Project No: 6/OR/14 Report No: 6/OR/AIA/C

ARBORICULTURAL IMPACT ASSESSMENT REPORT
TREE PROTECTION SPECIFICATION

6 Orchard Street
Warriewood

Prepared for: ASCOT PROJECT MANAGEMENT

24th October 2014
Revision C

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1.0 INTRODUCTION

1.1 Background

1.1.1 This Arboricultural Impact Assessment Report and Tree Protection Specification was prepared for Ascot Project Management, on behalf of Dragon Eye Properties Limited, in relation to the proposed subdivision of land and construction of multi-unit housing at 6 Orchard Street, Warriewood (subject site).

1.1.2 Reference should be made to Council's *Comments Impacts on Vegetation* (Summary of Recommendation Refusal, dated 16th July 2014). In regards to these comments, the TreeiQ Report (Revision B dated 28th April 2014) was prepared based on plans that were available at this time. The TreeiQ Rev B Report (Section 4.7) specified that *'when detailed plans are finalised for individual areas/sites, a detailed assessment of the potential impacts of the development on trees will be required and an Arboricultural Impact Assessment and Tree Protection Plan should be prepared. '*

1.1.3 Revised plans have been provided to TreeiQ for the current DA submission. This Revision C Report is based on these proposed plans. As outlined within the Revision B Report, further arboricultural assessment is likely to be required based on the design of each individual lot.

1.1.4 In preparing this report, the author is aware of and has taken into account the objectives of Pittwater Council's *Development Control Plan (2013) B4.22 Preservation of Trees or Bushland Vegetation, Australian Standard 4970 Protection of Trees on Development Sites (2009)* and *Australian Standard 4373 Pruning of Amenity Trees (2007).*

Refer to Methodology **(Appendix 1)**

1.1.5 The following documentation/plans were viewed in the preparation of this report:

- Plan of Sub Division Plan (dated October 2014), prepared by Stephen Bowers Architects
- Staging Plan (dated October 2014), prepared by Stephen Bowers Architects
- Building Footprint & Road Layout Plan (dated October 2014), prepared by Stephen Bowers Architects
- Tree Protection Plan (dated October 2014), prepared by Stephen Bowers Architects
- Road Sections Concepts 01 (dated October 2014), prepared by Stephen Bowers Architects
- Road Sections Concepts 02 (dated October 2014), prepared by Stephen Bowers Architects
- Conceptual Streetscape (dated October 2014), prepared by Stephen Bowers Architects
- Future Public Road Intersection (dated October 2014), prepared by Stephen Bowers Architects

Refer to Supplied Plans **(Appendix 2)**

1.2 Aims

1.2.1 The aims of this report are to:

- Review Council's policies for applicable conditions regarding the preparation of Arboricultural Reports
- Conduct a visual assessment of the subject tree(s) and growing environment
- Review the supplied plans to determine the impact on the subject tree(s)
- Where appropriate, recommend the use of sensitive construction methods to minimise the adverse impacts on the subject tree(s)
- Where appropriate, prepare site specific tree protection measures for the subject tree(s) to be retained

1.2.2 There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the subject tree(s) or the subject site may not arise in the future. Information contained in this report covers only the subject tree(s) that was assessed and reflects the condition of the subject tree(s) at the time of inspection.

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2.0 RESULTS

2.1 The Site

2.1.1 The subject site is located on the northern side of Orchard Street and comprises of an elongated, rectangular allotment with a north-south orientation along the longer axis.

2.1.2 The southern section of the subject site comprises of a sloping, grassed paddock with a two storey dwelling, including a pool and garden areas, located to the north of the paddock.

2.1.3 A large area containing dilapidated glass houses is located to the north of the dwelling with grassed paddocks extending beyond the glass houses to the northern site boundary. A single vehicle width driveway runs along the eastern boundary of the subject site between Orchard Street and the dwelling. Beyond the driveway, a single vehicle width, unmetalled track continues along the eastern boundary to the paddock area.

2.2 The Proposal

2.2.1 The proposal includes two (2) separate Development Applications for the subdivision of land to provide 22 residential lots (Stage 1-current DA submission) and an additional allotment for multi-unit housing (Stage 2-future DA submission).

2.3 The Trees

2.3.1 Seventy nine (79) trees (and groups of trees) have been surveyed as part of this assessment. Full results of the tree assessment are shown in the Tree Assessment Schedule **(Appendix 3)**. Tree numbers correlate with the Tree Assessment Schedule **(Appendix 3)** and Tree Protection Plan (**Appendix 2)**.

2.3.2 Trees 2-5, 7, 8, 10, 11, 15-24, 26, 27, 31-41, 43-53, 55, 57 and 78 are located within the subject site. Trees 6, 9, 12-14, 25, 28, 29 and Group GA are located on the Orchard Street road reserve and Trees 30, 42, 54, 56 and 73 are located on the Fern Creek Road, road reserve.

2.3.3 A full VTA was not undertaken on the trees located outside of the subject site. An estimate of the diameter at Breast Height (DBH) has been used for the purpose of calculating Tree Protection Zone (TPZ) areas. All trees located outside of the subject site have been allocated a Retention Value of *Priority for Retention*.

2.3.4 The subject trees are comprised of locally indigenous and Australian native species which are distributed predominantly around the boundaries of the subject site.

2.3.5 Trees 5 (*Eucalyptus haemastoma* - Scribbly Gum), 48 and 49 (*Allocasuarina littoralis* - Black She Oak), 66 (*Eucalyptus botryoides* - Bangalay) and 70 (*Allocasuarina torulosa* - Forest She Oak) are in poor health with an estimated Useful Life Expectancy (ULE) range of <5 years and have been allocated a Retention Value of *Priority for Removal*.

2.3.6 Tree 14 (*Eucalyptus haemastoma* - Scribbly Gum) and Tree 22 (*Eucalyptus botryoides* - Bangalay) have a short estimated ULE range of 5-15 years and have been allocated a Retention Value of *Consider for Removal*. The crowns of both these trees are in contact with adjacent better quality trees. This contact may lead to wounding through branch abrasion and suppression of growth of the adjacent trees.

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3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees to be removed

3.1.1 The supplied plans show that thirty five (35) trees will need to be removed to accommodate the proposed development. These include eleven (11) trees with a Retention Value of *Priority for Retention,* five (5) trees with a Retention Value of *Consider for Retention,* thirteen (13) trees with a Retention Value of *Consider for Removal* and six (6) trees with a Retention Value of *Priority for Removal*.

