	07.11.19

Design not to be amended without authorisation by Manager Major Projects

Bar Scales
0 50 100 150m
SCALE 1:2500 @ A1
SCALE 1:5000 @ A3
DO NOT SCALE, USE FIGURED DIMENSIONS ONLY

HORNSBY SHIRE COUNCIL
PO BOX 37, HORNSBY NSW 1630
DX 9655 HORNSBY

REVISED EXTENT OF WORKS AND VEGETATION MAPPING

Project Number: 100125
Sheet 1 of 1
Issue: A
HSC Drawing Number: -

0 30 60 90m
SCALE 1:3000 AT ORIGINAL SIZE

N

GHD

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

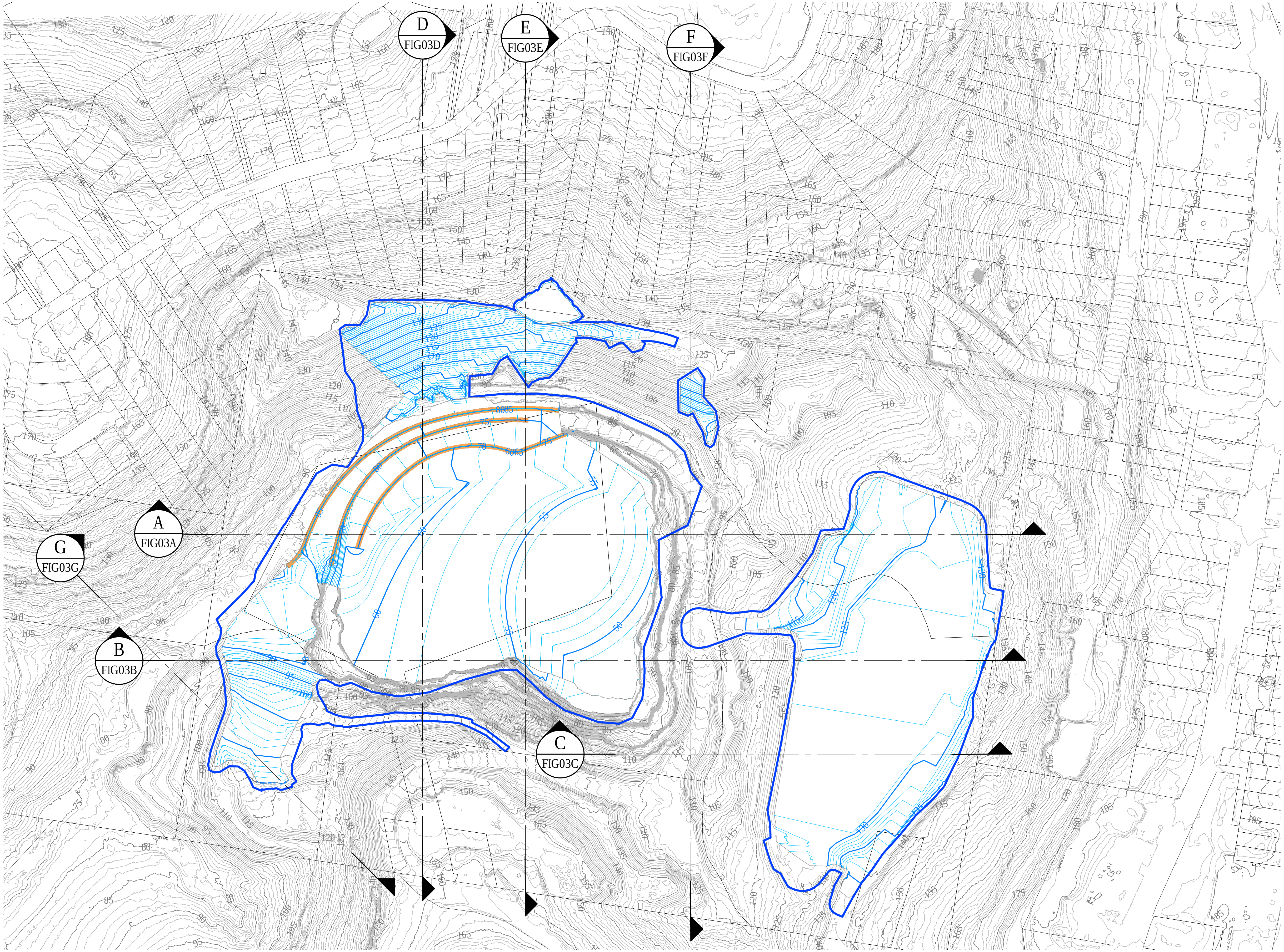
EXISTING SITE PLAN

Job Number 21-26457
Revision E
Date NOV 2019

Figure 01

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 1:27 PM Plotted by: Alison Horlyck Cad File No: G:\21\26457\CADD\Drawings\21-26457-FIG01.dwg



LEGEND

PRE-NORTHCONNEX FILL SURVEY SURFACE

CADASTRE

DESIGN SURFACE

EXTENT OF WORKS

RETAINING WALLS

0 50 100m
SCALE 1:3500 AT ORIGINAL SIZE

N

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

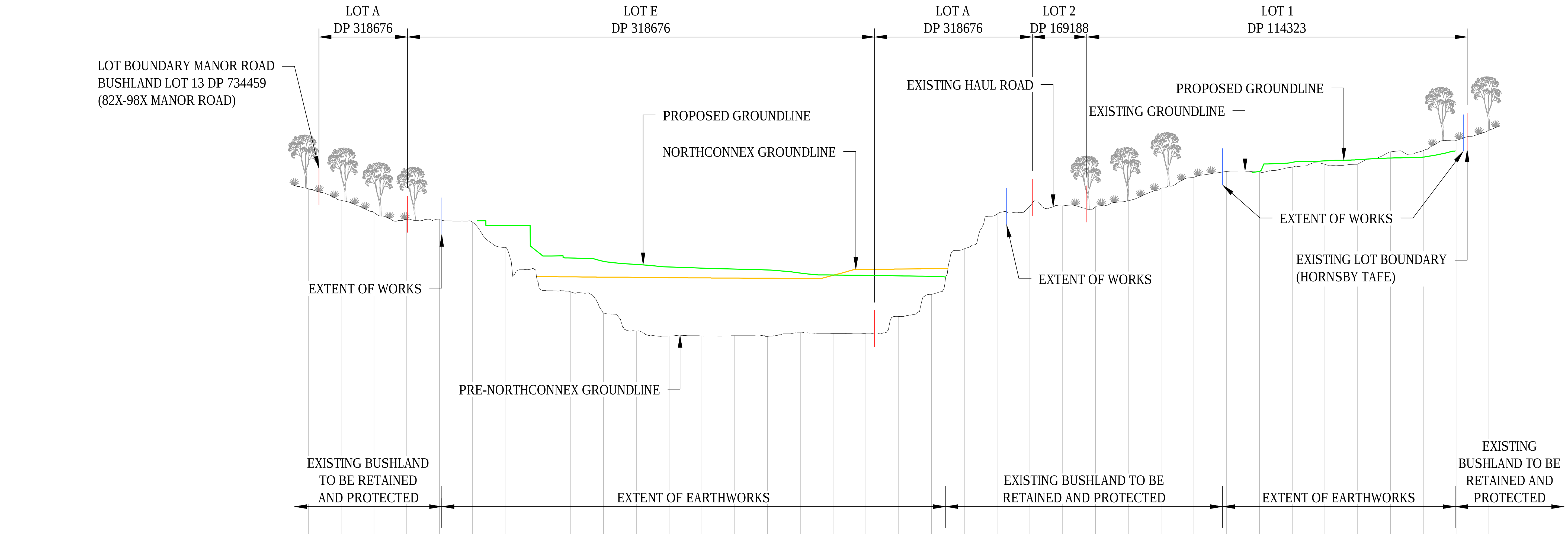
PROPOSED LANDFORM

Job Number	21-26457
Revision	J
Date	NOV 2019

Figure 02

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 1:29 PM Plotted by: Laurence Gae Posadas Cad File No: \\ghdnet\ghd\PH\Cebu\Projects\21\26457\CADD\Drawings\21-26457-FIG02.dwg



DATUM RL. -147.0

CHAINAGE	DESIGN SURFACE	APPROX. NORTHCONNEX FILL SURFACE	PRE-NORTHCONNEX SURFACE
0			106.48
20			99.47
40			91.98
60			87.71
80			87.59
100			86.28
120	84.01		70.7
140	67.94	52.99	50.33
160	64.29	52.81	43.67
180	62.25	52.63	30.86
200	60.37	52.54	19.8
220	58.87	52.34	16.85
240	58.11	52.19	16.82
260	57.56	52.06	16.94
280	57.05	51.93	16.45
300	55.10	51.81	18.78
320	53.91	53.71	18.36
340	53.69	57.31	18.18
360	53.45	57.57	28.64
380	53.12	57.82	42.11
400	51.59		69.91
420			91.04
440			95.83
460			96.06
480			95.46
500			99.17
520			106.74
540			113.26
560			117.04
580	117.04		116.83
600	122.61		119.66
620	123.47		121.36
640	124.17		121.54
660	125.21		129.03
680	125.78		129.79
700			136.03
720			142.26

A SECTION
FIG02
SCALE 1 : 2500

0 25 50 75m
SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

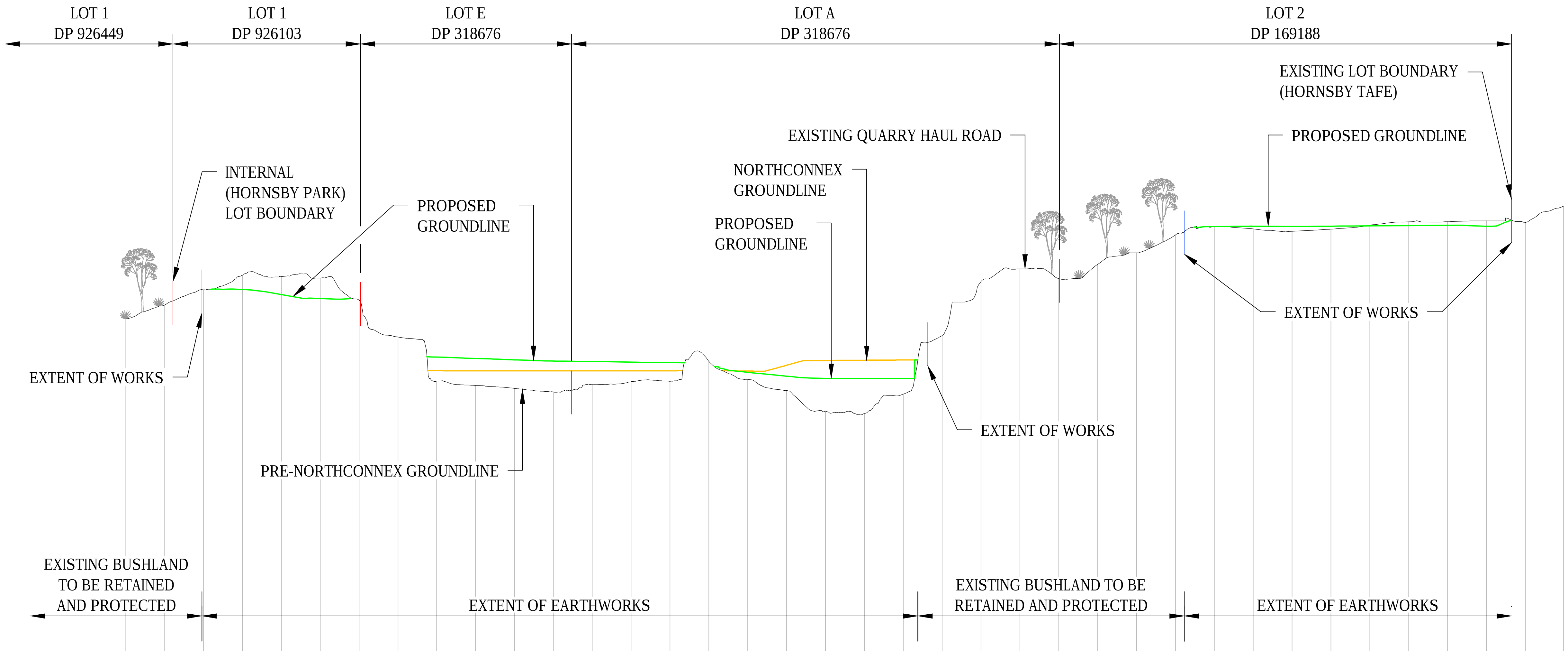
CROSS SECTIONS
SHEET 1

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03A

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 1:02 PM Plotted by: Laurence Gae Posadas Cad File No: \\ghdnet\ghd\PH\Cebu\Projects\21\26457\CADD\Drawings\21-26457-FIG03.dwg



DATUM RL. -133.0

CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360
DESIGN SURFACE				94.72	92.08	90.09			59.98	59.26	58.57	57.94	57.67	57.37	57.12		52.17	50.16	49.00
APPROX. NORTHCONNEX FILL SURFACE									52.97	52.93	52.9	52.88	52.92	52.91	52.96		52.79	55.77	58.22
PRE-NORTHCONNEX SURFACE	79.63	86.74	94.95	102.04	101.33	100.6	89.34	70.3	47.63	45.39	43.88	42.05	45.85	47.33	47.53	57.8	48.38	42.81	32.19

CHAINAGE	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	739.59
DESIGN SURFACE	49.00	49.00								127.05	127.22	127.11	127.24	127.39	127.53	127.67	127.23		
APPROX. NORTHCONNEX FILL SURFACE	58.36	58.49																	
PRE-NORTHCONNEX SURFACE	31.03	40.96	71.05	98.77	105.31	100.31	107.6	113.49	122.7	127.11	125.85	124.59	125.7	127.7	129.43	129.51	129.95	129.11	137.49

B SECTION

FIG02

SCALE 1 : 2500

0 25 50 75m

SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

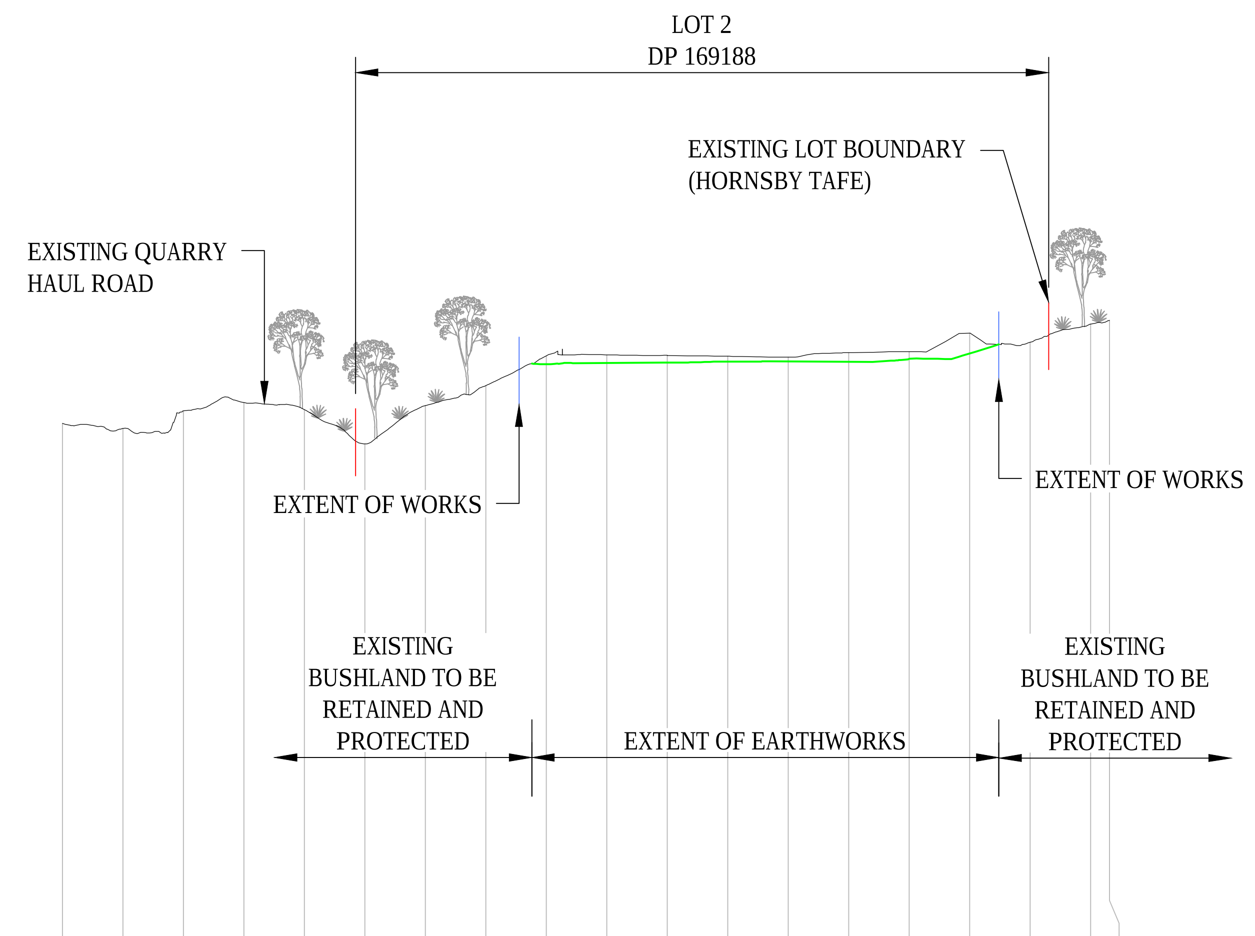
CROSS SECTIONS
SHEET 2

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03B

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 10:53 AM Plotted by: Laurence Gae Posadas Cad File No: \\ghdnet\ghd\PH\Cebu\Projects\21\26457\CADD\Drawings\21-26457-FIG03.dwg



DATUM RL. -62.0

DESIGN SURFACE									127.86	128.32	128.45	128.68	128.78	128.68	129.70	131.40			
APPROX. NORTHCONNEX FILL SURFACE																			
PRE-NORTHCONNEX SURFACE	108.28	106.66	112.45	115.18	112.81	101.5	114.18	120.77	130.64	130.99	130.79	130.5	130.23	131.68	131.98	138.1	135.14	141.17	142.39
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	346.26

C
FIG02

SECTION
SCALE 1 : 2500

0 25 50 75m
SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

CROSS SECTIONS
SHEET 3

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03C

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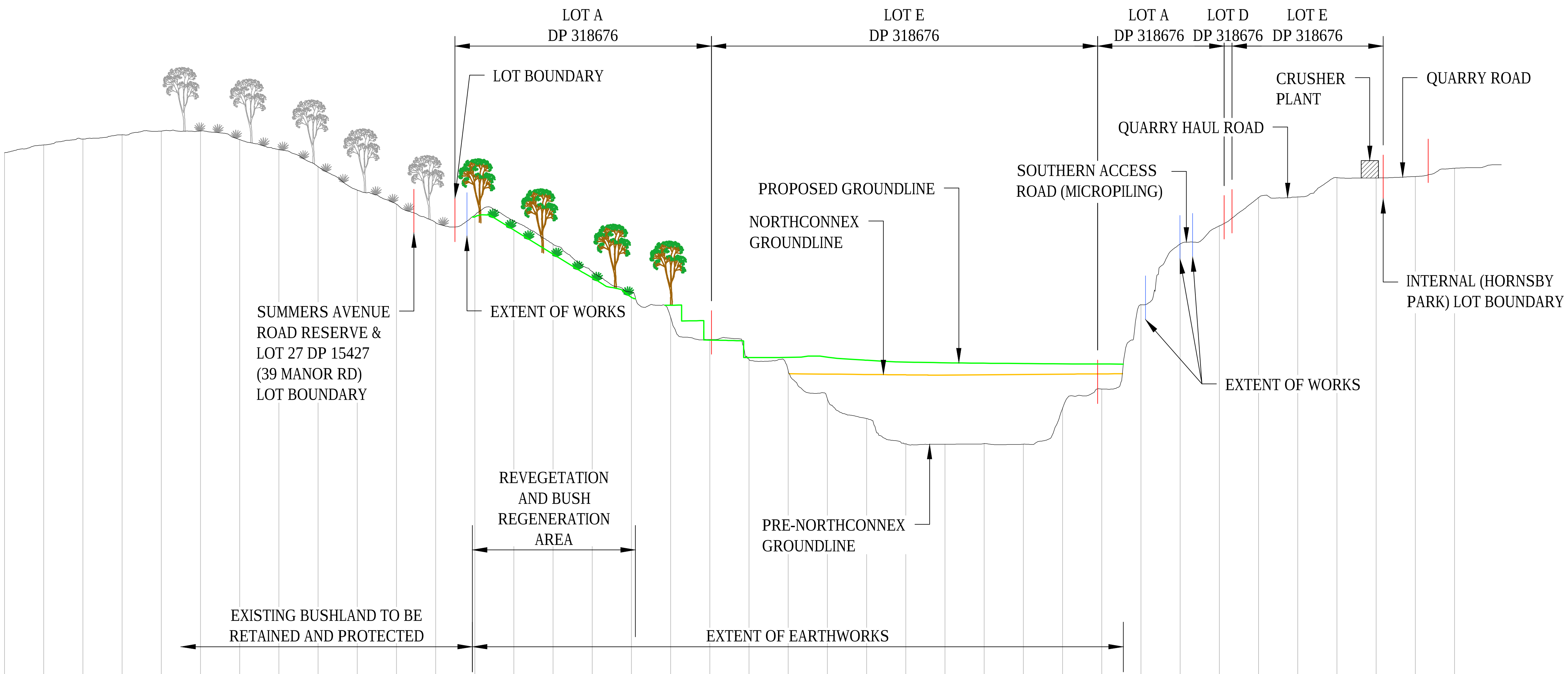

DATUM RL. -146.0

CHAINAGE	DESIGN SURFACE	APPROX. NORTHCONNEX FILL SURFACE	PRE-NORTHCONNEX SURFACE
0			165.72
20			169.68
40			172.67
60			174.84
80			176.72
100			176.77
120			172.41
140			167.26
160			158.63
180			146.64
200			139.5
220			130.12
240	132.99		133.85
260	126.27		130.85
280	113.96		119
300	101.85		105.09
320	91.87		94.64
340	87.95		81.64
360	70.18		70.47
380	61.23		60.17
400	61.39		54.18
420	61.47	52.81	39.99
440	59.90	52.61	30.13
460	58.92	52.42	17.22
480	58.60	52.31	17.04
500	58.37	52.47	17.41
520	58.19	52.63	17.08
540	58.04	52.79	35.5
560	57.95	52.93	45.2
580			88.17
600			119.19
620			128.4
640			142.83
660			143.15
680			152.96
700			152.82
720			153.56
740			157.79

D SECTION
FIG02
SCALE 1 : 2500

0 25 50 75m
SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

CROSS SECTIONS
SHEET 4

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03D

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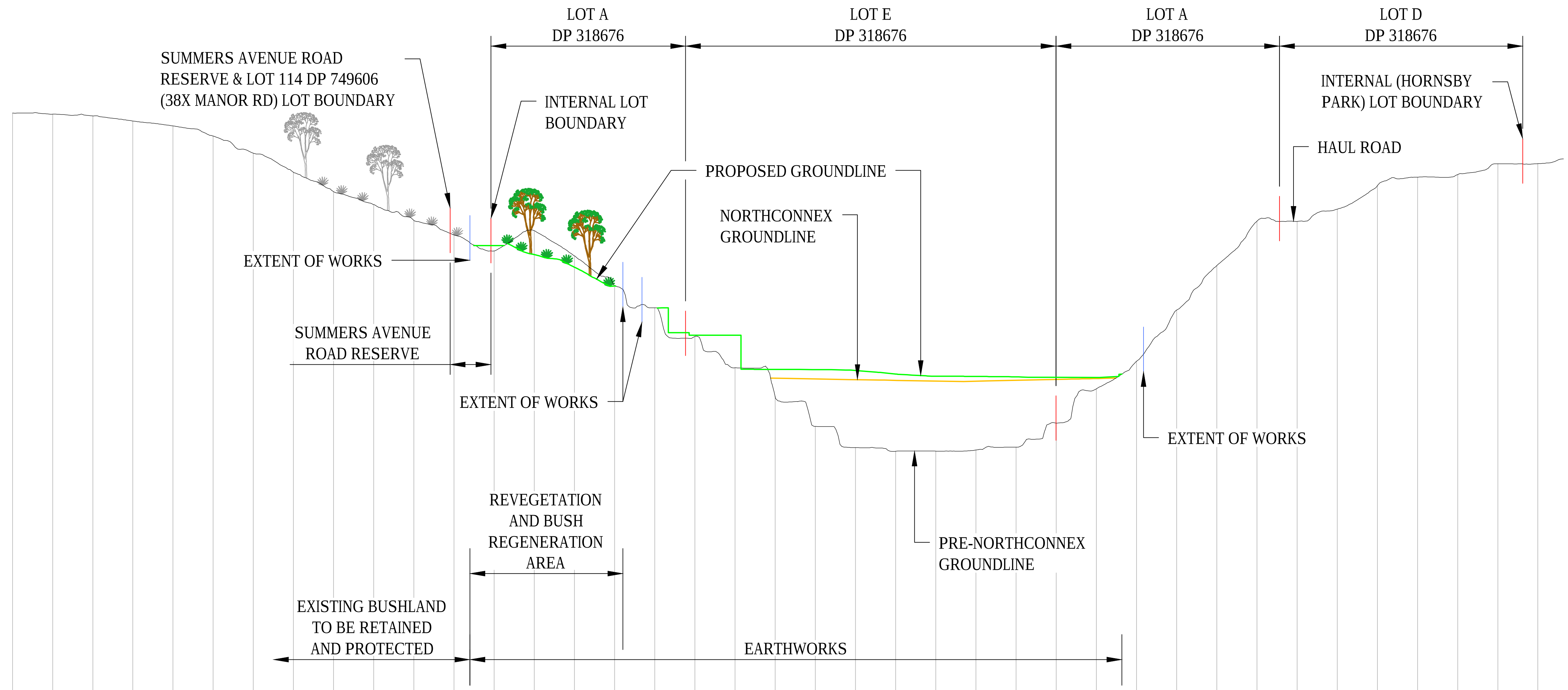


DATUM RL. -147.0

DESIGN SURFACE														119.00	114.49	108.25	98.94		74.40	74.37
APPROX. NORTHCONNEX FILL SURFACE																				52.96
PRE-NORTHCONNEX SURFACE	185	184.45	183.56	181.05	178.62	173.61	164.98	155.53	145.86	139.47	131.57	124.26	116.38	126.43	113.88	99.06	88.05	73.73	58.14	43.85
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380

DESIGN SURFACE	57.36	57.27	56.79	55.03	53.99	53.85	53.66	53.41	53.35										
APPROX. NORTHCONNEX FILL SURFACE	52.61	52.25	51.9	51.55	51.45	51.91	52.36	52.79											
PRE-NORTHCONNEX SURFACE	28.98	18.38	16.58	16.65	17.19	18.65	30.63	47.66	61.31	86.87	109.09	131.14	131.04	137.16	148.82	153.12	154.39	159.78	159.81
CHAINAGE	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760

E SECTION
FIG02 SCALE 1 : 2500

0 25 50 75m
SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

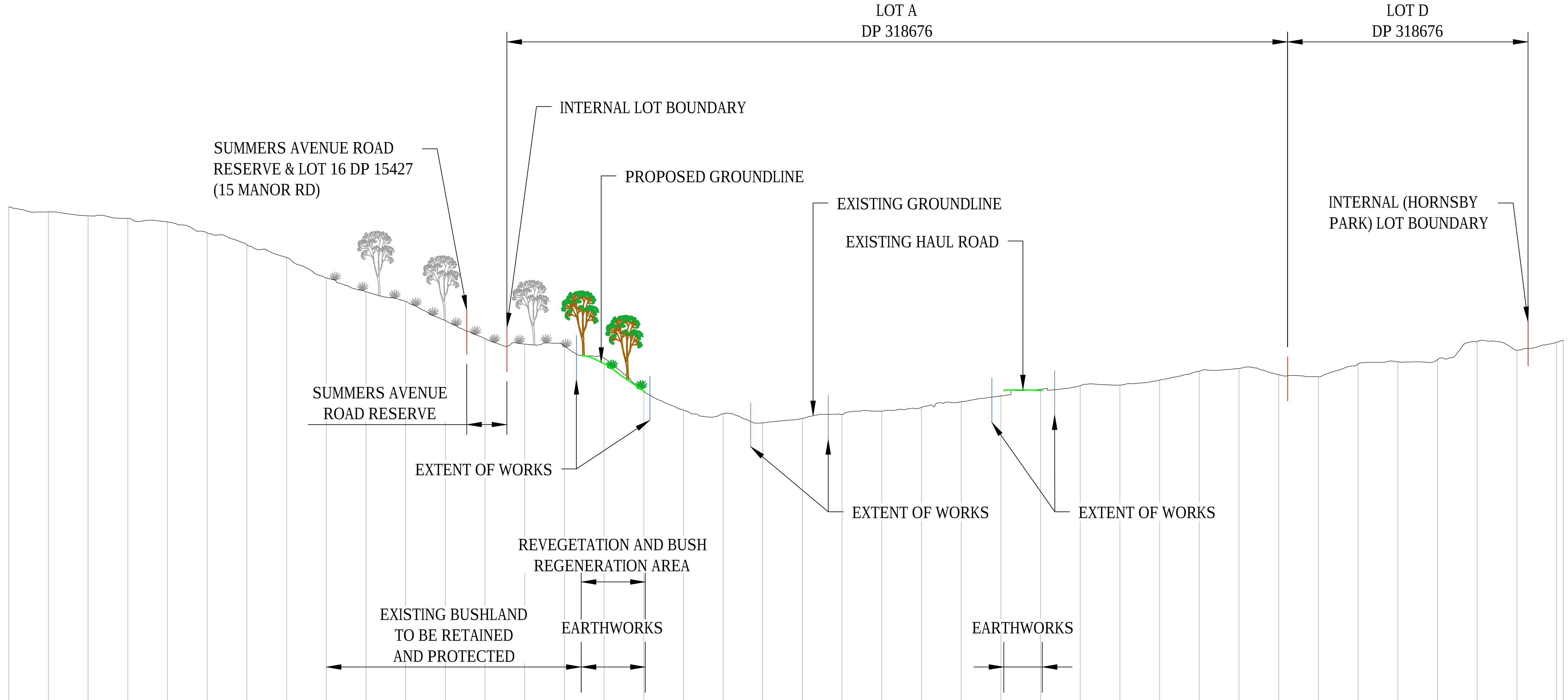
CROSS SECTIONS
SHEET 5

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03E

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 12:59 PM Plotted by: Laurence Gae Posadas Cad File No: \\ghdnet\ghd\PH\Cebu\Projects\21\26457\CADD\Drawings\21-26457-FIG03.dwg



DATUM RL. -76.0

DESIGN SURFACE																116.6	102.7			
APPROX. NORTHCONNEX FILL SURFACE																				
PRE-NORTHCONNEX SURFACE	195.49	193.04	191.08	189.75	187.98	182.45	176.57	169.99	159.77	152.79	147.92	138.31	129.18	126.45	125.61	119.41	102.69	93.23	91.28	86.77
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380

DESIGN SURFACE							103.1													
APPROX. NORTHCONNEX FILL SURFACE																				
PRE-NORTHCONNEX SURFACE	88.98	90.98	92.67	94.52	97.42	100.32	103.67	105.57	105.75	108.33	112.79	114.17	111.02	109.93	116.41	117.48	118.6	127.82	123.34	127.33
CHAINAGE	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760	780

F SECTION

FIG02 SCALE 1 : 2500

0 25 50 75m

SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

CROSS SECTIONS
SHEET 6

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03F

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

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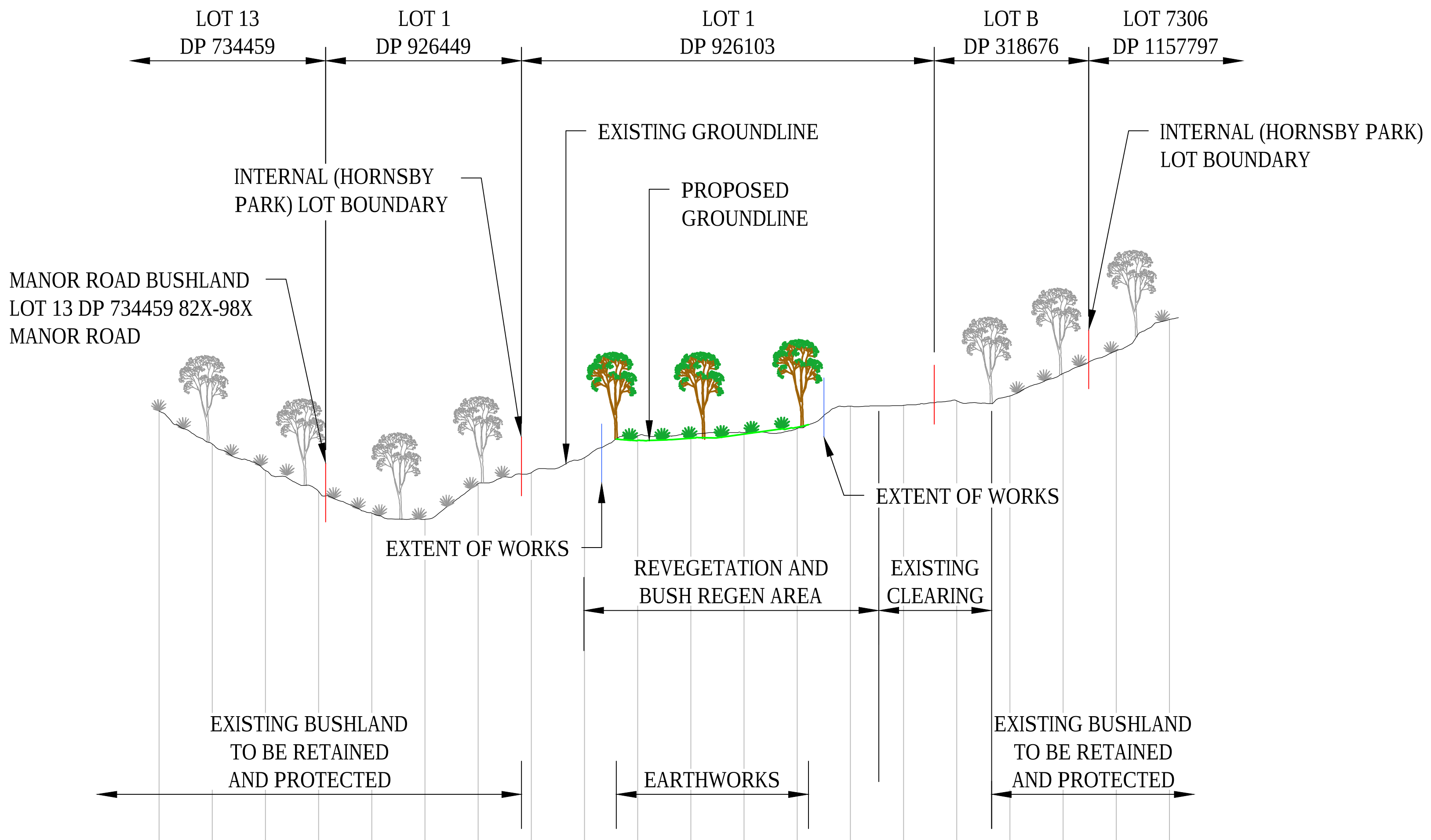


DATUM RL. -84.0

DESIGN SURFACE										109.06	109.89	111.46	114.02							
APPROX. NORTHCONNEX FILL SURFACE																				
PRE-NORTHCONNEX SURFACE	120.21	107.72	97.8	89.81	81.71	79.39	92.85	97	102.57	110.85	111.34	112.06	113.54	121.96	122.33	123.99	125.86	134.3	142.8	154.59
CHAINAGE	0	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380

G SECTION
FIG02
SCALE 1 : 2500

0 25 50 75m
SCALE 1:2500 AT ORIGINAL SIZE

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

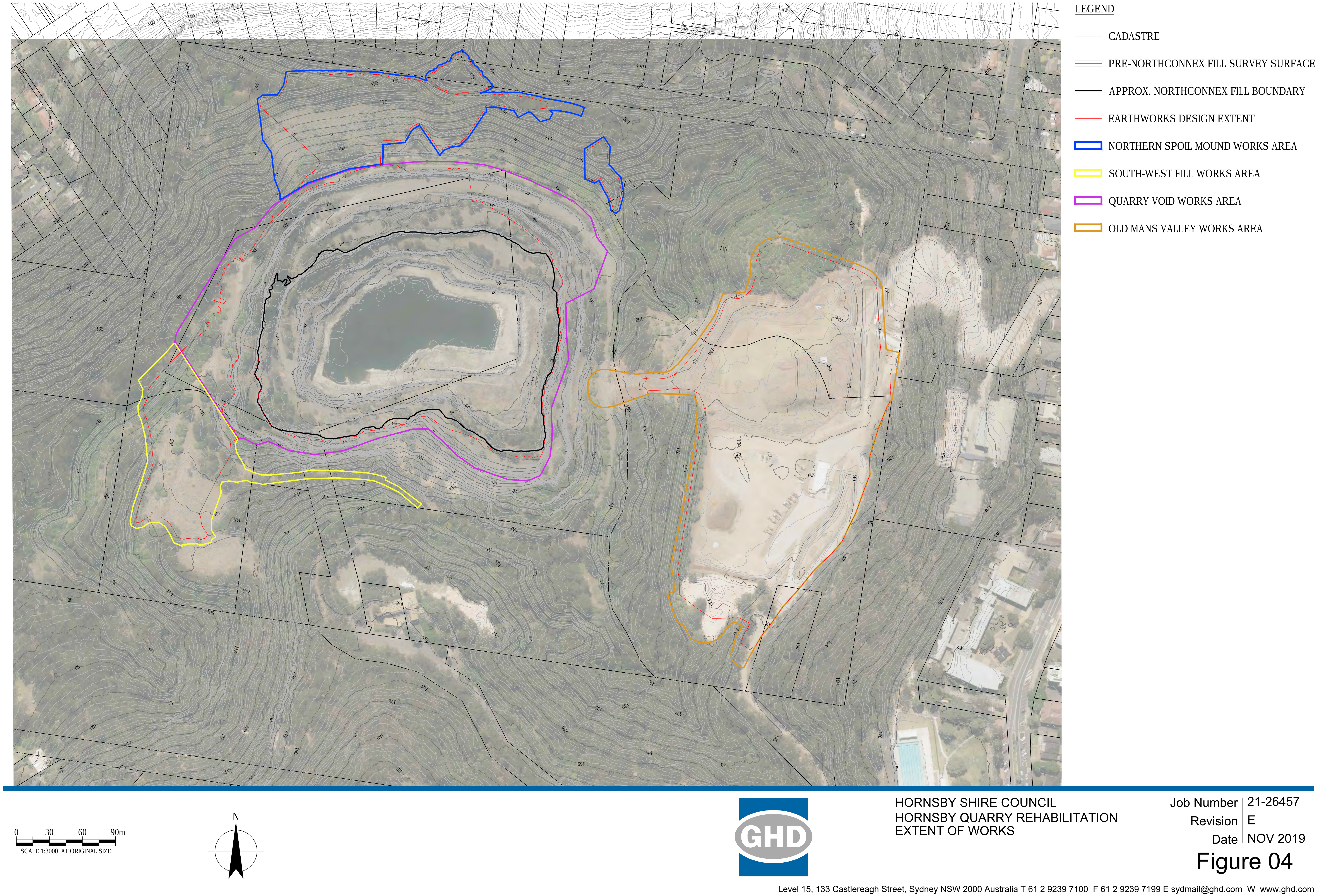
CROSS SECTIONS
SHEET 7

Job Number 21-26457
Revision J
Date NOV 2019

Figure 03G

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 10:54 AM Plotted by: Laurence Gae Posadas Cad File No: \\ghdnet\ghd\PH\Cebu\Projects\21\26457\CADD\Drawings\21-26457-FIG03.dwg



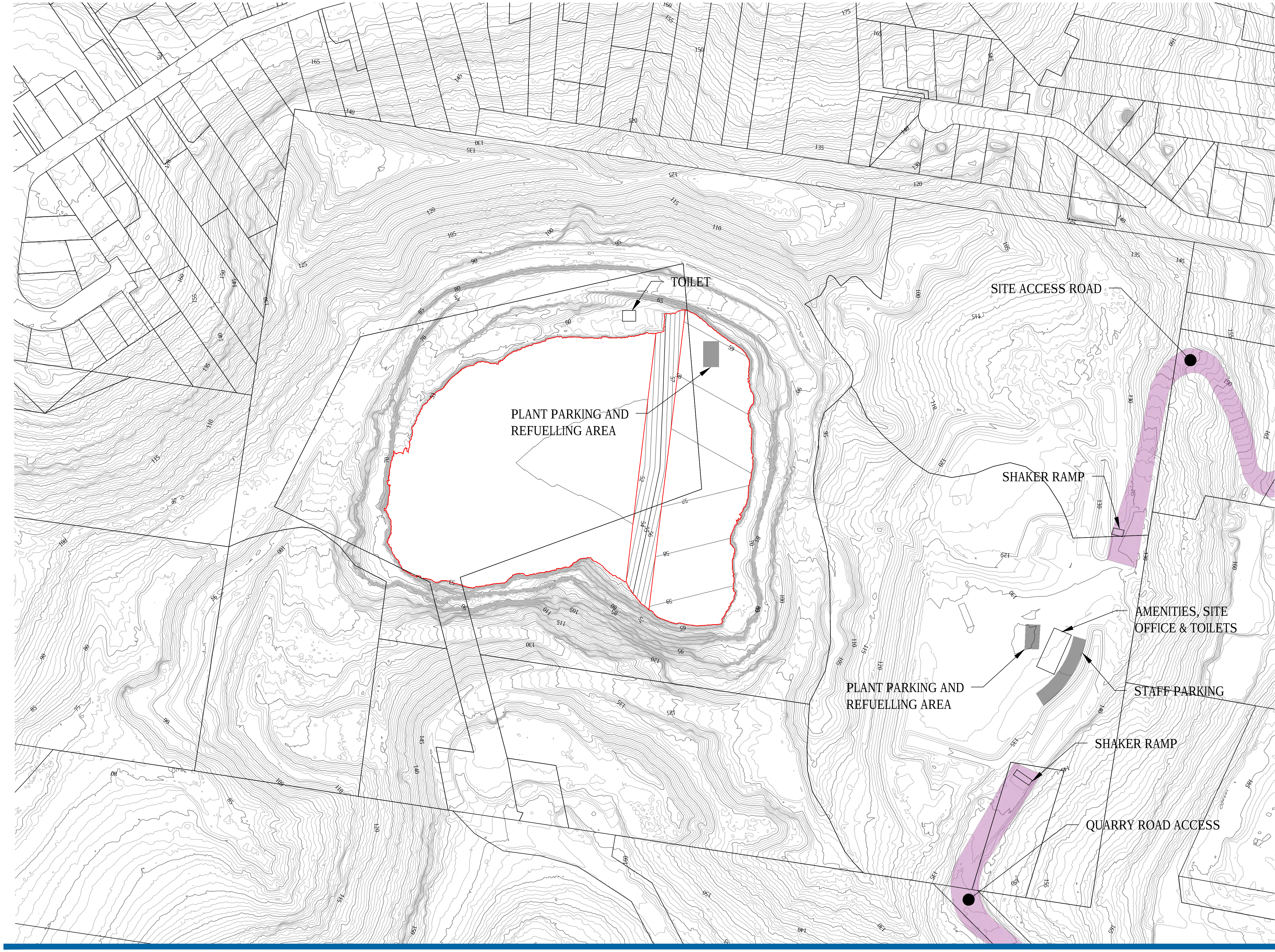
HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION
EXTENT OF WORKS

Job Number	21-26457
Revision	E
Date	NOV 2019

Figure 04

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 11:54 AM Plotted by: Alison Horlyck Cad File No: G:\21\26457\CADD\Drawings\21-26457-FIG6.1.dwg



LEGEND

SURVEY SURFACE

APPROX. FILL SURFACE (NORTHCONNEX)

APPROX. FILL BOUNDARY (NORTHCONNEX)

0 30 60 90m

SCALE 1:3000 AT ORIGINAL SIZE

N

GHD

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION

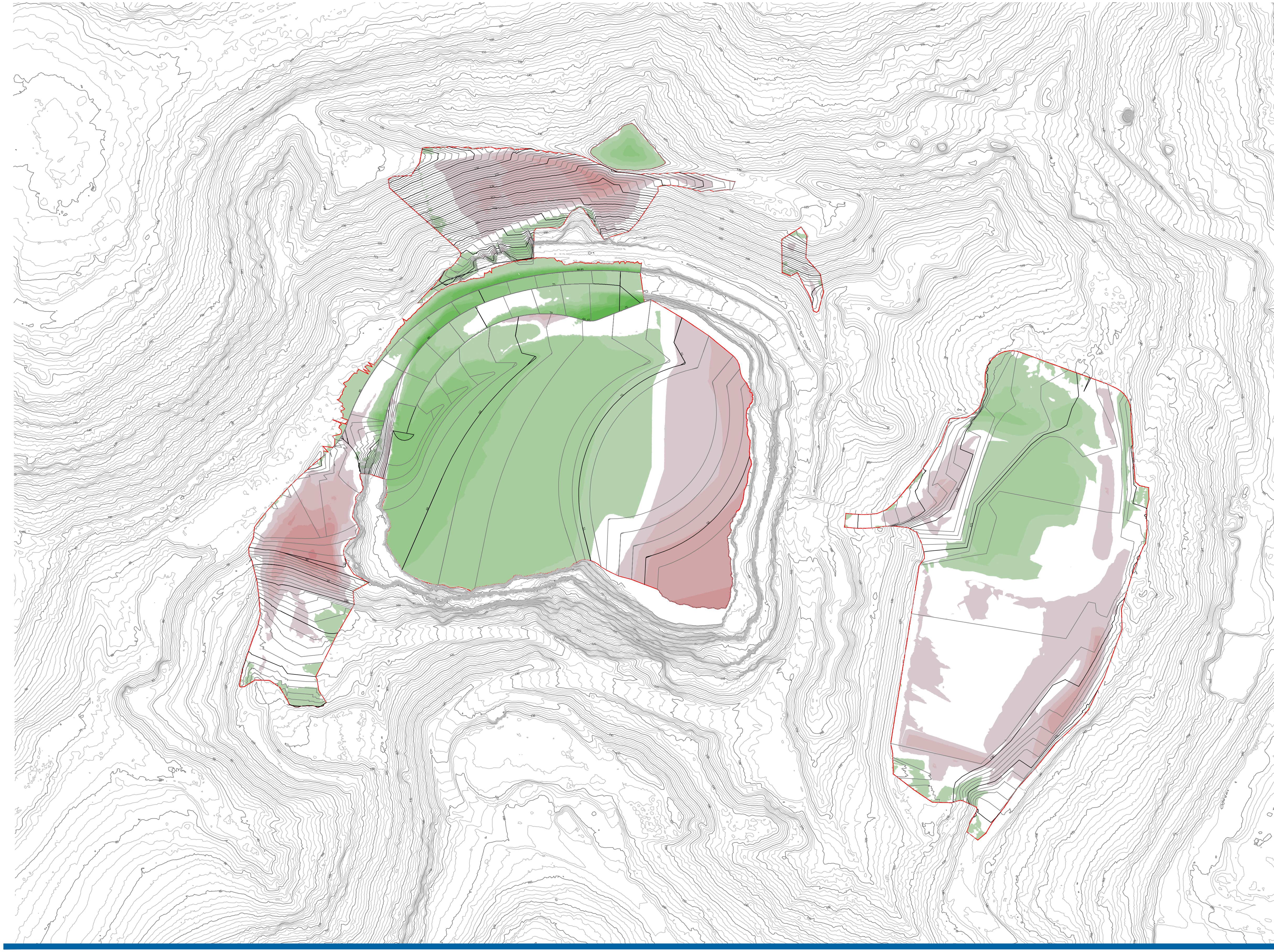
SITE MANAGEMENT PLAN

Job Number 21-26457
Revision C
Date NOV 2019

Figure 05

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 11:58 AM Plotted by: Alison Horlyck Cad File No: G:\21\26457\CADD\Drawings\21-26457-FIG04.dwg



LEGEND

ASSUMED EXISTING SURFACE

PIT AREA DESIGN SURFACE

VOLUME CALCULATION BOUNDARY

CUT FILL DEPTH RANGE

25m CUT
22.5m
20m
17.5m
15m
12.5m
10m
7.5m
5m
2.5m
0
2.5m
5m
7.5m
10m
12.5m
15m
17.5m
20m FILL

VOLUMES

AREA	CUT (m³)	FILL (m³)
QUARRY VOID AND SW FILL AREA	135,800	182,300
OLD MANS VALLEY	62,900	48,700
NORTHERN SPOIL MOUND	42,900	6,400
TOTAL	241,600	237,400

MEASURED FROM ASSUMED NORTHCONNEX FILL SURFACE AS ILLUSTRATED ON FIGURE 1

0 30 60 90m
SCALE 1:3000 AT ORIGINAL SIZE

N

HORNSBY SHIRE COUNCIL
HORNSBY QUARRY REHABILITATION
PROJECT FINAL LANDFORM
CUT AND FILL DETAILS

Job Number 21-26457
Revision D
Date NOV 2019

Figure 06

Level 15, 133 Castlereagh Street, Sydney NSW 2000 Australia T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com W www.ghd.com

Plot Date: 11 November 2019 - 12:39 PM Plotted by: Alison Horlyck Cad File No: G:\21\26457\CADD\Drawings\21-26457-FIG6.2.dwg

Appendix B – Retaining Wall Details and Overall Site Plan

Hornsby Shire Council Design & Construction Branch

TELEPHONE: (02) 9847 6666
FACSIMILE: (02) 9847 6999

Authorised for release - Manager Design & Construction
Name: R. RAJCA Signed: Date:

Designer: S. COMISH	Design Checked-Design Team Leader Signed:
Drawn: S. COMISH	Drawing Checked Signed:
Surveyor: LIDAR	NA Field Book / NA Level Book / AHD Datum
Project Identifier\-\CAD File Name: H:\\\12d\Southwest Fill Option\BASE JUNK.dwg	
TRIM Document Number	

Issue	Description	Name	Initial	Date
1	ISSUED FOR INFORMATION ONLY	C. CLENDINNING		

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Bar Scales: 0 10 20 30 40 50m — SCALE 1:1000 @ A1

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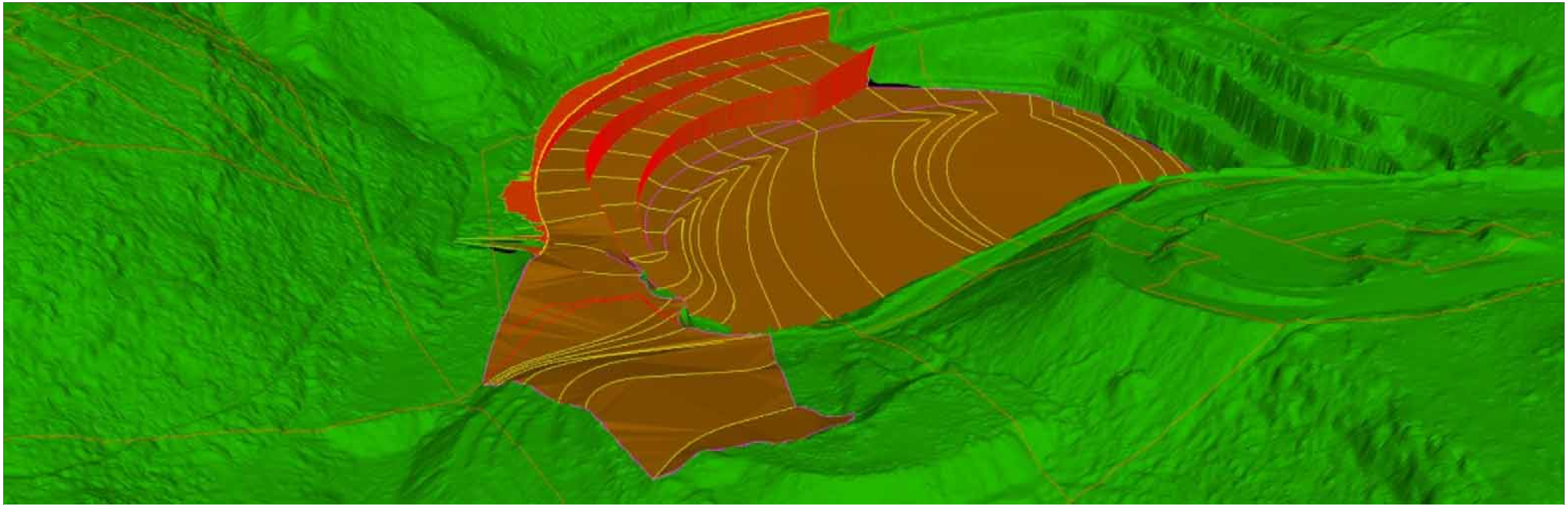
HORNSBY SHIRE COUNCIL
PO BOX 37, HORNSBY NSW 1630

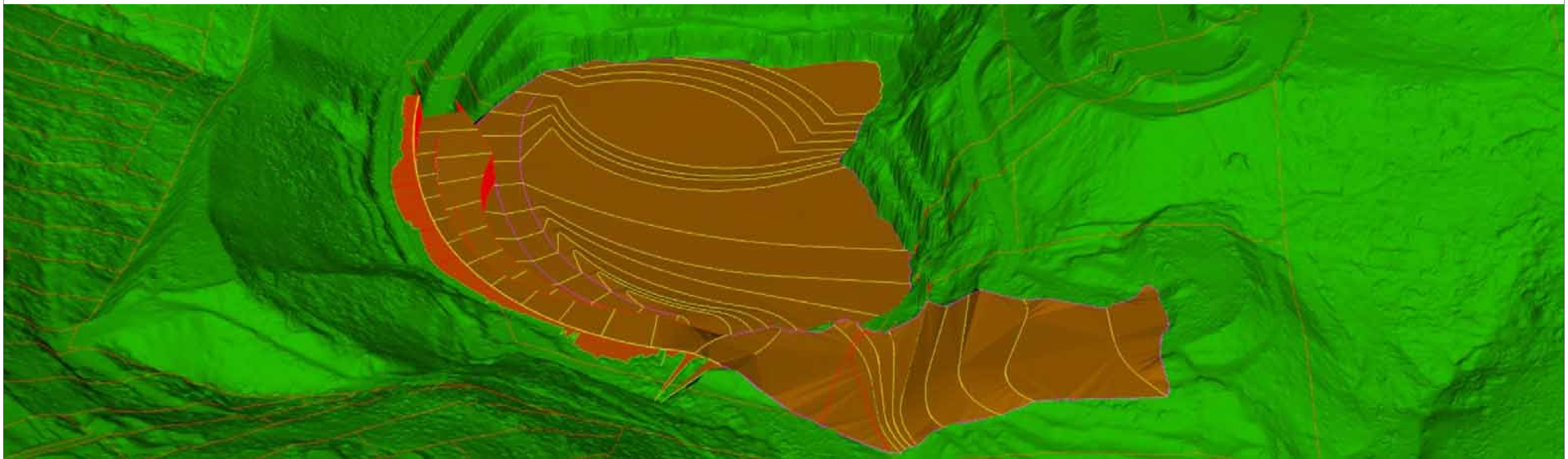
HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

OVERALL CONCEPT PLAN

Project Number: 100125
Sheet 1 of 9
Issue: -
HSC Drawing Number: -

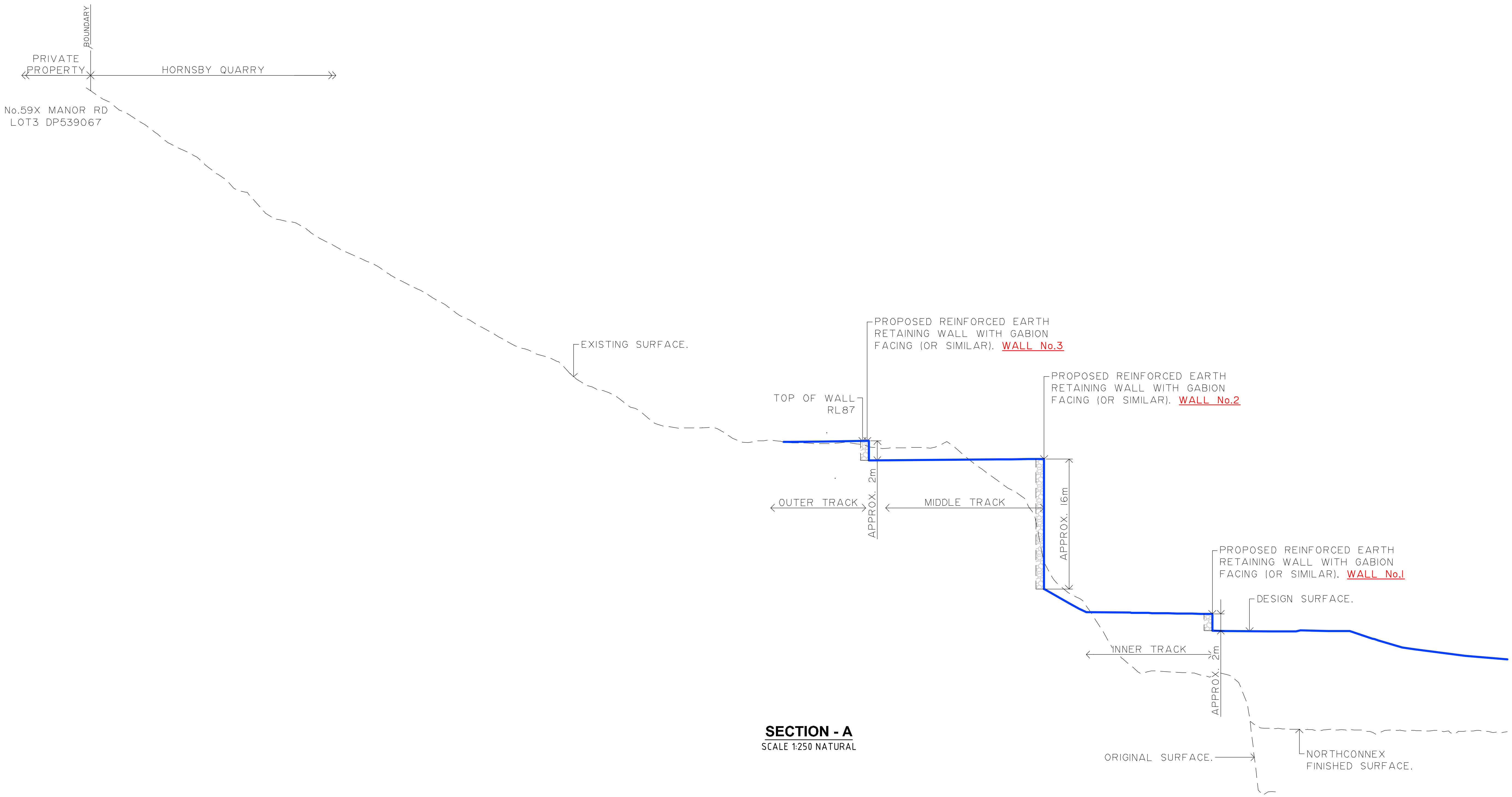


CONCEPTUAL DESIGN - LOOKING NORTHEAST



CONCEPTUAL DESIGN - LOOKING EAST

Hornsby Shire Council Design & Construction Branch TELEPHONE: (02) 9847 6666 FACSIMILE: (02) 9847 6999	Designer: S. COMISH Drawn: S. COMISH Surveyor: LODAR	Design Checked-Design Team Leader Signed: Drawing Checked Signed: NA Field Book / NA Level Book / AHD Datum	1	ISSUED FOR INFORMATION ONLY	C. CLENDINNING		Bar Scales NOT TO SCALE	HORNSBY QUARRY, HORNSBY PROPOSED REDEVELOPMENT RETAINING WALLL DETAILS PERSPECTIVE VIEWS OF PROPOSAL
	Project Identifier\-\CAD File Name H:\\\12d\Southwest Fill Option\BASE JUNK.dwg		Issue	Description	Name	Initial / Date	DO NOT SCALE, USE FIGURED DIMENSIONS ONLY	Project Number 100125
Authorised for release - Manager Design & Construction Name: R. RAJCA Signed: Date:	TRIM Document Number		Design not to be amended without authorisation by Manager Design & Construction				HORNSBY SHIRE COUNCIL PO BOX 37, HORNSBY NSW 1630	Sheet 2 of 9 Issue - HSC Drawing Number -



SECTION - A
SCALE 1:250 NATURAL

Hornsby Shire Council
Design & Construction Branch
TELEPHONE: (02) 9847 6666
FACSIMILE: (02) 9847 6999
Authorised for release - Manager Design & Construction
Name: R. RAJCA Signed: Date:

Designer: S. COMISH	Design Checked-Design Team Leader Signed:		
Drawn: S. COMISH	Drawing Checked Signed:		
Surveyor: LIDAR	NA (Field Book)	NA (Level Book)	AHD (Datum)
Project Identifier\-\CAD File Name: H:\\\12d\Southwest Fill Option\BASE JUNK.dwg			
TRIM Document Number			

Issue	Description	Name	Initial	Date
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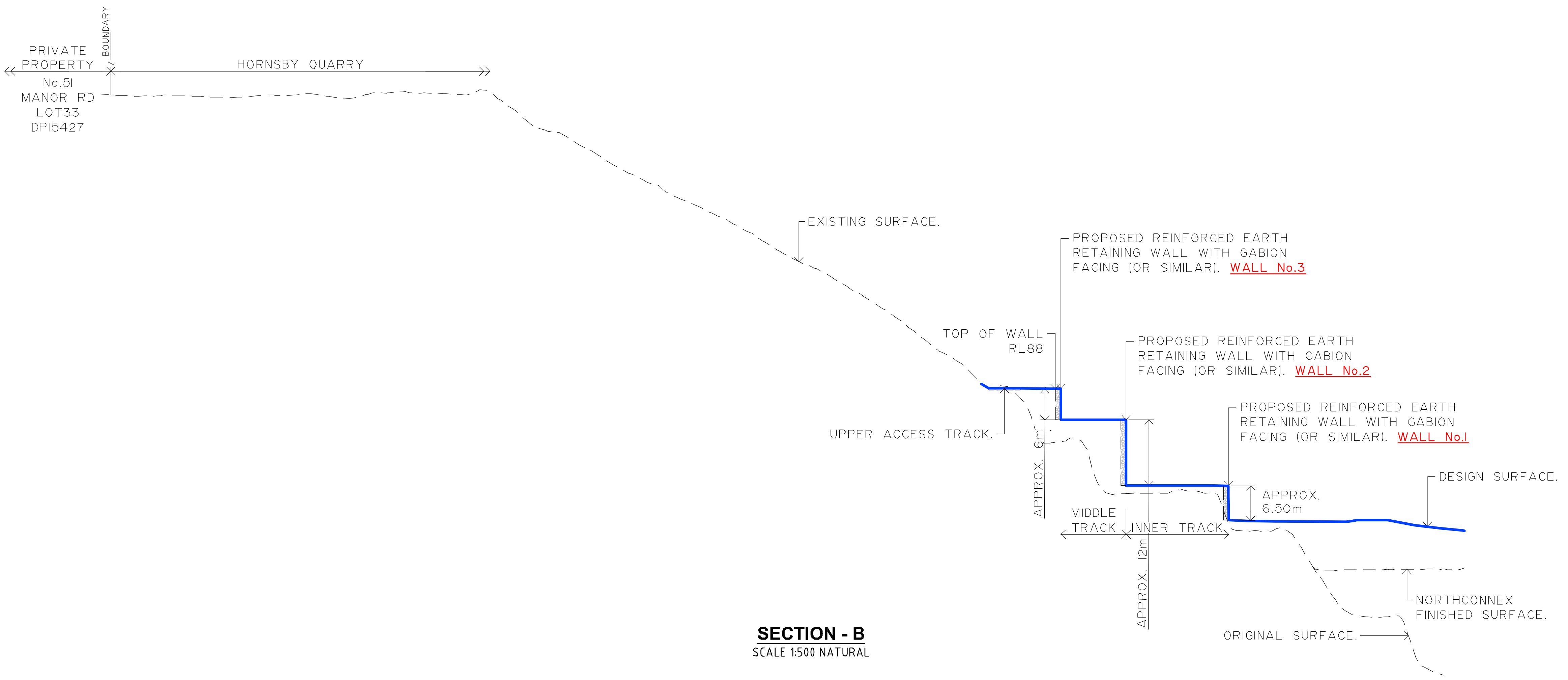
PO BOX 37, HORNSBY NSW 1630

HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

SECTION A

Project Number: 100125
Sheet 3 of 9
Issue: -
HSC Drawing Number: -



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Hornsby Shire Council
Design & Construction Branch
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Authorised for release - Manager Design & Construction
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Designer: S. COMISH	Design Checked-Design Team Leader Signed:			
Drawn: S. COMISH	Drawing Checked Signed:			
Surveyor: LIDAR	NA Field Book	NA Level Book	AHD Datum	
Project Identifier\-\CAD File Name: H:\\\12d\Southwest Fill Option\BASE JUNK.dwg				
TRIM Document Number				

Issue	Description	Name	Initial	Date
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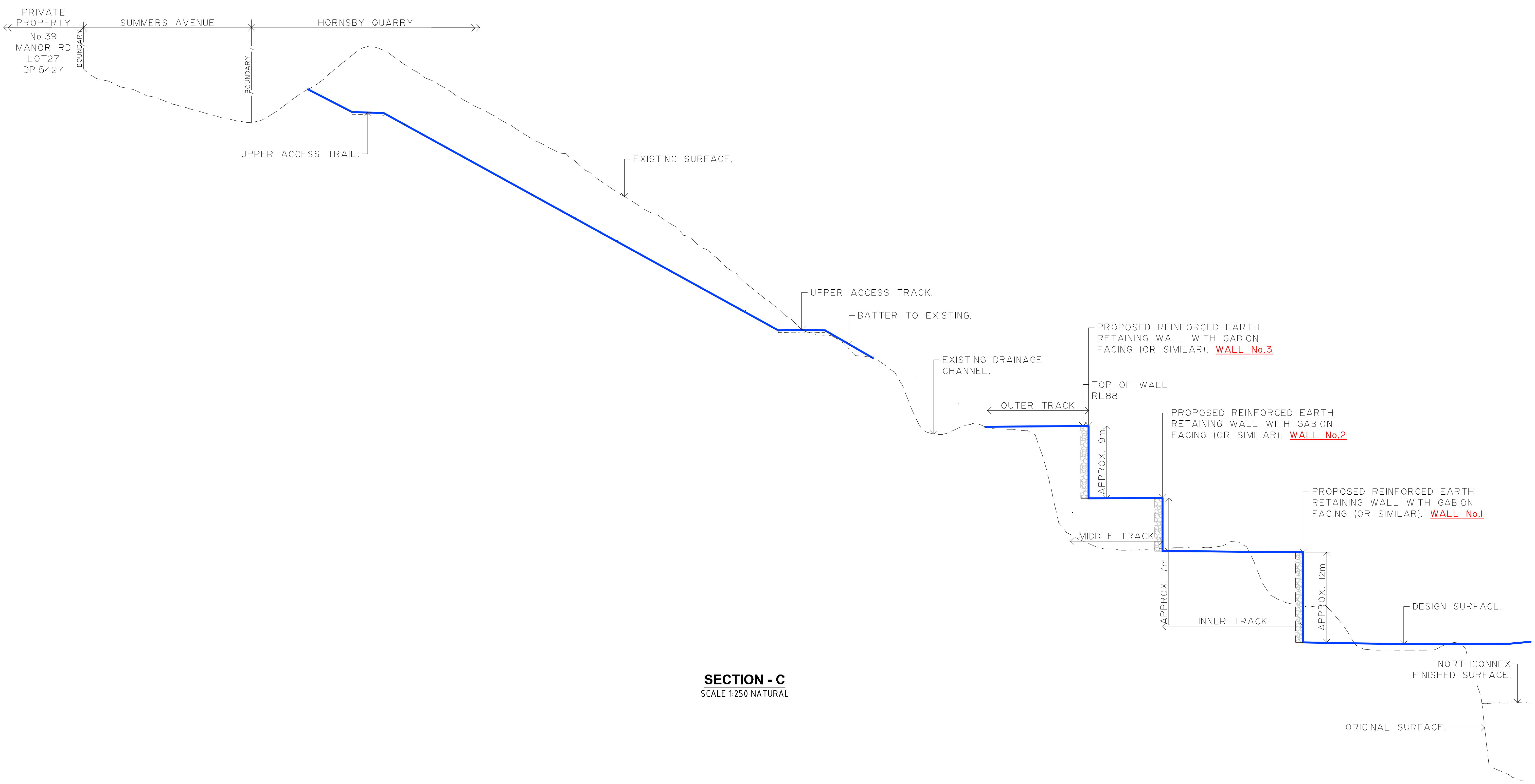
PO BOX 37, HORNSBY NSW 1630

HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

SECTION B

Project Number: 100125
Sheet 4 of 9
Issue -
HSC Drawing Number -



SECTION - C

SCALE 1:250 NATURAL

Hornsby Shire Council Design & Construction Branch

TELEPHONE: (02) 9847 6666
FACSIMILE: (02) 9847 6999

Authorised for release - Manager Design & Construction

Name: R. RAJCA Signed: Date:

Designer: S. COMISH
Drawn: S. COMISH
Surveyor: LIDAR

Design Checked-Design Team Leader
Signed:
Drawing Checked
Signed:

NA	NA	AHD
Field Book	Level Book	Datum

Project Identifier\-\CAD File Name: H:\\\12d\Southwest Fill Option\BASE JUNK.dwg

TRIM Document Number

Issue	Description	Name	Initial	Date
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PO BOX 37, HORNSBY NSW 1630

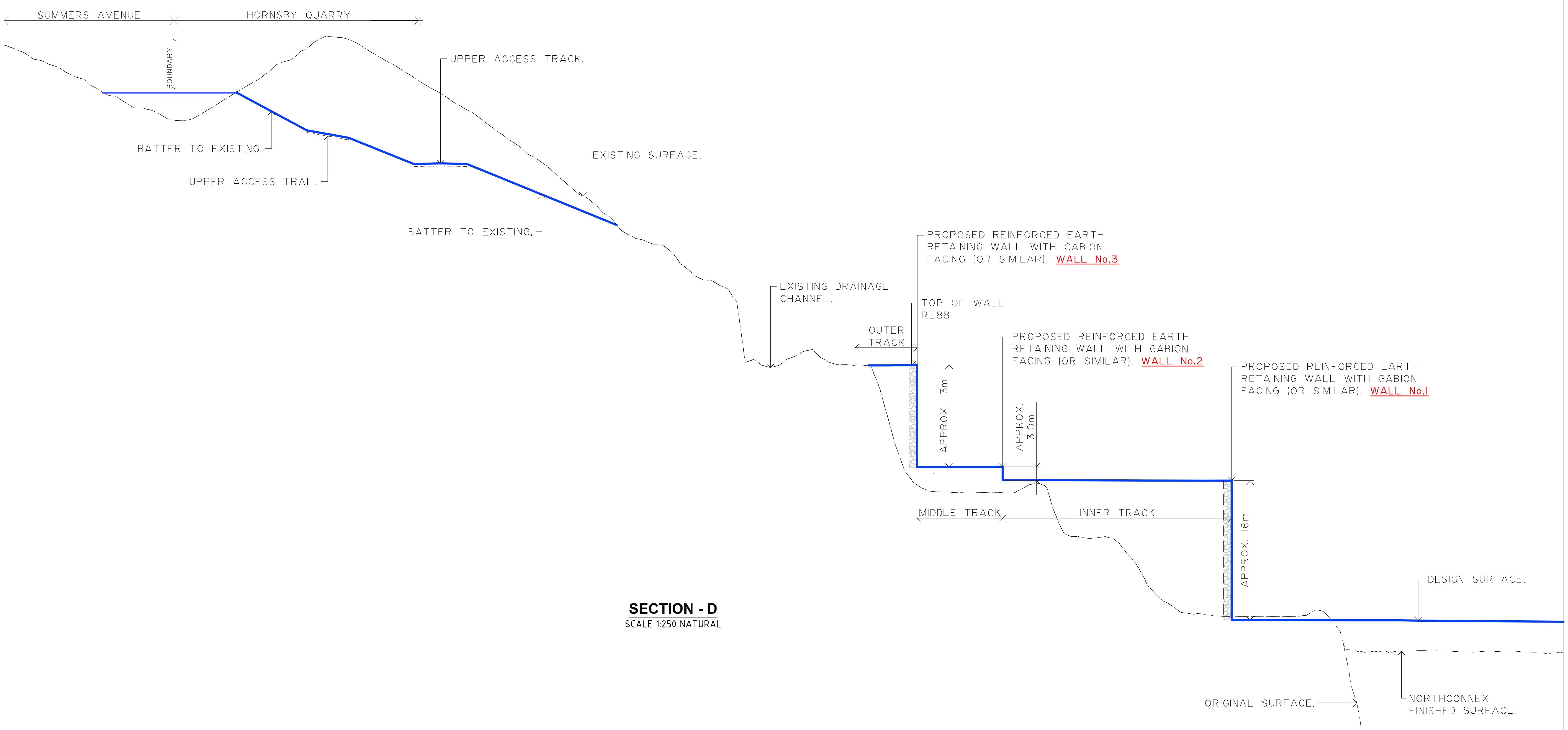
HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

SECTION C

Project Number: **100125**

Sheet 5 of 9 Issue -

HSC Drawing Number: -



SECTION - D

SCALE 1:250 NATURAL

Hornsby Shire Council Design & Construction Branch TELEPHONE: (02) 9847 6666 FACSIMILE: (02) 9847 6999	Designer S. COMISH	Design Checked-Design Team Leader Signed:						
	Drawn S. COMISH	Drawing Checked Signed:						
	Surveyor LIDAR	NA Field Book	NA Level Book	AHD Datum				
	Project Identifier\-\CAD File Name H:\\\12d\Southwest Fill Option\BASE JUNK.dwg			1	ISSUED FOR INFORMATION ONLY	C. CLENDINNING		
Authorised for release - Manager Design & Construction Name: R. RAJCA Signed: Date:	TRIM Document Number			Issue	Description	Name	Initial	Date
				Design not to be amended without authorisation by Manager Design & Construction				

Bar Scales

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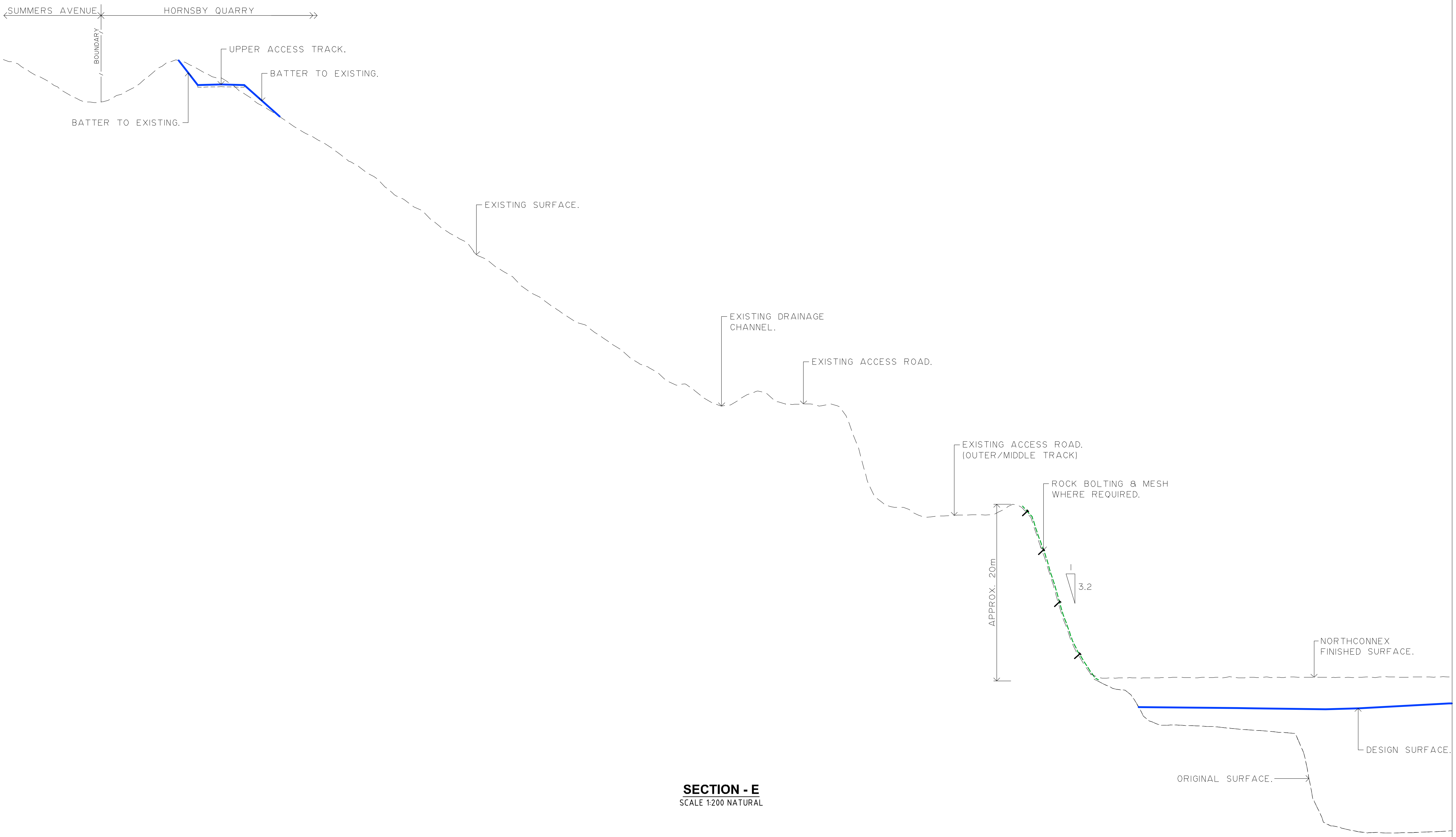
HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

SECTION D

Project Number 100125		
Sheet 6	of 9	Issue -
HSC Drawing Number -		



SECTION - E
SCALE 1:200 NATURAL

Hornsby Shire Council Design & Construction Branch	Designer: S. COMISH	Design Checked-Design Team Leader Signed:
TELEPHONE: (02) 9847 6666 FACSIMILE: (02) 9847 6999	Drawn: S. COMISH	Drawing Checked Signed:
Authorised for release - Manager Design & Construction	Surveyor: LIDAR	NA Field Book / NA Level Book / AHD Datum
Name: R. RAJCA Signed: Date:	Project Identifier\-\CAD File Name: H:\\\12d\Southwest Fill Option\BASE JUNK.dwg	TRIM Document Number

Issue	Description	Name	Initial	Date
1	ISSUED FOR INFORMATION ONLY	C. CLENDINNING		

Design not to be amended without authorisation by Manager Design & Construction

Bar Scales: 0 2 4 6 8 10m — SCALE 1:200 @ A1

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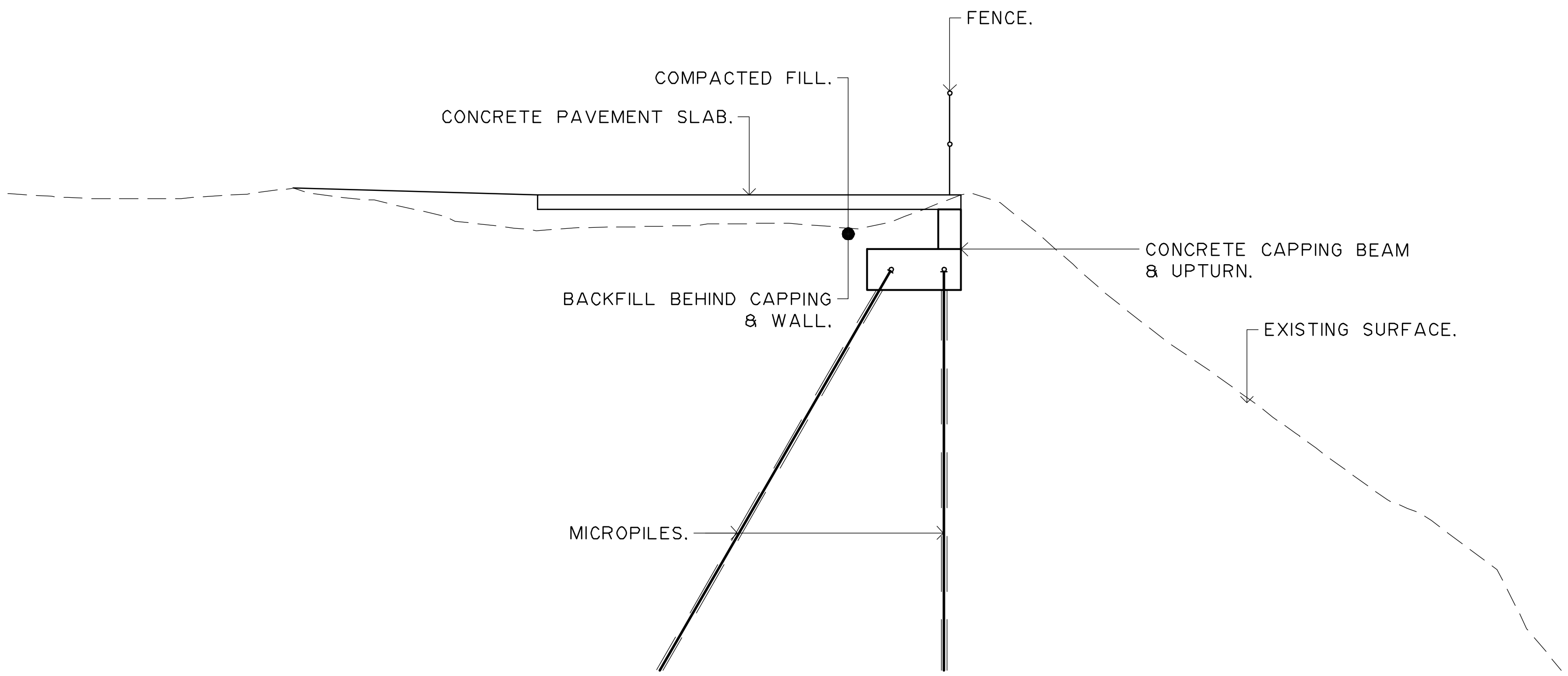
PO BOX 37, HORNSBY NSW 1630

HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

SECTION E

Project Number: 100125
Sheet 7 of 9
Issue: -
HSC Drawing Number: -



DRAWING SHOWING TYPICAL LAYOUT DETAILS OF MICROPILE WALL

NOT TO SCALE

Hornsby Shire Council Design & Construction Branch

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Project Identifier\-\CAD File Name: H:\\\12d\Southwest Fill Option\BASE JUNK.dwg

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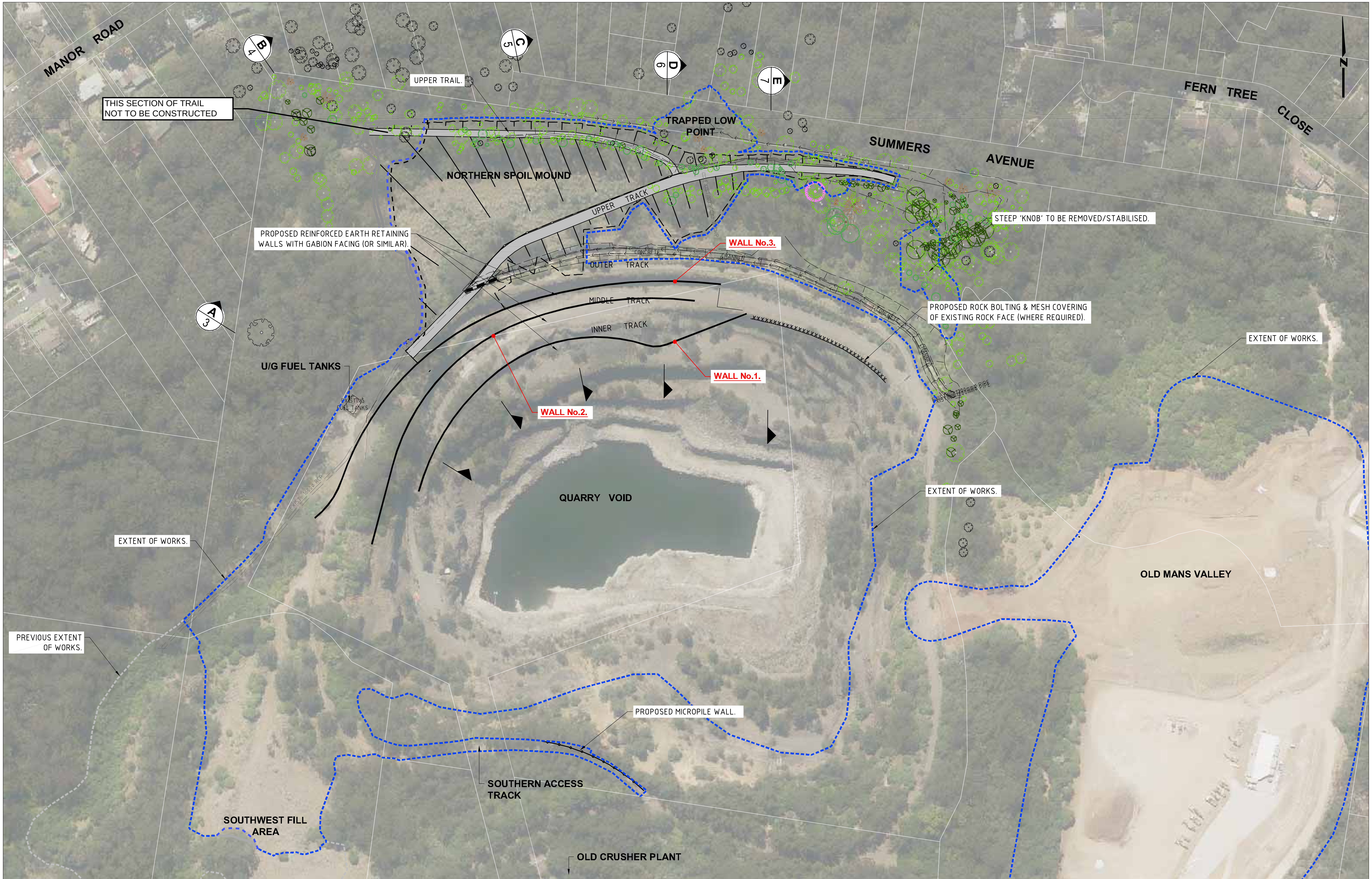
HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
RETAINING WALL DETAILS

MICROPILE DETAILS

Project Number: 100125
Sheet 8 of 9
Issue: -
HSC Drawing Number: -



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HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT

OVERALL SITE PLAN
PLAN SHOWING WORK AREA & GENERAL DESCRIPTION OF PROPOSED WORKS

Project Number: 100125
Sheet 9 of 9
Issue -
HSC Drawing Number -

Appendix C – Detailed response to RFI from Independent Planning Consultant and Specialists

28 June 2019

Craig Clendinning
Project Manager Major Projects
Hornsby Shire Council
296 Peats Ferry Road
HORNSBY NSW 2077

Our ref: 2126457-67896
Your ref:

Dear Craig

Hornsby Quarry Rehabilitation EIS
Response to Request for Additional information - Development Application No. DA/101/2019

1 Introduction

GHD prepared an Environmental Impact Statement (EIS) to accompany a development application (DA) for the proposed rehabilitation of Hornsby Quarry. The DA was lodged by Hornsby Shire Council (Council). Council's Planning and Compliance Division has undertaken a preliminary review of the DA and has requested additional information in a letter dated 4 June 2019.

The letter requests further detail in a number of key areas:

- DA plans to provide further detail/information
- Further description of the proposed development including:
  - design (to detailed design level)
  - proposed geotechnical safety management measures (to detailed level)
  - proposed bush regeneration and tree planting (to detailed level) and complete offset strategy
  - construction method (to detailed level)
- Contamination investigation prior to determination including:
  - Preliminary Site Investigation (Stage 1)
  - Detailed Site Investigation (Stage 2) if the extent of contamination is 'significant'
  - Remediation Action Plan (Stage 3) if the Stage 2 investigation reveals contamination exceeding criteria prescribed by the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM)*
- Preparation of a Construction Environmental Management Plan (CEMP) prior to determination

The letter also identifies a number of other minor items for clarification.

This letter provides a response to the key issues raised in the request for information by the Assessment Officer. A table containing suggested draft GHD responses to each point raised are also attached. Council may wish to respond to some or all of the matters raised.

2 Response regarding DA plans

Figures 01 to Figure 06 (attached) are being updated to include:

- Cadastre
- Additional sections
- Labelling to clarify pre-NorthConnex filling surface levels
- Work zones

Project No. 100125 Sheets 1-8 (attached) are being updated to provide:

- Further information regarding the proposed retaining walls
- Further information regarding the proposed micropiling.

3 Response regarding further description of the proposed development

Several comments and requests relate to further detail being provided with regard to the:

- design (to detailed design level)
- proposed geotechnical safety management measures (to detailed level)
- proposed bush regeneration and tree planting (to detailed level) and complete offset strategy
- construction method (to detailed level)

The description provided in the EIS includes the Project Description (Chapter 6), plus Chapters 14 and 18 (which are referred to in Chapter 6), which cover geotechnical safety measures and rehabilitation respectively.

The EIS provides a *concept design* for the project, which reflects the level of detail currently available about the works that are proposed to be undertaken. A higher level of detail would be developed in the next design phase (detailed design), which will be suited for obtaining a Construction Certificate and subsequent tendering of the works to contractors. It is not uncommon for projects of this scale, magnitude to be developed to a concept design level for the purpose of the development approval. Significant levels of further design development and associated geotechnical and other investigations are required to fully develop the design to the level being requested by the assessor.

Chapter 14 of the EIS contains as summary of the proposed geotechnical safety management measures that would be required to be developed during detailed design. Further detailed geotechnical investigations are required to confirm the concepts presented in Chapter 18 of the EIS. This would be undertaken in the next phase of the project development and details developed during the detailed design phase.

As described in Chapter 11 of the EIS, no offset is required for threatened biota listed under the EPBC Act. However Council proposes to develop an offsets package for the project in accordance with the Hornsby Shire Council Green Offsets Code to manage impacts on native vegetation. The offsets package will be developed as part of the approvals process, which will specify the works required, location, duration and funding.

Chapter 18 of the EIS provides a description of the proposed rehabilitation including potential areas for bush regeneration and tree planting. Chapter 18 describes this as including placement of top soil and tree planting – with the aim to re-establish Blue Gum High Forest. Figure 18.1 shows the areas of potential revegetation (green shaded - labelled 'revegetation and bush regeneration areas). The extent and details of bush regeneration works will be confirmed during detailed design.

Chapter 6 of the EIS includes an indicative construction methodology and describes the type of plant required to undertake the works. This is based on the concept design and best understanding of the most likely construction methods at this stage. The impacts of this particular method are assessed in the EIS, using estimated numbers of different plant items.

For example, the air and noise assessments analyse 3 different "worst case" type scenarios where the various plant items are working concurrently and in different parts of the site as it is expected that the plant items will be moved according to which areas of the site are being excavated or filled. The actual construction methods can only be confirmed once the detailed design has been completed and a construction contractor has been appointed.

4 Response regarding contamination investigation prior to determination

The letter from the Council assessor requests that a contamination investigations be undertaken prior to determination of the DA including:

- Preliminary Site Investigation (Stage 1)
- Detailed Site Investigation (Stage 2) if the extent of contamination is ‘significant’
- Remediation Action Plan (Stage 3) if the Stage 2 investigation reveals contamination exceeding criteria prescribed by the *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM)*

Chapter 14 of the EIS provides the results of a preliminary site investigation (Stage 1) undertaken by Parsons Brinckerhoff if 2004 as part of the land capability study and master plan for the site as well as the soil and contamination investigation presented by AECOM in the EIS for the 2015 Planning Approval.

Section 14.3.1 identifies that the majority of the site has very little potential for contamination and that small specific areas with some potential would be subject to further investigation prior to construction commencing and in accordance with the requirements of the CLM Act and Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011).

The requirements for the contamination investigation prior to works commencing, in accordance with the relevant legislation and guidelines can be included in the conditions of consent for the DA. The condition can require the contamination investigation to be prepared (and RAP if required) prior to any works commencing.

5 Response regarding preparation of a Construction Environmental Management Plan (CEMP) prior to determination

Neither a construction contractor nor certifier have been appointed at this stage. As discussed in Section 3, the EIS provides a *concept design* for the project, which reflects the level of detail currently available about the works that are proposed to be undertaken. Appointment of construction contractor(s) would occur following the next design phase (detailed design) when there is sufficient design detail to tender the construction of the project.

A CEMP will be developed prior to construction commencing. The requirement for preparation and content of the CEMP can be included in the conditions of consent for the DA. The condition can require the CEMP to be approved by Council prior to works commencing.

6 Other items

Table 1 provides suggested GHD responses to other items raised by the assessor.

Sincerely
GHD

David Gamble
Technical Director – Waste Infrastructure
+61 2 9239 7354

Table 1 Response to individual comments

Ref	Comment	Response
2.1	**Description of Proposed Development**	
	It is recommended that the Applicant more clearly define the description of the development	The title is considered to reflect the works required.
2.2	**DA Plans**	
	Figure 01 - Existing Site Plan - cadastre (lot boundaries) are required to be shown	Refer revised Figure 01 showing cadastre
	Figure 02 - Proposed Landform - show cadastre - additional sections are required. Attachment 1 shows locations of required additional sections. Sections are to extend across the whole of the site and include properties beyond the site as a point of reference - this plan appears to be inconsistent with Drawing - Project Number 100125, Sheet 1 of 8 and Figure 6.2 in the EIS, particularly in relation to the works associated with the south-western stockpile. Figure 6.2 shows cut in this part of the site. (NOTE: Figure 6.2 appears to be based on the proposed landform. This should be based on the existing landform).	Refer revised Figure 02 showing cadastre and additional sections. See revised drawings - Project Number 100125 (11 Sheets)
	Figure 03 - Cross Section - Confirm that the 'existing surface level' is the surface level prior to filling in accordance with the 2016 Planning Approval	Figure 03 'existing surface level' is the surface level prior to filling in accordance with the 2016 Planning Approval. Refer revised Figure 03.
	Figure 04 - Extent of work - Overlay onto an aerial photograph with cadastre - Show locations of work zones - Delete vegetation communities	Refer revised Figure 04 provided showing aerial, cadastre and work zones, but without vegetation communities.
	Figure 05 - Site Management Plan - Show location of mobile crusher (unless this is equipment that will be moved around the site, as required, in which case indicative locations should be shown) and any other equipment that will be used on site for the duration of the works.	The mobile crusher, along with most equipment will be moved around the site as required. Potential construction scenarios are provided in the appendices of the Air Quality (Appendix D) and Noise (Appendix C) reports.

Ref	Comment	Response
	- Confirm if the 'plant parking' is the storage location of equipment (as per list in Section 6.3.2 of the EIS) to be used on site	The plant parking area shown on Figure 05 will be used for storing equipment.
	Project No. 100125, Sheets 3-7 - Retaining Wall Details - Extend sections to include boundary/lot points of reference - identify the tracks by a reference name. Identify tracks as either existing or proposed. - Show RLs at level changes in the sections - In Sections B, C and D, if a safety barrier/temporary safety fencing is proposed along the upper edge of the retaining wall, include on the section drawings and on the plans - Change angle of Section E so that the upper access track is included	See revised drawings - Project Number 100125 (11 Sheets)
	Project No. 100125, Sheet 8 - Retaining Wall Details (Micropile wall details) - Is the concrete pavement slab proposed or existing? If proposed provide the following details: * Length of area to be paved * Will any retaining along that edge of the pavement away from the quarry be required? * Will there be any impacts on trees (not previously assessed) as a result of these works?	See revised drawings - Project Number 100125 (11 Sheets) The concrete pavement slab details, including edge treatment and impact on trees will be determined at the detailed design stage.
3	**Environmental Impact Statement**	
3.1	**Executive summary**	
	Has a construction phase soil and water management plan been prepared?	As described in Section 10.4 of the EIS, a Soil and Water Management Plan would be developed prior to construction in accordance with Landcom (2015) 'The Blue Book', including consideration of erosion and sediment control impacts.
	It is considered that the extent and nature of contamination in the vicinity of the former workshop and office building areas needs to be determined now so that any remediation works that might be required are captured	Refer response to Item 3.2.2 (SEPP 55 - Remediation of Land) below.