Table 1: Trees to be removed

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
11, 21, 40, 42, 47, 52, 54, 55, 57, 67 & 71	1, 19, 20, 39 & 78	3, 8, 9, 10, 12, 17, 18, 22, 23, 50, 51, 53 & 72	2, 5, 48, 49, 66 & 70

3.2 Trees to be retained

3.2.1 The supplied plans show that forty four (44) trees are to be retained as part of the proposed development. These are Trees 4, 6, 7, 13-16, 24-38, 41, 43-46, 56, 58-65, 68, 69, 73-77 and Group A.

3.2.2 Of these trees, works are located with the Tree Protection Zone (TPZ) of forty one (41) trees. Clause 3.3.4 of AS-4970 outlines that tree sensitive methods can be used to minimize the impact of an encroachment. These methods are discussed in more detail below:

3.2.3 **Footings & Slabs**

Structures (i.e buildings, walls, retaining walls, ramps & stairs) and slabs within the TPZ areas of Trees 4, 26, 36 and 73 should utilize methods which minimise excavation. For structures which are to be piered, the location of piers should remain flexible in order to retain roots (>25mmø) or as directed by the Project Arborist. Pier holes should be hand excavated to a depth of 600mm. Where roots are present adjacent to pier locations, pier holes should be sleeved to avoid encapsulation of roots when pouring concrete.

3.2.4 Concrete slabs should be installed above existing grade. Surface vegetation should be sprayed off with a Glyphosate-based herbicide applied at the manufacturer's recommended application rate. Vegetation should be left to die off ad desiccate before removal with hand tools.

3.2.5 **Pavements**

Pavement areas (i.e footpaths and driveways) within the TPZ areas of Trees 6, 7, 13-16, 26, 28-31, 33, 36, 41, 43, 56, 73 and Group A should be installed above existing grade (including sub base materials) to minimise excavation. Where sub base materials are required, a no fines aggregate should be used with a minimum particle size of 20mm.

3.2.6 **Fences**

The location of fence posts within the TPZ areas of Trees 4, 6, 7, 13-15, 24-29, 31-38, 41, 43-46, 56, 58, 60-65, 68, 69, 73, 74, 77 and Group A should remain flexible in order to retain roots (>25mmø) or as directed by the Project Arborist. Fence post holes should be hand excavated to a depth of 600mm. Where roots are present adjacent to post locations, post holes should be sleeved to avoid encapsulation of roots when pouring concrete.

3.2.7 Where the trees are located on a boundary, the fencing should be installed with a gap to accommodate the trees and to provide sufficient space for future growth in the short to medium term.

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3.2.8 **Demolition Works**

The demolition of existing in ground structures and pavements within the TPZ areas should be undertaken using hand operated electric or pneumatic breakers. To minimise root disturbance, structures should be demolished in small sections and removed by hand. When cutting pavement surfaces, trial cuts should be made outside of the TPZ to determine the thickness of the pavement and cutting restricted to this depth. Demolition waste should not be stored in the TPZ. Where possible, existing in ground structures should be left in situ to minimise root disturbance.

3.2.9 **Underground Services**

The installation of underground services within the TPZ areas should use hand trenching/hydro vacuum excavation to minimise damage to tree roots. If roots (>25mmø) are encountered during the excavation works, these roots should be retained in an undamaged condition and advice sought from the Project Arborist. In sections of trench where roots (>25mmø) are present and are to be retained, the services shall be either be re-routed or where falls permit, fed below these roots. Alternatively, sub surface boring methods may be utilised where cables/conduits are to be installed at depths greater than 600mm below existing grade. Entry and exit pits for boring equipment should be located outside of TPZ areas.

3.3 Replacement Trees

3.3.1 To offset the loss of amenity resultant from tree removals, replacement trees should be provided. As a minimum a replacement planting ratio of 1:1 is recommended unless otherwise specified by Council.

3.3.2 Replacement trees should be installed as semi-advanced specimens (minimum 75L rootball size) using locally indigenous species where available. To maintain the genetic biodiversity of the local area, additional planting using locally indigenous tree species grown as tubestock sourced from seed of local provenance to the area should be undertaken.

4.0 CONCLUSION

4.1 Seventy nine (79) trees and groups of trees have been surveyed as part of this assessment. The trees are comprised of locally indigenous and Australian native species which are distributed predominantly around the boundaries of the subject site.

4.2 The proposal includes two (2) separate Development Applications for the subdivision of land to provide 22 residential lots (Stage 1-current DA submission) and an additional allotment for multi-unit housing (Stage 2-future DA submission).

4.3 The supplied plans show that thirty five (35) trees will need to be removed to accommodate the proposed development. These are Trees 1-3, 5, 8-12, 17-23, 39, 40, 42, 47-55, 57, 66, 67, 70-72 and 78.

4.4 The supplied plans show that forty four (44) trees are to be retained as part of the proposed development. These are Trees 4, 6, 7, 13-16, 24-38, 41-46, 56, 58-65, 68, 69, 73-77 and Group A. Where works are proposed within the TPZ areas, these works should be undertaken using tree sensitive methods as outlined within Sections 3.2.3-3.2.9. A detailed Tree Protection Specification is provided as **Appendix 5**.

4.5 TPZ fencing should be installed for all trees to be retained prior to the commencement of demolition/site clearance works. TPZ fencing should be located at the radial TPZ distances detailed in the Tree Assessment Schedule **(Appendix 2)**. Existing ground levels within TPZ areas should be maintained.

4.6 As the current proposal is at subdivision stage only, detailed plans for individual lots have not yet been prepared. When detailed plans are finalised for individual areas/sites, a detailed assessment of the potential impacts of the development on the trees will be required and an Arboricultural Impact Assessment and Tree Protection Plan should be prepared.

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NOTE 1: Reference should be made to any relevant legislation including Tree Management Controls. All recommendations contained within this report are subject to approval from the relevant Consent Authority.

NOTE 2: This report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction issues.

NOTE 3: A comprehensive hazard assessment and management plan for the trees is beyond the scope of this report.

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AS 4373, 2007: Tree iQ- amended and reproduced under copyright Licence1110-c049

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5.0 BIBLIOGRAPHY& REFERENCES

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6.0 APPENDICES

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Appendix 1: Methodology

1.1 **Site Inspection**: This report was determined as a result of a comprehensive site inspection during February 2014. The comments and recommendations in this report are based on findings from this site inspection.

1.2 **Visual Tree Assessment (VTA)**: The subject tree(s) was visually assessed from the ground using the industry standard, VTA criteria and notes. The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.

1.3 **Tree Dimensions**: The dimensions of the subject tree(s) are approximate only.

1.4 **Tree Locations:** The location of the subject tree(s) was determined from the supplied plan attached as Appendix 2. Trees not shown on the supplied plans have been plotted in their approximate location only.

1.5 **Trees & Development**: Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites* (AS-4970).

The *Tree Protection Zone* (TPZ) is described in AS-4970 as a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The *Structural Root Zone* (SRZ) is described in AS-4970 as the area around the base of a tree required for the tree's stability in the ground. Severance of structural roots within the SRZ is not recommended as it may lead to the destabilisation and/or demise of the tree.

In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the area of the TPZ and is outside the SRZ. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. In this situation the Project Arborist must demonstrate that the tree would remain viable. This may require root investigation by non-destructive methods or the use of sensitive construction methods.

1.6 **Tree Health**: The health of the subject tree(s) was determined by assessing:

I. Foliage size and colour
II. Pest and disease infestation
III. Extension growth
IV. Crown density
V. Deadwood size and volume
VI. Presence of epicormic growth

1.7 **Tree Structural Condition**: The structural condition of the subject tree(s) was assessed by:

I. Visible evidence of structural defects or instability
II. Evidence of previous pruning or physical damage

Where the tree's base could not be accessed, no structural rating has been allocated.

1.8 **Useful Life Expectancy (ULE)**: The ULE is an estimate of the longevity of the subject tree(s) in its growing environment. The ULE is modified where necessary to take in consideration tree(s) health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (Modified from Barrell, 2001):

I. 40 years +
II. 15-40 years
III. 5-15 years
IV. Less than 5 years

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1.9 **Landscape Significance**: Landscape Significance was determined by assessing the combination of the cultural, environmental and aesthetic values of the subject tree(s). Whilst these values are subjective, a rating of high, moderate, low or insignificant has been allocated to the tree(s). This provides a relative value of the tree's Landscape Significance which may aid in determining its Retention Value. If the tree(s) can be categorized into more than one value, the higher value has been allocated.

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the *Local Environmental Plan* with a local or state level of significance.
	The subject tree is listed on Council's Significance Tree Register.
	The subject tree is a remnant tree.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species or forms part of an Endangered Ecological Community associated with the subject site, as defined under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.
	The subject tree is known to provide habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Preservation Order.
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.
Insignificant	The subject tree is declared a Noxious Weed under the Noxious Weeds Act

The above table has been modified from the Earthscape Criteria for Assessment of Landscape Significance

1.10 **Retention Value**: Retention Value was based on the subject tree's Useful Life Expectancy and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structural condition and site suitability. The subject tree(s) has been allocated one of the following Retention Values:

I. Priority for Retention
II. Consider for Retention
III. Consider for Removal
IV. Priority for Removal

<table>
<tr><th>ULE</th><th></th><th colspan="4">Landscape Significance</th></tr>
<tr><td></td><td>Very High</td><td>High</td><td>Moderate</td><td>Low</td><td>Insignificant</td></tr>
<tr><td>40 years +</td><td rowspan="3">Priority for Retention</td><td colspan="2">Priority for Retention</td><td rowspan="3">Consider for Removal</td><td rowspan="3">Priority for Removal</td></tr>
<tr><td>15-40 years</td><td>Priority for Retention</td><td>Consider for Retention</td></tr>
<tr><td>5-15 years</td><td colspan="2">Consider for Retention</td></tr>
<tr><td>Less than 5 years</td><td>Consider for Removal</td><td colspan="4">Priority for Removal</td></tr>
</table>

The above table has been modified from the Footprint Green Tree Significance and Retention Value Matrix.

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Appendix 2: Supplied Plans

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SCHEDULE OF TREES TO BE REMOVED	
TREE NO.	TREE TYPE
1	*Eucalytus haemastoma* - Scribbly Gum
2	*Eucalytus haemastoma* - Scribbly Gum
3	*Angophora costata* - Sydney Red Gum
5	*Eucalytus haemastoma* - Scribbly Gum
8	*Hakea salicifolia*- Willow Leaf Hakea
9	*Hakea salicifolia*- Willow Leaf Hakea
10	*Angophora costata* - Sydney Red Gum
11	*Angophora costata* - Sydney Red Gum
12	*Angophora costata* - Sydney Red Gum
17	*Syncarpia glomulifera* - Turpentine
18	*Allocasuarina littoralis* - Black She Oak
19	*Eucalytus haemastoma* - Scribbly Gum
20	*Angophora costata* - Sydney Red Gum
21	*Angophora costata* - Sydney Red Gum
22	*Eucalyptus botryoides* - Bangalay
23	*Angophora floribunda* - Rough Barked Apple
39	*Syncarpia glomulifera* - Turpentine
40	*Angophora costata* - Sydney Red Gum
42	*Angophora costata* - Sydney Red Gum
47	*Angophora floribunda* - Rough Barked Apple
48	*Allocasuarina littoralis* - Black She Oak
49	*Allocasuarina littoralis* - Black She Oak
50	*Allocasuarina littoralis* - Black She Oak
51	*Allocasuarina littoralis* - Black She Oak
52	*Angophora costata* - Sydney Red Gum
53	*Allocasuarina littoralis* - Black She Oak
54	*Allocasuarina littoralis* - Black She Oak
55	*Elaeocarpus reticulatus* - Blueberry Ash
57	*Angophora costata* - Sydney Red Gum
66	*Eucalyptus botryoides* - Bangalay
67	*Angophora costata* - Sydney Red Gum
70	*Allocasuarina torulosa* - Forest She Oak
71	*Angophora costata* - Sydney Red Gum
72	*Eucalytus haemastoma* - Scribbly Gum
78	*Hymenosporum fluvum* - Native Frangipani

FERN CREEK ROAD

BOUNDARY 389.295m

ORCHARD STREET

NINA STREET

16m ROAD RESERVE

4.25m 7.5m WIDE 4.25m

FUTURE DEDICATION

PLEASE REFER TO ARBORIST'S REPORT FOR TREE PROTECTION ZONES AROUND TREES TO BE RETAINED

TREE PROTECTION PLAN

DEVELOPMENT APPLICATION

REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE

DRAGON EYE PROPERTIES LIMITED

STEPHEN BOWERS ARCHITECTS

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Drawing Title

TREE PROTECTION PLAN

Scale	1:500(A1)/1:1000(A3)	Date	OCT 2014
Drawn by	LN	Check by	S.B
Drawing No.	DA - 04	Revision	-