Ref	Comment	Response
	by this DA and any approval issued for these works (NB: if remediation is proposed the description of the development must include this).	
	More detailed descriptions of the works to be undertaken are required. Details of works for which consent is required are to be provided.	Refer response to item 3.6.1
	Works in this part of the project include tree planting and reestablishment of Blue Gum High Forest however no plants showing locations of planting have been provided.	Refer response to Item 3.17
	More details are required as to what constitutes a short period of time with respect to exceedances of construction noise guidelines is required.	Full details of the time periods involved are provided in the noise assessment (Chapter 8 of the EIS and Appendix C of the EIS)
3.2	**Section 2 - Statutory Framework**	
3.2.1	**Hornsby LEP 2013**	
	We agree that, by virtue of the provisions of Clause 6.2 of the HELP, the proposed earthworks are permissible with consent, as they will facilitate development for the purposes of a permissible use (recreation area) in the RE1 Public Recreation and R2 Low Density Residential zones which apply to the site. Clause 6.2(3) of the LEP identifies that matters the consent authority must consider prior to determining and application under this clause. These matters include: (a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development (b) the effect of the development on the likely future use or redevelopment of the land, (c) the quality of the fill or the soil to be excavated, or both, (d) the effect of the development on the existing and likely amenity of adjoining properties, (e) the source of any fill material and the destination of any excavated material, (f) the likelihood of disturbing relics (g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area, (h) any appropriate measures proposed to avoid, minimise or mitigate	Refer responses in the table below. <table><tr><th>Matter for consideration</th><th>Response</th></tr><tr><td>(a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development</td><td>Chapter 10 of the EIS provides an assessment of water impacts including consideration of the potential impacts of the project on watercourse stability and morphology. No change to the proposed upstream or downstream diversion/drainage is proposed. Water would continue to be pumped from the void and discharged as it currently is. The site is ‘inwards draining’ and minor changes to drainage patterns within the site would not affect drainage patterns in the locality. Chapter 10 also describes how the project is not expected to impact on downstream waterways. As discussed in Section 14.2 of the EIS, the project would improve soil stability within the site</td></tr></table>

Ref	Comment	Response	
	the impacts of the development. It would be beneficial if the various sections of the EIS that address the matters the consent authority must consider to be identified		by regrading, slope reinforcement and drainage measures to address sections of the site that are excessively steep with significant likelihood of instability.
		b) the effect of the development on the likely future use or redevelopment of the land,	The project would facilitate the future development of the site into a parkland. As described in Section 5.3.3. of the EIS, should the project not proceed, the site would be unsuitable for development into a parkland for community use and would remain closed to the public indefinitely for safety reasons.
		(c) the quality of the fill or the soil to be excavated, or both,	No fill is proposed to be imported as part of the project. The existing site soils are discussed in Chapter 14 of the EIS.
		(d) the effect of the development on the existing and likely amenity of adjoining properties,	Section 17.3 of the EIS provides a summary of the potential for amenity impacts on surrounding receivers.
		(e) the source of any fill material and the destination of any excavated material,	No fill is proposed to be imported or exported as part of the project.
		(f) the likelihood of disturbing relics	Chapter 12 of the EIS provides an assessment of potential heritage impacts including likelihood of disturbing relics
		(g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or	Chapter 10 of the EIS provides an assessment of water impacts including consideration of potential water quality impacts

Ref	Comment	Response	
		environmentally sensitive area,	
		(h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	Section 20.2 of the EIS provides a summary of the proposed mitigation and management measures
3.2.2	**SEPP 55 - Remediation of Land**		
	The EIS indicates that further investigation will be undertaken however, based on the wording of Clause 7 of SEPP 55, information as to whether parts fo the site are contaminated is required prior to determination of this DA. The following information is required to be submitted for further consideration:	A contamination investigation will be undertaken prior to construction commencing. The requirements for the contamination investigation can be included in the conditions of consent for the DA. The condition can require the contamination investigation to be prepared (and RAP if required) prior to works commencing.	
	a) a Preliminary Environmental Site Investigation (Stage 1) must be prepared for the subject site by a certified land contamination consultant as recognised under the CEnvP(SC) or CPSSC CSAM certification and submitted to Council. The Investigation must be undertaken in accordance with NSW EPA's Contaminated Sites Guidelines and the NEPM (Assessment of Site Contamination).		
	b) a Detailed Environmental Site Investigation (Stage 2) must be prepared for the subject site by a certified land contamination consultant as recognised under the CEnvP(SC) or CPSSC CSAM certification and submitted to Council. The Investigation must be undertaken in accordance with NSW EPA's Contaminated Sites Guidelines and the NEPM (Assessment of Site Contamination). Note: A detailed investigation will be required where the extent of contamination is significant in accordance with the NSW EPA Contaminated Sites Guidelines or Council considers such investigation is warranted after consideration of the Preliminary Report.		

Ref	Comment	Response
	c) A Remedial Action Plan (RAP) must be prepared for the subject site by a certified land contamination consultant as recognised under the CEnvP(SC) or CPSSC CSAM certification and submitted to Council. The Investigation must be undertaken in accordance with NSW EPA's Contaminated Sites Guidelines and the NEPM (Assessment of Site Contamination), should the preliminary/detailed investigation reveal contamination exceeding criteria prescribed by the NEPM and in accordance with the NSW EPA Contaminated Sites Guidelines.	
3.3	**Section 3 - Stakeholder and Community Engagement**	
3.3.1	**Engagement Activities**	
	Please confirm if consultation with agencies (as part of the EIS preparation) is in addition to the consultation undertaken by NSW DPE as part of the SEARs preparation? Table 3.1 might need to be amended depending on the response to this question.	Agency consultation was *in addition* to the consultation undertaken by NSW DPE via distribution of letters to each agency. Letter responses that were received during the preparation of the EIS are provided in Appendix B of the EIS.
	Please update the EIS to confirm which stakeholder groups have been consulted.	Appendix B of the EIS contains the stakeholder engagement outcomes report with details of non-statutory consultation undertaken – including stakeholder groups.
	The SEARs required consultation with *infrastructure and service providers* however it is not clear that this has been done.	The SEARS requires consultation with *relevant* local, State or Commonwealth authorities, infrastructure and service providers and any surrounding landowners that may be impacted by the development. Details of the agencies and stakeholders engaged during preparation of the EIS are described in Chapter 3 of the EIS. As the project would not require any water or power connection, consultation with these utilities was not considered to be relevant, and was not undertaken.
3.4	**Section 4 - Description of the Site**	
	Note that Summers Avenue is zoned R2 Low Density Residential (and therefore Section 4.3 might need to be updated).	It is recognised that there is a small section of land that is connected to Summers Ave, that is zoned as R2 Low Density Residential. The proposed development (recreational area) is permitted within this zoning with consent.
	Confirm (by survey) that the finished level of the NorthConnex filling is RL 55 m AHD (page 21 of EIS)	The NorthConnex filling works was ongoing during preparation of the EIS and therefore the EIS assumes filling undertaken in accordance with the 2016 Planning Approval. Final surface levels of fill placed by

Ref	Comment	Response
		NorthConnex is approximately RL58 AHD at the eastern end of the void where additional surcharge material has been placed at the request of Council to aid compaction. The western end of the void is at approximately RL53 AHD. The surcharge material will be removed as part of this project to create a lake with a finished surface (water) level of RL55 AHD or lower.
3.5	**Section 5 - Strategic Justification**	
	A Plan for Growing Sydney (Section 5.2.2. of EIS) is no longer the relevant regional planning policy. This has been supplanted by *A Metropolis of Three Cities - Greater Sydney Region Plan* and the associated District Plans. The relevant District Plan in this instance is the North District Plan. The EIS will need to be updated to reference the relevant strategic plans.	It is recognised that a Plan for Growing Sydney (Section 5.2.2. of EIS) is no longer the relevant regional planning policy, and has been superseded by A Metropolis of Three Cities - Greater Sydney Region Plan and the associated District Plans. The relevant District Plan in this instance is the North District Plan. A Metropolis of Three Cities - Greater Sydney Region Plan outlines the NSW Government's vision for Greater Sydney as a metropolis of three cities: the Western Parkland City, the Central River City and the Eastern Harbour City. The Northern District Plan is applicable for the Hornsby local government area and identifies directions and priorities for improving lifestyle and environmental assets in the District. Consistent with the Northern District Plan, the project is an important step towards development of the site in the future as a community parkland and opening up the site to allow the community to enjoy the scenic and culturally significant landscape that is currently permanently closed to the public. The project would assist in delivering: • Planning Priority N2: "Working through collaboration" • Planning Priority N6: "Creating and renewing great places and local centres, and respecting the District's heritage" • Planning Priority N17: "Protecting and enhancing scenic and cultural landscapes" • Planning Priority N20: "Delivering high quality open space"
3.6	**Section 6 - Project Description**	
	This section should be read in conjunction with the discussion in Sections 2.1 and 2.2 of this letter.	Noted

Ref	Comment	Response
3.6.1	**Proposed Works**	
	A more detailed description of the proposed works is required to: 1. Ensure all proposed works are captured by the EIS/DA; and 2. Ensure full assessment of the impacts of the proposed works can be undertaken.	The description provided in the EIS includes the Project Description (Chapter 6), plus Chapters 14 and 18 (which are referred to in Chapter 6), which cover geotechnical safety measures and rehabilitation respectively.
	In section 6.2 of the EIS the design is described as 'conceptual' however, it is our understanding that this is the final design for the proposed bulk earthworks and the levels shown on the plans submitted with the DA are the design levels. We assume this is not an application under Section 4.22 (Concept DA) of the EP&A Act. Could you please confirm this is the case?	The EIS provides a concept design for the project, which reflects the level of detail currently available about the works that are proposed to be undertaken. A higher level of detail would be developed in the next design phase (detailed design), which will be suited for obtaining a Construction Certificate and subsequent tendering of the works to contractors. The application is not for a Concept DA under Section 4.22 of the EP&A Act.
	Based on our review of the EIS, the works proposed as part of this DA include: * Bulk earthworks * Construction of retaining walls/gabion walls * Weed removal * Tree removal * Soil manufacture * Micropile wall * Rehabilitation works, including re-establishing areas of Blue Gum High Forest * Drainage works * Construction of new roads and access tracks	
	The works appear to be being undertaken in four distinct zones: * The south-west stockpile * The northern spoil area * The quarry floor and southern face * Old Mans Valley It might be useful to provide a plan identifying each of these zones, together with a detailed description of the works to be undertaken in each zone. Where there are works proposed which apply to the whole of the site, these works can be described under a separate heading.	See new Overall Site Plan showing areas of proposed works.

Ref	Comment	Response
	In relation to the bulk earthworks, details regarding the depths of excavation/filling (in more detail than Figure 6.2) would be of benefit.	Figure 6.2 of the EIS shows the proposed (concept design) surface after completion of the works as well as details of the estimated cut and fill depth in each area. No further detail is available at this current concept design stage.
3.6.2	**Construction**	
	Details of the methodology for undertaking the bulk earthworks to be specified as different methods will have different impacts	Chapter 6 of the EIS includes an indicative construction methodology and describes the type of plant required to undertake the works. This is based on the concept design and best understanding of the most likely construction methods at this stage. The impacts of this particular method are assessed in the EIS, using estimated numbers of different plant items. The Air and Noise assessments analyse 3 different "worst case" type scenarios where the various plant items are working concurrently and in different parts of the site as it is expected that the plant items will be moved according to which areas of the site are being excavated or filled. The actual construction methods can only be confirmed once the detailed design has been completed and a construction contractor has been appointed.
	Will the materials for the gabion walls be sourced from inside the quarry? If so, these details are to be provided with the DA	The materials for the gabion walls will be confirmed during detailed design. It is envisaged that the material will likely be sourced from outside the quarry.
3.6.3	**Traffic**	
	There are contrary statement throughout the EIS in relation to whether any spoil material will be transported into or from the site. It is required that definitive advice in this regard be provided.	No spoil/fill material is proposed to be transported to the site or exported from the site. This is clearly stated in the EIS.
3.7	**Section 7 - Identification and Prioritisation of Issues**	
	The following issues need to be considered as part of Table 7.1	
	* Noise, vibration and blasting - consideration of onsite rock crushing under 'source of risk'	Rock crushing has been included in the noise assessment (Chapter 8 and Appendix C)
	* Hydrology and soils, flooding - there is no discussion about drainage works required to be undertaken within the northern spoil area. Further,	The drainage design for the Northern Spoil Mound has not yet been fully developed, but the impacts associated with draining this area have been

Ref	Comment	Response
	there is no discussion regarding protocols to be implemented for the inspection and maintenance of erosion and sediment control measures on a regular basis and after storms.	assessed in the EIS. As discussed below, no water can be discharged from the void unless it is pumped, and the quality of the water can be tested before pumping. Chapter 10 of the EIS includes an assessment of water quality and proposes a number mitigation measures to address surface and groundwater water quality. A Soil and Water Management Plan will address erosion and sediment control issues during construction phase and can be conditioned.
	* Biodiversity - noise impacts on fauna have not been identified as a risk and this needs to be considered.	Noise impacts are addressed in Chapter 11 (page 102) of the EIS and the Biodiversity Assessment Report
	* Visual amenity - the visual impacts of the significant retaining walls when viewed from within the quarry site have not been considered or addressed.	Refer response to Item 3.16
	* Weeds - the management of weed waste does not appear to have been considered	Refer response to Item 3.15
3.8	**Section 8 - Noise and vibration**	
	DFP Planning will provide commentary in relation to any additional information and/or clarification required in relation to noise and vibration following receipt of initial feedback from Acoustic Logic.	Noted
3.9	**Section 9 - Air Quality**	
	DFP Planning will provide commentary in relation to any additional information and/or clarification required in relation to noise and vibration following receipt of initial feedback from Council's environmental section.	Noted
3.10	**Section 10 - Water**	

Ref	Comment	Response
	In making the comments below, we have assumed that all water within the quarry void will be required to be removed in order to undertake the bulk earthworks: There is no discussion in Section 10 regarding the drainage works (including water quality considerations) that are proposed to be undertaken in conjunction with the bulk earthworks, including, for example, the provision of a new open drainage channel as part of the earthworks in the northern spoil area.	Because construction water falling on the site drains inwards to the void, and water can only leave the void by pumping, the quality of the water being pumped can be assessed before any pumping occurs. The water level in the quarry will be kept below surface level to aid vehicle movements on the fill. As discussed in response to item 3.7, the drainage design for the Northern Spoil Mound has not yet been fully developed, but the impacts associated with draining this area have been assessed in the EIS. Chapter 10 of the EIS includes an assessment of water quality and proposes a number mitigation measures to address surface and groundwater water quality.
	We have been provided with a copy of the dewatering licence (dated 16 April 2019) issued to Hornsby Shire Council by NSW Office of Water. The terms of the licence reference two timeframes - a 12 month timeframe and a 5 year timeframe. It is not clear if the volume of groundwater for which authorisation for extraction has been issued (i.e. 370 ML) is a total annual amount or a total amount able to be extracted/removed over the 5 year term. Clarification in this regard is required.	The wording on the dewatering licence is confusing. The original licence agreement allowed for 370ML per annum to be discharged.
3.11	**Section 11 - Biodiversity**	
	The statement at the top of page 97 of the EIS that "water quality in creeks immediately adjacent to the site are likely to be poor due to the surrounding development" is contrary to the investigations detailed in Section 10 of the EIS. Contrary comments such as this should be deleted from the EIS. The concluding comment under the heading *Surface Water* (page 101) is also relevant to this discussion.	Some exceedances of water quality criteria detected by monitoring events were noted in Chapter 10 of the EIS. This is not contrary to the observation that water quality can be affected by surrounding development, as the creeks are likely impacted by inflows from street stormwater systems. Regardless water quality coming from site needs to meet relevant standards and will be addressed by the Soil and Water Management Plan
	In section 11.3.1, there appears to be some confusion as to the total amount of vegetation to be removed and the amount of native vegetation to be removed as a result of these works. The text indicated that 5.89 ha of exotic and native vegetation will be removed however Table 11.2 suggests that a total of 8.28 ha (including 2.5 ha of native vegetation) will be removed. This must be clarified.	The project would remove a total of 5.89 ha of vegetation, of which 2.5 ha is native vegetation. The areas for hardstand and quarry void were incorrectly shown in the table. They should have been shown as 0.9 ha and 2.28 ha respectively. The total area should have been shown as 9.07 ha (to match Table 11.1). A revised Table 11.2 is as follows:

<table>
<tr><th>Ref</th><th>Comment</th><th>Response</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Zone ID</th><th>PCT ID</th><th>GHD Veg Type</th><th>TSC Act Status</th><th>EPBC Act Status</th><th>Area (ha)</th></tr>
<tr><td>HN648</td><td>1841</td><td>Blackbutt Gully Forest (HN648, Moderate/good - high)</td><td>Not listed</td><td>Not listed</td><td>0.26</td></tr>
<tr><td>HN648</td><td>1841</td><td>Blackbutt Gully Forest (HN648, Moderate/good - poor)</td><td>Not listed</td><td>Not listed</td><td>1.50</td></tr>
<tr><td>HN596</td><td>1237</td><td>Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest (HN596, Moderate/good - poor) (CEEC)</td><td>CEEC listed under the BC Act:
Blue Gum High Forest in the Sydney Basin Bioregion</td><td>Not listed</td><td>0.74</td></tr>
<tr><td></td><td></td><td>Exotic vegetation (Blackbutt Gully Forest HN648, Low)</td><td>Not listed</td><td>Not listed</td><td>3.39</td></tr>
<tr><td></td><td></td><td>Hardstand</td><td></td><td></td><td>0.90</td></tr>
<tr><td></td><td></td><td>Quarry void</td><td></td><td></td><td>2.28</td></tr>
<tr><td colspan="5">Native vegetation clearing</td><td>2.50</td></tr>
<tr><td colspan="5">Total vegetation clearing</td><td>5.89</td></tr>
<tr><td colspan="5">Total area</td><td>9.07</td></tr>
</table>
</td></tr>
<tr><td></td><td>In addition, details of the locations of vegetation to be removed are required to be provided. It is recommended that this be shown on a plan together with estimates of the number of trees to be removed within each section.</td><td>Figure 11.1 of the EIS shows locations of vegetation to be removed (the extent of works overlaid on the vegetation zones) and areas have been provided in Table 11.2 (as amended above).</td></tr>
<tr><td></td><td>There are a number of mitigation measures which have been identified as being necessary to include in a CEMP. Given the extent of measures identified as being necessary to include in the CEMP, it is recommended that this be prepared for consideration as part of the DA.</td><td>Refer response to Item 3.18</td></tr>
</table>

Ref	Comment	Response
	The draft CEMP should have particular regard to managing impacts on ecology and water systems of land immediately surrounding the work sites.	Refer response to Item 3.18
	Confirmation is required in relation to the extent of landscaping/revegetation works **occurring** as part of this DA. In the section title *Rehabilitation*, on page x in the *Executive Summary*, there is a statement that the project includes tree planting and reestablishment of Blue Gum High Forest. The second dot point at the top of page 105 of the EIS also indicates that landscape works will be undertaken however at the "completion of the project', suggesting that these works do not form part of this application. Clarification as to when vegetation rehabilitation works are proposed is required, however, given the extent of vegetation removal being undertaken as part of this application, it is considered that replacement planting should form part of this application, in the event that no further work is undertaken.	Refer response to Item 3.17
3.12	**Section 12 - Heritage**	
	There appears to be some confusion as to the extent to which the volcanic diatreme has been covered as a result of filling works approved under the 2016 Development Approval. Greater clarity is required in relation to the extent of the exposed diatreme that is currently exposed is in accordance with the NorthConnex filling works and whether more of the diatreme is likely to be exposed as a result of the works proposed as part of this DA.	The project would not change the extent of the diatreme that would be exposed compared to that proposed and approved under the 2016 Planning Approval. Refer response to Item 3.4
3.13	**Section 13 - Traffic and Transport**	

Ref	Comment	Response
	Please confirm whether the discussion regarding the *Existing intersection performance* (page 131 of the EIS) factors in the traffic associated with the NorthConnex works at the quarry or whether it predates that work. If it predates the NorthConnex works, the traffic volume assessment might need to be updated, given they are now some 4 years old (however, we are happy to be guided by Council's engineers in regard to this matter). Similarly, does the 'existing situation' modelled for the SIDRA results (first dot point under Section 13.3.3) include NorthConnex construction traffic?	Page 130 states the counts were undertaken 15 May 2015 (pre-NorthConnex filling works). Use of counts while the NorthConnex filling works are being undertaken would inflate the "existing" traffic volumes. Using the pre-NorthConnex filling works traffic volumes provides a more conservative assessment.
3.14	**Section 14 - Land Resources**	
	As previously noted, could you please confirm that the finished level of the filling undertaken in accordance with the 2016 Development Approval (NorthConnex) is RL 55 m AHD - refer paragraph of Section 14.2.3. This needs to be confirmed by survey.	The NorthConnex filling works was ongoing during preparation of the EIS and the EIS therefore assumes filling undertaken in accordance with the 2016 Planning Approval. Refer response to Item 3.4
	Also as previously noted, given the magnitude of mitigation measures that will be needed to be included in a CEMP, it is required that a draft CEMP be prepared for consideration as part of the DA.	Refer response to Item 3.18
	The discussion under the heading *further geotechnical assessment* (page 151 of the EIS), suggest that further investigation is required before the detailed design response with respect to the management of certain areas within the quarry can be determined. Given that (assuming this DA is approved) will be giving consent to the stabilisation works, these details are required to be finalised for consideration as part of this DA.	Further geotechnical assessment would be undertaken as part of the detailed design process for the project.
3.15	**Section 15 - Waste Management**	
	Clarification is required as to the management of the weeds to be removed as part of these works. We are assuming that the weeds will be removed and not mulched as part of the soil manufacturing.	All vegetation including weeds will be mulched on site as part of soil manufacturing. The mulching will be undertaken (to reach appropriate temperatures) so that the resulting product is free of pathogens.
	As such details regarding the disposal of removed weeds (including volumes, number of truck movements and location of tipping site) needs to be provided.	

Ref	Comment	Response
3.16	**Section 16 - Visual**	
	The potential impacts of retaining walls of 13 m on future users of the quarry site need to be addressed	The quarry void is characterised by dramatic topography including near vertical/steep walls. Any retaining walls would be consistent with the existing character of the site.
	Whilst it is acknowledged that as part of a future DA there will be significant landscaping undertaken, the visual impacts of the removal of vegetation as part of this DA need to be addressed.	Visual impacts of removal of vegetation have been considered in the visual impact assessment.
	We question to 'low' magnitude rating afforded to the visual impact associated with visitors of the Blue Gum Walking Track and Rosemead Road Picnic Area. Based on Table 16.1 it is our opinion that the magnitude would be at least 'moderate'. We recommend that the visual impacts from these areas be reassessed.	At its closest, the Blue Gum Walking Track is located more than 100 m from the southern most extent of proposed earthworks. The area between the walking track and the extent of earthworks is heavily vegetated with trees. This significant vegetation that would be retained between the edge of the earthworks (and vegetation clearance) and the walking track would continue to screen views to the site. Rosemead Road Picnic Area is located even further away, with retained vegetation to also provide significant screening. In addition, bush regeneration and plantings will assist in providing further vegetation in areas of earthworks in the medium to long term. Therefore the magnitude of visual impact rating has been assessed to be low at both these locations.
3.17	**Section 18 - Rehabilitation**	
	Section 18.1 also identifies that tree planting and re-establishment of Blue Gum High Forest will occur as part of this project. Details regarding this part of the project have not been provided and therefore have not been assessed. It is required that these details be submitted.	Figure 18.1 of the EIS shows the areas of potential revegetation (green shaded - labelled 'revegetation and bush regeneration areas). The extent and details of bush regeneration works would be confirmed during detailed design. Landscaping works are proposed as part of future development of the park land.
3.18	**Construction Environmental Management Plan**	
	A CEMP must be prepared by a suitably qualified environmental consultant in consultation with a qualified traffic engineer and submitted to Council for review.	Neither a construction contractor nor certifier have been appointed at this stage.

Ref	Comment	Response
	The CEMP must detail the contact information for developers, builder, private certifier and any emergency during and outside work hours.	A CEMP will be provided prior to construction commencing. The requirement for preparation and content of the CEMP can be included in the conditions of consent for the DA. The condition can require the CEMP to be approved by Council prior to issuing the Construction Certificate.
	a) The plan must include, but not limited to the following:	
	i) The plan shall detail the order of construction works and arrangements of all construction machines and vehicles being used at the same time during all stages	
	ii) the CTMP plans shall be in accordance with the approved Development Application plans and the Development Consent conditions	
	iii) In order to prevent injury, accident and loss of property, no building materials, work sheds, vehicles, machines or the like shall be allowed to remain in the road reserve without the written consent of Hornsby Shire Council.	
	iv) The plan shall be in compliance with the requirements of the RTA "Traffic Control at Worksites Manual 1998" and detailing:-	
	v) Public notification of proposed works	
	vi) long term signage requirements	
	vii) short term (during actual works) signage	
	viii) Vehicle Movement Plans, where applicable	
	ix) Traffic Management Plans	
	x) Pedestrian and Cyclist access and safety	
	xi) The plans shall indicate traffic controls including those used during non-working hours and shall provide pedestrian access and two-way traffic in the public road to be facilitated at all times	
	xii) Survey plan showing site sheds, concrete pump location, crane location and existing survey marks. The plan shall include details of parking arrangements for all employees and contractors, including	

Ref	Comment	Response
	layover areas for large trucks during all stages of works. The parking or stopping of truck and dog vehicles associated with the development will not be permitted other than on the site and the plan must demonstrate this will be achieved.	
	xiii) Confirmation that a street 'scrub and dry' service will be in operation during subdivision works	
	xiv) The plan shall include the proposed truck routes to and from the site including details of the frequency of truck movements at the different stages of the development	
	xiii) Confirmation that a street 'scrub and dry' service will be in operation during subdivision works;	
	xiv) The plan shall include the proposed truck routes to and from the site including details of the frequency of truck movements at the different stages of the development;	
	xv) The plan shall include swept path analysis for ingress and egress of the site throughout all stages of works.	
	xvi) The plan shall include site plans for all stages of works including the location of site sheds, unloading and loading areas, waste and storage areas being used.	
	xvii) The plan shall include the total volume of fill to be imported to the subject site throughout all stages to achieve approved levels. xviii) The plan shall include the total volume of fill to be exported at the subject property throughout all stages.	
	xix) The plan shall include the total quantity and size of trucks for all importation and exportation of fill on site throughout all stages of works, and a breakdown of total quantities of trucks for each stage of works.	
	xx) The plan shall include the number of total truck movements to and from the site for each stage of works.	

Ref	Comment	Response
	xxi) The plan shall include the number of weeks trucks will be accessing and leaving the site with excavated or imported fill material.	
	xxii) The plan shall include the maximum number of trucks travelling to and from the site on any given day for each stage of works.	
	xxiii) The plan shall include the maximum number of truck movements on any given day during peak commuting periods for all stages of works.	
	xxiv) The plan must include but not be limited to the location details of the licensed waste facility where excavated material required for removal will be disposed to.	
	xxv) The plan must include the location details of the source site of any proposed fill to be imported for all stages of works.	
	xxvi) The Applicant and all employees of contractors on the site must obey any direction or notice from the Prescribed Certifying Authority or Hornsby Shire Council in order to ensure the above.	
	xxvii) If there is a requirement to obtain a Work Zone, Out of Hours permit, partial Road Closure or Crane Permit, the Plan must detail these requirements and that an application to Hornsby Shire Council will be made.	
	b) A Construction Waste Management Plan detailing the following:-	
	i) Details of the importation or excavation of soil and fill, the classification of the fill, disposal methods and authorised disposal depots that will be used for the fill;	
	ii) Asbestos management requirement and procedures for removal and disposal from the site in accordance with AS 2601-2001 - 'The	

Ref	Comment	Response
	Demolition of Structures', and the Protection of the Environment Operations (Waste) Regulation 2005;	
	iii) General construction waste details including construction waste skip bin locations and litter management for workers.	
	c) Management of stormwater disposal from the detention basin or basement throughout all development phases in accordance with the ANZECC Guidelines trigger values for the area.	
	d) Sediment and Erosion control including during rainfall events and site plans showing entry to or exits from the site, all in accordance with the *'Soils and Construction 2004* (Bluebook)'.	
	e) Air quality management on site, including dust suppression measures during demolition and construction.	
	f) Details on the general operating procedures to manage environmental risk throughout all stages of works on the site;	
	g) To ensure Council assets are maintained throughout the development, a detailed survey plan showing existing survey marks, vehicle entry, footpath and hoarding (fencing) locations; and	
	h) Noise and vibration control information to address any noise nuisances such as rock sawing or breaking, the mitigation methods implemented and how complaints will be managed or prevented.	

Geotechnical Investigation Report

J&K Ref	Page No.	Heading	Para/ dot point	Comment Made by J&K	GHD Response	JKG Replies	Status / GHD Response Where Applicable
1	General			At this stage we have been unable to check the geometry of the slope and rockfall models as we do not seem to have a survey of the site. Would you please forward a survey plan if one exists so we can do some spot checking on the models.	Council to provide	No survey plan has been provided to us, and as such we have not been able to complete any checking of these models.	Assumed closed
2	21			Soil and weathered rock parameters. Some of the parameters appear to be quite high, such as the granular fill where a cohesion of 10 kPa has been adopted (where theoretically you would use 0 in a granular soil), cohesion of 110 kPa in weathered dolerite (though we don't know just what is referred to as weathered dolerite, such as is this a residual soil from the dolerite, or moderately weathered etc). the weathered sandstone also seems to have unusual properties of a quite precise number of 62 kPa for cohesion which may also be a bit high, but the friction angle of 15 degrees looks way too low (you would normally have say 30 degrees or above for sandstone, but again we don't know whether this is residual soil or a more competent rock). Could GHD please provide some details on how these parameters were derived.	Prior to GHD's involvement PSM conducted extensive studies on the site and developed soil and rock parameters accordingly which GHD adopted (PSM 2017a) as referenced in GHD's report (2.4.5 para 1). Therefore please refer to PSM report 2017a for details of parameter derivation. Furthermore, significant additional investigation as described in Section 8 of GHD's report is recommended prior to issuance of a Construction Certificate as part of normal refinements leading up to the issuance of a Construction Certificate. The parameters derived by PSM will be amended if needs be through that process of additional data gathering and refinement.	We agree, on the basis that Council accept there is still significant investigation and design work to be undertaken prior to Construction Certificate issue.	Closed
3	22	Section 2.4.7	Hazard 1	Page 22, Section 2.4.7, Hazard 1. The FOS=1.2 is stated to be 'unrealistic' due to no 10 m long defects being present in the face, but on Page 7 in PSM 2017a the summary says joint persistence is less than 10 m. So it is not clear on review whether these defects were or were not present. Can GHD please clarify this.	GHD has conducted multiple inspections during the NorthConnex filling operation and defects of this size are not expected. There will be further confirmatory rock mapping exercises prior to issuance of a Construction Certificate. There is no evidence to suggest such defects exist and no movements recorded since monitoring started in ten years despite significant rainfall events in that time and noting the quarry is not active, therefore problem discontinuities will no longer the exposed as a consequence of quarrying operations.	To be complete, it would be better for this comment to be included in the report, and again, Council must accept the further mapping is required.	Closed
4	22	Section 2.4.7	Hazards H3/H4	Page 22, Hazards H3/H4. FOS reported as being greater than 2.2 with 'generally reasonable' parameters, but as per point 2 above some of the parameters appear to be quite high - the inclusion of 10 kPa of cohesion in a soil slope of a couple of metres height makes a huge difference to FOS. This needs to be reconsidered following review of the soil parameters.	GHD refers to the response given to Item 2 above. Further, adopting the 10 kpa from previous (extensive) work was, on balance, considered reasonable (GHD also considered this value to be unusual) in the broader context of the measured performance of the slopes over a considerable time period and the unusual nature of some materials (e.g. quarry spoil with a high percentage of angular boulder size particles not easily assessed with traditional GI). We expect these parameters will be amended at some point leading up to the issuance of a Construction Certificate but do not believe that will materially influence the proposed scheme for the reasons given above.	We agree, on the basis that Council accept there is still significant investigation and design work to be undertaken prior to Construction Certificate issue.	Closed
5	23		H3/H4	Page 23, H3/H4. Despite the FOS being reported as greater than 2.2, paragraph 1 states there are steep slopes and slumping in the weathered profile below the track, and a significant likelihood of instability. Would GHD please comment on how this is consistent with the relatively high FOS of 2.2.	The FOS of 2.2 is assessing the global stability of the slope through competent (weathered rock) materials. However, it has been observed on site however that the quarry edge is susceptible to erosional and vegetation action causing slumping of the face which the 'A frame' micro-pile solution is designed to address to provide a 'hard edge'. Further vegetation management and erosion protection will form part of the final scheme. Also note geophysical survey has now been conducted in the area and additional boreholes in the area are planned prior to issuance of a Construction Certificate.	We now understand this relates to differences between deep seated and more surficial potential landslide features, and note that additional investigation and design will be conducted prior to the issue of a Construction Certificate, and so we agree provided Council accept such work will need to take place.	Closed
6				Option 1 for the access track is 'preferred', but there is not an assessment of risk to life for that option.	A risk to life assessment has been undertaken for Option 1. Please refer to Table 5 for summary outcomes.	While a risk assessment may have been undertaken, no details of this have been provided in the report, only the concluding comment in Table 5. Further, Table 5 lists the risk to the person most at risk as '"intolerable" and the societal risk as being within the "ALARP" region. The basis on which an "intolerable" risk is considered to be appropriate must be explained.	Full assessments and details will be provided leading up to and prior to issuing a Construction Certificate. GHD has now been engaged to undertake the detailed design which includes detailed design level risk assessments where required with corresponding design responses where required (e.g. stabilisation measures, drainage improvements, monitoring and preventative maintenance schemes and the like).

J&K Ref	Page No.	Heading	Para/ dot point	Comment Made by J&K	GHD Response	JKG Replies	Status / GHD Response Where Applicable
7	29			Page 29 - northern spoil mound. There has been an assumption on the phreatic surface in the soil mound and this exists the slope above the weathered dolerite. Where this occurs there will be seepage through the toe of the fill, which is usually associated with sloughing (erosion) of the soil which can then regress back into the spoil mound. Can GHD advise whether this has been considered or how this is controlled?	A significant portion of the northern spoil mound will be regraded to a shallower angle and drainage measures installed to improve the overall condition of this area thus removing or significantly controlling the mechanism discussed. Further comprehensive park maintenance and operating protocols will be in operation when the park is opened to ensure any residual potential stability issues are managed down to acceptable levels. This is an integral part of the broader strategy for the park to maximise the use of the space, where risks cannot be 'designed out' entirely a robust drainage, monitoring, maintenance and park closure protocol is provided will be provided.	We agree, on the basis that Council accept there is still significant design work to be undertaken prior to Construction Certificate issue, and long term monitoring, maintenance and closure protocols.	Closed
8	33			Page 33. It is mentioned that the likelihood level of 'L3' is conservative, but L3 would be appropriate (not conservative) for 5e-3.	Noted, as with similar aspects, the proposed likelihood and related aspects important to overall park operational safety will be subject to further assessment and refinement prior to issuance of a Construction Certificate.	We agree, on the basis that Council accept there is still significant design work to be undertaken prior to Construction Certificate issue.	Closed
9	35		Table 6	Do Council agree with the visitor number in the tables. On the face of it, the numbers appear quite low for such a significant project (funding).	GHD refers to the response in Item 8 above. Visitor numbers to particular areas are proposed to be controlled in a number of ways including public exclusion during particular conditions or outright exclusion in some cases (except for maintenance) in other areas. The visitor numbers and the corresponding risk management response will be refined commensurate with projected visitor numbers and exclusions / other management strategies that will be in place prior to issuance of the construction certificate. Council will be party to those assessments as the future asset manager and maintainer.	We agree, on the basis that Council accept there is still significant design work to be undertaken prior to Construction Certificate issue.	Closed
10	35			In the calculation there is a factor of 0.1 stating that Council will control access during wet periods so there is no access when risk levels are elevated. Do Council agree they will be responsible for ongoing monitoring of the situation so they know when to go and evacuate the quarry and prevent access, and understand what will be required before the quarry can be reopened for access. It may be very difficult to actually/physically block access to the road, especially to pedestrians.	Council are aware of this potential requirement. Monitoring and temporary park closure protocols are an integral part of maximising the potential usage of this unique urban space while accepting some specific (manageable) access related limitations and weather related closures are an inherent part of that overall strategy. Clear protocols will be developed and in some cases automated (automatic barriers) or pre-emptive closure based on expected weather conditions required. All these protocols are developed in conjunction with the future park maintainer and operator (Council).	Agreed provided Council accept this responsibiliy.	Closed
11	39			If 300 m of the northern spoil mound were to flow over the access track and presumably suspended deck structures, would the cleaning, repair and stabilisation costs not exceed $2M? If so that would result in a C2 consequence, increasing risk, and requiring higher factors of safety. Would GHD please comment on whether rectification costs would really be less than $2M.	A significant portion of the northern spoil mound will be regraded and removed along with the installation of new drainage measures plus proactive maintenance and monitoring as described. Thus it is considered <$2 M in rectification costs is a reasonable estimate, while noting this is a subjective judgement, and the combination of likelihood and consequences may be amended prior to the issuing of a Construction Certificate based on the various investigations; balancing design options against monitoring and maintenance requirements in consultation with the asset owner as described above. These evaluations may be refined leading up to the issuance of a Construction Certificate but GHD does not consider they will materially influence the proposed scheme for the reasons given above.	We agree, on the basis that Council accept there is still significant design work to be undertaken prior to Construction Certificate issue.	Closed
12	40	Section 3.5	Bullet 1	It is stated that the works would require regrading of portions of the northern spoil mound, but on Page 28 (last paragraph) it is assumed effective drainage measures would be in place. Do GHD not consider it essential to confirm the drainage is in fact present and is appropriate and robust?	GHD agrees that it is essential that appropriate and robust drainage measures are in place which will be required to be maintained regularly in accordance with the park monitoring and maintenance operational requirements as discussed above.	Noted.	Closed

J&K Ref	Page No.	Heading	Para/ dot point	Comment Made by J&K	GHD Response	JKG Replies	Status / GHD Response Where Applicable
13	40	Bullet 3	Sub Bullet 1	It is stated that the presence of trees provides drainage and increase the shear strength. While that is true, have GHD ever relied on these actions and if so, how are they quantified? Other considerations are that if the trees are providing 'drainage paths' in the soil, these can also allow the ingress of water to help saturate the soil (which is of course detrimental) and the trees are also an additional load on the steep slopes.	Sub bullet one discusses in general terms factors which influence and could be considered when evaluating slope stability assessments of this type. As with many geotechnical engineering evaluations, experienced professional judgement plays a part and (for example) a heavily wooded and vegetated slope may prompt the assessing engineer to err less on the side of caution when assigning parameters within the normal range to soil materials within the root zone. There is no definitive way to calculate the effect of roots specifically, however experience does play a part in geotechnical evaluations and should influence decisions where a range of potentially reasonable parameters are justifiable in such assessments.	Noted.	Closed
14	43			The Rn and Rt parameters for the rocks seem to be straight out of the text book, but would GHD please clarify the method in which the parameters have been assigned for the other materials, say with a worked example for one of the materials. Would GHD also please confirm where the parameters for DFC, RFC, roughness spacing and amplitude come from.	In accordance with the Geotechnical Report recommendations (Section 8) real world data has now been obtained from rock fall trials conducted on the site in June 2019. Previously in the absence of such data, published typical values for the parameters mentioned were used in the report. The real world data shows the initial published values are conservative, however the proposed park exclusion zone geometry on critical faces will remain unchanged to those proposed for planning.	Noted, however we do not have the data and assume this will be confirmed in a further issue of the report prior to Construction Certificate.	Closed
15	43	4.1.3	Para 2	The density of 2700kg/m3 seems quite high. Can GHD confirm all of the boulders in the possible rockfall areas are fresh dolerite, or will there be sandstone and breccia rocks as well. If the latter is the case, how would this affect the runout distances for densities of say 2300-2400kg/m3?	Rock fall trials have now been conducted for a range of block geometry and sizes as part of ongoing activities as recommended in the report (Section 8). The theoretical values have thus been refined based on the real world data. Laboratory testing of rock fragments from the field trials show a density of 2,650kg/m3.	Noted, however we do not have the data and assume this will be confirmed in a further issue of the report prior to Construction Certificate.	Closed
16	62		Table 22	The FOS of 1.35 seems quite low, but this seems to only apply for the more extreme load cases of parid drawdown and earthquake for which FOS=1.35 would probably be fair.	Noted.	Noted.	Closed
17	64		Table 23	Would GHD please confirm that the (%) after 'alpha' in the heading and the 'sigma' at the end of the first line of the table are just typo's. If not we will need to reassess. Also does the 'alpha' parameter have a depth range to which it applies?	GHD can confirm the % are typographical errors. Notional depth ranges have been used, however please refer to our response to Item 19 for further relevant background information.	We understand there will be further monitoring, analysis and design prior to Construction Certificate stage and so we agree on that basis.	Closed
18	65		Para 1	Would GHD please provide the reasoning behind the density profile of the fill. Is there a knowledge of the different ways in which these fill materials have been placed, or just estimates? Are there any other settlement sensitive elements on the backfill or just the retaining walls?	The quarry infilling was a bulk materials handling operation. Broadly materials were placed using a long drop conveyor fed stockpile spread with secondary conveyors and dozers with the only compaction achieved by the movement of dozers (track packed) through the spreading process, and self-weight compaction as the operation progressed. Notably a significant surcharge was present under the conveyor and also left in place over the proposed lake area where the landform will not be further built-up in future. None of these elements were subject to precise engineering control. Therefore the density profile is only a notional estimate in the report pending the investigation works specified in Section 8 of the report. The infilled quarry void will be a parkland area, the majority being landscaping type features not generally anticipated to be settlement sensitive. The potentially settlement sensitive structures are the retaining structures and the lake. However, the settlements estimated in the report are now significantly diminished (see note on Table 24 of the report) based on monitoring data acquired since filling completed. Note filling was still ongoing at the time the geotechnical report was issued. See item 19 below for details.	We understand there will be further monitoring, analysis and design prior to Construction Certificate stage and so we agree on that basis.	Closed. Note monitoring of infill material has been ongoing for over 6 months and the groundwater recovered to the top of the infill for the same period. In 6 months settlement has been very small (<5mm total) strongly suggesting inundation / collapse settlement is complete and creep settlement values are very low in the long term even for deep fill areas. Additional investigations are planned and the monitoring will be ongoing such that approaching 1 year of settlement data will be available before the detailed design is finalised and will take full account of all the latest settlement data and additional investigations planned.

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19	66		Table 24	Does Table 24 include the sum of collapse and creep settlements, or the creep settlement only? We are not aware of the grading of the material and suspect there may be a reasonably fines content, though can GHD confirm the saturated fill would not be subject to liquefaction in the case of earthquake.	Table 24 includes an estimate of both collapse and creep settlement while noting many assumptions combined with published values from case studies were used at the time of the assessment pending additional data acquisition. The fill source was almost exclusively from road header excavations in slightly weathered or fresh Hawkesbury Sandstone, although some shales / and dykes were also excavated in much smaller quantities. Consequently the fill material overwhelmingly comprises a well graded granular material with few fines. Given the nature of the infilling operation it is also reasonable to assume that any material derived from shale / dyke material deposited would have been distributed evenly about the site during the conveyor drop / stockpile / secondary conveyor and large scale spreading operations. No formal liquefaction assessment has been undertaken at this stage pending investigation using CPT methods as the preferred method for such assessments. While saturated granular material near surface will meet the basic screening criteria for liquefaction susceptibility, the low seismicity of the region and nature of the proposed structures makes this a very unlikely hazard to be realised. Nevertheless, this will be confirmed during the CPT assessment process and if necessary simple measures specified (e.g. near surface densification with vibro-flot) to mitigate the risk. This will be assessed as a matter of routine leading up to the issue of a Construction Certificate.	. Also note comments provided in item 18 above	Closed. Also refer to comments provided in Item 18 above.
20	68			The settlement profiles along the retaining walls are provided, but will there also be differential settlement across the width of the reinforced earth walls? If the fill is settling over a metre in places over the top of buried sloping quarry batters, there could be additional horizontal strain at the base of the reinforced earth walls. Can GHD advise whether this has been considered.	As noted above, at the time the Geotechnical Report was written filling operations and groundwater recharge were still active. Since that time the NorthConnex filling is completed and groundwater has fully recharged to the top of infill level (and is being pumped to remove surplus to maintain levels below ground level). Upon those conditions being attained (note the groundwater recovery occurred much quicker than initially expected), long term settlement monitoring plates were installed on the site and readings are available for approx. 3 Months at time of writing. At this point in time, minimal (1-3 mm total settlement) has been recorded over a three month period at the four locations monitored, covering the deepest and shallowest filled areas of the site. The groundwater recharge effectively means that collapse settlement is complete and the monitoring results indicate only creep settlements are occurring and at a rate low enough to reasonably anticipate future movements will be manageable by flexible retaining techniques noting these structures will not be constructed for some time, reducing the remaining creep further. Therefore while GHD acknowledges the settlement across the embankment width was not estimated at the time of reporting, the evidence clearly points to relatively easily manageable levels of long term creep for the type of development proposed. Creep levels will continue to be monitored throughout future activities prior to issuance of a Construction Certificate and, if necessary, the design amended accordingly in line with normal practice for developments of this type.	We understand there will be further monitoring, analysis and design prior to Construction Certificate stage and so we agree on that basis.	Closed. Also refer to comments provided in Item 18 above.
21	69			For the column supported deck, what approximate height range would be required for the supporting columns, and are these heights feasible with regard to buckling of the columns? Would these columns always be supported on level rock benches and not on sloping faces or quarry backfill?	Columns will be sized accordingly and cross bracing provided if needed to prevent buckling. For the geometries proposed, the deck footings would be placed on existing benches (which may in themselves require stabilisation) or otherwise carried deeper via bored shafts if needs be.	Noted.	Closed.

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22	71			Can durability be guaranteed with self-drilling bar? Presumably there is no protection for the scratching of galvanised coatings or for the maintenance of a minimum cover of grout etc.	Durability can be guaranteed. Often stainless steel reinforcement is specified for buried elements to address durability concerns with micro piles. Given the small quantities this does not impact the economics of this type of solution for challenging situations as present on this site. This approach has been successfully used on a number of projects including projects to support highway edges in similar geological / geometrical conditions and in coastal (aggressive environment) areas with the approval of regulatory authorities.	The report did not mention stainless steel bar but we are satisfied if stainless steel is used.	Closed
23	71			If the downhill soil and weathered rock slope regresses, as is suggested as being a significant likelihood in Page 23, would that not result in shear forces being applied to the micro piles which are probably inadequate to resist such lateral forces?	Vegetation management and erosion control measures will be specified to limit the future potential occurrence of the failure measures mentioned. Furthermore the micro-pile wall will remove all loading from the vulnerable quarry edge and transmit the loads to competent strata at depth, reducing the potential for such failures. As mentioned previously this solution has been used in very similar applications previously. Design challenges including the limited shear capacity of the individual micro piles can be addressed (e.g. use of micro pile clusters or upsizing to mini piles in particular areas). There is no reason to believe this approach cannot also be successful on this site.	Noted that further work will be required for investigation and design at a later date.	Closed
24	77			There seems to be a relatively low allowance for additional investigations. While we are not privy to all of the existing information, 2 boreholes and 1 CPT would seem to be very light to investigate something like 2-3 hectares of fill up to 55m deep. Have GHD considered whether DMT (dilatometer) testing of the fill would be preferable to CPT? Similarly shallow hand dug test pits o the northern quarry mound would seem to be inadequate unless there is extensive existing data.	As mentioned in response to earlier comments provided above; settlement monitoring has been ongoing for three months, and the materials used for infilling are expected to be granular with a relatively uniform grading and grain size. Note it was not suggested that only one CPT position would be completed (Section 8.5 of the report) but the field work would be completed in one week and involve two boreholes and CPT. GHD's expectation is that multiple CPT positions would be completed within the one week time scale for site works. DMT may also be considered at a later date, however given the very encouraging settlement performance of the placed fill material thus far, extensive specialised testing is considered less likely to be required. The suggestion of shallow hand dug pits in Section 8.2 was more related to the access difficulties in the area. Since the Geotechnical Report was issued geophysical survey (seismic refraction and GPR) has been conducted in the area combined with test pit excavations using a spider excavator. This data combined with historical records of the underlying rock bench profile will inform any refinements to slope stability models in the area in question prior to issuance of a Construction Certificate.	Noted.	Closed
25	Whole document			Within this geotechnical report, there appears to be a lot of flicking between RMS and limit equilibrium approaches, with references to the AGS risk assessment approach. However, apart from one reference to the risk likely to be above the tolerable limit, there does not appear to be an overall assessment of risk to life to users of the quarry/parkland where the risks to the persons at risk (and risks to property) are systematically combined to provide a measure of total risk. We consider that a risk analysis based approach would be essential for this type of public space. Would GHD please advise whether they do not require such an assessment would be required to comply with the general and site specific SEARs.	The RMS, limit equilibrium and AGS approaches to evaluating a complex site of this nature are not mutually exclusive approaches, they are complimentary. RMS and AGS guidelines take consideration of limit equilibrium calculation outcomes and the RMS guidance also includes elements of AGS type assessments. GHD considers it is appropriate to explore a range of different approaches for a challenging site of this nature in order to maximise the opportunity for the safe use of this unique urban space for the community in future. GHD considers that sufficient work has been undertaken using a range of industry accepted complimentary approaches to demonstrate that a suitably risk managed outcome, which combines engineering and maintenance, monitoring and exclusion protocols is achievable. The exact final details of engineering measures and risk management approaches adopted will evolve to an extent until the Construction Certificate is issued. However, GHD do not consider that process will materially influence the proposed scheme as currently presented for the reasons given above.	1. While we agree that differing risk assessments have their place in assessing landslide risk on a complex project such as this, where we do not agree is that the AGS 2007c guidelines have not been fully complied with. The risk to a park user (including maintenance workers and visitors) requires the summation of risk to a person from all of the hazards. Currently an AGS2007c assessment of risk has been provided for the northern and southern walls, though to assess the risk to the person most at risk, the components of the risk associated with the person most at risk accessing the quarry, risk from the southern access track and risk from instability of the northern spoil mound must also be added to determine the total risk which is then compared to the tolerable and acceptable risk levels.	Full assessments and details will be provided leading up to and prior to issuing a Construction Certificate. GHD has now been engaged to undertake the detailed design which includes detailed design level risk assessments where required with corresponding design responses to meet 'new build' criteria where required or a risk management approach in established areas (stabilisation measures, drainage improvements, monitoring and preventative maintenance schemes and the like). These principles will be applied to all relevant areas of the site in tandem with developing an understanding of the nature of the 'person most at risk' as the park usage aspirations are also developed.

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						2. GHD should also provide justification for using the 'Existing Development' critera for this comparison. While this is suitable for during the construction period where it is compared with 'tolerable risk', we consider that the completed project would have to be considered to be new development as it comprises additional structures and a new land use. We also consider that the new development should meet 'acceptable' risk criteria rathern 'tolerable' risk (acceptable risk is one order of magnitude lower risk). However, we also note that the Council as the 'owner' and the Department of Planning as the 'regulator' can accept increased risk levels.	Each structure, usage and area of the site will be evaluated on a case by case basis commensurate with the level of intervention required to achieve stability outcomes in defining whether existing or new development criteria apply. GHD have commited to establish a project risk register as an integral part of the park design development ,where project risks both generic and relating to specific areas will be listed evaluated and design or control measures developed accordingly with the full engagement of regulators. Under such an approach it is not intended regulators will be asked to "accept increased risk levels" but rather appropriate risk levels will be assigned based on the relevant data and engineering requirements on a case-by-case, documented and transparent basis to provide the required confidence to regulators.
26	Whole document			There are also quite a number of typo's in the report including note numbers on tables which do not match the notes underneath etc, and it would probably be worth GHD going over the text before the report is finalised.	Noted ‘typo’s’ [Sic: typos] are normally removed as part of GHD’s internal review process but the process is not infallible.	Noted.	Closed

Biodiversity impact assessment

Page No.	Heading	Paragraph/ dot point	Comment made by Eco Logical	Eco Logical Recommendation	GHD response
i	Executive Summary	4	The report says "14.83 ha would be retained within the wider Hornsby Quarry site". The wider Hornsby Quarry site is not defined and so it is not possible to judge what this really means. Stating clearly the size of the wider Hornsby Quarry site here would allow the reader to understand what is meant.		"The wider Hornsby Quarry site" refers to the area identified on Figure 1.1 as "The site". "The site" is also defined in Section 1.4, dot point 1. The wider Hornsby Quarry site is 62 ha in size.
i	Executive Summary	6	It is stated that only small hollows are to be removed, but small is not defined and could mean very different things to different people.	Define the size of the hollow to clearly indicate why it is small.	Hollows are identified as "up to 10 cm" in size in Section 4.3.2 Fauna habitats (paragraph 3 of row 1 in Table 4.5). Given this is the executive summary, that level of detail is not considered necessary.
ii	Executive Summary	2nd dot	A recurring issue with this report is its confusing definition of vegetation condition. It is stated that 0.74 ha of poor condition vegetation is to be removed, but later notes that this vegetation has a range of conditions, not all of which is poor. So the quality of vegetation looks may be devalued over its true state.	Be consistent in the terminology of the vegetation condition. But note that there looks to be a strong case to break up the 0.74 ha into more condition classes (see later points).	Additional information can be provided in Section 3.3.3 (current survey methods) and Section 4.2.2 (vegetation) that defines vegetation condition more clearly. Notwithstanding, this level of detail is inappropriate in an Executive Summary.
ii	Executive Summary	2	This is a very vague statement and mirrors the problem noted in regards to addressing the SEARs. The statement simply says that some area of vegetation will be revegetated in some way at some point in time in the future. None of this is detailed or specific and leaves no way for Council to	Be specific in stating how large an area is to be revegetated and what level of condition it should reach and when. This is important detail as it shows just what improvement is intended compared to what is being lost.	More detail can be added at Hornsby Shire Council's (HSC) discretion in Section 6.2.2 regarding revegetation, however given this is identified as a separate project that will be the subject of a separate assessment, this is not necessarily appropriate for inclusion in any level of detail as part of this assessment.

Page No.	Heading	Paragraph/ dot point	Comment made by Eco Logical	Eco Logical Recommendation	GHD response
			demonstrate what targets are being aimed for and so if the proposed regeneration would achieve any outcomes.		Specific details of revegetation are not suitable for inclusion in an executive summary.
ii	Executive Summary	3	The word **gen** looks like it should be removed.		Minor spelling error. Does not change findings or outcome of assessment.
ii	Executive Summary		Species are to be sourced from Blue Gum High Forest. This does not guarantee local provenance, which is preferable to avoid mixing up genetics and ensures plants suited to local conditions	State that species will be sourced from Blue Gum High Forest within the local population.	Not appropriate to collect seed from the local population within the construction footprint, given it is of unknown origin.
ii	Executive Summary		The statement that rehabilitation will use salvaged fauna habitat features is again very vague and does not provide any clear guidance as to what is to happen. So there is no clear way to fail implementing rehabilitation as what is to be done is not clearly stated. If it is just logs it will not be anywhere nearly as effective as moving logs, hollows and rocks.	State exactly what features are to be moved and what the expected amount of effort is that will be completed.	This level of detail is not appropriate in an Executive Summary. Section 6.2.1/Table 6.2 outlines the need for a flora and fauna management plan as part of the CEMP, which will incorporate the recommendations provided in Table 6.2, which include salvage of habitat resources if practical.
1	1.1	1	Was the quarry ever open to the public? I don't know of many quarries that have public access.	If it wasn't then change the statement or clarify the true extent of access.	This doesn't change the outcome or findings of this assessment and is purely a description of the current state of the quarry.
6	Table 1.2	3rd cell	Should be "In determining <u>an</u> appropriate offset package".		Minor spelling error. Does not change findings or outcome of assessment.
10	2.1.1	1	Should Environment Planning and Assessment Regulation be in italics?	Italicise if needed.	Minor formatting issue. Does not change findings or outcome of assessment.
12	2.1.4		There is no mention of Key Fish Habitat Map. I appreciate that there is nothing obvious on site, but it should still be consulted as	Consider consulting and including a statement about the DPI Key Fish Habitat Map.	Unnecessary at this point given no key fish habitat on site. GHD assessed the current state of the site, not what was in

Page No.	Heading	Paragraph/ dot point	Comment made by Eco Logical	Eco Logical Recommendation	GHD response
			it may indicate that there was once habitat that has now been lost/degraded by the Quarry.		place prior to the site being used as a quarry in the early 1900s. Section 4.3.2, Table 4.5, Aquatic Habitat notes that "No key fish habitat is present within the site. Berowra Creek, located downstream of the site, is mapped as having a freshwater fish community in fair condition (DPI 2016)"
13	2.1.5	2	The mentioning of finding one priority weed is out of place. That is a result and should be included only later. For consistency this section should only talk about legislation needing consideration, not outcomes.	Remove this paragraph.	All other legislative context sections discuss how the legislation was considered or relevant to the proposal, so it isn't out of place to discuss how the Biosecurity Act was considered as part of the assessment.
15	3.3.1	Dot point 1	In relation to a previous ELA field survey it says, "much of which is encompassed by the project site for this project, but has been excised from within the project site boundary". This is a very confusing statement to me. What has been excised? The area that was surveyed? The data for the surveys? I think it means that the area considered in the ELA study is interconnected with this project's site boundary, but has been removed from consideration for this project – maybe because it has been dealt with by that approval? I am not sure what it is saying and why the data would still not be valid to consider and maybe it has been, or it has been excised. And based on Figure 4.1 much of represents no more than	Clarify what is meant by this statement.	The ELA site is identified on Figure 1.1 as "NorthConnex impact area". This is the "construction footprint" identified in the ELA (2015) report, which was approved for the Hornsby Quarry Road Construction Spoil Management project and as such, was not included for additional approvals as part of this assessment as impacts on this area had already been offset. As such, this area was 'excised' from the report for the vegetation loss calculations. The construction footprint considered by ELA overlaps with a lot of the current site boundary. Ecological data collected by ELA was considered in this assessment, where relevant, and where it hadn't been lost to the NorthConnex project works. The current project site (ie area of disturbance) is 18.92 ha.

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			20% and probably closer to 10%, which does not sound like "much", rather a small proportion.		The NorthConnex impact area is 11.18 ha. The area of the project site overlapped by the NorthConnex impact area is 9.84 ha, which represents 52.02%.
15	3.3.2	Dot point 1	What is meant by floristic surveys? There are a wide range of floristic survey methods and such a simple statement makes it unclear what actually was done and so the extent and effectiveness of the work undertaken; Meanders? Transects? Rapid data points? This contrasts with the next point which says biometric plots – which are very specific.	Provide specifics on what the floristic surveys actually consisted of.	'Floristic survey' was the overarching term used by ELA (2015): "Floristic surveys as part of the plot / transect survey plots (20 metre by 20 metre quadrats)". The term "floristic survey" is also used in the ELA (2015) summary or survey effort. To be clear that the current assessment relied upon the past work of ELA, AECOM and Kleinfelder, their respective terms were used to describe survey effort to date.
16	3.3.2	1	What is the wider Hornsby Quarry site? This is not defined by the report and could mean anything. It is important to know just what areas were covered and what were not and how relevant the surveys would be for this study. Is this within 50 m or 500 m or 5000 m? Is the wider Hornsby Quarry site actually defined by anyone anywhere? I presume it means all areas of the Quarry that are being subject to assessment and redevelopment, but I cannot tell from this report.	Define and clearly map the meaning of the term "wider Hornsby Quarry site".	The "wider Hornsby Quarry site" refers to the area identified on Figure 1.1 as "The site". "The site" is also defined in Section 1.4, dot point 1. The wider Hornsby Quarry site is 62 ha in size.
16	3.3.3 Site stratification	1	It is stated that native vegetation was divided into vegetation zones which represented a distinct PCT and broad condition state. A PCT	Define what is meant by a broad condition state. Justify the reason for choosing to use a broad condition state in	Vegetation types were split into 'Moderate/good' and 'Low' broad condition states according to the criteria

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			is a very defined unit, but why then use a broad condition state and what is a broad condition state exactly? There are specific condition classes and why not separate them out into those classes? I say this because later there clearly is a combining of several condition classes into one, with no justification for doing so and it has some potential problems. the BAM provides 'Broad condition state: areas of the same PCT that are in relatively homogenous condition'. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score. Given the very mixed nature of vegetation was this appropriate to do? Might be, but there is no real detail or discussion provided on this point. This is done under BBAM of course, but condition is still a consideration under BBAM that needs to be clearly defined and justified so that following assessments can be confidently carried out.	the manner that it has been. Show that using a broad condition states has not resulted in areas of vegetation being clumped that could reasonably be split using a different approach and, if this could be the case, why the approach used here is suitable.	specified in the BBAM, with Moderate/good vegetation featuring native over storey cover and/or predominantly native groundcover (OEH 2014). Moderate/good condition vegetation zones that included notable variation in vegetation structure or other indicators of condition were further split into the following groups as appropriate, based on the condition of vegetation on site. • Moderate/good – high • Moderate/good – poor Condition states are largely arbitrary and simply serve to split up the same PCT into different condition states. As a general rule, they only need to be relative to condition states within a particular site. Vegetation that was primarily composed of remnant stands of vegetation with natural regeneration on relatively intact landforms was mapped as 'Moderate/good – high', while vegetation that was primarily composed of revegetation (identified by trees of the same age class planted in rows) with occasional regeneration, was mapped as 'Moderate/good – poor'. The division was considered appropriate given the uncertainty over the provenance of the revegetation, and the presence of weed infestations and below-benchmark conditions across all condition markers in this vegetation type.

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16	Plot/transect surveys	2	The number if plots chosen was based on the initial site stratification. I presume that this was designed to meet survey effort provided in the BBAM, but was that the case?	State if the chosen number and placement of plots was designed to meet minimum survey effort set out in the BBAM.	The first sentence states "Plot and transect surveys were conducted in the project site in accordance with the BBAM". This reaffirms that the survey effort was designed to meet the requirements of the BBAM.
16	Targeted threatened flora surveys	1	Who were the GHD ecologists who used their experience and judgement to decide on habitat for threatened flora? Were they the same people who attended the site? What were their relative skills and experience with the flora under consideration? It would be valuable to demonstrate that they did have those skills to ensure that all potential plants were appropriately considered. Many surveys are done by the most junior staff possible to keep costs down. Those people generally do not have much experience and knowledge and can represent a risk in undertaking assessments. I don't know if this is the case in this study, but the easy way to show the risk does not exist is to detail the skills of the team members making the decisions and surveys.	State who the GHD ecologists were, note which aspects of work they completed and their relevant skills/experience for that, whether they were BBAM accredited and/or where all of this information can be found. This is a relevant point for all surveys as no details are provided on who did the surveys and what their level of skill was. Detailing this would confirm the staff used were suitably qualified and experienced for the required works.	Field staff were as follows: Two senior GHD ecologists (one fauna specialist, Dr Kirsten Crosby; one botanist, Kath Chesnut) and one graduate botanist; Bridie Halse). Both senior ecologists are BBAM accredited. At the time of the field surveys, the senior botanist had nine years' experience as a consultant botanist, primarily in the Sydney Basin bioregion, as well as three years as a bushland regenerator throughout Sydney. The two senior ecologists were responsible for completing all reporting and BBAM credit calculations. The graduate ecologist was on site to provide assistance to the two seniors, and then completed data entry and formatting assistance with reporting. Credit calculations were reviewed by the GHD team leader of biodiversity offsets (an accredited BBAM assessor), and the biodiversity report was reviewed by the GHD team leader of biodiversity in NSW and ACT. GHD considers that the above staff have suitable experience to complete the assessment.
18	Anabat surveys	1	It is not stated who completed the anabat analysis and what skills they have in bat call identification. This takes some skill to avoid incorrect identifications or having	State who completed the analysis and their skills and experience in doing so, or where those skills can be found.	The Anabat analysis was completed by Craig Grabham, a senior GHD ecologist who specialises in bat survey and assessment, with over 20 years' experience in ecological survey and

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			to produce a larger proportion of uncertain identifications. The person also has to have a good call library and understanding of that library to be accurate. The actual anabat effort, one evening, is really well below what is normally completed and would not be enough to make any decisions on. I presume that this is because other bat detector work has been completed, but this is not clear.	State how much ultrasonic bat detection effort is available overall for this project to make its assessments on.	assessment. Craig has completed the following training courses: • Anabat system training course (Titley Scientific, December 2012) • Wildlife Accoustic's Song Meter/SongScope training (Faunatech, July 2015) Craig has completed echolocation (ultrasonic) analysis and reporting for over 150 GHD projects from WA, NSW, NT, QLD and Vic. Section 3.3.2 of the report notes the survey effort completed by ELA and Kleinfelder. This survey effort and information was built on by the GHD surveys. ELA (2015) completed 2 nights of overnight anabat surveys in December (December 15 and 17, 2014): "two Anabat detectors were placed in four separate locations (Figure 3) over two separate nights on the 15 and 17 December 2014. Each Anabat device was programmed to begin recording prior to dusk at 1800hr and turn off the following morning at 0600hr." Kleinfelder (2017) did not complete any anabat surveys. ELA (2015) stated that "The survey revealed that there were no Large-eared Pied Bats present" and that *Chalinolobus*

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					dwyeri (Large-eared Pied Bat) “was not detected and there is unlikely to be breeding habitat present. Therefore this species is excluded from further assessment and an offset is not required”. Further, the ELA (2015) report only considered *Chalinolobus dwyeri* (Large-eared Pied Bat) and *Pteropus poliocephalus* (Grey-headed Flying-Fox) as having a ‘potential’ and ‘likely’ respectively likelihood of occurrence in the study area. In acknowledgement of the amount of anabat survey completed, GHD took a conservative approach and considered the following microbat species to have the potential to occur on site, given the presence of suitable habitat, possible anabat call ID and/or previous records in the locality: • Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*) • Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) • Eastern Freetail Bat (*Mormopterus norfolkensis*) • Greater Broad-nosed Bat (*Scoteanax rueppellii*) • Little Bentwing Bat (*Miniopterus australis*) • Yellow-bellied Sheathtailed Bat (*Saccolaimus flaviventris*) The biodiversity assessment was completed on these assumptions.

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					Given OEH's agency requirements recommended that the Biobanking Assessment Methodology (BBAM) (OEH 2014) be used to determine the quantum of offsets required to compensate for residual impacts on biodiversity, this approach is considered acceptable.
18	Spotlighting and call playback	1	One large hollow-bearing stag was viewed. What is large? The size helps to determine what species might or might not use the stag and stating what size classes are being used in this report will clarify this.	Include the size of the stag that was surveyed and confirm that it was the only one in the large size class suitable for owls and larger mammals.	The large stag surveyed was outside of the site (but within the wider study area). This tree had one spout of about 20cm diameter. No evidence of usage by owls (eg whitewash, pellets, feathers, etc) was observed under this tree. The five hollows present within the site are all less than 10cm in size.
18	General		There is no summary of survey effort on which all of this assessment is based. Three different surveys are noted, but only effort for the GHD survey is provided. One night of call playback and one night of Anabat work is well below standard, presumably this is because it is being combined with the other works, but these are not detailed. They should be as the level of work completed determines the confidence in the results. There is no means at this time of determining if the work relied on meets minimum survey standards.	A table should be included that provides details of all of the surveys being used to complete the current assessments and details total survey effort for each technique.	Section 3.5 states that "Surveys carried out by GHD built on previous work conducted in the Hornsby Quarry site by Ecological (2015) and Kleinfelder (2017)." Throughout this assessment, GHD has taken the conservative approach and has not discounted species from occurring due to not finding them on site as a result of insufficient survey effort. Rather, if suitable habitat is present, and there are local records, the species have been considered as potential candidate species and assessed as such.
18	Aquatic habitat assessment		It is stated that habitat descriptions were documented	Either more clearly state what the method was that was	The rest of the paragraph continues on to say:

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			with reference to AUSRIVAS and Turack et al. But what does that mean? The approach may be reasonable, but there is not the information to know if the work provided a suitable approach to undertaking an aquatic habitat assessment.	used or refer to where the methods can be read and assessed.	‘and included assessment of different instream habitat types, and the structure and condition of riparian vegetation. The information recorded was used to describe the nature of aquatic habitats present within the study area, and identify any areas of potential habitat for threatened aquatic fauna species or key fish habitat. Descriptions of aquatic habitat were based on visual estimates of characteristics such as streambed composition (percentage of total composition for each substrate category), aquatic and riparian vegetation cover, amount of in stream organic material, and area of aquatic habitat and canopy cover. Estimates of channel morphology characteristics were made including width (wetted width in metres), bank full width (mean width between top of banks), and estimated depth.’ These are the habitat characteristics identified in Turack, E., Waddell, N., and Johnstone, G. (2004). *New South Wales (NSW) Australian River Assessment*

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					System (AUSRIVAS) Sampling and Processing Manual 2004 for the visual assessment of aquatic habitat.
21	Sydney Basin Diatremes	1	The information provided suggests that the local diatreme environment is relatively unique – "they always contain locally different landform, soil and vegetation". Based on this, any part of the diatreme that is affected is affecting an area that is actually not to be found anywhere else outside of the local diatreme. This indicates that the local diatreme has much greater importance that would be normally the case when assessing impacts to vegetation and the environment. It is not clear that this has been taken into any further consideration later in the document.	Detail how different and unique the local diatreme is compared to other diatremes in the Sydney Basin to demonstrate if it is or is not so unique that it should be considered as the only representative of its type or can be reasonably combined with other diatreme areas. Smith and Smith (2008) pages 18 and 49 could be relevant here.	Smith and Smith note that a total of 14 ha of Blue Gum Diatreme Forest occurred within the Hornsby LGA in 2007. The proposal will impact about 0.74 ha of this, or about 5% of the remaining amount. Notwithstanding, the assessment conforms to the legislative impact assessment requirements.
22	4.2.2	2	It is stated that vegetation was split into broad condition states yielding the vegetation zones as shown in Figure 4.1. Table 4.2 indicates that the broad condition states are moderate/good-high and moderate/good-poor. Why broad condition states? Why not finer states? Using broad states leaves the potential that important vegetation distinctions are not being made. It looks to be most important here in that all of the Blue Gum High Forest has been rated as poor. Would a less broad	Explain the reasoning for using broad condition states. It may be the word broad is misleading, but this needs to be clear.	Broad condition states is the standard term used to describe vegetation condition for BBAM assessments that has been routinely accepted by OEH – so much so, that under the new scheme, it is the terminology used and defined by OEH when splitting PCTs up into conditions. Within the subject site, all of the BGHF <u>is</u> in poor condition. Changing the word "broad" will not change that.

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			category result in some of the forest being not classified as poor? Would that then have an impact on impact assessment and offset requirements?		
29	Conservation significance	1	This paragraph (continuing on from the previous page) is vague. There is an assumption made that the lack of natural and intact profile across much of the site means that the vegetation is unlikely to be from remnant or indigenous specimens. What is much of the site? This is not quantified. No specific evidence is provided that shows that the it could not all be regeneration from remnant vegetation. If it is actually regeneration rather revegetation, then the resilience is much higher and the quality of vegetation would likely rate higher. Can regular disturbance or regenerating vegetation result in the same structure as revegetation works? Interestingly, below in condition it states specifically that it was unclear if regeneration of canopy species was a result of natural regeneration, regeneration of planted specimens or recent revegetation works. This is contradictory to the above assertions and does not take a precautionary approach.	Provide clear evidence that this community cannot regenerate from soils disturbed at the level in the quarry. Provide argument that the structure of the vegetation would lead to a logical conclusion that it was planted rather than regenerating.	Vegetation within the study area comprises a mixture of natural regeneration (outside of the subject site), revegetation, regeneration from planted specimens, and rehabilitation. The provenance of revegetation is unclear, and species used for revegetation are only broadly characteristic of those that would naturally occur (eg are sometimes comprised of monoculture stands of River Oak (*Casuarina cunninghamiana* subsp. *cunninghamiana*), which is not a diagnostic or characteristic species of the BGHF community). The topographic location of some patches of vegetation means revegetation is the only likely and sometimes feasible source of vegetative cover, as are the benched landforms and unnatural topography resulting from quarrying activities. In some instances, it was unclear if regeneration of canopy species was a result of natural regeneration, regeneration of planted specimens of recent revegetation works, given the lower topographic location (ie below stands of intact vegetation outside the site that could be contributing to seed banks, supplementing the vegetation that has been planted on site.

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29	Condition	1	It is stated that planted vegetation includes species that are broadly characteristic of the community. How then was it determined it was planted vegetation? Seems to be unclear what class the vegetation falls into.	Clarify how this vegetation was known to be planted vegetation or assume it was not and alter the assessment accordingly.	In this instance, broadly is used to describe a vegetation type that is only broadly characteristic of the vegetation type; ie, some species on site do not naturally occur in the vegetation community, or key diagnostic or characteristic species are missing within the subject site, despite their presence outside of the subject site and study area. It was determined that some patches were planted because they were clearly planted in rows, were of an even age class, lacked natural diversity, and were located on benched landforms that were not naturally formed, and/or which were comprised predominantly of ballast. Historical photos provided by HSC of the quarry site clearly demonstrate the areas of land that were cleared of vegetation and which were the subject of significant landform modifications from the 1960s onwards.
30	Overstorey	1	This cell seems to be clear in stating that the trees must be planted because they occur in rows. This would be a fair conclusion to reach, but would there not be records to show this? Which is to say the status of the vegetation in the quarry would be much easier to determine if records of vegetation management were available. Is there not any? And what proportions and areas of each of the monocultures, planted rows and mixed species patches?	Include any records of vegetation plantings and management as references in the report. Justify how the single species areas can be combined as the same condition class as the multi-species areas. Take a precautionary approach and assume the most significant levels of impact unless it is clearly able to be demonstrated otherwise.	As is standard and required in the BBAM methodology, vegetation zones that have an area of less than 0.25 ha must be combined with the nearest possible match in order to complete credit calculations and perform the assessment. Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest (HN596, Moderate/good - poor) was considered to be the best fit for the vegetation included within this vegetation type, hence the range of different types of vegetation that occur within this vegetation zone.

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			Goes back to the comment regarding the broad classification of this community. This seems quite a range of vegetation conditions and styles seemingly lumped together, so how do you justify combining them all into one class? The cell below notes that those mixed overstorey areas also tend to have a more diverse mid-storey – so can it really be the same condition?		
35	Table 4.5	Description	It says that the location of hollows is presented in Figure 4.1. This does not appear to be the case. Looks to be Figure 4.2. How many larger hollows and of what size were located in the surrounding Hornsby Quarry Site? Knowing this would help to understand how likely it is that species that use such hollows may be found using the Quarry site. It would be a much different result if there were 3 tree with five hollows > 30 cm compared with 30 trees with 70 hollows of > 30 cm. Much, much more likely that large hollow using species would be in the area in the latter case. Why are small hollows present not also potentially used by bats?	Include the locations in Figure 4.1 or provide the correct figure. Detail the number of larger hollows present within the surrounding area. Can do this as numbers of hollows in small, medium and large size classes. Include an explanation as to why bats would not use the smaller hollows.	Typo. As per comment, should be Figure 4.2. Figure 4.2 provides the locations of hollows within the study area. The assessment does not rule out species that use hollows of different sizes (eg Powerful Owl and microbats) from using the wider Hornsby Quarry area, but it does rule out species that require large hollows from roosting/nesting within the subject site given the lack of large hollows within that area. The report states that “Hollow-dependent fauna recorded at the site that could use hollows present included various microchiropteran bats” (Section 4.3.2, Table 4.5, page 36, row 2, paragraph 3).
38	Table 4.5	Aquatic habitat	If there is water that an Emerald Spotted Tree Frog can call from, then why can there not be Green	Explain why the Green and Golden Bell Frog could not be present.	One small concrete pond of about 2 m x 2 m was present and contained emergent vegetation. No Green and Golden Bell

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			and Golden Bell Frogs in the Hornsby Quarry Site? There may be good reasons, but this species appears to have been over-looked and the habitat certainly is potentially suitable given that this species is very well known for living in highly disturbed environments. Whilst it is likely that the presence of surrounding development is reducing water quality in the creeks and gully lines, this is not really an assumption that can be made when considering impacts to threatened species. If there is no evidence to show the water quality is reduced then it should be assumed to be still acceptable.	Provide clear evidence that water quality is reduced to unsuitable levels or assume it is suitable for frogs to breed in. Then reassess the potential impacts.	Frogs were heard or observed. No other potentially suitable habitat is present at the site, or in downstream sections of Old Mans Creek near the site. There are no records of the species in the Berowra Creek catchment area in the last 20 years. ELA (2015) considered that this species was unlikely to occur in the site, given there was no suitable habitat on site. GHD concurs with this assessment, especially given the quarry void itself was not within our area of consideration.
43	Table 4.7	Powerful Owl	It says that the hollow-bearing trees present tend to have small hollows. What does that mean? How many hollows actually are not small? Previous statements suggested that there were no large hollows present in the immediate area.	Clarify what is meant by tend.	Reflects the young age classes of the trees in the subject site, that have not had time to develop large hollows. All hollows within the subject site are less than 10cm in size.
48	5.1.1	1	It is stated that around 15 ha of Blue Gum High Forest will be retained. 0.74 ha will be lost. That is 5%. Justify why 5% of the loss of this vegetation type, which is a Critically Endangered Ecological Community, is suitably described as only a minor reduction. If I cut out 5% of a budget or pay-check I doubt that people would see that	Justify why the loss of 5% of the CEEC can be viewed as only a minor reduction.	Removal of 5% of the vegetation classified as BGHF from within the Hornsby Quarry site is necessary in order to rehabilitate the quarry by creating a landform suitable for a public reserve and recreation facility. It is a loss of a CEEC, however in the long term it is expected that this will have a positive outcome for the community as Council will be better able to manage the remainder of this

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			as a minor reduction. Remember that this is on a diatreme and is probably unique compared to other areas of Blue Gum High Forest for that reason. This could look rather dismissive of the impact to a highly threatened community. Only 19 more minor reductions and there will be none left! Not very minor then is it.		vegetation on site, and are likely to increase the overall amount of this vegetation through revegetation in the future. The impact is considered minor in that there will be no removal of remnant vegetation, rather removal of revegetation, regeneration from planted specimens, and rehabilitation areas. Future rehabilitation will aim to improve the condition of the vegetation for the long term, through the use of near natural soil profiles, use of locally sourced plant stock and weed management.
48	5.1.1	2	It says "a number of priority or environmental weeds" have been recorded. What is that number? This can be specific and so clearer. It is also stated that "a small number of individuals of non-threatened plants and noxious and environmental weeds" will be removed. What is a small number? I expect that it may be very hard to quantify, in which case stating the number is small has little meaning. Why not just use the area of land to be cleared, unless the actual number of plants can be quantified? Noxious has been replaced in the Biosecurity Act by State priority, regional priority and other regional priority weeds as indicated in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022.	Provide the exact number of weeds recorded. Note the area of land to be cleared rather than an indeterminate small number. Use the suggested weed categories if they are relevant.	Three priority weeds were recorded, as outlined in Table 4.4 in Section 4.2.3. With regards to the statement "a small number of individuals of non-threatened plants and noxious and environmental weeds" [will be removed], the statement is perhaps poorly worded, likely reflecting editorial changes in track changes not properly accepted during the review process and would better read "Vegetation clearing would remove a small area of native vegetation, that supports priority and environmental weeds." The sentiment of the statement is correct.

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			There are also Weeds of National Significance at Commonwealth level. Would it not be better to classify the present weeds according to these criteria?		
48	Impacts on Blue Gum HF	1	It is stated that much of the vegetation has been planted as part of previous rehabilitation activities. What is much? More importantly, this does not fit with other sections of the report that suggest it is not clear what areas have been planted and what may be regeneration. There is a lack of consistency in the reporting in this regard and, as mentioned, this is an important point to understanding the relative quality and importance of the Blue Gum HF to be cleared. If it is regenerating naturally it is likely to be much more resilient and significant as a community than if it is planted. This needs to be clarified and the decision on what is planted and what is regenerating consistent and justified.	Quantify what percentage/area is considered or known to be planted. Be consistent through the document as to what is determined to be regenerating vegetation and what is planted vegetation and have an initial clear justification for these categorisations. If there is uncertainty, be cautious and assume it is natural regeneration.	It is likely that some of the confusion experienced by the reader has resulted from a reduction in subject site size following completion of the first draft of the report. The previous subject site was larger and encompassed areas of the site where the source of vegetation was less clear. Within the current subject site, it is more obvious that vegetation is planted, for reasons already discussed. While there is some regeneration of vegetation mapped as BGHF, the BGHF that is regenerating is planted, rather than remnant or natural regrowth, and as such, is not considered to be resilient or significant.
48	Removal of habitat resources	1	How extensive are the “extensive areas of similar habitat in surrounding protected areas”? It is much clearer what extensive means when the numbers are actually provided and a much better argument that it is extensive. The same for the following paragraph where it	Provide the actual area. Page 47 states that there is over 19,000 ha in Berowra Valley National Park and so this is a good option.	Given the report states that 19,000 ha of vegetation is protected in the nearby Berowra Valley NP on the previous page, as noted by the reviewer, it is clear that there are extensive areas of similar habitat in surrounding protected areas.

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			says, "Large areas of better quality habitat".		
49	Removal of habitat resources	1	It is stated that rehabilitation would replace **many** of these resources. This is a very vague and unquantified statement. Especially so given that the details on the actual site rehabilitation are extremely vague as to what is going to happen (see later issue).	State the area of rehabilitation that will occur and contrast it with the size of the area that is being removed. Note what habitat features are to be included as part of the rehabilitation to clarify which features are the ones being replaced.	No detailed information was available on the proposed rehabilitation at the time of writing. This will be determined at some point in the future when plans for the site are finalised and approved.
49	Fauna injury and mortality resources	1	Displaced fauna will also suffer stress from a loss of known and familiar feeding and shelter habitat and will likely need to invade the territories of other individuals, leading to conflict and other displacements.		As noted in section 5.1.1, displaced individuals may suffer stress, increased energy costs or increased risk of predation.
50	Weed invasion and edge effects	3	How much would revegetation reduce edge effects? Giving a number assists the reader to understand how effective the revegetation can be expected to be. There will still be edges even if the vegetation grows up. Presumably this means the extent of edges will be reduced as gaps and fragmentation is filled in.	Provide an estimate of how much the edge effect will be reduced in the long-term.	No detailed information was available on the proposed rehabilitation at the time of writing. This will be determined at some point in the future when plans for the site are finalised and approved.
51	Pathogens	1	There is no indication that the surveyors actually looked for pathogens or would know what the effects would look like. Therefore, the line stating that no evidence was seen could be misleading as it suggests that	Clarify the effort made to look for signs of pathogens, if this was undertaken in any systematic way. Or remove the suggestion that signs of pathogens were looked for.	Both senior ecologists are familiar with the signs of dieback associated with phytophthora and myrtle rust. The senior botanist spent several years working in areas infected with phytophthora in lands owned/managed by the Sydney Harbour Federation Trust and in Sydney Harbour

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			they did look. If they did look, then there should be a description of that activity to indicate what sort of pathogen search was conducted and by whom. If there are other processes in place that provided that information then it has not been included and should be.		National Park around Bradleys Head and Middle Head where there is extensive dieback associated with this pathogen, and became familiar with the signs of this pathogen. There was no dieback likely to be associated with phytophthora evident at this site. The senior botanist completed an honours thesis on the impacts of psyllid attack on eucalypts and is very familiar with the signs of bell minor associated dieback (BMAD) and psyllid attack. While not a pathogen, this would also be discussed in terms of dieback if present, in the vegetation condition descriptions. Myrtle rust is generally easily identifiable, and both senior ecologists are familiar with the signs of infection, having worked extensively along the east coast of NSW since it was first detected in 2010. It is standard practice to note the presence of dieback (if present) when discussing the condition of vegetation. Survey effort associated with this is always opportunistic while traversing the site, unless otherwise required by the scope of the project.
51	Dust generation	1	Same comment as above. There is no indication that dust was specifically looked for and recorded so the comment that it was not evident may be misleading.		There was no evidence of dust on the leaves or foliage of plants within the subject site. Should it have been obvious or present, it would be discussed in the existing environment section of the report (Section 4). Both senior ecologists have worked in environments were dust is evident, such as areas adjacent to quarries and landfills in the past.

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52	Noise	1	How unlikely is unlikely? This seems to be a bit of a throwaway line. Have there been no noise studies to determine if noise will remain the same or increase over that produced by the NorthConnex work? If not, then such a statement is speculation and should not be made. On that point, how are they reshaping the quarry in future to allow development into whatever the design is that is decided on? If blasting or excavating walls, this could easily be louder than truck movements.	Provide justification that noise levels will not increase or be different.	The noise generated by works associated with the infilling of the Hornsby Quarry void by NorthConnex spoil was significant and fairly constant during the day. Noise impacts are discussed in the noise section of the EIS. There was no information available on likely methods for reshaping at the time of writing. This information would be available once the plans for the site are finalised.
52	5.2	1	This is not a detailed assessment of cumulative impacts. Statements that “recent projects include” and “other developments” are very non-specific in nature. It provides no indication of exactly how much impact other actions are having or have had or may have in the future. Are other projects likely to remove more Blue Gum High Forest? This section provides no indication one way or another. Has much been removed by the Thornleigh Third Track and NorthConnex? What happens if both of those removed 10 ha each of Blue Gum High Forest and this now means that the extent has dropped recently by >50%. That would put a different	A much more detailed review that lists all of the relevant projects that have or are impacting similar vegetation types within the wider Hornsby Quarry site (whatever that is). Then compare the expected increases as a result of revegetation resulting from this project with that removed by the others.	There is no legislative requirement under BBAM to provide a detailed assessment and review of cumulative impacts associated with a proposal. The report identifies that major projects such as Thornleigh Third Track and NorthConnex would have had an impact on vegetation and habitats in the locality. The Thornleigh Third Track project identifies the cumulative impact of projects in the locality on BGHF as being 3.3 ha, or 0.5% of the total vegetation within the region (assumed to be 616.33ha). It is not reasonable to expect the proponents of one project to know the possible impacts of all other projects in the area, when those details are not necessarily publicly available or finalised.

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			light on the remaining vegetation. This review lacks any detail and complete listings of cumulative impacts. It currently does not provide an understanding of what has been happening and will happen.		
53	Table 5.2		The table almost universally provides means to mitigate key threatening processes that are only recommendations or considerations. Which means that they are not necessarily being put in place. If they are not used then the impact assessments could change greatly. There needs to be a statement up front that the impacts of Key Threatening Processes need to be managed and assessments of their level of threat are based on the assumption that the recommended mitigation is to be used.	Include a statement that the current decisions on impact assessments are dependent on mitigation proceeding as suggested and would need reconsideration if the measures as not implemented, if that would be the case.	Wording provided in this section is standard to all GHD impact assessments reports which are routinely accepted by OEH and DPE and is considered sufficient.
54	5.4.1	1	Again, there is no evidence or extent provided for planted vs regenerating vegetation. This needs to be determined or all should be assumed to be regenerating and have greater resilience.	Confirm and justify the quantity of planted vegetation or assume all is regenerating vegetation.	As above.
54	5.4.1	2	As noted before, it is a matter of opinion whether 0.74 ha is a minor loss for this CEEC given this is still 5% of that remaining. Cumulative impacts have not	Justify why clearing 5% of an already over-cleared vegetation type is a minor loss.	Assessments of significance are always subjective. It is the view of the GHD assessors and internal reviewers that loss of 5% of poor condition revegetation commensurate with BGHF is a minor

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			been clearly defined and the actual condition class of this CEEC remains potentially uncertain as it has been broadly grouped and there is no clear understanding of how much is regeneration and how much is planting. This needs to be resolved in order to properly assess the impacts. I would be very reluctant to state that 15 ha of not all directly connected Blue Gum High Forest is extensive. It is already at <5% of what once existed.		loss, especially given the context of this project where the vegetation is planted and further rehabilitation and planting is proposed to increase the extent and condition of the community. Impacts are thus temporary.
55	5.4.2	Dot point 3	Blue Gum High Forest is to be improved. How large an area is to be revegetated? What level of improvement is being aimed for? 100% of benchmark?	Define the extent of improvement	No detailed information was available on the proposed rehabilitation at the time of writing. This will be determined at some point in the future when plans for the site are finalised and approved.
55	5.4.4	1	Statements of small hollows, large areas of good quality habitat and large areas of forest are very non-specific.	Provide an actual number for quantities.	Small hollows defined as less than 10cm in Section 4.3.2. Large areas of habitat are noted to be adjacent to the site, which can be assumed to be Berowra Valley NP, which is noted to be linked to the western portion of the site in Section 4.1.1. Repetition of this information is not necessary.
55	5.4.4	3	The Powerful Owl is stated to be more likely to roost away from the site, even though it has been found roosting at the site. This statement appears to be contradictory and needs clarification.	Explain clearly where the owls would be expected to roost and why.	The Powerful Owl was identified within the wider Hornsby Quarry study area by Kleinfelder, in an area with large mature trees and adequate hollows, and feathers were also identified by GHD. The report states that: “These owl species is likely to forage at the site on a regular basis. A

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					small area of roosting habitat is present, however the species is more likely to roost away from disturbed edges.” Given the lack of mature trees with adequate hollows within the subject site, this assessment is considered appropriate.
56	5.4.4	1	The Varied Sitella has been recorded on the site, yet is considered likely to only be a transient because the vegetation is disturbed. This looks to really be speculation and it would seem more reasonable to precautionarily assume it is present. My understanding is that Paul Burcher has been undertaking a monitoring study of the Varied Sitella along the Mountain Bike Track. That would seem to suggest a local and not so transient population?	Assume the Sitella is not a transient in the area unless this can be clearly demonstrated to be otherwise.	The assessment of significance prepared for this species states that the species has been recorded roosting on site and that it would forage in forest patches in the study area. Similarly, S.5.4.4 notes that the proposal would remove about 2.5 ha of habitat for this species. The reference to transience of this species relates to it being unlikely that the species would rely or regularly utilise the low and poor condition vegetation comprised of disturbed edges within the subject site, and that instead, it would use the better quality, intact, well-connected patches of vegetation elsewhere within the wider Hornsby Quarry site, as well as the 19,000 ha of Berowra Valley NP adjacent to the site, where suitable habitat for prey species is present. GHD does not dispute that the species could be resident within the Hornsby Quarry site, but given the poor quality habitat within the subject site, it is considered unlikely that the species would choose to use that vegetation when better quality habitat is available elsewhere. Vegetation around the mountain bike trails is mature, diverse, connected, well established, and supports a suite of

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					habitat features across all stratum, unlike that within the subject site.
56	5.4.4	2	What are large areas of potential roosting and breeding habitat. May as well quantify to demonstrate clearly what is meant. Assessments were completed for the group of species, not just one species.	Quantify what is large. Change text to group of hollow nesting species.	Large areas of habitat are noted to be adjacent to the site, which can be assumed to be Berowra Valley NP, which is noted to be linked to the western portion of the site in Section 4.1.1. Repetition of this information is not necessary.
57	Table 5.3		Most species have a loss of potential roosting habitat as well as foraging habitat. If the Powerful Owl can roost on the site, so can the others. I would think that the Quarry Habitat is likely to be used by the Grey-headed Flying-fox rather than being potential. Is there any reason they would not forage there? Nothing that comes to mind.	Change to include loss of potential roosting habitat. Justify why the GHFF would not forage in the Quarry vegetation.	Re: Powerful Owl – error resulting from numerous iterations of the report. Previously the site included areas of potential roosting habitat with larger hollows. Site is now smaller in area, and no large hollows suitable for use for roosting by this species are present. Table should read “loss of known foraging habitat”. Re: GHFF – assessment considers that this species is likely to occur (see appendix A) and the proposal would result in the loss of a small area of potential foraging habitat. Species has not been recorded within the subject site previously.
62	Table 6.2		As for Table 5.2, the mitigation is all about should. But what happens if the decision is made to not do these things? Once the approval is provided then what happens if they are not implemented? Probably nothing. I would consider it important to state up front what is essential to	Note that the impact assessments are based on the proposed mitigation being implemented. These would need to be re-evaluated if the mitigation is not carried out.	Standard wording for a mitigation section in an EIS that is widely accepted by OEH and DPE. Mitigation measures are typically used by DPE to write conditions of consent, which provide impetus for implementation for the proponent.

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			carry out and what is not. In this case, what is essential is what mitigation is necessary to ensure that impacts are not significant. If not carried out, the assessments of impacts would change.		
65	6.2.2	1	As noted in the assessment of adequacy of addressing the SEARs, this section is far from detailed when it comes to actions to be taken for mitigation. There is no quantification of the actions to be taken so it could be as little as planting one plant, re-using one log and half a day of managing weeds. There is no detail as to what is proposed, needed and expected to be done so that the value of the mitigation can be understood. I understand that this is to be a separate project, but this assessment cannot be completed without knowing what is actually going to happen with mitigation.	Complete a detailed plan of management for the future Hornsby Park and carry over those determined mitigations into this assessment report. Alternatively make minimum recommendations on what needs to go into the plan of management and ensure that those are met.	The mitigation measures include the requirement for preparation of a Flora and Fauna Management Plan as part of the CEMP. It is outside the scope of this project to complete a detailed PoM for the future Hornsby Park.
66	6.4	1	The lake is suddenly mentioned, essentially the first time in the document. Does it not represent habitat for migratory birds and frogs? Does it's presence indicate potential impacts that need consideration for this reason? Given its last minute mention there has been no real consideration provided on the impacts of its presence before this time.	Note the presence of the lake as aquatic habitat in the initial descriptions of available habitats.	The quarry void is excluded from this impact assessment and as such, details on potential habitat resources associated with it have not been included in this assessment. Impacts to the quarry void were considered by ELA (2015) in relation to the Road Construction Spoil Management project EIS. The final landform will include a lake in the remnant of the quarry void, which is the lake referenced in this section of the report. This lake is not currently in

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					existence, which is why it is mentioned first in this section.
67	7	7	Future revegetation would indeed improve biodiversity values in the long-term, but there is no means to tell what level of improvement, if any will occur because the extent of revegetation is unknown.		No detailed or specific information was available on the proposed rehabilitation at the time of writing. This will be determined at some point in the future when plans for the site are finalised and approved.
68	8		Note that the references have various style and formatting errors. Just for the information of the authors	Choose and stick to one reference style.	Noted. Minor editorial errors.
Appendix A	*Acacia bynoeana*		The species is able to tolerate disturbance and lives on sandy soils, but it is considered unlikely to occur. There is no clear reasoning why this decision is then reached	Clarify why the habitat on site is not suitable.	ELA (2015) excluded this species due to a lack of ironstone gravel within the study area. GHD excluded the species from occurring given its preference for heath or dry sclerophyll forest on dry sandy soils, which does not describe the vegetation types present on site, which are wet sclerophyll forests. Only a portion of the substrate and geology of the Hornsby soil type would yield sandy soils, and the rest would likely be loams or finer. Notwithstanding, the impacts of quarrying activities means soil profiles within the subject site are highly modified and unnatural and lack an intact soil profile or soil seed bank. While sandstone remaining around the edges of the quarry may yield sandy soils, three surveys in the area (Kleinfelder, ELA and GHD) all failed to find this species. This was summarised as “No suitable habitat present on site”.

Page No.	Heading	Paragraph/ dot point	Comment made by Eco Logical	Eco Logical Recommendation	GHD response
Appendix A	Various		Ecological (2015)	Should be Eco Logical (2015).	Noted. Minor editorial error.
Appendix A	*Grevillia parviflora*	Both subspecies	Both are noted that they are able to tolerate disturbance and lives on sandy soils, but it is considered unlikely to occur. There is no clear reasoning why this decision is then reached.	Clarify why the habitat on site is not suitable.	The impacts of quarrying activities means soil profiles within the subject site are highly modified and unnatural and lack an intact soil profile or soil seed bank. While sandstone remaining around the edges of the quarry may yield sandy soils, three surveys in the area (Kleinfelder, ELA and GHD) all failed to find these species. This was summarised as "No suitable habitat present on site".
Appendix A	*Callocephalon fimbriatum*		Minimal breeding habitat present on site is not an informative statement. There is obviously some. How many suitable hollows are there?	State the number of suitable hollows that are present.	No hollows suitable for breeding are present within subject site.
Appendix A	*Tyto novaehollandiae*		Few suitable large hollows present is not an informative statement. There is obviously some. How many suitable hollows are there and how large is large?	State the number of suitable large breeding hollows that are present.	No large hollows within subject site.
Appendix A	*Litoria aurea*		As noted previously, there is clearly currently a pond on site that can represent habitat for this species. Why is it stated that no wetland habitat is present? It might not be in the area of impact, but the frog may still use the impact area for foraging and shelter.	Justify the decision to state that there is no suitable habitat present.	Species excluded by ELA (2015). GHD supports this assessment.
Appendix A	Hollow roosting bats	All species	Minimal suitable breeding habitat present on site is not an informative statement. And what about hollows as roosting habitat? There is obviously some.	State the number of suitable hollows that are present in both categories.	Five small hollows (less than 10 cm in size) are present within the subject site which are suitable for microbats to roost or breed in. Given the large areas of hollows present in the surrounding area,

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			How many suitable hollows are there for both breeding or roosting?		these hollows are a negligible proportion of available roosting habitat for these species.
Appendix A	*Petauroides volans*		Few suitable hollow-bearing trees present is not an informative statement. There is obviously some. How many suitable hollows are there?	State the number of suitable hollows that are present.	There are 5 small hollows within the subject site. Hollows are less than 10cm in size, which is too small for this species to utilise. Species prefers old trees with abundant hollows, which does not describe the subject site. Similarly, prefers tall, montane moist eucalypt forest. Vegetation on site is wet sclerophyll forest, not tall, montane moist forest.
Appendix B	All plants		What do 0 and P refer to when talking about TSC and EPBC status? This is unclear. Why not use the same for fauna?	Be consistent with use of terms and explain what they mean.	Noted. These items should have been deleted during the review process.
Appendix C	Blue Gum High Forest	ci	Says there will be extensive revegetation activities. This is non-descriptive (what is extensive?) and uninformative as this provides no explanation of what exactly is planned. So extensive could be 1 ha, 10 ha or 100 ha. Compared to what is lost, they can be extensive, but there is no way to know. If the assessment of no significant impact is dependent on the extensive revegetation then a minimum acceptable level and quality of revegetation needs to be stated.	Include figures on what extensive is and demonstrate that this can be considered extensive.	No detailed or specific information was available on the proposed rehabilitation at the time of writing. This will be determined at some point in the future when plans for the site are finalised and approved. The assessment of no significant impact was not dependant on reveg/rehab works being completed.
Appendix C	Blue Gum High Forest	cii	Should be native and exotic species.	Change. Confirm that the NP vegetation, including the Blue	Minor editorial error.

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			If the vegetation in the study area is **unlikely** to significantly contribute to florist or genetic composition or variability of other vegetation in the locality, then that suggests that the vegetation in the study site forms the local population. The report needs to confirm that the Blue Gum in the National Park is still part of the study area. It is not entirely clear. This is especially the case when dii states that "the vegetation within the project site is effectively isolated from adjacent and nearby vegetation". If that is the case, is the vegetation in the Project Site not the local population? And, if so, how can the vegetation in the National Park be included in calculations of the area of available Blue Gum High Forest?	Gum High Forest, is actually connected to the Quarry vegetation in a way that they intermix. If it is not, then the report will need significant re-writing.	Berowra Valley NP is immediately adjacent to the western edge of the wider Hornsby Quarry site, as per EIS Figure 4.1, and Biodiversity Figure 1.1. Rationale behind statement that vegetation in the study area is unlikely to significantly contribute to the floristic of genetic composition or variability of other vegetation in the locality is based on premise that vegetation within the subject site lacks floristic or structural diversity compared to adjacent vegetation within the wider Hornsby Quarry area and Berowra Valley NP. Species diversity is below benchmark in all stratum, vegetation provenance within subject site is unknown given it is planted vegetation. The statement provided by the review is missing the word "much". The report states "much of the vegetation within the project site is effectively isolated from adjacent or nearby vegetation" with reference to the surrounding topography and development. However, figures that accompany the report clearly show that vegetation in the western portion of the wider Hornsby Quarry area is clearly connected to adjacent vegetation in the Berowra Valley NP.
Appendix C	Powerful Owl	F	Includes the retention of hollow-bearing trees **where possible**? If not possible would this change the decision on the extent of impacts?	Clarify that the loss of all possible hollow-bearing trees will not result in a significant impact to this species.	Given the 5 hollows to be removed are all small (less than 10cm), the loss of these hollows is not expected to result in any impact to the Powerful Owl.
Appendix C	Powerful Owl	Conclusion	Says the REF proposal. Is this correct?	Change as needed.	Minor editorial error.

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			REF proposal is also used in the profile for the Varied Sitella.		
Appendix C	Varied Sitella	dii	On one hand the Sitella is stated as being relatively sedentary and on the other highly mobile. It cannot really be both. Which one is it? Needs to be consistent.	Change as needed and consider if this alters at all the impact assessment.	LoO table lists species as sedentary. Part 5A assessments notes species is highly mobile. The Varied Sittella is sedentary in that it is a resident in the area not transient or nomdaic. Meaning of 'highly mobile' in this context means the species can fly, so widening a gap by a small area is unlikely to prevent it from traversing through the environment in the same way it would prevent something like a snail, frog or mammal that requires vegetative cover or equivalent to move through the landscape. Does not alter the findings of the impact assessment.