Cad file path.
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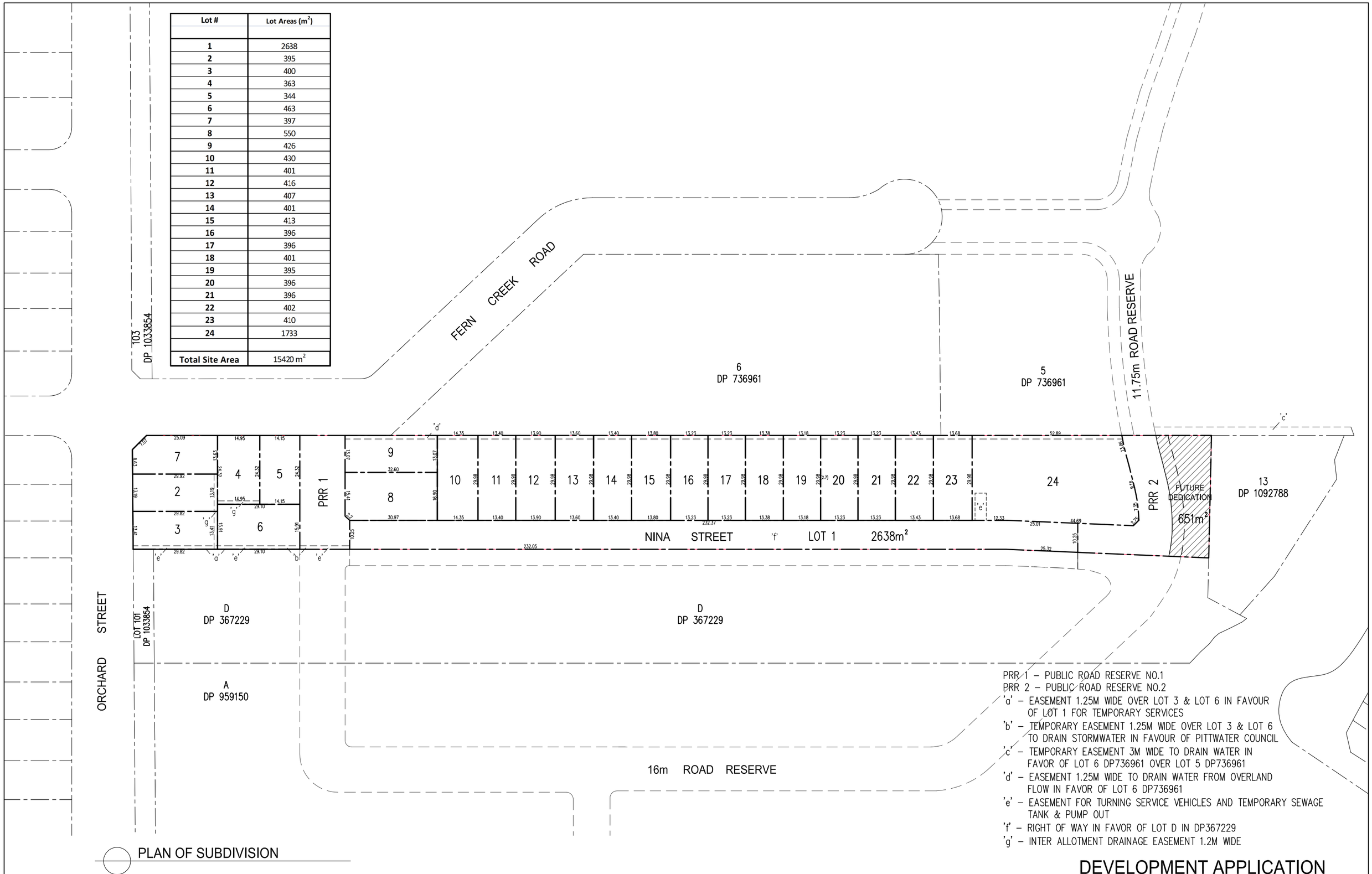
Lot #	Lot Areas (m^2)
1	2638
2	395
3	400
4	363
5	344
6	463
7	397
8	550
9	426
10	430
11	401
12	416
13	407
14	401
15	413
16	396
17	396
18	401
19	395
20	396
21	396
22	402
23	410
24	1733
Total Site Area	15420 m^2



PRR 1 – PUBLIC ROAD RESERVE NO.1
PRR 2 – PUBLIC ROAD RESERVE NO.2
'a' – EASEMENT 1.25M WIDE OVER LOT 3 & LOT 6 IN FAVOUR OF LOT 1 FOR TEMPORARY SERVICES
'b' – TEMPORARY EASEMENT 1.25M WIDE OVER LOT 3 & LOT 6 TO DRAIN STORMWATER IN FAVOUR OF PITTWATER COUNCIL
'c' – TEMPORARY EASEMENT 3M WIDE TO DRAIN WATER IN FAVOR OF LOT 6 DP736961 OVER LOT 5 DP736961
'd' – EASEMENT 1.25M WIDE TO DRAIN WATER FROM OVERLAND FLOW IN FAVOR OF LOT 6 DP736961
'e' – EASEMENT FOR TURNING SERVICE VEHICLES AND TEMPORARY SEWAGE TANK & PUMP OUT
'f' – RIGHT OF WAY IN FAVOR OF LOT D IN DP367229
'g' – INTER ALLOTMENT DRAINAGE EASEMENT 1.2M WIDE

PLAN OF SUBDIVISION

DEVELOPMENT APPLICATION

REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE

DRAGON EYE PROPERTIES LIMITED

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Drawing Title
PLAN OF SUBDIVISION

Scale	1:600(A1)/1:1200(A3)
Date	OCT 2014
Drawn by	LN
Check by	S.B
Drawing No.	DA - 01
Revision	-
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Lot #	Lot Areas (m^2)	Building Footprint (m^2)	Lot Site Coverage (max 55%)	Landscaped Lot Area (min 45%)
1	2638	TEMPORARY ACCESS WAY		
2	395	144.21	46%	54%
3	400	144.21	46%	54%
4	363	145.08	47%	53%
5	344	145.08	49%	51%
6	463	142.00	36%	64%
7	397	133.72	36%	64%
8	550	154.85	30%	70%
9	426	142.46	38%	62%
10	430	146.83	43%	57%
11	401	144.21	44%	56%
12	416	144.21	42%	58%
13	407	152.08	47%	53%
14	401	152.08	47%	53%
15	413	144.21	42%	58%
16	396	142.46	42%	58%
17	396	140.71	42%	58%
18	401	148.58	44%	56%
19	395	142.46	42%	58%
20	396	140.71	41%	59%
21	396	142.46	42%	58%
22	402	142.46	41%	59%
23	410	140.71	40%	60%
24	1946	857.14	48%	52%

Total	Building Footprint	4032.94
	Carriageway	2368.99
	Footpaths	343.05
	Driveways	958.64
	Site Area	15420.17
Total Site Coverage		**50.0%**

FERN CREEK ROAD

PROPOSED PUBLIC ROAD
11.75m ROAD RESERVE
•7.5m WIDE PERMANENT CARRIAGE WAY
•4.25m WIDE FOOTWAY

11.75m ROAD RESERVE

SOUTHERN BOUNDARY OF 25M WIDE RIPARIAN BUFFER

FUTURE DEDICATION

NINA STREET

PROPOSED PUBLIC ROAD
16m ROAD RESERVE
• 7.5m WIDE PERMANENT CARRIAGE WAY
• 4.25m WIDE FOOTWAYS

PROPOSED PRIVATE ROAD
16m ROAD RESERVE
• 6m WIDE CARRIAGE WAY + 1.5m POTENTIAL WIDENING
• 4.25m WIDE FOOTWAYS
REFER TO SECTION E–E

TEMPORARY SEWAGE TANK AND PUMP OUT

OSD TANK UNDER PRIVATE ROAD

STAGE ONE TURNING BAY

FUTURE INTERSECTION BY ADJOINING OWNER TO FACILITATE POTENTIAL EXTENSION OF PRR2
REFER TO SK–01

POTENTIAL 16m PUBLIC ROAD RESERVE

FUTURE 2.5m WIDE CYCLEWAY

ORCHARD STREET

16m ROAD RESERVE

16m ROAD RESERVE

BUILDING FOOTPRINT & ROAD LAYOUT PLAN

DEVELOPMENT APPLICATION

REV.	DESCRIPTION	DATE	REV.	DESCRIPTION	DATE

DRAGON EYE PROPERTIES LIMITED

STEPHEN BOWERS ARCHITECTS
ABN 64 087 958 423
SUITE 91 , 26-32 PIRRAMA ROAD, JONES BAY WHARF
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Drawing Title
BUILDING FOOTPRINT & ROAD LAYOUT PLAN

Scale 1:500(A1)/1:1000(A3)	Date OCT 2014
Drawn by LN	Check by S.B
Drawing No. DA - 03	Revision -
Cad file path. J:\warriewood\masterplanning\cad drawings	