20 Aug 2019

Hornsby Shire Council
Craig Clendenning
296 Peats Ferry Road,
Hornsby 2077

Our ref: 2126457-77347
Your ref:

Dear Craig

Hornsby Quarry Rehabilitation EIS
Response to Renzo Tonin's independent review

1 Introduction

GHD prepared a Noise and Vibration Impact Assessment (NVIA) for the construction activities associated with the Hornsby Quarry Rehabilitation EIS. It is acknowledged that an independent assessment has been undertaken by Renzo Tonin & Associates with comments relating to the NVIA prepared by GHD.

This letter provides a response to the following document: *Hornsby Quarry – Independent Assessment of EIS Acoustic Assessment* - Renzo Tonin & Associates, dated 26 July 2019

2 GHD response to Renzo Tonin's independent assessment

GHD's responses to each of the comments made by Renzo Tonin are provided in Table 1 below.

Table 1 GHD response to the independent assessment

Comment Number	Renzo Tonin's Comments	GHD Response
1	Table 1.1: The first Secretary's Environmental Assessment Requirements (SEARs) condition under the Noise heading states that 'construction noise impacts of the proposal in accordance with the Interim Construction Noise Guideline (DECC, 2009) and NSW Industrial Noise Policy (EPA, 2000) respectively. Note: This has been superseded by the NSW Policy for Industry (EPA, 2017)'. GHD has undertaken the construction noise assessment in accordance with the 'Interim Construction Noise Guideline' (ICNG) and the NSW 'Noise Policy for Industry' (NPfI) [which supersedes the NSW 'Industrial Noise Policy' (INP)], in order to address the SEARs condition for noise. Our interpretation of this SEARs assessment requirement is that the noise monitoring should be undertaken in accordance with the NPfI / INP in order to establish the rating background levels (RBL). On page 12 of the ICNG, the document states that the RBL is used when determining the management level and refers to the INP for details in establishing RBL. Therefore, we believe the use of the NPfI / INP is only to establish RBL and the ICNG is used for determining noise management levels and the subsequent assessment. All reference to and assessment against the NPfI / INP should be removed from the Report.	GHD agrees with RTs interpretation of the SEARs conditions regarding the appropriate document for the assessment of noise from construction activities and considers the NPfI inappropriate. This was stated in the original report and re-confirmed in GHD's letter to Council dated 31 May. Section 1.5 of the NPfI specifically states that it does not apply to "Construction Activities".
2	Table 3-7: In Figures 4.1, 4.4 and 4.5 of the Report, the noise monitoring location NL01 is shown as being within NCA1 but within Table 3-7 the noise monitoring location corresponding to NCA1 is NL04. No explanation is given as to why NL04 data was used. No noise monitoring results are presented for NL01.	These measurements were taken from the Hornsby Quarry – Road Construction Spoil Management EIS Chapter 6.2 (RMS & AECOM 201) as shown from the excerpt below:

<table>
<tr><th>Comment Number</th><th>Renzo Tonin’s Comments</th><th>GHD Response</th></tr>
<tr><td></td><td></td><td>
Table 6-15 Background noise monitoring
<table>
<tr><th>Noise catchment area</th><th>Noise measurement location</th><th>Rating background level dB(A) ($L_{A90,15\ minute}$))[1]
Day
(7 am to 6 pm)</th><th>Evening
(6 pm to 10 pm)</th><th>Night
(10 pm to 7 am)</th></tr>
<tr><td>NCA01</td><td>NL04[1]</td><td>34</td><td>34</td><td>31</td></tr>
<tr><td>NCA02</td><td>NL02</td><td>39</td><td>33</td><td>33</td></tr>
<tr><td>NCA03</td><td>NL03</td><td>37</td><td>37 (39)[2]</td><td>32</td></tr>
<tr><td>NCA04</td><td>NL04</td><td>34</td><td>34 (36)[1]</td><td>31</td></tr>
</table>
Note 1: Previous noise logging (undertaken by others) in the area has identified that noise levels can be considerably lower compared to those measured for this project. The higher noise levels measured for this project have been attributed to seasonal variability. To account for the lower noise levels a more conservative representative noise logger from the project was selected and the results presented in the table above
Note 2 : Application notes to the NSW Industrial Noise Policy indicate that the community generally expects a greater control of noise during the evening and night as compared to the daytime. Therefore the RBL for the evening is set to no more than that for the daytime and the night-time to no more than the evening
The measurements undertaken at NL01 were not provided, however it is stated that the measured levels were higher than what was expected for the area. As such, the measured levels from NL04 were used as the area was considered representative of the noise environment in NCA01. GHD’s assessment uses the minimum rating background noise levels for the day period for both NCA01 and NCA04.
</td></tr>
<tr><td>3</td><td>Section 3.8: The relevant period for incorporating noise enhancement due to temperature inversion is the night time period (10pm to 7am), which falls outside of the standard construction hours and therefore, temperature inversion effects should not be considered. Furthermore, the ICNG does not consider temperature inversion effects for construction noise predictions and assessment.</td><td>The ISO 9613-2 algorithm, by default, assumes a moderate temperature inversion. As such, the model is conservative in its predictions and provides a more robust assessment of potential noise impacts. Given the duration of the works, GHD considers this appropriate.</td></tr>
<tr><td>4</td><td>Section 3.9: It is noted that the ICNG does not specifically state that noise enhancing conditions due to adverse wind effects are to be considered. Therefore, any noise predictions taking into account wind affects are not required.</td><td>GHD understands that wind enhancing conditions are not mentioned in the ICNG, however the inclusion of wind affects provides a more robust assessment of noise impacts and the adoption of the ISO 9613-2 algorithm assumes downwind noise</td></tr>
</table>

Comment Number	**Renzo Tonin's Comments**	**GHD Response**
		enhancing conditions. Given the duration of the works, GHD considers this appropriate.
5	Table 4.2.4: Comparing the noise monitoring results from Table 3-6 and Table 3-7 of the Report shows that for some NCAs the measured evening and night time background noise levels were lower in 2018 compared to the 2015 noise monitoring. The lower evening and night background noise levels from the two sets of data should be considered for a more stringent criteria and assessment. Nevertheless, given that construction activities are to be conducted during the standard construction hours, provision of outside of standard construction hours NMLs are not required.	This is noted and it is not relevant to this project given that construction activities are to be conducted during the standard construction hours.
6	Section 4.3: As per Comment 1, the use of NPfI criteria is considered inappropriate.	See GHD Response 1. The criteria were provided to address the SEARs however the ICNG is adopted to managing noise impacts from the project.
7	Section 4.5.2: In Section 6.5.1 of the Report it is stated that the Construction Noise Vibration Guideline (CNVG) and The German Standard 'DIN 4150-3: 1999 Structural Vibration – Part 3: Effects' (DIN 4150-3) are used for determining vibration safe working distances. However, the vibration criteria from DIN 4150-3 is not presented in this section. In addition, no safe working distances are presented in DIN 4150-3. In the CNVB, the buffer distances for cosmetic damage are based on DS7385 for reinforced and unreinforced buildings and not DIN4150-3. The CNVG only uses DIN 4150-3 for heritage structures. No commentary or criteria has been presented for vibration sensitive equipment. As there are medical facilities identified in the vicinity of the project, hospitals and laboratories may utilise equipment that is highly sensitive and susceptible to vibration impacts and may require	GHD agrees that for heritage structures the DIN 4150-3 can be adopted for a conservative assessment. Our calculations indicate that an 18 tonne vibratory roller (worst-case scenario – peak particle velocity of 18 mm/s at 10 metres) is predicted to exceed the DIN criteria within 45 metres of construction works. As such, the buffer distance of 50 metres is still appropriate. The closest TAFE building is approximately 50 metres away from the nearest construction works and as such, cosmetic damage vibration impacts are not expected. Vibration impacts to sensitive medical equipment 300 metres from the site are highly unlikely and it should not be deemed necessary to undertake an assessment of potential vibration impacts to medical equipment 300 metres

Comment Number	**Renzo Tonin's Comments**	**GHD Response**
	assessment against vibration criteria other than those nominated for structural damage.	
8	Table 4-11 and Table 4-12: Following from Comment 7, vibration criteria for heritage structures should be in accordance with DIN 4150-3. The nominated criteria for heritage structures in Table 4-12 of the Report is incorrect.	See GHD Response 7.
9	Section 5.1.1: (It is noted that the use of Section 5.1.1 is repeated, and this is referring to the occurrence on page 39 of the Report): SoundPLAN 7.4 was the modelling software used which is an outdated version of the software. The current version of SoundPLAN is version 8.0 which was released on 17 August 2017 and over a year prior to the release of the Report.	GHD does not immediately use the newest version of noise modelling software upon its release as experience has shown that new versions of SoundPLAN contain bugs which are fixed through later releases of service packs. SoundPLAN 8.0 at the time was not immediately stable and often crashed during calculations. SoundPLAN 8.1 has now been released (subsequent to our noise modelling) as a more stable update compared to SoundPLAN 8.0. SoundPLAN 7.4 and SoundPLAN 8.0 implement the same ISO9613-2 algorithm, our experience indicates minimal differences in predicted levels between SoundPLAN 7.4 and SoundPLAN 8.0 (after the service packs have been installed).
10	Section 5.1.2: It is noted that for a worst-case scenario, the two noisiest items of equipment within each scenario was modelled for each scenario. Given the size of the construction fleet it is questionable as to whether the consideration of just two noisiest items of equipment is sufficient for the worst-case. A true worst-case would be all items of equipment within each scenario operating concurrently and a typical case would be two to five of the noisiest items of equipment within each scenario operating concurrently.	It is unknown at this stage exactly what the construction scenarios, fleet sizes and work methodologies will be. It is unlikely that more than 2 items of equipment would be located in such a way to result in significant cumulative impacts on any given receiver. The predictions assume the two noisiest items of equipment operating concurrently at the shortest distance between the source and receiver and is representative of the worst- case scenario. For the majority of the time, the distance between the source and receiver will be greater.

Comment Number	**Renzo Tonin's Comments**	**GHD Response**
11	Table 5-4: The parameter used for the receiver heights variable is "1.5 metres above building ground level". As per the ICNG, the assessment point should be at the property boundary that is most exposed to construction and at a height of 1.5m above ground level i.e. 1.5m above the ground and at the boundary, not at the building. It is unclear whether the modelling has taken this into account.	The assessment point is to be a location within the property boundary that is most exposed to construction noise. This can either be at the most affected facades of the dwelling (windows) or at a location within the property boundary and within 30 metres of the dwelling (1.5 metres above the ground level). Adding receiver points at the residential boundary of every receiver in the study area was deemed unnecessary detail for modelling purposes as the difference in noise levels (between the boundary and the façade) was insignificant. Having receivers points at the highest storey of the dwelling was considered more appropriate for the receivers in the study area as generally there was clearer direct line-of-sight from the source to the receiver (due to the topography of the area).
12	Section 6: As the construction NMLs presented in Table 4-2 provide NMLs for standard construction hours and outside standard construction hours for Day, Evening and Night, the NML used in this section should clarify that this is the NML for standard construction hours. It is also unclear as to what the average LAeq noise level refers to.	The NMLs presented in Table 4-2 are for standard construction hours. The average LAeq refers to the arithmetic mean of the noise levels for the NCA.
13	Section 6.2: As per Comment 1, the use of NPfI criteria is considered inappropriate.	GHD agrees and this is discussed in GHD Response 1.
14	Section 6.4 Road Noise Policy (RNP): The Report states that the use of construction vehicles along Dural Street and Quarry Road is predicted to comply with the acoustic requirements of the RNP but then states that mitigation measures to reduce potential construction traffic noise impact along Dural Street and Quarry Road are provided in Section 7.2. If the predicted levels are compliant then no mitigation should be required.	The road traffic noise levels are predicted to comply assuming only one heavy vehicle per hour during the night period. As such, vehicles along Dural Street and Quarry Road should be limited to one vehicle per hour during the night period. More than one heavy vehicles per hour in the night period is predicted to result in an exceedances of the RNP noise criteria

Comment Number	**Renzo Tonin's Comments**	**GHD Response**
15	**Section 7.3**: It is noted that noise control measures presented in the Report are generic in nature and there is no confirmation on which specific recommended noise mitigation measures would be implemented. These should be presented together with the expected noise reductions.	As discussed in GHD's letter dated 31 May 2019 in response to EPA's letter dated 20 May 2019, the ICNG provides guidance on the level of detail required at each stage of the application process. At the EIA stage, specific mitigation recommendations are not required as the specific details of the construction activities are not known. The ICNG states that "Conceptual description of feasible and reasonable work practices to minimise noise impacts" is typical of information included within the pre-approval EIA documentation. Never-the-less, further discussion of the proposed mitigation measures are provided in the response to EPA below

.

Please do not hesitate to contact me if you would like to discuss any of this further.

Sincerely
GHD

•

David Gamble
Technical Director - Waste Infrastructure
+61 2 9239 7354

Appendix C – Detailed response to RFI from Independent Planning Consultant and Specialists

31 May 2019

Hornsby Shire Council
Caroline Maeshian
296 Peats Ferry Road,
Hornsby 2077

Our ref: 2126457-77347
Your ref:

Dear Caroline

Hornsby Quarry Rehabilitation EIS
Response to request for additional information regarding noise

1 Introduction

GHD prepared a Noise and Vibration Impact Assessment (NVIA) for the construction activities associated with the Hornsby Quarry Rehabilitation EIS. The development application involves:

- Rehabilitation, stabilisation and geotechnical safety management works around various parts of the site; and
- Earthworks and placement of material from within the site to create a final landform suitable for future development into a community parkland.

The report addressed the potential noise and vibration impacts from the proposed construction activities at Hornsby Quarry in accordance with the Secretary's Environmental Assessment Requirements (SEARs 1167) for the project which refers to the Interim Construction Noise Guideline (DECC, 2009) and the Industrial Noise Policy (EPA, 2000), which has been superseded by the Noise Policy for Industry (EPA, 2017) – the NPfI.

Section 1.5 of the NPfI specifically states that it does not apply to "Construction Activities".

The Interim Construction Noise Guideline (DECC, 2009) is applicable to construction activities and has been adopted for this assessment.

The NVIA prepared by GHD identified the noise sensitive receivers potentially affected by the construction activities, assessed the likely noise impacts from various construction scenarios, and provided noise mitigation recommendations.

2 EPA response to EIS

The NSW Environment Protection Authority (EPA) provided a response to the Hornsby Quarry EIS (DOC19/276083-1 dated 10 May 2019) with regards to the noise and vibration assessment requesting further information.

The response says that the EPA is unable to provide approval due to the noise impacts identified and have requested further noise mitigation measures and assessment.

The EPA has raised the concerns or requests for additional information itemised below:

1. *The EPA has concerns that a number of noise sensitive receivers will be highly affected by the construction noise activities and therefore requests that the following additional information be provided.*
2. *For each of the noise sensitive receivers that are predicted to exceed the NML, please indicate the specific mitigation measures proposed to minimise noise impacts;*
3. *For each of the noise sensitive receivers that are predicted to exceed the NML, detail the attenuation that will be achieved;*
4. *For each of the noise sensitive receivers that are predicted to exceed the NML, identify the revised noise impact level predictions following mitigation; and*
5. *Where relevant NML cannot be met after application of all feasible and cost -effective mitigation measures, please outline any community engagement options proposed to inform and consult with the community in resolving the issues.*

The following sections provide GHD’s response to the items raised.

3 Response to EPA requests

Item 1: The EPA has concerns that a number of noise sensitive receivers will be highly affected by the construction noise activities and therefore requests that the following additional information be provided.

The construction activities are to be conducted during recommended standard hours:

- Monday to Friday: 7:00 am to 6:00 pm
- Saturday: 8:00 am to 1:00 pm
- No work on Sundays or Public Holidays

For recommended standard hours, the Interim Construction Noise Guideline (DECC, 2009) provides construction noise management levels for construction activities as follows:

- The *‘noise affected’* level which represents the point above which there may be some community reaction to noise: Background + 10 dBA
- The *‘highly noise affected’* level which represents the point above which there may be strong community reaction to noise: 75 dBA

The NVIA provides conservative predictions of construction noise based on an indicative construction schedule and activities. At the pre-approval stage of the project, details of construction equipment, construction activities, construction scheduled and specific mitigation are limited as a construction contractor has not been engaged.

Given this level of uncertainty, the predictions of noise levels at sensitive receivers during the environmental assessment phase are conservative in nature. The predicted noise levels for all sensitive receivers and all construction activities (including rock breaking) are predicted to be below the ‘*highly noise affected’* construction noise management level.

Therefore in accordance with the Interim Construction Noise Guideline (DECC, 2009) no noise sensitive receivers are considered *'highly noise affected'.*

It is noted that some sensitive receivers are predicted to be *'noise affected'.* The Interim Construction Noise Guideline (DECC, 2009) recommends that the following actions be undertaken to manage noise during the construction phase of the project:

- the proponent should apply all feasible and reasonable work practices to meet the noise affected level
- the proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

The Interim Construction Noise Guideline (DECC, 2009) Section 7.2 provides guidance on managing construction noise impacts through the various stages of the planning approvals process. This guidance is appended in Appendix A. The ICNG recommends:

- **Pre-approval:** conceptual description of feasible and reasonable work practices are provided during the pre-approval phase of the project. It is noted that this information has been provided in the NVIA along with additional details in the following sections of this letter
- **Post approvals**: detailed examination of feasible and reasonable work practices, strategies to deal with noise complaints and procedures for notifying nearby residents of upcoming works are provided during the post-approval phase of the project. These are recommended to be addressed in a Construction Noise Management Plan (CNMP) and Community Consultation Plan (CCP).

It is recommended that a CNMP is prepared post approval, after the construction contractor has been engaged and prepared its construction methodology. The CNMP would include a review of the construction noise predictions during the environmental impact assessment phase based on the construction contractor's methodology, and revised accordingly to include a detailed examination of feasible and reasonable work practices and noise mitigation measures to manage sensitive receivers that are predicted to be *'noise affected'.* The CNMP would include a CCP to liaise with the noise affected receivers.

Item 2: For each of the noise sensitive receivers that are predicted to exceed the NML, please indicate the specific mitigation measures proposed to minimise noise impacts.

Specific mitigation measures would be developed as part of the CNMP after the construction contractor is engaged and prepared their construction methodology. As discussed in item 1 above, in accordance with the Interim Construction Noise Guideline (DECC, 2009), a conceptual description of feasible and reasonable work practices is provided in the pre-approval phase of the project.

The NVIA has reviewed or provided the following conceptual measures:

- Source mitigation in NVIA Section 7.3.1, which includes recommendations to plant and equipment to be included in the CNMP. At this stage of the project specific detail is not available.
- Transmission mitigation in NVIA Section 7.3.2, which includes a review of a 5 m noise barrier. It was determined that noise mitigation measures in transmission were not feasible or reasonable to construct due to the terrain of the project site, the size of the barrier required, the associated cost,

the minimal amount of noise level reduction achieved and the short term nature of the construction project.

- Receiver mitigation in NVIA Section 7.3.3, which are not considered reasonable as construction noise is not predicted to result in any highly noise affected impacts, it is temporary in nature and at receiver treatment would not be cost-effective due to large number of sensitive receivers surrounding the site.

Item 3: For each of the noise sensitive receivers that are predicted to exceed the NML, detail the attenuation that will be achieved.

The achieved attenuation cannot be provided with certainty at the pre-approval stage of the project as the specific details of the construction methodology have not been determined. Following the preparation of the CNMP and compliance monitoring, the achieved attenuation could be determined.

However noise mitigation at source has been conceptually discussed in the NVIA. Information provided in Australian Standard AS 2436 *Guide to noise and vibration control on construction, demolition and maintenance sites* indicates that source noise levels can typically be reduced by 5-10 dBA with the incorporation of silencers, mufflers or diffusers, or substituting the equipment for a quieter item.

Item 4: For each of the noise sensitive receivers that are predicted to exceed the NML, identify the revised noise impact level predictions following mitigation.

Appendix B provides a summary of the predicted noise levels at residential receivers for scenarios where it may be possible to achieve a 10 dBA reduction due to reduction of noise level at the source. The reduction has not been applied to scenarios where rock breaking is involved.

The results demonstrate that the number of exceedances, and maximum exceedance above the noise management level can be significantly reduced if lower noise equipment is selected. Note that the 10 dBA reduction is indicative at this stage and should be assessed during the CNMP once the methodology and equipment have been selected.

Item 5: Where relevant NML cannot be met after application of all feasible and cost -effective mitigation measures, please outline any community engagement options proposed to inform and consult with the community in resolving the issues.

The Interim Construction Noise Guideline (DECC, 2009) recommends the following community engagement to be undertaken to manage noise during the construction phase of the project where sensitive receivers are predicted to be *'noise affected'* (and not *'highly noise affected'*) and construction activities are undertaken during recommended standard hours:

- *the proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.*

A Community Consultation Plan will be developed during the post-approvals phase of the project, as recommended by the Interim Construction Noise Guideline (DECC, 2009) Section 7.2, to inform and consult with the community.

Sincerely
GHD

C. Gordon

Chris Gordon
Senior acoustic engineer
02 9239 7072

Appendix A – ICNG noise management tools during planning approval process.

Table 11: Summary of noise management tools at various stages in the planning approval process

Type and function of document	Typical information included
Pre-approval	
EIA documentation This conceptually describes the proposal, the likely noise impacts and work practices to minimise the noise impacts.	• Description of proposed works and proposed duration • Identification of nearby residences and other sensitive land uses • Assessment of likely noise impacts • Conceptual description of feasible and reasonable work practices to minimise noise impacts • Changes made to the proposal in response to submissions or representations received.
Post-approval	
Construction Noise Management Plan This describes in detail the methods that will be implemented for the whole project to minimise the noise impacts. **Construction Method Statement** This describes in detail the methods that will be implemented at a specific site to minimise a range of impacts from the works. Noise is often a key issue for a Construction Method Statement, but not the only issue. **Community Consultation Plan** This describes in detail the methods that will be implemented, for the whole project, to liaise with affected community members to advise on and respond to noise-related complaints and disputes.	• Identification of nearby residences and other sensitive land uses • Assessment of expected noise impacts • Detailed examination of feasible and reasonable work practices that will be implemented to minimise noise impacts • Strategies to promptly deal with and address noise complaints • Details of performance evaluating procedures (for example, noise monitoring or checking work practices and equipment) • Procedures for notifying nearby residents of forthcoming works that are likely to produce noise impacts • Reference to relevant licence and consent conditions.
All stages	
Industry Best Practice Environment Manual This contains further information on best practice that the industry would expect to be used on their construction projects when assessing and managing noise impacts.	• Clarification of specific aspects of noise management to promote a better understanding • Standardisation of best practice approaches where appropriate.

Appendix B Summary of predicted noise levels based on conceptual source treatments (with and without noise mitigation)

NCA	NML	Without mitigation				With at source mitigation - assumed 10 dBA reduction			
		Max level in NCA	Avg. level in NCA	Max. exc. above NML	No. of exc. above NML	Max level in NCA	Avg. level in NCA	Max. exc. above NML	No. of exc. above NML
CS1A – Existing terrain, no rock breaking works (West, Quarry)									
NCA01	45	67	44	22	117	57	34	12	58
NCA02	49	65	42	16	67	55	32	6	24
NCA03	47	61	41	14	62	51	31	4	23
NCA04	45	62	54	18	112	52	44	8	62
Total					358				167
CS1C – Design terrain, no rock breaking works (West, Quarry)									
NCA01	45	67	44	22	117	57	34	12	58
NCA02	49	65	42	16	67	55	32	6	24
NCA03	47	61	41	14	62	51	31	4	23
NCA04	45	62	54	18	113	52	44	8	62
Total					359				167
CS2A – Existing terrain, no rock breaking works (North, East & Quarry)									
NCA01	45	68	43	23	109	58	33	13	58
NCA02	49	66	40	17	78	56	30	7	26
NCA03	47	60	40	13	58	50	30	3	18
NCA04	45	50	46	5	101	40	36	-5	0
Total					346				102

NCA	NML	Without mitigation				With at source mitigation - assumed 10 dBA reduction			
		Max level in NCA	Avg. level in NCA	Max. exc. above NML	No. of exc. above NML	Max level in NCA	Avg. level in NCA	Max. exc. above NML	No. of exc. above NML
CS2B – Existing terrain, no rock breaking works (North, East & Quarry)									
NCA01	45	68	45	23	120	58	35	13	69
NCA02	49	66	43	17	119	56	33	7	26
NCA03	47	60	42	13	75	50	32	3	22
NCA04	45	58	51	13	110	48	41	3	13
Total					424				130
CS2C – Design terrain, no rock breaking works (North, East & Quarry)									
NCA01	45	68	43	23	110	58	33	13	58
NCA02	49	66	40	17	78	56	30	7	26
NCA03	47	60	40	13	58	50	30	3	18
NCA04	45	51	46	6	101	41	36	-4	0
Total					347				102
CS3A – Existing terrain, no rock breaking works (West, East & Quarry)									
NCA01	45	64	42	19	111	54	32	9	41
NCA02	49	66	40	17	77	56	30	7	26
NCA03	47	60	40	13	62	50	30	3	22
NCA04	45	60	52	16	112	50	42	6	32
Total					362				121
CS3C – Design terrain, no rock breaking works (West, East & Quarry)									
NCA01	45	64	42	19	111	54	32	9	41

NCA	NML	Without mitigation				With at source mitigation - assumed 10 dBA reduction			
		Max level in NCA	Avg. level in NCA	Max. exc. above NML	No. of exc. above NML	Max level in NCA	Avg. level in NCA	Max. exc. above NML	No. of exc. above NML
NCA02	49	66	40	17	77	56	30	7	26
NCA03	47	60	40	13	63	50	30	3	22
NCA04	45	60	52	16	113	50	42	6	32
Total					364				121

20 August 2019

Hornsby Shire Council
Craig Clendenning
296 Peats Ferry Road,
Hornsby 2077

Our ref: 2126457-77347
Your ref:

Dear Craig

Hornsby Quarry Rehabilitation EIS
Response to EPA request for additional comments

1 Introduction

GHD prepared a Noise and Vibration Impact Assessment (NVIA) for the construction activities associated with the Hornsby Quarry Rehabilitation EIS. The Environmental Protection Authority (EPA) has requested additional information relating to the NVIA prior to the issue of General Terms of Approval (GTA) for the development application.

This letter provides a response to the NSW Environment Protection Authority (EPA) request for further information about the noise and vibration assessment (DOC19/276083-1 dated 10 May 2019).

2 EPA request for additional information

2.1 DA request for additional information – DA 101 2019 – Hornsby Park

1. *The Environment Protection Authority ("EPA") has reviewed the additional noise information (GHD ref 2126457-77347) provided for Application DA/101/2019 at Hornsby Quarry.*

   The response has not adequately addressed the concerns raised by the EPA regarding construction noise impacts. Specifically, it has not provided sufficient information on the duration and extent of noise impacts from each work phase at each noise catchment area; or evaluated whether the assumed 10 dB(A) reduction in noise from construction activities can be achieved. Furthermore, it does not address how residual impacts will be managed or how the community will be notified and/or engaged. Without this, the EPA is unable to issue General Terms of Approval ("GTA").

   GHD propose to develop a detailed assessment and evaluation of feasible and reasonable mitigation post-approval once the construction contractor has been engaged and has prepared their construction methodology.

   The EPA recommend that construction is limited to daytime hours (0700 – 1800 Monday to Friday, and 0700 to 1300 on Saturday) and that further information is provided, based on a reasonable worst-case construction scenario on the following to enable the EPA to develop GTA.

   - *The duration and extent of construction noise impact on each NCA and for each work phase*

- *Proposed mitigation measures to be applied to manage noise from each work phase*
- *An evaluation of the likely effectiveness of the proposed mitigation measures*
- *A description of procedures to manage any residual noise impacts, including community notification and engagement.*

In the absence of this information GTA cannot be prepared because there is insufficient information to determine likely duration and extent of impacts on the community, and whether the conceptual feasible and reasonable mitigation outlined in the GHD response will effectively manage construction noise impacts.

3 GHD response to EPA comments

3.1 GHD Response 1 (The duration and extent of construction noise impact on each NCA and for each work phase):

There are four main construction work areas, being the northern works, western works, the eastern works and the quarry works (see figures below). The exact duration for the works in each area is not yet known, however it can be estimated that the works in each area will be approximately 20 weeks in duration. The works in each area are likely to occur concurrently at some point throughout the project and as such, three worst-case scenarios were modelled in the NVIA report, being:

Scenario 1 – approximately 20 weeks in duration

- West: Excavation and rock breaking/ripping/crushing works
- Quarry: Rock ripping, filling works, screening and excavation

Scenario 2 – approximately 20 weeks in duration

- North: Excavation works
- Quarry: Excavation, Rock breaking/sawing/crushing, filling and screening
- East: Excavation and filling

Scenario 3 – approximately 20 weeks in duration

- West: Excavation and rock sawing
- Quarry: Filling
- East: Rock ripping/sawing/crushing, filling, excavation and screening

Based on this information, the NVIA provided conservative predictions of construction noise at receivers based on an indicative construction schedule of likely activities.

Once the contractor has been selected and the exact construction methodology and program have been determined, a Construction Noise Management Plan (CNMP) should be prepared to describe in further detail the methods that will be implemented for each construction work phase to minimise noise impacts.

The CNMP should identify any further noise modelling to be undertaken (if required), and should provide further detail for mitigation measures once all the required construction methodology information has been received. The ICNG states the CNMP should be undertaken during the post-approval phase of the project and not during the pre-approval stage (limited information is available).

The exceedances above the NML for CS1B, CS2D and CS3D are shown graphically for all receivers in the study area in Figure 1, Figure 2 and Figure 3.

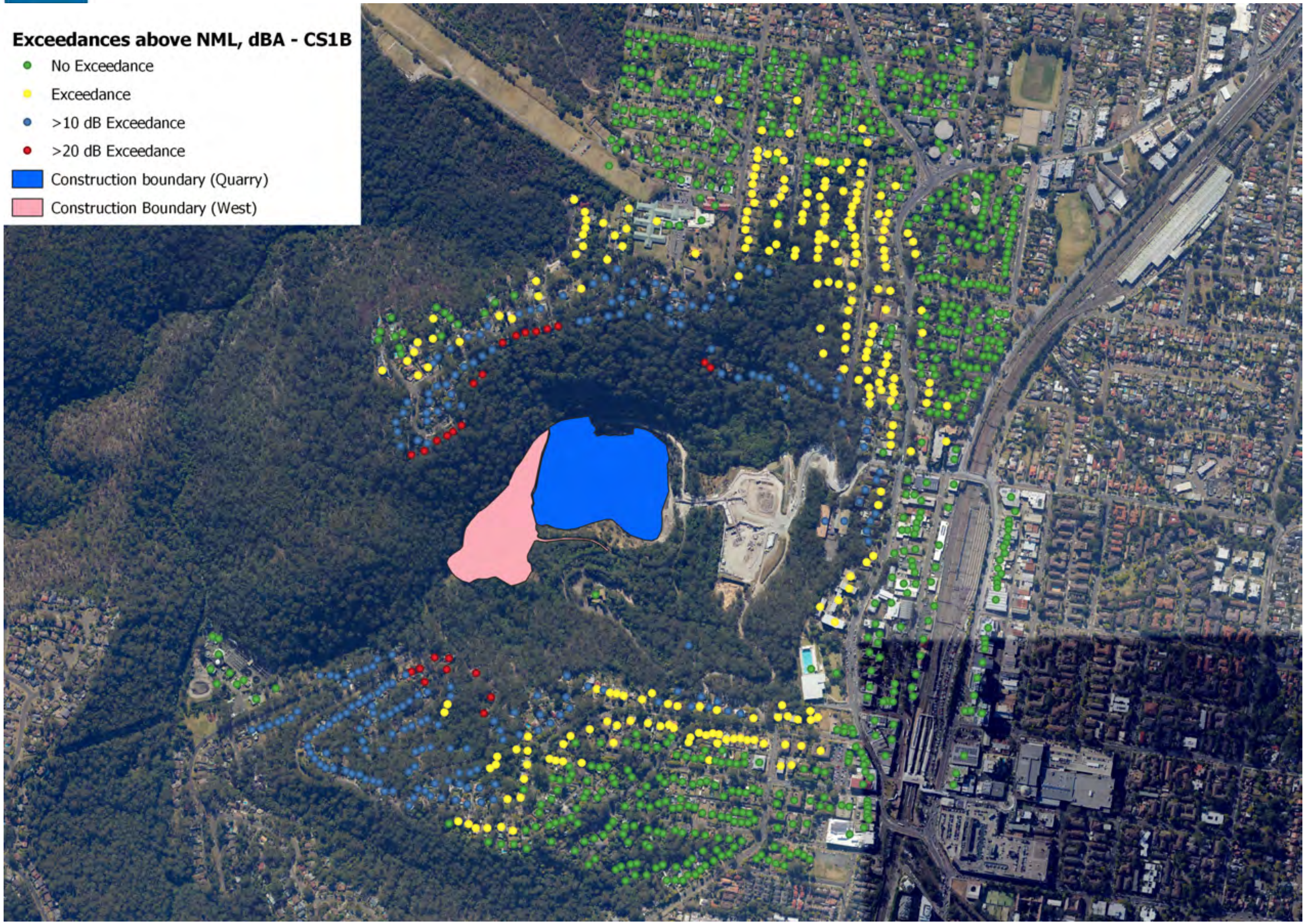

Figure 1- Exceedances above the NML, dBA – CS1B (includes rock-breaking works)

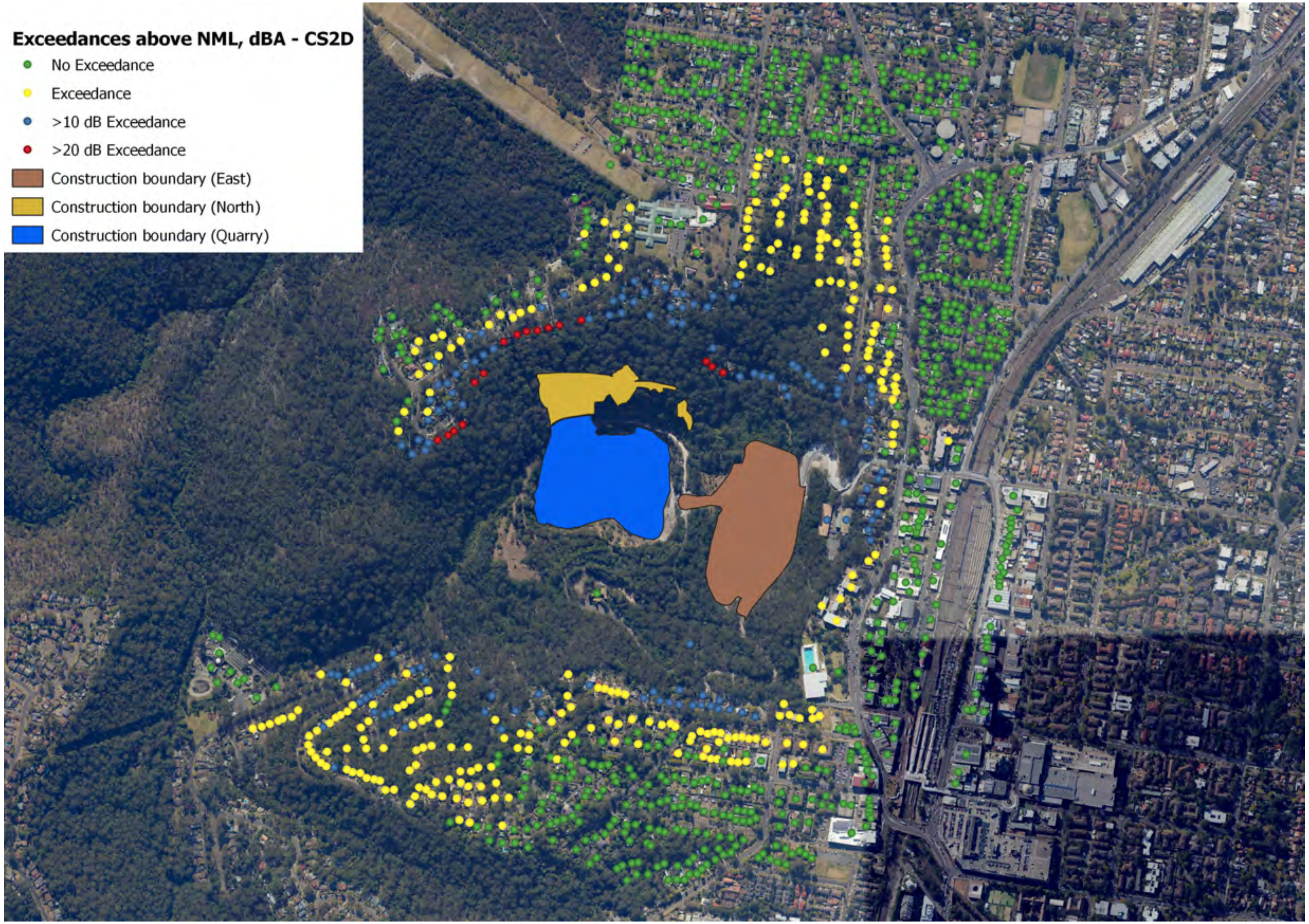

Figure 2- Exceedances above the NML, dBA – CS2D (includes rock-breaking works)

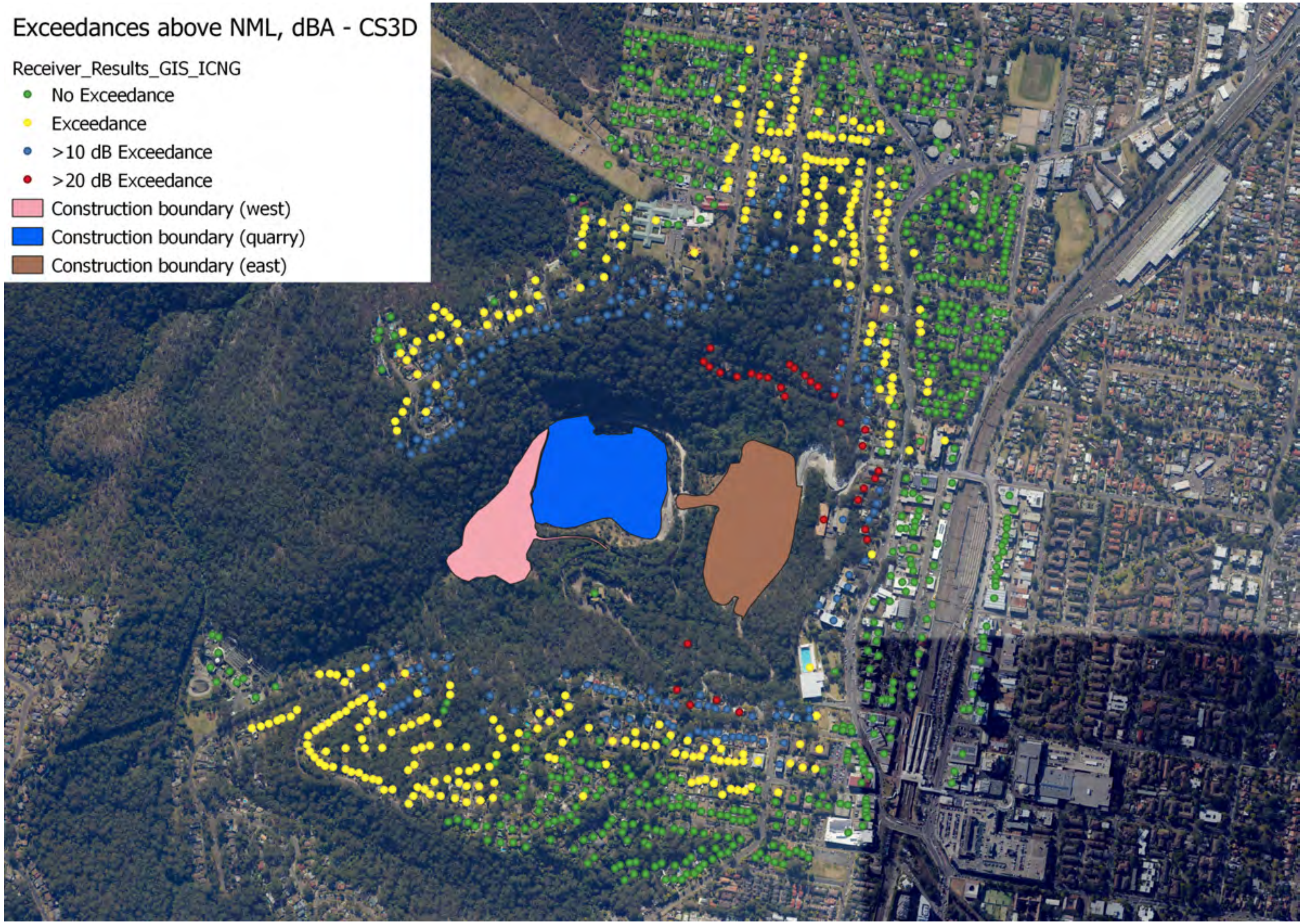

Figure 3- Exceedances above the NML, dBA – CS3D (includes rock-breaking works)

3.2 GHD Response 2 (Proposed mitigation measures to be applied to manage noise from each work phase)

The proposed mitigation measures to be applied have been re-evaluated and are presented in Table 1 below.

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Table 1 – Proposed mitigation measures to be incorporated

Management measures to reduce construction noise and vibration impacts			
Action required	**Detail of the mitigation measure**	**Responsible party**	**Timing**
Implementation of any project specific mitigation measures required	Any project specific mitigation measures identified in the EIS documentation or approval or licence conditions must be implemented.	Contractor	Throughout project duration
Implement stakeholder consultation measures	Periodic notification (monthly letterbox drop and website notification) detailing all upcoming construction activities delivered to sensitive receivers at least 7 days prior to commencement of relevant works. In addition to Periodic Notification, the following strategies may be adopted on a case-by-case basis: • Project Specific Website • Project Infoline • Construction Response Line • Email Distribution List • Web-based Surveys • Social Media • Community and Stakeholder Meetings and • Community Based Forums (if required by approval conditions).	Contractor	Throughout project duration
Register of noise and vibration sensitive receivers	A register of most affected noise and vibration sensitive receivers (NVSRs) would be kept on site (receivers that have been identified as receiving noise levels greater than 20 dB above the noise	Contractor	Throughout project duration

	management leve). The register would include the following details for each NVSR: • Address of receiver • Category of receiver (e.g. Residential, Commercial etc.) • Contact name and phone number (if available) The register may be included as part of the Project's Community Liaison Plan or similar document and maintained in accordance with the requirements of this plan.		
Construction hours and scheduling	All activities on site should be confined between the hours: daytime hours of 7:00 am to 6:00 pm from Monday to Friday and 7:00 am to 1:00 pm on Saturday	Contractor	Throughout project duration
Construction respite period	Noise with special audible characteristics and vibration generating activities (including rock hammering, rock breaking and vibratory rolling) may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block. 'Continuous' includes any period during which there is less than a 1 hour respite between ceasing and recommencing any of the work.	Contractor	Throughout project duration
Site inductions	All employees, contractors and sub-contractors are to receive an environmental induction. The induction should include: – all relevant project specific and standard noise and vibration mitigation measures – relevant licence and approval conditions – permissible hours of work – any limitations on high noise generating activities – location of nearest sensitive receivers	Contractor	Prior to construction works and throughout project duration

	– construction employee parking areas – designated loading/ unloading areas and procedures – construction traffic routes – site opening/closing times (including deliveries) – environmental incident procedures – All personnel on site should be made aware of the potential for noise impacts and should aim to minimise impact or elevated noise levels, where possible. – Regular identification of noisy activities and adoption of improvement techniques		
Behavioural practices	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors. No excessive revving of plant and vehicle engines. Controlled release of compressed air.	Contractor	Throughout project duration
Noise monitoring	A noise monitoring procedure and program should be carried out for the duration of works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions. Noise monitoring reports should be prepared in accordance with the requirements of the noise monitoring procedure.	Contractor	Throughout project duration
Update Construction Environmental Management Plans	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.	Contractor	Throughout project duration
Source mitigation measures			

Plan worksites and activities to minimise noise and vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.	Contractor / construction employees	Prior to construction works and throughout project duration
Construction vehicles traffic routes	Construction heavy vehicles utilising Dural Street and Quarry Road should be limited to one vehicle per hour during the night period	Contractor / construction employees	Throughout project duration
Equipment selection	Use quieter and less vibration emitting construction methods where feasible and reasonable	Contractor / construction employees	Prior to construction works and throughout project duration
Maximum noise levels	The noise levels of plant and equipment must have operating Sound Power equal or less than the levels stated in Table 5-1 of the Hornsby Quarry Rehabilitation EIS (NVIA Nov 2018)	Contractor	Prior to construction works and throughout project duration
Use and siting of plant	Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers.	Contractor / construction employees	Throughout project duration
Non-tonal reversing alarms	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work, including delivery vehicles.	Contractor	Throughout project duration

Construction Related Traffic	Schedule and route internal vehicle movements away from sensitive receivers and during less sensitive times. Limit the speed of vehicles and avoid the use of engine compression brakes.	Contractor / construction employees	Throughout project duration
Silencers on Mobile Plant	Where possible reduce noise from mobile plant through additional fittings including: Residential grade mufflers Damped hammers such as “City” Model Rammer Hammers Air Parking brake engagement is silenced.	Contractor / construction employees	Throughout project duration
Engine compression brake	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained original equipment manufacturer exhaust silencer or a silencer that complies with the National Transport Commission’s ‘In-service test procedure’ and standard.	Contractor / construction employees	Throughout project duration
Transmission path mitigation measures			
Shield stationary noise sources such as pumps, compressors, fans etc	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.	Contractor / construction employees	Throughout project duration
Shield sensitive receivers from noisy activities	Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when situating plant.	Contractor / construction employees	Prior to construction works and throughout project duration

3.3 GHD Response 3 (An evaluation of the likely effectiveness of the proposed mitigation measures)

Table 2 and Table 3 presents the likely effectiveness of the proposed mitigation measures at the source and in the transmission path.

Table 2 Relative effectiveness of various forms of noise control at the source

Control by	Nominal noise reduction possible (dBA)	Discussion of effectiveness	
		Mobile plant[1]	Stationary plant[2]
Distance	Approximately 6 for each doubling of distance	Very effective when implemented	Very effective when implemented
Screening	Normally 5 to 10 (maximum of 15)	Not generally possible and not effective, This is not recommended as most plant are mobile	The noise due to the project is dominated by mobile plant. Screening will likely have a negligible effect on noise levels at receivers.
Enclosure	Normally 15 to 25 (maximum 50)	Not generally possible and not effective for this project. This is not recommended as the majority of the noise plant are mobile.	The noise due to the project is dominated by mobile plant. Screening of stationary sources will likely have a negligible effect on noise levels at receivers.
Silencing / mufflers	Normally 5 to 10 (maximum 20)	Very effective when implemented – expected reduction of 10 dB. Not effective for rock breaking/ripping as the dominant noise source is from the impact of the attachment to the rock	N/A

1) Mobile plant refers to excavators (with attachments), dump trucks, bulldozers, mobile crushers, loaders, mobile screens, rollers/compactors, water cart, tub grinder and mulcher

2) Stationary plant refers to generators, A/C units, compressors, pumps etc.

Table 3 Relative effectiveness of various forms of noise control in the transmission path

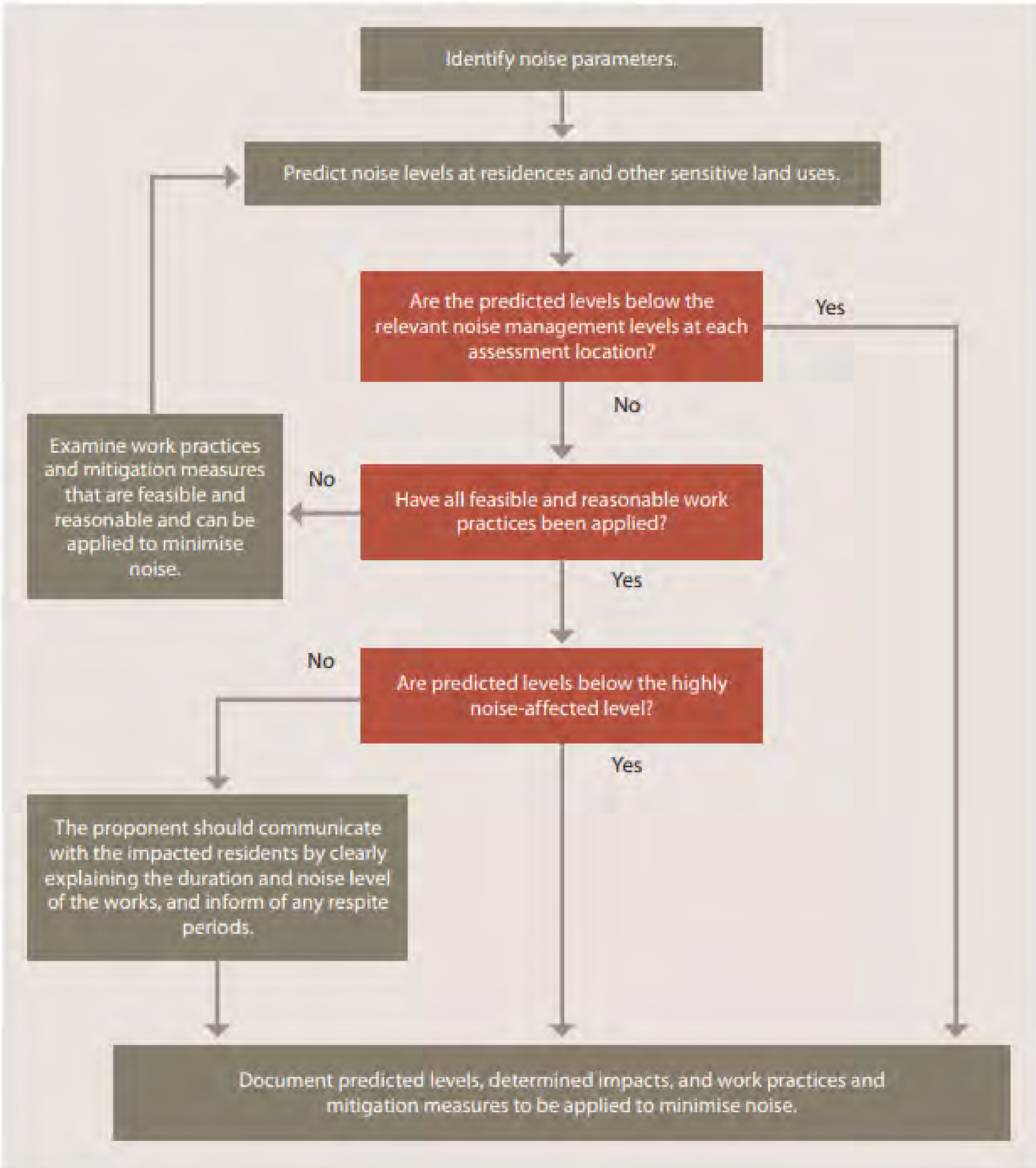
Control by	Nominal noise reduction possible (dBA)	Discussion of effectiveness	
		Mobile plant	Stationary plant
Shield stationary noise sources such as pumps,	Depends on the location of source and the receiver (normally 5 to 15)	N/A	Effective when it breaks the line of sight between the

Control by	Nominal noise reduction possible (dBA)	Discussion of effectiveness	
		Mobile plant	Stationary plant
compressors, fans etc.			source and receiver. Not effective if it doesn’t.
Shield sensitive receivers from noisy activities	Depends on the location of source and the receiver (normally 5 to 15)	Effective when it breaks the line of sight between the source and receiver. Not effective if it doesn’t.	Effective when it breaks the line of sight between the source and receiver. Not effective if it doesn’t

3.4 GHD Response 4 (A description of procedures to manage any residual noise impacts, including community notification and engagement).

The assessment and management of residual noise impacts is a requirement of the Noise Policy for Industry and does not form part of the quantitative assessment procedure in the Interim Construction Noise Guideline. See the excerpt below from Section 4.6 of the ICNG.

Figure 1: Prediction and assessment of impacts – quantitative method



Subsequent to all the feasible and reasonable work practices being applied, the ICNG recommends that if the predicted levels are below the highly affected noise level, the proponent should communicate with the impacts residents by clearly explaining the duration and noise level of the works, and inform of any respite periods. This has been proposed as presented in the management mitigation measures to reduce construction noise and vibration impacts (Table 1).

In lieu of any framework within the ICNG to assess and manage residual construction noise impacts, it is proposed that guidance be taken from Transport for NSW's Construction Noise Strategy as a suitable framework to manage additional noise mitigation measures.

These mitigation measures are dependent on how far the predicted construction noise levels are above the noise management level (NML). Note no receivers have been predicted to exceed the highly noise affected level of 75 dBA, however compliance monitoring would be required to confirm these levels. Reference can be made to Figure 1, Figure 2 and Figure 3 to determine the additional mitigation measures applicable for the receivers within the moderately intrusive and highly instructive ranges.

Table 4 Implementing additional noise management measures

Construction hours	Receiver perception	dB(A) above NML	Additional mitigation measures (refer to Table 6)
Standard hours	**Noticeable**	0	-
	Clearly audible	< 10	-
	Moderately intrusive	> 10 to 20	PN, V
	Highly intrusive	> 20	PN, V
	75 dBA or greater	N/A	PN, V, SN

Table 5 Details of the additional mitigation measures to be applied

Mitigation measure	Details of mitigation measure
Periodic notification (PN)	A notification entitled 'Project Update' or 'Construction Update' is produced and distributed to stakeholders via letterbox drop and distributed to the project postal and/or email mailing lists. Periodic notifications provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage, inform and provide project-specific messages. Advanced warning of potential disruptions (e.g. traffic changes or noisy works) can assist in reducing the impact on stakeholders. The approval conditions for projects specify requirements for notification to sensitive receivers where works may impact on them.

Verification monitoring (V)	Long-term verification monitoring of noise during construction should be conducted at a minimum of four affected receiver(s) surrounding the project area. Monitoring should provide alerts to the contractor when the highly noise affected level is exceeded (or a level agreed with the regulator). The purpose of monitoring is to confirm that: • construction noise and vibration from the project are consistent with the predictions in the noise assessment • mitigation and management of construction noise and vibration is appropriate for receivers affected by the works Where noise monitoring finds that the actual noise levels exceed those predicted in the noise assessment then immediate refinement of mitigation measures may be required and the CNVMP amended
Specific Notification (SN)	Specific notifications are in the form of a personalised letter or phone call to identified stakeholders no later than seven calendar days ahead of construction activities that are likely to exceed the noise objectives. Alternatively (or in addition to), communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities and provide an individual briefing. • Letters may be letterbox dropped or hand distributed • Phone calls provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and their specific needs • Individual briefings are used to inform stakeholders about the impacts of noisy activities and mitigation measures that will be implemented. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project

Please do not hesitate to contact the undersigned if you would like to discuss any of this further.

Sincerely
GHD

•

David Gamble
Technical Director - Waste Infrastructure
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Appendix E – Community Engagement Outcomes Report

Hornsby Park DA for Landform Earthworks - Engagement during Public Exhibition

Hornsby Park Engagement

Client: Hornsby Shire Council
Date: 24 May 2019

A Veris Company

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Reviewed by	Calli Brown
Date	24 May 2019
Version	4 (Final)

Contents

1 Background

1.1 The site

The site comprises approximately 60 hectares of bushland and open space surrounding the Quarry which is located at the western side of Hornsby, approximately 1km from the town centre.

In addition to the quarry void, the site is home to a number of features of historical and community interest, including early settler relics, the State Heritage listed Old Man's Valley Cemetery, remnant buildings of the quarry crusher plant and the existing Hornsby Park.

The Quarry has been closed for safety reasons since the late 1990's, meaning very few people have had the opportunity to appreciate its astonishing beauty. Transforming the site into recreational parklands will open the site to the community, allowing residents and visitors to enjoy the stunning landscape, ecological communities and history that make this location so special.

1.2 Previous engagement

1.2.1 Plan Your Parkland

In 2017, as part of its commitment to creating parklands that are "designed, owned, used and loved by residents", Hornsby Shire Council contracted Elton Consulting to provide communications and engagement support for its Hornsby Park project. This first phase of engagement resulted in the community being asked to 'Plan Your Parkland' by providing their blue-sky aspirations for the site. The engagement approach included:

- Email to 40,000 residents
- Letters and emails to stakeholders
- Project website updates
- Establishment of a Community Deliberative Forum, which met on three occasions
- Stakeholder meetings with
  - Mountain Bike groups
  - Bush care & Environmental Groups, and
  - Presentation at the local business chamber meeting
- Community Swing-Bys held in Hornsby Mall that engaged over 600 residents

The main themes heard are included in the graphic below:

1.2.2 DA preparation engagement

At the conclusion of the 'Plan Your Parkland' round of engagement, Council began preparing a Development Application (DA) and accompanying Environmental Impact Statement (EIS) for the earthworks required to create a safe, and accessible landform. As part of developing the DA and EIS, Council again worked with Elton Consulting to engage the community. The targeted engagement approach included the following:

- Email to 40,000 residents
- Letters and emails to stakeholders
- Project website updates
- Presentations to:
  - the Community Deliberative Forum
  - environmental and bushwalking stakeholder groups
- 4 Community Swing-Bys in Hornsby Mall
- Social media posts
- media release

This phase of engagement again demonstrated overwhelming support and understanding around the concept of transforming the quarry into parklands and identified a number of key themes:

1. **Accessibility** - support for making the site accessible to the public
2. **Environment** – support for careful management of any impacts to site vegetation, particularly the ecologically endangered communities.

3. **Engagement** - recognition of Council's commitment to engagement and support for transparency and openness as the project continues.
4. **Geotechnical investigations** – acknowledgement that the impacts of mining operations on site stability and safety had been appropriately investigated as part of the EIS process

2 Engagement to support exhibition

2.1 Engagement Objectives

Council submitted its Development Application and accompanying Environmental Impact Statement to independent planners. Once assessed by independent planners it will be sent to the Sydney North Planning Panel for assessment. Assessment of the DA and EIS are required before earthworks can begin to make the quarry site safe, stable and accessible.

In keeping with Council's ongoing commitment to engaging the community throughout the transformation of the site, Elton Consulting was engaged to provide communications and engagement support during the public exhibition period. The core purpose of engagement was to:

» raise awareness and understanding of the DA and EIS amongst key stakeholders, including those who participated in prior engagement rounds, and the broader community.

» Support the community and stakeholder to make submissions

Engagement was focused on a number of key messages that were designed around the outcomes of previous engagements and responded to the questions, concerns and interests previously expressed by the community and key stakeholders. The communication and engagement approach was developed and delivered around three focus points:

» the creation of a safe, stable, accessible and flexible landform that could accommodate the range of activities the community has identified for the parklands

» the extent of earthworks required to deliver the required landform objectives

» the mitigation measures as set out in the EIS to respond to potential impacts on the environment and community during construction

2.2 Tools and techniques

The following tools and techniques were used to engage the community, to support the exhibition process:

	Project website » Provide project update » Inform about opportunities for engagement » Encourage feedback through providing a link to DA application » Keep public engaged and generate a sense of continuity and project progression
	Emails to CDF and Environmental Stakeholders » Inform about progress and status of project » Encourage feedback by providing a link to DA application » Inform about opportunities for engagement » Keep stakeholders engaged and generate a sense of continuity and project progression

Community Swing-By Sessions

» Reaches those not previously engaged with the project -particularly Culturally and Linguistically Divers (CALD) communities, and young people

» Opportunity for project team and technical experts to directly engage with the community

» Provide information and generate and collect feedback

» Supported by collateral with images designed to enhance understanding and foster engagement

Site Tour for Manor Road and Ferntree Close residents

» Followed a letter that was issued to residents informing of the Exhibition process

» Organised following a request from a Manor Road resident

» To answer specific questions about the impact on adjacent neighbours

Outcomes report

» Details engagement methodology, tools and techniques

» Sets out key outcomes of engagement strategy

» Promotes transparency and openness of the engagement process

3 Engagement Outcomes

3.1 Engagement snapshot

The following table provides a high level snapshot of how many people were actively engaged:

594 Engaged at the four Mall Swing-By sessions

40,000 residents received email update

Site tour Invitations issued to 135 Ferntree and Manor Rd residents

21 participants on site tour

3.2 Key quotes heard

"I am all for the landform works to deliver recreational and ecological improvements."

"At the moment it is just loose slopes and weeds. Half of that valley is weed."

"All the blue gum is getting strangled by the weeds." "I want the weeds removed so blue gums can thrive."

"I would like to see the area cleared. It doesn't matter if you cut down extra trees to make it safe because we want to have access."

"That's a positive; giving access and safety to open up and let people see the crusher plant."

"This is the right thing to do. It is such an eyesore. Make it look nice and use it."

"Amazing." *"This will be brilliant."* *"Accessible and safe, that sounds good."* *"Make it safe to use."*

"It is good to hear about the regeneration work. The space should be used and protected."

"It is great that Council is engaging with the community. We really appreciate this."

"If they are going to make a decent facility…it is fine to lose a few trees in the short term."

4 Engagement Outcomes

4.1 Mall Swing-By sessions:

To engage as many people as possible, four 'swing by' sessions were held in Hornsby Mall during high foot traffic times. In total, approximately **594** were actively engaged, with a solid proportion being from both CALD communities and young people.

The sessions involved members of the project team talking to the community about the DA and EIS process, answering questions, and providing details on how submissions can be made. These conversations were supported by AO boards that explained the process and informed people about how to make submissions. A copy of the two new AO boards that were produced for this round of engagement are located in Appendix A.

The details of the sessions are outlined below:

Session Date	Numbers Engaged
Thursday 11 April	94
Saturday 13 April	193
Thursday 2 May	144
Saturday 4 May	163
Total engaged	**594**

4.1.1 Feedback Themes

Although 594 people were actively engaged – that is, stopped and read the information boards - conversations were had with over 100 people during the four sessions. Project team members took notes of their conversations and a thematic analysis has been completed below. The themes are listed in order of frequency.

Support for the application

General Support

As this round of engagement is based on highly technical documentation, the overwhelming majority of people who stopped by and were engaged had little nuanced feedback. They were not as interested in the landform as they were focused on the final activities. These people did express a significant amount of general support, making comments such as the below:

'very excited; 'can't wait'; 'superb'; 'bring it on'; 'Great! It will change Hornsby!; 'Very Happy!'; 'Looks very good' ; 'This is fantastic' ; 'Looks awesome. Council doing a great job'; 'This is a great project....need to do this now'; 'Great idea, looks like a wonderful park proposal'; 'Looking forward to when the park is open, should be wonderful. Thanks!'; 'Great proposal – HSC is very progressive'; 'Very brilliant idea'; "This will be brilliant."; 'I thinks it's fabulous it's going back to the people'; 'This is great, I love it'; ' I think it is great'; 'Very nice, will be a lovely park, excellent'; 'Fantastic, just amazing – let's get on with it!' .

Support for the DA and EIS

Those that were interested in the specifics of the DA and EIS were also incredibly supportive of Council's approach. Many acknowledged that as the site is currently "a man-made hole", earthworks are needed to make the site safe and accessible. Comments that reflect the views expressed include:

"That makes sense, I agree with that."

"That's a positive; giving access and safety....and to open up and let people see the crusher plant."

"Accessible and safe, that sounds good."

"This is the right thing to do. It is such an eyesore. Make it look nice and use it."

"Make is safe to use"

"No concerns. It's a great use of space"

"It will otherwise be wasted land…since we've messed it up, we should use it".

"Excellent. No concerns, good stuff"

"It's a good use of a hole"

"It is very hilly. I agree that we need to do the works to provide a flat space people can use."

"It is important for kids to be on the site so they can understand its history."

"It is for the community's benefit."

"Long term benefits to the community will be tremendous."

"The landform looks great."

Impacts on the environment

It was difficult to engage people about the specific work that needed to be done on site to make it safe and accessible, and the resulting impacts on the environment. For those people who had the time and/or interest, they expressed support for Council's approach. Comments that reflect the views expressed include:

"As long as the trees and nature will be improved, temporary disturbance is fine. It's good for the long-term. It's abandoned, so it will all be cleaned"

"It's not accessible, so it makes sense to disturb it now so we can enjoy it later."

"If they (Council) are going to make a decent facility, they have got to do it (complete earthworks)."

"Trees grow, it's fine to lose a few in the short term."

"It doesn't matter if you cut down extra trees to make it safe because we want to have access."

"I have no problem about the loss of trees in the short term."

"I agree with what you are doing. I don't want it locked up."

"It has already been farmed and quarried. It's time to open it up to the public"

"It's not exactly virgin wilderness. It is a quarry."

Support for Council's approach to enhancing the natural environment

It seemed that residents who were interested in discussing the impacts on the environment were those who have an active interest in it. Many were local bushwalkers, or volunteers at local bush care groups. Comments that reflect the views expressed include:

"Putting trees back is good. It fits in with your planting of 25,000 extra trees."

"I'm pleased you will be replanting with endemic species. It's very important."

"It's great to hear you will be concentrating on the lower storey and native grasses."

"I'm impressed you want to create a wetland area. It will be great for animals."

"It is great to hear about what is being done to look after the environment."

"I'm glad to hear that remnant won't be touched, that was my biggest concern. You have now allayed my concerns."

"Keep the bushland as its perfect Koala habitat."

Introduced species and weeds

A handful of residents who are familiar with the site (through bushwalking, mountain biking or being neighbours) were familiar with the types and location of the different vegetation and species that are on site. Comments that reflect the views expressed include:

"At the moment it's all loose slopes and weeds."

"Half that valley is weeds."

"All the Blue Gum is getting strangled by the weeds."

"I want the weeds removed so the Blue Gum can thrive."

"Please make sure any planting is with provenance species."

Future Uses

As outlined earlier in this chapter, many who had not already been engaged in previous rounds of consultation and were unfamiliar with the project, wanted to express opinions about what recreational activities they would like to see at the park once it is open in 2023. Team members explained that a subsequent round of consultation will be undertaken at a later date to seek this type of feedback, and comments expressed now will not be captured as part of the report for the DA/ EIS round of engagement.

General Support for Council

A sizeable number of people, unprompted and completely unsolicited, remarked spontaneously during conversations that they had faith in Council's overall approach to the project, and were supportive of the Council in general. Comments that reflect the views expressed include:

"I trust the Council."

"If you think this is the best way forward, I trust you."

"You have my full support. There are more people in the area and we need more spaces for kids."

Supportive of the transformation

A handful of people engaged are familiar with the site and have had used it currently. When discussing the DA and EIS, they were able to make a connection to the other aspects of the site that are important community. Comments that reflect the views expressed include:

"It is very important to keep and preserve the cemetery, this is an important part of Australia's history."

"I'd like to see the Aboriginal heritage of the area recognised."

"It is good to hear about the regeneration work. The space should be used and protected."

"I have no issues. I use the mountain bike trails and have experienced very little down time so far."

"I use the mountain bike trails twice a week. I am very happy about plans for them to be maintained and improved. There is very easy access to the site from the train."

"I use the bike trails. The site is already so much better than it was. The regeneration work is already making a difference. People need to know about this great work, if it wasn't for the parklands project the area would not be able to be used."

Impacts on adjoining residents in Manor Road and Ferntree Close

A handful of residents from both Manor Road and Ferntree close attended the Swing-By sessions and asked specific questions about the notification letters they had received in the mail as part of the DA process, as they were confused by the terminology 'area of impact' and what that would mean for them. In response to a request from one resident, Council decided to issue invitations to all residents on these streets to a site tour, to answers any questions residents may have about the 'area of impact' and the DA/ EIS process. The outcomes of this engagement are outline in chapter 5.

Council's commitment to ongoing engagement

As people were being engaged (by either by reading the display boards, or talking to team members), a large proportion commented on the value of the Swing- By and how it deepened their understanding of the project. Comments that reflect the views expressed include:

"It is great that Council is engaging with the community. We really appreciate this."

"It is great that you are keeping the community informed."

"Very good that you are open to presenting information. We need more of it."

"'I'm really happy with the engagement. Good job"

5 Site Tour

A Manor Road resident visited one of the Swing-By sessions held in the Mall. During the discussion with the project team, they suggested a site tour would be of value to residents of Manor road, to deepen their understanding of the "area of impact" that was outlined in the notification letters they received. Following this suggestion, a site tour was organised and extended to residents of Ferntree Close, as both roads back onto the site. Invitations were issued to 135 residents requesting that only 2 from each household might attend and with a limited number of spaces, and the site tour was held on Tuesday 14 May from 2:30pm- 4:30pm.

In total, 21 residents of Ferntree Close and Manor Road attended the site tour. The tour was planned with a number of stops where information regarding the DA and EIS were discussed, and then open for questions and answers. The map and notes of the tour are included as Appendix B and C of this document, however the main themes are captured below:

» Discussion about the earthworks:
  > visually showing attendees where earthworks will be occurring
  > explaining the required stabilisation works
  > detailing where vegetation will be lost and replanted
  > outlining the preservation and enhancement of EEC
  > acoustic implications
» Explanation about the vegetation mapping and condition assessment:
  > discussion and questions about mapped categories of Blue Gum and Blackbutt Forest communities (including unforested areas)and implications for how they will be treated
» Details about Quarry Fill:
  > broad explanation for the graded landform/ amphitheatre and lake proposal and how and why the proposed levels have been determined
  > discussion about what is hoped and may be achieved with the water that continues to fill the quarry void from the groundwater table, including such as necessary release of some water, returns to the creek, recirculation within the quarry for lake quality, potential harvesting for other uses such as irrigation and amenities

» General question and answer:
  > about next steps
  > more site tours

After the site tour, several participants sent emails thanking the team, commenting on how valuable the information was.

The comment below reflects the sentiments that were expressed in the emails received:

"The council staff were very patient and willing to answer questions which was much appreciated."

6 Next Steps

Once a Determination has been made regarding the EIS/ Development Application, the next steps will be to prepare an engagement methodology for the next round of consultation.

Appendices

A A0 boards

B Site tour map

C Site tour notes

A A0 Boards

HORNSBY PARK

THE TRANSFORMATION FROM QUARRY TO PARK CONTINUES

NorthConnex has finished delivery of fill material to Hornsby Quarry and are now demobilising from the site.

Council has lodged a Development Application (DA) with an Environmental Impact Statement (EIS) for the next stage of the works proposed for the former rock quarry and Old Mans Valley sites. The DA is concerned with earthworks that are required to make the site safe, enable environmental restoration and deliver a flexible landform that will be suitable for a variety of recreational experiences.

The EIS provides recommendations about how to stabilise parts of the quarry and make the site safe. It also outlines ways to protect the environment during construction. The DA will be assessed by independent planners and determined by the Sydney North Planning Panel.

A range of safety issues remain on site that will be rectified through the landform works including:

- removal of unstable mining spoil from parts of the northern slope, and
- measures to stabilise quarry cliff faces and implement rockfall exclusion zones.

The DA also provides guidance about how best to manage potential impacts on nearby residents, businesses and the community and addresses considerations such as noise, traffic and air quality. It also makes provisions for:

- the preservation of important cultural assets and heritage items,
- the protection of valuable vegetation,
- the restoration and regeneration of impacted and poor quality forest areas, and
- the management of potential impacts on soil, water and biodiversity within the site.

Old Mans Valley

View to eastern diatreme and part south cliff

www.hornsbypark.com.au

HAVE YOUR SAY
ON THE DEVELOPMENT APPLICATION AND ENVIRONMENTAL IMPACT STATEMENT

HORNSBY SHIRE COUNCIL

The DA and Environmental Impact Statement for the landform earthworks in Hornsby Quarry is on public exhibition and will remain open for comment until Friday 17 May 2019.

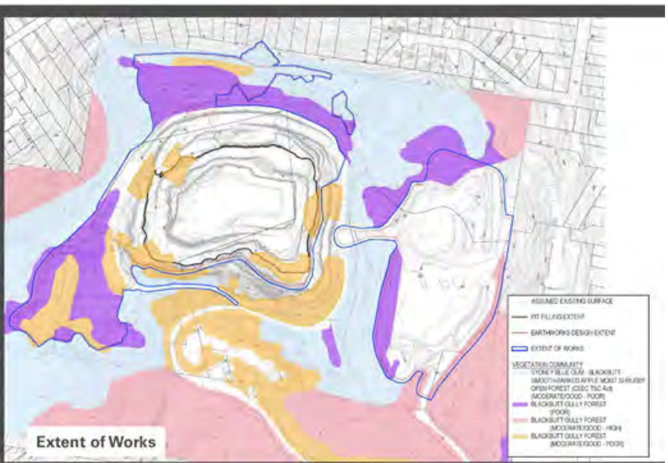
HOW DO I MAKE COMMENTS?

To view and make comments on the DA, go to the Hornsby Shire Council website and search for DA/101/2019 or go to the dedicated website for the **Hornsby Park and Quarry Redevelopment Project** at **hornsbypark.com.au** where a direct link is provided.

HOW DO I STAY UPDATED?

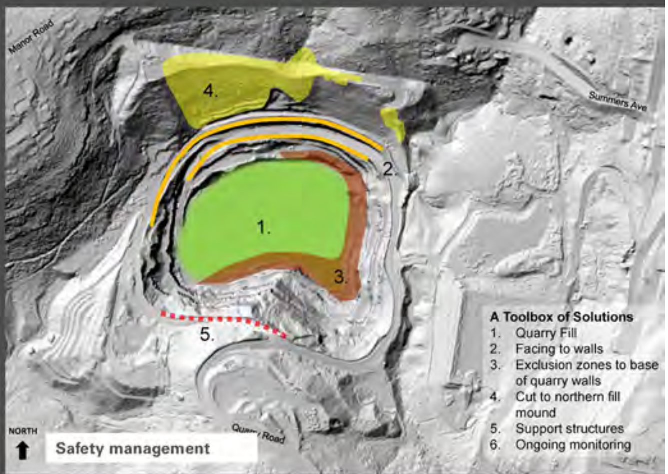
The Hornsby Park website hornsbypark.com.au has a document library and summarises the history of the project to this point. This will be your best way to stay in touch with the project and future opportunities to review and comment on any aspect of the planning and design towards the opening of the restored quarry and parkland in 2023.

Aerial view of site



Extent of Works

3D Laser map of site



Safety management

www.hornsbypark.com.au

B Site tour map

C Site tour notes

Hornsby Quarry Site Tour Notes

Tuesday 14 May 2019

2:30pm – 4:30pm

21 Residents from Manor Road and Ferntree Close in attendance.

Council Staff: Rob Rajca; Kurt Henkel; James Frawley; Craig Clendinning; David Beharrell

Elton Consulting: Calli Brown

Key

Q= Question

A= Answer

C= Comment

Background information:

Council Staff

"The site including Old Mans Valley was originally three parcels of land, with the Crusher plant being the building where the rock was crushed to make Sydney's roads. The DA, which will be assessed independently, is for the landform only".

Q: Are there other plans for the quarry?
A: Only Parklands
Q: Will there be any acoustic studies?
A: Yes. Many have already been done and they are in the DA.
Q: What were the acoustic studies for?
A: Construction only.
C: (comment) We care about the powerful owl. They seem to be coming back.
C: They roost in the trees

Stop 1: Southern Access track

Council Staff:

"The track we are currently on we'd like to maintain and keep as a track. However, the geotechnical engineers have said there is long term instability. In the DA we have outlined our plans to make it safe. We want to do micro-piling. This means we will drill holes and put concrete columns into the rock below. When we move across the valley you will see why – there is a lot of soil here that will erode over time. This monitor here is one of our 40 devices across the site, which is part of our safety precautions. After a downpour of rain, we check them. So, you can see that although the site is fenced off to the general public, we are still monitoring safety."

Q: Is it unsafe because of the dumping of unused fill? If the mining trucks used it for decades, does it really need the micro-piling?
A: Now that we want to open the area up to the public, safety is different to mine safety. The soil is very deep. It will eventually erode. That's why we have to micro-pile.
Q: Will the fence come down?
A: No, we will still have a fence here. We will need to remove some of the trees near this fence for safety reasons.
Q: Will you de-privet?
A: Yes. It will take a long time though.
Q: So, the quarry will remain?
A: Yes. It's too beautiful to fill it to the top, and it's part of the area's history.

Stop 2 View of South West Fill Site

Council Staff:

"Behind us is natural bushland. It's mapped as Blue Gum Forest. However, over in that area (pointing), it is fill from the quarry. This is an area that is up to 25 metres deep with spoil from the quarry. When you look at it, you can see it is unnatural – it's terraced. (shows a diagram). This is what we call the south west fill area, as it is south west of the quarry hole. We are proposing to move the fill from this area and use it to create an accessible landform in the quarry hole."

Q: Is it critically endangered?
A: We will not be touching the area that that is mapped as CEEC. (Showed on the EIS Extent of Works Plan/ Vegetation Map). We will be removing fill from some areas that will have minimal impact on vegetation.
Q: Does this mean you are saving the Blue Gum Forest but removing areas mapped as Blackbutt Forest?
A: Not necessarily. The Blackbutt Forest classified area is mostly exotic vegetation, eg, Pampas grass. When we did the vegetation mapping for the EIS we were required to use the BioBanking Assessment Methodology. So even though it is largely exotic, we need to view it as what it has the potential to be. This resulted in this area being bumped up to a higher category, e.g. Backbutt Gully Forest.
Q: (Looking at the map) All the light blue, is that all Blue Gum High Forest?
A: Yes.
Q: The Blackbutt Gully Forest is in three colours. Why isn't the Blue Gum the same?
A: Because it has been mapped as Critically Endangered. It won't be touched. Even if it is mapped as poor or medium quality, we still have to protect it as much as possible but at the same time ensure public safety.
We have spent the last 3 years looking at ways to avoid, minimise and mitigate impact as much as possible.
C: It's great to have those maps here on the tour (EIS Extent of Works Plan and Lidar Survey).
A: Yes (pointing) you can see the area where the material (spoil from the quarry) has been dumped.

Stop 3 Blue Gum High Forest:

Council staff:

"The quarry has filled with water faster than expected. It is up to the level of where the NorthConnex fill is, so NorthConnex is pumping the water out. It is done under a licence and it gets tested before it is pumped out. It is of a very high standard."

Q: Does it go into Berowra Creek?
A: Yes, eventually.

Council staff:

"You can see there is mapped Blue Gum High (Diatreme) Forest. You can see that it is good quality, meaning that it has a relatively intact forest composition and structure, including canopy trees, mid-story and ground cover. It wasn't touched during mining.
Over here though, you can see this bush isn't as good quality. The soil it is growing on was placed there as overburden from the mining activities and it has self-seeded over time. There are lots of weeds – with the mid and understory being primarily weeds. It still mapped as CEEC though, due to the existence and prevalence of the distinctive tree species associated with Blue Gum Forests.

Q: Before the quarry was it full of Blue Gum?
A: No, it was farmed, for timber. There were also orchards.

Council staff:

"We have found from soil samples that the soil profile is changing. They are in North of Old Mans Valley, with just a small modification from orchards. Everywhere else in this area though, the sandy soil from upper surrounding areas has eroded and come down over the top of the volcanic soils".
C: I read a historical paper that said there was cedar here originally.

Q: With the water – will you always have to pump it out?

A: Yes. While we're thinking we will create a big lake, we'll still always need to pump water out. The level that NorthConnex has now filled the quarry to, is over 20 metres below the level of the nearest watercourse and therefore will continually fill with groundwater. However, there's always the potential to use this water for irrigation of green spaces and other fit-for-purpose uses.

Q: Is it spring water?
A: No, its ground water and rain water. The bottom of the quarry was 8 metres above sea level.
Q: Where is the fill now?
A: About 55 metres above sea level.

Stop 4: Northern Mound and Hornsby Quarry void.

Council staff:

"At stop 1 we mentioned the need for micro-piling as the soil is slowly eroding. Looking across the quarry (points) you can see (from here) what we mean. You can see the soil over there on top of the rock face below. – that's stop 1 (pointing). Unfortunately, the rock doesn't go all the way up to the level of the track.
One of the areas for the instability is behind us (northern mound). There is a scalloped area in the northern mound that has previously slipped down. They put spoil material there and there is a creek line that has been blocked off by the mound. The worst thing you can do for instability is add water. So after significant rain, it can be very unstable. That's what happened at Thredbo. It was rain and groundwater. For Council to open the site up to the public, we have to unblock the creek and allow it to drain again. A drainage line was placed by the quarry operators but it was only temporary being a galvanised iron pipe, which has now rusted and totally collapsed.
In our DA we've outlined that we want to construct an access road, to lower the area to drain. To build a roadway, we will need to build an underground stormwater pipeline. The pipeline will take minor rainfall events and the roadway will take the heavier events.
There are some other minor areas towards the eastern end of the northern mound that are too steep and at risk of landslide. These areas will be removed as part of the works.

In terms of general drainage, the three mining diversion channels have kept stormwater and other overland flows out of the quarry void from the catchments that drains from houses and roads. The water in the quarry is groundwater and rain so it is very clean. The tests undertaken prior to the filling activities show it is almost drinkable".

Q: What would the access road do?
A: Firstly, as a construction access to work on the mound, then drain it, and the road serves as an overland flow path.
Q: The Manor Road water drains here?
A: Yes.

Council staff:

Drainage and stabilisation work on the northern spoil mound will mean that some of the trees that have grown on the mound created by the mining operations will be removed.
Q: What are the pink ribbons for?
A: We have looked at dozens of ways of doing it. We mapped individual trees so we could see all schemes and looked and how we could assess the trees and the impact
Q: But what does the pink ribbon actually mean?
A: That the tree has been surveyed. It does not mean that they will necessarily will be removed. They all have numbers. In the EIS it says the Blue Gum High Forest is impacted. The only way we can stabilise this area is to impact part of the mapped Blue Gum but we are hoping to reduce the impact even further during the detailed design stage.
Q: The 5 Blue Gums with the small hollows?
A: [Not sure where the trees with the hollows are but yes, if they are in the impact area]. This is in an area that has been mapped where the Blue Gum will be impacted. We will be putting new, manufactured soil from the area there and re-planting. Tree losses will be offset.

Q: Is sandstone runoff an issue?
A: It's not an issue, as its natural. It's the natural process that created the Blue Gum Forest.
Q: Will you need to go to the rear of properties?
A: No. Council owns a parcel of land in between.
Q: That will remain Council owned?
A: Yes.
Q: Are there any plans to change the use of the land?
A: We will keep it and turn it into a haul road and then provide access.
Q: Will there be a viewing platform in that area?
A: We are conscious of the drama of the site and one of the best views is from up there.
Q: Any animals?
A: There are wallabies and echidnas and other animals. Some animals will be wary of the activities and move further away during construction but are likely to return once the land is rehabilitated.
Q: What about acoustics of traffic?
A: The proposal at the moment is about earthworks and stabilising the site. Later when we are designing the park there will be further work and we will be going to the community to find out what they want to do.

Stop 5 Quarry Void

Council staff:

"We have several principals we are working from.
1st Principle: Diatreme wall is a strong feature and we want to make it a focal point.
2nd we want to build a lake.
3rd we want an amphitheatre – a graded landform rising from the water's edge to where the fuel tanks are that we walked past. Behind us it will stay as it is. But we are also aware of rock fall. There isn't a 'global instability' issue, but a natural process. To make the area safe we are proposing to have an exclusion zone at the base of cliffs."
Q: Will that be another fence at the base of the quarry?
A: Possibly but we would like to create a wetland edge, a series of cascading ponds running back to the lake at the base of the southern and eastern cliff faces. We think we can take the problem and solve it with creating an attractive feature with water flows and habitat potential.
4th Principle – create an accessible path. We want to have as long an accessible path as possible – we won't be able to get up to the Crusher Plant as it's so steep but we will be able to go around much of the site.
C: I like the idea of a wetland to attract more animals to the valley.
A: we have a large park to work with and a good opportunity to demonstrate Blue Gum Diatreme at various stages and ages.
Q: It has the potential to be beautiful but there is the potential for you to stuff it up, but I don't think you will. We are all worried about noise though.
A: The DA is to create a landform. It will be flexible but we haven't decided what activities will be where. It is important work creating the landform – we only want to do it once.
Q: Man has set up enormous beauty here. Why won't the lake be bigger?
A: There was an idea at one stage to fill it up with water but it will still be unstable and the lake would not be able to be used. We also looked at filling the hole up to the top but it would take 4 times the amount of fill. That would be at least 8 years of truck movements. Also, we can see the value in the visuals of the quarry so we have decided to fill it to a level that provides stability.
Q: Will we be able to swim in it?
A: Perhaps but there will be operational issues that need to be considered.
Q: Will this site tour be an annual event?
A: Yes, I think so

Comment – thank you.

Addendum: In relation to an annual site tour, Hornsby Shire Council would like residents to be aware that once earthworks/construction commence, access to most of the site will not be possible. Council is committed to holding site visits before this time, and will continue to keep residents informed once works begin.

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Appendix F – Preliminary Vegetation Management Plan

Hornsby Shire Council
Hornsby Quarry Rehabilitation
Preliminary Vegetation Management Plan

Report prepared by Hornsby Shire Council

2019

Executive Summary

This Preliminary Vegetation Management Plan (VMP) has been prepared for the Hornsby Quarry rehabilitation and proposed parkland development (DA/101/2019). The purpose of this Preliminary VMP is to describe vegetation management actions within the extent of works and the surrounding area (hereafter 'the Impact Area' and 'the Site' respectively) to support the conservation of biodiversity values in accordance with conditions of approval. The detail within this Preliminary VMP will provide guidance on the development of a more detailed VMP, which will form part of a holistic Offsets Package for the development.

The Hornsby diatreme in Old Mans Valley was quarried throughout the 1900s, this Site is now known as the Hornsby Quarry. The decommissioned Hornsby Quarry was acquired by Hornsby Shire Council in 2002 (Council). Since then, it has remained closed to the public for safety reasons. Council has undertaken research and planning to rehabilitate the Site as a recreational area within the unique natural environment for use by the community.

Rehabilitation earthworks are required to stabilise the Quarry and to provide for safe access. The critical area requiring stabilisation is on the northern spoil mound. The material extracted from stabilising the mound will be used to provide additional fill for the void to be shaped into a suitable landform. Any further material required to provide fill may be sourced from the south west mound. Both mounds are modified areas currently vegetated with a mixture of canopy and weed species. In addition, the presence of critically endangered Blue Gum High Diatreme Forest has been identified.

The proposed rehabilitation earthworks require 0.74 ha of highly modified Blue Gum High Diatreme Forest, 1.76 ha of Blackbutt Gully Forest and 3.39 ha of exotic grassland to be removed from the northern spoil mound and the south western mound. In accordance with the requirements of the Secretary of the NSW Department of Planning and Environment, the Secretary's Environmental Assessment Requirements (SEAR No 1167) dated 6 September 2017 and Council's Offset Policy, Council commissioned GHD Pty Ltd (GHD) to undertake an Environmental Impact Statement (EIS) to assess potential impacts on biodiversity. The EIS has undertaken vegetation mapping and condition assessment.

The aim of this Preliminary VMP is to identify how the Site's biodiversity will be protected, enhanced and restored in-perpetuity as part of the Site rehabilitation. Recommendations derive from best practice site rehabilitation, habitat protection and ecosystem enhancement. They are based on the mapped vegetation condition, previous and proposed levels of disturbance and the resilience of the vegetation to recover from that disturbance. Where soils have been heavily disturbed through modification, resilience is intrinsically low, and revegetation is the best option. There are three locations within the Impact Area where extensive soil modification has occurred and where revegetation is recommended: the eastern fill area, the northern spoil mound and the south western mound. Any revegetation is to include a representation of the floristic properties from the existing plant communities using locally sourced plant material. These works are proposed to improve the condition of the existing plant community types and increase the area of native vegetation present.

Vegetation management has been categorised into five (5) Management Zones based upon the position in the landscape and management actions required:

The Impact Area

- MZ1 North Sound Mound
- MZ2 South West Mound
- MZ3 Landscape Zone – including the eastern fill and crusher plant areas

The Site

- MZ4 Blackbutt Gully Forest
  MZ5 Blue Gum Diatreme Forest

The directives of this Preliminary VMP to achieve the aim include the following:

- Weed treatment
- Bush regeneration and revegetation
- Earthworks and soil preparation
- Retention, enhancement and restoration of habitat
- Management of edges, interface zones and buffers to maintain high levels of habitat connectivity in the region.

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Abbreviations

Abbreviation	Description
AS	Australian Standard
BBAM	BioBanking Assessment Methodology
BBGF	Blackbutt Gully Forest
BC Act	*Biodiversity Conservation Act* 2016
BGDF	Blue Gum Diatreme Forest
BVNP	Berowra Valley National Park
CBD	Central Business District
CEEC	Critically Endangered Ecological Community
DA	Development Application
EAR	Environmental Assessment Requirements
EIS	Environmental Impact Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act* 1999
GBD	General Biosecurity Duty
MZ	Management Zone
PPE	Personal Protective Equipment
PCT	Plant Community Type
SEAR	Secretary's Environmental Assessment Requirements
VMP	Vegetation Management Plan

1 Introduction

1.1 Purpose

The rehabilitation and development of the former Hornsby Quarry as a new recreational parkland, Hornsby Park, has been proposed under DA/101/2019. The Secretary's Environmental Assessment Requirements (EAR No 1167) dated 6 September 2017 notes that the EIS, in determining an offsets package, should *identify the conservation mechanisms to be used to ensure the in-perpetuity protection and management of proposed offset sites.*

The purpose of this Preliminary Vegetation Management Plan (VMP) is to provide a general description of the ongoing conservation vegetation management actions for the offset site in accordance with the EAR's and any conditions of approval. This Preliminary VMP has been prepared under the assumption that offset works will be required in the Impact Area and surrounding area, the Site (Figure 2, Table 1). At this stage the final land use for the different areas within Hornsby Park has not been determined and as such this VMP should be viewed as a Preliminary document with the works described within providing guidance in the development of the final VMP.

1.2 Background

The northern portion of the Hornsby Diatreme has historically been mined for blue metal aggregate since the early 1900's. It was decommissioned and then acquired by Hornsby Council in 2002. Since that time, it has been closed to the public for safety reasons. Council has undergone extensive investigations to rehabilitate the Quarry. Plans are being prepared to stabilise the area and transform it into a place of ecological integrity to be enjoyed as a public recreational parkland. To do so, the void requires some further filling and shaping, and the north mound requires stabilising.

The initial works to stabilise the quarry by filling the void have been undertaken. Roads and Maritime Services were given approval to partially fill the void with material extracted from the NorthConnex tunnel works. This stage of the rehabilitation project pertaining to the development application proposes to undertake works on the north and southwest mounds by reshaping them into stable and functional landforms with managed water movement through the site. The material extracted will be used to further fill and shape the void. Vegetation will need to be removed from both the north and southwest mounds in the process. The project design and a tree audit has minimised the area of vegetation to be removed with the aim of minimising the impacts on native vegetation and fauna. Final landscape landform proposals for these two areas are revegetation, provision of an access track to a lookout on the north mound and an accessible natural area in the southwest.

This Preliminary VMP is to support the Environmental Impact Statement (EIS) prepared by GHD Pty Ltd (GHD) to address the requirements of the Secretary of the NSW Department of Planning and Environment (SEAR No 1167) dated 6 September 2017 as part of development proposal documentation required under DA/101/2019 submitted by Hornsby Council. It will address vegetation management both within the Impact Area as part of the DA and the Site.

The vegetation management of the Impact Area is currently complex, expensive and physically difficult to manage because of unsafe access and the high amount of established weed plumes on disturbed soils in a high-risk landform. The topography is steep and unstable, site soils are varied and disturbed. In addition, any woody weed management requires serious consideration due to the existing habitat provision and soil stabilising characteristics these weeds are providing. Any vegetation management decisions require consideration to all these factors with a long-term perspective. The proposed project will be disruptive in the short term but with stringent and accountable processes put in place, it will enable a much better long-term outcome for the plant communities, the connectivity to adjacent natural areas and as an education platform for the broader community. Confidence should be gained from the Sites' exhibited native vegetation resilience following historic disturbances by the area of regrowth present.

Table 1. 1: The Site Definition

Land Title	Lot A, B, C, D and E in DP 318676, Lot 1 DP 926103, Lot 1 DP 926449, Lot 1 DP 114323, Lots 1 and 2 in DP 169188, Lot 7306 DP 1157797, Lot 1 DP 859646, Lot 1 DP 926449, Lot 13 DP 734459, Lot 114 DP 749606, Lot 213 DP 713249
Location	Old Mans Valley and Hornsby Park, HORNSBY
Grid Reference	151.090704 E, -33.69740 S
Ownership	Hornsby Shire Council, Crown
Zoning	RE1 Public Recreation
Current Land Use	Decommissioned Quarry, Mountain Bike Track, Walking Tracks, Native Bushland

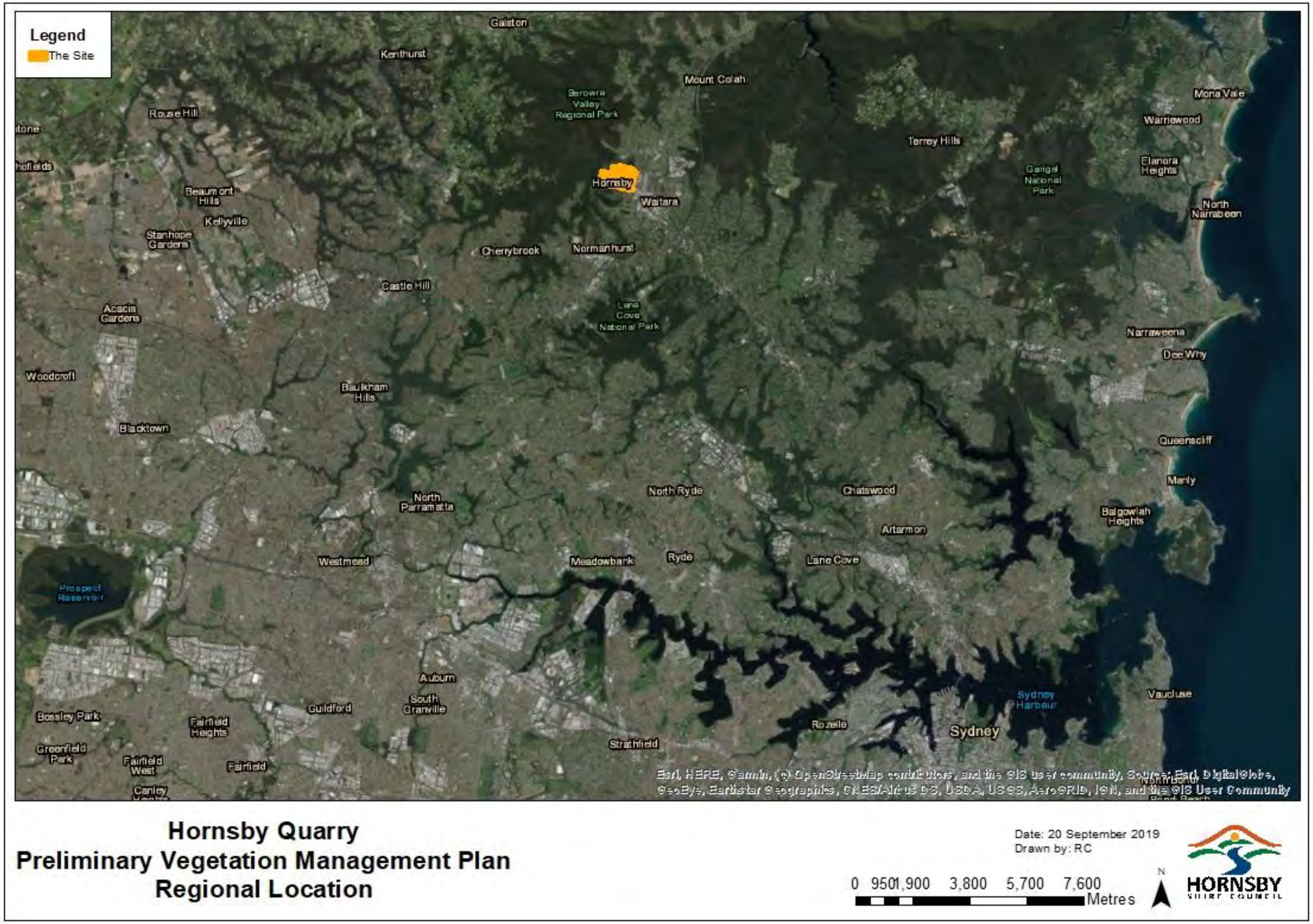

Figure 1. 1: The Site Regional Location

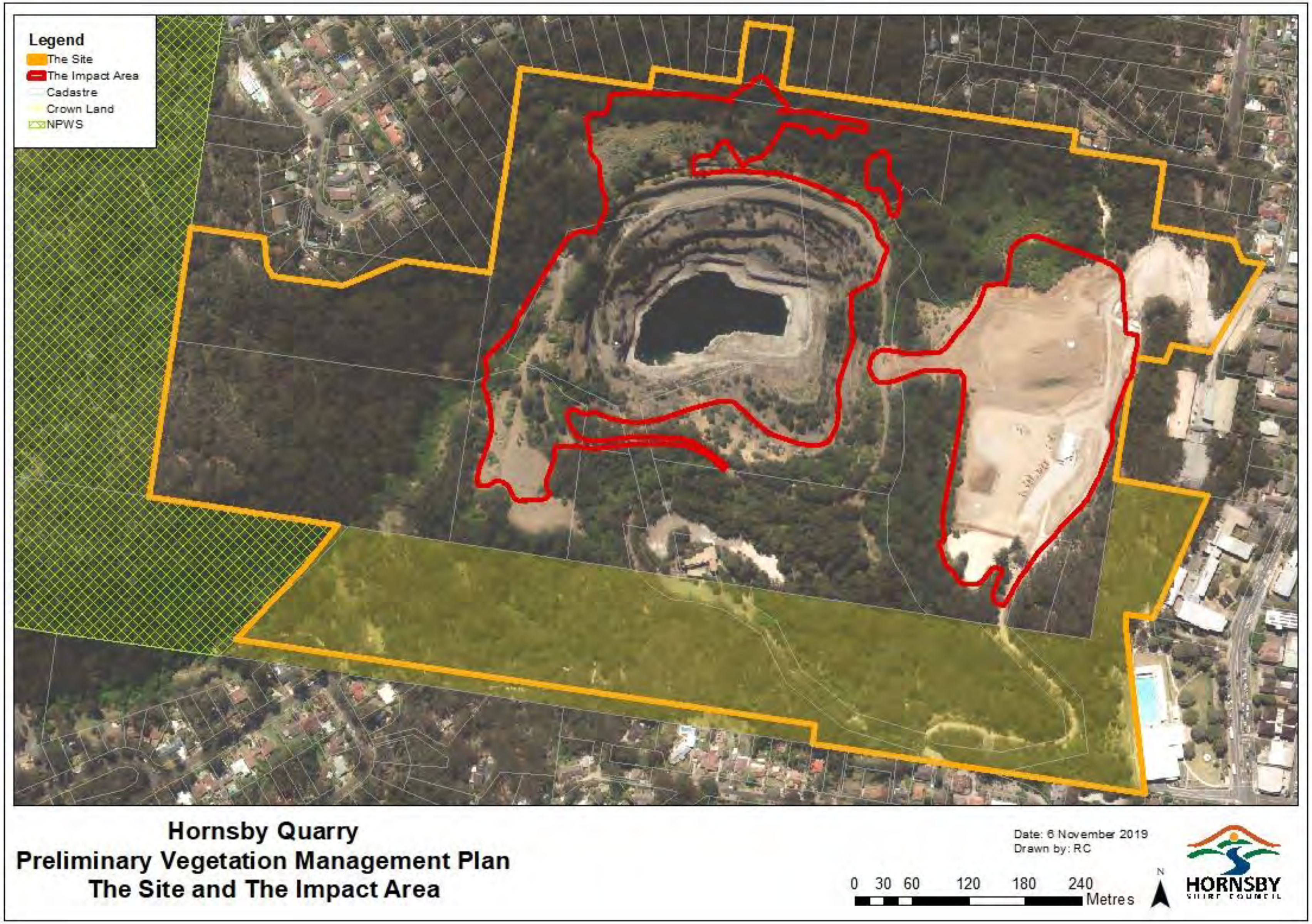

Figure 1. 2: The Site and The Impact Area

1.3 Aims and Objectives

This Preliminary VMP refers to areas of vegetation within the Impact Area of the Development Application and the vegetation of the surrounding bushland, defined as 'the Site' (Figure 1.2). The aim is to establish adaptive management actions to protect, enhance and conserve the Site's high level of ecological functions. The objectives to achieve the aim are to:

- Protect the Blue Gum High Diatreme Forest and surrounding vegetation
- Restore and conserve connectivity of native vegetation and habitat corridors in-perpetuity
- Sustainably re-establish native vegetation and associated ecological functions to a condition representative of the surrounding Plant Community Types (PCTs) in areas of major disturbance including areas requiring stabilisation works.