Appendix 3: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
1	*Eucalyptus haemastoma* (Scribbly Gum)	600 250 150	8	7	Good	Good	Wound/s, advanced stages of decay. Medium (25-75mm) diameter deadwood in low volumes. Structures within SRZ.	15-40	Moderate	Consider for Retention	8	2.8	Remove. Driveway.
2	*Eucalyptus haemastoma* (Scribbly Gum)	750	8	7	Fair	Poor	Crown density 75-100%. Large (>75mm) diameter deadwood in low volumes. Partially suppressed. Wound/s, advanced stages of decay. Trunk cavity, major. Root severance with decay within SRZ. Structures within SRZ.	<5	Moderate	Priority for Removal	9	3	Remove. Driveway.
3	*Angophora costata* (Sydney Red Gum)	200	6	3	Good	Good	Partially suppressed. Small (<25mm) diameter deadwood in low volumes.	40+	Low	Consider for Removal	2.4	1.7	Remove. Building pad.
4	*Syncarpia glomulifera* (Turpentine)	200 150 100	6	3	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Partially suppressed.	40+	Low	Consider for Removal	3.2	2	Retain. Tree sensitive construction methods required for building and fencing.
5	*Eucalyptus haemastoma* (Scribbly Gum)	550	8	9	Fair	Poor	Crown density 50-75%. Large (>75mm) diameter deadwood in low volumes. Extensive cambial dieback.	<5	Moderate	Priority for Removal	6.6	2.6	Remove. Building pad.
6	*Eucalyptus haemastoma* (Scribbly Gum)	350	5	8	Good	Fair	Wound/s, no visible signs of decay. Partially suppressed. Small (<25mm) diameter deadwood in low volumes.	5-15	Moderate	Consider for Retention	4.2	2.2	Retain. Tree sensitive construction methods required for driveway, path and fencing.
7	*Angophora costata* (Sydney Red Gum)	450	12	8	Good	Good	Small (<25mm) diameter deadwood in low volumes.	40+	Moderate	Priority for Retention	5.4	2.4	Retain. Tree sensitive construction methods required for driveway, path and fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
8	*Hakea salicifolia* (Willow Leaf Hakea)	100	4	2	Good	Good	Partially suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Remove. Driveway.
9	*Hakea salicifolia* (Willow Leaf Hakea)	100	4	2	Good	Good	Partially suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Remove. Driveway.
10	*Angophora costata* (Sydney Red Gum)	200	9	3	Good	Good	Etiolated form. Partially suppressed. Small (<25mm) epicormic growth in low volumes.	15-40	Low	Consider for Removal	2.4	1.7	Remove. Driveway.
11	*Angophora costata* (Sydney Red Gum)	250	10	3	Good	No Value	Etiolated form. Partially suppressed.	40+	Moderate	Priority for Retention	3	1.9	Remove. Driveway.
12	*Angophora costata* (Sydney Red Gum)	150	5	6	Good	Fair	Heavily suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Remove. Driveway.
13	*Syncarpia glomulifera* (Turpentine)	350	9	4	Good	Good	Partially suppressed. Branch contact with Tree 14.	40+	Moderate	Priority for Retention	4.2	2.2	Retain. Tree sensitive construction methods required for driveway, path and fencing.
14	*Eucalyptus haemastoma* (Scribbly Gum)	400	8	8	Good	Fair	Wound/s, early stages of decay. Removal recommended to allow for the development of Tree 13.	5-15	Moderate	Consider for Removal	4.8	2.3	Retain. Tree sensitive construction methods required for driveway, path and fencing.
15	*Angophora costata* (Sydney Red Gum)	150	9	3	Good	Good	Etiolated form.	40+	Low	Consider for Removal	2.0	1.5	Retain. Tree sensitive construction methods required for driveway and fencing.
16	*Syncarpia glomulifera* (Turpentine)	250	6	3	Good	Fair	Partially suppressed. Wound/s, advanced stages of decay. Trunk cavity, minor.	5-15	Low	Consider for Removal	3	1.9	Retain. Tree sensitive construction methods required for driveway.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
17	*Syncarpia glomulifera* (Turpentine)	100	6	2	Good	Good	Partially suppressed.	40+	Low	Consider for Removal	2.0	1.5	Remove. Driveway.
18	*Allocasuarina littoralis* (Black She Oak)	150	5	3	Fair	Good	Partially suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Remove. Driveway.
19	*Eucalyptus haemastoma* (Scribbly Gum)	500	10	8	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay. Partially suppressed.	15-40	Moderate	Consider for Retention	6	2.5	Remove. Building pad.
20	*Angophora costata* (Sydney Red Gum)	400	10	7	Good	Good	Wound/s, early stages of decay. Medium (25-75mm) diameter deadwood in low volumes. Partially suppressed.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove. Building pad.
21	*Angophora costata* (Sydney Red Gum)	600	15	10	Good	Good	Wound/s, early stages of decay. Medium (25-75mm) diameter deadwood in low volumes. Branch contact with Tree 22.	15-40	High	Priority for Retention	7.2	2.7	Remove. Building pad.
22	*Eucalyptus botryoides* (Bangalay)	500 400	17	13	Fair	Poor	Crown density 75-100%. Small (<25mm) epicormic growth in low volumes. Medium (25-75mm) diameter deadwood in moderate volumes. Wound/s, advanced stages of decay. Removal recommended to allow for development of Tree 21.	5-15	High	Consider for Removal	7.8	2.8	Remove. Building pad.
23	*Angophora floribunda* (Rough Barked Apple)	100	5	2	Good	Good	Partially suppressed.	40+	Low	Consider for Removal	2.0	1.5	Remove. Building pad.
24	*Eucalyptus botryoides* (Bangalay)	250	6	4	Fair	Fair	Large (>75mm) diameter deadwood in low volumes. Crown density 50-75%. Heavily suppressed.	5-15	Low	Consider for Removal	3	1.9	Retain. Tree sensitive construction methods required for fencing.
25	*Eucalyptus haemastoma* (Scribbly Gum)	150	6	3	Good	Good	Partially suppressed. Wound/s, early stages of decay.	5-15	Low	Consider for Removal	2.0	1.5	Retain. Tree sensitive construction methods required for fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
26	*Eucalyptus botryoides* (Bangalay)	400 300	16	9	Good	Good	Small (<25mm) & medium (25-75mm) diameter deadwood in low volumes. Small (<25mm) epicormic growth in moderate volumes. Large (>75mm) diameter deadwood in low volumes.	15-40	High	Priority for Retention	6	2.5	Retain. Tree sensitive construction methods required for building, path and fencing.
27	*Angophora costata* (Sydney Red Gum)	150	7	2	Good	Good	Etiolated form. Heavily suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Retain. Tree sensitive construction methods required for fencing.
28	*Angophora costata* (Sydney Red Gum)	250	8	4	Good	Fair	Partially suppressed. Wound/s, advanced stages of decay. Medium (25-75mm) diameter deadwood in low volumes.	5-15	Moderate	Consider for Retention	3	1.9	Retain. Tree sensitive construction methods required for path and fencing.
29	*Allocasuarina littoralis* (Black She Oak)	200	6	4	Good	Good	Partially suppressed.	5-15	Moderate	Consider for Retention	2.4	1.7	Retain. Tree sensitive construction methods required for path and fencing.
30	*Angophora floribunda* (Rough Barked Apple)	250								Priority for Retention	3	1.9	Retain. Tree sensitive construction methods required for driveway and path.
31	*Allocasuarina littoralis* (Black She Oak)	200								Priority for Retention	2.4	1.7	Retain. Tree sensitive construction methods required for path and fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
32	*Angophora costata* (Sydney Red Gum)	300	7	5	Good	Good	Large (>75mm) diameter deadwood in low volumes. Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	15-40	Moderate	Consider for Retention	3.6	2	Retain. Tree sensitive construction methods required for fencing.
33	*Hakea salicifolia* (Willow Leaf Hakea)	250								Priority for Retention	3	1.9	Retain. Tree sensitive construction methods required for path and fencing.
34	*Eucalyptus botryoides* (Bangalay)	200								Priority for Retention	2.4	1.7	Retain. Tree sensitive construction methods required for fencing.
35	*Angophora costata* (Sydney Red Gum)	150								Priority for Retention	2.0	1.5	Retain. Tree sensitive construction methods required for fencing.
36	*Angophora costata* (Sydney Red Gum)	600	18	9	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	40+	High	Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for building, path and fencing.
37	*Angophora costata* (Sydney Red Gum)	250	8	6	Good	Good	Partially suppressed.	5-15	Moderate	Consider for Retention	3	1.9	Retain. Tree sensitive construction methods required for fencing.
38	*Angophora costata* (Sydney Red Gum)	150								Priority for Retention	2.0	1.5	Retain. Tree sensitive construction methods required for fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
39	*Syncarpia glomulifera* (Turpentine)	200 200	6	3	Good	Fair	Co-dominant inclusion. Partially suppressed.	15-40	Moderate	Consider for Retention	3.5	2	Remove. Driveway.
40	*Angophora costata* (Sydney Red Gum)	350 300								Priority for Retention	5.6	2.5	Remove. Driveway.
41	*Allocasuarina littoralis* (Black She Oak)	250	7	4	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	3	1.9	Retain. Tree sensitive construction methods required driveway and fencing.
42	*Angophora costata* (Sydney Red Gum)	100								Priority for Retention	2.0	1.5	Remove. Driveway.
43	*Eucalyptus botryoides* (Bangalay)	100	6	2	Good	Good	Dead stem @ 250mm above grade.	15-40	Low	Consider for Removal	2.0	1.5	Retain. Tree sensitive construction methods required driveway and fencing.
44	*Glochidion ferdinandi* (Cheese Tree)	75 75 50	5	3	Good	Good	Partially suppressed.	40+	Low	Consider for Removal	2	1.5	Retain. Tree sensitive construction methods required for fencing.
45	*Angophora costata* (Sydney Red Gum)	150	6	2	Good	Fair	Wound/s, advanced stages of decay.	5-15	Low	Consider for Removal	2.0	1.5	Retain. Tree sensitive construction methods required for fencing.
46	*Elaeocarpus reticulatus* (Blueberry Ash)	100	6	2	Good	Good		15-40	Low	Consider for Removal	2.0	1.5	Retain. Tree sensitive construction methods required for fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
47	*Angophora floribunda* (Rough Barked Apple)	500	14	9	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	15-40	High	Priority for Retention	6	2.5	Remove. Road.
48	*Allocasuarina littoralis* (Black She Oak)	250	6	3	Poor	Good	Crown density 25-50%. Small (<25mm) diameter deadwood in high volumes.	<5	Low	Priority for Removal	3	1.9	Remove. Road.
49	*Allocasuarina littoralis* (Black She Oak)	150	9	3	Poor	Good	Crown density 25-50%. Small (<25mm) diameter deadwood in high volumes.	<5	Low	Priority for Removal	2.0	1.5	Remove. Road.
50	*Allocasuarina littoralis* (Black She Oak)	150	6	3	Fair	Good	Partially suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Remove. Road.
51	*Allocasuarina littoralis* (Black She Oak)	250	6	4	Fair	Good	Partially suppressed. Phototropic lean, moderate.	5-15	Low	Consider for Removal	3	1.9	Remove. Road.
52	*Angophora costata* (Sydney Red Gum)	350	10	6	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	40+	High	Priority for Retention	4.2	2.2	Remove. Road.
53	*Allocasuarina littoralis* (Black She Oak)	150	5	3	Fair	Good	Partially suppressed.	5-15	Low	Consider for Removal	2.0	1.5	Remove. Road.
54	*Allocasuarina littoralis* (Black She Oak)	300								Priority for Retention	3.6	2	Remove. Road.
55	*Elaeocarpus reticulatus* (Blueberry Ash)	200								Priority for Retention	2.4	1.7	Remove. Path.
56	*Eucalyptus botryoides* (Bangalay)	300 100 100								Priority for Retention	4.1	2.2	Retain. Tree sensitive construction methods required for driveway, path and fencing.
57	*Angophora costata* (Sydney Red Gum)	1000	15	10	Good	Good	Crown density 75-100%. Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	15-40	High	Priority for Retention	12	3.4	Remove. Driveway & building pad.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
58	*Angophora costata* (Sydney Red Gum)	600								Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for fencing.
59	*Backhousia citroidora* (Lemon Scented Myrtle)	150								Priority for Retention	2.0	1.5	Retain. No works within TPZ.
60	*Corymbia citriodora* (Lemon Scented Gum)	600								Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for fencing.
61	*Eucalyptus botryoides* (Bangalay)	600								Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for fencing.
62	*Eucalyptus botryoides* (Bangalay)	600								Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for fencing.
63	*Eucalyptus botryoides* (Bangalay)	600								Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for fencing.
64	*Eucalyptus botryoides* (Bangalay)	400 250								Priority for Retention	5.8	2.5	Retain. Tree sensitive construction methods required for fencing.
65	*Eucalyptus botryoides* (Bangalay)	600								Priority for Retention	7.2	2.7	Retain. Tree sensitive construction methods required for fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
66	*Eucalyptus botryoides* (Bangalay)	550 250 300	7	6	Fair	Poor	Crown density 50-75%. Medium (25-75mm) diameter deadwood in moderate volumes. Large (>75mm) diameter deadwood in low volumes. Wound/s, advanced stages of decay. Structures within SRZ.	<5	Moderate	Priority for Removal	8.2	2.9	Remove. Tree not considered worthy of retention.
67	*Angophora costata* (Sydney Red Gum)	350	8	5	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Branch inclusion/s, minor. Structures within SRZ.	40+	Moderate	Priority for Retention	4.2	2.2	Remove. Eavesment.
68	*Allocasuarina littoralis* (Black She Oak)	200 150								Priority for Retention	3	1.9	Retain. Tree sensitive construction methods required for fencing.
69	*Eucalyptus haemastoma* (Scribbly Gum)	450								Priority for Retention	5.4	2.4	Retain. Tree sensitive construction methods required for fencing.
70	*Allocasuarina torulosa* (Forest She Oak)	300	6	4	Poor	Fair	Crown density 25-50%. Wound/s, advanced stages of decay. Small (<25mm) diameter deadwood in high volumes.	<5	Low	Priority for Removal	3.6	2	Remove. Tree not considered worthy of retention.
71	*Angophora costata* (Sydney Red Gum)	350	11	4	Good	Good	Structures within SRZ.	40+	Moderate	Priority for Retention	4.2	2.2	Remove. Easement.
72	*Eucalyptus haemastoma* (Scribbly Gum)	150 150	6	3	Fair	Fair	Previous branch failure/s. Wound/s, no visible signs of decay.	5-15	Low	Consider for Removal	2.6	1.9	Remove. Easement.
73	*Eucalyptus botryoides* (Bangalay)	300 350 300								Priority for Retention	6.6	2.6	Retain. Tree sensitive construction methods required for building, driveway and fencing.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
74	*Eucalyptus haemastoma* (Scribbly Gum)	450								Priority for Retention	5.4	2.4	Retain. Tree sensitive construction methods required for fencing.
75	*Eucalyptus botryoides* (Bangalay)	250								Priority for Retention	3	1.9	Retain. No works within TPZ.
76	*Eucalyptus botryoides* (Bangalay)	300								Priority for Retention	3.6	2	Retain. No works within TPZ.
77	*Eucalyptus botryoides* (Bangalay)	800								Priority for Retention	9.6	3.1	Retain. Tree sensitive construction methods required for fencing.
78	*Hymenosporum flavum* (Native Frangipani)	350	9	5	Fair	Good	Partially suppressed. Crown density 75-95%. Wounds in various stages of decay.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove. Road.
GA	Mixed group of *Hakea salicifolia* (Willow Leaved Hakea), *Allocasuarina littoralis* (Black She Oak), *Eucalyptus haemastoma* (Scribbly Gum)	50-100	5	2	Good to Poor	Good to Fair	Understorey vegetation. Heavily suppressed.	5-15	Low	Consider for Removal	2	1.5	Retain. Tree sensitive construction methods required for path and fencing.