1.4 Scope of Works

The following scope of works was undertaken to prepare this Preliminary VMP:

- Review of previous reports: Soils - SESL (2018), Tree Survey - Arterra (2019), EIS - GHD (2019), Vegetation Survey and Mapping - Kleinfelder (2017), EcoLogical (2015), Dragonfly MBT REF (2011), Land Management Activity Reports), Preliminary Construction Environmental Management Plan – GHD (2019)
- On-ground field investigations
- Discussions with relevant stakeholders
- Consideration to the final earthwork requirements for stabilisation, vegetation condition and future surrounding landuse design

1.5 Plan Tenure

The Preliminary VMP is primarily to cover a period of five (5) years and then in-perpetuity under the guise of adaptive management. Levels and types of input and resources required to ensure natural processes ensure will need to be reviewed annually to assess if any alterations to ecological functionality are apparent due to disturbance: unforeseen, naturally occurring or through deviations from the original plan by others.

1.6 Legislation and planning controls

Table 1. 2: Relevant Legislation

Government Level	Relevant Policy/Legislation	Relevance to the Site
Local	• Hornsby Local Environmental Plan 2013	• RE1 Public Recreation (public open space or recreation; protect and enhance the natural environment for recreation; protect and maintain areas of bushland with ecological value) Note: A small section of R2 Low Density Residential Land is also incorporated into the Site.
State	• *Biodiversity Conservation Act 2016* • *NSW Biosecurity Act 2015*	• CEEC present. • Secretary's Environment Assessment Requirements (SEARs) published 28.08.17 (assess significance of impact including residual impacts to determine if Offsets are required.
Commonwealth	• *Environment Protection and Biodiversity Conservation Act 1999*	• CEEC present.

2 Existing Environment

2.1 Location

Hornsby is a suburb of Sydney located approximately 21 kilometres north west from the CBD. The Hornsby Quarry is located within the Old Mans Valley precinct and adjacent to Hornsby Park on the west side of the Hornsby CBD (Figure 1.1). Areas of native vegetation buffer the quarry from the built environment on the north, south and eastern boundaries. The native vegetation on the western boundary borders the Berowra Valley National Park. The Site has linkages to Dog Pound Creek, an extension of the diatreme supporting a Blue Gum Diatreme Forest protected in-perpetuity under the State's BioBanking Agreement Number 142 (Figures 1.2 and 2.1).

2.2 Topography

The original topography was that of gently undulating to low steep hills. Mining activities have highly modified the Site topography. The Site now forms an amphitheatre sloping away from the higher slopes of the built environment of Quarry, Old Peats Ferry, Manor and Summers Roads to the south, east and north respectively. Joe's Mountain within the Berowra Valley National Park is to the west (Figure 2.1).

The Quarry is surrounded by exposed rock cliffs including a representation of the diatreme formation on the eastern rock face. Steep exposed slopes extend from the northern and southern sides of the Quarry rim. A steep rise of natural forest vegetation extends from the western side.

2.3 Soil and Geology

The Quarry is at the northern end of the Hornsby diatreme, a rare volcanic structure formed within the joint system and horizontal layers of sedimentary rocks. Formed millions of years ago, the soil was a mixture of basaltic breccia, sedimentary breccia and metamorphosed Hawkesbury sandstone. The surrounding areas are Hawkesbury Sandstone (PSM 2006). The intrinsic qualities of Hornsby Diatreme's soil have resulted in its value to development and the mining of its properties. Based on Chapman and Murphy (1989) soil type descriptions, Hornsby (ho), Hawkesbury (ha) and Lucas Heights (lh) soils have been mapped on site in the *Soil Landscapes of the Sydney 1:100,00 Sheet.*

Previous studies of the Site soils have been undertaken by Coffeys and Partners Investigations (1990), Parsons Brickenhoff Investigations (2004), PSM Investigations (2006) and SESL (2019). These studies have identified the characteristics of the fill and will be discussed further in relation to suitability for supporting native vegetation in 2.8 Bushland Condition. The previous studies indicate that little, if any, of the remaining soil profiles exist in the Impact Area apart from the area north of the north wall. The Impact Area is now a mixture of varying development stages of breccia and sandstone overburden. Fill material associated with mining activities is located around the quarry and within the Impact Area.

The objective of the soil assessment report by SESL (2019) was with respect to the feasibility of, and directions to, engineering the site soils for re-establishing and supporting both Blue Gum Diatreme and Blackbutt Gully Forest vegetation. Two Bore Hole samples (BH1 and BH 4) were examined from amongst relatively intact native vegetation within a sandstone landscape and will be used as benchmark data for creating sandstone soil profiles. An additional two Bore Holes (BH14 and BH16) provided a good example of a young breccia profile. Replicating Bore Holes samples 14 and 16 as a representation of topsoil and subsoil horizons of a desirable soil profile will be the aim for Blue Gum Diatrame revegetation processes (SESL 2019).

2.4 Hydrology

Old Mans Valley is within the Hawkesbury Nepean River Catchment, the largest river/estuary system in the Sydney Region and one of the most important river systems in NSW. The land use of Old Mans Valley has changed overtime, and as such, so has the integrity of the natural water flows. Following thousands of years of Aboriginal occupation and use, the natural landforms were subjected to land clearing, then orcharding and finally mining activities. Water now flows into the valley from neighbouring urban and natural areas via ephemeral drainage lines. All surface water flows have been diverted around the quarry via a series of constructed channels and culverts to Old Mans Creek to the north west of the quarry, a tributary of Berowra Creek within the Hawkesbury River Catchment. Groundwater inflow has historically filled the base of the void with water requiring pumping out by Council under a *Water Management Act 2000,* dewatering licence with an allocation of 370 ML/year (Figure 2.1).

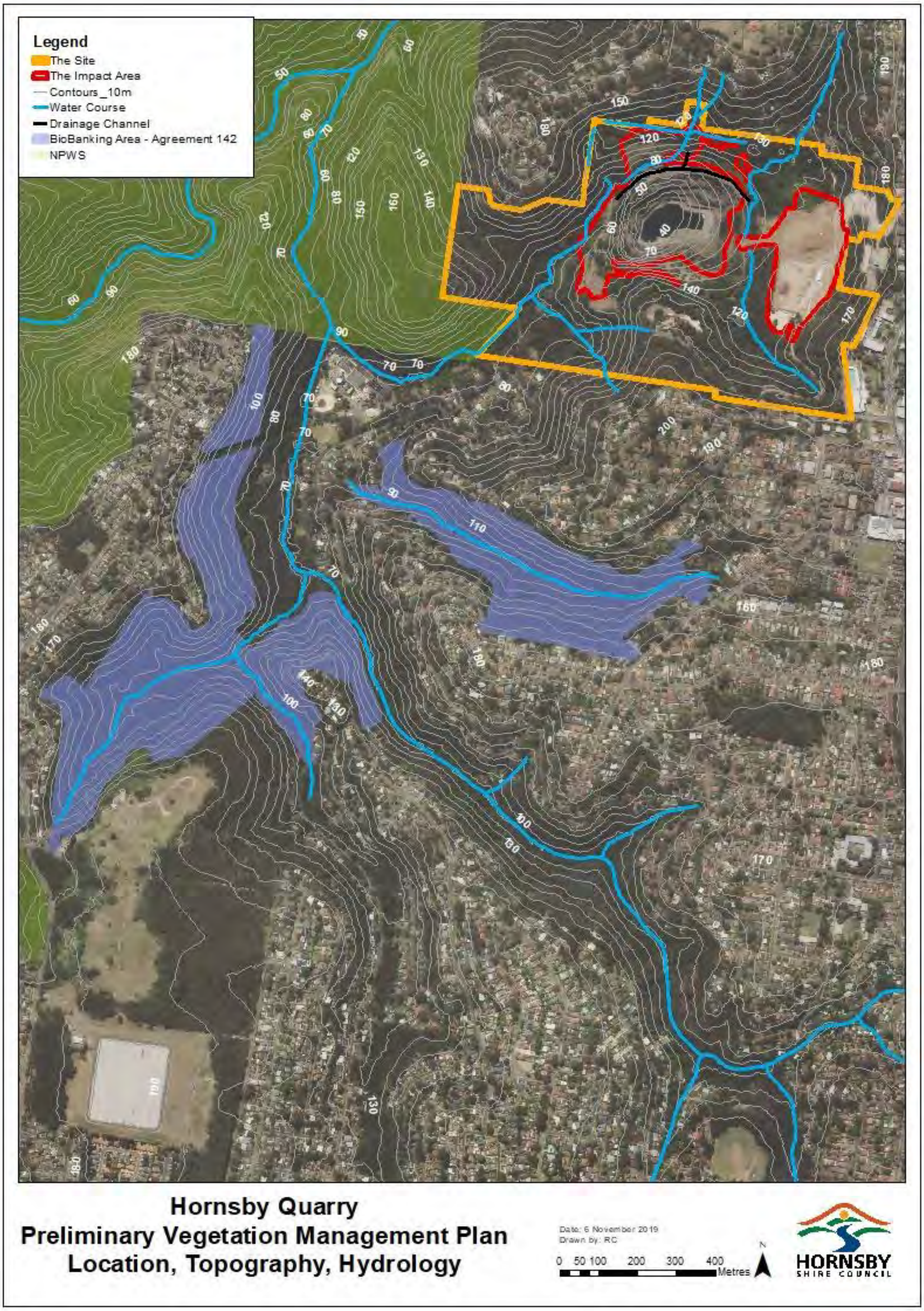

Figure 2. 1: Location, Topography, Hydrology

2.5 Vegetation Communities

Both Kleinfelder (2017) and GHD (2019) identified two vegetation communities present within the Site and the Impact Area using Biobanking Assessment Methodology, 2014. For the purposes of this Preliminary VMP, the Smith & Smith naming classification will be used to describe both plant communities Blue Gum Diatreme Forest (BGDF) and Blackbutt Gully Forest (BBGF). (Table 2.1, Figure 2.2, Appendix 1).

Table 2. 1: Hornsby Shire Vegetation communities and other vegetation classifications

Hornsby vegetation community (Smith & Smith 2008)	Australian endangered ecological community (EPBC Act)	NSW endangered ecological community (BCT Act)	BioMetric Vegetation Type (NSW BioBanking Scheme)	NSW Plant community Type (VIS Classification 2.1) PCTID
Blue Gum Diatreme Forest BGDF)	Blue Gum High Forest in the Sydney Basin Bioregion (CE)	Blue Gum High Forest in the Sydney Basin Bioregion (CE)	HN596/ME001. Sydney Blue Gum – Blackbutt – Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin	1237. Sydney Blue Gum – Blackbutt – Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion
Blackbutt Gully Forest (BBGF)	Not Listed	Not Listed	HN648 Smooth-barked Apple – Turpentine – Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region.	1841. Smooth-barked Apple – Turpentine – Blackbutt tall open forest on enrichhed sandstone slopes and gullies of Sydney region.

The Blue Gum Diatreme Forest is listed as a critically endangered ecological community (CEEC) under the *NSW Biodiversity Conservation Act 2016* and critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Blue Gum Shale Forest. The community is very restricted and may now be confined to the Hornsby Local Government Area (Smith & Smith 2008).

The area of each plant community within the project boundary is as follows:

Table 2. 2: Plant Community Areas

Plant Community Type	Total Area within the Site (Ha)	Area within the Impact Area (Ha)
Blue Gum High Diatreme Forest	15.75	0.74
Blackbutt Gully Forest	20.46	1.76
Blackbutt Gully Forest Regrowth	6.95	3.39
Total	**43.16**	**5.89**

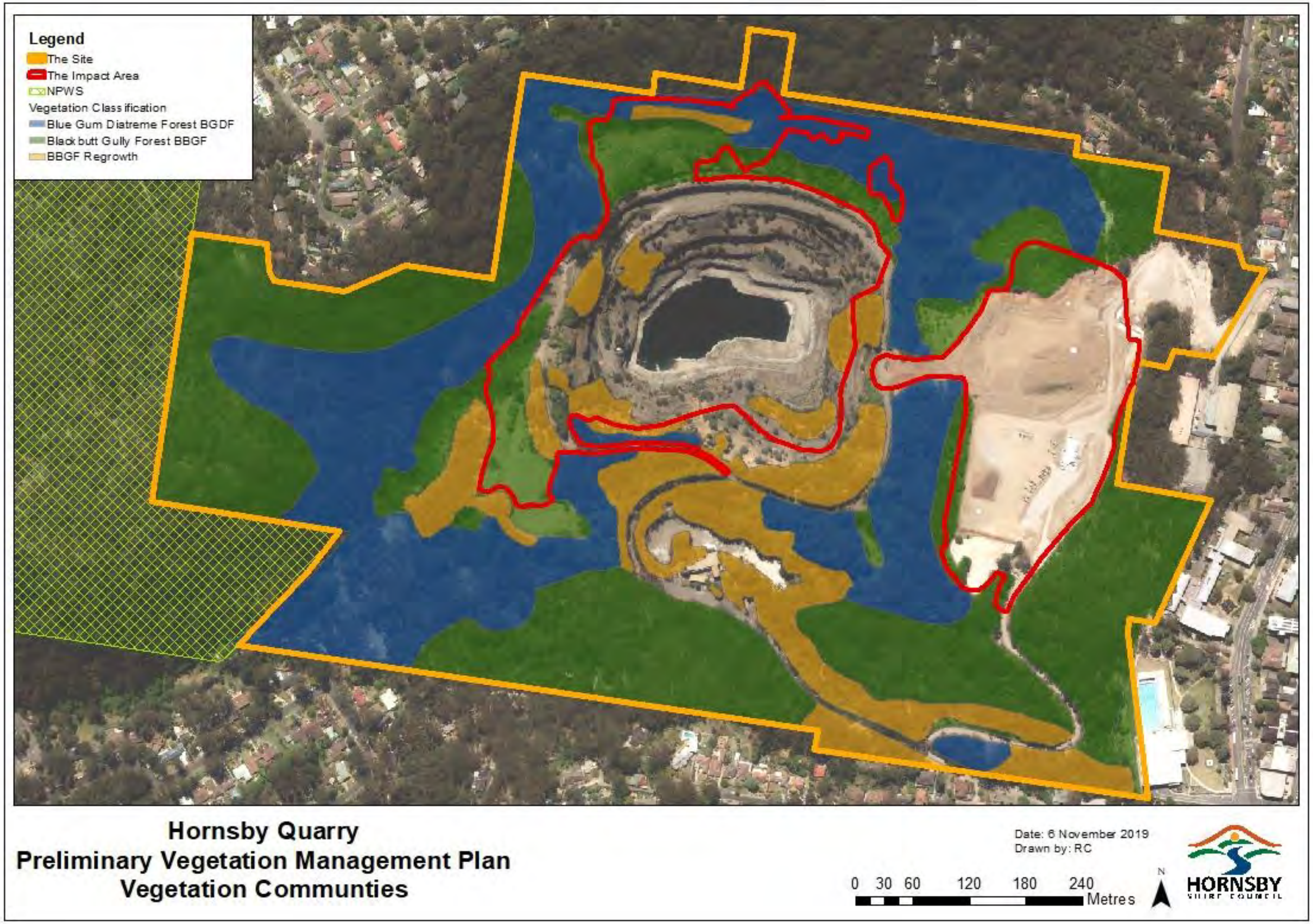

Figure 2. 2: Vegetation Communities

2.6 Conservation Significance

The Blue Gum Diatreme Forest is listed as critically endangered under both the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the NSW *Biodiversity Conservation Act 2016.* The existing condition of the forest is variable and is highly modified within the Impact Area due to past mining activities.

Two threatened plant species have been recorded near the Site boundary but not within the Impact Area, *Galium australe* Tangled Bedstraw and *Darwinia peduncularis.*

Four threatened fauna species have been positively recorded within the Site boundary:

- Eastern Bentwing Bat *Miniopterus schreibersii oceanensis,* listed as vulnerable under the BC Act
- Grey-headed Flying-Fox *Pteropus poliocephalus,* listed as vulnerable under the BC Act and the EPBC Act
- Powerful Owl *Ninox strenua,* listed as vulnerable under the BC Act
- Varied Sittela *Daphoenositta chrysoptera,* listed as vulnerable under the BC Act and the EPBC Act

The Site and the Impact Area provide significant roosting, nesting, sheltering and foraging sites for arboreal herpetofauna, mammals, microbats and birds who can move freely between the native vegetation within these areas and the neighbouring bushland.

2.7 Biodiversity Corridor Value, Connectivity and Edge Effects

The core area of bushland in the Site has a significant connection to largely undisturbed bushland. On the western boundary is the Berowra Valley National Park (BVNP). Connected to the BVNP are Council Bushland Reserves including the Rosemead Road Bushland as well as both the Dog Pound Creek and Galston Park BioBanking sites to the south and west respectively. To the north, Council's reserves, Turner Road Bushland, Woolwash Bay and Furber Park connects the BVNP to Muogamarra Nature Reserve and the Marramarra National Park, all on the banks of Berowra Creek flowing into the Hawkesbury River (Figure 2.3).

Vegetation within the Site is subject to edge effects resulting from fragmentation due to historic, current and surrounding land uses. Fragmentation is a threatening process to biodiversity as it changes ecological functionality. The ecological functions change in varying degrees of intensity along a gradient from the exposed edge to the forest core. GHD have noted that edge effects are known to extend up to 50 metres beyond the edge of vegetation (Figure 9). The results of edge effects include increased temperatures, wind and light and reduced humidity and shelter. This preliminary VMP aims to reduce the impact of edge effects during operations and to reduce current levels of fragmentation through increased connective corridors and condition of core bushland (refer to section 3.4.5). Strong consideration to be given to the current habitat value woody weed plumes are providing when planning strategic weed removal prior to operations and through the rehabilitation process.

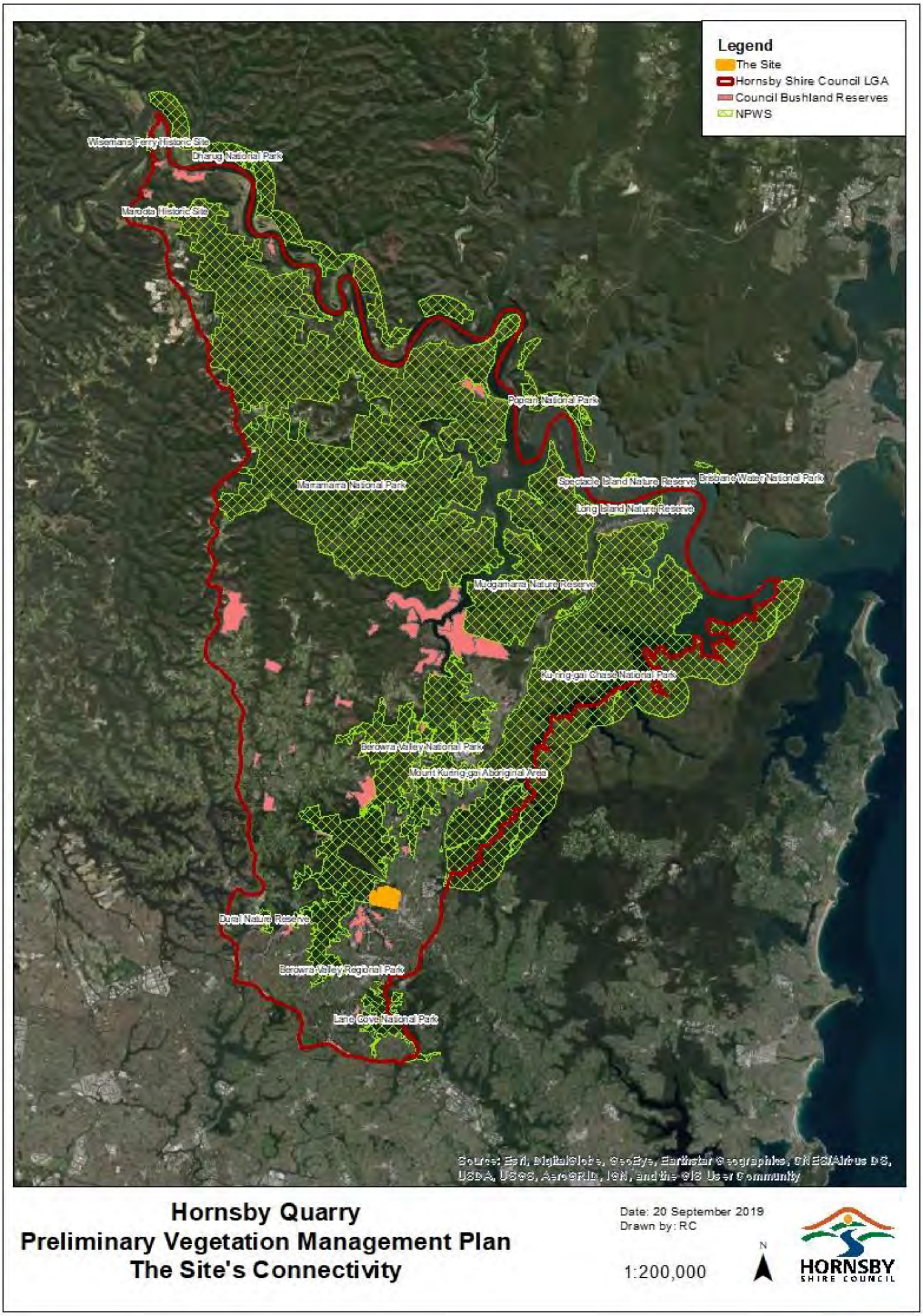

Figure 2. 3: Connectivity

2.8 Bushland Condition

The soil structure and composition within the Site and the Impact Area have been highly modified due to mining activities and as a result the native vegetation has been compromised. The current bushland condition directly reflects the amount and type of soil disturbance that has occurred. Previous studies mapped and described the Plant Community Types (PCTs) and condition with reference to the BBAM methodology.

This Preliminary VMP will use a version of bushland condition mapping adapted from The National Trust of Australia (NSW) Bush Regenerator's Handbook 3rd Edition (2010). The method describes the native vegetation condition by assessing the structure, species composition, diversity, response to disturbance (i.e. native resilience) and density of weeds present. The description then indicates the appropriate management strategies required to achieve aims and objectives of native vegetation restoration, protection and preservation (Table 2.3).

The Site has been assessed using The National Trust methodology following site inspections, previous studies review and a desktop. Once assessed, both the Impact Area and the Site have been mapped into Management Zones using the most appropriate management strategies indicated by the National Trust methodology assessment with the aim of maintaining the ecological integrity of the bushland in-perpetuity (Figure 2.4). It should be noted that the Impact Area has been mapped into Zones with consideration of the proposed works (Figure 3.1, Section 3. Site Management). A detailed and refined bushland condition and management assessment for these Zones is beyond the scope of this preliminary report and will be undertaken in the more detailed VMP as part of the development Offsets Package.

Table 2.3: Bushland condition mapping adapted from The National Trust of Australia (NSW)

Colour Code	Condition of Bushland	Weed Density	Description	Management
Green	**Good**	<5%	High level of native vegetation structure, species composition and diversity. Virtually weed/exotic plant free. Soil in-tact. High Level of resilience.	**Low (Regeneration)** Maintain connectivity to bushland of similar condition. Prevent impacts from bushland of lesser condition. Monitor for possible wind or bird dispersed weed/exotic plants.
Blue	**Fair**	6-20%	Plant community slightly compromised but native species dominate the site. Minor infestations of weed/exotic plants. Soil intact. Good level of resilience.	**Medium (Regeneration)** Assess cause of infestation and address where possible (eg neighbouring property source, overclearing, overuse). Remove weed/exotic plants with best practice bush regeneration techniques.
Orange	**Poor**	21-60%	Dominant native species highly suppressed, one or more strata layers missing. Severe infestations of weed/exotic plants. Soil integrity low. Poor level of resilence.	**High (Regeneration and Revegetation)** Assess cause of infestation and address where possible (eg modified soils, neighbouring property source, overclearing, overuse). Remove weed/exotic plants with best practice bush regeneration techniques. 'Assisted regeneration' eg revegetation, physical disturbance, fire.
Red	**Very Poor**	>61%	Only mature specimens of the dominant highest stratum of the PCT remain. Recruitment absent due to modified soils and heavy infestation of weeds/exotic plants. Bushland has been completely replaced by exotics.	**Extremely High (Revegetation)** Ability of the PCT to recover is extremely low, at times non-existent. 'Assisted regeneration' will require soil reconstruction, revegetation and ongoing weed/exotic plant treatment.

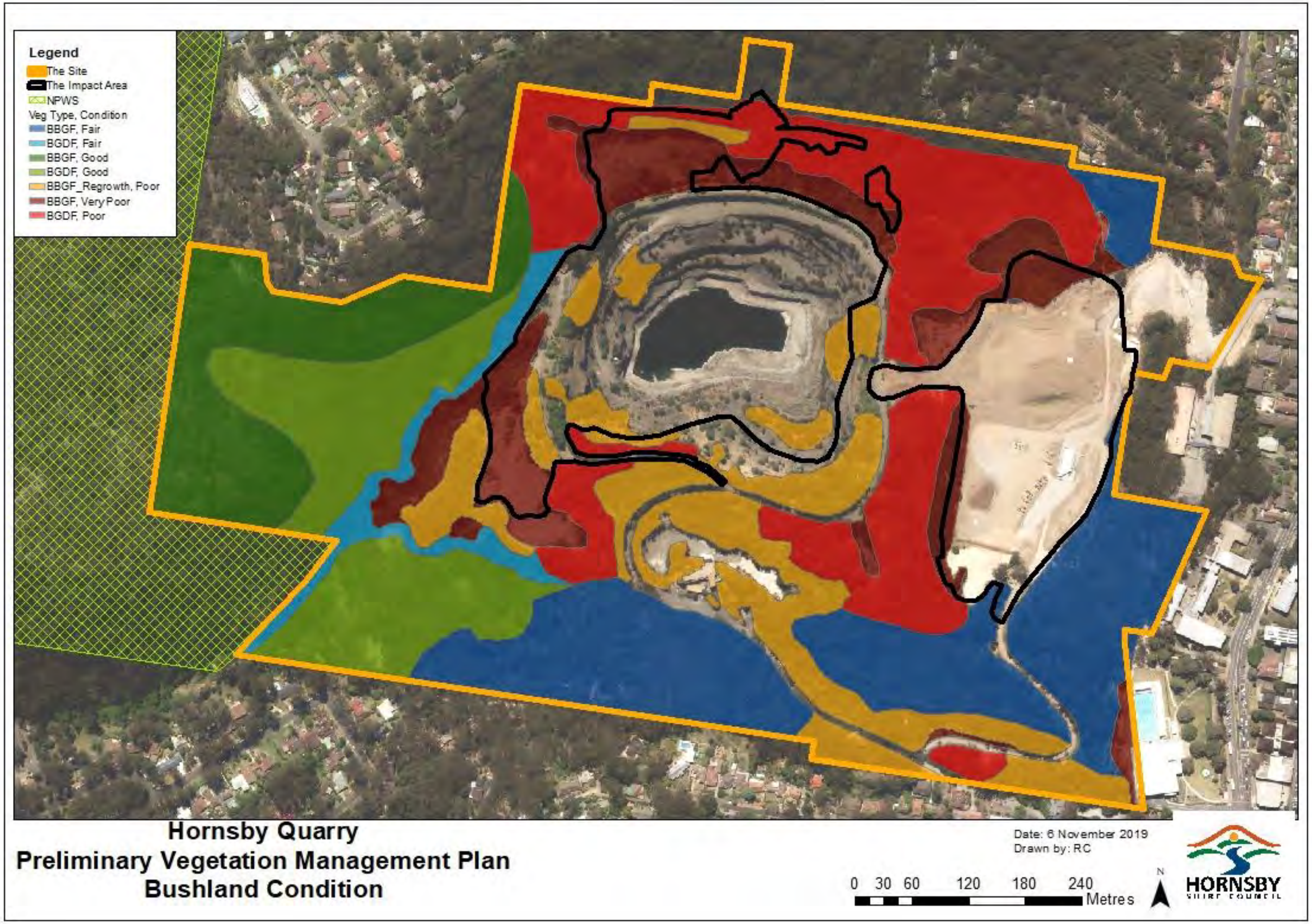

Figure 2. 4: Bushland Conditi

3 Site Management

3.1 Management Zones Overview

Vegetation management focuses on areas within the Impact Area as well as the surrounding bushland within the Site boundary. The proposal stipulates that some vegetation within the Impact Area will require clearing for Earthworks. The areas will then be revegetated with locally provenant plant species to represent the original plant communities following the completion of works. Though this Preliminary VMP, the proposal also aims to regenerate and revegetate areas of the Site and manage it in-perpetuity, with the intent of increasing the ecological integrity of the region. The strategy is to work with the staging of the Hornsby Park Project and beyond to ensure the aims and objectives of the Preliminary VMP are achieved. Strategies to achieve these are as follows:

- Prepare a buffer on the interface prior to disturbance of an area and reduce fragmentation
- Propagate plant material
- Strategically stage weed removal
- Engineer site soils to reflect benchmark data for both plant communities
- Identify future threats to the natural environment and mitigate effects

To implement these strategies the Impact area and the Site have been divided into management zones based on the position in the landscape, vegetation type and proposed earth works (Figure 3.1).

3.2 Site Management – 'The Impact Area'

3.2.1 Management Zone 1 – North Mound

The North Mound land formation is a steep wall on the northern boundary above the quarry (Figure 3.1). Historical photographs indicate its creation during the 1960's and then further excavation occurred from the eastern edge of the north mound from around 1989 resulting in a modified slope of 1:12.

Soil testing results indicate both varying soil profile types and depths. Geotechnical reports indicate localised high levels of instability. Current access for management is limited due to the steep slope. Weed density is high and consists of woody and wind dispersed weed species. The weeds present are a source of weed seed within the Impact Area, the Site and beyond to adjoining land.

The proposal is to stabilise the area with earthworks and reduce the slope to improve access for management. Some of the material from the slope will be used to partially fill the void.

The vegetation on the North Mound has been mapped as Blue Gum Diatreme Forest (BGDF), Blackbutt Gully Forest (BBGF) and Exotic (GHD EIS 2018 Figure 4.1). Where earthworks are undertaken revegetation will be carried out. The bushland of very poor condition that isn't impacted will require assisted regeneration and regeneration (refer to section 3.3). Improved site soils to support BGDF and BBHF PCTs are to be engineered and applied prior to planting. Where soil depth is limited, shallow rooted species will be chosen. Specific species selection around the lookout will also be required to maintain views into the Quarry.

3.2.2 Management Zone 2 – South West Mound

The South West Mound is located on the south west corner of the Quarry area and below the crusher plant (Figure 3.1). Historical aerial photographs show this area cleared of vegetation dating back to 1942. Modifications to the soil and shape of the area appear to have commenced in the 1960's. The South West Mound is now a terraced slope of overburden that supports a mixture of canopy species with a weedy midstorey and a plateau of exotic grasses and herbaceous weed species.

Soil testing results indicate soils are not engineered and vary in type and structure between the terraced slope and the plateau. The terraced slope has been filled with clayey gravel sands, large boulders and a variety of dumped manmade objects. In contrast, the plateau is composed of sandy gravels, cobbles and boulders.

The proposal is to partially reshape the mound to blend in with surrounding topography, re-use the material excavated to partially fill the void and introduce engineered site soils to support restoration of BGDF and BBGF PCTs.

Whilst the south west mound holds significant numbers of mature *Eucalyptus saligna* Blue Gums, the vegetation of the area has been mapped as Blackbutt Gully Forest (BBGF) and Exotic (GHD EIS 2018 Figure

4.1). The bushland condition of the South Mound Bushland is poor. Best practice bush regeneration and 'assisted regeneration' (revegetation) is required.

3.2.3 Management Zone 3 – Landscape Zone (Eastern Fill area and Quarry Void)

Management Zone 3 has two distinct areas, the eastern fill area and the Quarry void (Figure 3.1). The eastern area was previously a non-engineered fill area (PSM 2006) with a low vegetative cover of predominately weed species. NorthConnex occupied and reshaped the area for transporting and partially filling the void with material excavated from the NorthConnex tunnel. The proposal is to use this area as the main access point to the Hornsby Park area, to provide a sports field and other recreation activities. The area has been cleared of all vegetation apart from a strip of Blackbutt Gully Forest (BBGF) along the eastern escarpment and exotic vegetation on the north and western boundaries (GHD EIS 2018 Figure 4.1).

The void has been largely filled with material from the NorthConnex tunnel and re-shaped in preparation for further fill and final landscaping as a recreational area for public use. The vegetation mapping (BBAM 2014) indicates representative pockets of BBGF vegetation on the Quarry walls. It is dominated by canopy species. *Casuarina cunninghamiana* has a significant presence in this area, a species not naturally found in Hornsby.

Landscape plans for both areas will incorporate planting with both BBGF and BGDF species to increase the integrity of connectivity within the site. The strip of BBGF on the eastern escarpment will require bush regeneration maintenance. The area dominated by exotic vegetation on the north and western boundaries will require assisted regeneration.

3.3 Site Management – 'The Site'

3.3.1 Management Zone 4 – Blackbutt Gully Forest (BBGF)

Management Zone 4 is the area within the Site beyond the Impact Area mapped as BBGF (Figure 3.1). It occupies the South, Eastern and Western edges of the Site. This Zone is significant as a buffer to the core bushland beyond the Impact Area.

The crusher plant fill area is within this Zone. It has been significantly disturbed and now has a mixture of engineered and non-engineered soils. It is supporting a mixture of native canopy and woody weed species. The area has potential to be restored as a core part of Hornsby Park for use by the community.

Additional existing facilities in this zone include:

- The new access road from Bridge Street built by NorthConnex
- The mountain bike track, a 6 km network of trails on the eastern and southern boundaries.
- Fire trails
- Access to the Great North Walk
- The Hornsby Heritage Steps

The level of soil disturbance and site resilience varies through the Zone from fill soils to intact and undisturbed soils. The position in the landscape, surrounding land uses (residential properties, roads and the Hornsby Pool) as well as the type and level of activity throughout the Zone directly or indirectly put the area at risk to key threatening processes (e.g. loss of habitat, altered hydrological flows, clearing of native vegetation, bush rock removal, loss of hollow-bearing trees, removal of dead wood and dead trees, predation by feral animals, invasion of exotic plant species and infection of native plants by pathogens).

The Zone's condition varies from very poor to good. Given the varied bushland condition results, soil quality and land uses, management actions include bush regeneration, assisted revegetation and revegetation.

3.3.2 Management Zone 5 – Blue Gum Diatreme Forest (BGDF)

Management Zone 5 is the Zone within the Site beyond the Impact Area mapped as BGDF (Figure 3.1). It runs in a north-south direction through the centre of the site reflecting the original diatreme location prior to Quarrying activities. This Zone is significant as a buffer to core bushland. The soils and water movement through the Zone have been significantly disturbed throughout during and following mining activities. Current weed plumes reflect the levels and location of disturbance with dense pockets of woody weeds dominating the midstory in these locations. Structures and facilities in this Zone include:

- The Higgins Family Cemetery
- Rosemead Road Park
- Fire Trails
- Access to the Great North Walk
- The Hornsby Heritage Steps

The Zone's condition varies from very poor to good. Given the varied bushland condition results, soil quality and water movement through the site, management actions include bush regeneration, assisted revegetation and revegetation.

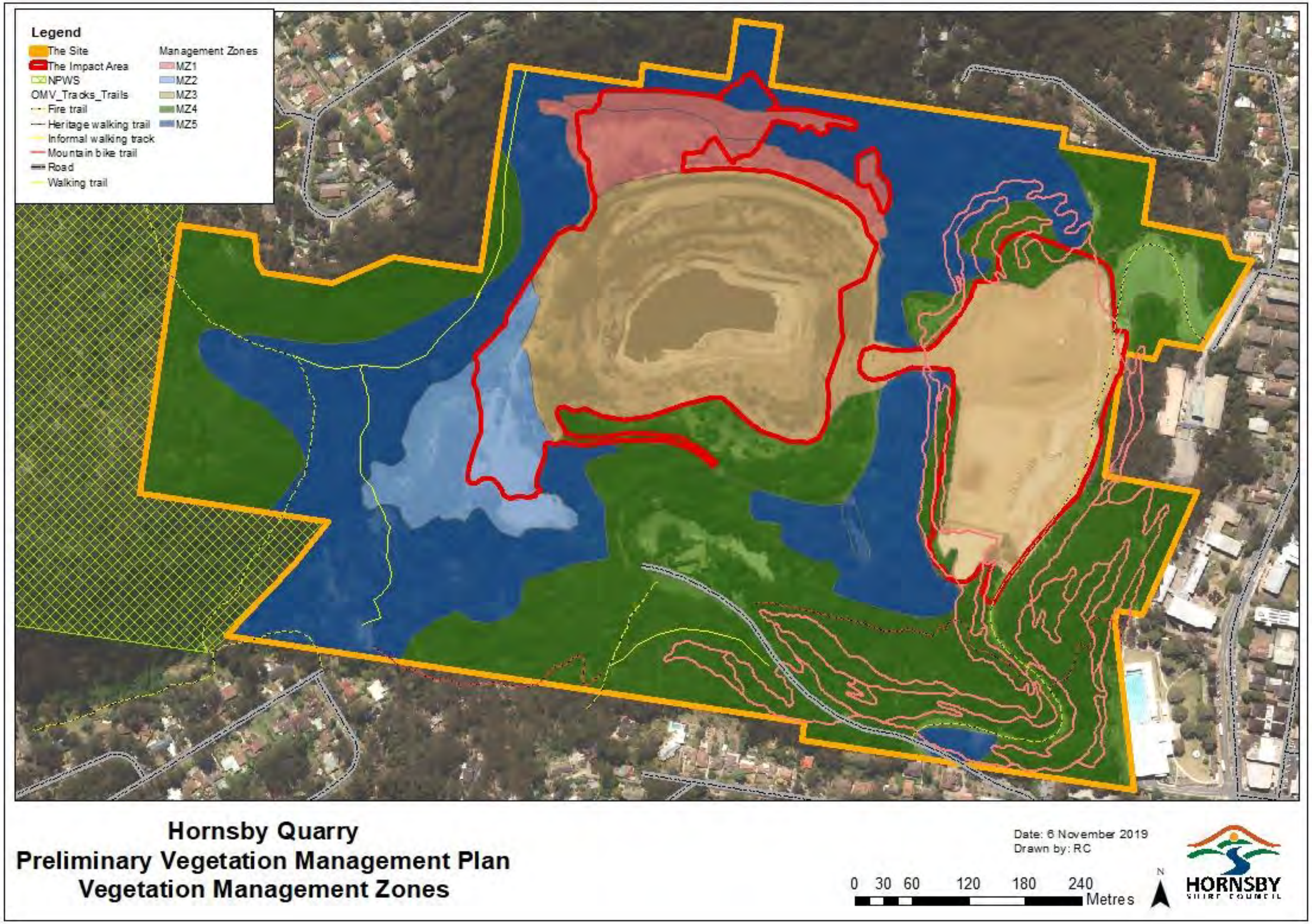

Figure 3. 1: Vegetation Management Zones

3.4 Management Zones Action Requirements

Table 3. 1: Management Actions per Zone
(Refer to Figure 3.2)

		The Impact Area			The Site		
Management Action	**Site Set-up**	**MZ1**	**MZ2**	**MZ3**	**MZ4**	**MZ5**	**On-going**
Implement hygiene protocols	✓	✓	✓	✓	✓	✓	✓
Prepare and implement habitat program	✓	✓	✓	✓			✓
Set-up interface zones and buffers to mitigate edge effects through construction	✓	✓	✓	✓	✓	✓	✓
Install fauna friendly fencing around exclusion zones – TBD							
Commence strategic weed removal – target climbers and high priority weeds	✓	✓	✓	✓	✓	✓	✓
Seed collection	✓	✓	✓		✓	✓	✓
Trial revegetation in engineered soils	✓			✓			
Apply engineered soils - reflect BGDF and BBGF PCT's for revegetation		✓	✓	✓			
Revegetation with native plant species		✓	✓	✓	✓	✓	
Bush Regeneration		✓	✓		✓	✓	✓
Assisted Bush Regeneration				✓	✓	✓	

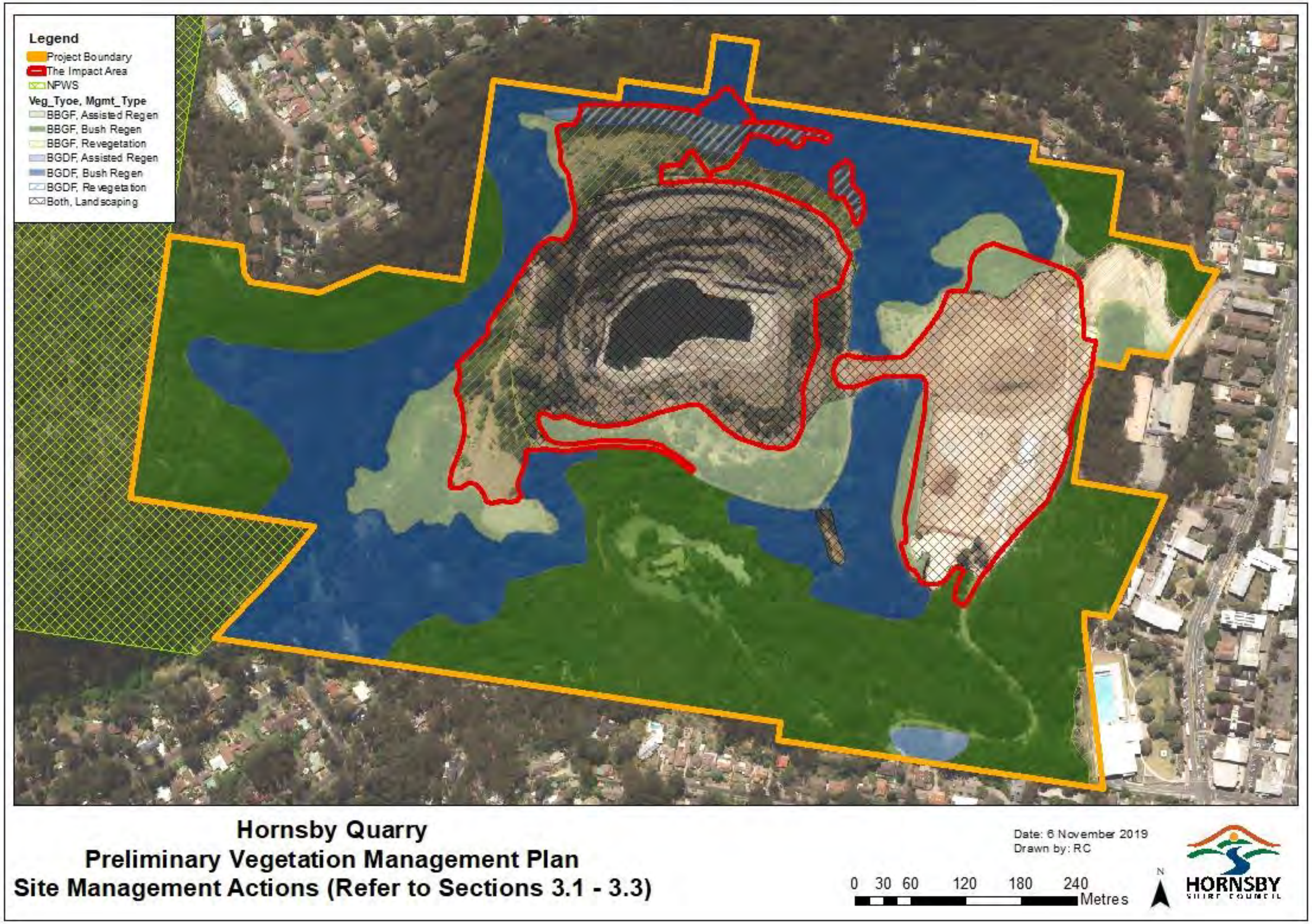

Figure 3. 2: Site Management Actions (Refer to Section 3.1 - 3.3)

3.5 Weed Treatment

A weed is a plant that is growing in the wrong location, dominating the landscape and suppressing plants which should normally exist. With reference to bushland, weeds are plants which do not grow within the classified plant community type. Bushland weeds are known to be opportunistic in a disturbed area with adaptations of rapid growth, effective dispersal mechanisms and therefore, the capacity to alter ecological systems to increase disturbance and conditions for their survival. Whilst undesirable, the value of weeds as habitat for fauna should be considered in a treatment plan.

3.5.1 Priority Weeds

The *Biosecurity Act 2015* and regulations provide a list of priority weeds and high-risk activities at a State level. The following Table lists priority weeds within the Site. This includes their status at a State and the Greater Sydney Local Land Services Regional scale, and outcomes to demonstrate compliance with the General Biosecurity Duty (GBD).

The Biosecurity Act prioritises weeds based upon management objectives. Prevention is the highest followed by Eradication, Containment and Asset Protection.

Table 3. 2: Priority Weeds

Botanical Name	Common Name	State level Category	Regional Level Category	*Biosecurity Act 2015* requirementts and Strategic response in region for GBD
Anredera cordifolia	Madeira vine	Asset Protection		No movement import or sale
Asparagus aethiopicus	Asparagus weed	Asset Protection		No movement import or sale
Cortaderia jubata	Pampas grass		Asset Protection	Fully and continuously suppressed and destroyed
Genista monspessulana	Cape/Montpellier broom	Asset Protection		No movement import or sale
Lantana camara	Lantana	Asset Protection		No movement import or sale
Ligustrum lucidum	Privet – broad-leaf	Asset Protection		No movement import or sale
Ligustrum sinense	Privet – narrow leaf	Asset Protection		No movement import or sale
Olea europaea subsp. *cuspidata*	African olive		Containment	Prevent spread, reduce impact on assets, identify assets for targeted mgmt
Rubus fruticosus	Blackberry	Asset Protection		No movement import or sale
Senecio madagascariensis	Fire Weed	Asset Protection		No movement import or sale

Biosecurity duty definitions

General Biosecurity Duty: *All plants are regulated with a* ***general biosecurity duty*** *to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.*
Asset Protection: *These weeds are widely distributed in some areas of the State. As Weeds of National Significance, their spread must be minimised to protect priority assets.*
Containment: *These weeds are widely distributed in the region. While broad scale elimination is not practicable, minimisation of the biosecurity risk posed by these weeds is reasonably practicable.*

3.5.2 Weeds of Regional Concern

The following Table lists weeds within the Site that are of regional concern because, by definition, they present a risk to biodiversity due to the likelihood of them spreading throughout the Site and into the surrounding areas. Despite appearing in separate lists within the *Biosecurity Act 2015,* they will also be treated as a priority due to the impact they will have on the success of rehabilitation.

Table 3. 3: Weeds of Regional Concern

Botanical Name	Common Name	Asset/value at risk
Eragrostis curvula	African lovegrass	Environment
Cardiospermum grandiflorum	Balloon vine	Environment
Cinnamumum campphora	Camphor laurel	Environment, Agriculture, Human health
Delairea odorata	Cape Ivy	Environment
Senna pendula	Cassia, Senna	Environment
Cotoneaster spp	Cotoneaster	Environment
Ageratina adenophora	Crofton weed	Environment
Ageratina riparia	Mistflower	Environment, Agriculture
Araujia sericifera	Moth vine	Environment
Ochna serrulata	Ochna	Environment
Lonicera japonica	Japanese Honeysuckle	Environment
Tradescantia fluminensis	Trad	Environment
Andropogon virginicus	Whistky Grass	Environment
Solanum mauritianum	Wild tobacco bush	Environment, Agriculture

3.5.3 Weed Control Methods

Weed control is required to improve the ecological integrity of the Site. It is necessary to assist the natural systems present by removing competition from weeds and prevent further spread of weeds. Best practice bush regeneration works from ‘good’ bush to ‘poor’ bush, thus allowing natural processes the best opportunity to re-establish and defend against potential weed incursions. Weed treatment is to be undertaken in the following stages:

- Primary – the initial weed treatment. The appropriate timing, area and method of treatment is determined by weed species, weed density, site resilience, adjoining land use and the weed plumes potential as a soil stabiliser or habitat.
- Secondary – weed control that is follow-up work required after primary weed control. Work is targeted on germinating weed seed in the soil or opportunistic weed spread following primary weed treatment. Secondary weed control can be the most time consuming and expensive weed management stage. Timing of works is crucial to efficient and effective secondary weed treatment.
- Maintenance – this final stage of work is to be applied following restoration success. The amount of maintenance required depends on whether the cause of weed incursion has been sufficiently managed.

Weed control is to be undertaken by professional bush regenerators who are adept in undertaking integrated weed management. The complexity of the Site and the nature and extent of degradation will require a combination of management methods. These may include the following:

- Manual hand removal
- Biological control
- Herbicide application
- Slashing, mowing
- Flame or steam weeding
- Fire
- Supplementary Planting
- Surface capping and mulching

3.6 Bush Regeneration, Assisted Regeneration and Revegetation

Bush Regeneration is the dynamic and specialised process used to restore an altered natural area to a healthy and sustainable representation of its original composition of Australian plants. It is a complex and evolving process requiring strategic methods, precise observations and adaptive management to relieve the native plants from existing impacts, favour their growth and allow for germination of the native seed bank and spores in the soil.

Natural **bush regeneration** involves controlling weeds using weed control methods (refer to section 3.5.3). **Assisted regeneration** combines the natural regeneration methods with revegetation. Revegetation is the process of artificially reintroducing native plant material through a variety of methods including planting, transplanting, direct seeding, surface capping, mulching, hydromulching or brushmatting.

Best practice bush regeneration only considers revegetation in areas that have been extensively modified for a long period of time resulting in little or no native seed bank within the soil and a low likelihood of natural regeneration. The act of revegetation reintroduces native plants to provide an environment conducive to further native germination, out compete exotic weed species, create buffers on good bush interfaces and restock the native seed bank.

3.6.1 Revegetation Location

Revegetation is required in Management Zones 1 and 2 based on the condition assessments and modifications required to stabilise the site and improve access for ongoing vegetation management. The species list will reflect the mapped locations of the current plant community types. In locations where, exotic plants have been mapped, plant species will be chosen from both BGDF and BBGF PCTs and planted in locations to reflect the position in the landscape including the surrounding vegetation type.

3.6.2 Seed Collection

Tree Canopy

Wherever Eucalyptus spp. trees are to be removed for earthworks seed should be taken from the crowns before the material is chipped or disposed of. This must happen on the day of felling as the seed is quickly released once sap flow is stopped.

For every 10 trees felled seed should be collected from at least one(10% of trees felled are then sampled). At least three branches of seed-bearing material should be reserved. Branches would ideally be 10cm in diameter at the cut end and be approximately 2-3 m in length. These must then have the fruit removed as soon as possible into a bag/container.

Mid-storey/Understorey smaller trees and shrubs

These species either have seed held within the canopy available 12 months of the year, or, they are shed annually in a short window of time and hence are only available once a year. As such, species with seed available 12 months of the year can be treated as the first example above- Eucalyptus spp.

The other plants will need to be targeted when they have seed shed imminent. These species need to be identified and mapped in order of abundance on the Site before clearing can occur. The majority of these species have seed available in autumn if they are of mesophylic origin or in November/ December if they are of sclerophylic origin. Seed for both types of plants are hand harvested from the individuals following Florabank Guidelines.

Ground layer

Ground layer consists of grasses, herbs and groundcovers. Many can be propagated by cloning if seed is unavailable at the time of collection. This is best undertaken in cooler months. Grasses generally shed seed over mid-summer to early autumn depending on species. They can easily be collected in volume by hand collecting. As with shrubs these species need to be identified and mapped in order of abundance on site for targeted seed collecting before clearing can occur.

Natural areas abundant in seed and propagules outside of the Impact Area and the Site should be identified as donor sites to provide seed where critical species for PCT to be restored are missing or unavailable in the Site itself.

3.6.3 Revegetation Plant Material

All plant material to be used for revegetation will be locally provenant species sourced from similar PCTs including the neighbouring BGDF. Where planting requires propagation, the material required will be propagated in Council's Community Nursery. The Community Nursery has NIASA accreditation (2005-2019) and EcoHort Certification (2017-2019). There is currently BBGF seed stock available in the Nursery Seed Bank collected from the Bridge Street area prior to NorthConnex occupation of the site.

3.6.4 Revegetation, Site Preparation and Timing

Site preparation will include recommendations as per sections 3.7.1 Earthworks, 3.7.2 Soil Preparation and 3.5 Weed Treatment.

Timing of planting will be subject to the completion of the earthworks program. Ideally planting should be undertaken in Autumn to enable the plants to establish prior to hot Summer weather conditions. Spring has been viewed as the next best time for planting as Winter has deemed to be too cold and Summer too hot for new plants to establish. However, due to Sydney's recent climate exhibiting dry Spring, wet Summer and relatively warm Winter conditions, consideration can be given to altering the timing of planting and adapted to suit long term weather forecasts.

Staged and supplementary planting will be necessary to enable successional growth and assist with maintenance. Some locations will primarily be planted with fast growing canopy and shrub species representative of primary succession species (Fabaceae Family species). This will deter annual weed establishment by creating shade cover and nurture the soil for secondary succession (longer lived slower growing species).

3.6.5 Revegetation Methods, Maintenance and Monitoring

Planting material will be a combination of Hiko Cells or tubestock. The optimum planting density is between five and eight plants per square metre. As planting is to reflect the existing plant communities, densities from each stratum should be based on the mature PCTs. To assist establishment, each plant should be planted into a pre-watered hole with water-holding crystals and slow-release fertiliser then watered in post planting.

Hydromulching using a mixture of sterile grasses and a native grass mix can be used prior to planting.

Follow up watering will be required. Deep watering on a weekly basis until plant establishment is optimal (at least 6 weeks). Additional water may be required depending on weather conditions. Watering to be via a water breaker to ensure the soil surface structure is not damaged, runoff is minimised, and water reaches the roots of the plants where it is required.

Weed management during the establishment phase will be necessary. All weeds should be treated with the aim of breaking the life cycle, i.e. prior to flowering and seeding.

A planting schedule will be required to monitor plant survival and replacement requirements. Monitoring of plants for herbivory will indicate the necessity for protective fencing.

3.7 Site Preparation

Site preparation requires the final landform to be completed to support implementation of this Preliminary VMP.

3.7.1 Earthworks

Earthworks will be required in Management Zones 1 and 2 to stabilise the soil and provide detailed contouring to prevent erosion and reflect the adjacent environment. Earthwork planning and design is to accommodate extraction of different soil types to be stockpiled and used in soil profile engineering. The success of revegetation will depend highly on the quality of the engineered soils and early consideration of the soil properties required is highly recommended.

Once soil profiles are established, landscape features are required to assist with stabilisation and erosion control. They will also create microclimate pockets to 'kick-start' habitat creation and provide decomposition elements. These are to include but are not limited to rock boulders, natural debris and any timber required to be felled as part of the works. Landscape features are to mimic the natural environment. While random in their location, they should follow contours and maintain connectivity. Earthworks planning, and design is to include survey and stockpile areas for any material that can be used for habitat. Any machines used for earthwork should aerate soils as they exit the site to avoid risk of soil compaction.

3.7.2 Soils

Engineering of site soils is required prior to revegetation. Soils in Management Zones 1 and 2 are to be suitable to support BGDF and BBGF. Specifications for engineered soils need to refer to SESL's report (SESL 2019) and the recommendation of 'concept' profile of soils found at BH1 and BH4 for sandstone soil profile and BH14 and BH16 for breccia soil profile. Engineering of site soils are to be incorporated into Earthworks (refer to section 3.4.1).

Engineered soils should be trialled and tested for suitability prior to installation of plant material.

VENM crushed sandstone capping to a depth of approximately 300mm could be considered where suitable site soil is not available or if access is limited.

3.7.3 Fauna Management: Habitat Retention and Enhancement

The proposed works will have direct and indirect impacts on fauna within and beyond the impact area. Actions are required to mitigate the impacts. A Habitat Retention and Enhancement Plan is to be developed and implemented prior to any works commencing in Management Zones 1 and 2. The Plan should include, but is not limited to, the following:

- Ground dwelling fauna habitat creation - survey area for location of habitat to be retained, survey for potential material that can be used for habitat creation, develop donor site and storage plan for surveyed material;
- Nesting box strategy including target species (eg. microbats, arboreal mammals, birds, native bees), design principles, installation/creation location, monitoring and maintenance;
- Foraging, breeding, nesting and shelter habitat - retain, protect, replace protective vegetative cover (evaluate potential of weed plumes as habitat prior to removal – plan to retain sections of weeds on edges prior to replacement habitat creation);
- Retain and protect any water features;
- Identify likelihood of predation
- Management of existing tree hollows - Five hollow bearing trees have been recorded in the Impact Area (GHD 2019). Prior to any works, the hollows should be examined for any occupants. Relocation is to be undertaken by a qualified ecologist and/or wildlife handler. The hollows should then be dismantled and relocated to the nearby buffer area at the interface. A qualified ecologist and/or wildlife handler should be on site for any tree removal activities.

3.7.4 Tree Protection

Tree protection measures to be installed around all trees to be retained. Tree protection measures are to reflect best practice in accordance with Australian Standard (AS) 4970-2009 *Protection of Trees on Development Sites.* Wherever possible, habitat trees should be identified, retained and protected.

3.7.5 Interface zones, edge effects and buffers

An interface is the area between bushland and another adjoining land use. It is the area that experiences changes in ecological functions known as edge effects (refer to section 2.7). The Site has many interface areas due to the high amount and range of surrounding and interspersed land uses. With respect to the Impact Area, edge effects are already evident and to a large degree, currently extend to 50m around the Impact Area as predicted by GHD. To mitigate the current edge effect impacts and those predicted to occur as works commence, buffers will need to be created along interface areas of Management Zones 1 and 2.

The purpose of a buffer is to reduce levels of edge effects by creating a barrier. In this situation, buffers will be created with dense planting of quick growing shrub species. Existing weed plumes will also be utilised as immediate buffers and planting will be scheduled to complement the timing of their staged removal. Further regeneration and revegetation works throughout the Site will also provide a buffer by reducing fragmentation, enhancing connectivity and assisting with ongoing maintenance of the natural areas on the southern and eastern boundaries.

3.7.6 Protection of Bushland during construction

Access to the bushland is to be restricted to certain personnel during construction. No machines or equipment are to go beyond the Impact Area. Signage is to be installed at regular intervals along the interface to signify no entry. Monitoring of the bushland is to be undertaken to identify if fencing is necessary. If so, fauna friendly and fit for purpose fencing is to be installed to enforce no access. That is, fencing that will allow animals to pass through or underneath, and with gaps left at corners to act as a gateway. No barbed wire or electric fencing is to be used.

Wires should be called if any fauna is injured or displaced through construction.

3.7.7 Hygiene

A strict hygiene protocol is essential to prevent the spread of pathogens, including *Phytophthora cinnamomi,* Myrtle Rust and weed propagules.

Procedures and guidelines should include disinfecting machinery, PPE, tools and equipment prior to entering and when leaving the site. Protocol details can by sourced from the following link, 'Bushland Hygiene Protocols for Phytophthora' and 'Preventing spread of Myrtle Rust in bushland below: http://www.hornsby.nsw.gov.au/environment/flora-and-fauna/bushland-management/bushcare/volunteer-resources

4 Implementation

4.1 Monitoring, Reporting, Evaluation and Adaptive Management

The responsibility for the implementation of this Preliminary VMP will be upon Hornsby Shire Council. The Natural Resources Branch should be assigned to the management of the bushland. All project management meetings and decisions should be inclusive of the assigned project manager. It should be noted, activities can directly or indirectly impact the surrounding bushland, in this regard the precautionary principle should be applied.

Any weed management should be undertaken by suitably qualified and experienced bush regenerators with a TAFE Certificate IV in Conservation and Land Management or similar. All works should comply with best practice bush regeneration techniques within an adaptive management program (Buchanan 2009).

A monitoring program should be developed and is to include an annual assessment of the works undertaken, an evaluation of the site response and an adaptive management plan for the way forward. The initial key performance indicators of this Preliminary VMP will be measured by the success of revegetation in Management Zones 1 and 2 and the establishment of locally endemic plant species utilised in the design and implementation of Management Zone 3, all within the Impact Area. All revegetation is to be documented with a map including species, numbers, source of material and planting locations at installation. The area should be surveyed for fatalities on an annual basis and replacement plants installed where necessary. A 5% failure rate is acceptable.

The success of managing bushland within the Site will be assessed by the enhancement of the Site's species diversity and the restoration of ecosystem functionality. The baseline data presented by previous reports (Arterra 2019, GHD 2019, Kleinfelder 2017 and EcoLogical 2015 in particular) provide a reasonable quantitative assessment of site floristics and structural integrity to compare with information gathered in future years. Monitoring and reporting beyond the Impact Area is not within scope of this report and to be determined when the detailed and refined bushland condition and management assessment for these areas has been undertaken.

5 Summary

Hornsby Park is to be developed as a parkland which supports recreational pursuits and prioritises conservation of its natural areas. To obtain such conservation and recreation objectives, priority is to be given to managing impacts on the natural area from the threatening process of fragmentation, edge effects and loss of habitat. This can be achieved by increasing areas of core native vegetation, connectivity and appropriate access as discussed. The final detail on management actions for the Site are to be developed in accordance with the principles of this Preliminary VMP.

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PSM Appendix A
https://www.hornsby.nsw.gov.au/_resources/documents/council/current-works-and-projects/quarry/psm-geo-report/PSM-Geotechnical-Report-Appendix-A.pdf

SESL (2018) *Hornsby Park/Quarry Soil Profile Investigation Hornsby, 2077.* Prepared for Hornsby Council.

Smith P. & Smith J. (2007). *Native Vegetation Communities of Hornsby Shire 2007.* Prepared for Hornsby Council.

Appendix 1 – Smith and Smith PCT Descriptions

3.4 Blue Gum Diatreme Forest (Community BG2)

Description: Tall open-forest dominated by *Eucalyptus saligna* (Sydney Blue Gum). Other, less common tree species include *Angophora costata* (Sydney Red Gum), *Eucalyptus pilularis* (Blackbutt), *E. piperita* (Sydney Peppermint) and *Syncarpia glomulifera* (Turpentine). Low tree and shrub species include *Acacia parramattensis*, *Angophora floribunda*, *Pittosporum undulatum*, and the introduced *Cinnamomum camphora*, *Ligustrum lucidum* and *L. sinense*. Ground layer species include *Adiantum aethiopicum*, *Blechnum cartilagineum*, *Calochlaena dubia*, *Dichondra repens*, *Lomandra longifolia*, *Microlaena stipoides*, *Oplismenus aemulus*, *Poa affinis*, *Pteridium esculentum*, and the introduced *Lonicera japonica*. Climbers include *Morinda jasminoides*, *Pandorea pandorana*, *Smilax australis* and *Stephania japonica*.

Distribution and habitat in survey area: Restricted to gullies on Jurassic diatremes (volcanic necks) along tributaries of Waitara Creek at Hornsby and Westleigh.

Total extent in survey area: 14 ha.

Conservation significance: Forms part of the critically endangered ecological community, 'Blue Gum High Forest', as listed in the NSW *Threatened Species Conservation Act 1995* (NSW Scientific Committee 2007), but not as listed in the Australian *Environment Protection and Biodiversity Conservation Act 1999*, which only covers the Blue Gum Shale Forest (Threatened Species Scientific Committee 2005a). The community has a very restricted distribution in the Sydney region, and may now be confined to the Hornsby Local Government Area (Benson and Howell 1994; map unit 6c, subunit i). It has been depleted by extensive quarrying for blue metal aggregate at Old Mans Valley, which is the largest of the diatremes. **Critically Endangered Community**

Photo 5. Blue Gum Diatreme Forest, Hornsby

3.9 Blackbutt Gully Forest (Community L)

Description: Tall open-forest in which the main tree species are *Eucalyptus pilularis* (Blackbutt), *Angophora costata* (Sydney Red Gum) and *Syncarpia glomulifera* (Turpentine). Other, less common tree species include *Corymbia gummifera* (Red Bloodwood), *Eucalyptus piperita* (Sydney Peppermint) and *E. resinifera* (Red Mahogany), with occasional *E. punctata* (Grey Gum) and *E. saligna* (Sydney Blue Gum). Low tree and shrub species include *Acacia linifolia*, *Allocasuarina littoralis*, *A. torulosa*, *Banksia serrata*, *Callicoma serratifolia*, *Ceratopetalum gummiferum*, *Dodonaea triquetra*, *Elaeocarpus reticulatus*, *Grevillea linearifolia*, *Leptospermum trinervium*, *Persoonia linearis*, *Pittosporum undulatum* and *Pultenaea flexilis*. Ground layer species include *Calochlaena dubia*, *Dianella caerulea*, *Entolasia stricta*, *Lomandra longifolia*, *Microlaena stipoides*, *Pratia purpurascens*, *Pteridium esculentum* and *Xanthosia pilosa*. Climbers include *Billardiera scandens*, *Cassytha pubescens* and *Smilax glyciphylla*.

Distribution and habitat in survey area: Gullies on Hawkesbury Sandstone with a shale influence (from shale lenses in the sandstone or from proximity to Wianamatta Group shales), in the southern parts of the Shire (Epping to Galston).

Total extent in survey area: 836 ha.

Conservation significance: Identified as a locally significant community in the Hornsby Shire Biodiversity Conservation Strategy (Hornsby Shire Council 2004). Although it is a common community in Hornsby Shire, it is uncommon and poorly conserved outside the Shire. For example, only small areas occur in Ku-ring-gai Chase National Park (Thomas and Benson 1985a). **Locally Significant Community**

Photo 9. Blackbutt Gully Forest, Beecroft

Appendix 2 – Photo Reference Points

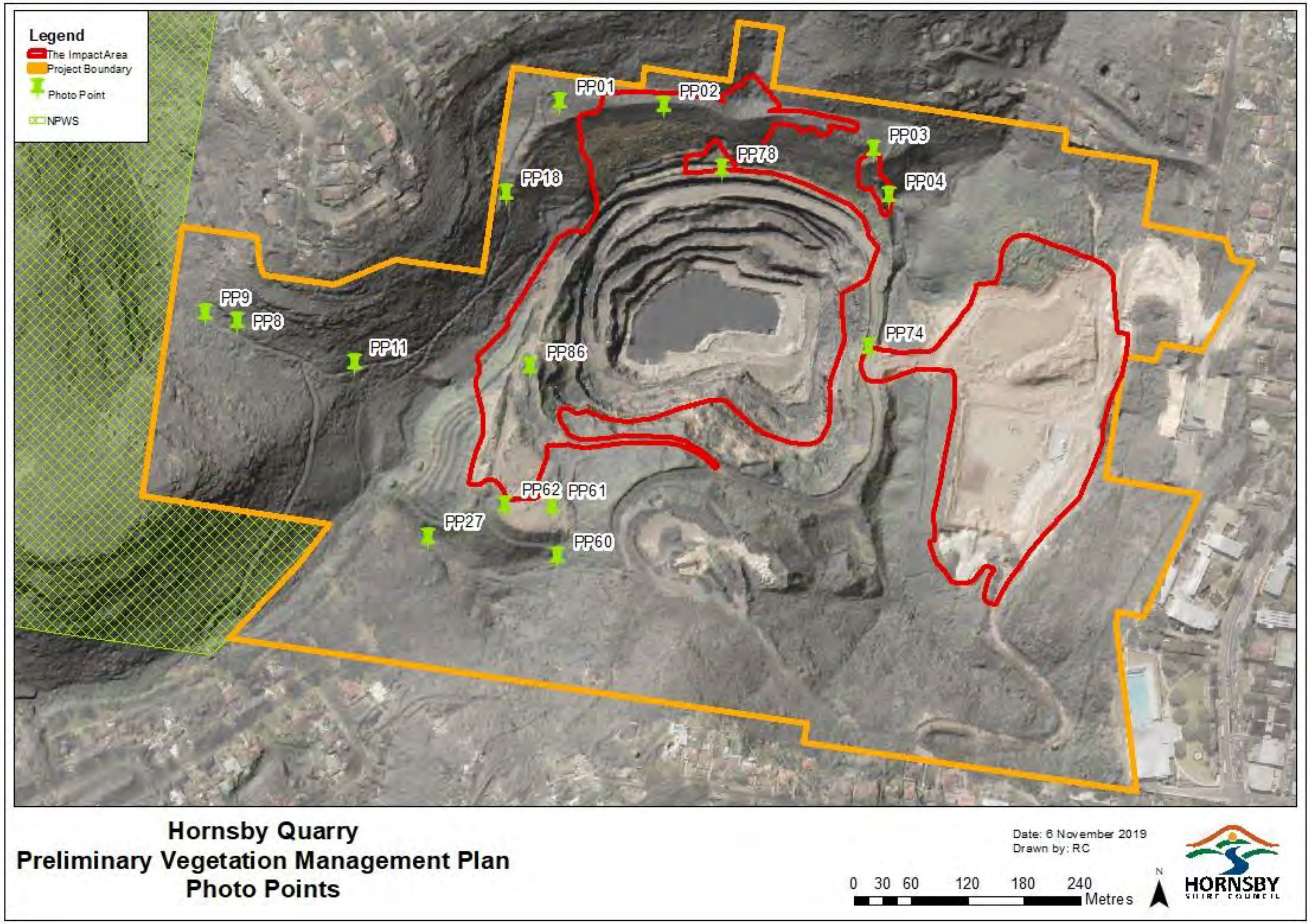

Figure A2. 1: Photo point Locations


PP01 – MZ1 - Look out location


PP02 – MZ1 – Pampas Grass. RHS trees beyond impact zone

PP03 – MZ1 – Looking south through Privet understorey into the void. Unstable soils within impact area.

PP03 – MZ1 – Looking south through Privet understoery into the void. Unstable soils within impact area.

PP04 – MZ1 – Looking north from up slope. Unstable soils within impact area.

PP04 – MZ1 – Looking north from up slope. Unstable soils within impact area.

PP78 – MZ1 Looking north

PP78 – MZ1 Looking north


PP78 – MZ1 – from top of rim looking west


PP78 – MZ3 Partially filled void looking south east


PP74 – MZ3 Partially filled void looking west


PP61 – MZ2 looking west


PP62 – MZ2 looking north


PP60 – Beyond impact area below crusher plant looking north

PP86 – Looking north into void through Privet understorey.


PP27 – On impact area interface looking west. Impact area to the right of PP.

PP27 – On impact area interface looking east. Impact area to the left of PP.


PP11 – In Blue Gum Diatreme Forest looking east to Impact Area. Site of potential Edge Effects.


PP18 – Beyond impact area looking north. Modified drainage system.

PP8 – BBGF looking north

PP9 BBGF looking southwest

Appendix 3 – Hornsby Quarry Rehabilitation (EAR 1167)

NSW GOVERNMENT | Office of Environment & Heritage

DOC17/431342
EAR 1167

Mr Tertius Greyling
Senior Environmental Assessment Officer
NSW Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Mr Greyling

Request for SEARs - Hornsby Quarry Rehabilitation (EAR 1167)

I refer to your email received 15 August 2017, by the Office of Environment and Heritage (OEH) requesting requirements for the preparation of an Environmental Impact Statement (EIS) for the above proposal. OEH understands that the proposal involves:

- Major stabilisation works to both the north and south faces of the Hornsby Quarry void to make them safe.
- Earthworks across other parts of Hornsby Park in order to rehabilitate the site.
- Placement of material from stabilisation works and other earthworks in the quarry void to create a final landform suitable for future development into a community parkland.

OEH recommends that the EIS include an assessment of potential impacts on biodiversity and OEH estate (Attachment 1).

If you have any further questions about this matter please contact Dana Alderson on 8837 6304 or dana.alderson@environment.nsw.gov.au.

Yours sincerely

S. Harrison 31/08/17

SUSAN HARRISON
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ATTACHMENT 1 – Office of Environment and Heritage - Hornsby Quarry Rehabilitation (EAR 1167)

1. Biodiversity

OEH data indicates the presence of the critically endangered Blue Gum High Forest vegetation community. It is therefore recommended the EARs include a biodiversity assessment to be undertaken in accordance with the draft *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (November 2004)* and the *NSW Guide to Surveying Threatened Plants (February 2016)*. These guidelines and other information on threatened species surveys and assessments, can be downloaded from the OEH website at: www.environment.nsw.gov.au/threatenedspecies/surveyassessmentgdlns.htm.

OEH further recommends that the proposal be designed to avoid and minimise impacts on biodiversity and offset remaining direct and indirect biodiversity impacts. In determining an appropriate offset package it is recommended that the EIS:

a. Accord with the 13 OEH offsetting principles available at http://www.environment.nsw.gov.au/biodivoffsets/oehoffsetprincip.htm.

b. Use the BioBanking Assessment Methodology (OEH, 2014) to determine the quantum of offsets required to compensate for those remaining biodiversity impacts.

c. Identify the conservation mechanisms to be used to ensure the in-perpetuity protection and management of proposed offset sites.

d. Include a specific Statement of Commitments for the proposed offset package which is informed by a., b. and c. above and by any consultation with OEH.

With regard to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the EIS should identify any relevant Matters of National Environmental Significance and whether the proposal has been referred to the Commonwealth or already determined to be a controlled action.

2. Impacts on OEH Estate

As the development adjoins Berowra Valley Regional Park, the EIS must address the matters to be considered as outlined in the *Guidelines for developments adjoining land managed by the OEH* (OEH, 2013) which include:

a. erosion and sediment control;
b. stormwater runoff;
c. wastewater;
d. management implications relating to pests, weeds and edge effects;
e. fire and the location of asset protection zones;
f. boundary encroachments and access through OEH lands;
g. visual, odour, noise, vibration, air quality and amenity impacts;
h. threats to ecological connectivity and groundwater dependent ecosystems; and
i. cultural heritage.

(END OF SUBMISSION)

Appendix G – Tree survey reports

Tree Inventory

Tree Survey Carried out across Northern Slope, Hornsby Quarry

Prepared for

Hornsby Shire Council

By

Dennis Marsden
Consulting Arborist

The Sugar Factory – *Arbor Advocate*
ABN: 29 995 746 283
6 Leumeah Close, West Pennant Hills NSW 2125
Telephone: 9875 4074

16 April 2018

Ref: hsc060

General:

All 315 surveyed trees bar one are Australian native. The majority (255) occur naturally in Hornsby precinct while a further 47 are Australian native but not indigenous to Hornsby LGA. Those non-local native trees are however becoming endemic to the site ('Other Indigenous Species' in Table 1, following page) and have the potential to spread further. The Spotted Gum in particular appear in robust good health and seem quite well-suited to the edaphic conditions afforded by the anthropogenic fill.

Some of the species are growing outside of their preferred niche, presumably being planted as part of site remediation works. For example, the many Swamp Oak growing on the hilltop (and achieving substantial height), and a strong presence of Turpentine and Bangalay across the ridgeline.

Weed growth is well established within the study area, the main representatives being Glossy Privet and Small-leaved Privet predominately in the open areas along and beside trails. Elsewhere on the site but outside of the study area can be found lantana, oleander, and madeira vine, among others, in addition to privet.

Note that the site constraints are such that only limited viewing angles are afforded for identification and assessment of the subject trees, nor was it practical to collect samples of fruit or foliage *etc* for the keying of all to species level. Two of the eucalypts are unknown; there are eight that appear to be Red Mahogany but which could be revised if further data were to become available. Lemon-scented Gum was distinguished from Spotted Gum on the basis of leaf morphology; the stems are similar but the leaves of the Lemon-scented Gum in the study area are much more linear-lanceolate as opposed to the lanceolate-falcate leaves of the Spotted Gum, which was confirmed on site by the discovery of fallen foliage samples.

The Key to the Categories of Assessment is contained on page 4. Most categories are self-explanatory, although a few may benefit from further explanation as follows:

The height categories work well for most of the surveyed trees with the exception of the Swamp Oak. The majority of these are placed in one of two categories: 10 - 20 metres, or, > 20 metres. Their actual size is probably 20 ± 2 metres, hence most of those placed in the 10 – 20m category are in the upper range while those placed in the > 20m category are in the lower range.

The category of 'Condition Rating' could be used as a general guide to suitability for retention. Category 1 includes trees that are dead, declining, or obviously hazardous. Category 2 includes those that are environmentally stressed, or damaged, or of poor form. Poor form encompasses defective structure such as codominant stems with included bark, as well as trees which are strongly misshapen and potentially problematic in an urban setting due to strong lean or extreme crown asymmetry. Category 3 and 4 are those trees in average or better condition. None were ranked with Condition Rating 5 (outstanding example of the species).

Local Blue Gum High Forest Species	**Number**
Forest Oak *Allocasuarina torulosa*	1
Grey Gum *Eucalyptus punctata*	2
Red Bloodwood *Corymbia gummifera*	2
Rough-barked Apple *Angophora floribunda*	2
Black She-oak *Allocasuarina littoralis*	3
? Red Mahogany *Eucalyptus resinifera*	8
Turpentine *Syncarpia glomulifera*	16
Blackbutt *Eucalyptus pilularis*	20
Bangalay *Eucalyptus botryoides*	37
Sydney Blue Gum *Eucalyptus saligna*	109
Total	**200**
Other Local Indigenous Species	**Number**
Swamp Mahogany *Eucalyptus robusta*	1
Willow Bottlebrush *Callistemon salignus*	2
Prickly-leafed Paper-bark *Melaleuca styphelioides*	3
Swamp Oak *Casuarina glauca*	49
Total	**55**
Other Indigenous Species	**Number**
Silky Oak *Grevillea robusta*	4
Brush Box *Lophostemon confertus*	5
Lemon-scented Gum *Corymbia citriodora*	7
Tallowwood *Eucalyptus microcorys*	10
Spotted Gum *Corymbia maculata*	21
Total	**47**
Exotic & Unknown or Dead Species	**Number**
Camphor Laurel *Cinnamomum camphora*	1
Unknown eucalypt species	2
Dead trees (most probably eucalypts).	10
Total	**13**
Study-area total	**315**

Table 1. Species composition and number.

A Key to Categories of Assessment

? (Tree species) = Tentative identification due to lack of characteristics present for accurate keying-out to species level.

Height: Visually estimated. Categories: < 5 metres, 5 – 10 metres, 10 – 20 metres, > 20 metres.

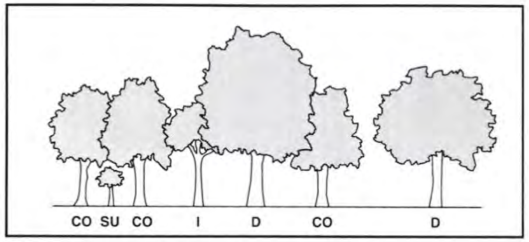


Figure 13. Crown Class is a description of the overall form of the tree as dominant (D), codominant (CO), intermediate (I) or suppressed (SU). Crown class is influenced by the proximity of the tree to other trees. (Adapted from The Hazard Tree Assessment Program, Recreation and Park Dept., City and County of San Francisco)

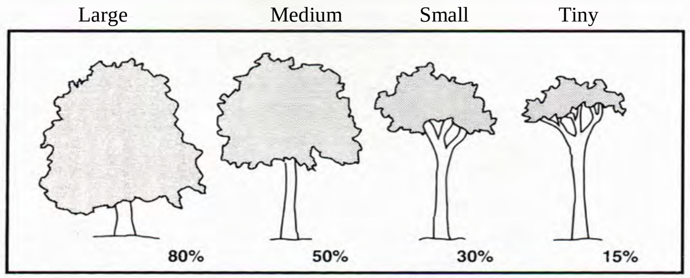


Figure 12. Live Crown Ratio is the ratio of the foliage canopy to the total height of the tree. Trees grown in stands usually have a lower live crown ratio than trees grown in the open.

Crown Class and **Live Crown Ratio** sourced from Matheny, N. P and Clark, J. R (1994, 2nd ed.) *'A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas'* International Society of Arboriculture, Champaign, Illinois.

Condition Rating: adapted from Table 5.2 of Matheny, N. P and Clark, J. R (1998) *'Trees and Development – A Technical Guide to Preservation of Trees During Land Development'* International Society of Arboriculture, Champaign, Illinois.

Age (Maturity): Categories:
Young; a well-established but juvenile tree.
Semi-mature; a tree at growth stages between immaturity and full size.
Early-mature; a tree that is more-or-less of mature dimensions yet still vigorously growing.
Mature; a full-sized tree with some capacity for further, expansive crown growth.
many years away from decline.
Late Mature; a tree of full, mature dimensions with little capacity for expansive growth,
Over-mature; a tree of old age in a phase of slow decline.

Vig. = Vigour. A measure of the robustness of health. Categories: **G**ood, **N**ormal, **F**air, **P**oor.

Occurrence:
Local BGHF species = Blue Gum High Forest species locally indigenous to this area.
Local Indigenous Species = locally indigenous but not to BGHF.
Other Indigenous Community = Australian native but not to Hornsby LGA.

Condition Rating:
An expression of Health and Structure. Categories:

1 = dead, or declining, or otherwise hazardous;
2 = stressed, or damaged, or poor form; may require further investigation of suspected defects.
3 = average with normal characteristics, may require crown maintenance or other works;
4 = good with relatively few defects, requiring little or no works;
5 = outstanding example of the species.

B Schedule of Trees

Table 2. Schedule of Surveyed Trees

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
208	Black She-oak *Allocasuarina littoralis*	Early-mature	10 - 20m	Intermediate	Small	Fair	2	Local BGHF species
210	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species
211	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Tiny	Normal	3	Local BGHF species
212	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
214	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
215	? Red Mahogany *Eucalyptus resinifera*	Young	5 - 10m	Suppressed	Small	Fair	2	Local BGHF species
216	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Medium	Normal	3	Local indigenous species
217	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Medium	Normal	3	Local indigenous species
218	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
219	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
220	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Medium	Normal	3	Local indigenous species
221	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Suppressed	Small	Normal	2	Local indigenous species
222	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Dominant	Medium	Good	4	Local BGHF species
223	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
224	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
225	Sydney Blue Gum *Eucalyptus saligna*	Young	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
226	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
227	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
228	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
231	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
232	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
234	Blackbutt *Eucalyptus pilularis*	Young	10 - 20m	Suppressed	Small	Normal	3	Local BGHF species
235	Blackbutt *Eucalyptus pilularis*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
238	Blackbutt *Eucalyptus pilularis*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
239	Blackbutt *Eucalyptus pilularis*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
240	Blackbutt *Eucalyptus pilularis*	Young	10 - 20m	Intermediate	Tiny	Normal	3	Local BGHF species
241	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
242	Sydney Blue Gum *Eucalyptus saligna*	Young	10 - 20m	Suppressed	Tiny	Normal	3	Local BGHF species
243	Blackbutt *Eucalyptus pilularis*	Mature	> 20m	Dominant	Medium	Normal	4	Local BGHF species
249	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
251	? Red Mahogany *Eucalyptus resinifera*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
258	? Red Mahogany *Eucalyptus resinifera*?	Early-mature	10 - 20m	Intermediate	Medium	Fair	2	Local BGHF species
259	? Red Mahogany *Eucalyptus resinifera*	Early-mature	10 - 20m	Suppressed	Small	Fair	2	Local BGHF species
260	Blackbutt *Eucalyptus pilularis*	Mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species
264	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
265	Blackbutt *Eucalyptus pilularis*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
266	Bangalay *Eucalyptus botryoides*	Young	5 - 10m	Suppressed	Tiny	Fair	2	Local BGHF species
282	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
283	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Co-dominant	No Value	No Value	1	-
316	? Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
317	Blackbutt *Eucalyptus pilularis*	Mature	> 20m	Dominant	Large	Normal	3	Local BGHF species
400	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
401	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
402	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
403	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
404	Eucalypt *Eucalypts sp.* mostly dead stump	Over-mature	10 - 20m	No Value	No Value	No Value	1	-
406	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Co-dominant	No Value	No Value	1	-
407	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Intermediate	No Value	No Value	1	-
409	Sydney Blue Gum *Eucalyptus saligna*	Young	5 - 10m	Suppressed	Small	Normal	3	Local BGHF species
410	Sydney Blue Gum *Eucalyptus saligna*	Young	10 - 20m	Suppressed	Small	Normal	2	Local BGHF species
411	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Fair	2	Local BGHF species
412	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
514	Blackbutt *Eucalyptus pilularis*	Mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species
600	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Medium	Normal	3	Local indigenous species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
602	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
603	Swamp Oak *Casuarina glauca*	Mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5000	Blackbutt *Eucalyptus pilularis*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5001	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5002	Tallowwood *Eucalyptus microcorys*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Other indigenous community
5003	Tallowwood *Eucalyptus microcorys*	Semi-mature	10 - 20m	Suppressed	Small	Normal	3	Other indigenous community
5004	Tallowwood *Eucalyptus microcorys*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5005	Tallowwood *Eucalyptus microcorys*	Early-mature	> 20m	Co-dominant	Medium	Normal	2	Other indigenous community
5006	Tallowwood *Eucalyptus microcorys*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Other indigenous community
5007	Tallowwood *Eucalyptus microcorys*	Early-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5008	? Rough-barked Apple *Angophora floribunda*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5009	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Medium	Normal	3	Local BGHF species
5010	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Medium	Normal	3	Local BGHF species
5011	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Medium	Normal	3	Local BGHF species
5012	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	2	Local BGHF species
5013	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5014	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5015	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5016	Blackbutt *Eucalyptus pilularis*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5017	Bangalay *Eucalyptus botryoides*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5018	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Intermediate	Small	Normal	2	Local BGHF species
5019	Spotted Gum *Corymbia maculata*	Young	5 - 10m	Suppressed	Small	Normal	2	Other indigenous community
5020	Tallowwood *Eucalyptus microcorys*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Other indigenous community
5021	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Tiny	Normal	3	Local BGHF species
5022	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5023	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5024	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5025	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5026	Turpentine *Syncarpia glomulifera*	Semi-mature	5 - 10m	Suppressed	Large	Normal	3	Local BGHF species
5027	Lemon-scented Gum *Corymbia citriodora*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5028	Bangalay *Eucalyptus botryoides*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5029	Lemon-scented Gum *Corymbia citriodora*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5030	Tallowwood *Eucalyptus microcorys*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5031	Lemon-scented Gum *Corymbia citriodora*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5032	Lemon-scented Gum *Corymbia citriodora*	(No data)	(No data)	(No data)	(No data)	(No data)	(No data)	Other indigenous community
5033	Blackbutt *Eucalyptus pilularis*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5034	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5035	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5036	Bangalay *Eucalyptus botryoides*	Young	5 - 10m	Suppressed	Small	Normal	3	Local BGHF species
5037	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5038	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5039	Bangalay *Eucalyptus botryoides*	Young	5 - 10m	Suppressed	Small	Normal	3	Local BGHF species
5040	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5041	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Medium	Normal	3	Local BGHF species
5042	Bangalay *Eucalyptus botryoides*	Young	5 - 10m	Intermediate	Small	Normal	3	Local BGHF species
5043	Blackbutt *Eucalyptus pilularis*	Semi-mature	10 - 20m	Intermediate	Tiny	Normal	3	Local BGHF species
5044	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5045	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5046	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	2	Local BGHF species
5047	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5048	Spotted Gum *Corymbia maculata*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Other indigenous community
5049	Spotted Gum *Corymbia maculata*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Other indigenous community
5050	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Co-dominant	Large	Normal	3	Local BGHF species
5051	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5052	Blackbutt *Eucalyptus pilularis*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5053	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5054	Turpentine *Syncarpia glomulifera*	Early-mature	10 - 20m	Intermediate	Large	Normal	2	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5055	Lemon-scented *Gum Corymbia citriodora*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5056	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Co-dominant	Medium	Fair	2	Local BGHF species
5057	Turpentine *Syncarpia glomulifera*	Semi-mature	5 - 10m	Intermediate	Large	Normal	2	Local BGHF species
5058	Spotted Gum *Corymbia maculata*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Other indigenous community
5059	Turpentine *Syncarpia glomulifera*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5060	Bangalay Eucalyptus botryoides	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5061	Bangalay Eucalyptus botryoides	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5062	Tallowwood *Eucalyptus microcorys*	Semi-mature	10 - 20m	Intermediate	Large	Normal	2	Other indigenous community
5063	Blackbutt *Eucalyptus pilularis*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5064	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5065	Turpentine *Syncarpia glomulifera*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	2	Local BGHF species
5066	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5067	Swamp Mahogany *Eucalyptus robusta*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5068	Turpentine *Syncarpia glomulifera*	Mature	5 - 10m	Intermediate	Large	Normal	3	Local BGHF species
5069	Brush Box *Lophostemon confertus*	Semi-mature	10 - 20m	Intermediate	Medium	Good	3	Other indigenous community
5070	Brush Box *Lophostemon confertus*	Semi-mature	5 - 10m	Intermediate	Medium	Good	3	Other indigenous community
5071	Turpentine *Syncarpia glomulifera*	Early-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5072	Eucalypt *Eucalypts sp.*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	-
5073	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Suppressed	Small	Normal	2	Other indigenous community

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5074	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Co-dominant	Small	Normal	3	Local BGHF species
5075	Lemon-scented Gum *Corymbia citriodora*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	4	Other indigenous community
5076	Turpentine *Syncarpia glomulifera*	Early-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5077	Turpentine *Syncarpia glomulifera*	Early-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5078	Turpentine *Syncarpia glomulifera*	Mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5079	Turpentine *Syncarpia glomulifera*	Early-mature	5 - 10m	Intermediate	Medium	Fair	2	Local BGHF species
5080	Bangalay *Eucalyptus botryoides*	Young	5 - 10m	Intermediate	Small	Normal	3	Local BGHF species
5081	Turpentine *Syncarpia glomulifera*	Semi-mature	5 - 10m	Intermediate	Large	Normal	3	Local BGHF species
5082	Brush Box *Lophostemon confertus*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5083	Bangalay *Eucalyptus botryoides*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	2	Local BGHF species
5084	Turpentine *Syncarpia glomulifera*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5085	Blackbutt *Eucalyptus pilularis*	Mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5086	Blackbutt *Eucalyptus pilularis*	Mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5087	Turpentine *Syncarpia glomulifera*	Mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5088	? Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5089	Bangalay *Eucalyptus botryoides*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5090	Red Bloodwood *Corymbia gummifera*	Semi-mature	5 - 10m	Intermediate	Small	Fair	2	Local BGHF species
5091	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Small	Normal	2	Local BGHF species
5092	Blueberry Ash *Elaeocarpus reticulatus*	Early-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5093	Blackbutt *Eucalyptus pilularis*	Mature	> 20m	Dominant	Medium	Normal	4	Local BGHF species
5094	Grey Gum *Eucalyptus punctata*	Semi-mature	5 - 10m	Intermediate	Large	Good	4	Local BGHF species
5095	Grey Gum *Eucalyptus punctata*	Semi-mature	5 - 10m	Co-dominant	Medium	Normal	2	Local BGHF species
5096	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Suppressed	Small	Normal	2	Other indigenous community
5097	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5098	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5099	Bangalay *Eucalyptus botryoides*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	3	Local BGHF species
5100	Bangalay *Eucalyptus botryoides*	Mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species
5101	Lemon-scented Gum *Corymbia citriodora*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5102	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5103	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Other indigenous community
5104	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Intermediate	Small	Normal	2	Local BGHF species
5105	Bangalay *Eucalyptus botryoides*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5106	? Lemon-scented Gum *Corymbia citriodora*	Mature	> 20m	Dominant	Small	Good	4	Other indigenous community
5107	? Red Mahogany *Eucalyptus resinifera*	Semi-mature	10 - 20m	Suppressed	Tiny	Normal	2	Local BGHF species
5108	? Red Mahogany *Eucalyptus resinifera*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5109	? Red Mahogany *Eucalyptus resinifera*	Semi-mature	10 - 20m	Suppressed	Small	Normal	2	Local BGHF species
5110	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5111	Camphor Laurel *Cinnamomum camphora*	Early-mature	10 - 20m	Co-dominant	Small	Normal	3	Exotic

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5112	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5113	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5114	Silky Oak *Grevillea robusta*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5115	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5116	Silky Oak *Grevillea robusta*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5117	Silky Oak *Grevillea robusta*	Semi-mature	10 - 20m	Intermediate	Small	Fair	2	Other indigenous community
5118	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5119	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Co-dominant	No Value	No Value	1	-
5120	Tallowwood *Eucalyptus microcorys*	Early-mature	> 20m	Intermediate	Small	Normal	2	Other indigenous community
5121	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5122	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Co-dominant	No Value	No Value	1	-
5123	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Co-dominant	No Value	No Value	1	-
5124	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5125	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5126	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5128	Bangalay *Eucalyptus botryoides*	(No data)	(No data)	(No data)	(No data)	(No data)	(No data)	Local BGHF species
5129	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5130	Swamp Oak *Casuarina glauca*	Mature	> 20m	Intermediate	Medium	Normal	3	Local indigenous species
5131	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5132	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5133	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5134	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5135	Swamp Oak *Casuarina glauca*	Mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5136	Swamp Oak *Casuarina glauca*	Mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5137	Swamp Oak *Casuarina glauca*	Mature	> 20m	Co-dominant	Small	Normal	3	Local indigenous species
5138	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5139	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5140	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Dominant	Medium	Normal	2	Local BGHF species
5142	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5143	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5144	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5145	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Medium	Normal	3	Local BGHF species
5147	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5149	Silky Oak Grevillea robusta	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5150	Swamp Oak *Casuarina glauca*	Early-mature	10 – 20m	Intermediate	Small	Normal	3	Local indigenous species
5151	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5152	Swamp Oak *Casuarina glauca*	Mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5154	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5155	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5156	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5157	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local indigenous species
5158	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5159	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5160	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5161	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5162	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5163	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5164	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5165	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5166	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Medium	Normal	3	Local indigenous species
5167	Sydney Blue Gum *Eucalyptus saligna*	Over-mature	> 20m	Dominant	Small	Poor	2	Local BGHF species
5168	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5169	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5170	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5171	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5172	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5173	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species

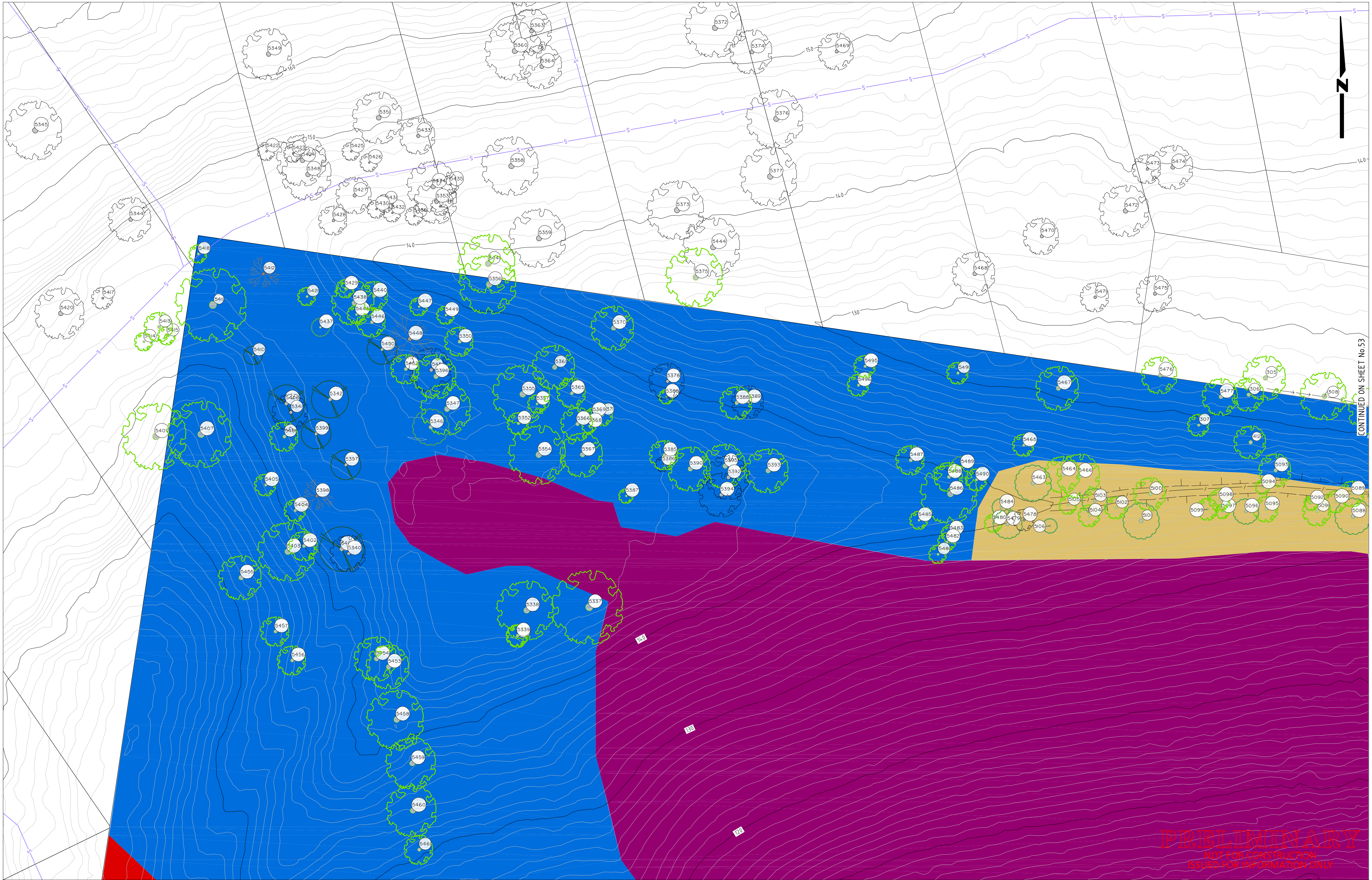
Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5174	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5175	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Dominant	Medium	Normal	2	Local BGHF species
5176	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5177	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5178	Sydney Blue Gum *Eucalyptus saligna*	Young	5 - 10m	Suppressed	Small	Normal	3	Local BGHF species
5179	Swamp Oak *Casuarina glauca*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5180	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5181	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5182	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5183	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5184	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5185	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5186	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5188	Swamp Oak *Casuarina glauca* **dead**	Over-mature	> 20m	Intermediate	No Value	No Value	1	Local indigenous species
5192	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5193	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5194	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5195	Spotted Gum *Corymbia maculata*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Other indigenous community
5196	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5197	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5200	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Suppressed	Small	Normal	2	Local BGHF species
5201	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5202	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	5 - 10m	Suppressed	Small	Normal	3	Local BGHF species
5203	Swamp Oak *Casuarina glauca*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5204	Swamp Oak *Casuarina glauca*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5205	Brush Box *Lophostemon confertus*	Semi-mature	5 - 10m	Suppressed	Medium	Normal	3	Other indigenous community
5206	? Spotted Gum *Corymbia maculata*	Mature	> 20m	Dominant	Small	Good	4	Other indigenous community
5207	Black She-oak *Allocasuarina littoralis*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5208	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5209	Spotted Gum *Corymbia maculata*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Other indigenous community
5210	Spotted Gum *Corymbia maculata*	Early-mature	> 20m	Co-dominant	Medium	Good	4	Other indigenous community
5211	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5212	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Medium	Normal	3	Local indigenous species
5213	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5214	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5215	Spotted Gum *Corymbia maculata*	Mature	> 20m	Dominant	Small	Good	4	Other indigenous community
5216	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Suppressed	Small	Normal	3	Local indigenous species
5217	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5218	Swamp Oak *Casuarina glauca*	Semi-mature	10 - 20m	Suppressed	Small	Normal	3	Local indigenous species
5219	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	2	Local indigenous species
5220	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5221	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5222	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5223	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5224	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5225	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5226	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5227	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5228	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5231	Sydney Blue Gum *Eucalyptus saligna* huge	Late-mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species
5233	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5234	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5235	Spotted Gum *Corymbia maculata*	Young	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5236	Swamp Oak *Casuarina glauca*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local indigenous species
5237	Spotted Gum *Corymbia maculata*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Other indigenous community
5238	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Co-dominant	No Value	No Value	1	-
5239	Sydney Blue Gum *Eucalyptus saligna*	Mature	> 20m	Dominant	Medium	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5240	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5241	? Red Mahogany *Eucalyptus resinifera*	Semi-mature	5 - 10m	Suppressed	Small	Fair	3	Local BGHF species
5242	Blackbutt *Eucalyptus pilularis*	Early-mature	> 20m	Intermediate	Medium	Normal	3	Local BGHF species
5243	Sydney Blue Gum *Eucalyptus saligna*	Young	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5244	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Medium	Normal	3	Local BGHF species
5245	Rough-barked Apple *Angophora floribunda*	Young	5 - 10m	Suppressed	Tiny	Normal	3	Local BGHF species
5246	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5247	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5248	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Fair	2	Local BGHF species
5249	Sydney Blue Gum *Eucalyptus saligna*	Young	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5250	Eucalypt *Eucalypts sp.*	Early-mature	> 20m	Co-dominant	Small	Fair	2	-
5251	Blackbutt *Eucalyptus pilularis*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5252	Eucalypt *Eucalypts sp.*	Semi-mature	10 - 20m	Intermediate	Tiny	Fair	2	-
5253	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5254	Sydney Blue Gum *Eucalyptus saligna*	Early-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5255	Black She-oak *Allocasuarina littoralis* **big**	Mature	> 20m	Co-dominant	Small	Normal	3	Local BGHF species
5256	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	> 20m	Intermediate	Small	Normal	3	Local BGHF species
5257	Eucalypt (dead) *Eucalyptus sp.*	Over-mature	> 20m	Intermediate	No Value	No Value	1	-
5258	Sydney Blue Gum *Eucalyptus saligna*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species

Tree #	Species	Maturity	Height	Crown Class	Live Crown Ratio	Vigour	Condition Rating	Occurrence
5259	Swamp Oak *Casuarina glauca*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5260	Swamp Oak *Casuarina glauca*	Early-mature	> 20m	Intermediate	Medium	Normal	3	Local indigenous species
5261	Bangalay *Eucalyptus botryoides*	Young	5 - 10m	Suppressed	Small	Fair	2	Local BGHF species
5262	Forest Oak *Allocasuarina torulosa*	Semi-mature	5 - 10m	Suppressed	Small	Fair	2	Local BGHF species
5263	Brush Box *Lophostemon confertus*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	3	Other indigenous community
5264	Willow Bottlebrush *Callistemon salignus*	Semi-mature	5 - 10m	Intermediate	Small	Normal	3	Local indigenous species
5265	Prickly-leafed Paper-bark *Melaleuca styphelioides*	Young	5 - 10m	Suppressed	Medium	Normal	3	Local indigenous species
5266	Willow Bottlebrush *Callistemon salignus*	Semi-mature	5 - 10m	Intermediate	Small	Normal	3	Local indigenous species
5267	Prickly-leafed Paper-bark *Melaleuca styphelioides*	Semi-mature	5 - 10m	Intermediate	Medium	Normal	3	Local indigenous species
5268	Swamp Oak *Casuarina glauca*	Early-mature	10 - 20m	Intermediate	Small	Normal	3	Local indigenous species
5269	Red Bloodwood *Corymbia gummifera*	Young	5 - 10m	Suppressed	Tiny	Normal	3	Local BGHF species
5270	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5271	Bangalay *Eucalyptus botryoides*	Semi-mature	10 - 20m	Intermediate	Small	Normal	3	Local BGHF species
5272	Prickly-leafed Paper-bark *Melaleuca styphelioides*	Semi-mature	5 - 10m	Intermediate	Small	Normal	3	Local indigenous species



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Drawn: S. COMISH
Surveyor: LIDAR

Field Book	Level Book	Datum
NA	NA	AHD

Design Checked-Design Team Leader   Signed:
Drawing Checked   Signed:

Project Identifier\-\CAD File Name
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TRIM Document Number

Issue	Description	Name	Initial	Date
1	ISSUED FOR INFORMATION ONLY	C. CLENDENNING		

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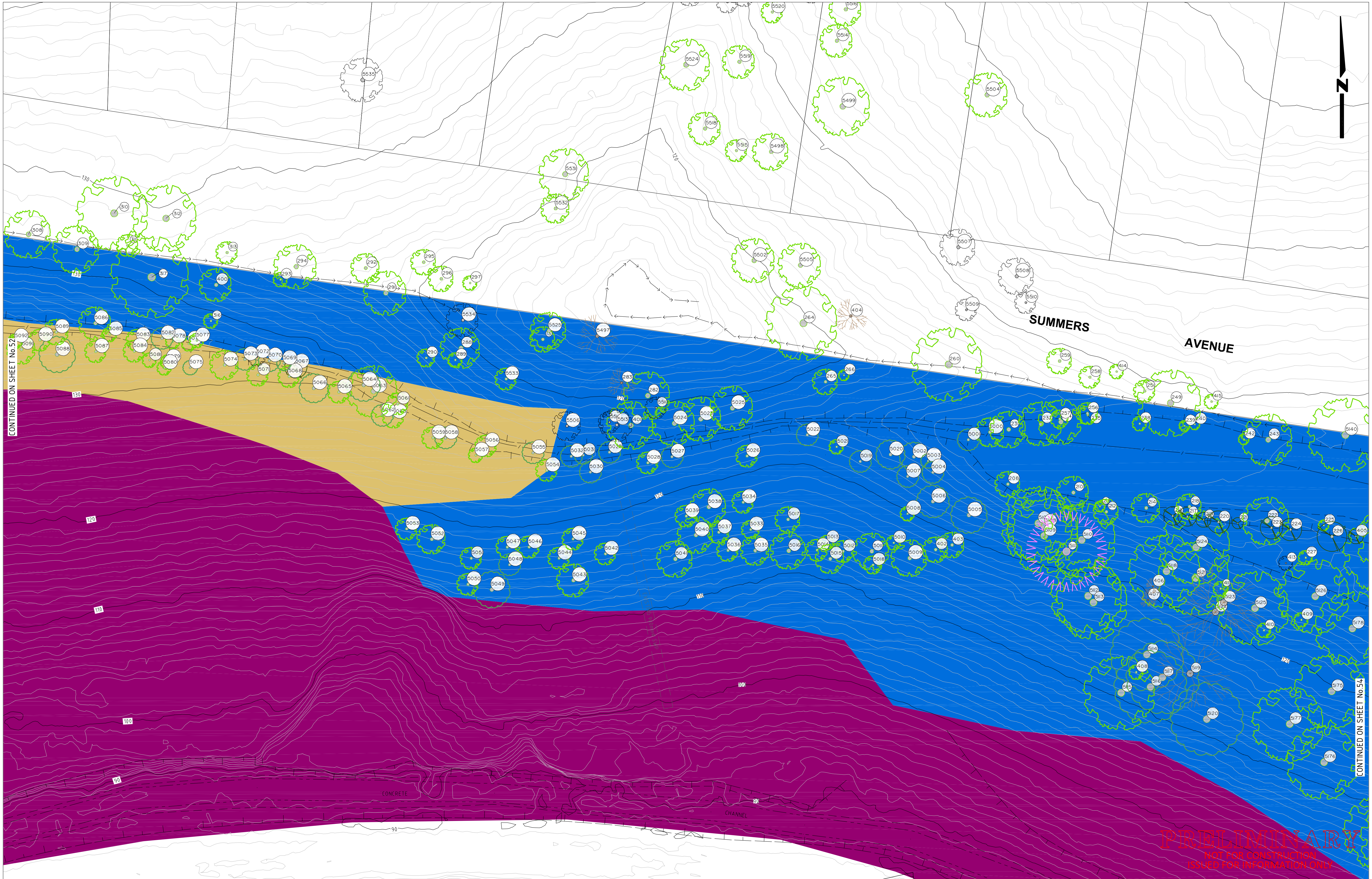
HORNSBY QUARRY, HORNSBY
PROPOSED REDEVELOPMENT
NORTHERN SPOIL MOUND STABILITY ASSESSMENT

TREE IDENTIFICATION SURVEY PLAN
SHEET 1 OF 3

Project Number: 100125
Sheet 52 of 56
Issue 1
HSC Drawing Number: QUARRY-28062018



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Drawn	S. COMISH	Drawing Checked	Signed:		
Surveyor	LIDAR	NA (Field Book)	NA (Level Book)	AHD (Datum)	
Project Identifier\-\CAD File Name	H:\Hornsby Park Redevelopment\ACAD\DESIGN\Sound Mound Options\Mound Options.dwg				
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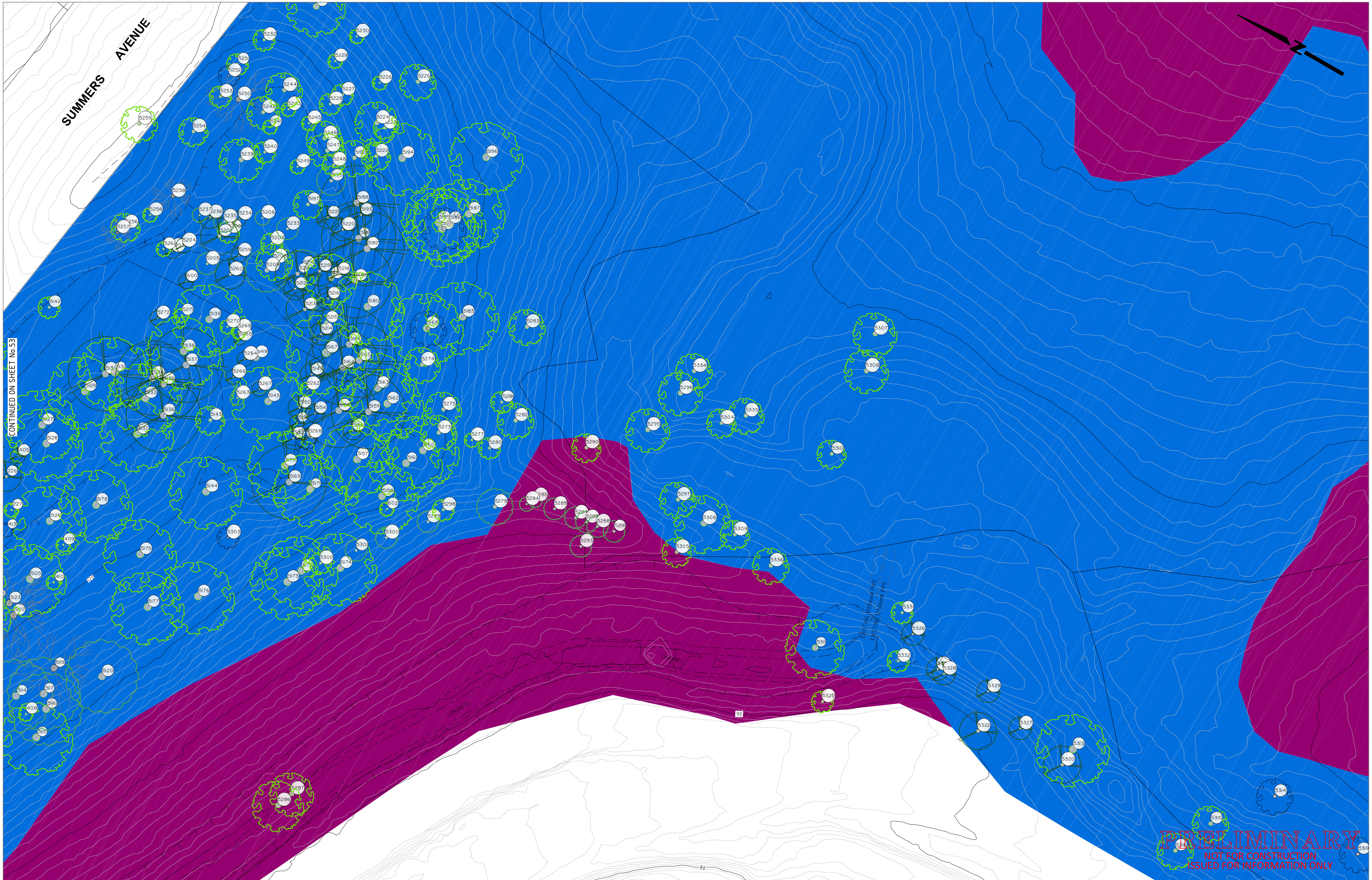
PROPOSED REDEVELOPMENT
NORTHERN SPOIL MOUND STABILITY ASSESSMENT

TREE IDENTIFICATION SURVEY PLAN
SHEET 2 OF 3

Project Number: 100125
Sheet 53 of 56
Issue 1
HSC Drawing Number: QUARRY-28062018



Hornsby Shire Council Design & Construction Branch TELEPHONE: (02) 9847 6666 FACSIMILE: (02) 9847 6999	Designer: S. COMISH	Design Checked-Design Team Leader Signed:		
	Drawn: S. COMISH	Drawing Checked Signed:		
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PROPOSED REDEVELOPMENT
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TREE IDENTIFICATION SURVEY PLAN
SHEET 3 OF 3

Project Number: 100125
Sheet 54 of 56
Issue: 1
HSC Drawing Number: QUARRY-28062018

pre-development tree survey and assessment

TS-01
Revision A, Issued for Information
22 August 2019

PROJECT
Hornsby Park / Hornsby Quarry
Quarry Road
Hornsby, NSW 2077

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Hornsby Shire Council
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CONTENTS

i EXECUTIVE SUMMARY

In July 2019, Arterra was engaged by Hornsby Shire Council to carry out a tree survey and prepare a brief arboricultural assessment report for portions of the Hornsby Park site around the existing Quarry and Old Mans Valley areas. The now disused Hornsby Quarry site has been identified for restoration and redevelopment as a significant regional park for recreational activities within a natural area.

The area of the old quarry site and Old Mans Valley is approximately 40 hectares. Arterra completed an arboricultural assessment of the trees within portions of the site, being an area of approximately 6.4 hectares (64,220m2), that will be potentially impacted by proposed major earthworks as part of the sites rehabilitation and development as a regional park.

For the purposes of this tree survey and assessment, a 'tree' that was to be surveyed was defined by Council as:

- Any tree having a Diameter at Breast Height (DBH @ 1400mm above the ground from the base of the tree) of **greater than 150mm** (or greater than 200mm DBH for *Pittosporum undulatum*.)
- Trees smaller than this, regardless of their height or species, were excluded from being recorded.
- Weeds such as Privet and Camphor Laurel were not included within the survey.

Figure i – View of some Sydney Blue Gums near the southern end of Old Mans Valley, adjacent to the mountain bike pump track that were typical of what is found throughout the survey area. (Photo: Arterra 25 July 2019)

A total of **1005** trees were observed and assessed. Detailed information on each tree is provided in Appendix 4.1 'Hornsby Quarry - Tree Assessment Schedule'. The information recorded included;

- A unique Identification Number (ID),
- Species,
- Tree Heights and Canopy Spread,
- Trunk diameters (at both DBH and DGL),
- Tree Age Class
- Tree Form and Vigour
- General Condition Rating

There were 30 different tree species recorded within the survey area. The **top four species represented 73%** of the overall population. Many of the other species were represented by only a few specimens. There are many very significant and endemic trees located in the survey area. The dominant species observed and recorded were:

- *322 x Eucalyptus saligna* (Sydney Blue Gum) - (or 32% of total population)
- *180 x Angophora floribunda* (Rough-barked Apple) – (or 18% of total population)
- *125 x Casuarina cunninghamiana* (River She-Oak) – (or 12% of total population)
- *110 x Eucalyptus pilularis* (Blackbutt) – (or 11% of total population)

The nominal tree protection zones have been calculated for all the trees on the site. These zones have been calculated based on the Australian Standard 4970 – Protection of Trees on Development Sites. At this stage they have been depicted as simple circles centred on the trunks of the trees and depicted graphically on the tree inventory plans for the 'high' and 'moderate' condition rating trees only. It is important to note that for many of the trees observed, traditional and nominal Tree Protection Zones may not strictly apply, as they would for more traditional forest trees or urban parkland trees. Many trees are growing in rather extreme and very disturbed environments. For example, trees growing in a very rocky or cliff like surrounding may have roots that are totally to one side of the tree and expanding throughout extensive rock crevices and fissures. The extent and nature of the root development in this environment would be very difficult to predict.

Likewise, trees that are growing on very steep land may develop root systems that are extremely biased towards upslope directions, to facilitate tree stability, and there may be very little structural root development on the less structurally important, downslope side of the tree. It may be possible to undertake earthworks much closer to some of these trees than would normally be allowed, particularly if it involves careful and judicious removal of rocks or spoil that may have been placed after the tree had initially started to establish.

In summary, the starting position for a tree to be retained should be to ensure work is undertaken well outside its 'nominal' tree protection zone. If it is required to undertake disturbances closer to some important trees, it may be necessary to conduct more detailed arboricultural assessments and reviews based on the specific site conditions surrounding those trees. Typically, it will be far more critical to avoid disturbance on the upslope side of trees when they are located on steep embankments.

As with all aspects in the development and construction process, the tree related constraints must be weighed up against many other relevant development opportunities and constraints. The retention of the trees on the site must also consider economic, social, environmental, construction and practical realities.

This document has been prepared by Arterra Design Pty Ltd, using the expertise of our in-house consulting arborist (AQF Level 5), Robert Smart. Robert Smart is a member of the International Society of Arboriculture - Australian Chapter and also a Registered Consulting Arborist with Arboriculture Australia.

Robert Smart AAILA , ISA, AA
Director, Registered Landscape Architect (054), Registered Consulting Arborist (1804).

Figure ii – View of an excellent specimen of an Angophora floribunda (Rough-barked Apple) very common throughout the survey area . (Photo: Arterra 25 July 2019)

1.0 INTRODUCTION

1.1 Background

In July 2019, Arterra was engaged by Hornsby Shire Council to carry out a tree survey and prepare a brief arboricultural assessment report for portions of the Hornsby Park site around the existing Quarry and Old Mans Valley areas. The now disused Hornsby Quarry site has been identified for restoration and redevelopment as a significant regional park for recreational activities within a natural area. The site is in close proximity to Hornsby CBD and is accessed from both Quarry Road and Bridge Road. The area of the old Quarry site and Old Mans Valley is approximately 40 hectares. Refer to site Location Plan – Figure 2.

Arterra was engaged to complete an arboricultural assessment of the trees within portions of the site, being an area of approximately 6.4 hectares (64,220m2). This area is potentially impacted by proposed major earthworks as part of the sites rehabilitation and development as a regional park. A key component of the project was the accurate location, by reliable survey methods, of each tree, (or close grouping of trees of the same species) within the defined survey area, as shown shaded orange in Figure 3. The positional tree survey was undertaken by LTS Lockley, registered surveyors (LTS), under the direction of Arterra's consulting arborist, Robert Smart.

The main purpose of this assignment was to accurately locate, identify and provide a condition assessment for those trees in the areas identified. This is intended to provide an overview of the tree population and help inform the decision-making process regarding trees that will inevitably have to be removed in the course of the project, together with the trees proposed to be retained and protected. This work will be crucial to aid with the design and implementation of appropriate tree protection measures for the trees that are proposed to be retained. The survey and assessment were restricted to specific portions of the site. The other surrounding trees, across the broader site that are unlikely to be impacted, are not addressed as part of this report or the survey.

Figure 1 – View from the western side of the now abandoned Hornsby Quarry looking east towards Old Mans Valley. (Photo: Arterra 25 July 2019)

The site operated as a quarry under private ownership since the early to mid 1900s. CSR owned two properties covering the quarry by freehold title, being the Jones property and the Howes property. Both were part of an original land grant to Thomas Edward Higgins of 250 acres during February 1836. The Higgins family cemetery is still located within the south-eastern corner of the Jones property, with the graves dating from about 1875. (extracted from: http://friendsberowravalley.org.au/html/landscape_-_hornsby_quarry.html accessed 19.08.2019)

Council compulsorily acquired the Quarry in 2004, under a decision handed down by the NSW Supreme Court when then owners, CSR Construction Materials, ceased operations on the site. More recently the Quarry has been partially filled-in using in excess of 1million m3 of material excavated from the construction of the nearby NorthConnex tunnel project. Today the site contains a mixture of remnant, planted and self-sown trees. Many are on very highly disturbed, and relatively unstable spoil (fill) areas remaining from quarry operations and also adjacent to remnant and re-growth native bushland. There are expansive areas around the Quarry and the surrounding bushland that are heavily impacted by Privet, Camphor Laurel and other invasive species. Walking trails, both formal and informal run throughout the site, together with extensive mountain bike trails and a mountain bike jump track. Obsolete quarrying infrastructure, including a rock crushing plant, fuel depot and miscellaneous abandoned equipment is also scattered throughout the site.

Figure 2 – Context and demarcation of Hornsby Park, Hornsby Quarry and Old Mans Valley. (Source: Hornsby Shire Council 2019)

Figure 3 – Site context and demarcation of the 'Tree Survey Area' as identified by Council prior to undertaking the assessment. (Source: Arterra)

Figure 4 – Context and approximate demarcation of the remaining and surrounding natural vegetation communities and its relationship to the quarry and the identified survey area. (Source: Arterra, adapted from mapping supplied by Hornsby Council)

As per the figure above, the natural vegetation communities that are associated with this area are Blue Gum/Blackbutt/Smooth-barked Apple Moist Shrubby Open Forest and Blackbutt Gully Forest. These are communities that are often more broadly described as Blue Gum High Forest. This is an Endangered Ecological Community under NSW Threatened Species legislation, with less than 5% of its original distribution still remaining. *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus pilularis* (Blackbutt) were the dominant trees, with the Blue Gums favouring the moist lower slopes and Blackbutts more prevalent on the ridges. The mid and understorey tree species would have been dominated by *Angophora costata*, *Angophora floribunda*, *Eucalyptus globoidea*, *Allocasuarina torulosa* and *Syncarpia glomulifera*. (Benson and Howell, 1995).

Figure 5 – The site contains numerous significant and impressive endemic trees such as this Blackbutt (Euc. pilularis) which often stand well in excess of 35m tall and with trunk diameters close to 1m at ground level. These older trees often provide significant habitat with numerous small hollows and spouts that would support native wildlife. (Photo: Arterra 25 July 2019)

As stated, the primary purpose of the tree survey and assessment was to accurately locate and identify the trees that may be potentially impacted by proposed future works, so that Council can then take a more informed and proactive approach to the management of the trees. Arterra has identified, tagged and carried out a preliminary arboricultural assessment of the trees within the identified survey area. The registered surveyors (LTS) then carried out the necessary survey of the tree positions, to accurately locate the trees and enable their positions to be plotted on to plans and issued to Council designers for use in their ongoing work.

Figure 6 – View of the mountain bike 'pump track' located to the southern end of the Old Man's Valley fill area. This is part of a far more extensive mount bike trail network that surrounds much of the quarry site. Trees are often intimately related to the extensive trail network. (Photo: Arterra 22 July 2019)

Figure 7 – View of the northern end of the Old Man's Valley fill area and the newly constructed driveway leading to Bridge Road. (Photo: Arterra 22 July 2019)

For the purposes of the survey, the broader Hornsby Quarry/ Hornsby Park site was broken up into five distinct precincts being:

- Old Man's Valley
- Northern fill slopes
- Western slopes (adjacent the existing fuel depot/shed)
- South-west fill area
- Southern access road

The following photos illustrate an overview of the character and type of trees and vegetation encountered at each of these separate portions of the site.

*Figure 8 – **Old Man's Valley** - view northwest along forested eastern site boundary. Note the historical 'baby bath' carved into the rock adjacent T28 at the far left. (Photo: Arterra 22/7/19)*

*Figure 9 – **Northern fill slopes** - at right and view to western edge of the fill slope and its interface with the more natural vegetation of the Blue Gum and Blackbutt Gully Forest beyond. (Photo: Arterra 25/7/19)*

*Figure 10 – **Western slopes** at the right, view southwest from the fuel depot towards Rosemead Reserve. (Photo: Arterra 25/6/19)*

*Figure 11 – **South-west fill area** – View east from the toe of the fill bank in Rosemead Reserve looking back towards the south-west fill embankments. (Photo: Arterra 27/7/19)*

*Figure 12 – **Southern Cliffs access road**. View west from the top gate towards the southwest fill area. (Photo: Arterra 25/6/19)*

1.2 Aims of This Report

This report, together with the accompanying tables and plans, is intended as a guide to aid in the planning of the proposed bulk earthworks to redevelop and rehabilitate the site into a valuable regional resource. This preliminary assessment of the trees provides Council, and its consultants, with a method to identify and quantify the trees that will be impacted by the proposed works. It also highlights those trees that are most appropriate to retain and qualifies those trees that need not be considered a significant constraint. Specifically the work and report aims to:-

- Identify, tag and accurately locate the 'trees' within or adjacent to the project site;
- assess the health, condition and habitat value of the trees;
- accurately record information relevant to the existing trees;
- assess the significance and SULE of the existing trees;
- provide a basis for recommendations as to which trees should ideally be retained and protected;
- identify the proposed Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) to guide the project's design and construction and
- provide preliminary advice on the necessary tree protection measures that may be required during construction to ensure trees may be successfully retained.

The following limitations apply to this report's use: -

1. <u>It is a preliminary document:</u> intended to provide guidance to the designers and engineers. It may be necessary to make adjustments once the nature and full extent of the proposed site works are known.
2. <u>Plans:</u> All plans are for planning purposes only. They should only be used relating to tree issues and are not suitable for any other purpose.
3. <u>Confidentiality:</u> This report is confidential to the Client and should not be released to any Third Party without consultation with Arterra and consent from the Client.
4. <u>Notification of proposed disturbance within TPZs</u>: Arterra or the client should be clearly notified of any disturbance proposed in TPZs, so that we may advise on the implications before any layout is finalised.

1.3 Relevant Tree Survey Brief

The purpose of the survey and assessment was to identify trees that should be considered as Council moves forward with plans and designs for the ultimate Hornsby Park development. Most of the areas that were reviewed are highly disturbed environments and have numerous trees, shrubs and groundcovers and other exotic vegetation. For the purposes of this tree survey and assessment, a 'tree' that was to be surveyed was defined by Council as:

- Any tree having a Diameter at Breast Height (DBH @ 1400mm above the ground from the base of the tree) of **greater than 150mm** (or greater than 200mm DBH for *Pittosporum undulatum*).
- Trees smaller than this, regardless of their height or species, were excluded from being recorded.
- 'Exempt' tree species (weeds) as defined under the Hornsby Council DCP (such as Privet and Camphor Laurel) were specifically excluded, and therefore not included within the survey.

1.4 Conduct and Author Qualifications

Given the above stated aims of this report, as author of this report, Arterra Design confirms that Robert Smart is suitably qualified (AQF 5 Consulting Arborist) to provide comment and the required arboricultural advice pertaining to these matters.

Furthermore, Mr Smart confirms that he has read and agrees to be bound by the NSW Uniform Civil Procedure Rules 2005, Part 31 Division 2 Provisions, Schedule 7 - Expert witness code of conduct.

Arterra provides specialist consulting arborist services only and does not provide any physical tree work services such as climbing, pruning, removal, root investigations or root pruning. Our advice is based on impartial professional assessment only, as we do not derive any financial benefit from specifying pruning or other physical services. We will not specify any such activities unless we determine them to be essential to the ongoing health or stability of a tree.

1.5 Key Definitions and Abbreviations

The following abbreviations are used throughout this report.

DBH = Diameter at Breast Height
This is the diameter of the trunk measured at 1.4m above ground level.

DGL = Diameter at Ground Level
This is the diameter of the trunk measured at ground level just above any root flare.

"TPZ" = Tree Protect Zone
This is the area as defined by AS 4970 – "Protection of trees on development sites" and means the typical minimum area above and below ground at a given distance from the trunk to provide for protection of the tree. Most importantly it represents the root zone required to be kept uninjured to maintain a healthy and viable tree. Please note, that roots will usually extend well beyond this zone, so this represents the minimum remaining root zone required, assuming all others are lost or damaged due to construction. It is typically calculated as a circle centred on the trunk unless existing site conditions can be assessed and indicate otherwise.

"SRZ" = Structural Root Zone
This is the area as defined by AS 4970 – "Protection of trees on development sites" and means the area immediately around the base of the tree at a given distance from the trunk. The woody roots and soil cohesion in this area are considered vital to the structural stability of the tree. Damage or removal of soil and or roots from this area will typically render the tree unstable and require its removal. It is typically calculated as a circle, centred on the trunk, unless existing site conditions can be assessed and indicate otherwise.

1.6 Assessment Methodology

Arterra's team consisting of an AQF5 consulting arborist and arborist assistant attended the site for several days over the period 22 July to 9 August 2019 to identify, tag, measure and assess the trees in the predefined survey area. The registered surveyors team from LTS attended the site over a similar period with some additional days required to complete the surveying due to the very challenging site conditions, including very dense understorey vegetation across steep and unstable ground.

It is important to note that the broader Hornsby Quarry site covers approximately 40ha and only a relatively small, 6.4 ha portion site was the subject of this tree survey, assessment and report. The survey extent is shown in Figure 3. As noted, not every tree within the site survey extent was recorded. The trees surveyed had to meet the following criteria:

- Trees, generally – DBH greater than 150mm.
- Pittosporum sp. – DBH greater than 200mm.
- Dead trees with habitat potential – DBH greater than 150mm (trees with hollows, spouts, cavities or 'stag' potential).
- 'Exempt' tree species as defined under the Hornsby Council DCP (such as Privet and Camphor Laurel) were specifically excluded from the survey.

The arborist team identified the trees to be surveyed and then affixed a small aluminium tag bearing a unique identification number. The survey team followed close behind, surveying (locating) the tagged trees and recording the identification number of each surveyed tree, as cross check for accuracy and completeness. Tree trunk diameters were measured using a metric diameter tape measure. If they were unable to be reached, a reasonable estimate was made. Heights were measured using the two-point clinometer function of a Nikon Forestry Pro laser range finder, when possible. Canopy spreads were estimated. Particularly asymmetric canopy development was noted and then illustrated in the plans via graphically offsetting the canopy circles from the trees' trunk position.

Once a tree was physically located and identified a variety of data was measured and recorded. Where trees were not physically accessible due to work safety considerations, measurements were estimated and the tree was noted as having been 'remotely assessed'. A total of 85 trees were remotely assessed and typically observed from only one side and from a distance.

Key data captured for each tree included:

- Tree ID number
- Species and Common name
- Tree origin
- DBH and DGL
- Height and Spread
- Vigour
- Condition rating
- Safe Useful Life Expectancy (SULE)
- Any major defects or flaws
- Hollow bearing / Habitat potential

LTS Lockley surveyed the tree positions by way of GNSS/GPS Corsnet to establish site MGA control from local state survey marks. The primary mark adopted was (SSM 83774 Easting 323633.352 Northing 6269462.389 Class B order 2.).

A Leica T16 Robotic Total Station was used to survey the tree trunk positions. Using this method decimetre accuracy of the tree trunks was obtained. The survey was back connected to various site survey points where known MGA co-ordinates were provided and no significate differences were found.

Desktop Review and Research

Digital AutoCAD files of the surveyed trees were imported into Arterra's standard CAD software (ArchiCAD v21). Recent aerial photography data was obtained from the Nearmap website with aerial photos of the site dating from 2019 imported into the above software for cross checking and general site understanding and assessment. (http://www.nearmap.com/ accessed 20 July 2019). A number of historic aerial photos of the area provided by Council and dating back to 1930 were also reviewed and imported.

Figure 13 – Photo illustrating that the trees were surveyed using a registered surveyor to accurately position the trees spatially on the site. This was done at the same time as the trees were surveyed and identified by the arborist to maintain consistency, accuracy of recording and numbering throughout. (Photo: Arterra 22/7/19)

1.7 Tree Assessment – Tree Condition Rating Values

The information gathered in the field has been tabulated and the 'condition rating' values assessed using a combination of techniques commonly used and recognised in the arboricultural industry. The tree life expectancy was established using the Safe Useful Life Expectance (SULE) system. A brief summary of these systems is described below.

SULE – SAFE USEFUL LIFE EXPECTANCY

This is a system developed by Jeremy Barrell in 1993 that determines the time a tree may be expected to be retained based on its age, health, condition, safety and location. This is then moderated by the economics of maintenance or other costs of retaining the tree. A long SULE means the tree is presently expected to live longer than 40 years with minimal intervention and cost. A short SULE indicates a tree that is not expected to live longer than 5 years or may require substantial intervention or costs to retain it.

CONDITION RATING VALUES
The proposed 'retention' or 'condition rating' value of the trees was determined based on a considered combination of the size, age, condition and suitability of the tree.

Each tree was then ranked according to one of 5 retention categories.

1. **"Dead" Condition Rating Value** – these are trees that are considered dead, and therefore could be considered for removal regardless of any development, unless they provide beneficial habitat value.
2. **"Very Low" Condition Rating Value** – these are trees that are, invasive weeds, or in very poor condition or have serious structural defects, are not historically, environmentally or socially significant and probably should be removed if they are likely to cause any risk to future park users or spread weed material. They could be retained but only if they remain in extremely low target areas and don't constrain potential desirable development outcomes.
3. **"Low" Condition Rating Value** – these are trees that are of poor condition or have structural defects, are particularly small or common place, are not historically, environmentally or socially significant and should not be considered as a constraint to development. They could be retained but only if they are not likely to be impacted by or constrain potential desirable development outcomes.
4. **"Moderate" Condition Rating Value** – these are trees that are in good to reasonable condition and should be retained where possible and feasible to do so. These are typically trees that are endemic to the site with few significant issues or defects. They may also be non-endemic trees that are considered to be particularly good specimens.
5. **"High" Condition Rating Value** – these are trees that are typically in good or very good condition, large and visually prominent, historically or environmentally important. They should represent a serious physical constraint to the development and their removal avoided where possible and feasible.

1.8 Tree Assessment – Tree Protection Zones Generally

In order to ensure the long-term survival and growth of any tree that is planned to be retained on the potential development site, a suitable area is required to be protected around the tree. This area should typically be as large as possible. It should also take into consideration: -

- The size and age of the tree;
- Above and below ground properties;
- The health and condition of the tree;
- The species of tree and its tolerance to disturbance;
- Soil conditions, type, depth and site hydrology and
- Site specific conditions and any existing obstructions to root development.

The Tree Protection Zones (TPZs) presented in the schedules within the rear of this document and shown on the drawings have been calculated using the formula and criteria outlined in AS 4970-2009 - Protection of Trees on Development Sites. In summary the standard applies the calculation for the radius of the TPZ as 12 x (the tree trunk diameter (in metres) calculated at breast height (DBH)). DBH is taken at 1.4m above ground level.

A maximum TPZ radius will be 15m (unless crown protection is required) while the minimum TPZ radius shall be 2m.

The TPZ is typically assumed to be radial and centred on the centre of the tree's trunk unless other site factors or tree canopy size and location dictate an adjustment. Encroachments of up to 10% of the area may be accepted within the TPZ as long as it is outside of the Structural Root Zone (SRZ). This is known as a "minor encroachment". Encroachments greater than this, known as "major encroachments" will only be accepted with additional specific evidence that the tree will not be unduly impacted.

Whenever an encroachment is made into a TPZ, a suitable compensation should be made elsewhere and physically contiguous to the remaining TPZ.

The Structural Root Zone (SRZ) is the area defined as the minimum area required to retain the structural stability of the tree. The formula for calculating the SRZ is outlined in AS 4970 Section 3.3.5. No encroachment into the SRZ shall typically be allowed.

2.0 KEY OBSERVATIONS & STATISTICS

2.1 Tree Assessment – Species and Conditions

A total of **1005** trees were observed and assessed in the course of preparing this report. The information collected in the field has been tabulated and analysed to provide an overview of the tree population across the survey site which is summarised in the following tables. For further and more detailed information on a tree by tree basis refer to Appendix 4.1 – Hornsby Quarry - Tree Assessment Schedule. There are many very significant and endemic trees located in the survey area. The dominant species observed and recorded were:

- *Eucalyptus saligna* (Sydney Blue Gum),
- *Angophora floribunda* (Rough-barked Apple)
- *Casuarina cunninghamiana* (River She-Oak)
- *Eucalyptus pilularis* (Blackbutt)

Apart from the River She-Oak, the other top 3 species are endemic to the locality and would be expected to be dominant and present. The River She-Oak is not normally associated with the natural forests of this area and is believed to have been intentionally planted around the quarry to help stabilise some of the Quarry rim and surrounding embankments. These are very hardy and adaptable trees and often flourish in disturbed areas and freely sucker and self seed. Some of the *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus pilularis* (Blackbutt) have developed into particularly large and significant specimens of large girth and spread. Some of the larger and older trees often display significant habitat features such as hollows and spouts. Most of the very large trees are believed to be remnants of original forest trees or very early regrowth, following initial clearing for agricultural purposes and the Quarry works in the early 1900s.

Table 1 - Population by Species (in order of level of occurrence)

Tree Species	Common Name	Number of Trees	% Population
Eucalyptus saligna	Sydney Blue Gum	322	32%
Angophora floribunda	Rough-barked Apple	180	18%
Casuarina cunninghamiana	River She-Oak	125	12%
Eucalyptus pilularis	Blackbutt	110	11%
Angophora costata	Smooth-barked Apple	34	3%
Syncarpia glomulifera	Turpentine	33	3%
Eucalyptus microcorys	Tallowood	26	3%
Allocasuarina littoralis	Black She-Oak	24	2%
Pittosporum undulatum	Sweet Pittosporum	22	2%
Casuarina glauca	Swamp She-Oak	19	2%
Populus deltoides	American Cottonwood	16	1%
Allocasuarina torulosa	Forest She-Oak	14	1%
Eucalyptus botryoides	Bangalay	14	1%
Eucalyptus resinifera	Red Mahogany	14	1%
Grevillea robusta	Silky Oak	9	1%
Lophostemon confertus	Brush Box	8	1%
Eucalyptus robusta	Swamp Mahogany	5	<1%
Liquidambar styraciflua	Liquidamber	4	<1%
Banksia serrata	Old Man Banksia	4	<1%
Eucalyptus acmenioides?	White Mahogany	3	<1%
Corymbia citriodora	Lemon-scented Gum	3	<1%
Pinus roxburghii	Chir Pine	3	<1%
Callistemon salignus cv.	Willow Bottlebrush	2	<1%
Acacia falcata	Sickle-leaf Wattle	2	<1%
Exocarpus cupressiformis	Cherry Ballart	2	<1%
Acacia parramattensis	Parramatta Wattle	2	<1%
Pinus caribaea ?	Carribean Pine	2	<1%
Pinus radiata ?	Monterey Pine	1	<1%
Livistona australis	Cabbage Tree Palm	1	<1%
Corymbia maculata	Spotted Gum	1	<1%
	Total Population	**1005**	**100%**

2.2 Statistical Analysis and Spatial Analysis

The following tables illustrate the basic statistics surrounding the tree population that was recorded during the survey. These are accompanied by plans that illustrate where the various trees occur and their relevant ratings and other factors.

Table 2 - Population by Tree Condition Rating Value

Condition Rating Value	Number of Trees	% of Population
5 High	122	12%
4 Moderate	585	58%
3 Low	220	22%
2 Very Poor	42	4%
1 Dead	36	4%
Total Population	**1005**	**100%**

Table 3 - Population by Origin

Species Origin	Number of Trees	% of Population
Endemic (to local area)	767	76%
Native (wider Sydney or Australia)	203	20%
Invasive	25	3%
Non-native / Exotic	10	1%
Total Population	**1005**	**100%**

Table 4 - Population – 'High' Condition Rating Value by the Species

Tree Species	Number of Trees	Number of Trees	% of Population
Eucalyptus saligna	Sydney Blue Gum	60	49%
Eucalyptus pilularis	Blackbutt	29	24%
Angophora floribunda	Rough-barked Apple	11	9%
Syncarpia glomulifera	Turpentine	8	7%
Eucalyptus resinifera	Red Mahogany	4	3%
Angophora costata	Smooth-barked Apple	3	2%
Allocasuarina torulosa	Forest She-Oak	2	2%
Banksia serrata	Old Man Banksia	2	2%
Exocarpus cupressiformis	Cherry Ballart	1	<1%
Livistona australis	Cabbage Tree Palm	1	<1%
Allocasuarina littoralis	Black She-Oak	1	<1%
	Total of High Value	**122**	**100.00%**

Table 5 - Population by Trunk (Diameter at Breast Height)

DBH Range	Number of Trees	%of Population
= or >1.00m	16	2%
0.75m – 0.99m	41	4%
0.15m-0.74m	948	94%
Total Population	**1005**	**100.00%**

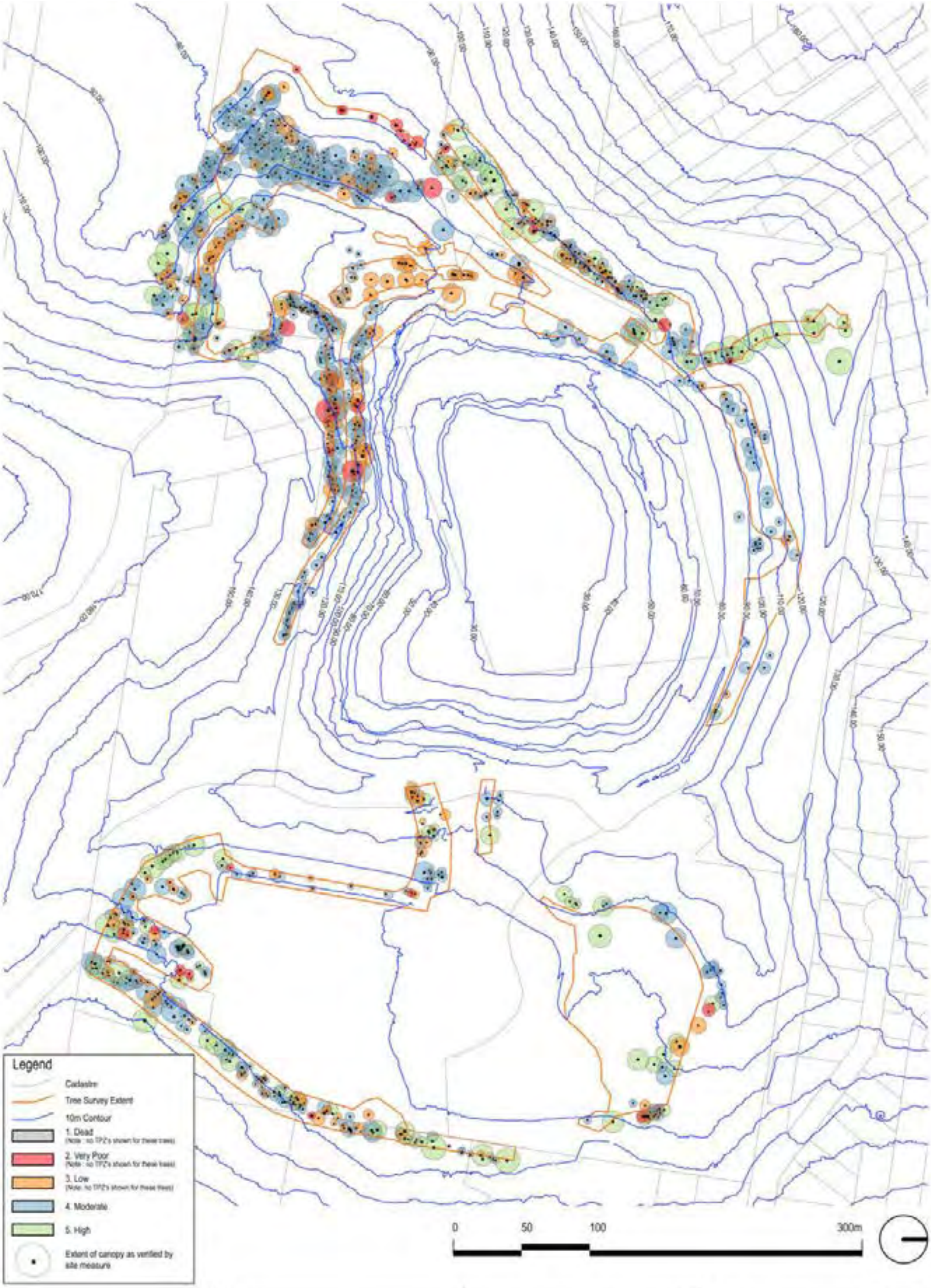

Figure 14 – Condition Value Rating Plan - Overview plan illustrating the general arrangement of trees that were surveyed and their relative Condition Value Rating. (Source: Arterra) [Note: this information is presented in the appendix via more detailed plans, including tree ID numbers.]

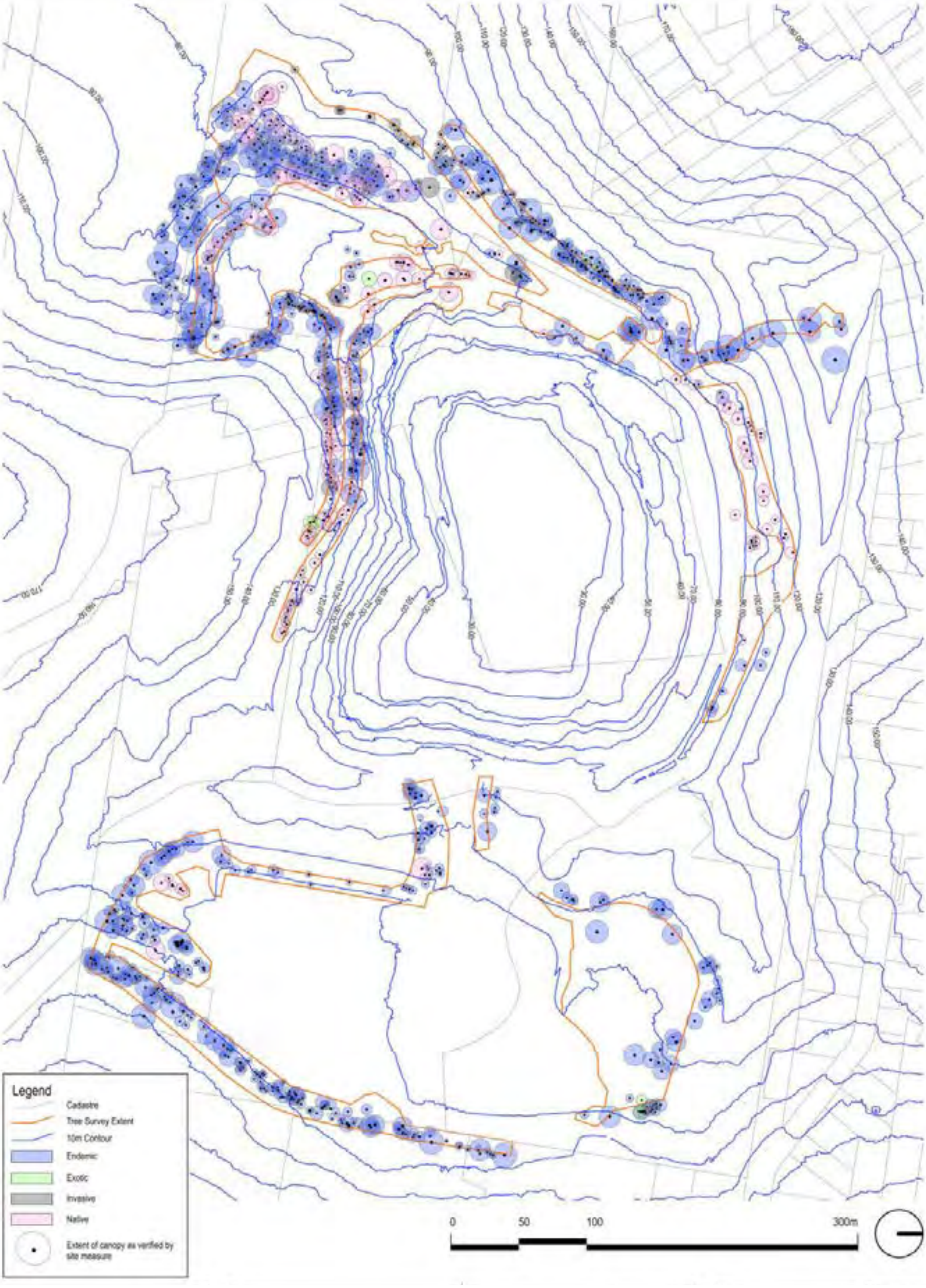

Figure 15 – Tree Origins Plan - Overview plan illustrating the general arrangement of trees that were surveyed and whether they are endemic to the site, general Australian native species or other exotic or invasive species. (Source: Arterra) [Note: this information is presented in the appendix via more detailed plans, including tree ID numbers.]

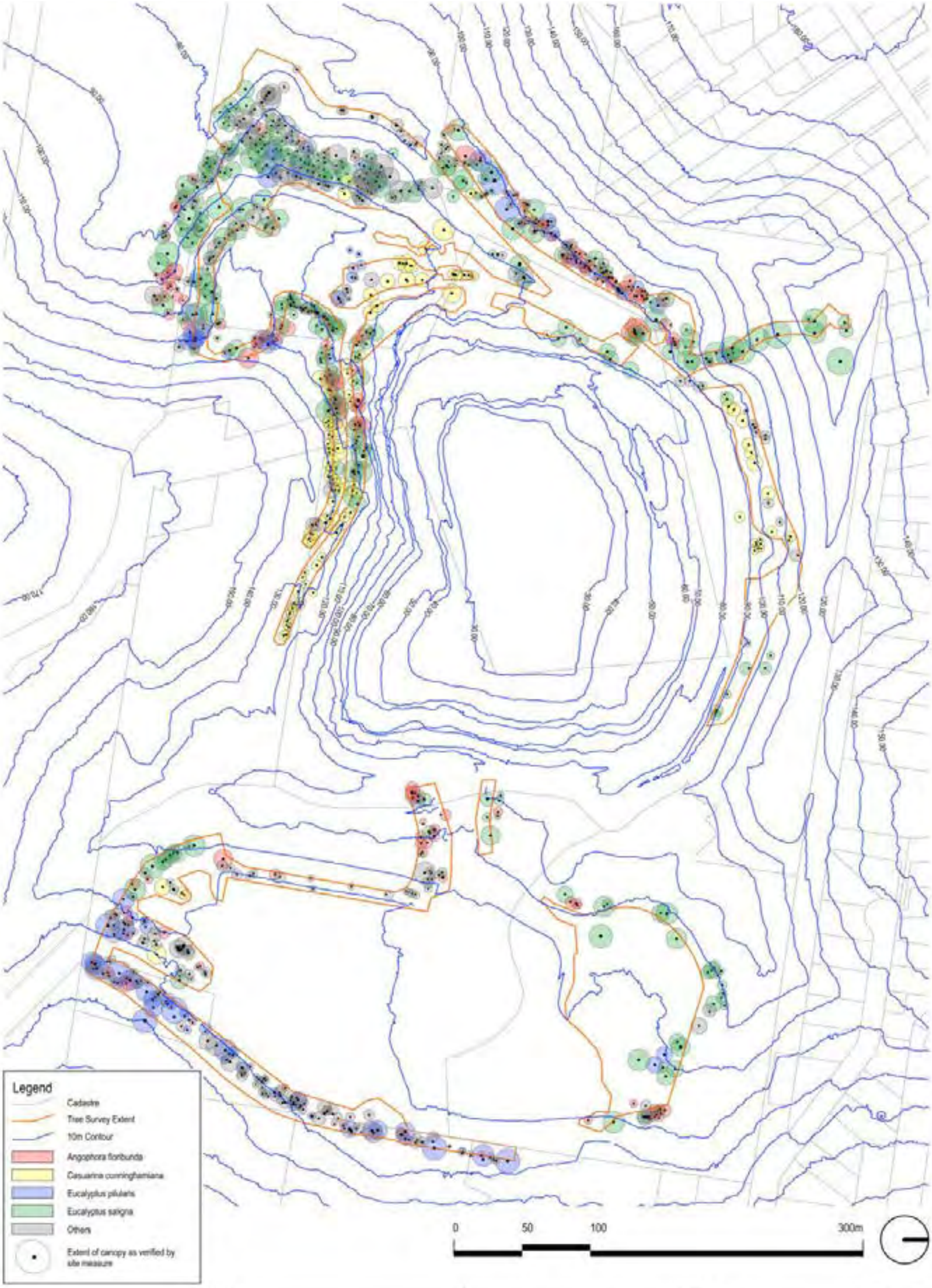

Figure 16 – Tree Species Distribution Plan - Overview plan illustrating the general arrangement of trees that were surveyed and the relative location of the primary species. (Source: Arterra) [Note: this information is presented in the appendix via more detailed plans, including tree ID numbers.]

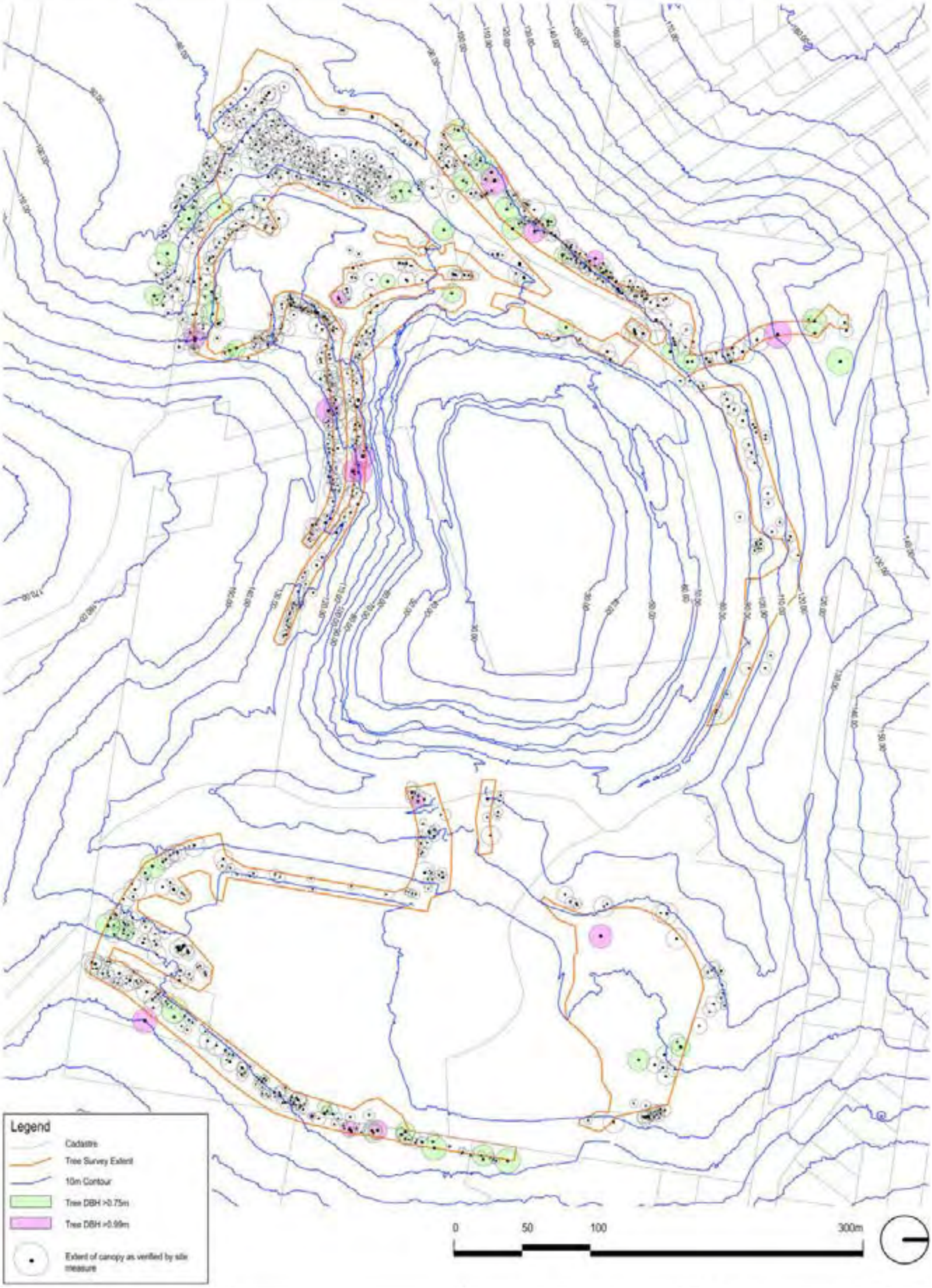

Figure 17 – Significant / Large Tree Plan - Overview plan highlighting the location of the particularly large and significant trees that were recorded. (Source: Arterra) [Note: this information is presented in the appendix via more detailed plans, including tree ID numbers.]

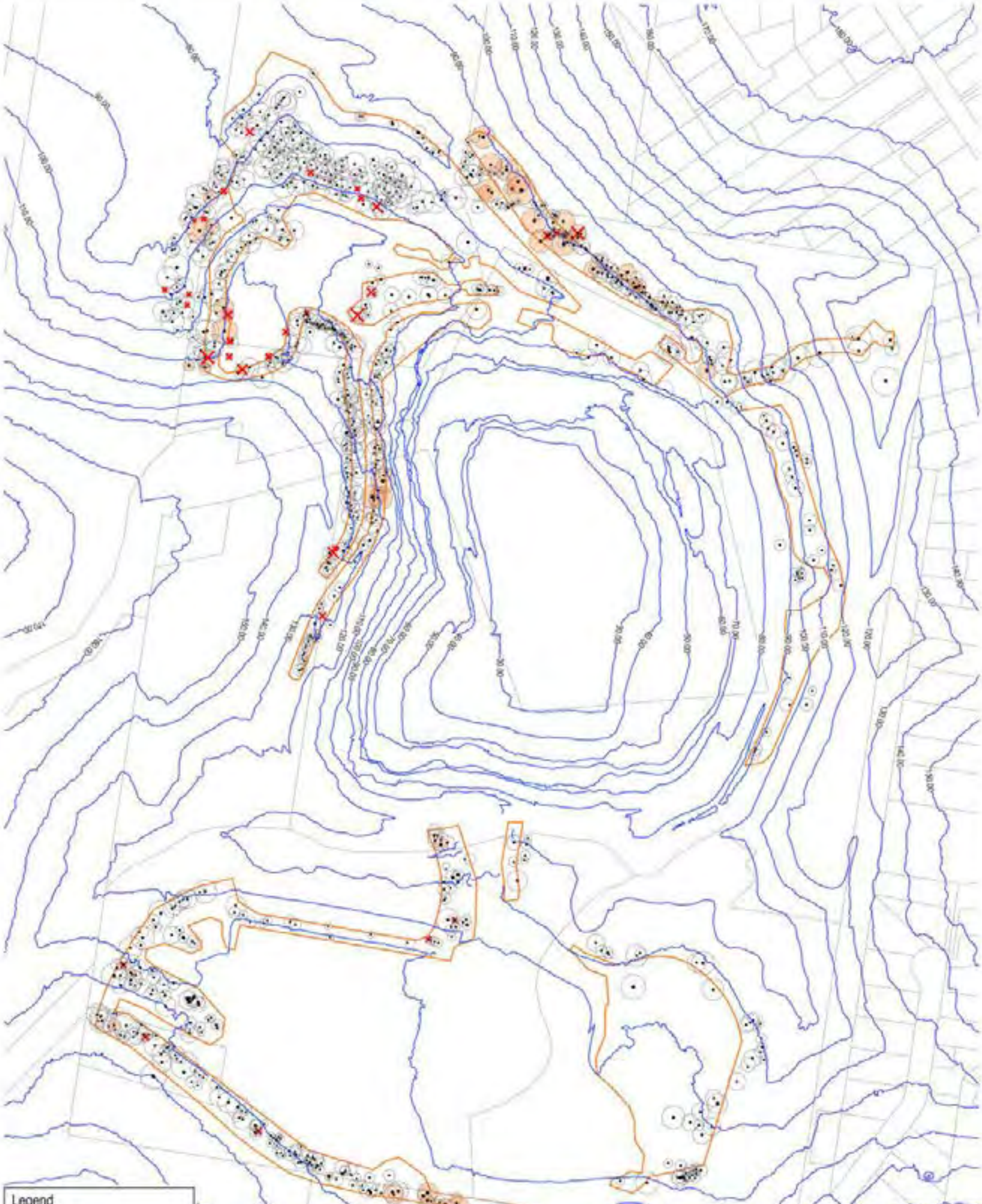

Figure 18 – Habitat Value Trees and Dead Trees - Overview plan highlighting the location of tree considered to provide habitat value plus also the location of dead trees. Note these two categories can and often do overlap, although not all dead trees provide habitat. (Source: Arterra) [Note: this information is presented in the appendix via more detailed plans, including tree ID numbers.]

Table 6 - Population by Age Class

Age Class	Number of Trees	% of Population
Mature	848	84%
Semi-mature	84	8%
Over-mature	33	3%
Senescent	3	<1%
Dead	37	4%
Total Population	**1005**	**100.00%**

2.3 Tree Biology and Tree Care Basics

Trees are dynamic living organisms. Trees can be very susceptible to damage, stress and declining rapidly if overly impacted by construction. Trees take decades to grow but can be injured and killed in a very short time frame. This is particularly due to the irreparable damage to the often shallow, extensive and unseen root systems. It is rarely possible to repair a stressed or damaged tree, after the damage has occurred. Proper protection is the key. Severing of roots within the Structural Root Zone (SRZ) can also lead to potentially unsafe instability of the tree as a structure.

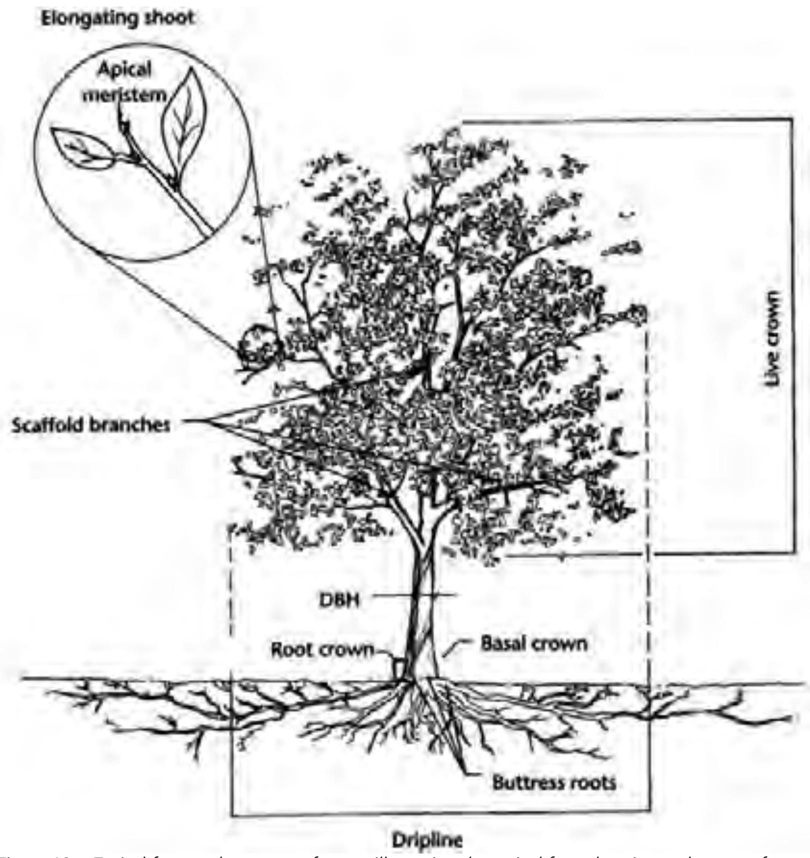

Figure 19 – Typical form and structure of a tree illustrating the typical form, location and extent of root growth (Source: Matheny and Clark, 1998)

<u>Basic Tree Needs</u>

As a living organism a tree remains alive by completing the following chemical reaction -

Carbon Dioxide and water in combination with chlorophyll and light is converted to Glucose and Oxygen [CO_2 + H_2O + light = sugar (CH_2O [Glucose]) + O_2]

The process ultimately leads to the plant cells 'respiring' and producing energy for survival, a natural requirement for all living cells. Anything that affects a plant's photosynthesis and then cellular respiration will affect the overall plant health. The limiting factors of photosynthesis and respiration will typically be the availability of oxygen, water and nutrients, which make up the important chemical molecules and reactions.

Trees therefore have five basic requirements to survive and successfully grow:-

1. Oxygen (and particularly oxygen within the soil);
2. Water (a cellular necessity and primarily taken up by the tree roots);

3. Light & Sufficient Foliage (in order to photosynthesise and create the resources needed for cellular survival);
4. Soil (for physical anchorage and critical chemical nutrients) and
5. Physical Space (both above and below ground to grow).

Importantly, a minimum of 15% soil oxygen is required for active root growth and nutrient uptake. Less than 10% available soil oxygen starts to restrict root extension and growth and a minimum of 3% soil oxygen is required to just maintain root existence. Less than this will result in root death (Harris 1999).

One of the most insidious affects of construction on trees is often that of soil compaction or covering of root zones with impervious surfaces, as it:-

- Reduces infiltration rates of surface water;
- Reduces the availability of water to the roots as they can't naturally extract remaining moisture when soil becomes too dry;
- Reduces air to roots (roots cease to function properly and die without oxygen);
- Increased soil strength caused by compaction mean that roots need more energy to growth through it or can't even physically penetrate the soil;
- Roots are physically broken or crushed and there is increased potential for fungal and pathogen attack. (Harris 1999).

Tree Tolerance

Typically older and larger trees are less tolerant of construction impacts. Different species also have different tolerance of injury and disturbance. Importantly it needs to be stressed, that a tree does not "heal" from injury as animals do. Typically any injury made to a tree results in the tree expending considerable energy reserves to create new growth that "seals" and surrounds a wound and then attempting to compensate structurally and physically for any losses. Impacts to trees are therefore cumulative and a series of otherwise small and unrelated impacts can easily result in the death of a tree.

A tree that is already compromised or showing signs of stress is far less likely to tolerate construction impacts due to its lower levels of energy reserves and already weakened state. Therefore a tree that is only in a fair condition or poor condition is less likely to tolerate construction impacts than a young tree in good or excellent condition.

Weakened or stressed trees are also far less able to combat the myriad of normal environmental stresses and pathogens that are naturally imposed against them such as drought, decay, fungi, bacteria and insect pests.

2.4 Potential Tree Related Impacts to be Managed During Future Construction

The main potential impacts from the potential and proposed construction activity can be summarised as tree damage and 'reduced life expectancy' caused by:-

- Root loss and disturbance due to site excavations;
- Compaction of the root zone from filling or storage and stockpiling of materials;
- Contamination of the soil from; the preparation of chemicals, wash down/ cleaning of equipment, refuelling of vehicles and dumping of waste;
- Compaction of the root zone from haul roads and the parking of vehicles/ plant equipment;
- Root disturbance from cut and fill and soil level changes;
- Physical damage to the tree trunks and branches from passing machinery;
- Damage to the tree roots from landscaping and pedestrian pathway construction.

The following Section provides some recommendations with regard to tree retention and proposed measures that aim to minimise and avoid these impacts as much as realistically possible.

3.0 FINDINGS AND CONCLUSIONS

3.1 Nominal Tree Protection Zones

The nominal tree protection zones have been calculated for all the trees on the site. These zones have been calculated based on the Australian Standard 4970 – Protection of Trees on Development Sites. At this stage they have been depicted as simple circles centred on the trunks of the trees and depicted graphically on the tree inventory plans for the 'high' and 'moderate' condition rating trees only.

It is important to note that where a tree is located adjacent to or near elements such as much larger existing trees or retaining walls, very steep embankments, rock outcrops etc. the TPZ and SRZ may have to be adjusted to compensate for the likelihood of there being little root development into these constrained areas. Any adjusted TPZ for each tree should be offset from the constraining element, to an approximately equal area, to more accurately represent the likely extent of tree roots. This level of assessment has not been possible, or feasible, given the numbers of trees being assessed and the currently unknown nature of the likely tree removals and bulk earthworks.

Encroachments and deviations within the nominal tree protection zones may be considered. It should be noted however that:-

- Minor encroachments of less than 10% would be acceptable but should typically involve compensatory areas applied elsewhere contiguous to the remaining TPZ;
- Major encroachments may necessitate the need for a much more indepth inspection of the particular tree(s) and potentially non-destructive investigations of root extents to justify the proposed incursion;
- Above ground encroachments may also need to consider the impact and loss of any branches and foliage;
- Incursions into the Structural Root Zone will typically <u>not</u> be allowed and it would be difficult to justify that level of incursion without extraordinary building techniques being employed and/or rigorous investigation of the tree root zone.

It is important to note that for many of the trees observed, traditional and nominal Tree Protection Zones may not strictly apply, as they would normally for more traditional forest trees or urban parkland trees. Many trees are growing in rather extreme and very disturbed environments. Others are also growing in naturally rocky conditions with minimal soils, that is common for this type of geology, and therefore root developments can be very 'atypical'. For example, trees growing in a very rocky or cliff like surroundings may have roots that are totally to one side of the tree and expanding throughout extensive rock crevices and fissures. The extent and nature of the root development in this environment would be very difficult to predict.

Figure 20 – Photo illustrating tree root development in extreme environments such as on cliffs or steep embankments may be very atypical and not confirm to normal circular and nominal TPZs. Once the exact nature or earthworks and disturbances are known it may be necessary to undertake more site specific analysis of individual trees that are desired to be retained and protected. (Photo: Arterra 25/7/19)

Likewise, trees that are growing on very steep land may develop root systems that are extremely biased towards upslope directions, to facilitate tree stability, and there may be very little structural root development on the less structurally important, downslope side of the tree.

It was also noted during field assessments that some trees may be growing in, or next to historically constructed or 'filled' gullys or adjacent to more recent erosion areas and large washouts. In these instance, the root development may need to be far more carefully assessed once the desired earthworks and nature and direction of disturbance is known. For example, trees may have developed very one side root plates or ones that may be very easily undermined and subject to structural failure. It may be possible to undertake earthworks much closer to some of these trees than would normally be allowed, particularly if it involves careful and judicious removal of rocks or spoil that may have been placed after the tree had initially started to establish.

In summary, the starting position for a tree to be retained should be to ensure work is undertaken well outside its 'nominal' tree protection zone. If it is required to undertake disturbances closer to some important trees, it may be necessary to conduct more detailed arboricultural assessments and reviews base on the specific site conditions surrounding those trees. Typically, it will be far more critical to avoid disturbance on the upslope side of trees when they are located on steep embankments.

3.2 Key Recommendations to Reduce Potential Tree Impacts

The actual tree protection measures required to be imposed on the site cannot be fully explored until the nature and extent of the development and proposed earthworks is fully known. The following broad guidelines can be given as an indication of the likely measures that will be required to retain and protect trees that may be outside the disturbance zone or adjacent to the work area.

<u>Design and Realistic Expectations</u>
The best tree protection measure is to consider the retention and physical requirements of the trees to be retained during the design period for the project. Most importantly a tree to be retained should be given the appropriate space to grow and continue to develop and prosper for many years to come. As much as possible, all work, including bulk earthworks, road construction, trenching and landscaping should be avoided within the identified TPZs. Where an incursion is required, this should be limited and appropriate compensatory areas applied elsewhere, that are contiguous to the remaining TPZ.

Where adequate protection is not possible, or is unlikely to be rigorously defended by the client and their contractors, then serious thought should be given to removing the tree and ultimately replacing it with new tree planting at the completion of the development. This is preferable to wasting time, resources and development energy on retaining a tree that will almost inevitably decline and die, or that may become structural unstable.

<u>Clearing and Removal of Trees to be Removed</u>
Removal and clearing of existing trees should be done by a suitably qualified and experience arborist. Care should be taken to avoid impact or damage to other surrounding trees throughout the process. Existing stumps should be grubbed out or ground in a controlled fashion to remove wood that may decay and promote unwanted pathogens.

<u>Tree Protection and Exclusion Fencing</u>
Prior to any major works, including demolition and bulk grading, a rigid temporary 1.8m high metal "Tree Protection Fence" with adequate lateral bracing and signage shall typically be installed to demarcate and restrict access to all identified tree protections zones. No unauthorised access should be permitted within this zone once the fence is erected. No stockpiling, excavation, trenching or material storage should be allowed in this area.

If work is required with in a TPZ, this work should be done with small tracked equipment or by hand, with care to limit damage and disturbance of the root zone. All work within TPZ zones should be supervised and overseen by a qualified AQF5arborist.

<u>Controlled Construction Access & Ground Protection</u>
Construction access points and stockpiling and storage areas shall be clearly identified and fenced where appropriate. Uncontrolled access points and parking of vehicles on site is to be avoided. Parking around the shade of existing trees is a common practice for many Contractors and unless controlled can lead to unexpected damage to trees that were thought to be well away from the works areas. If access is required through a tree protection zone, the access way shall be mulched with 100mm of hardwood woodchip with rumble boards or other suitable rigid plating laid down over the mulch to limit soil compaction and root disturbance.

<u>Clearance Pruning</u>
Pruning of retained trees should typically be avoided. If there is need for pruning of the tree canopies to facilitate machinery access or proposed building encroachments, this pruning should only be done by a qualified arborist and strictly in accordance with AS 4373-2007 Pruning of Amenity Trees.

<u>Communication - Tool Box Meetings and Construction Inductions</u>
All contractors and subcontractors should be properly inducted prior to working on the site. All inductions shall include description and identification of the sites Tree Protection Zones and the restriction on work and activities with regard to site trees. The site foreman shall ensure that all new staff and contractors are appropriately inducted and that brief "tool box" meetings are conducted regularly to ensure Tree Protection is maintained at the forefront

of workers' minds. A nominated representative should be appointed with the responsibility of regularly checking and maintaining the tree protection measures in site.

3.3 References

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- End of report.

4.0 APPENDICES

4.1 Hornsby Quarry - Tree Assessment Schedule

Hornsby Quarry - Tree Assessment Schedule

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
1	1		*Eucalyptus pilularis*	Blackbutt	22.5	15.0	0.55	0.62	6.60	2.71	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
2	1		*Eucalyptus pilularis*	Blackbutt	22.0	15.0	0.50	0.60	6.00	2.67	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
3	1		*Eucalyptus pilularis*	Blackbutt	20.5	17.0	0.65	0.78	7.80	2.98	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	
4	1		*Angophora costata*	Smooth-barked Apple	11.0	9.0	0.18	0.21	2.16	1.72	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
5	1		*Angophora costata*	Smooth-barked Apple	12.5	8.0	0.15	0.18	2.00	1.61	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
6	1		*Eucalyptus pilularis*	Blackbutt	19.0	6.0	0.23	0.26	2.76	1.88	Semi-mature	Normal	Average		Long (>40 years)	Endemic		3 Low	Damage to trunk from 0.5-2.0m. Close to adjacent stormwater pit.
7	1		*Eucalyptus pilularis*	Blackbutt	19.0	6.0	0.25	0.28	3.00	1.94	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Adjacent to stormwater pit. Asymmetric canopy to north-west.
8	1		*Angophora costata*	Smooth-barked Apple	15.5	8.0	0.22	0.26	2.64	1.88	Semi-mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
9	1		*Angophora costata*	Smooth-barked Apple	16.0	9.0	0.28	0.30	3.36	2.00	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
10	1		*Angophora floribunda*	Rough-barked Apple	11.0	9.0	0.26	0.29	3.12	1.97	Mature	Poor	Average	Deadwood-Minor Decay-Minor Tip Dieback	Short (5-15 years)	Endemic	Small Hollows or Spouts	3 Low	
11	1		*Eucalyptus pilularis*	Blackbutt	21.0	18.0	0.66	0.75	7.92	2.93	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
12	1		*Eucalyptus pilularis*	Blackbutt	21.5	8.0	0.33	0.41	3.96	2.28	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
13	1		*Angophora costata*	Smooth-barked Apple	12.5	6.0	0.18	0.22	2.16	1.75	Semi-mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
14	1		*Angophora costata*	Smooth-barked Apple	12.5	6.0	0.20	0.25	2.40	1.85	Semi-mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
15	1		*Angophora floribunda*	Rough-barked Apple	17.5	12.0	0.24	0.31	2.88	2.02	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
16	1		*Eucalyptus pilularis*	Blackbutt	23.0	15.0	0.60	0.80	7.20	3.01	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
17	1		*Allocasuarina littoralis*	Black She-Oak	9.0	6.0	0.17	0.23	2.04	1.79	Over-mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy	Short (5-15 years)	Endemic		3 Low	Near road edge.
18	1		*Allocasuarina littoralis*	Black She-Oak	9.0	6.0	0.17	0.22	2.04	1.75	Over-mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy Lean-Minor	Short (5-15 years)	Endemic		3 Low	Near road edge. Growing out of embankment.
19	1		*Allocasuarina littoralis*	Black She-Oak	7.0	5.0	0.18	0.20	2.16	1.68	Over-mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy	Short (5-15 years)	Endemic		3 Low	Near road edge. Growing out of embankment.
20	1		*Eucalyptus pilularis*	Blackbutt	15.0	11.0	0.23	0.27	2.76	1.91	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
21	1		*Allocasuarina littoralis*	Black She-Oak	8.0	6.0	0.15	0.19	2.00	1.65	Dead	Dead	Average	Deadwood-Minor	Remove (<5 years)	Endemic		1 Dead	
22	1		*Eucalyptus pilularis*	Blackbutt	18.0	15.0	0.55	0.55	6.60	2.57	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
23	1		*Eucalyptus pilularis*	Blackbutt	16.5	13.0	0.52	0.60	6.24	2.67	Over-mature	Poor	Poor	Deadwood-Major Decay-Minor Termites Tip Dieback	Medium (15-40 years)	Endemic		3 Low	Central leader dead
24	1		*Eucalyptus pilularis*	Blackbutt	13.0	7.0	0.29	0.33	3.48	2.08	Semi-mature	Normal	Poor	Asymmetric Canopy Co-dominant Stems Deadwood-Minor Inclusions	Long (>40 years)	Endemic		4 Moderate	
25	1		*Eucalyptus pilularis*	Blackbutt	14.0	6.0	0.19	0.26	2.28	1.88	Semi-mature	Good	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	At base of embankment.
26	1		*Allocasuarina littoralis*	Black She-Oak	6.5	6.0	0.15	0.30	2.00	2.00	Mature	Fair	Poor	Deadwood-Minor	Short (5-15 years)	Endemic		3 Low	Growing out of embankment.
27	1		*Eucalyptus pilularis*	Blackbutt	18.5	14.0	0.40	0.48	4.80	2.43	Mature	Good	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
28	1		*Eucalyptus pilularis*	Blackbutt	22.0	18.0	1.29	1.34	15.00	3.74	Mature	Good	Average	Co-dominant Stems Branch Tearouts Deadwood-Major	Long (>40 years)	Endemic		5 High	Major tree with carved rock bath at the base to south-eastern side.
29	1		*Eucalyptus pilularis*	Blackbutt	17.0	6.0	0.18	0.26	2.16	1.88	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment.
30	1		*Eucalyptus pilularis*	Blackbutt	18.0	11.0	0.27	0.34	3.24	2.10	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy to west.
31	1		*Eucalyptus pilularis*	Blackbutt	16.5	7.0	0.15	0.22	2.00	1.75	Mature	Normal	Average	Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy and lean to west.
32	1		*Eucalyptus pilularis*	Blackbutt	21.0	19.0	0.99	1.11	11.88	3.46	Mature	Fair	Average	Co-dominant Stems Deadwood-Minor Decay-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy and lean to west.
33	1		*Eucalyptus pilularis*	Blackbutt	16.0	7.0	0.19	0.26	2.28	1.88	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy to west.
34	1		*Eucalyptus pilularis*	Blackbutt	17.0	7.0	0.23	0.29	2.76	1.97	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy to west.
35	1		*Angophora costata*	Smooth-barked Apple	11.0	8.0	0.23	0.29	2.76	1.97	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Growing on rock shelf.
36	1		*Eucalyptus pilularis*	Blackbutt	12.0	6.0	0.16	0.20	2.00	1.68	Semi-mature	Normal	Average	Lean-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
37	1		*Angophora floribunda*	Rough-barked Apple	10.0	5.0	0.22	0.28	2.64	1.94	Mature	Fair	Average	Deadwood-Minor Tip Dieback Co-dominant Stems	Long (>40 years)	Endemic		3 Low	Multi-trunk from base. In embankment.
38	1		*Eucalyptus pilularis*	Blackbutt	15.5	9.0	0.30	0.37	3.60	2.18	Mature	Normal	Average	Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy to west.
39	1		*Angophora costata*	Smooth-barked Apple	15.0	13.0	0.43	0.50	5.16	2.47	Mature	Good	Good	Deadwood-Major	Long (>40 years)	Endemic		5 High	
40	1		*Angophora costata*	Smooth-barked Apple	17.5	15.0	0.67	0.77	8.04	2.97	Mature	Fair	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Sparse canopy.
41	1		*Eucalyptus pilularis*	Blackbutt	17.0	16.0	0.64	0.75	7.68	2.93	Mature	Good	Poor	Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	
42	1		*Eucalyptus pilularis*	Blackbutt	12.0	6.0	0.16	0.21	2.00	1.72	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy to west.
43	1		*Syncarpia glomulifera*	Turpentine	12.0	6.0	0.24	0.30	2.88	2.00	Mature	Fair	Poor	Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		4 Moderate	Canopy to south.
44	1		*Angophora costata*	Smooth-barked Apple	16.5	14.0	0.54	0.65	6.48	2.76	Mature	Fair	Good	Deadwood-Major Tip Dieback Termites	Long (>40 years)	Endemic		5 High	Sparse canopy. Basal wounding. Historical termite mudding.
45	1		*Eucalyptus pilularis*	Blackbutt	17.0	8.0	0.24	0.29	2.88	1.97	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing out of embankment. Canopy to west.
46	1		*Eucalyptus pilularis*	Blackbutt	17.0	8.0	0.24	0.33	2.88	2.08	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
47	1		*Eucalyptus resinifera*	Red Mahogany	18.0	8.0	0.34	0.44	4.08	2.34	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
48	1		*Eucalyptus resinifera*	Red Mahogany	16.5	8.0	0.30	0.39	3.60	2.23	Mature	Poor	Poor		Long (>40 years)	Endemic		3 Low	
49	1		*Syncarpia glomulifera*	Turpentine	13.5	6.0	0.24	0.35	2.88	2.13	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
50	1		*Banksia serrata*	Old Man Banksia	13.5	6.0	0.20	0.27	2.40	1.91	Dead	Dead	Poor	Termites	Remove (<5 years)	Endemic		1 Dead	
51	1		*Banksia serrata*	Old Man Banksia	8.5	5.0	0.26	0.29	3.12	1.97	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Growing out of cliff base. Good tree.
52	1		*Syncarpia glomulifera*	Turpentine	10.0	5.0	0.19	0.24	2.28	1.82	Semi-mature	Good	Good		Long (>40 years)	Endemic		4 Moderate	
53	1		*Syncarpia glomulifera*	Turpentine	10.0	5.0	0.21	0.35	2.52	2.13	Semi-mature	Good	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	Multitrunked, historically felled or failed from base, resprouting with 5-6 trunks.
54	1		*Exocarpus cupressiformis*	Ballart	10.0	5.0	0.23	0.23	2.76	1.79	Mature	Fair	Poor	Lean-Major	Short (5-15 years)	Endemic		3 Low	Very chlorotic foliage, lean towards west. probably displaced by failed Turpentine adjacent trunk. Growing out of base of T52
55	1		*Angophora floribunda*	Rough-barked Apple	10.0	5.0	0.24	0.30	2.88	2.00	Semi-mature	Good	Average	Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Minor lean and butt sweep at base.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
56	1		*Angophora costata*	Smooth-barked Apple	8.5	5.0	0.18	0.28	2.16	1.94	Semi-mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	Growing out of near vertical cliff.
57	1		*Eucalyptus resinifera*	Red Mahogany	10.5	5.0	0.17	0.24	2.04	1.82	Semi-mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	
58	1		*Syncarpia glomulifera*	Turpentine	7.0	5.0	0.24	0.29	2.88	1.97	Mature	Good	Average	Epicormic Growth Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	Growing out of near vertical cliff. Previously topped for clearing SSM.
59	1		*Banksia serrata*	Old Man Banksia	9.0	5.0	0.32	0.32	3.84	2.05	Mature	Good	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic		5 High	Growing on top of rock shelf.
60	1		*Eucalyptus pilularis*	Blackbutt	7.0	5.0	0.18	0.30	2.16	2.00	Semi-mature	Fair	Poor	Epicormic Growth	Long (>40 years)	Endemic		3 Low	Growing out of near vertical cliff. Previously topped for clearing sightlines to SSM.
61	1		*Angophora costata*	Smooth-barked Apple	11.0	6.0	0.20	0.24	2.40	1.82	Mature	Fair	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west.
62	1		*Allocasuarina littoralis*	Black She-Oak	7.0	6.0	0.17	0.23	2.04	1.79	Over-mature	Normal	Average	Lean-Minor Deadwood-Minor	Short (5-15 years)	Endemic		3 Low	Asymmetric to south-west.
63	1		*Allocasuarina littoralis*	Black She-Oak	8.5	7.0	0.18	0.24	2.16	1.82	Mature	Fair	Poor	Asymmetric Canopy Lean-Minor Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to south-west.
64	1		*Allocasuarina littoralis*	Black She-Oak	9.5	7.0	0.17	0.24	2.04	1.82	Mature	Fair	Poor	Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	
65	1		*Eucalyptus pilularis*	Blackbutt	19.0	7.0	0.33	0.40	3.96	2.25	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Good tree.
66	1		*Allocasuarina torulosa*	Forest Oak	11.5	8.0	0.22	0.32	2.64	2.05	Mature	Good	Good		Medium (15-40 years)	Endemic		5 High	
67	1		*Angophora costata*	Smooth-barked Apple	14.0	8.0	0.27	0.32	3.24	2.05	Mature	Fair	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to west
68	1		*Angophora costata*	Smooth-barked Apple	17.5	9.0	0.46	0.46	5.52	2.39	Mature	Normal	Average	Branch Tearouts Deadwood-Minor Termites	Long (>40 years)	Endemic		4 Moderate	
69	1		*Banksia serrata*	Old Man Banksia	10.5	6.0	0.30	0.34	3.60	2.10	Mature	Fair	Average	Deadwood-Minor Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south-west.
70	1		*Allocasuarina torulosa*	Forest Oak	14.0	5.0	0.16	0.22	2.00	1.75	Mature	Good	Good		Medium (15-40 years)	Endemic		5 High	
71	1		*Eucalyptus resinifera*	Red Mahogany	22.0	9.0	0.38	0.46	4.56	2.39	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
72	1		*Eucalyptus pilularis*	Blackbutt	19.0	8.0	0.26	0.34	3.12	2.10	Mature	Good	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Good tree.
73	1		*Syncarpia glomulifera*	Turpentine	15.5	7.0	0.22	0.28	2.64	1.94	Mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	Good tree.
74	1		*Syncarpia glomulifera*	Turpentine	18.0	8.0	0.47	0.57	5.64	2.61	Mature	Good	Average	Inclusions Co-dominant Stems	Long (>40 years)	Endemic		5 High	Good tree.
75	1		*Allocasuarina torulosa*	Forest Oak	14.0	6.0	0.23	0.35	2.76	2.13	Mature	Good	Average	Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Substantial wound to base to east. Asymmetric to west.
76	1		*Eucalyptus pilularis*	Blackbutt	23.0	12.0	0.60	0.62	7.20	2.71	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good tree.
77	1		*Angophora costata*	Smooth-barked Apple	17.0	9.0	0.43	0.53	5.16	2.53	Mature	Poor	Poor	Asymmetric Canopy Deadwood-Major	Medium (15-40 years)	Endemic		3 Low	Very asymmetric to west.
78	1		*Syncarpia glomulifera*	Turpentine	15.5	5.0	0.22	0.32	2.64	2.05	Mature	Good	Average	Inclusions	Long (>40 years)	Endemic		4 Moderate	
79	1		*Syncarpia glomulifera*	Turpentine	15.0	6.0	0.27	0.33	3.24	2.08	Mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	
80	1		*Eucalyptus pilularis*	Blackbutt	15.0	6.0	1.15	1.25	13.80	3.63	Over-mature	Moribund	Average	Branch Tearouts Epicormic Growth Tip Dieback Deadwood-Major	Short (5-15 years)	Endemic	Stag Creation Potential	2 Very Poor	Really only one lower major branch to west remaining alive. Could be good wild life stag candidate.
81	1		*Allocasuarina torulosa*	Forest Oak	14.0	6.0	0.27	0.32	3.24	2.05	Mature	Good	Average	Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Wound to base to east. Asymmetric to west.
82	1		*Angophora costata*	Smooth-barked Apple	19.0	10.0	0.90	0.90	10.80	3.17	Mature	Fair	Average	Asymmetric Canopy Deadwood-Major	Medium (15-40 years)	Endemic		4 Moderate	Very asymmetric to west. Sparse foliage
83	1		*Angophora costata*	Smooth-barked Apple	19.0	10.0	0.40	0.52	4.80	2.51	Mature	Poor	Average	Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	Very sparse foliage.
84	1		*Allocasuarina torulosa*	Forest Oak	10.5	5.0	0.21	0.26	2.52	1.88	Mature	Fair	Average	Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Wound to base to east. Asymmetric to west.
85	1		*Allocasuarina torulosa*	Forest Oak	12.0	7.0	0.26	0.37	3.12	2.18	Mature	Fair	Average	Asymmetric Canopy Decay-Minor Lean-Major Termites	Medium (15-40 years)	Endemic		3 Low	Major wounding to base to south-east. Asymmetric to west.
86	1		*Angophora floribunda*	Rough-barked Apple	12.0	6.0	0.17	0.24	2.04	1.82	Semi-mature	Fair	Average	Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west.
87	1		*Eucalyptus pilularis*	Blackbutt	22.0	12.0	1.00	1.20	12.00	3.57	Mature	Fair	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	Growing against boulder.
88	2		*Syncarpia glomulifera*	Turpentine	14.0	5.0	0.28	0.70	3.36	2.85	Mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	
89	1		*Angophora costata*	Smooth-barked Apple	9.0	5.0	0.15	0.22	2.00	1.75	Semi-mature	Fair	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric canopy to west.
90	1		*Angophora costata*	Smooth-barked Apple	13.0	7.0	0.27	0.31	3.24	2.02	Mature	Fair	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric canopy to west.
91	1		*Allocasuarina torulosa*	Forest Oak	13.5	7.0	0.32	0.44	3.84	2.34	Mature	Fair	Average	Asymmetric Canopy Tip Dieback	Medium (15-40 years)	Endemic		3 Low	Asymmetric to west.
92	1		*Allocasuarina torulosa*	Forest Oak	8.5	7.0	0.23	0.26	2.76	1.88	Mature	Good	Poor	Epicormic Growth Branch Tearouts	Medium (15-40 years)	Endemic		3 Low	Historically broken leader at 2.0m. Canopy now regrowth.
93	1		*Syncarpia glomulifera*	Turpentine	16.0	8.0	0.52	0.57	6.24	2.61	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Very asymmetric canopy to west.
94	1		*Allocasuarina torulosa*	Forest Oak	13.0	6.0	0.22	0.27	2.64	1.91	Mature	Fair	Average	Asymmetric Canopy Tip Dieback	Medium (15-40 years)	Endemic		3 Low	Asymmetric to west.
95	1		*Pittosporum undulatum*	Sweet Pittosporum	12.5	7.0	0.42	0.42	5.04	2.30	Mature	Normal	Average	Decay-Minor Termites	Medium (15-40 years)	Endemic		4 Moderate	
96	1		*Syncarpia glomulifera*	Turpentine	16.0	8.0	0.55	0.55	6.60	2.57	Mature	Fair	Average	Decay-Minor Deadwood-Minor Termites Co-dominant Stems Inclusions	Medium (15-40 years)	Endemic		3 Low	Major cambial dysfunction to south and fungal fruitiong bodes noted to southern trunk.
97	1		*Eucalyptus pilularis*	Blackbutt	37.0	14.0	0.82	0.97	9.84	3.27	Mature	Fair	Average	Termites Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	
98	1		*Syncarpia glomulifera*	Turpentine	20.0	14.0	0.59	0.63	7.08	2.73	Mature	Fair	Average	Termites Deadwood-Major	Long (>40 years)	Endemic	Basal Hollow	4 Moderate	Major hollow from base to 3.5m on east.
99	1		*Eucalyptus pilularis*	Blackbutt	37.0	14.0	1.03	1.10	12.36	3.44	Mature	Normal	Good	Termites Deadwood-Major	Long (>40 years)	Endemic		5 High	
100	1		*Allocasuarina littoralis*	Black She-Oak	12.5	7.0	0.27	0.34	3.24	2.10	Mature	Fair	Average	Asymmetric Canopy Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to west.
101	1		*Angophora floribunda*	Rough-barked Apple	18.5	9.0	0.50	0.65	6.00	2.76	Mature	Poor	Average	Termites Deadwood-Major	Medium (15-40 years)	Endemic		3 Low	Sparse canopy. Termite mudding and chamber at first fork at 8.0m.
102	1		*Eucalyptus pilularis*	Blackbutt	36.0	14.0	0.93	1.09	11.16	3.43	Mature	Normal	Good	Termites Branch Tearouts	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
103	1		*Eucalyptus pilularis*	Blackbutt	25.0	9.0	0.56	0.68	6.72	2.81	Mature	Normal	Good	Termites Branch Tearouts	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
104	1		*Syncarpia glomulifera*	Turpentine	16.0	6.0	0.27	0.34	3.24	2.10	Mature	Normal	Good	Termites Branch Tearouts	Long (>40 years)	Endemic		5 High	
105	1		*Syncarpia glomulifera*	Turpentine	20.0	8.0	0.48	0.54	5.76	2.55	Mature	Normal	Good	Decay-Minor Cavity	Long (>40 years)	Endemic	Basal Hollow	5 High	Basal hollow
106	1		*Allocasuarina littoralis*	Black She-Oak	15.0	7.0	0.20	0.27	2.40	1.91	Mature	Good	Good	Asymmetric Canopy	Medium (15-40 years)	Endemic		5 High	Asymmetric to west.
107	1		*Syncarpia glomulifera*	Turpentine	25.0	8.0	0.39	0.64	4.68	2.74	Mature	Good	Good	Co-dominant Stems	Long (>40 years)	Endemic	Basal Hollow	5 High	Basal hollow
108	1		*Angophora costata*	Smooth-barked Apple	19.5	8.0	0.38	0.44	4.56	2.34	Mature	Fair	Average	Asymmetric Canopy	Long (>40 years)	Endemic	Basal Hollow	4 Moderate	Very asymmetric to west.
109	1		*Eucalyptus pilularis*	Blackbutt	33.0	18.0	0.87	0.99	10.44	3.30	Mature	Good	Good	Termites Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Large Hollow	5 High	Excellent tree.
110	1		*Allocasuarina torulosa*	Forest Oak	6.0	3.0	0.33	0.40	3.96	2.25	Mature	Good	Poor	Epicormic Growth	Medium (15-40 years)	Endemic		3 Low	Previously topped at 1.5m. Extensive epicormic regrowth.
111	1		*Eucalyptus pilularis*	Blackbutt	17.5	6.0	0.27	0.33	3.24	2.08	Mature	Good	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west.
112	1		*Allocasuarina torulosa*	Forest Oak	10.5	5.0	0.22	0.33	2.64	2.08	Mature	Fair	Average	Asymmetric Canopy Decay-Minor	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to west.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
113	1		*Allocasuarina torulosa*	Forest Oak	10.5	5.0	0.21	0.34	2.52	2.10	Mature	Good	Average	Asymmetric Canopy Co-dominant Stems Decay-Minor	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to west.
114	1		*Angophora floribunda*	Rough-barked Apple	12.5	5.0	0.19	0.24	2.28	1.82	Mature	Poor	Poor	Asymmetric Canopy Tip Dieback Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	Asymmetric to west, very sparse..
115	1		*Eucalyptus pilularis*	Blackbutt	35.5	16.0	0.79	0.95	9.48	3.24	Mature	Good	Average	Branch Tearouts Termites	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Asymmetric to west.
116	1		*Allocasuarina torulosa*	Forest Oak	12.5	5.0	0.20	0.26	2.40	1.88	Mature	Good	Average	Asymmetric Canopy Co-dominant Stems Decay-Minor	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to west. Basal wounding to north.
117	1		*Syncarpia glomulifera*	Turpentine	16.5	5.0	0.34	0.39	4.08	2.23	Mature	Good	Average	Branch Tearouts Inclusions	Long (>40 years)	Endemic		4 Moderate	Basal wounding to south
118	1		*Syncarpia glomulifera*	Turpentine	19.0	5.0	0.45	0.45	5.40	2.37	Mature	Good	Average	Branch Tearouts Inclusions	Long (>40 years)	Endemic		5 High	
119	1		*Eucalyptus pilularis*	Blackbutt	35.0	18.0	0.91	1.12	10.92	3.47	Mature	Good	Good	Branch Tearouts Inclusions	Long (>40 years)	Endemic		5 High	
120	1		*Angophora floribunda*	Rough-barked Apple	14.5	6.0	0.33	0.39	3.96	2.23	Mature	Normal	Good		Long (>40 years)	Endemic		4 Moderate	
121	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	16.0	0.72	0.79	8.64	3.00	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
122	1		*Angophora floribunda*	Rough-barked Apple	15.0	6.0	0.32	0.35	3.84	2.13	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	Directly in front of bike tunnel exit.
123	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	16.0	0.77	0.85	9.24	3.09	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Isolated tree in bike track area surrounded by Privet. Major rams horn feature on trunk to south-east at 3.5-5.0m
124	1		*Eucalyptus pilularis*	Blackbutt	21.0	12.0	0.47	0.62	5.64	2.71	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Isolated tree in bike track area surrounded by Privet. Good tree. Probably just outside area of scope.
125	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	17.0	1.09	1.21	13.08	3.59	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Isolated tree in bike track area surrounded by Privet.Smaller secondary trunk coming from base to north-west.
126	1		*Angophora floribunda*	Rough-barked Apple	18.0	6.0	0.32	0.39	3.84	2.23	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
127	1		*Angophora floribunda*	Rough-barked Apple	18.0	8.0	0.46	0.59	5.52	2.65	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
128	1		*Angophora floribunda*	Rough-barked Apple	18.0	8.0	0.38	0.45	4.56	2.37	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
129	1		*Eucalyptus saligna*	Sydney Blue Gum	17.0	12.0	0.35	0.42	4.20	2.30	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Isolated tree in bike track area surrounded by Privet.
130	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	14.0	0.69	0.76	8.28	2.95	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Isolated tree in bike track area surrounded by Privet.
131	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	7.0	0.24	0.28	2.88	1.94	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	Kink in trunk.
132	1		*Eucalyptus saligna*	Sydney Blue Gum	19.5	10.0	0.55	0.61	6.60	2.69	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
133	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	7.0	0.33	0.42	3.96	2.30	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
134	1		*Eucalyptus saligna*	Sydney Blue Gum	17.0	5.0	0.24	0.34	2.88	2.10	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
135	1		*Angophora floribunda*	Rough-barked Apple	18.0	7.0	0.28	0.35	3.36	2.13	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
136	1		*Eucalyptus saligna*	Sydney Blue Gum	15.0	5.0	0.19	0.21	2.28	1.72	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
137	1		*Angophora floribunda*	Rough-barked Apple	17.0	8.0	0.30	0.40	3.60	2.25	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west.
138	1		*Angophora floribunda*	Rough-barked Apple	12.0	8.0	0.28	0.39	3.36	2.23	Mature	Normal	Poor	Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		3 Low	Very asymmetric to west.
139	1		*Angophora floribunda*	Rough-barked Apple	18.0	10.0	0.27	0.30	3.24	2.00	Mature	Normal	Poor		Long (>40 years)	Endemic		3 Low	
140	1		*Angophora floribunda*	Rough-barked Apple	18.0	10.0	0.47	0.52	5.64	2.51	Mature	Normal	Average	Tip Dieback Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		5 High	Right on edge of large batter. Minor lean towards batter.
141	1		*Angophora floribunda*	Rough-barked Apple	15.0	10.0	0.23	0.30	2.76	2.00	Mature	Normal	Poor	Deadwood-Major Lean-Minor Tip Dieback	Long (>40 years)	Endemic		3 Low	Right on top edge of batter with slight lean towards east.
142	1		*Eucalyptus pilularis*	Blackbutt	19.0	10.0	1.00	1.00	12.00	3.31	Dead	Dead	Average	Deadwood-Major	Remove (<5 years)	Endemic	Stag Creation Potential Small Hollows or Spouts	3 Low	Mid very steep batter. Dead tree.
143	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	10.0	0.63	0.75	7.56	2.93	Mature	Normal	Average	Asymmetric Canopy Tip Dieback Deadwood-Major	Long (>40 years)	Endemic		5 High	Mid slope of large batter of large batter.
144	1		*Angophora floribunda*	Rough-barked Apple	14.5	8.0	0.24	0.30	2.88	2.00	Mature	Normal	Poor	Tip Dieback Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very overgrown by adjoining Camphor Laurels. Very asymmetric to north.
145	1		*Angophora floribunda*	Rough-barked Apple	20.0	8.0	0.48	0.60	5.76	2.67	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Growing on very steep batter to south of road. Good tree.
146	1		*Angophora floribunda*	Rough-barked Apple	13.0	5.0	0.19	0.25	2.28	1.85	Mature	Poor	Poor	Deadwood-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Growing on very steep batter to south of road.
147	1		*Angophora floribunda*	Rough-barked Apple	20.0	8.0	0.50	0.59	6.00	2.65	Mature	Good	Good	Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		5 High	Growing on very steep batter to south of road. Good tree. Minor lean to east.
148	2		*Eucalyptus saligna*	Sydney Blue Gum	21.0	9.0	0.60	0.70	7.20	2.85	Mature	Good	Good	Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		5 High	Growing on very steep batter to south of road. Good tree. Smaller tree growing within 1m to the south-west. Smaller tree with slight lean away to south-west. Smaller tree DBH is 0.32.
149	1		*Angophora floribunda*	Rough-barked Apple	13.0	5.0	0.16	0.18	2.00	1.61	Mature	Poor	Poor	Deadwood-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Growing on very steep batter to south of road. Lower part of slope. Very asymmetric to west. Kink in trunk at 6.0m
150	1		*Angophora floribunda*	Rough-barked Apple	14.0	8.0	0.43	0.53	5.16	2.53	Mature	Poor	Poor	Co-dominant Stems Deadwood-Major	Medium (15-40 years)	Endemic		3 Low	Growing on very steep batter to south of road. Top broken out and major dead wood.
151	1		*Angophora floribunda*	Rough-barked Apple	14.0	8.0	0.21	0.30	2.52	2.00	Mature	Poor	Poor	Lean-Minor Epicormic Growth Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	Growing on very steep batter to south of road.
152	2		*Angophora floribunda*	Rough-barked Apple	13.0	8.0	0.28	0.34	3.36	2.10	Mature	Normal	Average	Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	Group of 2. Growing on very steep batter to south of road.
153	1		*Angophora floribunda*	Rough-barked Apple	8.0	8.0	0.16	0.20	2.00	1.68	Mature	Fair	Poor	Deadwood-Minor Lean-Major Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Partial root plate failure to north.
154	1		*Eucalyptus saligna*	Sydney Blue Gum	16.5	5.0	0.28	0.35	3.36	2.13	Mature	Fair	Average	Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Major lean to north the corrected.
155	1		*Eucalyptus microcorys*	Tallowood	22.0	16.0	0.65	0.80	7.80	3.01	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	Good tree, non endemic near bike tracks.
156	1		*Syncarpia glomulifera*	Turpentine	12.0	5.0	0.23	0.23	2.76	1.79	Semi-mature	Good	Good	Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	
157	1		*Angophora floribunda*	Rough-barked Apple	14.0	4.0	0.18	0.22	2.16	1.75	Dead	Dead	Average	Co-dominant Stems Inclusions	Remove (<5 years)	Endemic		1 Dead	
158	1		*Eucalyptus botryoides*	Bangalay	15.0	8.0	0.30	0.34	3.60	2.10	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric to east.
159	1		*Syncarpia glomulifera*	Turpentine	14.5	6.0	0.31	0.38	3.72	2.20	Semi-mature	Good	Good	Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	
160	1		*Pittosporum undulatum*	Sweet Pittosporum	12.0	6.0	0.22	0.25	2.64	1.85	Mature	Good	Good		Medium (15-40 years)	Endemic		4 Moderate	Right on edge of bike track.
161	1		*Eucalyptus botryoides*	Bangalay	12.0	6.0	0.35	0.44	4.20	2.34	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
162	3		*Angophora floribunda*	Rough-barked Apple	17.0	6.0	0.36	0.45	4.32	2.37	Mature	Normal	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	Very close spaced group of 3.
163	1		*Eucalyptus saligna*	Sydney Blue Gum	17.0	7.0	0.31	0.34	3.72	2.10	Mature	Normal	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	
164	1		*Allocasuarina littoralis*	Black She-Oak	9.5	6.0	0.45	0.50	5.40	2.47	Over-mature	Fair	Average	Deadwood-Major Tip Dieback	Short (5-15 years)	Endemic		3 Low	
165	1		*Allocasuarina littoralis*	Black She-Oak	9.5	6.0	0.17	0.22	2.04	1.75	Over-mature	Fair	Poor	Tip Dieback Deadwood-Minor	Short (5-15 years)	Endemic		2 Very Poor	
166	1		*Allocasuarina littoralis*	Black She-Oak	9.5	6.0	0.26	0.31	3.12	2.02	Over-mature	Poor	Average	Tip Dieback Deadwood-Minor Lean-Minor	Short (5-15 years)	Endemic		3 Low	
167	1		*Allocasuarina littoralis*	Black She-Oak	8.0	5.0	0.16	0.22	2.00	1.75	Dead	Dead	Average	Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
168	1		*Pittosporum undulatum*	Sweet Pittosporum	11.0	7.0	0.26	0.26	3.12	1.88	Mature	Good	Average	Lean-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to north.
169	1		*Pittosporum undulatum*	Sweet Pittosporum	9.0	5.0	0.23	0.33	2.76	2.08	Mature	Good	Average	Asymmetric Canopy	Medium (15-40 years)	Endemic		4 Moderate	Right on edge of bike track.
170	1		*Acacia falcata*	Hickory Wattle	10.5	5.0	0.23	0.32	2.76	2.05	Mature	Good	Average	Lean-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Two other smaller specimens to the south-west and north-west. Small basal wound to east. Good reaction wood. Failed butt sweep at base.
171	1		*Angophora floribunda*	Rough-barked Apple	11.5	5.0	0.20	0.27	2.40	1.91	Semi-mature	Good	Average	Lean-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	
172	1		*Pittosporum undulatum*	Sweet Pittosporum	9.0	8.0	0.24	0.32	2.88	2.05	Mature	Good	Average	Co-dominant Stems	Medium (15-40 years)	Endemic		4 Moderate	
173	1		*Angophora floribunda*	Rough-barked Apple	13.0	8.0	0.40	0.50	4.80	2.47	Mature	Fair	Poor	Decay-Major Branch Tearouts	Medium (15-40 years)	Endemic		3 Low	Major central leader broken out.
174	1		*Allocasuarina littoralis*	Black She-Oak	13.0	6.0	0.25	0.30	3.00	2.00	Mature	Normal	Average	Deadwood-Minor Lean-Minor	Medium (15-40 years)	Endemic		4 Moderate	
175	1		*Allocasuarina littoralis*	Black She-Oak	12.0	6.0	0.21	0.25	2.52	1.85	Mature	Normal	Average	Deadwood-Minor Lean-Minor	Medium (15-40 years)	Endemic		4 Moderate	
176	1		*Pittosporum undulatum*	Sweet Pittosporum	9.0	8.0	0.22	0.26	2.64	1.88	Mature	Good	Average		Medium (15-40 years)	Endemic		4 Moderate	
177	1		*Allocasuarina littoralis*	Black She-Oak	12.0	6.0	0.19	0.24	2.28	1.82	Over-mature	Poor	Average	Deadwood-Minor Lean-Minor	Short (5-15 years)	Endemic		2 Very Poor	
178	1		*Pittosporum undulatum*	Sweet Pittosporum	9.0	8.0	0.24	0.33	2.88	2.08	Mature	Good	Average		Medium (15-40 years)	Endemic		4 Moderate	
179	1		*Angophora floribunda*	Rough-barked Apple	17.5	14.0	0.55	0.55	6.60	2.57	Mature	Good	Average	Co-dominant Stems Deadwood-Minor	Long (>40 years)	Endemic		5 High	
180	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	16.0	0.73	0.86	8.76	3.11	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
181	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	6.0	0.24	0.27	2.88	1.91	Mature	Fair	Average	Lean-Major Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Good row of trees just downslope of bike track.
182	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	13.0	0.64	0.68	7.68	2.81	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
183	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.48	0.56	5.76	2.59	Mature	Good	Average	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
184	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.34	0.40	4.08	2.25	Mature	Good	Average	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
185	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	12.0	0.54	0.63	6.48	2.73	Mature	Good	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
186	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	12.0	0.50	0.55	6.00	2.57	Mature	Good	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
187	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	18.0	0.89	1.02	10.68	3.34	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track. Very good tree.
188	1		*Syncarpia glomulifera*	Turpentine	17.5	8.0	0.57	0.58	6.84	2.63	Mature	Good	Good	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		5 High	Good row of trees just downslope of bike track.
189	1		*Angophora floribunda*	Rough-barked Apple	12.5	6.0	0.25	0.36	3.00	2.15	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Asymmetric to north. Just downslope of bike track. Basal wound to west.
190	1		*Angophora floribunda*	Rough-barked Apple	14.0	8.0	0.34	0.43	4.08	2.32	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy Termites	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to north.
191	1		*Eucalyptus saligna*	Sydney Blue Gum	26.5	16.0	0.46	0.58	5.52	2.63	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
192	1		*Allocasuarina littoralis*	Black She-Oak	12.5	6.0	0.26	0.29	3.12	1.97	Over-mature	Poor	Poor	Deadwood-Minor Lean-Minor Decay-Minor Tip Dieback	Short (5-15 years)	Endemic		3 Low	Top leaders broken out on southern side.
193	1		*Eucalyptus pilularis*	Blackbutt	25.0	16.0	0.52	0.58	6.24	2.63	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
194	1		*Angophora floribunda*	Rough-barked Apple	16.5	8.0	0.25	0.28	3.00	1.94	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy Tip Dieback	Medium (15-40 years)	Endemic		4 Moderate	Asymmetric to north-west
195	1		*Allocasuarina littoralis*	Black She-Oak	9.0	5.0	0.18	0.25	2.16	1.85	Dead	Dead	Average	Deadwood-Minor Asymmetric Canopy	Remove (<5 years)	Endemic		1 Dead	
196	1		*Angophora costata*	Smooth-barked Apple	18.0	8.0	0.43	0.50	5.16	2.47	Mature	Fair	Poor	Deadwood-Major Termites Pest/Disease	Medium (15-40 years)	Endemic		3 Low	Major central leader dead.
197	1		*Angophora costata*	Smooth-barked Apple	18.0	8.0	0.39	0.39	4.68	2.23	Mature	Fair	Average	Termites Pest/Disease Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west.
198	1		*Eucalyptus resinifera*	Red Mahogany	18.0	8.0	0.26	0.38	3.12	2.20	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy	Medium (15-40 years)	Endemic		3 Low	Asymmetric to west.
199	1		*Eucalyptus pilularis*	Blackbutt	25.0	18.0	0.94	1.15	11.28	3.51	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		5 High	
200	1		*Eucalyptus resinifera*	Red Mahogany	22.0	12.0	0.65	0.72	7.80	2.88	Mature	Good	Good	Deadwood-Minor Tip Dieback Termites	Long (>40 years)	Endemic		5 High	On very steep batter next to drainage head wall. Surface mudding from termites.
201	1		*Casuarina cunninghamiana*	River She-Oak	18.0	12.0	0.36	0.47	4.32	2.41	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
202	1		*Casuarina glauca*	Swamp She-Oak	21.0	6.0	0.32	0.38	3.84	2.20	Mature	Fair	Average	Tip Dieback	Medium (15-40 years)	Native		3 Low	
203	7		*Casuarina glauca*	Swamp She-Oak	19.0	6.0	0.28	0.34	3.36	2.10	Mature	Fair	Average		Medium (15-40 years)	Native		3 Low	Copse of 7 closely grouped trees - Largest measured. Spread is total for all seven.
204	1		*Casuarina cunninghamiana*	River She-Oak	21.0	8.0	0.48	0.62	5.76	2.71	Mature	Normal	Average	Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
205	1		*Casuarina cunninghamiana*	River She-Oak	14.0	7.0	0.29	0.36	3.48	2.15	Mature	Good	Average	Co-dominant Stems Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	
206	1		*Eucalyptus pilularis*	Blackbutt	14.0	9.0	0.42	0.51	5.04	2.49	Mature	Normal	Poor	Lean-Major Asymmetric Canopy Root Impacts	Long (>40 years)	Endemic		2 Very Poor	Growing out of rock crevice. No roots to. Western side of tree. Major lean back towards road to east. Tree lifting away from rock.
207	1		*Eucalyptus pilularis*	Blackbutt	28.0	16.0	0.75	0.85	9.00	3.09	Mature	Good	Good	Branch Tearouts	Long (>40 years)	Endemic		5 High	Good tree.
208	1		*Angophora floribunda*	Rough-barked Apple	9.0	6.0	0.27	0.30	3.24	2.00	Mature	Fair	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Asymmetric to north.
209	1		*Angophora floribunda*	Rough-barked Apple	13.0	8.0	0.26	0.33	3.12	2.08	Mature	Fair	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-west.
210	1		*Angophora costata*	Smooth-barked Apple	14.0	6.0	0.30	0.35	3.60	2.13	Semi-mature	Poor	Average	Deadwood-Major Tip Dieback	Long (>40 years)	Endemic	Stag Creation Potential	3 Low	Major dieback to central leader..
211	1		*Angophora costata*	Smooth-barked Apple	12.0	6.0	0.19	0.22	2.28	1.75	Semi-mature	Fair	Poor	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		3 Low	Asymmetric to north.
212	1		*Eucalyptus pilularis*	Blackbutt	26.0	9.0	0.40	0.48	4.80	2.43	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	Growing out of rock crevice. No roots to. Western side of tree.
213	1		*Eucalyptus pilularis*	Blackbutt	15.0	5.0	0.17	0.22	2.04	1.75	Semi-mature	Good	Good		Long (>40 years)	Endemic		4 Moderate	No tag
214	1		*Eucalyptus pilularis*	Blackbutt	18.0	6.0	0.24	0.35	2.88	2.13	Mature	Good	Good		Long (>40 years)	Endemic		4 Moderate	No tag
215	1		*Eucalyptus pilularis*	Blackbutt	22.0	9.0	0.43	0.49	5.16	2.45	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Good tree.
216	1		*Eucalyptus resinifera*	Red Mahogany	11.5	5.0	0.18	0.29	2.16	1.97	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-west.
217	1		*Eucalyptus resinifera*	Red Mahogany	18.0	9.0	0.58	0.62	6.96	2.71	Mature	Good	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
218	1		*Pittosporum undulatum*	Sweet Pittosporum	10.0	7.0	0.27	0.32	3.24	2.05	Mature	Normal	Average		Medium (15-40 years)	Endemic		4 Moderate	
219	1		*Allocasuarina littoralis*	Black She-Oak	6.0	7.0	0.20	0.28	2.40	1.94	Senescent	Moribund	Poor	Lean-Major Asymmetric Canopy	Remove (<5 years)	Endemic		2 Very Poor	Very asymmetric to west. Major lean.
220	1		*Angophora floribunda*	Rough-barked Apple	15.5	9.0	0.33	0.35	3.96	2.13	Mature	Normal	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
221	1		*Angophora costata*	Smooth-barked Apple	14.0	10.0	0.21	0.29	2.52	1.97	Mature	Fair	Poor	Lean-Minor Asymmetric Canopy Cavity Tip Dieback Termites Deadwood-Major	Medium (15-40 years)	Endemic		3 Low	Very asymmetric to west. Leaning over track.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
222	1		*Angophora costata*	Smooth-barked Apple	16.0	8.0	0.45	0.82	5.40	3.04	Mature	Good	Average	Co-dominant Stems Asymmetric Canopy Decay-Minor	Long (>40 years)	Endemic		4 Moderate	Multitrunked from base. Growth from previously failed tree at base.
223	1		*Casuarina cunninghamiana*	River She-Oak	13.5	14.0	0.58	0.74	6.96	2.92	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
224	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	13.0	0.50	0.66	6.00	2.78	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
225	1		*Allocasuarina littoralis*	Black She-Oak	9.0	6.0	0.17	0.19	2.04	1.65	Mature	Fair	Average	Tip Dieback Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	
226	1		*Allocasuarina littoralis*	Black She-Oak	10.0	8.0	0.41	0.62	4.92	2.71	Mature	Good	Poor	Co-dominant Stems Cracks/Splits Inclusions	Medium (15-40 years)	Endemic		2 Very Poor	Propagating inclusion split in main trunk to north.
227	1		*Allocasuarina littoralis*	Black She-Oak	8.0	5.0	0.20	0.24	2.40	1.82	Over-mature	Fair	Average	Tip Dieback Deadwood-Minor	Short (5-15 years)	Endemic		3 Low	
228	1		*Allocasuarina littoralis*	Black She-Oak	8.0	7.0	0.33	0.40	3.96	2.25	Senescent	Moribund	Average	Deadwood-Major Tip Dieback	Remove (<5 years)	Endemic		2 Very Poor	
229	4		*Eucalyptus resinifera*	Red Mahogany	23.0	10.0	0.56	1.10	6.72	3.44	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Group of 4 closely spaced trees - DGL for group
230	2		*Eucalyptus pilularis / Eucalyptus resinifera*	Blackbutt / Red Mahogany	19.0	12.0	0.61	1.10	7.32	3.44	Mature	Normal	Good	Co-dominant Stems Inclusions Termites	Long (>40 years)	Endemic		5 High	Several trunks emanating from base out of a rock embankment adjacent to pump track. Suspected to be two separate trees. Termite mudding evident.
231	1		*Angophora costata*	Smooth-barked Apple	18.0	7.0	0.34	0.35	4.08	2.13	Mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	
232	1		*Angophora costata*	Smooth-barked Apple	17.0	9.0	0.46	0.70	5.52	2.85	Mature	Good	Good	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	3 trunks from base adjacent to pump track.
233	1		*Eucalyptus resinifera*	Red Mahogany	16.5	10.0	0.45	0.90	5.40	3.17	Mature	Good	Average	Co-dominant Stems Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Multitrunked from base. Adjacent to pump track.
234	1		*Exocarpus cupressiformis*	Ballart	8.5	5.0	0.21	0.27	2.52	1.91	Mature	Good	Good	Co-dominant Stems	Long (>40 years)	Endemic		5 High	
235	1		*Angophora floribunda*	Rough-barked Apple	14.5	6.0	0.27	0.33	3.24	2.08	Mature	Good	Average	Tip Dieback Inclusions	Long (>40 years)	Endemic		5 High	Good tree growing close to pump track edge out of rock crevice.
236	1		*Allocasuarina torulosa*	Forest Oak	8.0	4.0	0.38	0.70	4.56	2.85	Mature	Good	Average	Co-dominant Stems	Medium (15-40 years)	Endemic		4 Moderate	Multitrunked.
237	1		*Angophora costata*	Smooth-barked Apple	16.0	8.0	0.45	0.53	5.40	2.53	Mature	Normal	Average	Asymmetric Canopy Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west
238	1		*Casuarina cunninghamiana*	River She-Oak	9.5	8.0	0.32	0.44	3.84	2.34	Mature	Good	Poor	Branch Tearouts Epicormic Growth Asymmetric Canopy	Long (>40 years)	Native		3 Low	Central leader broken out at 4.0m. Asymmetric to south.
239	1		*Eucalyptus robusta*	Swamp Mahogany	10.0	9.0	0.37	0.52	4.44	2.51	Mature	Good	Average	Branch Tearouts Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric to south. Wounding to lower branch.
240	1		*Casuarina cunninghamiana*	River She-Oak	10.5	8.0	0.37	0.51	4.44	2.49	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	Good tree.
241	1		*Casuarina glauca*	Swamp She-Oak	14.5	6.0	0.35	0.41	4.20	2.28	Mature	Good	Average	Co-dominant Stems Inclusions	Long (>40 years)	Native		4 Moderate	
242	1		*Casuarina cunninghamiana*	River She-Oak	12.0	8.0	0.45	0.45	5.40	2.37	Mature	Good	Average	Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
243	1		*Casuarina glauca*	Swamp She-Oak	15.0	8.0	0.48	0.53	5.76	2.53	Mature	Fair	Average	Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
244	1		*Casuarina cunninghamiana*	River She-Oak	15.0	10.0	0.42	0.52	5.04	2.51	Mature	Good	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
245	1		*Casuarina cunninghamiana*	River She-Oak	20.0	12.0	0.46	0.61	5.52	2.69	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
246	1		*Casuarina cunninghamiana*	River She-Oak	19.0	10.0	0.37	0.46	4.44	2.39	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
247	1		*Casuarina cunninghamiana*	River She-Oak	19.0	10.0	0.46	0.57	5.52	2.61	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
248	1		*Casuarina glauca*	Swamp She-Oak	11.0	7.0	0.23	0.34	2.76	2.10	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
249	1		*Casuarina glauca*	Swamp She-Oak	12.0	7.0	0.39	0.51	4.68	2.49	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
250	1		*Casuarina glauca*	Swamp She-Oak	10.5	7.0	0.26	0.41	3.12	2.28	Mature	Good	Average	Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
251	1		*Casuarina glauca*	Swamp She-Oak	11.0	6.0	0.26	0.37	3.12	2.18	Mature	Good	Average		Long (>40 years)	Native		4 Moderate	
252	1		*Casuarina glauca*	Swamp She-Oak	11.0	7.0	0.30	0.52	3.60	2.51	Mature	Good	Average	Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
253	1		*Casuarina cunninghamiana*	River She-Oak	23.0	10.0	0.45	0.63	5.40	2.73	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	Good tree.
254	1		*Grevillea robusta*	Silky Oak	8.5	4.0	0.16	0.20	2.00	1.68	Semi-mature	Good	Good		Long (>40 years)	Invasive		3 Low	Invasive native tree should remove.
255	1		*Casuarina cunninghamiana*	River She-Oak	20.0	10.0	0.55	0.62	6.60	2.71	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	Good tree.
256	1		*Casuarina cunninghamiana*	River She-Oak	19.0	10.0	0.31	0.46	3.72	2.39	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	Good tree.
257	1		*Eucalyptus saligna*	Sydney Blue Gum	19.5	10.0	0.42	0.48	5.04	2.43	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Good tree.
258	1		*Casuarina cunninghamiana*	River She-Oak	19.0	5.0	0.22	0.26	2.64	1.88	Mature	Fair	Average		Long (>40 years)	Native		3 Low	
259	1		*Eucalyptus saligna*	Sydney Blue Gum	13.5	6.0	0.18	0.30	2.16	2.00	Semi-mature	Normal	Poor	Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Good tree.
260	1		*Casuarina glauca*	Swamp She-Oak	23.0	8.0	0.30	0.42	3.60	2.30	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	Good tree. On very steep cutting next to road.
261	1		*Casuarina glauca*	Swamp She-Oak	19.5	8.0	0.38	0.55	4.56	2.57	Mature	Good	Average	Co-dominant Stems Inclusions	Long (>40 years)	Native		4 Moderate	Immediately next to road.
262	1		*Casuarina glauca*	Swamp She-Oak	18.5	8.0	0.45	0.65	5.40	2.76	Mature	Good	Average	Co-dominant Stems Inclusions	Long (>40 years)	Native		4 Moderate	Immediately next to road.
263	1		*Casuarina cunninghamiana*	River She-Oak	18.5	8.0	0.37	0.49	4.44	2.45	Mature	Good	Good		Long (>40 years)	Native		4 Moderate	
264	1		*Casuarina cunninghamiana*	River She-Oak	11.5	4.0	0.18	0.22	2.16	1.75	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
265	1		*Casuarina cunninghamiana*	River She-Oak	12.5	6.0	0.20	0.27	2.40	1.91	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
266	1		*Casuarina cunninghamiana*	River She-Oak	11.0	5.0	0.18	0.24	2.16	1.82	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
267	1		*Casuarina cunninghamiana*	River She-Oak	9.0	5.0	0.17	0.20	2.04	1.68	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
268	1		*Casuarina cunninghamiana*	River She-Oak	11.0	6.0	0.22	0.30	2.64	2.00	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
269	1		*Casuarina cunninghamiana*	River She-Oak	12.0	5.0	0.16	0.23	2.00	1.79	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
270	1		*Casuarina cunninghamiana*	River She-Oak	12.0	6.0	0.20	0.29	2.40	1.97	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric to south.
271	1		*Casuarina glauca*	Swamp She-Oak	12.0	7.0	0.31	0.40	3.72	2.25	Mature	Normal	Average	Lean-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric to south.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
272	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	9.0	0.50	0.59	6.00	2.65	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to south.
273	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	9.0	0.51	0.62	6.12	2.71	Mature	Normal	Good	Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		4 Moderate	
274	1		*Eucalyptus saligna*	Sydney Blue Gum	14.0	6.0	0.18	0.25	2.16	1.85	Mature	Normal	Good		Long (>40 years)	Endemic		4 Moderate	
275	1		*Eucalyptus saligna*	Sydney Blue Gum	9.5	6.0	0.23	0.30	2.76	2.00	Semi-mature	Fair	Average		Long (>40 years)	Endemic		3 Low	
276	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	9.0	0.55	0.65	6.60	2.76	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Growing adjacent drainage channel.
277	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	8.0	0.42	0.48	5.04	2.43	Mature	Good	Good	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Growing adjacent drainage channel. Asymmetric to east.
278	1	Remote	*Casuarina cunninghamiana*	River She-Oak	16.0	6.0	0.40	0.49	4.80	2.45	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	On quarry void face near fuel tanks.
279	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.40	0.45	4.80	2.37	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	On quarry void face near fuel tanks.
280	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	21.0	12.0	0.78	0.80	9.36	3.01	Mature	Fair	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	On quarry void face near fuel tanks. Tridominant trunks.
281	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	22.5	12.0	0.42	0.50	5.04	2.47	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	On quarry void face near fuel tanks.
282	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.55	0.80	6.60	3.01	Mature	Normal	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	On quarry void face near fuel tanks.
283	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.50	0.65	6.00	2.76	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	On quarry void face near fuel tanks.
284	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	14.0	12.0	0.17	0.20	2.04	1.68	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	On quarry void face near fuel tanks.
285	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	10.0	0.65	0.72	7.80	2.88	Mature	Normal	Average	Lean-Minor Deadwood-Minor Branch Tearouts Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks. Lean to east then corrected. Asymmetric to east.
286	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	15.0	0.60	0.65	7.20	2.76	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Near fuel tanks. Lean to east then corrected. Asymmetric to east.
287	1		*Angophora floribunda*	Rough-barked Apple	14.5	15.0	0.48	0.55	5.76	2.57	Mature	Good	Average	Deadwood-Minor Asymmetric Canopy Decay-Minor	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks. Asymmetric to south. Growing under bigger Blue Gum.
288	1		*Angophora floribunda*	Rough-barked Apple	13.5	15.0	0.22	0.28	2.64	1.94	Mature	Good	Average	Deadwood-Minor Asymmetric Canopy Decay-Minor	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks. Asymmetric to north. Growing under bigger Blue Gum.
289	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	12.0	0.54	0.62	6.48	2.71	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Near fuel tanks.
290	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	12.0	0.86	1.01	10.32	3.32	Mature	Good	Good	Branch Tearouts Lean-Major Deadwood-Major	Long (>40 years)	Endemic	Large Hollow Small Hollows or Spouts	4 Moderate	Near fuel tanks. Major lean to south then corrected.
291	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	16.0	0.68	1.15	8.16	3.51	Mature	Good	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	Near fuel tanks. Multitrunked from base.
292	1		*Angophora floribunda*	Rough-barked Apple	12.0	10.0	0.25	0.35	3.00	2.13	Mature	Poor	Poor	Deadwood-Minor Asymmetric Canopy Tip Dieback Lean-Major	Short (5-15 years)	Endemic		2 Very Poor	Near fuel tanks. Very asymmetric to south. Appears to have partially failed at base.
293	1		*Angophora floribunda*	Rough-barked Apple	14.0	10.0	0.50	0.52	6.00	2.51	Mature	Good	Good	Deadwood-Minor Asymmetric Canopy Tip Dieback Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks.
294	1		*Angophora floribunda*	Rough-barked Apple	10.5	6.0	0.19	0.24	2.28	1.82	Mature	Good	Poor	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks. Very asymmetric to south. Burls on trunk.
295	1		*Angophora floribunda*	Rough-barked Apple	14.5	6.0	0.37	0.41	4.44	2.28	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks.
296	1		*Angophora floribunda*	Rough-barked Apple	13.0	6.0	0.34	0.39	4.08	2.23	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks.
297	1		*Eucalyptus pilularis*	Blackbutt	25.0	12.0	0.48	0.62	5.76	2.71	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Near fuel tanks.
298	1		*Angophora floribunda*	Rough-barked Apple	16.0	10.0	0.40	0.47	4.80	2.41	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Near fuel tanks.
299	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	12.0	0.55	0.69	6.60	2.83	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Near fuel tanks.
300	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	16.0	0.65	0.84	7.80	3.08	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Top lookout.
301	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	18.0	0.99	1.15	11.88	3.51	Mature	Good	Good	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		5 High	Top lookout. Tri dominant trunks
302	1		*Eucalyptus saligna*	Sydney Blue Gum	11.0	5.0	0.18	0.23	2.16	1.79	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Top lookout.
303	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	10.0	0.62	0.78	7.44	2.98	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Top lookout.
304	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	10.0	0.48	0.60	5.76	2.67	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Top lookout.
305	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	20.0	0.90	1.10	10.80	3.44	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Top lookout. Very large tree just inside fence line to east of lookout.
306	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	20.0	1.00	1.15	12.00	3.51	Mature	Good	Good	Deadwood-Major	Long (>40 years)	Endemic		5 High	Edge tree of forest along northern fill batter.
307	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	18.0	0.70	0.88	8.40	3.14	Mature	Good	Good	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	Edge tree of forest along northern fill batter.
308	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	18.0	0.60	0.77	7.20	2.97	Mature	Good	Good	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	Edge tree of forest along northern fill batter.
309	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	18.0	0.63	0.80	7.56	3.01	Mature	Good	Good	Deadwood-Major	Long (>40 years)	Endemic		5 High	Edge tree of forest along northern fill batter.
310	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	10.0	0.23	0.29	2.76	1.97	Mature	Good	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Edge tree of forest along northern fill batter.
311	1		*Eucalyptus saligna*	Sydney Blue Gum	12.0	6.0	0.75	0.75	9.00	2.93	Mature	Normal	Poor	Deadwood-Major Epicormic Growth Asymmetric Canopy	Short (5-15 years)	Endemic		2 Very Poor	Edge tree of forest along northern fill batter. Tree cut off at 2.5m
312	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	8.0	0.33	0.39	3.96	2.23	Mature	Good	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Edge tree of forest along northern fill batter.
313	1		*Eucalyptus pilularis*	Blackbutt	24.0	10.0	0.38	0.44	4.56	2.34	Mature	Good	Average	Deadwood-Major Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Edge tree of forest along northern fill batter.
314	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	16.0	0.63	0.70	7.56	2.85	Mature	Good	Good	Deadwood-Major	Long (>40 years)	Endemic		5 High	Edge tree of forest along northern fill batter.
315	1		*Eucalyptus saligna*	Sydney Blue Gum	11.0	5.0	0.15	0.21	2.00	1.72	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Edge tree of forest along northern fill batter.
316	1		*Eucalyptus pilularis*	Blackbutt	15.0	5.0	0.23	0.29	2.76	1.97	Semi-mature	Normal	Good		Long (>40 years)	Endemic		4 Moderate	Edge tree of forest along northern fill batter.
317	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	10.0	0.54	0.57	6.48	2.61	Semi-mature	Normal	Good	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Edge tree of forest along northern fill batter.
318	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	12.0	0.56	0.61	6.72	2.69	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	Edge tree of forest along northern fill batter.
319	1		*Eucalyptus saligna*	Sydney Blue Gum	32.5	16.0	0.84	0.95	10.08	3.24	Mature	Normal	Average		Long (>40 years)	Endemic		5 High	Edge tree of forest along northern fill batter.
320	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	10.0	0.41	0.50	4.92	2.47	Mature	Normal	Average	Lean-Minor Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
321	1		*Angophora floribunda*	Rough-barked Apple	9.0	5.0	0.17	0.26	2.04	1.88	Mature	Normal	Poor	Deadwood-Minor Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Very asymmetric to south.
322	1		*Angophora floribunda*	Rough-barked Apple	12.0	8.0	0.31	0.36	3.72	2.15	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
323	1		*Angophora floribunda*	Rough-barked Apple	19.0	10.0	0.42	0.51	5.04	2.49	Mature	Good	Average		Long (>40 years)	Endemic		4 Moderate	
324	1		*Angophora floribunda*	Rough-barked Apple	13.0	5.0	0.18	0.25	2.16	1.85	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
325	1		*Angophora floribunda*	Rough-barked Apple	12.0	5.0	0.20	0.26	2.40	1.88	Mature	Normal	Average	Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
326	1		*Angophora floribunda*	Rough-barked Apple	12.0	5.0	0.17	0.23	2.04	1.79	Mature	Normal	Average	Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
327	1		*Angophora floribunda*	Rough-barked Apple	13.5	7.0	0.18	0.27	2.16	1.91	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
328	1		*Angophora floribunda*	Rough-barked Apple	11.5	5.0	0.19	0.27	2.28	1.91	Mature	Normal	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
329	1		*Angophora floribunda*	Rough-barked Apple	11.5	6.0	0.21	0.29	2.52	1.97	Mature	Normal	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
330	1		*Eucalyptus pilularis*	Blackbutt	26.0	9.0	0.31	0.49	3.72	2.45	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
331	1		*Angophora floribunda*	Rough-barked Apple	10.0	5.0	0.23	0.31	2.76	2.02	Mature	Normal	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
332	1		*Angophora floribunda*	Rough-barked Apple	16.0	9.0	0.53	0.59	6.36	2.65	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
333	1		*Angophora floribunda*	Rough-barked Apple	14.0	8.0	0.41	0.44	4.92	2.34	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
334	1		*Eucalyptus pilularis*	Blackbutt	24.0	10.0	0.36	0.45	4.32	2.37	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	
335	1		*Pittosporum undulatum*	Sweet Pittosporum	7.0	7.0	0.21	0.26	2.52	1.88	Mature	Normal	Average	Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	
336	1		*Angophora costata*	Smooth-barked Apple	9.0	5.0	0.27	0.32	3.24	2.05	Mature	Fair	Poor	Asymmetric Canopy Lean-Major	Long (>40 years)	Endemic		3 Low	Very poor form.
337	1		*Eucalyptus saligna*	Sydney Blue Gum	15.0	6.0	0.32	0.44	3.84	2.34	Mature	Fair	Poor	Asymmetric Canopy Lean-Major	Long (>40 years)	Endemic		3 Low	Very poor form.
338	1		*Angophora floribunda*	Rough-barked Apple	10.0	6.0	0.24	0.28	2.88	1.94	Mature	Fair	Poor	Asymmetric Canopy Lean-Major	Long (>40 years)	Endemic		3 Low	Very poor form.
339	1		*Angophora floribunda*	Rough-barked Apple	10.0	6.0	0.19	0.24	2.28	1.82	Mature	Fair	Average	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to south.
340	1		*Angophora floribunda*	Rough-barked Apple	12.0	8.0	0.24	0.37	2.88	2.18	Mature	Normal	Average	Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
341	1		*Angophora floribunda*	Rough-barked Apple	11.5	6.0	0.18	0.26	2.16	1.88	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
342	1		*Angophora floribunda*	Rough-barked Apple	13.0	6.0	0.22	0.27	2.64	1.91	Mature	Normal	Average	Asymmetric Canopy Inclusions	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
343	1		*Angophora floribunda*	Rough-barked Apple	10.5	8.0	0.17	0.23	2.04	1.79	Mature	Normal	Poor	Asymmetric Canopy Lean-Major	Long (>40 years)	Endemic		3 Low	Very asymmetric to south.
344	1		*Angophora floribunda*	Rough-barked Apple	10.5	6.0	0.16	0.22	2.00	1.75	Mature	Normal	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to south.
345	1		*Angophora floribunda*	Rough-barked Apple	13.0	7.0	0.23	0.28	2.76	1.94	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to south-east
346	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	10.0	0.70	0.89	8.40	3.15	Mature	Normal	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Minor basal wound to north. Wire attached to trunk.
347	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	10.0	0.85	1.38	10.20	3.79	Mature	Normal	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Tri-trucked from near base.
348	1		*Angophora costata*	Smooth-barked Apple	15.0	8.0	0.24	0.28	2.88	1.94	Mature	Fair	Average		Long (>40 years)	Endemic		4 Moderate	Sparse canopy
349	1		*Pinus caribaea ?*	Carribbean Pine	21.0	7.0	0.32	0.37	3.84	2.18	Mature	Fair	Poor		Medium (15-40 years)	Exotic		3 Low	
350	1		*Eucalyptus pilularis*	Blackbutt	26.0	9.0	0.29	0.35	3.48	2.13	Mature	Good	Average	Asymmetric Canopy	Long (>40 years)	Endemic		5 High	Good early mature tree.
351	1		*Angophora floribunda*	Rough-barked Apple	8.0	4.0	0.15	0.21	2.00	1.72	Mature	Normal	Poor	Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
352	1		*Angophora floribunda*	Rough-barked Apple	10.5	6.0	0.21	0.26	2.52	1.88	Mature	Normal	Average	Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
353	1		*Angophora floribunda*	Rough-barked Apple	12.0	8.0	0.33	0.44	3.96	2.34	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
354	1		*Angophora floribunda*	Rough-barked Apple	9.0	8.0	0.19	0.27	2.28	1.91	Mature	Normal	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to south.
355	1		*Angophora floribunda*	Rough-barked Apple	17.0	9.0	0.26	0.34	3.12	2.10	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
356	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	12.0	1.00	1.18	12.00	3.55	Mature	Normal	Good	Branch Tearouts Deadwood-Minor Cavity	Long (>40 years)	Endemic	Large Hollow Basal Hollow	5 High	Major basal wound to north.Good reaction wood around. Wire attached to trunk.
357	1		*Pinus caribaea ?*	Caribbean Pine?	25.0	7.0	0.47	0.54	5.64	2.55	Mature	Fair	Poor		Medium (15-40 years)	Exotic		3 Low	
358	1		*Angophora floribunda*	Rough-barked Apple	12.0	6.0	0.18	0.26	2.16	1.88	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
359	1		*Angophora floribunda*	Rough-barked Apple	8.0	6.0	0.15	0.20	2.00	1.68	Mature	Fair	Poor	Lean-Major Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to south. Leaning against adjoining tree to south.
360	1		*Eucalyptus pilularis*	Blackbutt	24.0	8.0	0.28	0.37	3.36	2.18	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
361	1		*Angophora floribunda*	Rough-barked Apple	18.0	9.0	0.31	0.39	3.72	2.23	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
362	1		*Eucalyptus pilularis*	Blackbutt	24.0	8.0	0.38	0.49	4.56	2.45	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
363	1		*Angophora floribunda*	Rough-barked Apple	14.0	11.0	0.42	0.49	5.04	2.45	Mature	Normal	Poor	Deadwood-Minor Lean-Major Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to south.
364	1		*Angophora floribunda*	Rough-barked Apple	12.0	5.0	0.20	0.26	2.40	1.88	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
365	1		*Angophora floribunda*	Rough-barked Apple	14.5	6.0	0.21	0.29	2.52	1.97	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
366	1		*Angophora floribunda*	Rough-barked Apple	17.0	8.0	0.43	0.55	5.16	2.57	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
367	1		*Eucalyptus pilularis*	Blackbutt	18.0	5.0	0.15	0.22	2.00	1.75	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
368	1		*Eucalyptus pilularis*	Blackbutt	21.0	8.0	0.30	0.37	3.60	2.18	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
369	1		*Angophora floribunda*	Rough-barked Apple	16.0	8.0	0.37	0.45	4.44	2.37	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Tip Dieback Lean-Minor	Long (>40 years)	Endemic		4 Moderate	
370	1		*Angophora floribunda*	Rough-barked Apple	10.5	8.0	0.23	0.27	2.76	1.91	Mature	Normal	Poor	Deadwood-Minor Asymmetric Canopy Tip Dieback Lean-Minor	Long (>40 years)	Endemic		3 Low	
371	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	12.0	0.99	1.16	11.88	3.52	Mature	Normal	Good	Branch Tearouts Deadwood-Minor Cavity	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Major wound to south at 3.0m. Wire attached to trunk. Right on edge of batter step. Big foot of trunk base on large rock beneath.
372	1		*Eucalyptus pilularis*	Blackbutt	17.0	6.0	0.19	0.24	2.28	1.82	Mature	Normal	Poor	Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	
373	1		*Eucalyptus pilularis*	Blackbutt	21.0	7.0	0.23	0.34	2.76	2.10	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
374	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	8.0	0.45	0.53	5.40	2.53	Mature	Normal	Average	Lean-Minor	Long (>40 years)	Endemic		4 Moderate	
375	1		*Angophora floribunda*	Rough-barked Apple	12.0	8.0	0.28	0.36	3.36	2.15	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		4 Moderate	
376	1		*Angophora floribunda*	Rough-barked Apple	13.0	7.0	0.20	0.28	2.40	1.94	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
377	1		*Eucalyptus pilularis*	Blackbutt	19.0	7.0	0.17	0.24	2.04	1.82	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
378	1		*Eucalyptus pilularis*	Blackbutt	25.0	12.0	0.39	0.51	4.68	2.49	Mature	Normal	Good	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	
379	1		*Pittosporum undulatum*	Sweet Pittosporum	14.5	6.0	0.21	0.24	2.52	1.82	Mature	Normal	Average		Medium (15-40 years)	Endemic		4 Moderate	
380	1		*Pittosporum undulatum*	Sweet Pittosporum	14.5	6.0	0.20	0.24	2.40	1.82	Mature	Fair	Average	Deadwood-Major Decay-Minor Cavity	Short (5-15 years)	Endemic		3 Low	
381	1		*Eucalyptus pilularis*	Blackbutt	23.0	12.0	0.95	0.98	11.40	3.28	Dead	Dead	Average	Deadwood-Major	Medium (15-40 years)	Endemic	Stag Creation Potential Small Hollows or Spouts	1 Dead	
382	1		*Angophora floribunda*	Rough-barked Apple	11.0	10.0	0.36	0.48	4.32	2.43	Mature	Fair	Poor	Deadwood-Major Asymmetric Canopy Branch Tearouts Decay-Minor Hangers	Medium (15-40 years)	Endemic	Stag Creation Potential Small Hollows or Spouts	3 Low	Very asymmetric to south. Brocken. Out central leader.
383	1		*Angophora floribunda*	Rough-barked Apple	14.0	7.0	0.27	0.32	3.24	2.05	Mature	Fair	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Sparse canopy.
384	1		*Angophora floribunda*	Rough-barked Apple	14.0	7.0	0.28	0.31	3.36	2.02	Mature	Poor	Poor	Deadwood-Major Decay-Major Asymmetric Canopy	Short (5-15 years)	Endemic		2 Very Poor	Sparse canopy. Very asymmetric to south. A main leader broken out.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
385	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	16.0	1.00	1.35	12.00	3.75	Mature	Normal	Average	Deadwood-Major Branch Tearouts Hangers	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
386	1		*Eucalyptus pilularis*	Blackbutt	20.0	3.0	0.49	0.55	5.88	2.57	Dead	Dead	Average	Deadwood-Major	Medium (15-40 years)	Endemic	Stag Creation Potential	1 Dead	
387	1		*Angophora floribunda*	Rough-barked Apple	16.0	5.0	0.24	0.34	2.88	2.10	Mature	Poor	Poor	Asymmetric Canopy Deadwood-Minor	Short (5-15 years)	Endemic		2 Very Poor	Sparse canopy. Very asymmetric to south.
388	1		*Angophora floribunda*	Rough-barked Apple	17.0	5.0	0.22	0.26	2.64	1.88	Mature	Poor	Average	Asymmetric Canopy Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		3 Low	Sparse canopy. Very asymmetric to south.
389	1		*Angophora floribunda*	Rough-barked Apple	17.0	5.0	0.17	0.24	2.04	1.82	Mature	Poor	Average	Asymmetric Canopy Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		3 Low	Sparse canopy. Very asymmetric to east.
390	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	16.0	0.57	0.70	6.84	2.85	Mature	Normal	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
391	1		*Angophora floribunda*	Rough-barked Apple	14.5	6.0	0.30	0.44	3.60	2.34	Mature	Fair	Average	Asymmetric Canopy Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		4 Moderate	Sparse canopy. Very asymmetric to east.
392	1		*Angophora floribunda*	Rough-barked Apple	8.5	6.0	0.25	0.27	3.00	1.91	Dead	Dead	Poor	Asymmetric Canopy Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	Dead, no stag potential.
393	1		*Angophora floribunda*	Rough-barked Apple	14.5	6.0	0.46	0.65	5.52	2.76	Mature	Fair	Average	Asymmetric Canopy Tip Dieback Deadwood-Major	Long (>40 years)	Endemic	Small Hollows or Spouts	3 Low	Very asymmetric to south
394	1		*Pittosporum undulatum*	Sweet Pittosporum	12.0	6.0	0.22	0.27	2.64	1.91	Mature	Fair	Average	Deadwood-Major Asymmetric Canopy Tip Dieback	Short (5-15 years)	Endemic		3 Low	
395	1		*Eucalyptus pilularis*	Blackbutt	22.0	7.0	0.50	0.65	6.00	2.76	Dead	Dead	Average	Deadwood-Major	Medium (15-40 years)	Endemic	Stag Creation Potential	1 Dead	
396	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	16.0	0.83	1.07	9.96	3.40	Mature	Normal	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
397	1		*Angophora floribunda*	Rough-barked Apple	16.5	7.0	0.31	0.37	3.72	2.18	Mature	Fair	Average	Asymmetric Canopy Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		3 Low	Sparse canopy. Asymmetric to. South
398	1		*Angophora floribunda*	Rough-barked Apple	9.5	3.0	0.15	0.21	2.00	1.72	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		3 Low	Sparse canopy.
399	1		*Angophora floribunda*	Rough-barked Apple	16.0	7.0	0.30	0.37	3.60	2.18	Mature	Fair	Average	Tip Dieback Deadwood-Major	Long (>40 years)	Endemic		3 Low	Sparse canopy.
400	1		*Angophora floribunda*	Rough-barked Apple	12.0	6.0	0.17	0.24	2.04	1.82	Mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Sparse canopy. Asymmetric to south.
401	1		*Livistona australis*	Cabbage Palm	10.0	6.0	0.23	0.30	2.76	2.00	Mature	Good	Good		Long (>40 years)	Endemic		5 High	
402	1		*Eucalyptus pilularis*	Blackbutt	32.0	18.0	0.97	1.15	11.64	3.51	Mature	Normal	Average	Branch Tearouts Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Scar to western side of trunk between 1.0-4.0m
403	1		*Angophora floribunda*	Rough-barked Apple	14.0	4.0	0.19	0.24	2.28	1.82	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
404	1		*Eucalyptus pilularis*	Blackbutt	20.0	8.0	0.32	0.48	3.84	2.43	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
405	1		*Eucalyptus pilularis*	Blackbutt	20.0	6.0	0.28	0.41	3.36	2.28	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
406	1		*Angophora floribunda*	Rough-barked Apple	15.0	4.0	0.18	0.28	2.16	1.94	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		4 Moderate	Asymmetric to south.
407	1		*Eucalyptus pilularis*	Blackbutt	36.0	20.0	1.41	1.59	15.00	4.02	Mature	Good	Good	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts Basal Hollow	5 High	Major basal hollow to northern side of trunk to 3.0m
408	1		*Eucalyptus saligna*	Sydney Blue Gum	34.0	16.0	0.81	1.04	9.72	3.36	Mature	Normal	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts Basal Hollow	5 High	Small basal hollow to north.
409	1		*Eucalyptus saligna*	Sydney Blue Gum	18.5	8.0	0.42	0.55	5.04	2.57	Mature	Fair	Poor	Branch Tearouts Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic	Small Hollows or Spouts Basal Hollow	4 Moderate	Asymmetric to south. Basal borer blaze to east.
410	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	4.0	0.21	0.30	2.52	2.00	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
411	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	4.0	0.21	0.29	2.52	1.97	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
412	1		*Eucalyptus saligna*	Sydney Blue Gum	19.5	5.0	0.31	0.40	3.72	2.25	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
413	1		*Eucalyptus saligna*	Sydney Blue Gum	17.5	4.0	0.19	0.28	2.28	1.94	Semi-mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to south.
414	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	6.0	0.17	0.24	2.04	1.82	Semi-mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to south.
415	1		*Casuarina cunninghamiana*	River She-Oak	21.0	7.0	0.33	0.48	3.96	2.43	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Native		3 Low	Sparse canopy.
416	1		*Casuarina cunninghamiana*	River She-Oak	21.0	7.0	0.36	0.48	4.32	2.43	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Native		3 Low	Sparse canopy.
417	1		*Eucalyptus saligna*	Sydney Blue Gum	19.5	9.0	0.41	0.50	4.92	2.47	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
418	1		*Eucalyptus saligna*	Sydney Blue Gum	34.0	16.0	0.78	0.84	9.36	3.08	Mature	Normal	Average	Branch Tearouts Deadwood-Major	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
419	1		*Eucalyptus saligna*	Sydney Blue Gum	14.0	10.0	0.42	0.50	5.04	2.47	Mature	Normal	Average	Branch Tearouts Deadwood-Major Asymmetric Canopy	Long (>40 years)	Endemic	Small Hollows or Spouts	4 Moderate	Very asymmetric to south.
420	1		*Casuarina cunninghamiana*	River She-Oak	24.0	5.0	0.24	0.32	2.88	2.05	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	Sparse canopy.
421	1		*Eucalyptus saligna*	Sydney Blue Gum	19.5	9.0	0.20	0.28	2.40	1.94	Semi-mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to east.
422	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	15.0	0.52	0.69	6.24	2.83	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
423	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	12.0	0.38	0.50	4.56	2.47	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to south.
424	1		*Acacia falcata*	Hickory Wattle	20.0	6.0	0.31	0.35	3.72	2.13	Mature	Normal	Average	Deadwood-Minor Lean-Minor	Medium (15-40 years)	Endemic		4 Moderate	
425	1		*Grevillea robusta*	Silky Oak	19.0	8.0	0.26	0.34	3.12	2.10	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Invasive		3 Low	
426	1		*Grevillea robusta*	Silky Oak	19.0	6.0	0.25	0.33	3.00	2.08	Mature	Fair	Good	Deadwood-Minor	Long (>40 years)	Invasive		3 Low	
427	1		*Grevillea robusta*	Silky Oak	19.0	6.0	0.23	0.30	2.76	2.00	Mature	Fair	Poor	Deadwood-Minor Co-dominant Stems Inclusions	Short (5-15 years)	Invasive		2 Very Poor	
428	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	5.0	0.30	0.39	3.60	2.23	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
429	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	5.0	0.26	0.32	3.12	2.05	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
430	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	5.0	0.22	0.29	2.64	1.97	Mature	Fair	Average		Long (>40 years)	Endemic		4 Moderate	
431	1		*Eucalyptus saligna*	Sydney Blue Gum	34.0	16.0	0.87	1.02	10.44	3.34	Mature	Normal	Good	Deadwood-Major Branch Tearouts	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Basal wounding to north, but good signs of reaction wood.
432	1		*Angophora floribunda*	Rough-barked Apple	12.0	8.0	0.19	0.25	2.28	1.85	Mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Sparse canopy. Very asymmetric to south.
433	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	5.0	0.26	0.33	3.12	2.08	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
434	1		*Angophora floribunda*	Rough-barked Apple	26.0	16.0	0.71	0.86	8.52	3.11	Mature	Good	Good	Deadwood-Major Branch Tearouts	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Good tree.
435	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	4.0	0.15	0.18	2.00	1.61	Mature	Fair	Average		Long (>40 years)	Endemic		4 Moderate	
436	1		*Eucalyptus saligna*	Sydney Blue Gum	19.5	9.0	0.33	0.37	3.96	2.18	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
437	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	8.0	0.36	0.45	4.32	2.37	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
438	1		*Angophora floribunda*	Rough-barked Apple	17.0	8.0	0.32	0.41	3.84	2.28	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
439	1		*Eucalyptus pilularis*	Blackbutt	38.0	16.0	0.82	0.96	9.84	3.25	Mature	Excellent	Good	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Good tree.
440	2		*Eucalyptus saligna*	Sydney Blue Gum	24.0	9.0	0.65	1.12	7.80	3.47	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Two trees growing side by side. Asymmetric canopy either side east and west.
441	1		*Eucalyptus botryoides*	Bangalay	18.0	6.0	0.35	0.39	4.20	2.23	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
442	2		*Eucalyptus botryoides*	Bangalay	14.0	2.0	0.33	0.49	3.96	2.45	Dead	Dead	Average	Deadwood-Major	Remove (<5 years)	Native		1 Dead	No stag creation potential
443	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	7.0	0.26	0.36	3.12	2.15	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
444	1		*Grevillea robusta*	Silky Oak	16.0	12.0	0.40	0.46	4.80	2.39	Mature	Normal	Poor	Deadwood-Minor Congested Branches	Long (>40 years)	Invasive		3 Low	
445	1		*Grevillea robusta*	Silky Oak	19.0	14.0	0.51	0.59	6.12	2.65	Mature	Normal	Average	Deadwood-Minor Congested Branches	Long (>40 years)	Invasive		3 Low	
446	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	11.0	0.52	0.59	6.24	2.65	Mature	Normal	Good	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the east.
447	1		*Casuarina cunninghamiana*	River She-Oak	10.5	7.0	0.21	0.25	2.52	1.85	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		3 Low	Asymmetric to the north.
448	1		*Casuarina cunninghamiana*	River She-Oak	13.0	7.0	0.37	0.55	4.44	2.57	Mature	Normal	Poor	Asymmetric Canopy Co-dominant Stems	Long (>40 years)	Native		3 Low	Asymmetric to the north.
449	1		*Casuarina cunninghamiana*	River She-Oak	15.0	7.0	0.37	0.65	4.44	2.76	Mature	Normal	Average	Asymmetric Canopy Co-dominant Stems Deadwood-Minor	Long (>40 years)	Native		3 Low	Asymmetric to the north. Three trunks.
450	1		*Casuarina cunninghamiana*	River She-Oak	16.5	8.0	0.37	0.46	4.44	2.39	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Native		3 Low	Asymmetric to the north. Three trees in a closely spaced row.
451	1		*Casuarina cunninghamiana*	River She-Oak	16.5	8.0	0.33	0.39	3.96	2.23	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor Branch Tearouts	Long (>40 years)	Native		3 Low	Asymmetric to the north. Three trees in a closely spaced row.
452	1		*Casuarina cunninghamiana*	River She-Oak	17.0	8.0	0.54	0.63	6.48	2.73	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Native		3 Low	Three trees in a closely spaced row. Bases sitting in a hollow.
453	1		*Casuarina cunninghamiana*	River She-Oak	17.0	14.0	0.85	0.85	10.20	3.09	Mature	Normal	Average	Branch Tearouts Deadwood-Major Decay-Minor	Long (>40 years)	Native		3 Low	Big tree on edge of quarry void.
454	1		*Casuarina cunninghamiana*	River She-Oak	14.0	11.0	0.42	0.54	5.04	2.55	Mature	Fair	Average	Tip Dieback Deadwood-Minor	Long (>40 years)	Native		3 Low	
455	2		*Casuarina cunninghamiana*	River She-Oak	20.5	11.0	0.50	0.70	6.00	2.85	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Native		3 Low	Second smaller and suppressed specimens to north-east by 1.5m.
456	1		*Casuarina cunninghamiana*	River She-Oak	19.0	11.0	0.87	0.87	10.44	3.12	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
457	1		*Pinus radiata ?*	Monterey Pine	17.0	11.0	0.45	0.56	5.40	2.59	Mature	Fair	Average	Deadwood-Minor	Medium (15-40 years)	Exotic		3 Low	Two needles, larger cones
458	1		*Casuarina cunninghamiana*	River She-Oak	17.0	11.0	0.56	0.66	6.72	2.78	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
459	1		*Casuarina cunninghamiana*	River She-Oak	20.5	11.0	0.63	0.73	7.56	2.90	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Native		3 Low	
460	2		*Casuarina cunninghamiana*	River She-Oak	19.5	9.0	0.37	0.50	4.44	2.47	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	Smaller tree to south less than 1000mm from trunk.
461	1		*Casuarina cunninghamiana*	River She-Oak	20.5	13.0	0.49	0.63	5.88	2.73	Mature	Normal	Good	Deadwood-Minor Branch Tearouts	Long (>40 years)	Native		3 Low	
462	1		*Casuarina cunninghamiana*	River She-Oak	20.5	5.0	0.32	0.40	3.84	2.25	Mature	Normal	Good	Deadwood-Minor Branch Tearouts	Long (>40 years)	Native		3 Low	
463	2		*Casuarina cunninghamiana*	River She-Oak	21.0	10.0	0.34	0.43	4.08	2.32	Mature	Normal	Good	Deadwood-Minor Branch Tearouts Asymmetric Canopy	Long (>40 years)	Native		3 Low	Group of two very closely spaced. Inter growing canopies. 1m to south of one surveyed.
464	1		*Eucalyptus pilularis*	Blackbutt	13.0	5.0	0.30	0.34	3.60	2.10	Semi-mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
465	1		*Eucalyptus pilularis*	Blackbutt	13.0	5.0	0.29	0.33	3.48	2.08	Semi-mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
466	1		*Eucalyptus pilularis*	Blackbutt	16.5	7.0	0.43	0.51	5.16	2.49	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
467	1		*Eucalyptus pilularis*	Blackbutt	19.5	8.0	0.38	0.47	4.56	2.41	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
468	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	6.0	0.35	0.39	4.20	2.23	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
469	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	3.0	0.18	0.25	2.16	1.85	Semi-mature	Fair	Average		Long (>40 years)	Endemic		4 Moderate	
470	1		*Eucalyptus saligna*	Sydney Blue Gum	15.0	4.0	0.27	0.34	3.24	2.10	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Asymmetric to north-east. Prominent kink in trunk at 2.5m
471	1		*Eucalyptus saligna*	Sydney Blue Gum	13.0	8.0	0.26	0.31	3.12	2.02	Mature	Fair	Poor	Lean-Major Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Very asymmetric canopy to north.
472	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	10.0	0.51	0.61	6.12	2.69	Mature	Normal	Average	Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
473	1		*Eucalyptus saligna*	Sydney Blue Gum	24.5	7.0	0.40	0.50	4.80	2.47	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-east.
474	1		*Eucalyptus saligna*	Sydney Blue Gum	23.5	5.0	0.29	0.34	3.48	2.10	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-west.
475	2		*Eucalyptus saligna*	Sydney Blue Gum	15.0	4.0	0.18	0.22	2.16	1.75	Semi-mature	Normal	Average	Co-dominant Stems Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Smaller trunk adjacent to east. Asymmetric to north.
476	1		*Eucalyptus saligna*	Sydney Blue Gum	17.0	7.0	0.25	0.29	3.00	1.97	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
477	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	5.0	0.27	0.35	3.24	2.13	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
478	1		*Eucalyptus saligna*	Sydney Blue Gum	13.5	3.0	0.15	0.21	2.00	1.72	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
479	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	7.0	0.40	0.45	4.80	2.37	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
480	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	9.0	0.32	0.38	3.84	2.20	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
481	1		*Eucalyptus saligna*	Sydney Blue Gum	12.5	4.0	0.18	0.23	2.16	1.79	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
482	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	7.0	0.35	0.40	4.20	2.25	Mature	Normal	Average	Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
483	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	3.0	0.23	0.26	2.76	1.88	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-east.
484	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	6.0	0.29	0.40	3.48	2.25	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
485	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	6.0	0.33	0.41	3.96	2.28	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
486	1		*Eucalyptus saligna*	Sydney Blue Gum	12.0	3.0	0.19	0.27	2.28	1.91	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
487	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	7.0	0.32	0.45	3.84	2.37	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
488	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	9.0	0.35	0.42	4.20	2.30	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
489	1		*Eucalyptus saligna*	Sydney Blue Gum	13.5	7.0	0.17	0.20	2.04	1.68	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
490	1		*Eucalyptus saligna*	Sydney Blue Gum	16.5	6.0	0.22	0.29	2.64	1.97	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
491	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	4.0	0.50	0.50	6.00	2.47	Dead	Dead	Average	Deadwood-Major	Medium (15-40 years)	Endemic	Small Hollows or Spouts Stag Creation Potential	1 Dead	
492	1		*Eucalyptus saligna*	Sydney Blue Gum	14.5	5.0	0.18	0.33	2.16	2.08	Mature	Normal	Poor	Pest/Disease Asymmetric Canopy Decay-Minor	Long (>40 years)	Endemic		3 Low	Asymmetric to north. Previous codominant stem failure. Borer attack.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
493	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	11.0	0.50	0.65	6.00	2.76	Mature	Good	Good		Long (>40 years)	Endemic		5 High	Good tree.
494	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	12.0	0.27	0.34	3.24	2.10	Mature	Normal	Poor	Co-dominant Stems Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Bifurcated trunk at 3.0m with contorted trunks.
495	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	6.0	0.34	0.45	4.08	2.37	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
496	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	12.0	0.56	0.62	6.72	2.71	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Good tree growing within an artificial gully. Adjoining angophora leaning against trunk.
497	1		*Angophora floribunda*	Rough-barked Apple	18.0	12.0	0.46	0.51	5.52	2.49	Mature	Fair	Poor	Lean-Major Deadwood-Major Tip Dieback Asymmetric Canopy	Short (5-15 years)	Endemic		2 Very Poor	Leaning against trunk adjoining. Appears to have had partial rootplate failure. Very asymmetric to north.
498	1		*Angophora floribunda*	Rough-barked Apple	20.0	12.0	0.45	0.51	5.40	2.49	Mature	Fair	Average	Asymmetric Canopy Lean-Minor Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-east.
499	1		*Angophora floribunda*	Rough-barked Apple	18.0	9.0	0.33	0.36	3.96	2.15	Mature	Fair	Average	Asymmetric Canopy Lean-Minor Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-west.
500	1		*Eucalyptus saligna*	Sydney Blue Gum	12.0	5.0	0.37	0.40	4.44	2.25	Dead	Dead	Average	Deadwood-Major Decay-Major	Medium (15-40 years)	Endemic		1 Dead	
501	1		*Angophora costata*	Smooth-barked Apple	19.0	8.0	0.33	0.35	3.96	2.13	Mature	Fair	Poor	Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Bulge on trunk and occluded injury from dead tree leaning at fork at 9.0m.
502	1		*Eucalyptus pilularis*	Blackbutt	26.0	12.0	0.50	0.57	6.00	2.61	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
503	1		*Eucalyptus pilularis*	Blackbutt	26.0	12.0	0.43	0.53	5.16	2.53	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Small Angophora leaning against trunk.
504	1		*Eucalyptus pilularis*	Blackbutt	28.0	14.0	0.68	0.81	8.16	3.03	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Growing in steep fill batter, otherwise good tree.
505	1		*Angophora floribunda*	Rough-barked Apple	11.0	8.0	0.15	0.20	2.00	1.68	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-west.
506	1		*Eucalyptus pilularis*	Blackbutt	19.0	7.0	0.23	0.28	2.76	1.94	Mature	Normal	Average	Deadwood-Minor Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Growing in steep fill batter, slight lean and asymmetric canopy to north-east.
507	1		*Angophora floribunda*	Rough-barked Apple	13.0	9.0	0.23	0.29	2.76	1.97	Mature	Normal	Average	Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-west.
508	1		*Angophora floribunda*	Rough-barked Apple	15.0	7.0	0.29	0.35	3.48	2.13	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
509	1		*Angophora floribunda*	Rough-barked Apple	19.0	15.0	0.65	0.70	7.80	2.85	Mature	Good	Average	Deadwood-Minor Co-dominant Stems Termites	Long (>40 years)	Endemic		5 High	Good tree on steep batter.
510	1		*Eucalyptus pilularis*	Blackbutt	20.0	5.0	0.35	0.37	4.20	2.18	Dead	Dead	Average	Deadwood-Major Decay-Major	Medium (15-40 years)	Endemic	Stag Creation Potential	1 Dead	Minimal habitat value other than attaching nest boxes.
511	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	13.0	0.82	0.91	9.84	3.18	Mature	Good	Average	Deadwood-Minor Lean-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	Good tree. Slight lean to north-east.
512	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	9.0	0.90	0.90	10.80	3.17	Dead	Dead	Average	Deadwood-Major Decay-Major Termites	Medium (15-40 years)	Endemic	Stag Creation Potential Large Hollow	1 Dead	Major hollow.
513	1		*Eucalyptus pilularis*	Blackbutt	24.0	8.0	0.39	0.45	4.68	2.37	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
514	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	5.0	0.42	0.42	5.04	2.30	Dead	Dead	Average	Deadwood-Major	Medium (15-40 years)	Endemic	Stag Creation Potential	1 Dead	Minimal habitat value other than attaching nest boxes.
515	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	5.0	0.70	0.75	8.40	2.93	Dead	Dead	Average	Deadwood-Major Decay-Major	Medium (15-40 years)	Endemic	Stag Creation Potential	1 Dead	Minimal habitat value. Extensively decayed.
516	2		*Angophora floribunda*	Rough-barked Apple	13.5	8.0	0.26	0.30	3.12	2.00	Mature	Fair	Poor	Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Group of two with smaller tree to west against dead tree. Asymmetric east.
517	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	18.0	0.82	0.95	9.84	3.24	Mature	Good	Average	Branch Tearouts Deadwood-Major	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	Good tree. Potential large hollow habitat value in future.
518	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	8.0	0.45	0.50	5.40	2.47	Dead	Dead	Average	Deadwood-Major	Short (5-15 years)	Endemic	Stag Creation Potential	1 Dead	Minimal habitat value other than attaching nest boxes.
519	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	14.0	0.99	0.99	11.88	3.30	Mature	Good	Average	Branch Tearouts Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic	Small Hollows or Spouts	4 Moderate	
520	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	14.0	0.68	0.77	8.16	2.97	Mature	Good	Good	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
521	1		*Syncarpia glomulifera*	Turpentine	14.5	4.0	0.27	0.33	3.24	2.08	Mature	Good	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	
522	1		*Eucalyptus botryoides*	Bangalay	16.0	12.0	0.57	0.62	6.84	2.71	Mature	Good	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Native		4 Moderate	
523	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	14.0	0.38	0.48	4.56	2.43	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
524	1		*Eucalyptus botryoides*	Bangalay	22.0	12.0	0.50	0.57	6.00	2.61	Mature	Normal	Average	Branch Tearouts Deadwood-Major	Long (>40 years)	Native		4 Moderate	
525	1		*Eucalyptus botryoides*	Bangalay	22.0	12.0	0.41	0.53	4.92	2.53	Mature	Normal	Average	Branch Tearouts Deadwood-Major	Long (>40 years)	Native		4 Moderate	
526	1		*Syncarpia glomulifera*	Turpentine	14.5	5.0	0.35	0.34	4.20	2.10	Mature	Poor	Average	Deadwood-Minor Co-dominant Stems Pest/Disease	Long (>40 years)	Endemic		4 Moderate	
527	1		*Lophostemon confertus*	Brush Box	16.0	4.0	0.25	0.48	3.00	2.43	Mature	Fair	Average	Co-dominant Stems Pest/Disease	Long (>40 years)	Native		3 Low	Codominant stem from base.
528	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	14.0	0.48	0.69	5.76	2.83	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
529	1		*Lophostemon confertus*	Brush Box	14.5	4.0	0.17	0.27	2.04	1.91	Mature	Fair	Poor	Co-dominant Stems Pest/Disease Tip Dieback	Long (>40 years)	Native		3 Low	Codominant stem from base. Asymmetric to west.
530	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	17.0	0.36	0.75	4.32	2.93	Mature	Normal	Good	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	
531	1		*Syncarpia glomulifera*	Turpentine	15.5	5.0	0.31	0.37	3.72	2.18	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
532	1		*Angophora costata*	Smooth-barked Apple	20.0	12.0	0.35	0.41	4.20	2.28	Mature	Fair	Average	Deadwood-Major	Long (>40 years)	Endemic		3 Low	
533	1		*Eucalyptus botryoides*	Bangalay	16.0	7.0	0.41	0.46	4.92	2.39	Mature	Normal	Average	Branch Tearouts Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric to north.
534	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	14.0	0.48	0.54	5.76	2.55	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
535	1		*Lophostemon confertus*	Brush Box	14.0	5.0	0.21	0.27	2.52	1.91	Semi-mature	Fair	Average	Pest/Disease	Long (>40 years)	Native		3 Low	
536	1		*Eucalyptus botryoides*	Bangalay	19.0	9.0	0.41	0.47	4.92	2.41	Mature	Fair	Average	Branch Tearouts Asymmetric Canopy Deadwood-Minor Lean-Minor	Long (>40 years)	Native		3 Low	Asymmetric to north.
537	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	16.0	0.55	0.70	6.60	2.85	Mature	Normal	Average	Deadwood-Minor Branch Tearouts Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Minor butt lean then corrected.
538	1		*Lophostemon confertus*	Brush Box	12.0	9.0	0.16	0.40	2.00	2.25	Mature	Fair	Poor	Pest/Disease Co-dominant Stems	Long (>40 years)	Native		3 Low	Codominant trunks from ground level.
539	1		*Eucalyptus botryoides*	Bangalay	15.5	12.0	0.43	0.53	5.16	2.53	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
540	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	10.0	0.38	0.56	4.56	2.59	Mature	Normal	Poor	Deadwood-Minor Lean-Major	Long (>40 years)	Endemic		3 Low	Major lean to north east but then corrected.
541	1		*Eucalyptus botryoides*	Bangalay	19.0	10.0	0.49	0.67	5.88	2.80	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Native		3 Low	
542	1		*Syncarpia glomulifera*	Turpentine	18.0	7.0	0.29	0.35	3.48	2.13	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
543	1		*Eucalyptus botryoides*	Bangalay	18.0	9.0	0.39	0.50	4.68	2.47	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
544	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	16.0	0.55	0.68	6.60	2.81	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
545	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	16.0	0.57	0.67	6.84	2.80	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
546	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	12.0	0.32	0.44	3.84	2.34	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
547	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	16.0	0.69	0.77	8.28	2.97	Mature	Normal	Good	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		5 High	

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
548	1		*Pittosporum undulatum*	Sweet Pittosporum	16.5	12.0	0.31	0.35	3.72	2.13	Mature	Good	Good	Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	
549	1		*Eucalyptus pilularis*	Blackbutt	28.0	12.0	0.36	0.44	4.32	2.34	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to east
550	1		*Eucalyptus pilularis*	Blackbutt	16.0	12.0	0.20	0.25	2.40	1.85	Dead	Dead	Average	Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	Little habitat value.
551	1		*Eucalyptus pilularis*	Blackbutt	30.0	12.0	0.72	0.85	8.64	3.09	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
552	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	8.0	0.30	0.36	3.60	2.15	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north-east.
553	1		*Eucalyptus pilularis*	Blackbutt	28.0	7.0	0.46	0.53	5.52	2.53	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts	4 Moderate	
554	1		*Angophora costata*	Smooth-barked Apple	24.0	8.0	0.52	0.68	6.24	2.81	Mature	Fair	Average	Deadwood-Minor Cavity Branch Tearouts	Long (>40 years)	Endemic	Basal Hollow	4 Moderate	Basal cavity to south. Large tear out at 9.0m to north.
555	1		*Eucalyptus pilularis*	Blackbutt	32.0	12.0	0.66	0.82	7.92	3.04	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good tree.
556	1		*Eucalyptus pilularis*	Blackbutt	32.0	16.0	1.02	1.15	12.24	3.51	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good tree.
557	1		*Eucalyptus pilularis*	Blackbutt	24.0	10.0	0.39	0.47	4.68	2.41	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
558	1		*Eucalyptus pilularis*	Blackbutt	33.0	16.0	0.69	0.75	8.28	2.93	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
559	1		*Eucalyptus pilularis*	Blackbutt	29.0	10.0	0.43	0.57	5.16	2.61	Mature	Fair	Average	Asymmetric Canopy Epicormic Growth Deadwood-Major Branch Tearouts	Long (>40 years)	Endemic		3 Low	Asymmetric to north-west.
560	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	12.0	0.55	0.65	6.60	2.76	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
561	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	8.0	0.18	0.24	2.16	1.82	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		3 Low	
562	1		*Eucalyptus saligna*	Sydney Blue Gum	36.0	12.0	0.54	0.67	6.48	2.80	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
563	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	10.0	0.54	0.67	6.48	2.80	Mature	Fair	Average	Deadwood-Major Asymmetric Canopy Cavity	Long (>40 years)	Endemic	Basal Hollow	4 Moderate	Asymmetric canopy to north east. Basal cavity.
564	1		*Eucalyptus saligna*	Sydney Blue Gum	34.0	20.0	0.78	0.90	9.36	3.17	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
565	1		*Angophora floribunda*	Rough-barked Apple	15.0	9.0	0.26	0.34	3.12	2.10	Mature	Fair	Poor	Asymmetric Canopy Branch Tearouts Decay-Minor	Long (>40 years)	Endemic		3 Low	Very asymmetric canopy to north east. Major tear out at 8.0m to south.
566	1		*Eucalyptus saligna*	Sydney Blue Gum	15.0	9.0	0.24	0.30	2.88	2.00	Mature	Fair	Poor	Asymmetric Canopy Lean-Major	Short (5-15 years)	Endemic		2 Very Poor	Very major lean and asymmetric canopy to north east. Suspected rootplate failure.
567	1		*Angophora floribunda*	Rough-barked Apple	18.5	8.0	0.41	0.50	4.92	2.47	Mature	Fair	Average	Asymmetric Canopy Branch Tearouts	Long (>40 years)	Endemic		3 Low	Asymmetric canopy to north east. Failed tree leaning through fork.
568	1		*Eucalyptus saligna*	Sydney Blue Gum	35.0	16.0	0.62	0.80	7.44	3.01	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
569	1		*Angophora floribunda*	Rough-barked Apple	18.5	8.0	0.40	0.51	4.80	2.49	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
570	1		*Angophora floribunda*	Rough-barked Apple	19.0	8.0	0.33	0.40	3.96	2.25	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
571	1		*Angophora floribunda*	Rough-barked Apple	19.0	8.0	0.34	0.40	4.08	2.25	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Very Asymmetric to north.
572	1		*Angophora floribunda*	Rough-barked Apple	17.0	8.0	0.40	0.49	4.80	2.45	Mature	Poor	Average	Asymmetric Canopy Deadwood-Major	Medium (15-40 years)	Endemic		3 Low	Asymmetric to north. Very sparse canopy.
573	1		*Syncarpia glomulifera*	Turpentine	17.0	7.0	0.25	0.40	3.00	2.25	Mature	Normal	Average	Deadwood-Major Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
574	1		*Angophora floribunda*	Rough-barked Apple	17.0	4.0	0.28	0.50	3.36	2.47	Dead	Dead	Average	Decay-Major Deadwood-Major Co-dominant Stems	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
575	1		*Angophora floribunda*	Rough-barked Apple	19.0	8.0	0.44	0.55	5.28	2.57	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
576	1		*Angophora floribunda*	Rough-barked Apple	18.0	7.0	0.37	0.60	4.44	2.67	Mature	Normal	Poor	Asymmetric Canopy Lean-Minor Deadwood-Major Branch Tearouts Buldges	Long (>40 years)	Endemic		3 Low	Asymmetric canopy to north.
577	1		*Angophora floribunda*	Rough-barked Apple	17.0	4.0	0.30	0.40	3.60	2.25	Dead	Dead	Average	Decay-Major Deadwood-Major Lean-Minor	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
578	1		*Angophora floribunda*	Rough-barked Apple	20.0	12.0	0.62	0.75	7.44	2.93	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		4 Moderate	Growing adjacent and amongst rock.
579	1		*Angophora floribunda*	Rough-barked Apple	19.0	12.0	0.37	0.48	4.44	2.43	Mature	Fair	Poor	Deadwood-Minor Tip Dieback Termites	Long (>40 years)	Endemic		3 Low	
580	1		*Angophora floribunda*	Rough-barked Apple	19.0	8.0	0.40	0.48	4.80	2.43	Mature	Fair	Poor	Tip Dieback Deadwood-Major Co-dominant Stems	Long (>40 years)	Endemic		3 Low	Growing on edge of washout. Minimal. Foliage
581	1		*Angophora floribunda*	Rough-barked Apple	17.0	6.0	0.22	0.27	2.64	1.91	Mature	Fair	Poor	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Minimal. Foliage
582	1		*Angophora floribunda*	Rough-barked Apple	17.0	6.0	0.19	0.22	2.28	1.75	Semi-mature	Fair	Poor	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		3 Low	Minimal foliage.
583	1		*Angophora floribunda*	Rough-barked Apple	18.0	4.0	0.24	0.30	2.88	2.00	Dead	Dead	Average	Decay-Major Deadwood-Major Lean-Minor	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
584	1		*Syncarpia glomulifera*	Turpentine	25.0	14.0	0.75	1.00	9.00	3.31	Mature	Good	Good	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		5 High	Growing adjacent to deep washout.
585	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	15.0	0.55	0.67	6.60	2.80	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Growing adjacent to washout.
586	1		*Eucalyptus saligna*	Sydney Blue Gum	35.0	18.0	0.79	0.87	9.48	3.12	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
587	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	15.0	0.50	0.60	6.00	2.67	Mature	Fair	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	
588	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	15.0	0.46	0.52	5.52	2.51	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
589	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	11.0	0.38	0.46	4.56	2.39	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
590	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	10.0	0.44	0.48	5.28	2.43	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
591	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	7.0	0.17	0.20	2.04	1.68	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
592	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	18.0	0.95	0.95	11.40	3.24	Mature	Normal	Average	Deadwood-Major Co-dominant Stems	Long (>40 years)	Endemic	Small Hollows or Spouts	5 High	
593	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	4.0	0.45	0.55	5.40	2.57	Dead	Dead	Average	Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
594	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	10.0	0.60	0.68	7.20	2.81	Mature	Fair	Average	Deadwood-Minor Epicormic Growth Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Minor lean but then corrected.
595	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	10.0	0.41	0.48	4.92	2.43	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
596	1		*Angophora floribunda*	Rough-barked Apple	22.0	7.0	0.36	0.36	4.32	2.15	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
597	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	7.0	0.26	0.30	3.12	2.00	Mature	Fair	Poor	Deadwood-Minor Epicormic Growth Lean-Minor	Long (>40 years)	Endemic		3 Low	Minor lean but then corrected. Top partially broken and kinked.
598	1		*Angophora floribunda*	Rough-barked Apple	26.0	6.0	0.35	0.45	4.20	2.37	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
599	1		*Pittosporum undulatum*	Sweet Pittosporum	13.0	8.0	0.20	0.26	2.40	1.88	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Lean-Minor	Medium (15-40 years)	Endemic		4 Moderate	
600	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	2.0	0.90	0.90	10.80	3.17	Dead	Dead	Average	Deadwood-Major Co-dominant Stems	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
601	1		*Angophora floribunda*	Rough-barked Apple	12.0	2.0	0.22	0.35	2.64	2.13	Mature	Poor	Average	Epicormic Growth Decay-Minor Deadwood-Major	Short (5-15 years)	Endemic		2 Very Poor	

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
602	1		*Angophora floribunda*	Rough-barked Apple	16.0	8.0	0.46	0.46	5.52	2.39	Mature	Fair	Poor	Deadwood-Minor Inclusions Co-dominant Stems	Long (>40 years)	Endemic		3 Low	
603	1		*Angophora floribunda*	Rough-barked Apple	17.0	8.0	0.43	0.50	5.16	2.47	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
604	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	14.0	0.70	0.87	8.40	3.12	Mature	Normal	Average	Deadwood-Minor Epicormic Growth Lean-Minor	Long (>40 years)	Endemic		4 Moderate	
605	1		*Pittosporum undulatum*	Sweet Pittosporum	12.0	9.0	0.22	0.25	2.64	1.85	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy Lean-Minor	Medium (15-40 years)	Endemic		3 Low	
606	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	8.0	0.36	0.44	4.32	2.34	Mature	Fair	Poor	Deadwood-Minor	Long (>40 years)	Endemic		3 Low	
607	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	15.0	0.70	0.84	8.40	3.08	Mature	Normal	Average	Deadwood-Minor Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
608	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	9.0	0.26	0.30	3.12	2.00	Mature	Normal	Average	Deadwood-Minor Lean-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north. Growing out of rock.
609	1		*Pittosporum undulatum*	Sweet Pittosporum	14.0	8.0	0.22	0.26	2.64	1.88	Mature	Normal	Average	Deadwood-Minor	Medium (15-40 years)	Endemic		4 Moderate	
610	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	10.0	0.80	0.97	9.60	3.27	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Cavity	Long (>40 years)	Endemic	Basal Hollow	4 Moderate	Asymmetric to north. Cavity at base on eastern side.
611	1		*Angophora floribunda*	Rough-barked Apple	16.5	8.0	0.30	0.36	3.60	2.15	Mature	Fair	Average	Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		4 Moderate	
612	1		*Pittosporum undulatum*	Sweet Pittosporum	15.5	6.0	0.26	0.32	3.12	2.05	Mature	Fair	Poor	Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	
613	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	5.0	0.55	0.68	6.60	2.81	Dead	Dead	Average	Deadwood-Major	Short (5-15 years)	Endemic	Stag Creation Potential	1 Dead	
614	1		*Pittosporum undulatum*	Sweet Pittosporum	18.5	10.0	0.28	0.33	3.36	2.08	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Medium (15-40 years)	Endemic		4 Moderate	
615	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	10.0	0.36	0.42	4.32	2.30	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
616	1		*Eucalyptus saligna*	Sydney Blue Gum	34.5	13.0	0.50	0.62	6.00	2.71	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
617	1		*Eucalyptus saligna*	Sydney Blue Gum	34.0	10.0	0.48	0.55	5.76	2.57	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-west.
618	1		*Eucalyptus saligna*	Sydney Blue Gum	33.5	10.0	0.54	0.60	6.48	2.67	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
619	1		*Eucalyptus saligna*	Sydney Blue Gum	33.0	10.0	0.48	0.62	5.76	2.71	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
620	1		*Eucalyptus saligna*	Sydney Blue Gum	18.5	8.0	0.21	0.25	2.52	1.85	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
621	1		*Eucalyptus saligna*	Sydney Blue Gum	21.5	10.0	0.37	0.45	4.44	2.37	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
622	1		*Pittosporum undulatum*	Sweet Pittosporum	17.5	11.0	0.26	0.45	3.12	2.37	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Medium (15-40 years)	Endemic		4 Moderate	Three stems from base.
623	1		*Eucalyptus saligna*	Sydney Blue Gum	26.5	11.0	0.44	0.55	5.28	2.57	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
624	1		*Eucalyptus saligna*	Sydney Blue Gum	25.5	12.0	0.33	0.39	3.96	2.23	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
625	1		*Pittosporum undulatum*	Sweet Pittosporum	15.5	8.0	0.21	0.25	2.52	1.85	Mature	Normal	Poor	Deadwood-Minor Epicormic Growth	Medium (15-40 years)	Endemic		3 Low	
626	1		*Eucalyptus saligna*	Sydney Blue Gum	31.5	12.0	0.35	0.44	4.20	2.34	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
627	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	9.0	0.26	0.35	3.12	2.13	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-east.
628	1		*Angophora floribunda*	Rough-barked Apple	15.5	6.0	0.17	0.23	2.04	1.79	Mature	Poor	Poor	Deadwood-Major Tip Dieback	Medium (15-40 years)	Endemic		3 Low	
629	1		*Eucalyptus microcorys*	Tallowood	30.5	14.0	0.62	0.65	7.44	2.76	Mature	Normal	Average	Deadwood-Major	Long (>40 years)	Native		4 Moderate	
630	1		*Eucalyptus microcorys*	Tallowood	29.5	9.0	0.45	0.50	5.40	2.47	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
631	1		*Eucalyptus microcorys*	Tallowood	28.5	7.0	0.49	0.55	5.88	2.57	Dead	Dead	Average	Co-dominant Stems Deadwood-Major	Remove (<5 years)	Native		1 Dead	Codominant at 5m.
632	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	9.0	0.39	0.45	4.68	2.37	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
633	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	7.0	0.15	0.19	2.00	1.65	Semi-mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
634	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	9.0	0.32	0.40	3.84	2.25	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
635	1		*Eucalyptus saligna*	Sydney Blue Gum	31.5	10.0	0.49	0.55	5.88	2.57	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
636	1		*Eucalyptus saligna*	Sydney Blue Gum	18.5	6.0	0.20	0.25	2.40	1.85	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
637	1		*Eucalyptus saligna*	Sydney Blue Gum	31.5	13.0	0.44	0.49	5.28	2.45	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
638	1		*Eucalyptus microcorys*	Tallowood	29.5	5.0	0.44	0.53	5.28	2.53	Mature	Poor	Poor	Deadwood-Major Epicormic Growth	Long (>40 years)	Native		3 Low	
639	1		*Eucalyptus microcorys*	Tallowood	30.5	10.0	0.50	0.64	6.00	2.74	Mature	Normal	Average	Deadwood-Major Epicormic Growth Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
640	1		*Eucalyptus microcorys*	Tallowood	29.5	6.0	0.51	0.65	6.12	2.76	Mature	Normal	Average	Deadwood-Major Epicormic Growth Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
641	1		*Eucalyptus microcorys*	Tallowood	30.5	18.0	0.61	0.76	7.32	2.95	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
642	1		*Eucalyptus microcorys*	Tallowood	15.0	11.0	0.37	0.45	4.44	2.37	Mature	Fair	Poor	Deadwood-Major Asymmetric Canopy	Long (>40 years)	Native		3 Low	Asymmetric canopy to north-west.
643	1		*Eucalyptus microcorys*	Tallowood	12.0	8.0	0.20	0.28	2.40	1.94	Mature	Poor	Poor	Deadwood-Major Asymmetric Canopy	Long (>40 years)	Native		3 Low	Asymmetric canopy to north-east.
644	1		*Eucalyptus microcorys*	Tallowood	30.5	15.0	0.54	0.65	6.48	2.76	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north east.
645	1		*Eucalyptus saligna*	Sydney Blue Gum	26.5	9.5	0.52	0.61	6.24	2.69	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north
646	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	8.0	0.38	0.43	4.56	2.32	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
647	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	7.0	0.44	0.53	5.28	2.53	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
648	1		*Eucalyptus microcorys*	Tallowood	30.0	11.0	0.43	0.57	5.16	2.61	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
649	1		*Eucalyptus microcorys*	Tallowood	30.5	7.0	0.46	0.55	5.52	2.57	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
650	1		*Eucalyptus microcorys*	Tallowood	28.5	15.0	0.70	0.70	8.40	2.85	Mature	Normal	Poor	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Native		3 Low	Codominant at 1.5m.
651	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	12.0	0.34	0.44	4.08	2.34	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
652	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	9.0	0.38	0.48	4.56	2.43	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
653	1		*Eucalyptus microcorys*	Tallowood	29.0	10.0	0.40	0.48	4.80	2.43	Mature	Normal	Poor	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Native		3 Low	Adjacent tree resting in canopy. Asymmetric canopy to east.
654	1		*Eucalyptus pilularis*	Blackbutt	28.5	7.0	0.39	0.49	4.68	2.45	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-east.
655	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	5.0	0.26	0.32	3.12	2.05	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to east.
656	1		*Eucalyptus saligna*	Sydney Blue Gum	26.5	4.0	0.22	0.29	2.64	1.97	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to east.
657	1		*Angophora floribunda*	Rough-barked Apple	18.0	7.0	0.35	0.41	4.20	2.28	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
658	1		*Eucalyptus microcorys*	Tallowood	27.5	12.0	0.39	0.45	4.68	2.37	Mature	Normal	Average	Deadwood-Major	Long (>40 years)	Native		4 Moderate	
659	1		*Eucalyptus pilularis*	Blackbutt	29.5	10.0	0.41	0.50	4.92	2.47	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
660	1		*Eucalyptus pilularis*	Blackbutt	20.5	5.0	0.25	0.33	3.00	2.08	Mature	Normal	Poor	Asymmetric Canopy Deadwood-Minor Branch Tearouts Lean-Major	Long (>40 years)	Endemic		3 Low	Asymmetric canopy to north. Suspected partial root plate failure.
661	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	5.0	0.27	0.29	3.24	1.97	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
662	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	4.0	0.20	0.25	2.40	1.85	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
663	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	9.0	0.39	0.46	4.68	2.39	Mature	Normal	Average	Deadwood-Major Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
664	1		*Angophora floribunda*	Rough-barked Apple	16.0	6.0	0.28	0.37	3.36	2.18	Mature	Normal	Average	Lean-Minor Deadwood-Minor Asymmetric Canopy	Remove (<5 years)	Endemic		4 Moderate	Asymmetric canopy to north.
665	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	1.0	0.25	0.30	3.00	2.00	Dead	Dead	Poor	Decay-Major Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	Minimal habitat potential.
666	1		*Eucalyptus microcorys*	Tallowood	26.0	16.0	0.55	0.62	6.60	2.71	Mature	Normal	Average	Deadwood-Major Epicormic Growth	Long (>40 years)	Native		4 Moderate	
667	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	7.0	0.36	0.47	4.32	2.41	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-east.
668	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	7.0	0.41	0.53	4.92	2.53	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north east.
669	1		*Angophora floribunda*	Rough-barked Apple	18.0	7.0	0.27	0.32	3.24	2.05	Mature	Fair	Poor	Deadwood-Minor Tip Dieback	Remove (<5 years)	Endemic		3 Low	
670	1		*Eucalyptus pilularis*	Blackbutt	27.5	9.0	0.40	0.47	4.80	2.41	Mature	Normal	Average	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
671	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	10.0	0.44	0.50	5.28	2.47	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
672	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	10.0	0.36	0.44	4.32	2.34	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
673	1		*Pittosporum undulatum*	Sweet Pittosporum	10.5	8.0	0.22	0.26	2.64	1.88	Mature	Fair	Poor	Epicormic Growth Deadwood-Minor	Short (5-15 years)	Endemic		3 Low	
674	1		*Eucalyptus pilularis*	Blackbutt	25.0	9.0	0.32	0.35	3.84	2.13	Mature	Fair	Poor	Asymmetric Canopy Deadwood-Major Tip Dieback	Long (>40 years)	Endemic		3 Low	Asymmetric canopy to north.
675	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	16.0	0.39	0.46	4.68	2.39	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
676	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	13.0	0.53	0.62	6.36	2.71	Mature	Normal	Average	Deadwood-Major Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to east.
677	1		*Eucalyptus acmenioides?*	White Mahogany	13.5	8.0	0.38	0.40	4.56	2.25	Mature	Fair	Poor	Asymmetric Canopy Deadwood-Major Tip Dieback Lean-Major	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to east.
678	1		*Eucalyptus microcorys*	Tallowood	29.5	18.0	0.60	0.73	7.20	2.90	Mature	Normal	Average	Epicormic Growth Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
679	1		*Eucalyptus microcorys*	Tallowood	28.0	14.0	0.57	0.77	6.84	2.97	Mature	Normal	Average	Epicormic Growth Deadwood-Major	Long (>40 years)	Native		4 Moderate	
680	1		*Eucalyptus microcorys*	Tallowood	27.5	16.0	0.78	0.97	9.36	3.27	Mature	Normal	Average	Epicormic Growth Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
681	1		*Angophora floribunda*	Rough-barked Apple	20.5	9.0	0.36	0.45	4.32	2.37	Mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
682	1		*Eucalyptus microcorys*	Tallowood	25.5	11.0	0.51	0.56	6.12	2.59	Mature	Normal	Average	Epicormic Growth Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
683	1		*Eucalyptus microcorys*	Tallowood	26.0	16.0	0.54	0.67	6.48	2.80	Mature	Normal	Average	Epicormic Growth Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
684	1		*Eucalyptus microcorys*	Tallowood	24.5	14.0	0.38	0.40	4.56	2.25	Mature	Normal	Average	Epicormic Growth Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north-east.
685	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	16.0	0.58	0.64	6.96	2.74	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to east.
686	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	9.0	0.38	0.47	4.56	2.41	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
687	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	7.0	0.38	0.43	4.56	2.32	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
688	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	9.0	0.36	0.41	4.32	2.28	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy north-east.
689	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	8.0	0.35	0.44	4.20	2.34	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy north.
690	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	15.0	0.36	0.39	4.32	2.23	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
691	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	16.0	0.54	0.62	6.48	2.71	Mature	Normal	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	
692	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	12.0	0.36	0.39	4.32	2.23	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
693	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	4.0	0.29	0.34	3.48	2.10	Mature	Poor	Poor	Inclusions Co-dominant Stems Deadwood-Major Epicormic Growth	Long (>40 years)	Endemic		3 Low	Codominant stems at 3m. One side dead.
694	1		*Eucalyptus saligna*	Sydney Blue Gum	25.5	6.0	0.33	0.39	3.96	2.23	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
695	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	7.0	0.26	0.30	3.12	2.00	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
696	1		*Eucalyptus saligna*	Sydney Blue Gum	25.5	7.0	0.33	0.36	3.96	2.15	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
697	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	4.0	0.18	0.19	2.16	1.65	Mature	Poor	Poor	Deadwood-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
698	1		*Eucalyptus saligna*	Sydney Blue Gum	25.5	7.0	0.23	0.26	2.76	1.88	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
699	1		*Eucalyptus saligna*	Sydney Blue Gum	24.5	6.0	0.25	0.30	3.00	2.00	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
700	1		*Eucalyptus saligna*	Sydney Blue Gum	21.5	7.0	0.32	0.42	3.84	2.30	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
701	1		*Eucalyptus saligna*	Sydney Blue Gum	22.5	9.0	0.36	0.46	4.32	2.39	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
702	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	8.0	0.29	0.36	3.48	2.15	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-east.
703	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	14.0	0.35	0.39	4.20	2.23	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-east.
704	1		*Eucalyptus pilularis*	Blackbutt	26.5	16.0	0.44	0.55	5.28	2.57	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
705	1		*Eucalyptus saligna*	Sydney Blue Gum	24.5	16.0	0.51	0.56	6.12	2.59	Mature	Normal	Average	Lean-Minor Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	Minor lean to south.
706	1		*Callistemon salignus cv.*	Willow Bottlebrush	12.0	7.0	0.19	0.22	2.28	1.75	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Medium (15-40 years)	Native		3 Low	
707	1		*Callistemon salignus cv.*	Willow Bottlebrush	10.0	5.0	0.18	0.20	2.16	1.68	Mature	Poor	Poor	Tip Dieback Co-dominant Stems Inclusions Deadwood-Major Decay-Minor	Short (5-15 years)	Native		2 Very Poor	
708	1		*Syncarpia glomulifera*	Turpentine	18.0	9.0	0.28	0.48	3.36	2.43	Mature	Normal	Poor	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	Codominant at base.
709	1		*Syncarpia glomulifera*	Turpentine	22.0	16.0	0.38	0.52	4.56	2.51	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	Codominant and included at base.
710	1		*Syncarpia glomulifera*	Turpentine	21.5	10.0	0.38	0.49	4.56	2.45	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	Codominant and included at base.
711	1		*Corymbia maculata*	Spotted Gum	26.5	18.0	0.44	0.51	5.28	2.49	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Long (>40 years)	Native		4 Moderate	
712	1		*Lophostemon confertus*	Brush Box	16.0	7.0	0.17	0.21	2.04	1.72	Mature	Fair	Average	Pest/Disease Tip Dieback	Long (>40 years)	Native		3 Low	
713	1		*Eucalyptus microcorys*	Tallowood	26.5	14.0	0.35	0.42	4.20	2.30	Mature	Normal	Average	Epicormic Growth Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
714	1		*Casuarina cunninghamiana*	River She-Oak	26.5	12.0	0.46	0.55	5.52	2.57	Mature	Normal	Average	Inclusions Co-dominant Stems	Medium (15-40 years)	Native		3 Low	Codominant and included at base.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
715	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	16.0	0.46	0.52	5.52	2.51	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
716	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	4.0	0.36	0.42	4.32	2.30	Dead	Dead	Poor	Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
717	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	4.0	0.26	0.29	3.12	1.97	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to east.
718	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	14.0	0.49	0.58	5.88	2.63	Mature	Normal	Average	Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	
719	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	10.0	0.35	0.42	4.20	2.30	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
720	1		*Eucalyptus saligna*	Sydney Blue Gum	30.5	14.0	0.39	0.48	4.68	2.43	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
721	1		*Eucalyptus saligna*	Sydney Blue Gum	30.0	14.0	0.42	0.55	5.04	2.57	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Endemic		4 Moderate	
722	1		*Eucalyptus saligna*	Sydney Blue Gum	20.5	6.0	0.17	0.22	2.04	1.75	Mature	Normal	Average	Deadwood-Minor Branch Tearouts Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
723	1		*Eucalyptus saligna*	Sydney Blue Gum	22.5	3.0	0.21	0.24	2.52	1.82	Mature	Poor	Average	Branch Tearouts Epicormic Growth Deadwood-Minor	Long (>40 years)	Endemic		3 Low	
724	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	6.0	0.31	0.39	3.72	2.23	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north-east.
725	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	13.0	0.43	0.54	5.16	2.55	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
726	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	11.0	0.33	0.40	3.96	2.25	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
727	1		*Eucalyptus saligna*	Sydney Blue Gum	27.5	9.0	0.26	0.30	3.12	2.00	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
728	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	15.0	0.47	0.55	5.64	2.57	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
729	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	7.0	0.36	0.45	4.32	2.37	Mature	Normal	Average	Deadwood-Minor Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
730	1		*Eucalyptus pilularis*	Blackbutt	31.5	18.0	0.56	0.72	6.72	2.88	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
731	1		*Eucalyptus saligna*	Sydney Blue Gum	12.0	5.0	0.26	0.26	3.12	1.88	Dead	Dead	Average	Deadwood-Major	Remove (<5 years)	Endemic		1 Dead	Minimal habitat value.
732	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	8.0	0.43	0.50	5.16	2.47	Mature	Normal	Poor	Deadwood-Major Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	
733	1		*Eucalyptus saligna*	Sydney Blue Gum	31.5	16.0	0.50	0.58	6.00	2.63	Mature	Normal	Average	Deadwood-Major Epicormic Growth	Long (>40 years)	Endemic		5 High	
734	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	12.0	0.46	0.48	5.52	2.43	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
735	1		*Eucalyptus saligna*	Sydney Blue Gum	28.5	7.0	0.20	0.24	2.40	1.82	Mature	Normal	Average	Deadwood-Minor Epicormic Growth Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
736	1		*Eucalyptus pilularis*	Blackbutt	29.5	14.0	0.38	0.45	4.56	2.37	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
737	1		*Eucalyptus pilularis*	Blackbutt	28.5	16.0	0.34	0.40	4.08	2.25	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
738	1		*Eucalyptus saligna*	Sydney Blue Gum	31.5	16.0	0.51	0.60	6.12	2.67	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
739	1		*Eucalyptus saligna*	Sydney Blue Gum	18.0	8.0	0.28	0.37	3.36	2.18	Mature	Fair	Poor	Deadwood-Minor Epicormic Growth	Long (>40 years)	Endemic		3 Low	
740	1		*Eucalyptus saligna*	Sydney Blue Gum	29.5	7.0	0.26	0.31	3.12	2.02	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to south.
741	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	12.0	0.33	0.45	3.96	2.37	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north. Growing out of rock.
742	1		*Eucalyptus pilularis*	Blackbutt	28.5	16.0	0.66	0.80	7.92	3.01	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
743	1		*Eucalyptus pilularis*	Blackbutt	19.5	5.0	0.16	0.22	2.00	1.75	Mature	Normal	Average	Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Minor lean to north east.
744	1		*Eucalyptus pilularis*	Blackbutt	28.5	8.0	0.32	0.35	3.84	2.13	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
745	1		*Eucalyptus robusta*	Swamp Mahogany	18.0	12.0	0.39	0.45	4.68	2.37	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
746	1		*Corymbia citriodora*	Lemon Scented Gum	29.5	16.0	0.39	0.50	4.68	2.47	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
747	1		*Corymbia citriodora*	Lemon Scented Gum	22.0	18.0	0.44	0.54	5.28	2.55	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Native		4 Moderate	Codominant stems at 0.5m.
748	1		*Eucalyptus pilularis*	Blackbutt	27.5	7.0	0.36	0.53	4.32	2.53	Mature	Normal	Average	Deadwood-Minor Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Minor lean to west.
749	1		*Corymbia citriodora*	Lemon Scented Gum	19.0	12.0	0.39	0.55	4.68	2.57	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric to south
750	1		*Eucalyptus robusta*	Swamp Mahogany	20.5	8.0	0.27	0.29	3.24	1.97	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
751	1		*Eucalyptus acmenioides?*	White Mahogany	28.0	8.0	0.48	0.52	5.76	2.51	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Fine flaky bark to smallest branches.
752	1		*Syncarpia glomulifera*	Turpentine	18.0	5.0	0.25	0.40	3.00	2.25	Dead	Dead	Average	Co-dominant Stems Deadwood-Major	Long (>40 years)	Endemic		1 Dead	Tridominant stems, minimal habitat value.
753	1		*Casuarina cunninghamiana*	River She-Oak	22.0	10.0	0.48	0.56	5.76	2.59	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
754	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	8.0	0.26	0.32	3.12	2.05	Dead	Dead	Average	Deadwood-Major	Long (>40 years)	Endemic		1 Dead	Minimal habitat value.
755	1		*Eucalyptus robusta*	Swamp Mahogany	20.5	10.0	0.33	0.42	3.96	2.30	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
756	1		*Eucalyptus botryoides*	Bangalay	22.0	12.0	0.49	0.56	5.88	2.59	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
757	1		*Eucalyptus acmenioides?*	White Mahogany	24.5	10.0	0.59	0.59	7.08	2.65	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	Fine flaky bark to smallest branches.
758	1		*Eucalyptus saligna*	Sydney Blue Gum	12.0	8.0	0.17	0.22	2.04	1.75	Semi-mature	Poor	Poor	Deadwood-Minor Lean-Minor Asymmetric Canopy Epicormic Growth Tip Dieback	Medium (15-40 years)	Endemic		2 Very Poor	Asymmetric to south.
759	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	16.0	0.48	0.58	5.76	2.63	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
760	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	8.0	0.20	0.26	2.40	1.88	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		3 Low	
761	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	5.0	0.22	0.32	2.64	2.05	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
762	1		*Populus deltoides ?*	American Cottonwood	25.0	15.0	0.55	0.75	6.60	2.93	Mature	Normal	Average		Medium (15-40 years)	Invasive		2 Very Poor	Others also down stream of outlet pipe ladder
763	1		*Eucalyptus microcorys*	Tallowood	18.0	6.0	0.23	0.27	2.76	1.91	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		3 Low	Asymmetric to west.
764	1		*Eucalyptus microcorys*	Tallowood	22.0	10.0	0.39	0.50	4.68	2.47	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
765	1		*Casuarina cunninghamiana*	River She-Oak	25.0	16.0	0.88	0.99	10.56	3.30	Mature	Normal	Average	Deadwood-Major	Long (>40 years)	Native		4 Moderate	
766	1		*Lophostemon confertus*	Brush Box	12.0	5.0	0.18	0.25	2.16	1.85	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
767	1		*Eucalyptus pilularis*	Blackbutt	16.0	8.0	0.62	0.62	7.44	2.71	Dead	Dead	Average	Deadwood-Major	Short (5-15 years)	Endemic		1 Dead	Minimal habitat value
768	1		*Lophostemon confertus*	Brush Box	13.5	7.0	0.23	0.28	2.76	1.94	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
769	1		*Syncarpia glomulifera*	Turpentine	14.0	7.0	0.50	0.50	6.00	2.47	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	Chlorotic foliage.
770	1		*Lophostemon confertus*	Brush Box	10.0	4.0	0.16	0.24	2.00	1.82	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		3 Low	
771	1		*Eucalyptus pilularis*	Blackbutt	20.0	12.0	1.00	1.00	12.00	3.31	Dead	Dead	Average	Deadwood-Major Asymmetric Canopy Lean-Major Termites Branch Tearouts	Short (5-15 years)	Endemic		1 Dead	Minimal habitat value. Major lean

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
772	1		*Grevillea robusta*	Silky Oak	18.0	10.0	0.49	0.57	5.88	2.61	Mature	Normal	Average	Deadwood-Minor	Medium (15-40 years)	Invasive		3 Low	
773	1		*Grevillea robusta*	Silky Oak	15.0	5.0	0.18	0.23	2.16	1.79	Mature	Normal	Average	Deadwood-Minor	Medium (15-40 years)	Invasive		3 Low	
774	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	7.0	0.31	0.41	3.72	2.28	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to west.
775	1		*Eucalyptus saligna*	Sydney Blue Gum	16.0	8.0	0.18	0.23	2.16	1.79	Semi-mature	Normal	Average	Deadwood-Minor Epicormic Growth Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north west.
776	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	9.0	0.53	0.63	6.36	2.73	Mature	Normal	Average	Epicormic Growth Deadwood-Major Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to west.
777	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	12.0	0.51	0.57	6.12	2.61	Mature	Normal	Average	Deadwood-Major Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to west.
778	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	12.0	0.50	0.56	6.00	2.59	Mature	Normal	Poor	Deadwood-Major Asymmetric Canopy Decay-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north west.
779	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	14.0	0.70	0.80	8.40	3.01	Mature	Good	Good	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		5 High	Asymmetric canopy to north.
780	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	14.0	0.65	0.78	7.80	2.98	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
781	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	12.0	0.59	0.67	7.08	2.80	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
782	1		*Eucalyptus saligna*	Sydney Blue Gum	17.0	4.0	0.16	0.30	2.00	2.00	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
783	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	7.0	0.20	0.30	2.40	2.00	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
784	1		*Angophora floribunda*	Rough-barked Apple	18.0	8.0	0.29	0.42	3.48	2.30	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	Codominant from base.
785	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	9.0	0.31	0.36	3.72	2.15	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
786	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	9.0	0.30	0.39	3.60	2.23	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy north west.
787	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	9.0	0.34	0.44	4.08	2.34	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy north.
788	1		*Eucalyptus pilularis*	Blackbutt	26.0	8.0	0.30	0.41	3.60	2.28	Mature	Normal	Average		Long (>40 years)	Endemic		4 Moderate	
789	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	9.0	0.20	0.31	2.40	2.02	Semi-mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Epicormic Growth Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy and minor lean to north.
790	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	12.0	0.58	0.63	6.96	2.73	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy Epicormic Growth	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
791	1		*Angophora floribunda*	Rough-barked Apple	10.0	10.0	0.25	0.30	3.00	2.00	Mature	Fair	Poor	Deadwood-Minor Lean-Major Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Major lean and asymmetric canopy to north.
792	1		*Angophora floribunda*	Rough-barked Apple	7.0	10.0	0.25	0.30	3.00	2.00	Semi-mature	Fair	Poor	Deadwood-Minor Lean-Major Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		2 Very Poor	Major lean and asymmetric canopy to north. Minor root plate failure.
793	1		*Angophora floribunda*	Rough-barked Apple	12.0	10.0	0.24	0.28	2.88	1.94	Mature	Fair	Poor	Deadwood-Minor Lean-Major Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Major lean and asymmetric canopy to north.
794	1		*Angophora floribunda*	Rough-barked Apple	14.0	10.0	0.29	0.31	3.48	2.02	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Asymmetric canopy to north.
795	1		*Angophora floribunda*	Rough-barked Apple	16.0	10.0	0.30	0.33	3.60	2.08	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		3 Low	
796	1		*Angophora floribunda*	Rough-barked Apple	18.0	9.0	0.26	0.32	3.12	2.05	Mature	Fair	Average	Deadwood-Minor Tip Dieback Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		3 Low	Asymmetric canopy and minor lean to north.
797	1		*Casuarina cunninghamiana*	River She-Oak	25.0	12.0	0.49	0.62	5.88	2.71	Mature	Normal	Average	Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
798	1		*Casuarina cunninghamiana*	River She-Oak	26.0	12.0	0.36	0.45	4.32	2.37	Mature	Normal	Average		Long (>40 years)	Native		4 Moderate	
799	1		*Angophora floribunda*	Rough-barked Apple	16.0	8.0	0.31	0.36	3.72	2.15	Mature	Poor	Poor	Deadwood-Minor Tip Dieback Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		3 Low	Asymmetric canopy and minor lean to north.
800	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	15.0	0.25	0.25	3.00	1.85	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
801	1		*Angophora floribunda*	Rough-barked Apple	14.0	10.0	0.58	0.58	6.96	2.63	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	Codominant at trunks.
802	1		*Angophora floribunda*	Rough-barked Apple	16.0	10.0	0.30	0.39	3.60	2.23	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
803	1		*Angophora floribunda*	Rough-barked Apple	12.0	10.0	0.26	0.30	3.12	2.00	Mature	Fair	Poor	Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		3 Low	Asymmetric canopy and minor lean to north.
804	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	18.0	0.72	0.85	8.64	3.09	Semi-mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
805	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	18.0	1.00	1.04	12.00	3.36	Mature	Normal	Average	Deadwood-Minor Decay-Major Lean-Major	Long (>40 years)	Endemic		2 Very Poor	Major root plate failure and leaning on T804. Major decay from base for 3m.
806	1		*Casuarina cunninghamiana*	River She-Oak	16.0	6.0	0.34	0.35	4.08	2.13	Mature	Fair	Poor	Asymmetric Canopy Decay-Major Lean-Minor Deadwood-Minor	Long (>40 years)	Native		2 Very Poor	Major wound and decay to south. Asymmetric canopy to north.
807	1		*Casuarina cunninghamiana*	River She-Oak	18.0	6.0	0.38	0.58	4.56	2.63	Mature	Fair	Poor	Decay-Major Deadwood-Minor	Long (>40 years)	Native		2 Very Poor	Major wound and decay to south.
808	1		*Angophora floribunda*	Rough-barked Apple	18.0	12.0	0.39	0.48	4.68	2.43	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric canopy to north.
809	1		*Angophora floribunda*	Rough-barked Apple	10.0	7.0	0.22	0.27	2.64	1.91	Mature	Normal	Poor	Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Asymmetric canopy to north.
810	1		*Casuarina cunninghamiana*	River She-Oak	18.0	12.0	0.35	0.50	4.20	2.47	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Native		4 Moderate	Tridominant at base.
811	1		*Casuarina cunninghamiana*	River She-Oak	18.0	10.0	0.23	0.44	2.76	2.34	Mature	Fair	Poor	Co-dominant Stems Decay-Major Deadwood-Major Asymmetric Canopy	Long (>40 years)	Native		3 Low	Tridominant at base. Basal decay. Asymmetric canopy to north.
812	1		*Casuarina cunninghamiana*	River She-Oak	19.0	8.0	0.30	0.42	3.60	2.30	Mature	Fair	Poor	Co-dominant Stems Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Native		3 Low	Codominant at base. Asymmetric canopy to north.
813	1		*Casuarina cunninghamiana*	River She-Oak	18.0	9.0	0.34	0.50	4.08	2.47	Mature	Fair	Poor	Co-dominant Stems Asymmetric Canopy Deadwood-Minor Decay-Major Tip Dieback	Long (>40 years)	Native		3 Low	Codominant at base. Asymmetric canopy to north. Basal wound and decay.
814	1		*Casuarina cunninghamiana*	River She-Oak	22.0	7.0	0.48	0.48	5.76	2.43	Mature	Fair	Poor	Deadwood-Minor Decay-Major Tip Dieback	Long (>40 years)	Native		3 Low	Basal wound and decay.
815	1		*Casuarina cunninghamiana*	River She-Oak	23.0	9.0	0.40	0.56	4.80	2.59	Mature	Normal	Average	Tip Dieback Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
816	1		*Casuarina cunninghamiana*	River She-Oak	25.0	8.0	0.50	0.60	6.00	2.67	Mature	Fair	Poor	Tip Dieback Asymmetric Canopy Decay-Major	Long (>40 years)	Native		3 Low	Asymmetric canopy to north. Major decay and basal wound to south.
817	1		*Casuarina cunninghamiana*	River She-Oak	24.0	8.0	0.50	0.63	6.00	2.73	Mature	Fair	Poor	Tip Dieback Asymmetric Canopy Decay-Major	Long (>40 years)	Native		3 Low	Asymmetric canopy to north. Major decay and basal wound to south.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
818	1		*Casuarina cunninghamiana*	River She-Oak	18.0	6.0	0.25	0.36	3.00	2.15	Mature	Fair	Poor	Tip Dieback Asymmetric Canopy Decay-Major	Long (>40 years)	Native		2 Very Poor	Asymmetric canopy to north. Major decay and basal wound to south.
819	1		*Casuarina cunninghamiana*	River She-Oak	23.0	16.0	0.45	0.58	5.40	2.63	Mature	Normal	Average	Tip Dieback Asymmetric Canopy Decay-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north. Minor decay and basal wound to south.
820	1		*Casuarina cunninghamiana*	River She-Oak	16.0	8.0	0.25	0.45	3.00	2.37	Mature	Normal	Average	Tip Dieback Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north. Codominant at base. Growing out of embankment.
821	1		*Casuarina cunninghamiana*	River She-Oak	22.0	12.0	0.45	0.55	5.40	2.57	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
822	1		*Casuarina cunninghamiana*	River She-Oak	20.0	8.0	0.33	0.43	3.96	2.32	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
823	1		*Casuarina cunninghamiana*	River She-Oak	21.0	9.0	0.40	0.44	4.80	2.34	Mature	Normal	Average	Asymmetric Canopy Decay-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
824	1		*Eucalyptus saligna*	Sydney Blue Gum	19.0	10.0	0.28	0.39	3.36	2.23	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to north.
825	1		*Casuarina cunninghamiana*	River She-Oak	18.0	8.0	0.31	0.40	3.72	2.25	Semi-mature	Normal	Poor	Asymmetric Canopy Co-dominant Stems	Long (>40 years)	Native		3 Low	Asymmetric canopy to north east. Codominant at base.
826	1		*Casuarina cunninghamiana*	River She-Oak	18.0	10.0	0.32	0.41	3.84	2.28	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
827	1		*Casuarina cunninghamiana*	River She-Oak	20.0	8.0	0.30	0.43	3.60	2.32	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
828	1		*Casuarina cunninghamiana*	River She-Oak	21.0	10.0	0.45	0.55	5.40	2.57	Mature	Normal	Average	Asymmetric Canopy Decay-Major	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north. Major basal wound and decay to the south.
829	1		*Casuarina cunninghamiana*	River She-Oak	23.0	12.0	0.46	0.49	5.52	2.45	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
830	1		*Casuarina cunninghamiana*	River She-Oak	22.0	10.0	0.40	0.55	4.80	2.57	Mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
831	1		*Casuarina cunninghamiana*	River She-Oak	18.0	6.0	0.40	0.40	4.80	2.25	Mature	Fair	Poor	Asymmetric Canopy Deadwood-Major	Long (>40 years)	Native		3 Low	Asymmetric canopy to north. Four trunks at 1m.
832	1		*Grevillea robusta*	Silky Oak	23.0	12.0	0.39	0.45	4.68	2.37	Mature	Fair	Poor	Decay-Minor	Long (>40 years)	Invasive		3 Low	Minor basal wound to south.
833	1		*Casuarina cunninghamiana*	River She-Oak	19.0	7.0	0.37	0.50	4.44	2.47	Mature	Fair	Average	Deadwood-Major Branch Tearouts	Long (>40 years)	Native		4 Moderate	Basal wound and decay to south.
834	1		*Casuarina cunninghamiana*	River She-Oak	19.5	6.0	0.26	0.30	3.12	2.00	Mature	Normal	Average	Asymmetric Canopy Deadwood-Minor Decay-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north. Minor basal decay and wound to south.
835	1		*Casuarina cunninghamiana*	River She-Oak	19.0	5.0	0.25	0.40	3.00	2.25	Mature	Normal	Average	Decay-Minor Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Minor basal decay and wound to south.
836	1		*Casuarina cunninghamiana*	River She-Oak	20.0	10.0	0.51	0.69	6.12	2.83	Mature	Normal	Average	Epicormic Growth Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
837	1		*Casuarina cunninghamiana*	River She-Oak	22.0	12.0	0.55	0.70	6.60	2.85	Mature	Normal	Average	Epicormic Growth Asymmetric Canopy Deadwood-Minor Decay-Minor Branch Tearouts	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north. Minor basal wound and decay to south.
838	1		*Casuarina cunninghamiana*	River She-Oak	18.0	7.0	0.20	0.28	2.40	1.94	Semi-mature	Normal	Average	Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
839	1		*Casuarina cunninghamiana*	River She-Oak	23.0	12.0	0.47	0.59	5.64	2.65	Mature	Normal	Average	Deadwood-Minor Branch Tearouts Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north east.
840	1		*Casuarina cunninghamiana*	River She-Oak	21.0	10.0	0.31	0.41	3.72	2.28	Mature	Normal	Average	Deadwood-Minor Branch Tearouts Epicormic Growth	Long (>40 years)	Native		4 Moderate	
841	1		*Casuarina cunninghamiana*	River She-Oak	15.0	8.0	0.21	0.32	2.52	2.05	Semi-mature	Normal	Poor	Deadwood-Minor Branch Tearouts Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric canopy to north.
842	1		*Pinus roxburghii*	Chir Pine	30.0	10.0	0.68	0.79	8.16	3.00	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Exotic		3 Low	
843	1		*Pinus roxburghii*	Chir Pine	28.0	10.0	0.44	0.58	5.28	2.63	Dead	Dead	Poor	Asymmetric Canopy Deadwood-Major	Short (5-15 years)	Exotic		1 Dead	
844	1		*Pinus roxburghii*	Chir Pine	26.0	4.0	0.30	0.41	3.60	2.28	Dead	Dead	Poor	Deadwood-Major	Short (5-15 years)	Exotic		1 Dead	
845	1	Remote	*Casuarina cunninghamiana*	River She-Oak	18.0	8.0	0.40	0.60	4.80	2.67	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
846	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	7.0	0.30	0.42	3.60	2.30	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
847	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	6.0	0.30	0.42	3.60	2.30	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
848	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.0	6.0	0.22	0.31	2.64	2.02	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
849	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.0	6.0	0.21	0.30	2.52	2.00	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
850	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.5	5.0	0.21	0.30	2.52	2.00	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
851	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.5	6.0	0.22	0.35	2.64	2.13	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
852	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.5	6.0	0.18	0.22	2.16	1.75	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
853	1	Remote	*Casuarina cunninghamiana*	River She-Oak	20.0	6.0	0.24	0.31	2.88	2.02	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
854	1	Remote	*Casuarina cunninghamiana*	River She-Oak	20.0	7.0	0.24	0.31	2.88	2.02	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
855	1	Remote	*Casuarina cunninghamiana*	River She-Oak	18.0	4.0	0.19	0.30	2.28	2.00	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
856	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.5	6.0	0.21	0.33	2.52	2.08	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
857	2	Remote	*Casuarina cunninghamiana*	River She-Oak	18.0	5.0	0.16	0.25	2.00	1.85	Semi-mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Two tree side by side less than 1m apart.(east west).
858	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.5	6.0	0.16	0.25	2.00	1.85	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
859	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.5	6.0	0.23	0.30	2.76	2.00	Mature	Fair	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Native		4 Moderate	
860	3	Remote	*Casuarina cunninghamiana*	River She-Oak	20.0	8.0	0.28	0.44	3.36	2.34	Mature	Fair	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Native		4 Moderate	Treat as one tree and canopy. All within 0.5m of each other.

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
861	1	Remote	*Casuarina cunninghamiana*	River She-Oak	22.0	6.0	0.28	0.35	3.36	2.13	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Some distance from fence line.
862	1	Remote	*Casuarina cunninghamiana*	River She-Oak	22.0	6.0	0.48	0.52	5.76	2.51	Dead	Dead	Average	Deadwood-Minor	Remove (<5 years)	Native		1 Dead	
863	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.0	6.0	0.23	0.33	2.76	2.08	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
864	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.0	6.0	0.24	0.35	2.88	2.13	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
865	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.0	8.0	0.44	0.63	5.28	2.73	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
866	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	7.0	0.42	0.60	5.04	2.67	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
867	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	10.0	0.42	0.61	5.04	2.69	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	On crest of bund.
868	1	Remote	*Casuarina cunninghamiana*	River She-Oak	16.0	8.0	0.40	0.59	4.80	2.65	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	On crest of bund.
869	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	8.0	0.37	0.55	4.44	2.57	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
870	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	8.0	0.60	0.71	7.20	2.87	Mature	Normal	Average	Deadwood-Minor Branch Tearouts	Long (>40 years)	Native		4 Moderate	Previous codominant stem pruned at 3.0m
871	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	17.0	12.0	0.65	0.85	7.80	3.09	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
872	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	8.0	0.25	0.40	3.00	2.25	Mature	Fair	Average	Deadwood-Minor Cavity	Long (>40 years)	Native		4 Moderate	
873	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	19.0	14.0	0.51	0.70	6.12	2.85	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
874	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	8.0	0.28	0.41	3.36	2.28	Mature	Fair	Average	Deadwood-Minor Cavity	Long (>40 years)	Native	Basal Hollow	4 Moderate	Small basal hollow.
875	1	Remote	*Casuarina cunninghamiana*	River She-Oak	16.0	7.0	0.24	0.30	2.88	2.00	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
876	1	Remote	*Pittosporum undulatum*	Sweet Pittosporum	8.5	7.0	0.21	0.28	2.52	1.94	Mature	Fair	Average	Deadwood-Minor Lean-Major	Long (>40 years)	Endemic		4 Moderate	Lean and then corrected.
877	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	24.5	16.0	1.28	1.85	15.00	4.29	Over-mature	Poor	Average	Co-dominant Stems Tip Dieback Decay-Minor Deadwood-Major Branch Tearouts Epicormic Growth Pest/Disease	Short (5-15 years)	Endemic	Small Hollows or Spouts Stag Creation Potential	2 Very Poor	Trunk to east is dead. Remaining side of tree is poor condition with major wounding at 16m. Extensive deadwood.
878	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	26.0	16.0	1.00	1.20	12.00	3.57	Mature	Fair	Average	Tip Dieback Branch Tearouts Epicormic Growth Co-dominant Stems Asymmetric Canopy Deadwood-Minor	Long (>40 years)	Endemic	Small Hollows or Spouts Stag Creation Potential Large Hollow	4 Moderate	Asymmetric to north.
879	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	17.0	6.0	0.38	0.52	4.56	2.51	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
880	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	17.0	1.30	1.80	15.00	4.24	Mature	Poor	Average	Deadwood-Major Tip Dieback Epicormic Growth	Medium (15-40 years)	Endemic	Stag Creation Potential Small Hollows or Spouts	3 Low	Extensive deadwood and dieback.
881	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	15.0	8.0	0.28	0.35	3.36	2.13	Mature	Fair	Poor	Deadwood-Major Lean-Minor Branch Tearouts	Long (>40 years)	Endemic		3 Low	
882	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	17.0	9.0	0.33	0.40	3.96	2.25	Mature	Fair	Poor	Deadwood-Major Lean-Minor Branch Tearouts Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Asymmetric to north-west.
883	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	19.0	7.0	0.40	0.55	4.80	2.57	Mature	Fair	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
884	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	16.0	7.0	0.46	0.60	5.52	2.67	Mature	Fair	Poor	Branch Tearouts Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Asymmetric to north.
885	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	17.0	6.0	0.40	0.55	4.80	2.57	Mature	Fair	Average	Branch Tearouts Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		3 Low	Asymmetric to north.
886	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	20.0	10.0	0.55	0.70	6.60	2.85	Mature	Fair	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
887	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	20.0	14.0	0.70	0.70	8.40	2.85	Mature	Fair	Average	Branch Tearouts Lean-Minor Epicormic Growth Deadwood-Minor Decay-Minor	Long (>40 years)	Endemic		4 Moderate	Large trunk scar to south.
888	1	Remote	*Angophora floribunda*	Rough-barked Apple	15.0	12.0	0.64	0.80	7.68	3.01	Mature	Poor	Average	Branch Tearouts Lean-Minor Epicormic Growth Deadwood-Minor Tip Dieback Asymmetric Canopy	Short (5-15 years)	Endemic		4 Moderate	Asymmetric to north.
889	1	Remote	*Angophora floribunda*	Rough-barked Apple	16.0	10.0	0.40	0.56	4.80	2.59	Mature	Fair	Average	Branch Tearouts Deadwood-Minor Tip Dieback	Medium (15-40 years)	Endemic		4 Moderate	
890	1	Remote	*Angophora floribunda*	Rough-barked Apple	12.0	9.0	0.24	0.28	2.88	1.94	Mature	Fair	Average	Branch Tearouts Deadwood-Minor Tip Dieback Epicormic Growth Lean-Major	Medium (15-40 years)	Endemic		3 Low	Lean and mistletoe.
891	1	Remote	*Angophora floribunda*	Rough-barked Apple	14.0	10.0	0.67	0.85	8.04	3.09	Senescent	Poor	Poor	Branch Tearouts Tip Dieback Epicormic Growth Co-dominant Stems Deadwood-Major Asymmetric Canopy	Short (5-15 years)	Endemic		2 Very Poor	Asymmetric to north.
892	1	Remote	*Angophora floribunda*	Rough-barked Apple	14.0	10.0	0.30	0.38	3.60	2.20	Over-mature	Poor	Average	Branch Tearouts Tip Dieback Epicormic Growth Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	
893	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	7.0	0.25	0.32	3.00	2.05	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
894	4	Remote	*Angophora floribunda*	Rough-barked Apple	13.0	10.0	0.30	0.46	3.60	2.39	Over-mature	Fair	Poor	Tip Dieback Epicormic Growth Deadwood-Minor	Medium (15-40 years)	Endemic		3 Low	Group of four trunks all within 1m of each other. Treat as one and one canopy.
895	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	7.0	0.18	0.25	2.16	1.85	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
896	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	15.0	8.0	0.45	0.60	5.40	2.67	Mature	Fair	Poor	Branch Tearouts Deadwood-Minor Lean-Major Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Asymmetric to east.
897	1	Remote	*Casuarina cunninghamiana*	River She-Oak	17.0	7.0	0.30	0.42	3.60	2.30	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
898	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	20.0	12.0	0.62	0.80	7.44	3.01	Mature	Fair	Average	Branch Tearouts Deadwood-Major	Long (>40 years)	Endemic		4 Moderate	
899	1	Remote	*Casuarina cunninghamiana*	River She-Oak	18.0	8.0	0.21	0.26	2.52	1.88	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
900	1	Remote	*Angophora floribunda*	Rough-barked Apple	15.0	8.0	0.26	0.32	3.12	2.05	Mature	Fair	Average	Branch Tearouts Tip Dieback Epicormic Growth Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
901	1	Remote	*Angophora floribunda*	Rough-barked Apple	12.0	6.0	0.26	0.32	3.12	2.05	Mature	Fair	Average	Branch Tearouts Tip Dieback Epicormic Growth Deadwood-Major	Long (>40 years)	Endemic		3 Low	Asymmetric to north.
902	1	Remote	*Casuarina cunninghamiana*	River She-Oak	18.0	8.0	0.23	0.28	2.76	1.94	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	
903	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	20.0	6.0	0.26	0.38	3.12	2.20	Mature	Fair	Average	Branch Tearouts Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to east.
904	1	Remote	*Casuarina cunninghamiana*	River She-Oak	19.0	6.0	0.24	0.30	2.88	2.00	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric to east.
905	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	22.0	8.0	0.45	0.55	5.40	2.57	Mature	Fair	Average	Branch Tearouts Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
906	1	Remote	*Casuarina cunninghamiana*	River She-Oak	20.0	7.0	0.33	0.45	3.96	2.37	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Native		4 Moderate	Asymmetric to north.
907	2	Remote	*Casuarina cunninghamiana*	River She-Oak	21.0	9.0	0.26	0.35	3.12	2.13	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Native		4 Moderate	Smaller tree towards south with 0.15m. DBH. within 1m.
908	1	Remote	*Casuarina cunninghamiana*	River She-Oak	21.0	11.0	0.48	0.59	5.76	2.65	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Native		4 Moderate	
909	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	15.0	12.0	0.35	0.55	4.20	2.57	Mature	Fair	Poor	Branch Tearouts Deadwood-Minor Lean-Major Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Very asymmetric to north-east
910	1	Remote	*Angophora floribunda*	Rough-barked Apple	10.0	8.0	0.26	0.30	3.12	2.00	Mature	Fair	Average	Tip Dieback Co-dominant Stems Deadwood-Minor	Long (>40 years)	Endemic		3 Low	
911	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	11.0	0.50	0.68	6.00	2.81	Mature	Normal	Good	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
912	1	Remote	*Angophora floribunda*	Rough-barked Apple	17.0	10.0	0.38	0.49	4.56	2.45	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
913	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	8.0	0.45	0.60	5.40	2.67	Mature	Normal	Average	Deadwood-Minor Decay-Minor	Long (>40 years)	Endemic		4 Moderate	
914	1	Remote	*Angophora floribunda*	Rough-barked Apple	15.0	9.0	0.40	0.50	4.80	2.47	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmmetric to south-west.
915	1	Remote	*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.50	0.76	6.00	2.95	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
916	1		*Liquidambar styraciflua*	Liquidambar	17.0	8.0	0.30	0.39	3.60	2.23	Mature	Normal	Average		Long (>40 years)	Exotic		3 Low	
917	1		*Liquidambar styraciflua*	Liquidambar	16.0	9.0	0.38	0.60	4.56	2.67	Mature	Normal	Poor	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Exotic		2 Very Poor	Decay and dysfunction at base.
918	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	11.0	0.56	0.65	6.72	2.76	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
919	1		*Angophora floribunda*	Rough-barked Apple	16.0	6.0	0.22	0.25	2.64	1.85	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the west.
920	2		*Liquidambar styraciflua*	Liquidambar	14.0	9.0	0.20	0.60	2.40	2.67	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Exotic		3 Low	Two trees, smaller one to south-east (0.13 DBH).
921	1		*Angophora floribunda*	Rough-barked Apple	14.0	5.0	0.16	0.23	2.00	1.79	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy Tip Dieback	Long (>40 years)	Endemic		3 Low	Asymmetric to the west.
922	1		*Angophora floribunda*	Rough-barked Apple	14.0	5.0	0.19	0.24	2.28	1.82	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Long (>40 years)	Endemic		4 Moderate	
923	1		*Angophora floribunda*	Rough-barked Apple	15.0	6.0	0.20	0.24	2.40	1.82	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the west.
924	1		*Angophora floribunda*	Rough-barked Apple	16.0	8.0	0.25	0.31	3.00	2.02	Mature	Fair	Average	Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the west.
925	1		*Angophora floribunda*	Rough-barked Apple	18.0	6.0	0.31	0.35	3.72	2.13	Mature	Fair	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
926	1		*Angophora floribunda*	Rough-barked Apple	15.0	6.0	0.23	0.36	2.76	2.15	Mature	Poor	Poor	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		3 Low	Tridominant stems from base.
927	1		*Angophora floribunda*	Rough-barked Apple	15.0	8.0	0.22	0.28	2.64	1.94	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy Lean-Minor	Long (>40 years)	Endemic		4 Moderate	Very asymmetric to the west.
928	1		*Angophora floribunda*	Rough-barked Apple	12.0	5.0	0.25	0.46	3.00	2.39	Mature	Poor	Poor	Deadwood-Minor Co-dominant Stems Asymmetric Canopy	Long (>40 years)	Endemic		3 Low	Four stems from base. Asymmetric to west. Treat as one tree.
929	1		*Angophora floribunda*	Rough-barked Apple	13.0	3.0	0.16	0.22	2.00	1.75	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the west.
930	1		*Angophora floribunda*	Rough-barked Apple	16.0	6.0	0.25	0.31	3.00	2.02	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the west.
931	1		*Angophora floribunda*	Rough-barked Apple	16.0	6.0	0.25	0.30	3.00	2.00	Mature	Fair	Poor	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to the west.
932	1		*Angophora floribunda*	Rough-barked Apple	19.0	9.0	0.42	0.55	5.04	2.57	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
933	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	13.0	0.63	0.85	7.56	3.09	Mature	Good	Average	Deadwood-Minor Co-dominant Stems Inclusions	Long (>40 years)	Endemic		4 Moderate	
934	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	12.0	0.51	0.62	6.12	2.71	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	Good tree.
935	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	7.0	0.35	0.43	4.20	2.32	Mature	Good	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
936	1		*Eucalyptus pilularis*	Blackbutt	24.0	12.0	0.54	0.72	6.48	2.88	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
937	1		*Eucalyptus saligna*	Sydney Blue Gum	21.0	14.0	0.89	1.30	10.68	3.69	Mature	Normal	Poor	Deadwood-Minor Lean-Minor Co-dominant Stems Decay-Major Epicormic Growth Branch Tearouts Hangers	Long (>40 years)	Endemic		3 Low	Decay and dysfunction at centre of trunks from base to 3.0m but with significant reaction wood.
938	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	12.0	0.41	0.51	4.92	2.49	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
939	1		*Acacia parramattensis*	Parramatta Wattle	14.0	12.0	0.32	0.40	3.84	2.25	Mature	Fair	Average	Deadwood-Major Tip Dieback Branch Tearouts Epicormic Growth	Short (5-15 years)	Endemic		3 Low	Major tear out at 8.0m to east side. Top broken out.
940	1		*Acacia parramattensis*	Parramatta Wattle	18.0	10.0	0.31	0.38	3.72	2.20	Mature	Fair	Poor	Deadwood-Major Tip Dieback Branch Tearouts Asymmetric Canopy Lean-Minor	Short (5-15 years)	Endemic		2 Very Poor	Asymmetric to west.
941	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	12.0	0.47	0.53	5.64	2.53	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
942	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	6.0	0.27	0.34	3.24	2.10	Mature	Normal	Average	Deadwood-Minor Decay-Minor	Long (>40 years)	Endemic		4 Moderate	Fungal fruiting bodies at base.
943	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	8.0	0.38	0.46	4.56	2.39	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
944	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	6.0	0.40	0.46	4.80	2.39	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
945	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	7.0	0.34	0.40	4.08	2.25	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
946	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	5.0	0.42	0.51	5.04	2.49	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	

Tree ID	Trees in Group	Remote Assessment Made	Tree Species	Common Name	Height (m)	Spread (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Noted Defects	SULE Rating	Tree Origin	Habitat Values /Hollow Bearing	Condition Rating Value	General Comments and Notes
947	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	5.0	0.22	0.30	2.64	2.00	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
948	1		*Eucalyptus saligna*	Sydney Blue Gum	24.0	10.0	0.50	0.62	6.00	2.71	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
949	1		*Eucalyptus saligna*	Sydney Blue Gum	26.0	12.0	0.51	0.62	6.12	2.71	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
950	1		*Eucalyptus saligna*	Sydney Blue Gum	27.0	8.0	0.37	0.48	4.44	2.43	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to west.
951	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	15.0	0.49	0.63	5.88	2.73	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
952	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	16.0	0.72	1.02	8.64	3.34	Mature	Normal	Average	Deadwood-Minor Co-dominant Stems	Long (>40 years)	Endemic		4 Moderate	
953	1		*Eucalyptus saligna*	Sydney Blue Gum	20.0	13.0	0.36	0.47	4.32	2.41	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
954	1		*Eucalyptus saligna*	Sydney Blue Gum	22.0	7.0	0.32	0.36	3.84	2.15	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
955	1		*Eucalyptus saligna*	Sydney Blue Gum	23.0	15.0	0.54	0.68	6.48	2.81	Mature	Good	Good	Deadwood-Minor	Long (>40 years)	Endemic		5 High	
956	1		*Eucalyptus saligna*	Sydney Blue Gum	28.0	9.0	0.44	0.58	5.28	2.63	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
957	1		*Eucalyptus saligna*	Sydney Blue Gum	25.0	12.0	0.33	0.48	3.96	2.43	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
958	1		*Eucalyptus saligna*	Sydney Blue Gum	29.0	14.0	0.44	0.52	5.28	2.51	Mature	Normal	Average	Deadwood-Minor Asymmetric Canopy	Long (>40 years)	Endemic		4 Moderate	Asymmetric to south-west.
959	1		*Eucalyptus saligna*	Sydney Blue Gum	32.0	13.0	0.57	0.69	6.84	2.83	Mature	Normal	Average	Deadwood-Minor	Long (>40 years)	Endemic		4 Moderate	
960	1		*Eucalyptus robusta*	Swamp Mahogany	12.5	8.0	0.28	0.37	3.36	2.18	Mature	Fair	Average	Deadwood-Minor Tip Dieback	Medium (15-40 years)	Native		3 Low	
961	2		*Populus deltoides*	American Cottonwood	13.0	9.0	0.28	0.37	3.36	2.18	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Lean-Minor Deadwood-Major	Medium (15-40 years)	Invasive		2 Very Poor	In base of creekline.
962	1		*Populus deltoides*	American Cottonwood	13.0	7.0	0.49	0.55	5.88	2.57	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major	Medium (15-40 years)	Invasive		2 Very Poor	In base of creekline.
963	1		*Populus deltoides*	American Cottonwood	15.0	7.0	0.52	0.57	6.24	2.61	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major	Medium (15-40 years)	Invasive		2 Very Poor	In base of creekline.
964	1		*Populus deltoides*	American Cottonwood	12.0	6.0	0.48	0.52	5.76	2.51	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major Decay-Major	Medium (15-40 years)	Invasive		2 Very Poor	In base of creekline.
965	4		*Populus deltoides*	American Cottonwood	15.0	9.0	0.40	0.45	4.80	2.37	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major	Medium (15-40 years)	Invasive		2 Very Poor	4 trees in a cluster. All very poor condition. Treat as one tree. In base of creekline.
966	3		*Populus deltoides*	American Cottonwood	13.0	7.0	0.39	0.46	4.68	2.39	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major Decay-Major	Medium (15-40 years)	Invasive		2 Very Poor	3 trees in a cluster. All very poor condition. Treat as one tree. In base of creekline.
967	2		*Populus deltoides*	American Cottonwood	13.0	7.0	0.43	0.46	5.16	2.39	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major Decay-Major	Medium (15-40 years)	Invasive		2 Very Poor	In base of creekline.
968	1		*Populus deltoides*	American Cottonwood	10.5	6.0	0.50	0.52	6.00	2.51	Over-mature	Poor	Poor	Tip Dieback Asymmetric Canopy Deadwood-Major Decay-Major Branch Tearouts Lean-Minor	Medium (15-40 years)	Invasive		2 Very Poor	Very poor condition. In base of creekline.

4.2 Hornsby Quarry - Detailed Tree Assessment Plans

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PROJECT & CLIENT

Hornsby Quarry

Pre Development
Hornsby NSW 2077

Prepared for :

Hornsby Shire Council

Tree Assessment Package

DRAWING INDEX

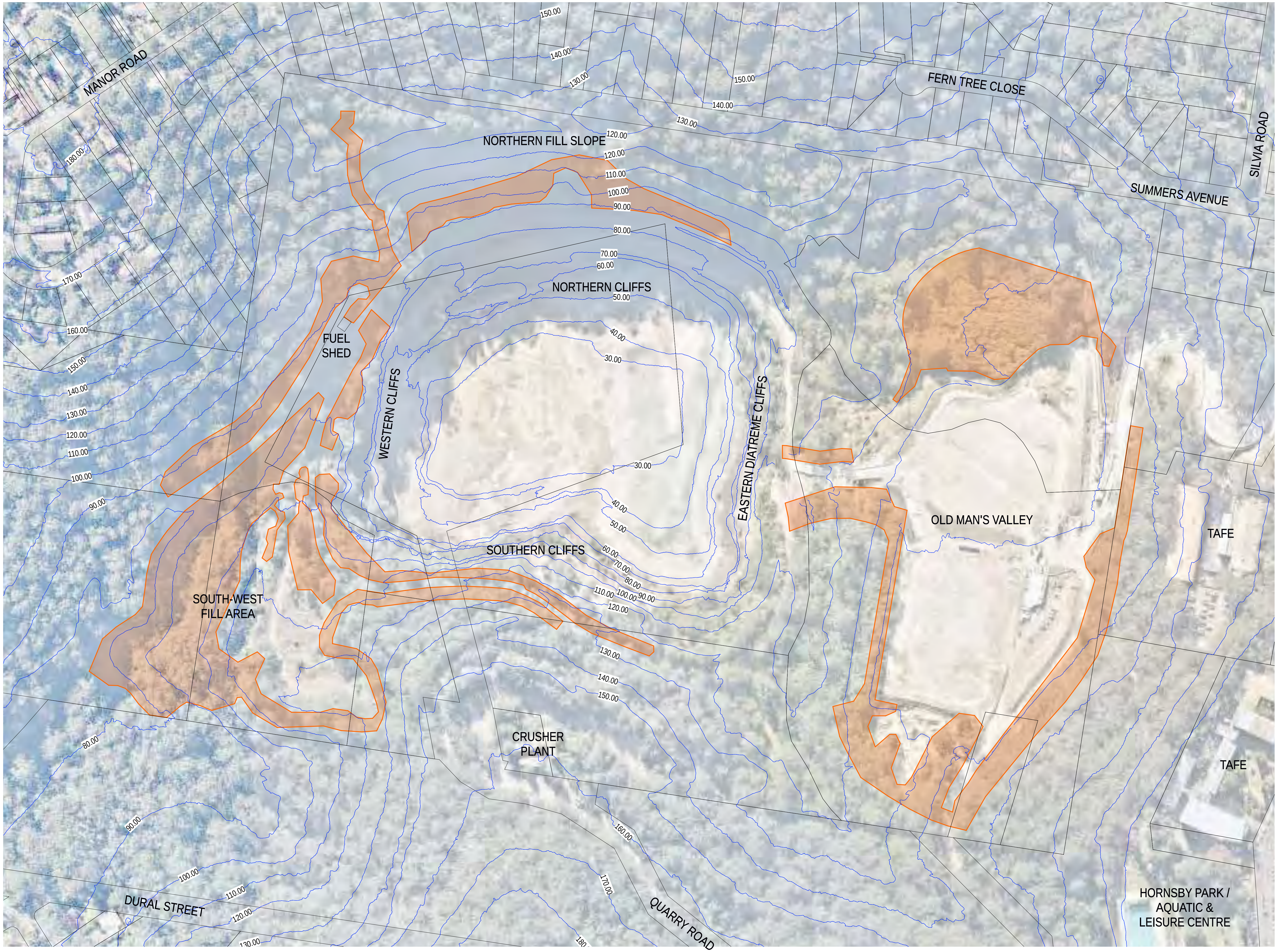
Drawing No:	Drawing Name	Current Rev.
T-00	Cover Page	A
T-01	Overall Site Plan	A
T-02	Tree Inventory Plan - North West	A
T-03	Tree Inventory Plan - North East	A
T-04	Tree Inventory Plan - South West	A
T-05	Tree Inventory Plan - South East	A
T-06	Tree Condition Rating Plan - North West	A
T-07	Tree Condition Rating Plan - North East	A
T-08	Tree Condition Rating Plan - South West	A
T-09	Tree Condition Rating Plan - South East	A
T-10	Tree Species Plan - North West	A
T-11	Tree Species Plan - North East	A
T-12	Tree Species Plan - South West	A
T-13	Tree Species Plan - South East	A
T-14	Tree Origin Plan - North West	A
T-15	Tree Origin Plan - North East	A
T-16	Tree Origin Plan - South West	A
T-17	Tree Origin Plan - South East	A
T-18	Tree Habitat Value Plan - North West	A
T-19	Tree Habitat Value Plan - North East	A
T-20	Tree Habitat Value Plan - South West	A
T-21	Tree Habitat Value Plan - South East	A
T-22	Large DBH Tree Plan - North West	A
T-23	Large DBH Tree Plan - North East	A
T-24	Large DBH Tree Plan - South West	A
T-25	Large DBH Tree Plan - South East	A

DATE :

22 August 2019

ISSUE :

For Review / Comment



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Legend
- Cadastre
- 10m Contours
- Tree Survey Extent

0 20 40 100m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

Overall Site Plan

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:1000@A0/1:2000@A2

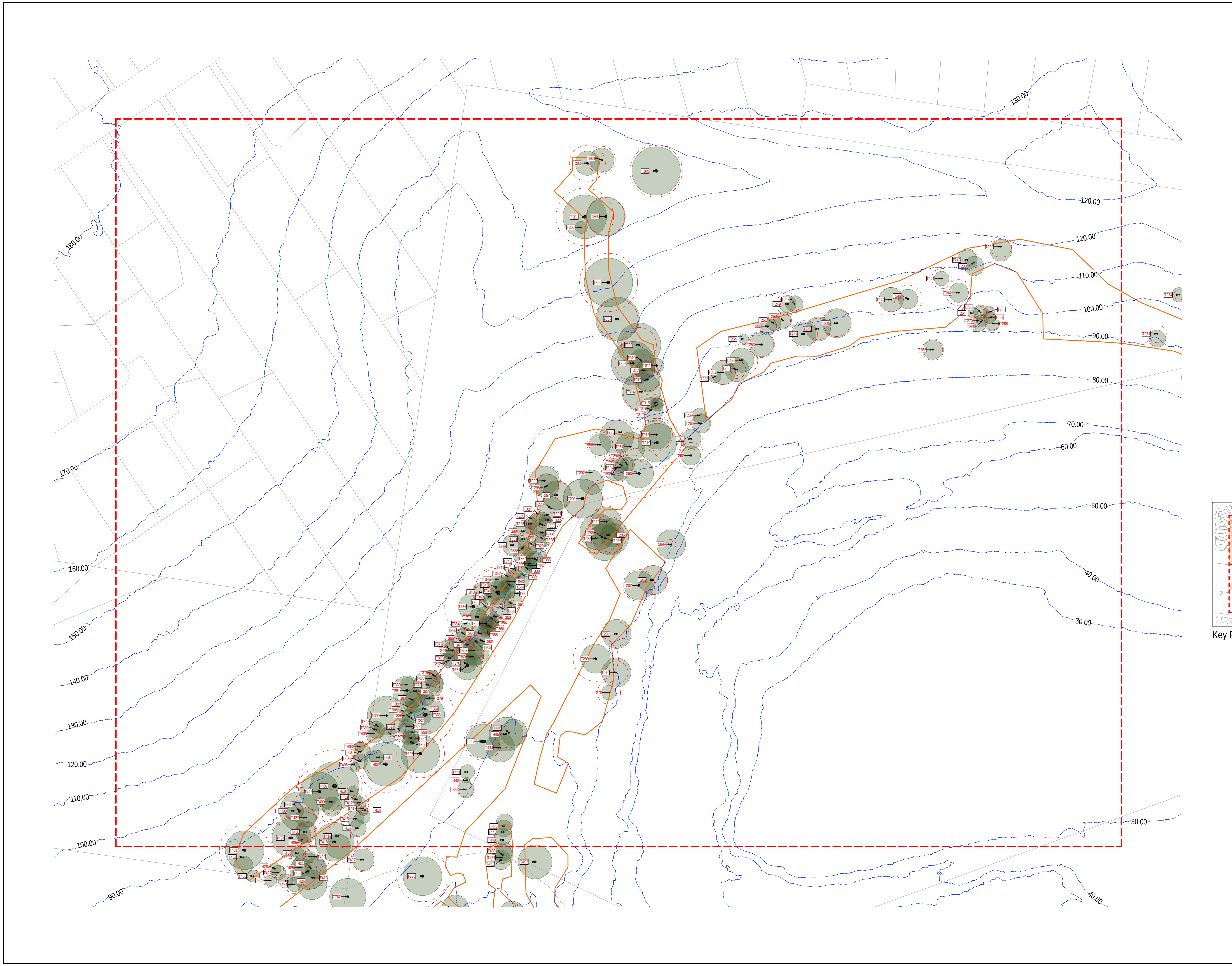
DRAWING NUMBER

T-01

REVISION

A

Plotted at : 3:37 pm 22/8/19



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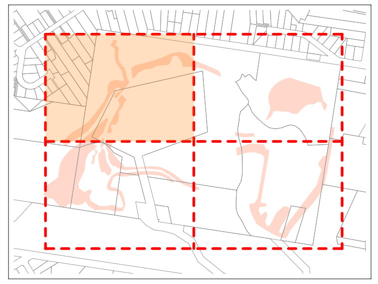
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

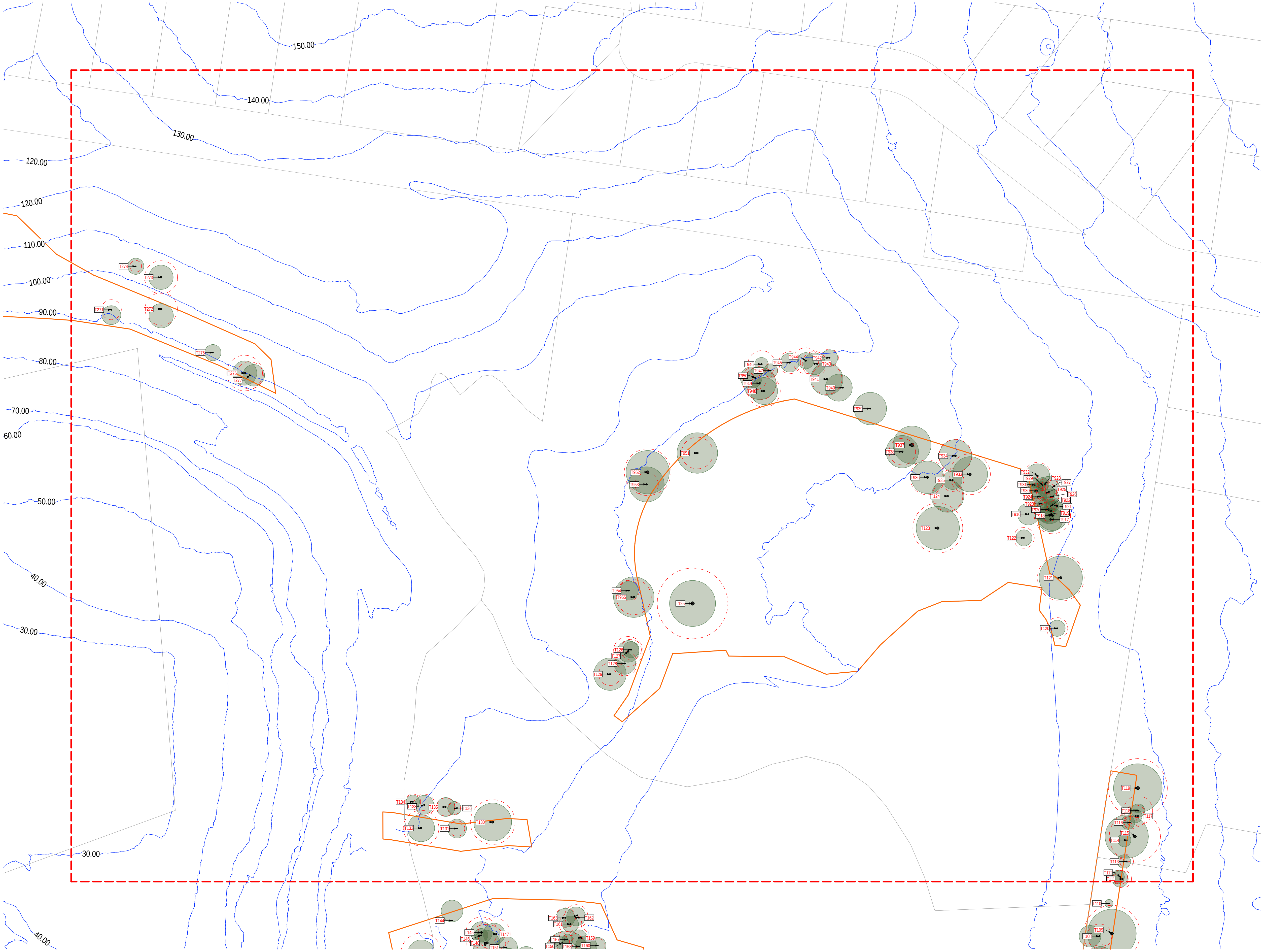
DRAWING TITLE

Tree Inventory Plan - North West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-02
REVISION: A

Plotted at : 3:38 pm 22/8/19



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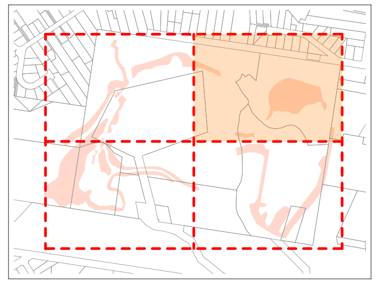
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- Tree Identification Number

Key Plan



0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

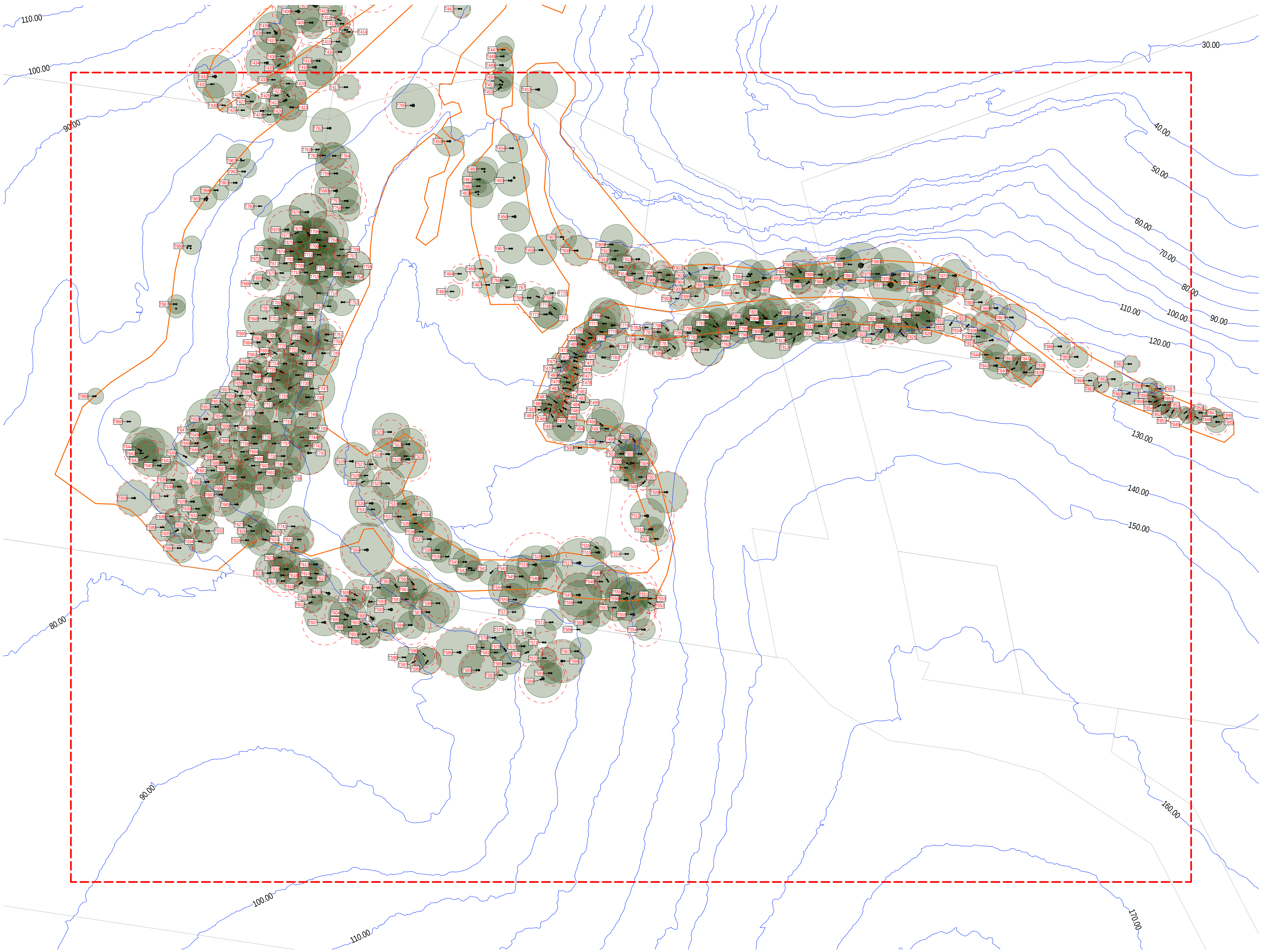
DRAWING TITLE

Tree Inventory Plan - North East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-03
REVISION A

Plotted at : 3:38 pm 22/8/19



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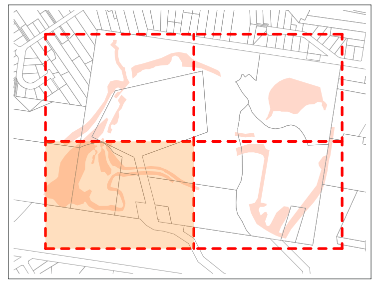
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

Tree Inventory Plan - South West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-04
REVISION: A

Plotted at : 3:39 pm 22/8/19

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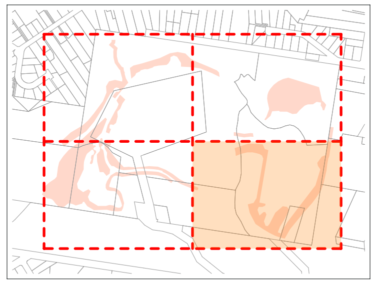
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

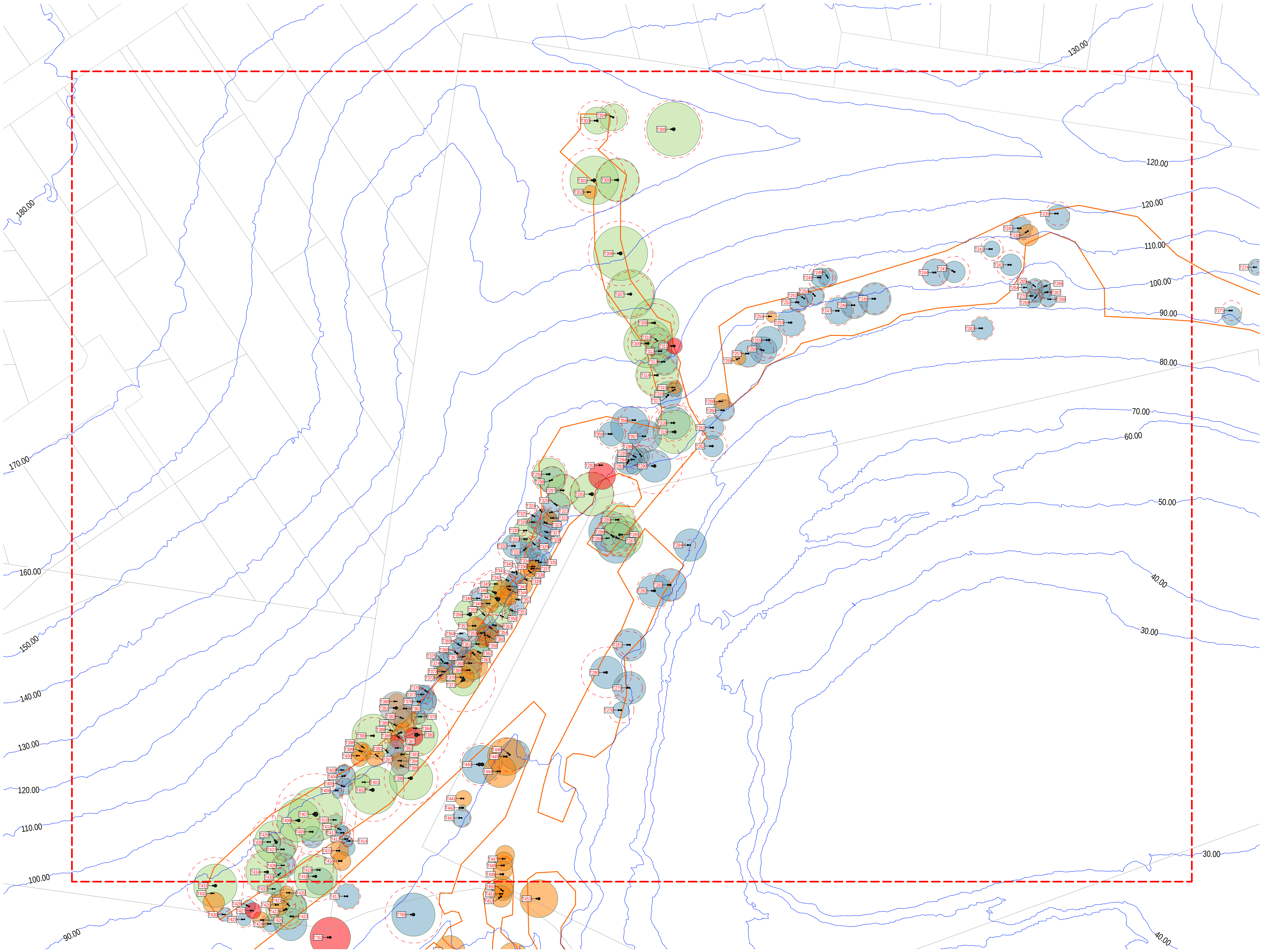
DRAWING TITLE

Tree Inventory Plan - South East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-05
REVISION: A

Plotted at : 3:39 pm 22/8/19



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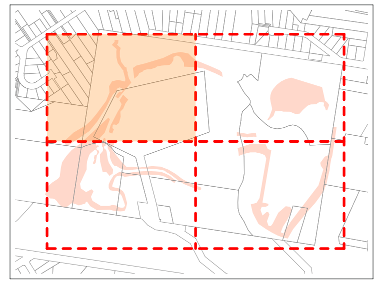
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- 1. Dead (Note : no TPZ's shown for these trees)
- 2. Very Poor (Note : no TPZ's shown for these trees)
- 3. Low (Note: no TPZ's shown for these trees)
- 4. Moderate
- 5. High
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

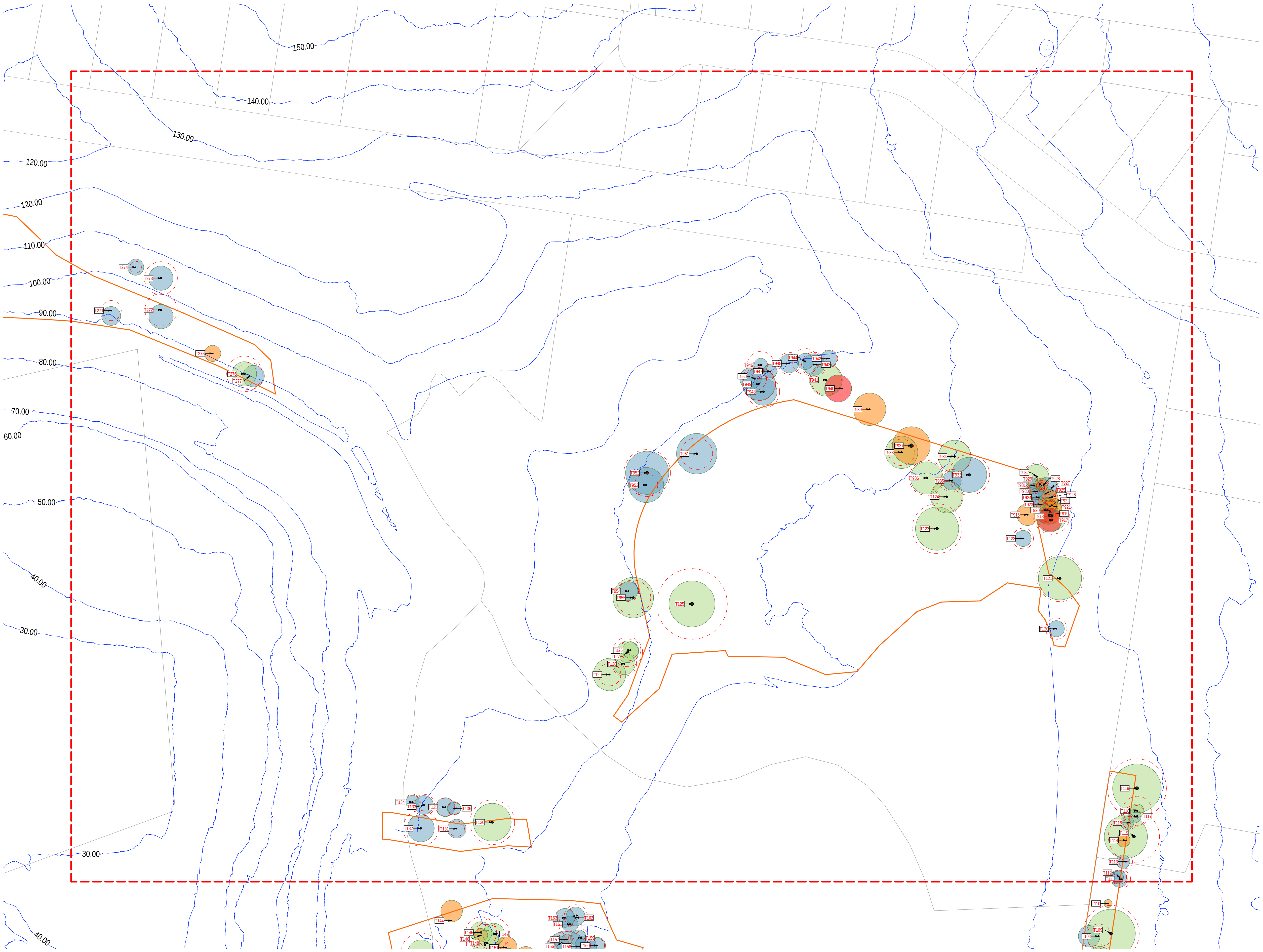
DRAWING TITLE

Tree Condition Rating Plan - North West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-06
REVISION: A

Plotted at : 3:39 pm 22/8/19



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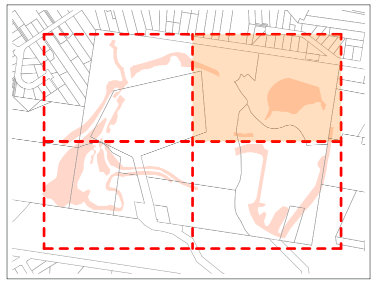
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- 1. Dead (Note : no TPZ's shown for these trees)
- 2. Very Poor (Note : no TPZ's shown for these trees)
- 3. Low (Note: no TPZ's shown for these trees)
- 4. Moderate
- 5. High
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- T26 Tree Identification Number



Key Plan

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

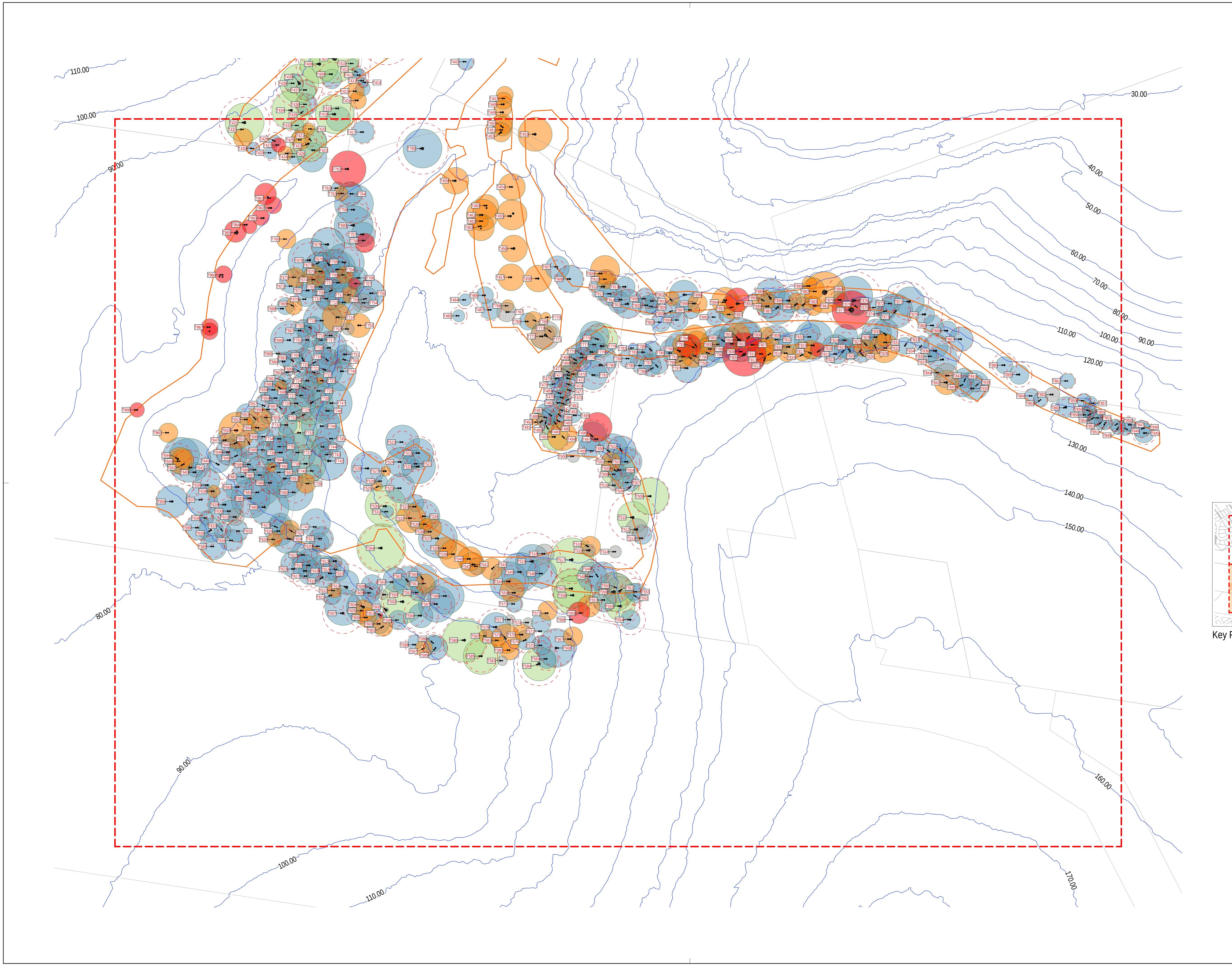
Tree Condition Rating Plan - North East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-07

REVISION A

Plotted at : 3:39 pm 22/8/19



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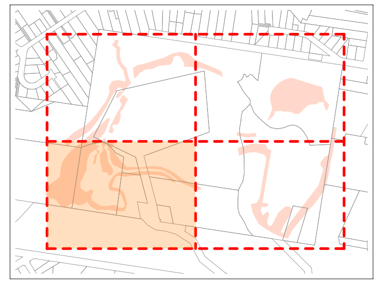
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- 1. Dead (Note : no TPZ's shown for these trees)
- 2. Very Poor (Note : no TPZ's shown for these trees)
- 3. Low (Note: no TPZ's shown for these trees)
- 4. Moderate
- 5. High
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

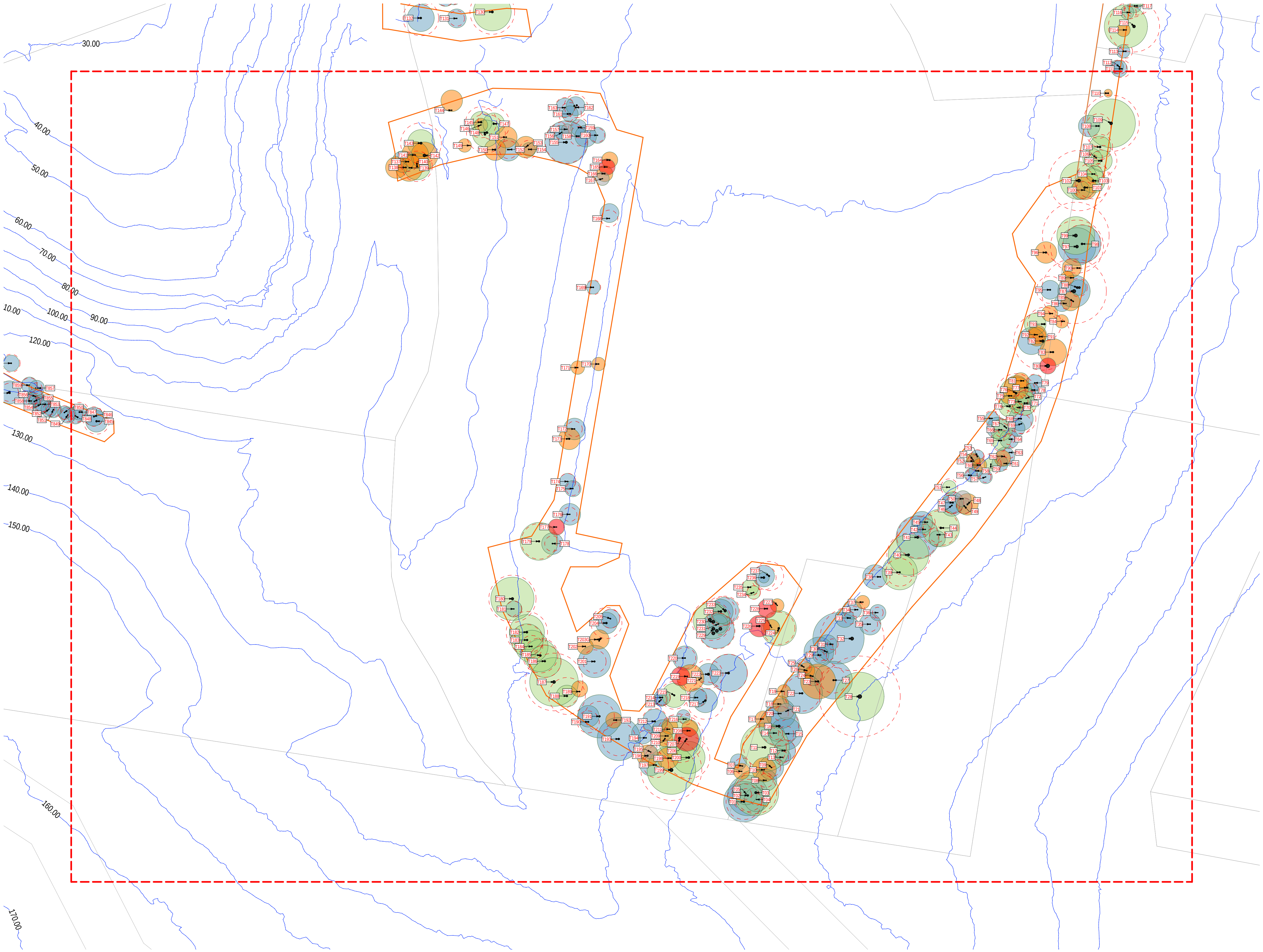
DRAWING TITLE

Tree Condition Rating Plan - South West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-08 REVISION A

Plotted at : 3:40 pm 22/8/19



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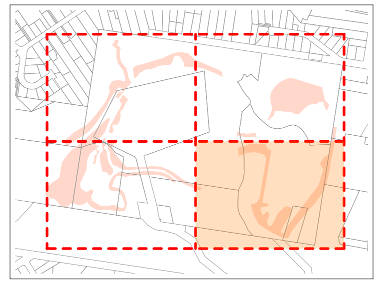
Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- 1. Dead (Note : no TPZ's shown for these trees)
- 2. Very Poor (Note : no TPZ's shown for these trees)
- 3. Low (Note: no TPZ's shown for these trees)
- 4. Moderate
- 5. High
- Extent of canopy as verified by site measure
- Nominal Tree Protection Zone Radius (TPZ) (Only shown for Moderate and High condition rating trees)
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

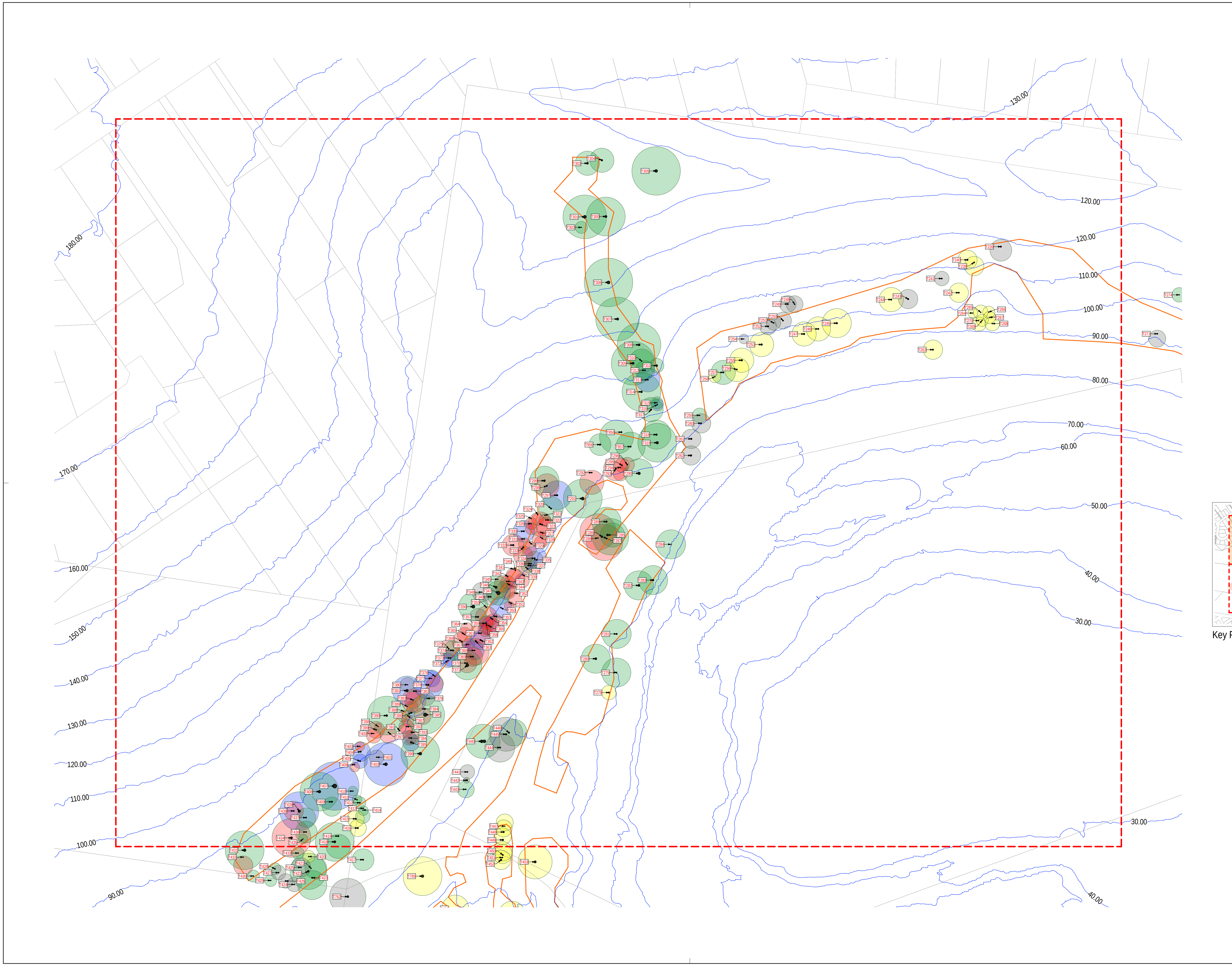
DRAWING TITLE

Tree Condition Rating Plan - South East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-09
REVISION A

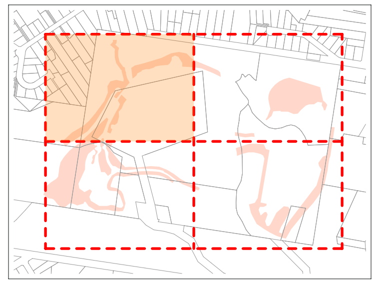
Plotted at : 3:40 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Angophora floribunda
- Casuarina cunninghamiana
- Eucalyptus pilularis
- Eucalyptus saligna
- Others
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

Tree Species Plan - North West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

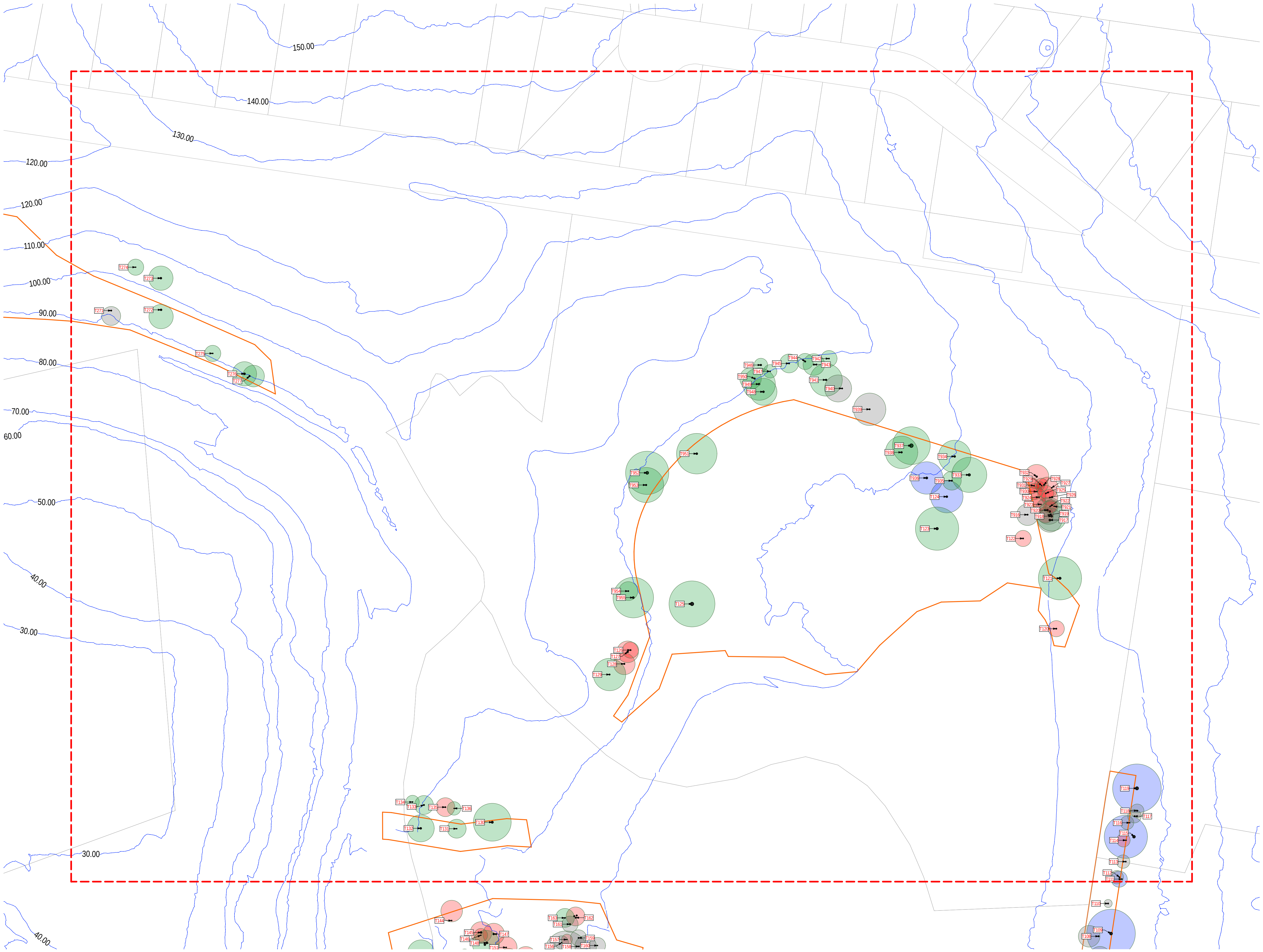
DRAWING NUMBER

T-10

REVISION

A

Plotted at : 3:40 pm 22/8/19

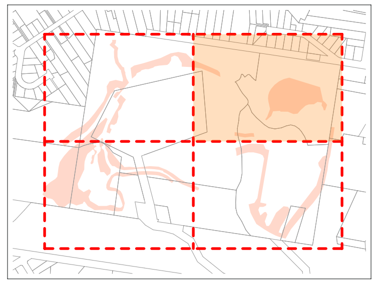


arterra

ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Angophora floribunda
- Casuarina cunninghamiana
- Eucalyptus pilularis
- Eucalyptus saligna
- Others
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

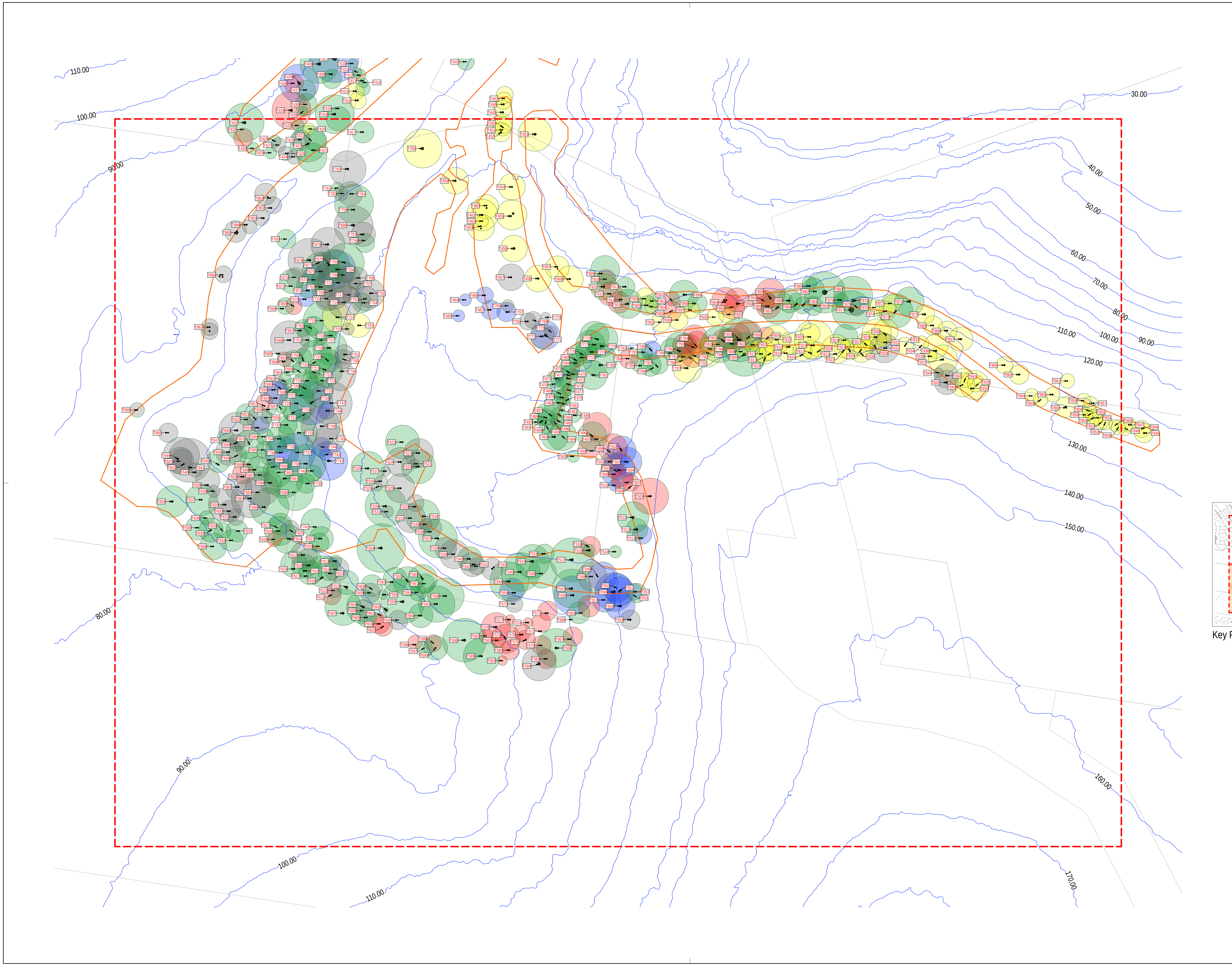
DRAWING TITLE

Tree Species Plan - North East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-11
REVISION: A

Plotted at : 3:40 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Angophora floribunda
- Casuarina cunninghamiana
- Eucalyptus pilularis
- Eucalyptus saligna
- Others
- Extent of canopy as verified by site measure
- Tree Identification Number

Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

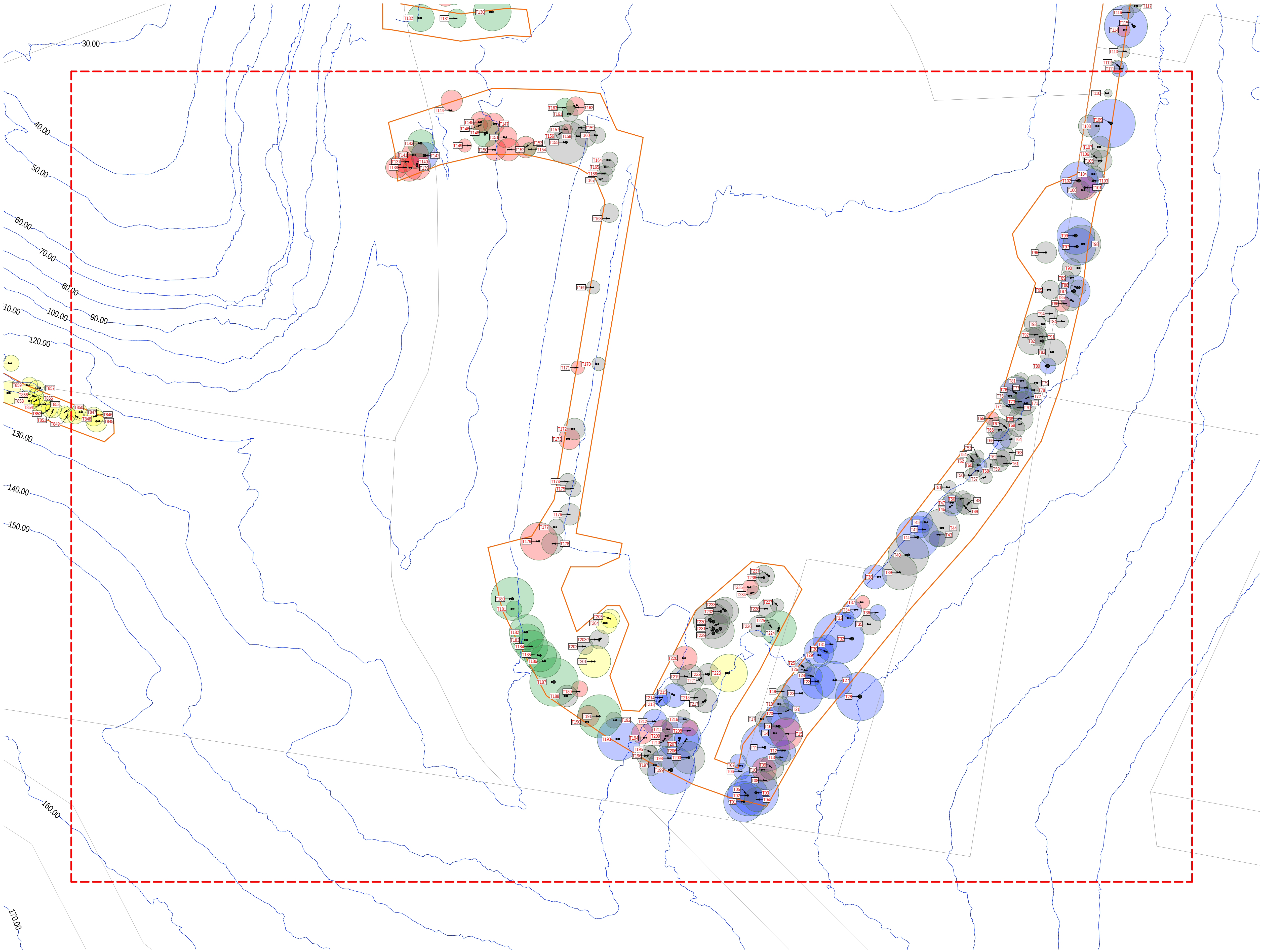
Tree Species Plan - South West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-12

REVISION A

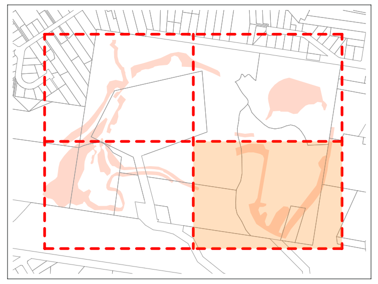
Plotted at : 3:40 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Angophora floribunda
- Casuarina cunninghamiana
- Eucalyptus pilularis
- Eucalyptus saligna
- Others
- Extent of canopy as verified by site measure
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

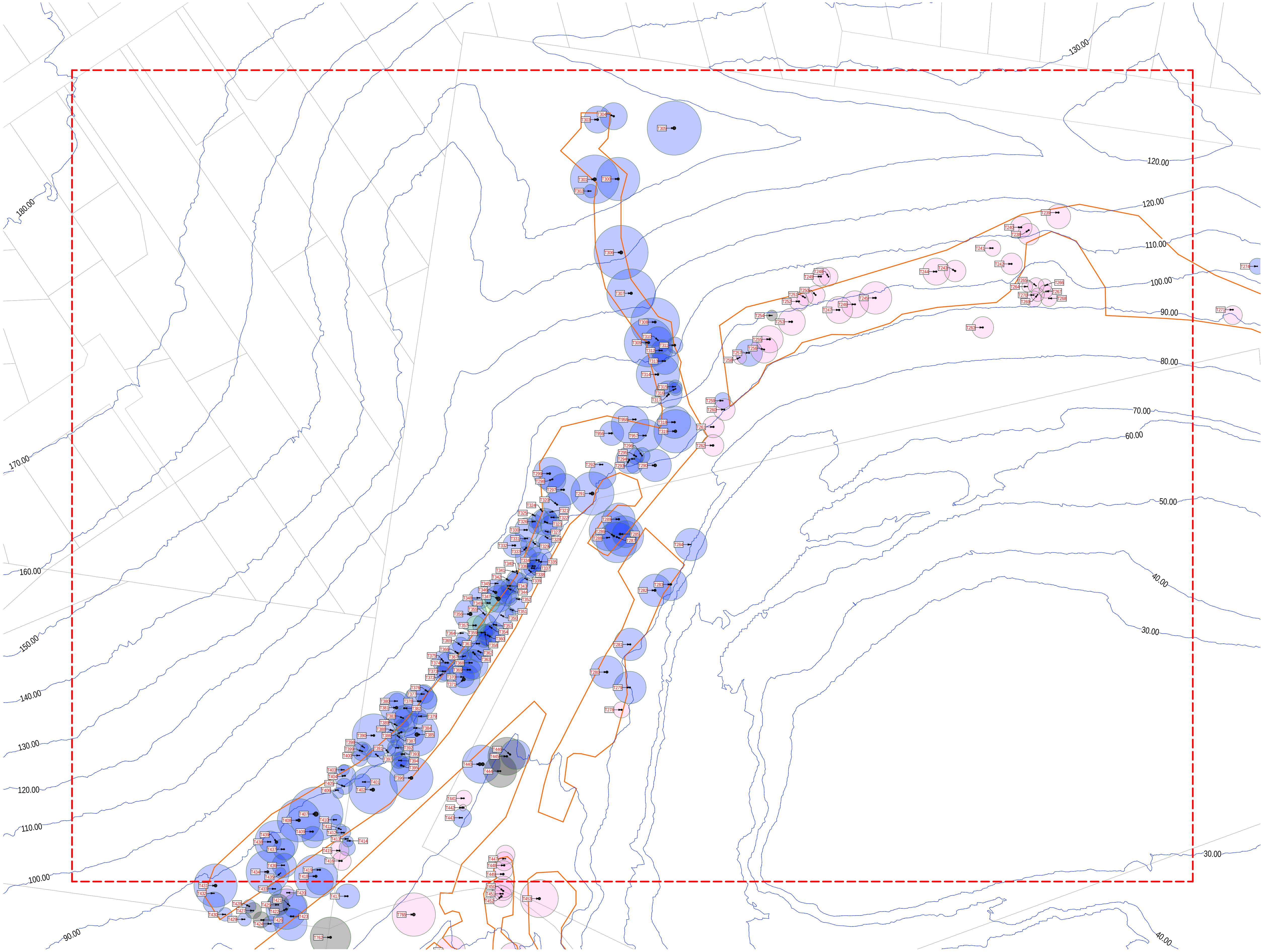
DRAWING TITLE

Tree Species Plan - South East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-13 REVISION A

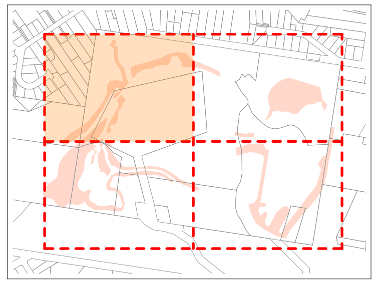
Plotted at : 3:41 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Endemic
- Exotic
- Invasive
- Native
- Extent of canopy as verified by site measure
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

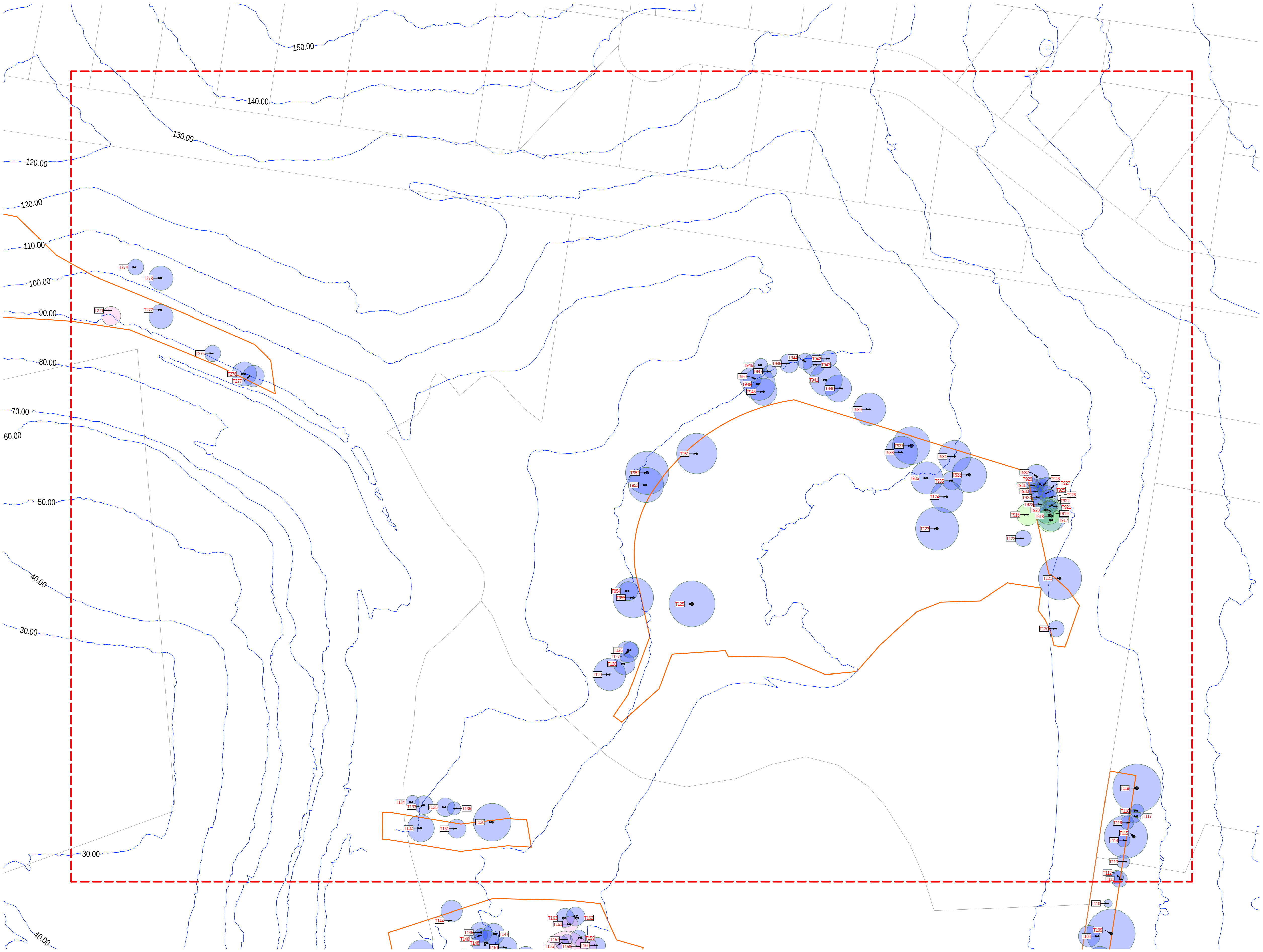
Tree Origin Plan - North West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER
T-14

REVISION
A

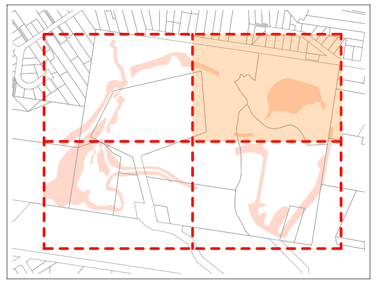
Plotted at : 3:41 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Endemic
- Exotic
- Invasive
- Native
- Extent of canopy as verified by site measure
- T26 Tree Identification Number



Key Plan

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

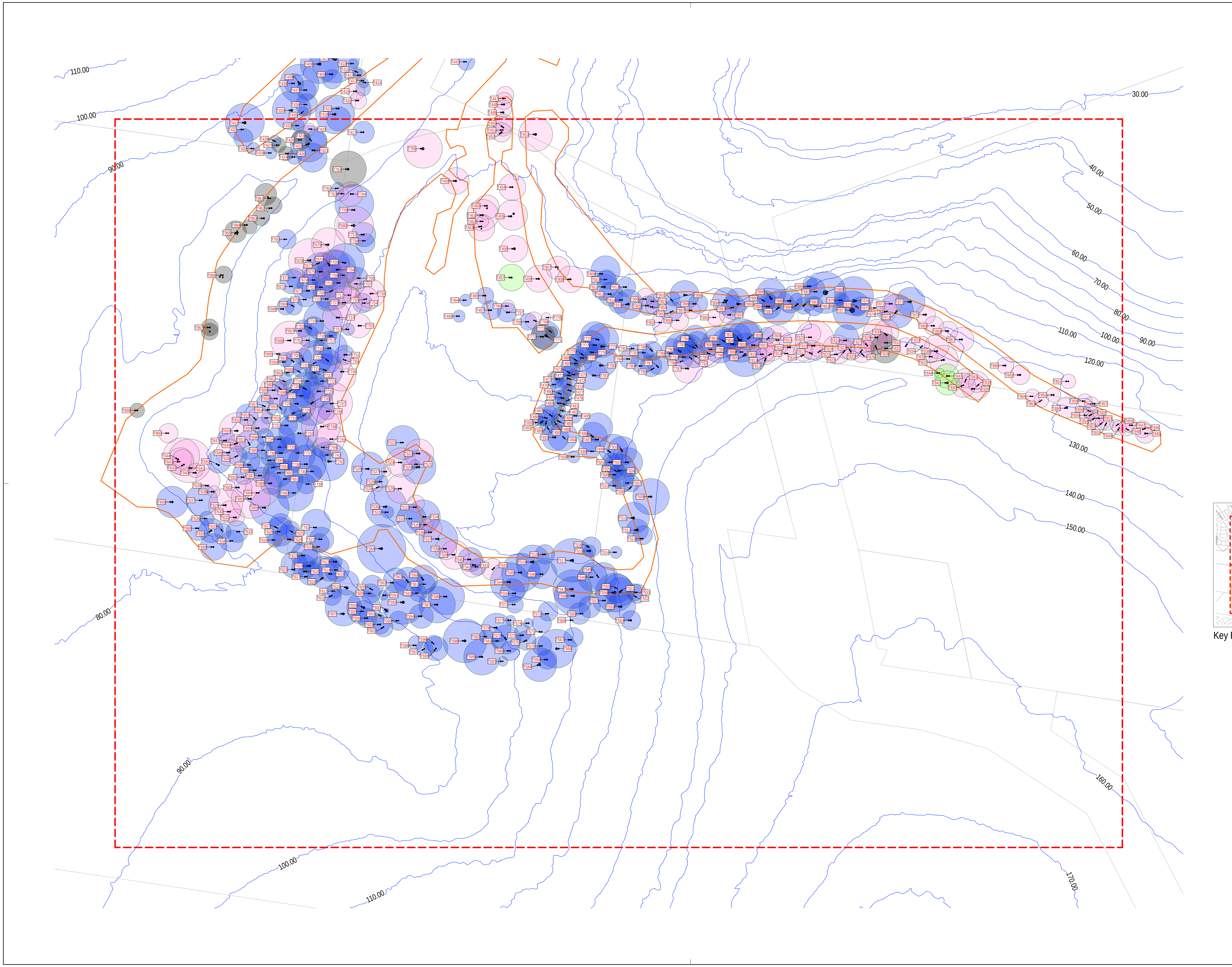
DRAWING TITLE

Tree Origin Plan - North East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-15
REVISION: A

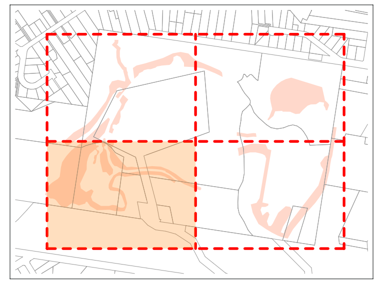
Plotted at : 3:41 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Endemic
- Exotic
- Invasive
- Native
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

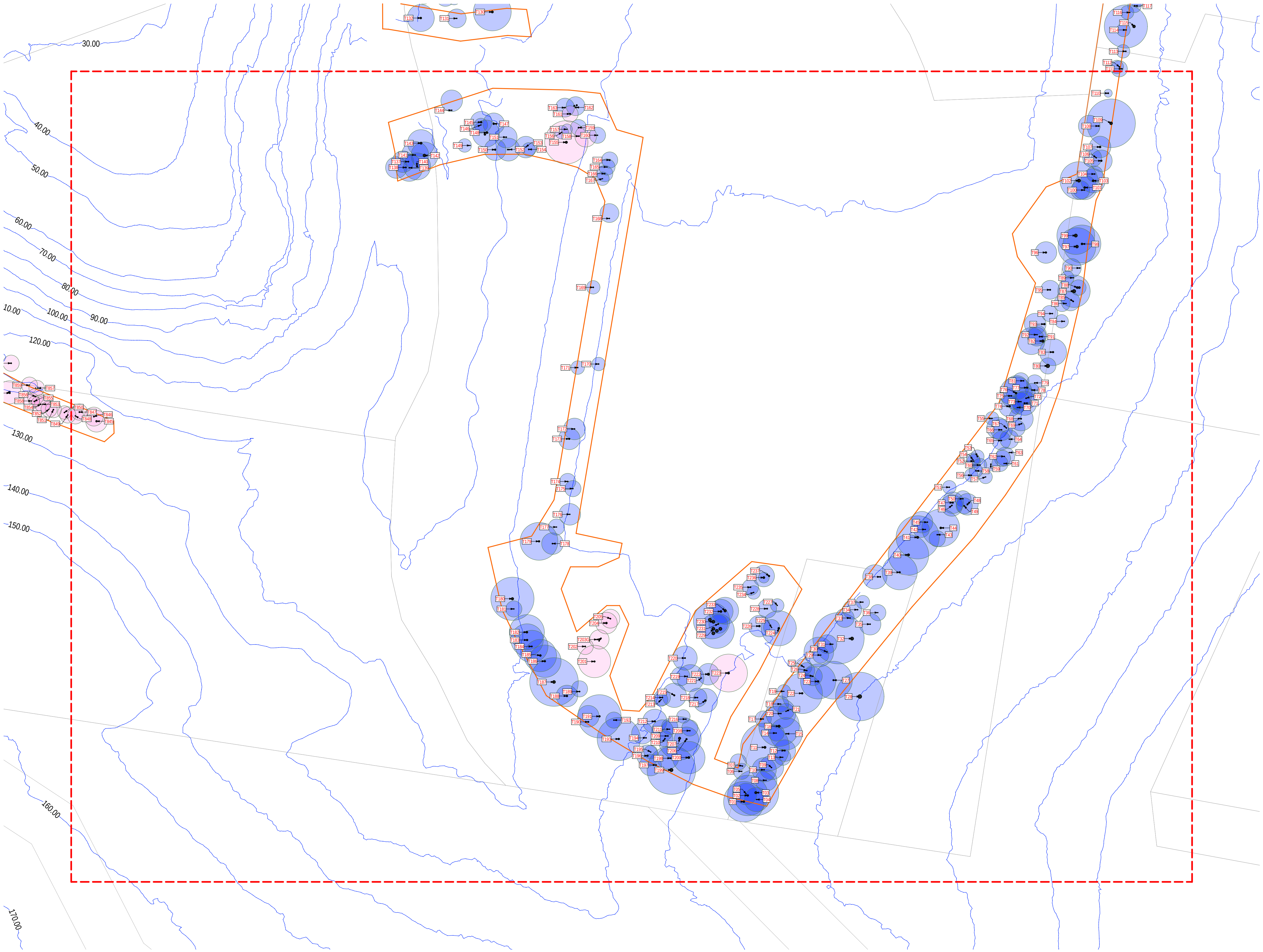
Tree Origin Plan - South West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-16

REVISION A

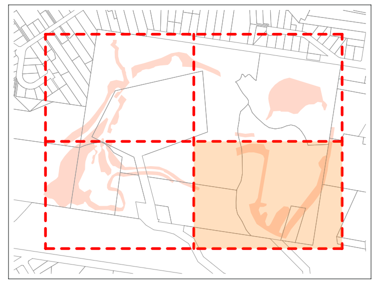
Plotted at : 3:41 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Endemic
- Exotic
- Invasive
- Native
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

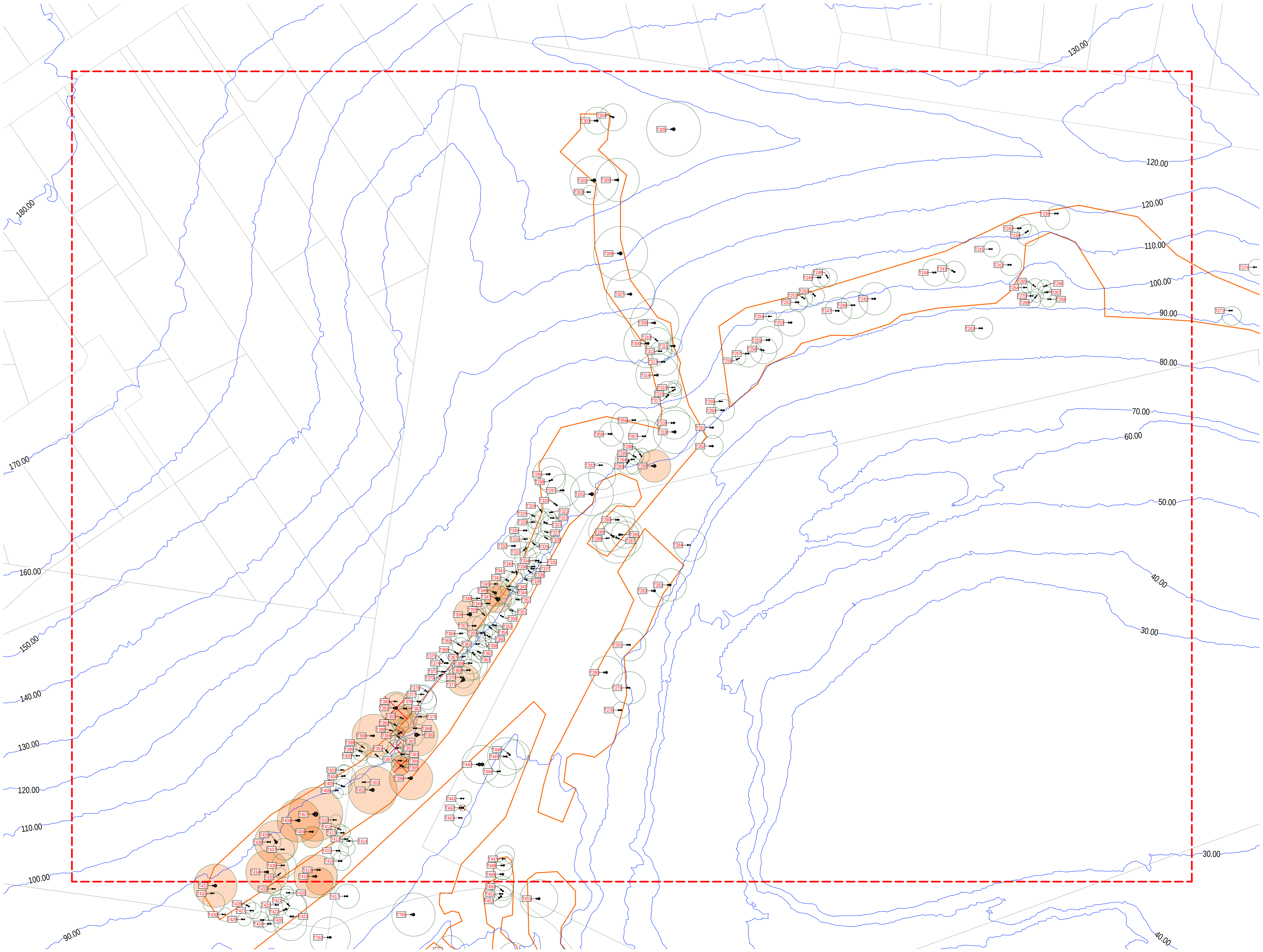
Tree Origin Plan - South East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER REVISION

T-17 A

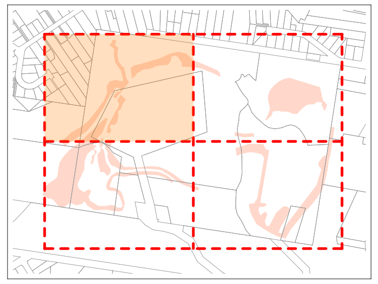
Plotted at : 3:41 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Potential Habitat Value
- Dead Tree
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

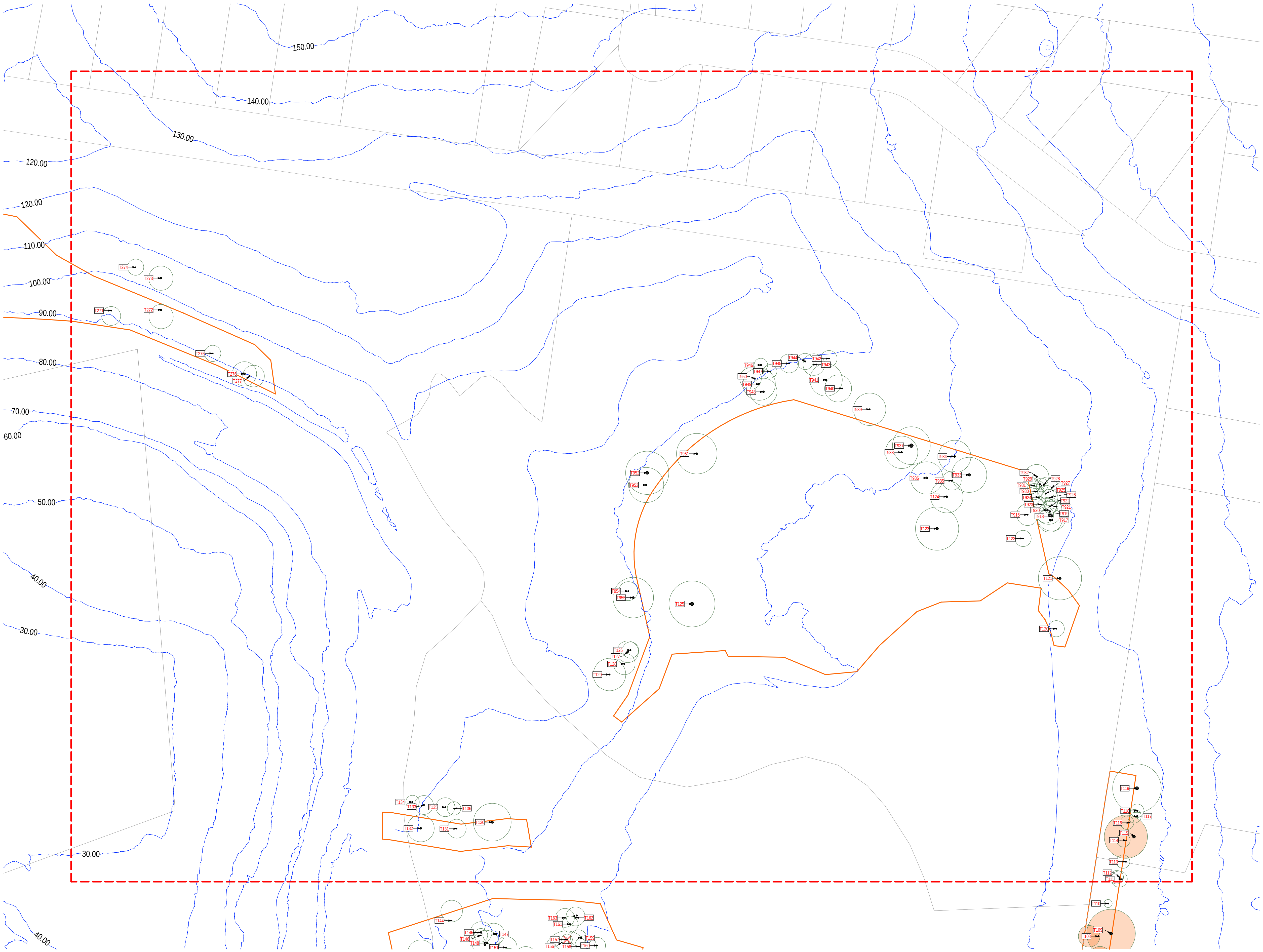
DRAWING TITLE

Tree Habitat Value Plan - North West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-18
REVISION A

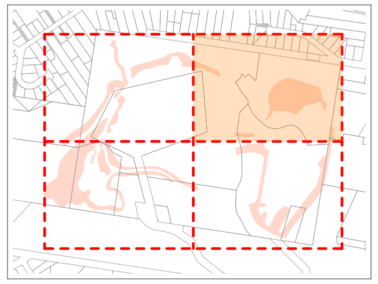
Plotted at : 3:42 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Potential Habitat Value
- Dead Tree
- Extent of canopy as verified by site measure
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

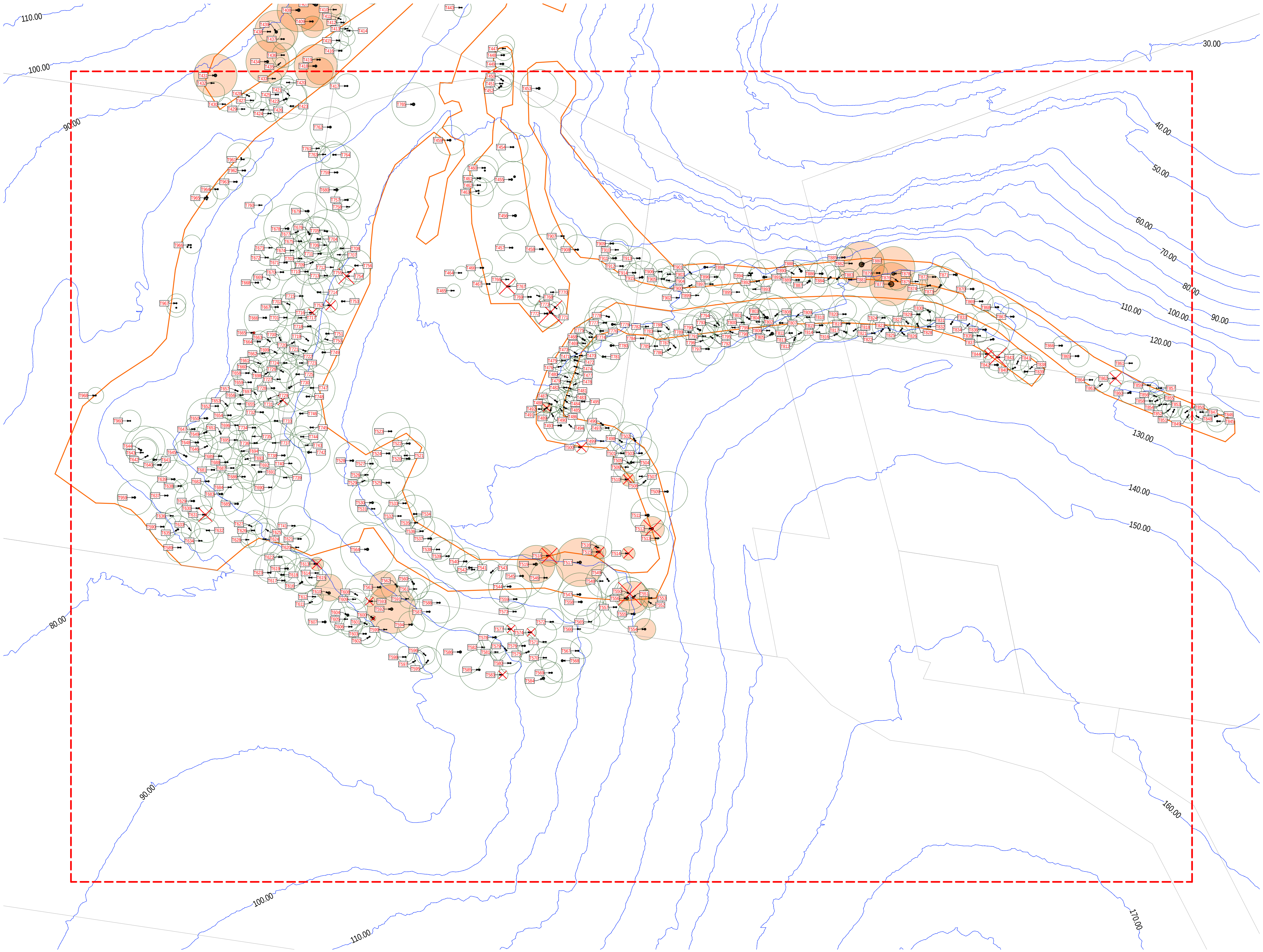
DRAWING TITLE

Tree Habitat Value Plan - North East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-19
REVISION: A

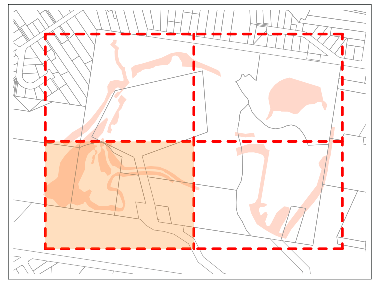
Plotted at : 3:42 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Potential Habitat Value
- Dead Tree
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

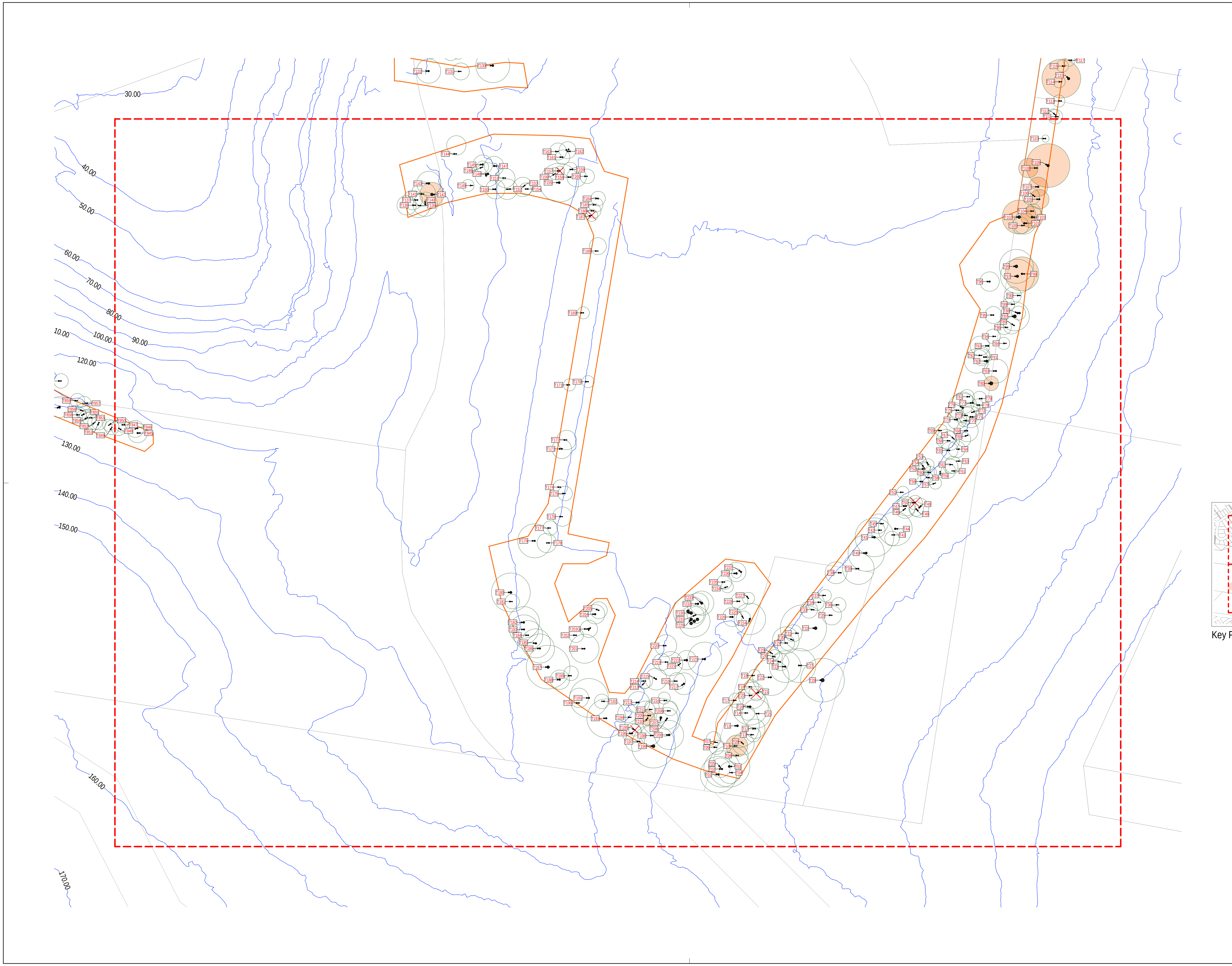
Tree Habitat Value Plan - South West

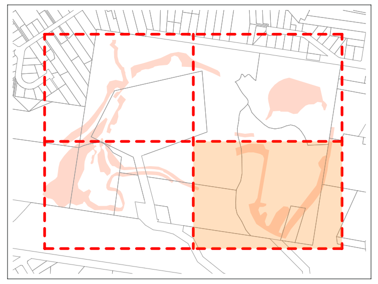
Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-20

REVISION A

Plotted at : 3:42 pm 22/8/19




Key Plan

ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Potential Habitat Value
- Dead Tree
- Extent of canopy as verified by site measure
- Tree Identification Number

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

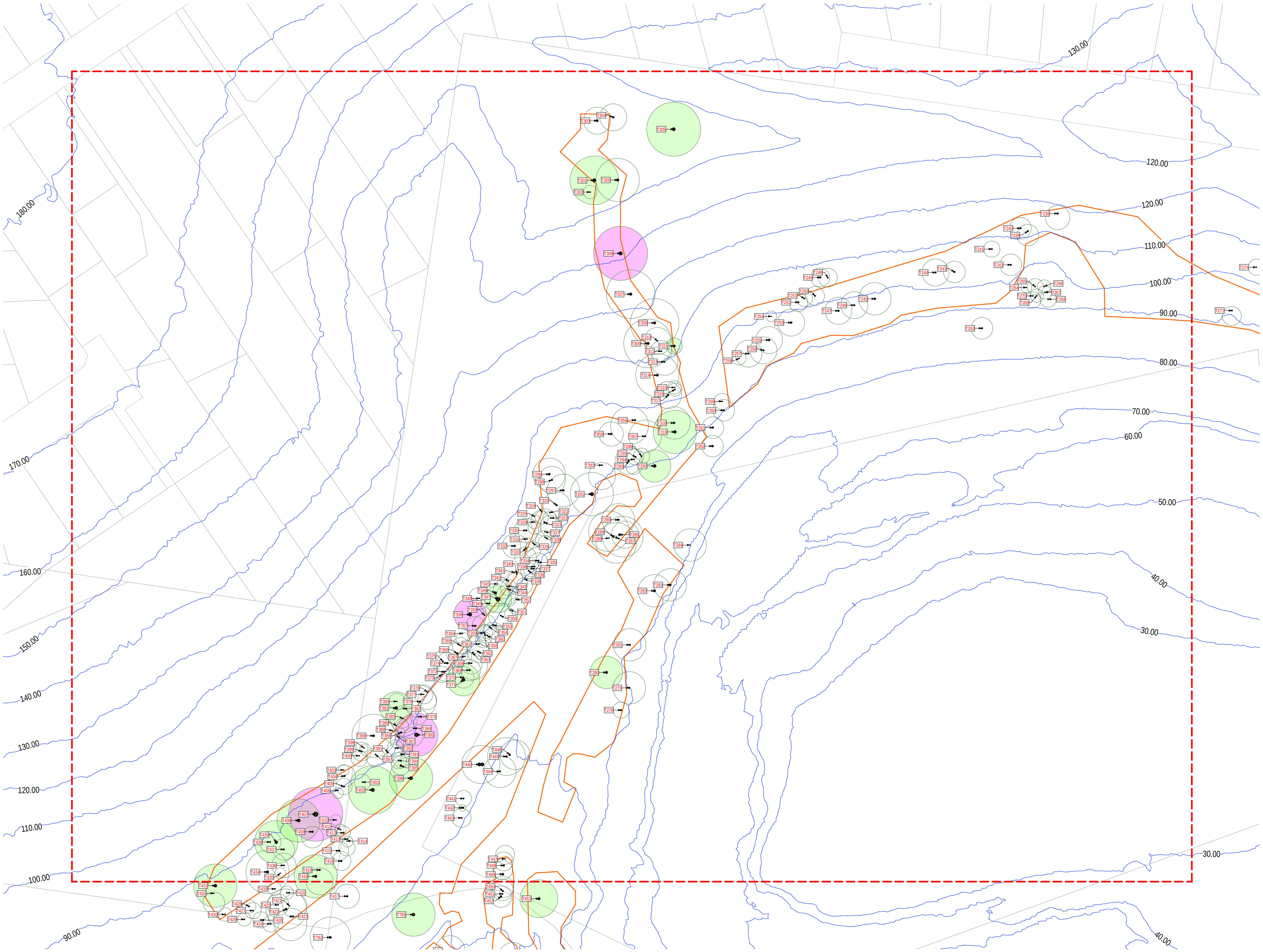
DRAWING TITLE

Tree Habitat Value Plan - South East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-21 REVISION A

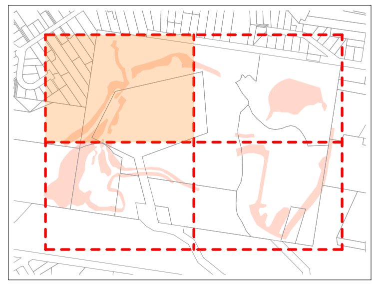
Plotted at : 3:42 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Tree DBH >0.75m
- Tree DBH >0.99m
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

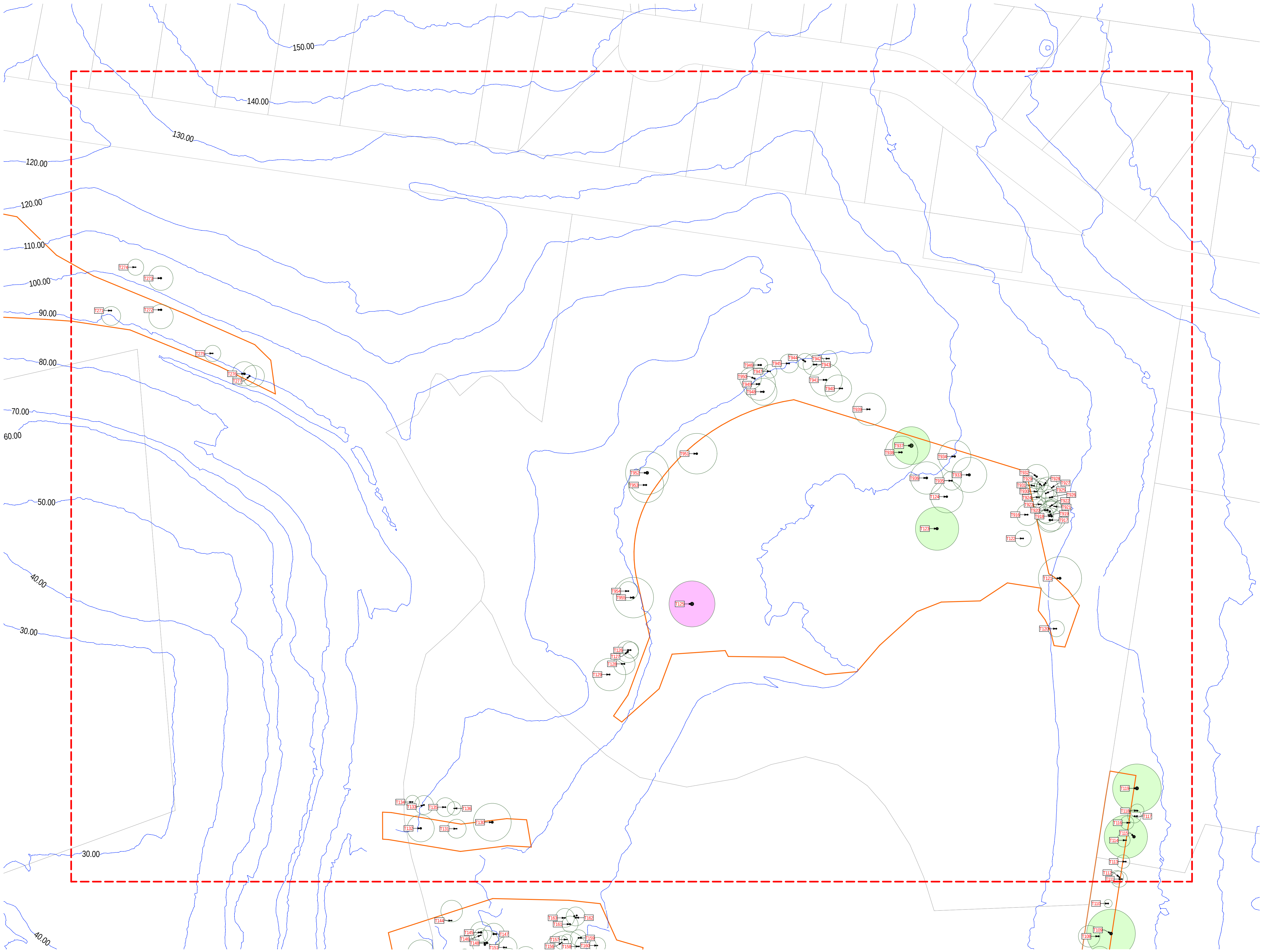
Large DBH Tree Plan - North West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER: T-22

REVISION: A

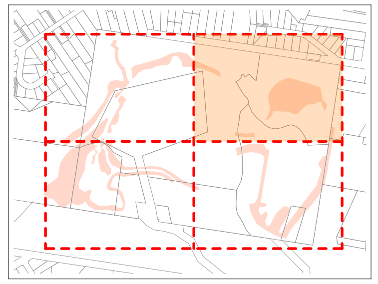
Plotted at : 3:43 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Tree DBH >0.75m
- Tree DBH >0.99m
- Extent of canopy as verified by site measure
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

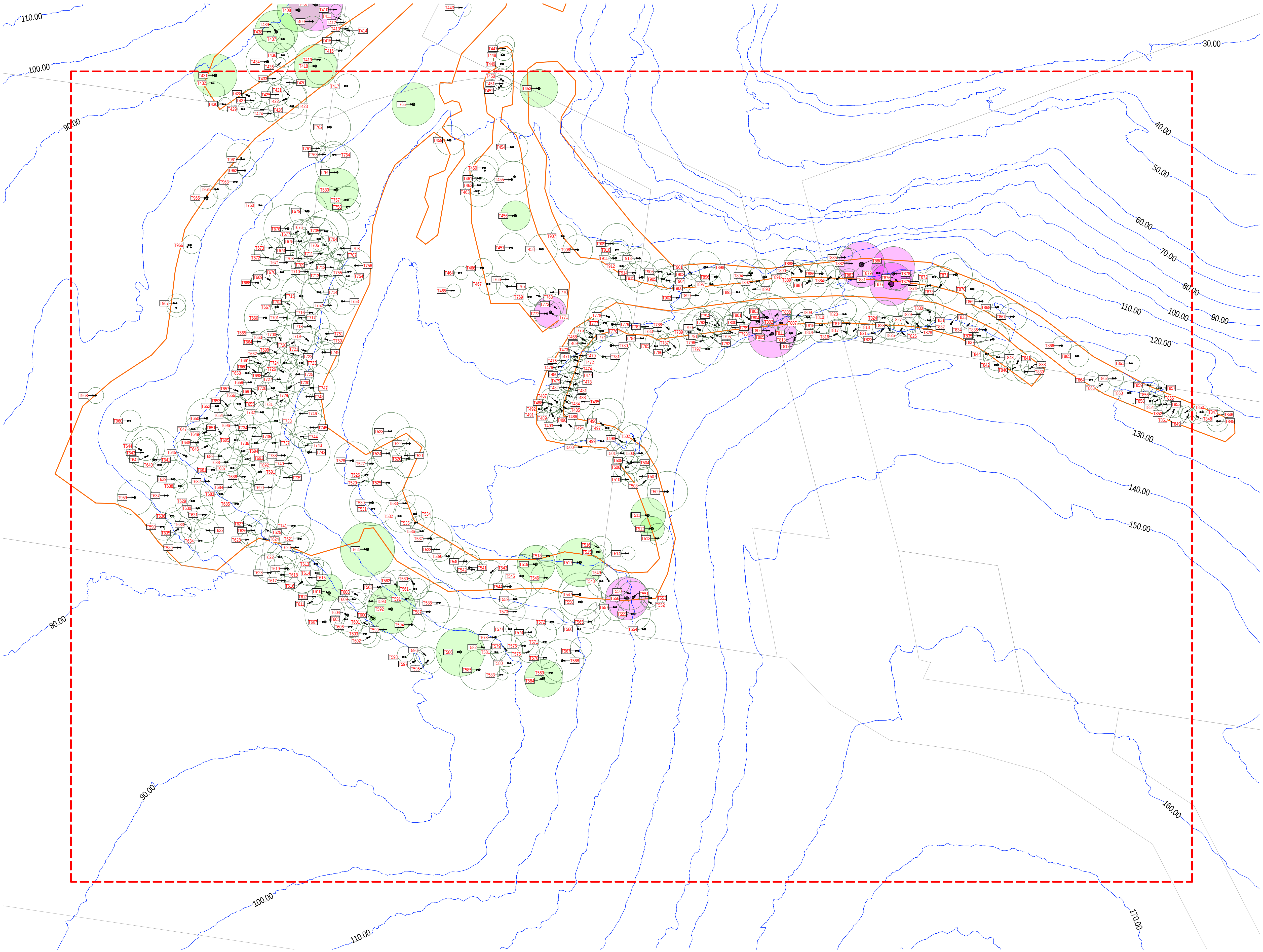
Large DBH Tree Plan - North East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-23

REVISION A

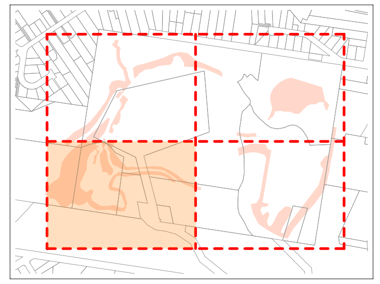
Plotted at : 3:43 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Tree DBH >0.75m
- Tree DBH >0.99m
- Extent of canopy as verified by site measure
- T26 Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

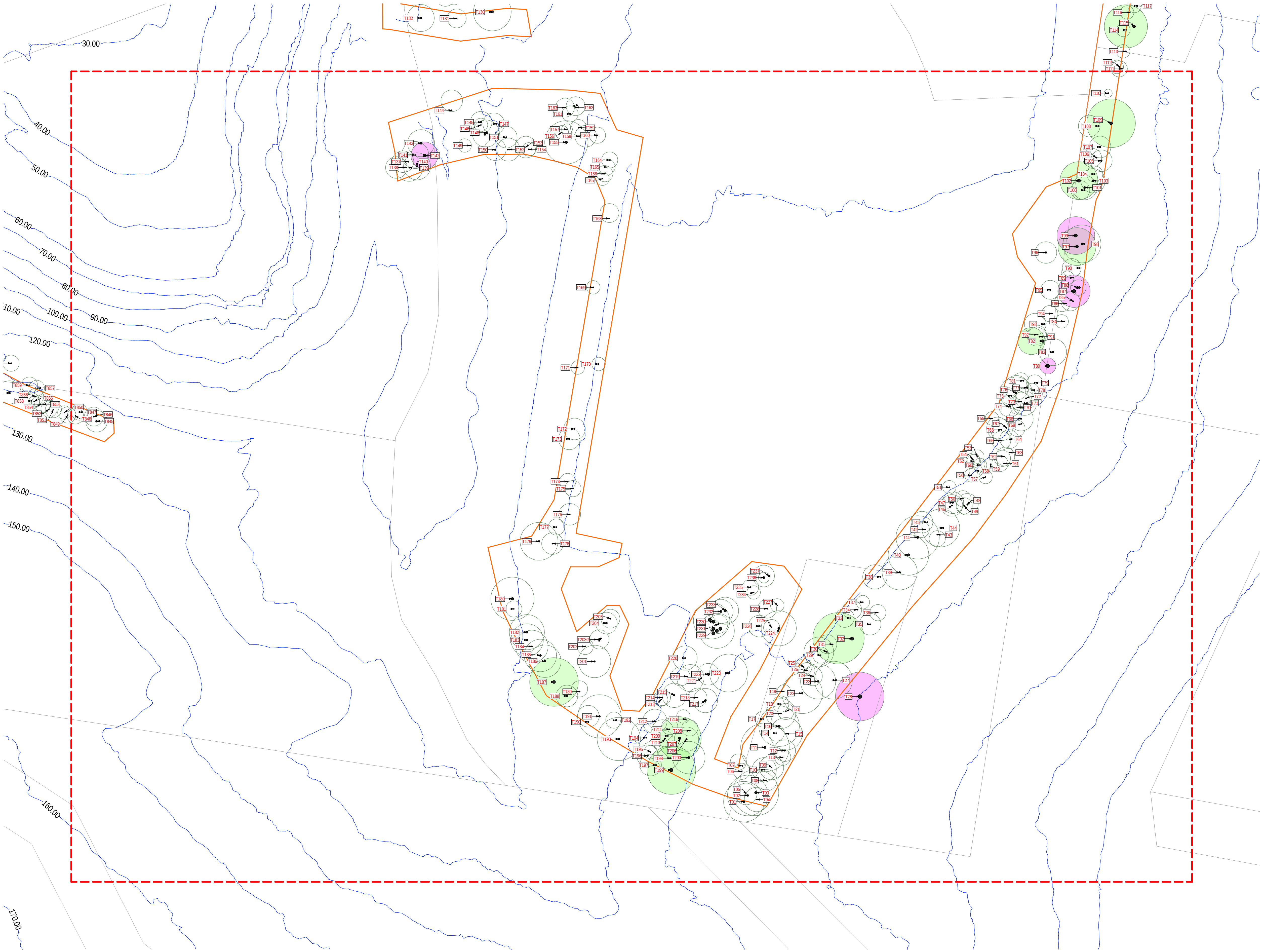
Large DBH Tree Plan - South West

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER
T-24

REVISION
A

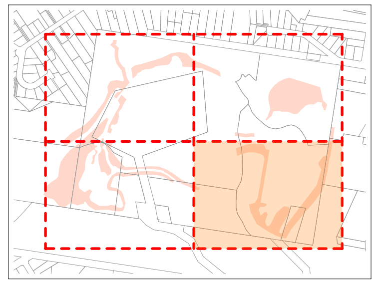
Plotted at : 3:43 pm 22/8/19



ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 F 02 9957 3977 W ARTERRA.COM.AU

Legend

- Cadastre
- Tree Survey Extent
- 10m Contour
- Tree DBH >0.75m
- Tree DBH >0.99m
- Extent of canopy as verified by site measure
- Tree Identification Number



Key Plan

0 10 20 50m

REVISION	DESCRIPTION	CHKD	DATE
A	For Review / Comment	RWS	22/08/19

PROJECT & CLIENT

Hornsby Quarry

Hornsby Shire Council

DRAWING TITLE

Large DBH Tree Plan - South East

Project No : 19.09
Designed : RWS
Drawn : CLB/SK
Scale : 1:500@A0/1:1000@A2

DRAWING NUMBER T-25 REVISION A

Plotted at : 3:43 pm 22/8/19

Appendix H – Traffic Impact Statement

31 October 2019

Our ref:2126457-84496 (Rev 4)
Your ref:

Hornsby Shire Council
Craig Clendinning
Project Manager Major Projects
296 Peats Ferry Road
Hornsby NSW 2077

Dear Craig

Hornsby Quarry Rehabilitation EIS
Traffic Impact Statement

1 Background

GHD was engaged by Hornsby Shire Council to undertake a Traffic Impact Assessment (TIA) to support a development application for approval of the Hornsby Quarry Rehabilitation project under Part 4 of the New South Wales (NSW) *Environmental Planning and Assessment Act 1979* (the EP&A Act). The Environmental Impact Statement (EIS) was prepared in accordance with the provisions of the EP&A Act.

1.1 Purpose of this letter

Following exhibition of the EIS, Hornsby Shire Council's Planning Assessor requested that the traffic impacts be reassessed with updated traffic count volumes obtained in August 2019 as well as consider the potential impacts associated with the delivery of construction materials with respect to traffic flows and intersection operations within proximity of the quarry.

In order to address the request from Hornsby Shire Council, GHD considered that a Traffic Impact Statement was required to provide an updated traffic assessment of the operation of the surrounding road network for the base case (year 2019) with comparison to the potential construction period scenario. The assessment would use SIDRA 8 intersection modelling to investigate the intersection operations associated with adjoining roads including Bridge Road, Peats Ferry Road, Jersey Street and George Street.

This Traffic Impact Statement therefore supplements the TIA report produced by GHD in 2018 to support the Hornsby Quarry Rehabilitation EIS (refer to *Hornsby Quarry Rehabilitation EIS: Traffic Impact Assessment, Novemeber 2018*).

This Traffic Impact Statement has been undertaken in accordance with Roads and Maritime Services *Guide to Traffic Generating Developments (2002).*

1.2 Assumptions/Limitations

This letter is subject to the following assumptions:

- Data collectedfrom traffic count surveys completed by Matrix on Thursday, 8 August 2019 is representative of tycpial current conditions.
- Traffic distribution estimates that are based on high level assumptions on light and heavy vehicle routes are representative of conditions during the proposed project.

This study has been limited by the following:

- The analysis is a desktop study with no site visits undertaken.
- The conditions of the surrounding network are based on information either supplied by the traffic surveys mentioned above and Google Maps / Google Street View.

1.3 Site Location

The project is located in the Hornsby Local Government Area (LGA), approximately 21 kilometres (km) north-west of the Sydney Central Business District. The site is currently accessible from Bridge Road (off the Peats Ferry Road).

The location of the site is shown in Figure 1.1.

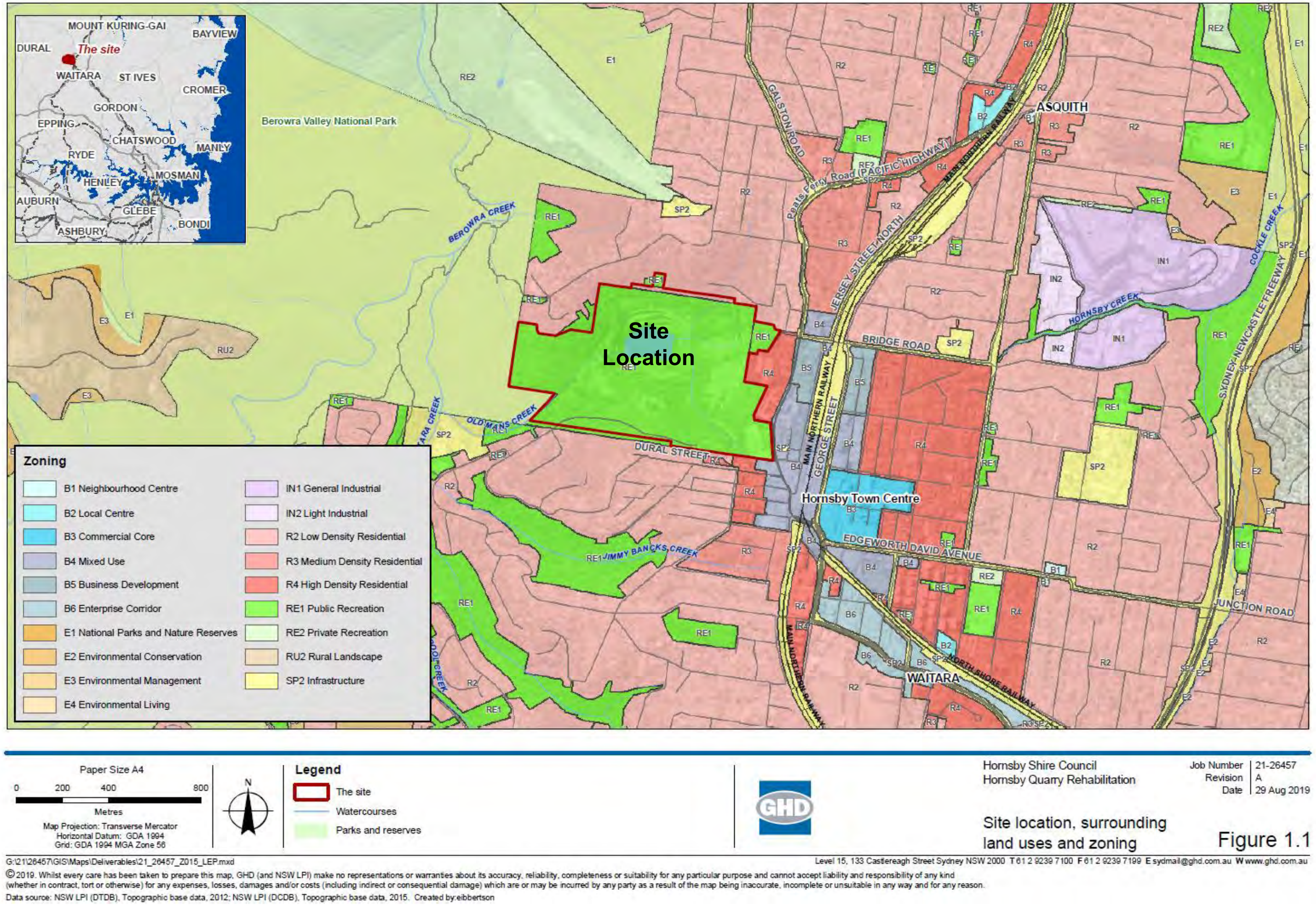


Figure 1.1 Site location and surrounding land uses

2 Existing conditions

2.1 Peats Ferry Road / Bridge Road intersection

Peats Ferry Road / Bridge Road intersection is a traffic signal controlled intersection, with the Peats Ferry Road forming the major approaches.

Peats Ferry Road forms part of the the local road network south of Bridge Street and state road network north of Bridge Street. Peats Ferry Road is oriented generally a north-south direction within the vicinity of the site and provides connection through the Hornsby sub Town Centre. Peats Ferry Road comprises of two lanes in each direction separated by double continuous lines.

Bridge Road, between Peats Ferry Road and George Street, is a state road which runs in an east-west direction. Bridge Road also provides direct access to the site, west of Peats Ferry Road, as a local road,and commercial developments along the length of the road to the east. Bridge Road comprises of two lanes in each direction separated by double continuous lines east of Bridge Road. West of Peats Ferry Road, it contains one lane in each direction.

2.2 Jersey Street (South) / Bridge Road intersection

The Jersey Street (South) / Bridge Road intersection is a three leg priority-controlled intersection, with Bridge Road forming the major approaches. A “Left Turn Only” restriction is in place for vehicles from Jersey Street (South) onto Bridge Road. A short gap in the central median permits right turn movement from Bridge Road (eastbound) into Jersey Road (South)

Jersey Street (South) is a local road which runs in a north-south direction and provides access to the commercial developments in the Hornsby Town Centre. Jersey Street (South) contains one lane in each direction.

2.3 Jersey Street (North) / Bridge Road intersection

The Jersey Street (North) / Bridge Road intersection is a traffic signal controlled intersection, with Bridge Road forming the major approaches. A “Left Turn Only” restriction is in place for vehicles from Jersey Street (North) onto Bridge Road.

Jersey Street (North) is a state road that runs in a north-south direction parallel to the railway line serving Hornsby Station. Jersey Street (North) comprises of two lanes in each direction separated by double continuous lines.

2.4 Railway Parade / Bridge Road / George Street intersection

The Railway Parade / Bridge Road / George Street intersection is a traffic signal controlled intersection, with Bridge Road and George Street forming the major approaches. A “Left Turn Only” restriction is in place for vehicles from George Street onto Bridge Road.

Railway Parade formerly a two-way road, has been converted to a one-way road northbound and forms the north approach to the intersection.

George Street is a state road within the Hornsby Town Centre. George Street comprises of two lanes in each direction separated by double continuous lines.

2.5 Existing road network performance

2.5.1 Traffic counts

Hornsby Shire Council engaged Matrix Traffic and Transport Data Pty Ltd to undertake intersection traffic turning counts at the following intersections on Thursday 8 August 2019:

- Peats Ferry Road / Bridge Road (signalised intersection)
- Jersey Street (South) / Bridge Road (priority controlled intersection)
- Jersey Street (North) / Bridge Road intersection (signalised intersection)
- Railway Parade / Bridge Road / George Street (signalised intersection)

The surveys were undertaken during the following time periods:

- Weekday AM peak (2 hours): 7 am to 9 am
- Weekday PM peak (2 hours): 4 pm to 6 pm

Analysis of the survey data identified the following peak hour periods:

- Weekday AM peak hour = 7:30 am to 8:30 am
- Weekday PM peak hour = 5:00 pm to 6:00 pm

2.5.2 Existing intersection performance

The performance of the existing road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network. SIDRA 8 intersection modelling software was used to assess the proposed peak hour operating performance of intersections operating as a network. The layout of the intersection network model, as produced in SIDRA 8 is shown in Figure 2.1.

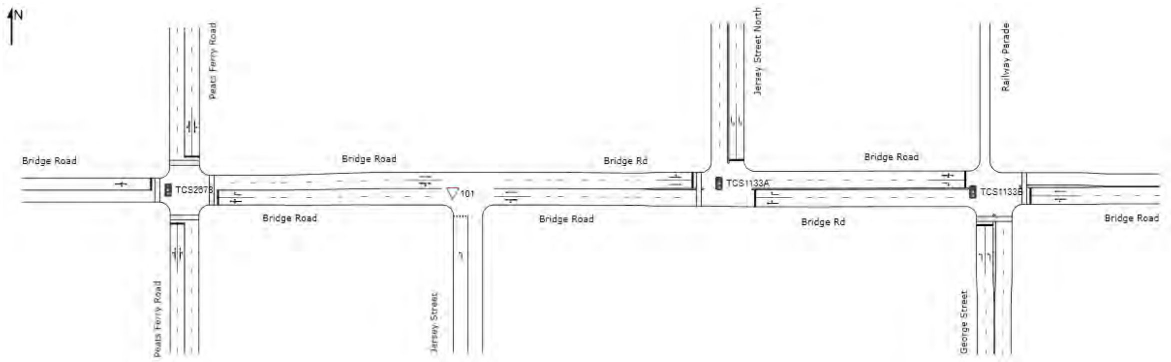


Figure 2.1 SIDRA 8 intersection network

The criteria for evaluating the operational performance of intersections is provided by the *Guide to Traffic Generating Developments (Roads and Maritime Services, 2002)* and reproduced in Table 2.1. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (i.e. Level of Service), which is applied to each band of average vehicle delay.

Table 2.1 Level of service criteria for intersections

Level of service	Average delay per vehicle (secs/veh)	Traffic signals, roundabouts	Give way & stop signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & **spare capacity**
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require **other control modes**	At capacity, requires **other control mode**
F	> 70	Over Capacity Unstable operation	Over Capacity Unstable operation

Source: Guide to Traffic Generating Developments (Roads and Maritime 2002)

Notes:

- *The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.*
- *The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.*
- *The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.*

The existing (base 2019) traffic models were developed using the AM and PM weekday peak hour surveyed data results. Existing traffic flows at key intersections were analysed using SIDRA 8 to obtain the current operating performance. A summary of the results is outlined in Table 2.2.

Table 2.2 Existing intersection performance

Intersection	AM Peak				PM Peak			
	Ave. Delay (s)	LOS	Control Type	Degree of Saturation	Ave. Delay (s)	LOS	Control Type	Degree of Saturation
Peats Ferry Road / Bridge Road	34	C	Signalised	0.952	28	C	Signalised	0.534
Jersey Street (South) / Bridge Road	7	A	Priority controlled	0.254	8	A	Priority controlled	0.130
Jersey Street (North) / Bridge Road	25	C	Signalised	0.829	25	C	Signalised	0.822

Intersection	AM Peak				PM Peak			
	Ave. Delay (s)	LOS	Control Type	Degree of Saturation	Ave. Delay (s)	LOS	Control Type	Degree of Saturation
Railway Parade / Bridge Road / George Street	13	B	Signalised	0.614	149	F	Signalised	1.484

Notes:

- *The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.*
- *The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.*
- *The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.*
- *Average delay is given in seconds per vehicle.*
- *The LOS and Average Delay for priority controlled intersections is based on the worst movement*

The intersection modelling results summarised in Table 2.2 indicates that the intersection at Peats Ferry Road / Bridge Road (east of the site) currently operates with an acceptable Level of Service (i.e. better than Level of Service E) with spare capacity in both the weekday morning and evening peak periods.

The other signalised intersections to operate at Level of Service C during the AM and PM peak periods except for the Railway Parade / Bridge Road / George Street intersection during the PM peak period which is currently operating at Level of Service F. The Degree of Saturation exceeds the desirable 0.9 at 1.448. Queuing is evident along George Street (southern approach) and Bridge Road (eastern approach).

The priority controlled intersection at Jersey Street (South) / Bridge Road is operating with spare capacity as indicated by the Level of Service of each of the approaches (LOS A). The priority control intersection Level of Service is based on the worst delay movement. For both the AM and PM peak period, the worst delay movement is the right turn into Jersey Street (South) from Bridge Road.

3 Traffic Impact Assessment

3.1 Scope of assessment

This section summarises the traffic impact assessment of incorporating assumed construction traffic volumes within the existing road network. To assess the potential impacts on the surrounding road network, traffic modelling has been undertaken for the following intersections during the construction stage:

- Peats Ferry Road / Bridge Road
- Jersey Street (South) / Bridge Road
- Jersey Street (North) / Bridge Road
- Railway Parade / Bridge Road / George Street

3.2 Traffic generation - Construction

The expected traffic generation associated with the construction works at the Hornsby Quarry rehabilitation development is summarised in Table 3.1.

Table 3.1 Hornsby Quarry development construction traffic generation

Type	Daily		AM Peak Hour		PM Peak Hour	
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
Light vehicle movements	30	30	30	0	0	30
Heavy vehicle movements	20	20	10	5	5	10
Total	**50**	**50**	**40**	**5**	**5**	**40**

During each of the peak hour periods per day, 30 light vehicle movements and 15 heavy vehicle movements are expected to occur for a worst case scenario assessment. It is noted that most of the movements associated with construction activity will occur outside the road network peak periods (i.e. prior to 7 am and before 5 pm.

The anticipated number of trucks required over the life cycle of the project is outlined in Table 3.2. It is estimated that the life cycle of the project will be 1.5 to 2 years.

Table 3.2 Number of trucks over project life cycle

Vehicle type	Delivery type	Number
Task Specific Trucks		
Agi-trucks	Concrete delivery from local plant	50
Flat bed trucks	Importing steel	50
Flat bed trucks	Geofabric rolls	5
Sub-total		*105*
Other Trucks		
Fuel trucks	Fuel	250
Trucks	Miscellaneous	250
Sub-total		*500*
TOTAL (trucks over project life cycle)		**605**

The expected number of project life cycle truck movements is outlined in Table 3.2. However, it is estimated that the majority of the “Task Specific Trucks” would be accessing the site in the span of the first 6 months of the project life cycle.

For a review assessment of the potential worst case daily traffic generation, it has been assumed that 70 percent of the total project life cycle truck movements for the “Task Specific Trucks” would occur within the 6 month timeframe with an even daily distribution for the project cycle “Other Trucks” movements. The estimated worst case breakdown of the number of trucks averaging each week and in turn per day is outlined in Table 3.3.

Table 3.3 Number of trucks – Daily Estimate

Vehicle type	Number
Task specific trucks	
Number of trucks accessing site in the first 6 months (70% of project cycle Task Specific Trucks)	74
Number of trucks accessing site per week	5
Estimated Worst case scenario adopt 2 trucks / day	*10*
Other trucks	
Number of fuel trucks accessing site over project life cycle	250
Number of miscellaneous trucks accessing site over project life cycle	250
Number of fuel trucks accessing site per week	5
Number of miscellaneous trucks accessing site per week	5
Worst case scenario adopt 1 fuel trucks / day	*1*
Estimated Worst case scenario adopt 2 miscellaneous trucks / day	*9*
TOTAL trucks per day	**20**

3.3 Trip distribution

The light vehicle traffic generation has been distributed and assigned to the external road network based on the assumed local locations of workers residency to align with the previous traffic impact assessment (refer to *GHD report Hornsby Quarry Rehabilitation EIS: Traffic Impact Assessment, November 2018*).

The heavy vehicle traffic generation by the proposed project has been distributed and assigned to the external road network based on the location of the nearby concrete batching plant (Able Concrete - approximately 1.5 km east of project site), and the routes of heavy vehicles during the NorthConnex project.

The traffic distribution to the surrounding road network is outlined in Table 3.4.

Table 3.4 Light and heavy vehicle trip distribution

Description	Light vehicles	Heavy vehicles
AM Peak		
Inbound		
Bridge Road *(Westbound from Railway Parade / Bridge Road / George Street intersection)*	0	10
Peats Ferry Road *(Southbound and into Bridge Road westbound)*	15	0
Peats Ferry Road *(Northbound and into Bridge Road westbound)*	15	0
Outbound		
Jersey Street North *(Northbound from Bridge Road eastbound)*	0	3
Bridge Road *(Eastbound)*	0	2
PM Peak		
Inbound		
Bridge Road *(Westbound from Railway Parade / Bridge Road / George Street intersection)*	0	5
Outbound		
Jersey Street North *(Northbound from Bridge Road eastbound)*	0	6
Bridge Road *(Eastbound)*	0	4
Peats Ferry Road *(Northbound from Peats Ferry Road / Bridge Road intersection)*	15	0
Peats Ferry Road *(Southbound from Peats Ferry Road / Bridge Road intersection)*	15	0

3.4 Intersection performance

A summary of the SIDRA modelling results for the 'construction' scenario is provided in Table 3.5. SIDRA outputs are provided in Appendix A.

Table 3.5 Construction phase intersection performance

Intersection	AM Peak				PM Peak			
	Ave. Delay (s)	LOS	Control Type	Degree of Saturation	Ave. Delay (s)	LOS	Control Type	Degree of Saturation
Peats Ferry Road / Bridge Road	52	D	Signalised	1.028	29	C	Signalised	0.606
Jersey Street (South) / Bridge Road	7	A	Priority controlled	0.255	8	A	Priority controlled	0.134
Jersey Street (North) / Bridge Road	27	C	Signalised	0.859	28	C	Signalised	0.837
Railway Parade / Bridge Road / George Street	13	B	Signalised	0.645	149	F	Signalised	1.503

The analysis undertaken for the construction period indicates that the intersections are anticipated to operate similarly to how they currently operate – the additional vehicles will have negligible impact.

4 Conclusions

This Traffic Impact Statement report has been prepared to address the request from Hornsby Shire Council's Planning Assessors, to outline potential traffic impacts associated with the proposed construction activity of the Hornsby Quarry development on the existing adjoining intersections.

It provides an assessment of the existing operation of the Peats Ferry Road / Bridge Road, Jersey Street (South) / Bridge Road, Jersey Street (North) / Bridge Road and Railway Parade / Bridge Road / George Street intersections for a baseline and an assessment of the construction phase of the Hornsby Quarry in order to identify intersection operational impacts to the adjoining road network around the Quarry.

SIDRA 8 intersection modelling has been undertaken for the network of intersections adjacent to the site. The modelling identified that the intersections perform with an acceptable Level of Service (i.e. better than Level of Service E) and spare capacity during the weekday AM and PM peak periods. The exception being the Railway Parade / Bridge Road / George Street intersection, which currently operates at Level of Service F in the PM peak period.

Additionally, the expected increase in construction traffic associated with the proposed Hornsby Quarry construction activity would have negligible impacts to the operation of the Peats Ferry Road / Bridge Road, Jersey Street (South) / Bridge Road, Jersey Street (North) / Bridge Road and Railway Parade / Bridge Road / George Street intersections compared to the existing scenario.

Sincerely
GHD

Michael Tran
Traffic and Transport Engineer
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Appendix A – SIDRA Results

MOVEMENT SUMMARY

Site: TCS2678 [2019_AM_Peats Ferry Road & Bridge Road] — **Network: N101 [2019_AM_BASE]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 101 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peats Ferry Road														
1	L2	41	0.0	41	0.0	0.336	14.6	LOS B	5.3	39.7	0.51	0.49	0.51	37.2
2	T1	333	8.1	333	8.1	0.336	10.0	LOS B	5.3	39.7	0.51	0.49	0.51	42.1
3	R2	51	5.9	51	5.9	0.816	66.2	LOS E	2.1	15.6	0.95	1.07	1.64	17.9
Approach		425	7.1	425	7.1	0.816	17.2	LOS B	5.3	39.7	0.57	0.56	0.65	36.6
East: Bridge Road														
4	L2	71	2.8	71	2.8	0.613	49.7	LOS D	4.6	32.8	0.97	0.81	0.98	24.4
5	T1	12	0.0	12	0.0	0.613	45.1	LOS D	4.6	32.8	0.97	0.81	0.98	9.0
6	R2	239	1.7	239	1.7	0.613	45.3	LOS D	4.6	32.8	0.94	0.80	0.94	11.6
Approach		322	1.9	322	1.9	0.613	46.3	LOS D	4.6	32.8	0.95	0.80	0.95	15.3
North: Peats Ferry Road														
7	L2	874	0.3	874	0.3	0.952	52.9	LOS D	35.6	250.0	0.91	1.05	1.26	6.7
8	T1	673	4.5	673	4.5	0.612	13.9	LOS B	12.6	91.9	0.67	0.68	0.67	38.8
9	R2	12	0.0	12	0.0	0.612	18.4	LOS B	12.6	91.9	0.67	0.68	0.67	9.4
Approach		1559	2.1	1559	2.1	0.952	35.8	LOS D	35.6	250.0	0.81	0.89	1.00	20.2
West: Bridge Road														
10	L2	1	0.0	1	0.0	0.154	55.6	LOS E	0.5	3.4	0.98	0.68	0.98	8.7
11	T1	13	0.0	13	0.0	0.154	51.7	LOS D	0.5	3.4	0.98	0.68	0.98	4.2
12	R2	2	0.0	2	0.0	0.154	55.6	LOS E	0.5	3.4	0.98	0.69	0.98	21.7
Approach		16	0.0	16	0.0	0.154	52.4	LOS D	0.5	3.4	0.98	0.68	0.98	7.8
All Vehicles		2322	3.0	2322	3.0	0.952	34.0	LOS C	35.6	250.0	0.78	0.82	0.93	22.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2019_AM_Bridge Road & Jersey Street] — **Network: N101 [2019_AM_BASE]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Jersey Street														
1	L2	115	2.6	115	2.6	0.093	5.9	LOS A	0.1	1.1	0.16	0.55	0.16	50.0
Approach		115	2.6	115	2.6	0.093	5.9	LOS A	0.1	1.1	0.16	0.55	0.16	50.0
East: Bridge Road														
4	L2	72	1.4	72	1.4	0.076	2.4	LOS A	0.0	0.0	0.00	0.27	0.00	54.8
5	T1	218	1.8	218	1.8	0.076	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	48.8
Approach		290	1.7	290	1.7	0.076	0.6	NA	0.0	0.0	0.00	0.13	0.00	53.9
West: Bridge Road														
11	T1	844	0.6	844	0.6	0.254	0.2	LOS A	11.9	84.0	0.06	0.05	0.06	53.7
12	R2	81	1.2	81	1.2	0.254	6.8	LOS A	11.9	84.0	0.15	0.11	0.15	55.0
Approach		925	0.6	925	0.6	0.254	0.8	NA	11.9	84.0	0.07	0.05	0.07	54.2
All Vehicles		1330	1.1	1330	1.1	0.254	1.2	NA	11.9	84.0	0.06	0.11	0.06	53.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

MOVEMENT SUMMARY

Site: TCS1133A [2019_AM_Bridge Road & Jersey Street North] **Network: N101 [2019_AM_BASE]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 101 seconds (Network User-Given Cycle Time)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bridge Rd														
5	T1	287	1.7	287	1.7	0.263	4.4	LOS A	2.1	15.2	0.29	0.27	0.29	25.3
6	R2	299	4.7	299	4.7	0.263	9.0	LOS A	2.8	20.1	0.43	0.64	0.43	42.8
Approach		586	3.2	586	3.2	0.263	6.8	LOS A	2.8	20.1	0.36	0.46	0.36	39.6
North: Jersey Street North														
7	L2	614	3.1	614	3.1	0.420	21.3	LOS C	7.1	50.7	0.65	0.77	0.65	32.7
Approach		614	3.1	614	3.1	0.420	21.3	LOS C	7.1	50.7	0.65	0.77	0.65	32.7
West: Bridge Rd														
10	L2	9	0.0	9	0.0	0.829	46.1	LOS D	2.0	14.0	0.99	1.02	1.21	21.9
11	T1	857	0.6	857	0.6	0.829	39.2	LOS D	2.0	14.0	0.98	0.97	1.13	2.6
Approach		866	0.6	866	0.6	0.829	39.3	LOS D	2.0	14.0	0.98	0.97	1.13	3.0
All Vehicles		2066	2.1	2066	2.1	0.829	24.7	LOS C	7.1	50.7	0.71	0.77	0.77	20.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: TCS1133B [2019_AM_Bridge Road & Railway Parade & George Street] **Network: N101 [2019_AM_BASE]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 101 seconds (Network User-Given Cycle Time)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: George Street														
1	L2	326	2.8	326	2.8	0.123	7.5	LOS A	1.4	9.8	0.30	0.63	0.30	19.3
Approach		326	2.8	326	2.8	0.123	7.5	LOS A	1.4	9.8	0.30	0.63	0.30	19.3
East: Bridge Road														
4	L2	43	14.0	43	14.0	0.614	52.5	LOS D	4.3	32.0	0.99	0.81	1.02	9.9
5	T1	263	3.8	263	3.8	0.614	46.2	LOS D	4.8	34.5	0.99	0.81	1.01	8.2
Approach		306	5.2	306	5.2	0.614	47.1	LOS D	4.8	34.5	0.99	0.81	1.01	8.5
West: Bridge Road														
10	L2	21	19.0	21	19.0	0.575	9.5	LOS A	6.5	45.9	0.52	0.59	0.52	34.0
11	T1	350	0.9	350	0.9	0.575	5.6	LOS A	6.5	45.9	0.52	0.59	0.52	35.1
12	R2	1080	1.7	1080	1.7	0.575	6.6	LOS A	6.5	45.9	0.32	0.63	0.32	26.7
Approach		1451	1.7	1451	1.7	0.575	6.4	LOS A	6.5	45.9	0.37	0.62	0.37	29.2
All Vehicles		2083	2.4	2083	2.4	0.614	12.5	LOS B	6.5	45.9	0.45	0.65	0.45	20.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: TCS2678 [2019_PM_Peats Ferry Road & Bridge Road] — **Network: N101 [2019_PM_BASE]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 114 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peats Ferry Road														
1	L2	3	0.0	3	0.0	0.532	26.9	LOS C	11.2	79.9	0.75	0.67	0.75	30.3
2	T1	646	2.5	646	2.5	0.532	24.7	LOS C	11.2	79.9	0.77	0.69	0.77	32.7
3	R2	70	5.7	70	5.7	0.532	35.4	LOS D	6.6	47.9	0.84	0.75	0.84	26.6
Approach		719	2.8	719	2.8	0.532	25.7	LOS C	11.2	79.9	0.78	0.69	0.78	32.1
East: Bridge Road														
4	L2	70	0.0	66	0.0	0.534	39.2	LOS D	8.7	60.7	0.89	0.82	0.89	27.6
5	T1	4	0.0	4	0.0	0.534	34.6	LOS C	8.7	60.7	0.89	0.82	0.89	10.8
6	R2	569	0.2	536	0.2	0.534	39.2	LOS D	8.7	61.2	0.89	0.82	0.89	12.9
Approach		643	0.2	606 N1	0.2	0.534	39.2	LOS D	8.7	61.2	0.89	0.82	0.89	15.1
North: Peats Ferry Road														
7	L2	385	0.3	385	0.3	0.418	19.7	LOS B	8.1	57.3	0.60	0.75	0.60	15.4
8	T1	421	2.6	421	2.6	0.418	21.2	LOS C	8.2	58.6	0.69	0.68	0.69	34.2
9	R2	1	0.0	1	0.0	0.418	26.5	LOS C	8.2	58.6	0.70	0.67	0.70	8.3
Approach		807	1.5	807	1.5	0.418	20.5	LOS C	8.2	58.6	0.65	0.71	0.65	29.1
West: Bridge Road														
10	L2	2	0.0	2	0.0	0.136	62.4	LOS E	0.5	3.4	0.98	0.68	0.98	7.7
11	T1	7	0.0	7	0.0	0.136	58.5	LOS E	0.5	3.4	0.98	0.68	0.98	3.7
12	R2	5	0.0	5	0.0	0.136	62.4	LOS E	0.5	3.4	0.98	0.68	0.98	20.0
Approach		14	0.0	14	0.0	0.136	60.4	LOS E	0.5	3.4	0.98	0.68	0.98	11.7
All Vehicles		2183	1.5	2148 N1	1.5	0.534	27.8	LOS C	11.2	79.9	0.76	0.74	0.76	26.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 101 [2019_PM_Bridge Road & Jersey Street] — **Network: N101 [2019_PM_BASE]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Jersey Street														
1	L2	132	0.0	132	0.0	0.146	6.4	LOS A	0.2	1.6	0.31	0.57	0.31	49.2
Approach		132	0.0	132	0.0	0.146	6.4	LOS A	0.2	1.6	0.31	0.57	0.31	49.2
East: Bridge Road														
4	L2	75	2.7	69	2.6	0.170	2.4	LOS A	0.0	0.0	0.00	0.14	0.00	55.7
5	T1	508	0.2	468	0.2	0.170	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	52.1
Approach		583	0.5	538 N1	0.5	0.170	0.3	NA	0.0	0.0	0.00	0.07	0.00	54.7
West: Bridge Road														
11	T1	446	0.2	446	0.2	0.130	0.3	LOS A	5.7	40.1	0.06	0.03	0.06	54.5
12	R2	25	16.0	25	16.0	0.130	7.9	LOS A	2.8	20.1	0.13	0.07	0.13	54.3
Approach		471	1.1	471	1.1	0.130	0.7	NA	5.7	40.1	0.06	0.03	0.06	54.5
All Vehicles		1186	0.7	1141 N1	0.7	0.170	1.2	NA	5.7	40.1	0.06	0.11	0.06	52.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: TCS1133A [2019_PM_Bridge Road & Jersey Street North] **Network: N101 [2019_PM_BASE]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 114 seconds (CCG User-Given Phase Times)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bridge Rd														
5	T1	586	0.5	536	0.5	0.822	19.4	LOS B	7.1	50.0	0.92	0.86	0.95	9.4
6	R2	1069	0.8	978	0.8	0.822	23.6	LOS C	7.1	50.0	0.89	0.92	1.01	31.6
Approach		1655	0.7	1514 [N1]	0.7	0.822	22.1	LOS C	7.1	50.0	0.90	0.90	0.99	27.1
North: Jersey Street North														
7	L2	344	0.6	344	0.6	0.271	26.2	LOS C	4.7	32.9	0.66	0.75	0.66	29.6
Approach		344	0.6	344	0.6	0.271	26.2	LOS C	4.7	32.9	0.66	0.75	0.66	29.6
West: Bridge Rd														
10	L2	19	0.0	19	0.0	0.419	47.6	LOS D	2.0	14.0	1.00	0.85	1.00	21.4
11	T1	422	0.2	422	0.2	0.419	35.6	LOS D	2.0	14.0	0.88	0.75	0.88	2.9
Approach		441	0.2	441	0.2	0.419	36.1	LOS D	2.0	14.0	0.88	0.75	0.88	4.4
All Vehicles		2440	0.6	2299 [N1]	0.7	0.822	25.4	LOS C	7.1	50.0	0.86	0.85	0.92	23.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: TCS1133B [2019_PM_Bridge Road & Railway Parade & George Street] **Network: N101 [2019_PM_BASE]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 114 seconds (CCG User-Given Phase Times)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: George Street														
1	L2	1061	0.6	1061	0.6	0.869	36.4	LOS D	18.6	130.9	0.85	0.94	1.03	5.4
Approach		1061	0.6	1061	0.6	0.869	36.4	LOS D	18.6	130.9	0.85	0.94	1.03	5.4
East: Bridge Road														
4	L2	66	1.5	66	1.5	1.484	494.0	LOS F	41.2	290.6	1.00	2.30	3.82	1.2
5	T1	590	0.8	590	0.8	1.484	490.1	LOS F	41.2	290.6	1.00	2.32	3.82	0.9
Approach		656	0.9	656	0.9	1.484	490.5	LOS F	41.2	290.6	1.00	2.32	3.82	0.9
West: Bridge Road														
10	L2	9	0.0	9	0.0	0.390	12.2	LOS B	3.9	27.6	0.61	0.64	0.61	32.4
11	T1	168	1.2	168	1.2	0.390	8.3	LOS A	3.9	27.6	0.61	0.64	0.61	30.0
12	R2	583	0.2	583	0.2	0.390	12.5	LOS B	6.8	47.8	0.61	0.71	0.61	19.0
Approach		760	0.4	760	0.4	0.390	11.6	LOS B	6.8	47.8	0.61	0.70	0.61	21.7
All Vehicles		2477	0.6	2477	0.6	1.484	149.1	LOS F	41.2	290.6	0.82	1.23	1.64	2.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: TCS2678 [2019_AM_Peats Ferry Road & Bridge Road - Construction] **Network: N101 [2019_AM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 101 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peats Ferry Road														
1	L2	56	0.0	56	0.0	0.349	15.6	LOS B	5.6	41.6	0.52	0.50	0.52	37.1
2	T1	333	8.1	333	8.1	0.349	10.0	LOS B	5.6	41.6	0.52	0.50	0.52	42.0
3	R2	51	5.9	51	5.9	0.824	68.0	LOS E	2.2	15.8	0.95	1.08	1.67	17.6
Approach		440	6.8	440	6.8	0.824	17.4	LOS B	5.6	41.6	0.57	0.57	0.65	36.4
East: Bridge Road														
4	L2	71	2.8	71	2.8	0.643	50.2	LOS D	4.7	34.9	0.96	0.81	0.99	24.3
5	T1	22	45.5	22	45.5	0.643	45.6	LOS D	4.7	34.9	0.96	0.81	0.99	9.0
6	R2	239	1.7	239	1.7	0.643	44.1	LOS D	4.7	34.9	0.93	0.80	0.95	11.8
Approach		332	4.8	332	4.8	0.643	45.5	LOS D	4.7	34.9	0.94	0.80	0.96	15.3
North: Peats Ferry Road														
7	L2	874	0.3	874	0.3	1.028	101.3	LOS F	51.1	358.8	1.00	1.25	1.75	3.7
8	T1	673	4.5	673	4.5	0.642	14.3	LOS B	13.3	96.9	0.69	0.70	0.69	38.4
9	R2	27	0.0	27	0.0	0.642	18.8	LOS B	13.3	96.9	0.69	0.70	0.69	9.3
Approach		1574	2.1	1574	2.1	1.028	62.7	LOS E	51.1	358.8	0.86	1.00	1.28	13.7
West: Bridge Road														
10	L2	1	0.0	1	0.0	0.278	57.7	LOS E	0.7	5.6	0.99	0.71	0.99	8.4
11	T1	18	27.8	18	27.8	0.278	53.7	LOS D	0.7	5.6	0.99	0.71	0.99	4.1
12	R2	2	0.0	2	0.0	0.278	57.7	LOS E	0.7	5.6	0.99	0.71	0.99	21.2
Approach		21	23.8	21	23.8	0.278	54.3	LOS D	0.7	5.6	0.99	0.71	0.99	6.8
All Vehicles		2367	3.5	2367	3.5	1.028	51.8	LOS D	51.1	358.8	0.82	0.89	1.11	17.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2019_AM_Bridge Road & Jersey Street - Construction] **Network: N101 [2019_AM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Jersey Street														
1	L2	115	2.6	115	2.6	0.094	5.9	LOS A	0.2	1.1	0.17	0.55	0.17	49.9
Approach		115	2.6	115	2.6	0.094	5.9	LOS A	0.2	1.1	0.17	0.55	0.17	49.9
East: Bridge Road														
4	L2	72	1.4	72	1.4	0.080	2.4	LOS A	0.0	0.0	0.00	0.26	0.00	54.8
5	T1	228	6.1	228	6.1	0.080	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	48.6
Approach		300	5.0	300	5.0	0.080	0.6	NA	0.0	0.0	0.00	0.13	0.00	53.8
West: Bridge Road														
11	T1	844	0.6	844	0.6	0.255	0.2	LOS A	11.9	84.0	0.06	0.05	0.06	53.6
12	R2	81	1.2	81	1.2	0.255	6.9	LOS A	11.9	84.0	0.15	0.12	0.15	54.9
Approach		925	0.6	925	0.6	0.255	0.8	NA	11.9	84.0	0.07	0.05	0.07	54.1
All Vehicles		1340	1.8	1340	1.8	0.255	1.2	NA	11.9	84.0	0.06	0.11	0.06	52.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: TCS1133A [2019_AM_Bridge Road & Jersey Street North - Construction] **Network: N101 [2019_AM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 101 seconds (Network User-Given Cycle Time)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bridge Rd														
5	T1	297	5.1	297	5.1	0.271	4.3	LOS A	2.2	15.8	0.29	0.27	0.29	25.5
6	R2	299	4.7	299	4.7	0.271	9.4	LOS A	2.9	21.1	0.45	0.65	0.45	42.4
Approach		596	4.9	596	4.9	0.271	6.9	LOS A	2.9	21.1	0.37	0.46	0.37	39.2
North: Jersey Street North														
7	L2	614	3.1	614	3.1	0.447	22.2	LOS C	6.6	47.4	0.67	0.78	0.67	32.1
Approach		614	3.1	614	3.1	0.447	22.2	LOS C	6.6	47.4	0.67	0.78	0.67	32.1
West: Bridge Rd														
10	L2	12	25.0	12	25.0	0.859	48.5	LOS D	2.0	14.0	1.00	1.07	1.25	20.9
11	T1	859	0.8	859	0.8	0.859	43.1	LOS D	2.0	14.0	0.99	1.04	1.20	2.4
Approach		871	1.1	871	1.1	0.859	43.1	LOS D	2.0	14.0	1.00	1.04	1.20	2.8
All Vehicles		2081	2.8	2081	2.8	0.859	26.6	LOS C	6.6	47.4	0.72	0.80	0.81	19.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akcelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: TCS1133B [2019_AM_Bridge Road & Railway Parade & George Street - Construction] **Network: N101 [2019_AM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 101 seconds (Network User-Given Cycle Time)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles														
Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: George Street														
1	L2	326	2.8	326	2.8	0.123	7.5	LOS A	1.4	9.8	0.30	0.63	0.30	19.3
Approach		326	2.8	326	2.8	0.123	7.5	LOS A	1.4	9.8	0.30	0.63	0.30	19.3
East: Bridge Road														
4	L2	43	14.0	43	14.0	0.645	53.0	LOS D	4.5	34.2	1.00	0.83	1.05	9.8
5	T1	273	7.3	273	7.3	0.645	46.8	LOS D	5.0	36.9	1.00	0.83	1.04	8.1
Approach		316	8.2	316	8.2	0.645	47.6	LOS D	5.0	36.9	1.00	0.83	1.04	8.4
West: Bridge Road														
10	L2	21	19.0	21	19.0	0.613	9.7	LOS A	6.0	42.5	0.37	0.48	0.37	33.9
11	T1	352	1.4	352	1.4	0.613	5.8	LOS A	6.0	42.5	0.37	0.48	0.37	34.9
12	R2	1080	1.7	1080	1.7	0.613	6.5	LOS A	6.0	42.5	0.29	0.61	0.29	26.7
Approach		1453	1.9	1453	1.9	0.613	6.4	LOS A	6.0	42.5	0.31	0.58	0.31	29.1
All Vehicles		2095	3.0	2095	3.0	0.645	12.8	LOS B	6.0	42.5	0.41	0.62	0.42	20.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation

MOVEMENT SUMMARY

Site: TCS2678 [2019_PM_Peats Ferry Road & Bridge Road - Construction] **Network: N101 [2019_PM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 114 seconds (Network User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Peats Ferry Road														
1	L2	3	0.0	3	0.0	0.532	27.9	LOS C	11.2	79.9	0.75	0.67	0.75	30.3
2	T1	646	2.5	646	2.5	0.532	24.7	LOS C	11.2	79.9	0.77	0.69	0.77	32.7
3	R2	70	5.7	70	5.7	0.532	35.4	LOS D	6.6	47.9	0.84	0.75	0.84	26.8
Approach		719	2.8	719	2.8	0.532	25.7	LOS C	11.2	79.9	0.78	0.69	0.78	32.1
East: Bridge Road														
4	L2	70	0.0	66	0.0	0.532	39.2	LOS D	8.6	60.5	0.89	0.82	0.89	27.7
5	T1	4	0.0	4	0.0	0.532	34.6	LOS C	8.6	60.5	0.89	0.82	0.89	10.8
6	R2	569	0.2	537	0.2	0.532	39.2	LOS D	8.7	61.0	0.89	0.82	0.89	12.9
Approach		643	0.2	606 N1	0.1	0.532	39.1	LOS D	8.7	61.0	0.89	0.82	0.89	15.1
North: Peats Ferry Road														
7	L2	385	0.3	385	0.3	0.418	19.7	LOS B	8.1	57.3	0.60	0.75	0.60	15.4
8	T1	421	2.6	421	2.6	0.418	21.2	LOS C	8.2	58.6	0.69	0.68	0.69	34.2
9	R2	1	0.0	1	0.0	0.418	26.5	LOS C	8.2	58.6	0.70	0.67	0.70	8.3
Approach		807	1.5	807	1.5	0.418	20.5	LOS C	8.2	58.6	0.65	0.71	0.65	29.1
West: Bridge Road														
10	L2	17	0.0	17	0.0	0.606	66.1	LOS E	2.0	16.0	1.00	0.79	1.09	7.2
11	T1	17	58.8	17	58.8	0.606	62.2	LOS E	2.0	16.0	1.00	0.79	1.09	3.4
12	R2	20	0.0	20	0.0	0.606	66.2	LOS E	2.0	16.0	1.00	0.79	1.09	19.0
Approach		54	18.5	54	18.5	0.606	64.9	LOS E	2.0	16.0	1.00	0.79	1.09	11.6
All Vehicles		2223	1.9	2186 N1	2.0	0.606	28.5	LOS C	11.2	79.9	0.77	0.74	0.77	25.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: 101 [2019_PM_Bridge Road & Jersey Street - Construction] **Network: N101 [2019_PM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Jersey Street														
1	L2	132	0.0	132	0.0	0.146	6.5	LOS A	0.2	1.6	0.31	0.57	0.31	49.2
Approach		132	0.0	132	0.0	0.146	6.5	LOS A	0.2	1.6	0.31	0.57	0.31	49.2
East: Bridge Road														
4	L2	75	2.7	69	2.5	0.171	2.4	LOS A	0.0	0.0	0.00	0.13	0.00	55.7
5	T1	513	1.2	471	1.1	0.171	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	52.1
Approach		588	1.4	540 N1	1.3	0.171	0.3	NA	0.0	0.0	0.00	0.07	0.00	54.7
West: Bridge Road														
11	T1	456	2.4	456	2.4	0.134	0.3	LOS A	5.8	41.1	0.06	0.03	0.06	54.6
12	R2	25	16.0	25	16.0	0.134	8.0	LOS A	3.5	25.1	0.13	0.07	0.13	54.3
Approach		481	3.1	481	3.1	0.134	0.7	NA	5.8	41.1	0.06	0.03	0.06	54.5
All Vehicles		1201	1.9	1153 N1	2.0	0.171	1.2	NA	5.8	41.1	0.06	0.11	0.06	52.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: TCS1133A [2019_PM_Bridge Road & Jersey Street North - Construction] **Network: N101 [2019_PM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 114 seconds (CCG User-Given Phase Times)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Bridge Rd														
5	T1	591	1.4	538	1.3	0.837	21.2	LOS C	7.1	50.0	0.93	0.89	0.99	8.8
6	R2	1069	0.8	974	0.8	0.837	26.8	LOS C	7.1	50.0	0.91	0.94	1.07	29.9
Approach		1660	1.0	1512 [N1]	1.0	0.837	24.8	LOS C	7.1	50.0	0.92	0.92	1.04	25.5
North: Jersey Street North														
7	L2	344	0.6	344	0.6	0.276	26.2	LOS C	4.8	33.6	0.66	0.75	0.66	29.6
Approach		344	0.6	344	0.6	0.276	26.2	LOS C	4.8	33.6	0.66	0.75	0.66	29.6
West: Bridge Rd														
10	L2	25	24.0	25	24.0	0.463	49.6	LOS D	1.9	14.0	1.00	0.85	1.00	20.6
11	T1	426	1.2	426	1.2	0.463	36.7	LOS D	2.0	14.0	0.88	0.75	0.88	2.8
Approach		451	2.4	451	2.4	0.463	37.4	LOS D	2.0	14.0	0.89	0.76	0.89	4.6
All Vehicles		2455	1.2	2307 [N1]	1.3	0.837	27.5	LOS C	7.1	50.0	0.88	0.87	0.95	22.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

MOVEMENT SUMMARY

Site: TCS1133B [2019_PM_Bridge Road & Railway Parade & George Street - Construction] **Network: N101 [2019_PM_BASE - CONSTRUCTION]**

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 114 seconds (CCG User-Given Phase Times)
Common Control Group: CCG1 [CCGName]

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	Demand Flows HV %	Arrival Flows Total veh/h	Arrival Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	Aver. Back of Queue Vehicles veh	Aver. Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: George Street														
1	L2	1061	0.6	1061	0.6	0.869	36.4	LOS D	18.6	130.9	0.85	0.94	1.03	5.4
Approach		1061	0.6	1061	0.6	0.869	36.4	LOS D	18.6	130.9	0.85	0.94	1.03	5.4
East: Bridge Road														
4	L2	66	1.5	66	1.5	1.503	510.7	LOS F	42.2	299.6	1.00	2.33	3.88	1.1
5	T1	595	1.7	595	1.7	1.503	506.8	LOS F	42.2	299.6	1.00	2.35	3.89	0.8
Approach		661	1.7	661	1.7	1.503	507.2	LOS F	42.2	299.6	1.00	2.35	3.89	0.9
West: Bridge Road														
10	L2	9	0.0	9	0.0	0.393	12.3	LOS B	3.6	25.3	0.55	0.61	0.55	32.3
11	T1	172	3.5	172	3.5	0.393	8.4	LOS A	3.6	25.3	0.55	0.61	0.55	29.9
12	R2	583	0.2	583	0.2	0.393	12.8	LOS B	7.0	49.4	0.60	0.71	0.60	18.8
Approach		764	0.9	764	0.9	0.393	11.8	LOS B	7.0	49.4	0.59	0.68	0.59	21.5
All Vehicles		2486	1.0	2486	1.0	1.503	154.0	LOS F	42.2	299.6	0.81	1.24	1.66	2.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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