Appendix 4: Plates

Plate 1: Tree 1

Plate 2: Tree 2

Plate 3: Trees 19 & 20

Plate 4: Tree 47

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Plate 5: Tree 57

Plate 6: Trees 62 --65

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Appendix 5: Tree Protection Specification

1.0 Appointment of Project Arborist

A Project Arborist shall be engaged prior the commencement of work on-site and monitor compliance with the protection measures. The Project Arborist shall inspect the tree protection measures and Compliance Certification shall be prepared by the Project Arborist for review by the Principal Certifying Authority prior to the release of the Compliance Certificate.

The Project Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture.

The site specific requirement for mulching, irrigation, the location of tree protection fencing and temporary access, and other specific tree protection measures shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works.

1.1 Compliance

Contractors and site workers shall receive a copy of these specifications a minimum of 3 working days prior to commencing work on-site. Contractors and site workers undertaking works within the Tree Protection Zone shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

1.2 Tree & Vegetation Removal

Trees approved for removal by the determining authority shall be removed prior to the establishment of the tree protection measures. Tree removal shall not damage the trees to be retained.

Tree removal works shall be undertaken in accordance with the *Workcover Code of Practice for the Amenity Tree Industry* (1998).

Trees to be removed that contain hollows shall be inspected by a Fauna Ecologist prior to the tree removal works commencing. In the event that wildlife is found, the Fauna Ecologist shall advise on tree dismantling requirements appropriate to the observed species.

1.3 Tree Protection Zone

The trees to be retained shall be protected prior and during construction from activities that may result in an adverse effect on their health or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, unless otherwise stated:-

- Modification of existing soil levels, excavations and trenching
- Mechanical removal of vegetation
- Movement of natural rock
- Storage of materials, plant or equipment or erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials, refueling or disposal of waste materials and chemicals
- Lighting fires
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Any other activities that may cause damage to the tree

NOTE: If access, encroachment or incursion into the TPZ is deemed essential, prior authorisation is required by the Project Arborist.

1.4 Tree Protection Fencing

Tree Protection Fencing shall be installed at the perimeter of the TPZ as outlined within the Tree Assessment Schedule. Where trees are located in close proximity to one another, the TPZ areas may be combined. The minimum radial TPZ for each tree within the group shall be adhered to when setting out fencing.

Where works approved by the determining authority are required within the TPZ areas, fencing may be setback to provide temporary access, only where ground and trunk protection has been provided. Refer to Sections 1.6 & 1.8.

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As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Panels shall be fastened together and supported to prevent sideways movement. The fence must have a lockable opening for access. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) **Appendix 6**.

1.5 Signage

Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site. The lettering on the sign should comply with *Australian Standard - 1319 (1994) Safety signs for the occupational environment*. The signage shall be installed prior to the commencement of works on-site and shall be maintained in good condition for the duration of the development period.

1.6 Trunk & Branch Protection

Where deemed necessary by the Project Arborist, trunk protection shall be installed by wrapping padding around the trunk to a minimum height of 2m or as the lower branches permit. 2m lengths of timber batons (75mm x 45mm) spaced at 100mm centres shall be strapped together and placed over the padding. Branch protection shall be installed to those branches 1m or closer to scaffolding. Branch protection shall be installed by wrapping padding around the branch. Refer to Typical Tree Protection Details (4) **Appendix 6**.

1.7 Site Management

Materials and waste storage, site sheds and temporary services shall not be located within the TPZ.

1.8 Ground Protection & Temporary Access

Where required, Ground Protection & Temporary Access within the TPZ shall be shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist.

Where light traffic access <3.5tons is required the ground surface shall be protected by a 100mm deep mulch cover overlaid with rumble boards/road plates. The mulch shall be Horticultural Grade Pine Bark as certified to *AS4454: Composts, Soil Conditioners and Mulches* (1997). The mulch shall be spread by hand to avoid soil disturbance and compaction.

Where heavy traffic access >3.5 tons is required the ground surface shall be protected by a layer of geo-textile fabric over which a 300mm layer of compacted road base is to be installed. The geo-textile shall extend a minimum of 300mm beyond the edge of the road base. When removing temporary access road the material shall be removed with care to prevent disturbance of natural ground levels below. Refer to Typical Tree Protection Details (4) **Appendix 6**.

1.9 Scaffolding

Where possible, scaffolding shall not be located within the TPZ. Scaffolding shall not be in contact with the tree. As necessary, this shall be achieved by erecting scaffolding around branches. Branches shall be tied back and protected as deemed necessary by the Project Arborist. Refer to Typical Tree Protection Details (5) **Appendix 6.**

1.10 Works within the Tree Protection Zones

In some cases works within the TPZ may be authorized by the determining authority. **These works shall be supervised by the Project Arborist**. When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

If roots (>25mmø) are encountered during the demolition, excavation and construction works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of roots (>25mmø) where deemed necessary by the Project Arborist.

1.11 Structure Demolition

Demolition of existing structures within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs, pavements or areas of ground protection (refer to Section 1.8). Machinery should not contact the tree's roots, trunk, branches and crown.

When removing slab sections within TPZ, machinery shall work backwards out of the TPZ to ensure machinery remains on un-demolished sections of slab at all times. Wherever possible, footings or elements below grade shall be retained to minimise disturbance to the tree's roots.

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Where deemed necessary by the Project Arborist, the structures shall be shattered prior to removal with a hand-operated pneumatic/electric breaker.

If roots (>25mmø) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times. Where the Project Arborist determines that the subject tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

1.12 Pavement Demolition

Demolition of the existing pavements within the TPZ shall be supervised by the Project Arborist. The existing pavement shall be carefully lifted by hand to minimise damage to the existing sub-base and to prevent damage to tree roots. Wherever possible, the existing sub-base material shall remain in-situ.

The exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times.

If roots (>25mmø) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times. Where the Project Arborist determines that the subject tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

1.13 Pavement Installation

Installation of the new sub-base and pavement surfaces within the TPZ shall be supervised by the Project Arborist. The new sub-base and pavement surfaces shall be placed above grade to minimise excavations and retain roots (unless prior root mapping results show above sensitive construction to be unnecessary). Where possible, existing sub-base materials shall remain in-situ and be reused.

If roots (>25mmø) are encountered during the installation of the new sub-base and pavement surfaces, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of structural roots (>25mmø) where deemed necessary by the Project Arborist.

If required, the new sub-base material shall be a 20mm no-fines road base (Benedict Sand & Gravel - Product Code 20NF/RB or similar approved material). The sub-base shall only be imported and spread when the underlying soil conditions are dry to avoid compaction. The depth of the new sub-base shall be no lower than the existing ground level to protect roots.

If required, the new bedding sand shall be a washed river sand (recycled crushed paving blends shall not be used). The bedding sand shall be consolidated with a pedestrian-operated mini plate compactor to minimise soil compaction with the TPZ. If possible, the pavement material shall be permeable to allow for water infiltration and gaseous exchange into the underlying soil.

Root pruning and excavations shall be undertaken as outlined within Section 1.17.

1.14 Footing Installation

Installation of footings within the TPZ shall be supervised by the Project Arborist. All parts of the foundation structure shall be installed above grade other than supportive piers/posts.

The location of the footings shall be flexible to enable the retention of roots (>25mmø), where deemed necessary by the Project Arborist. Where retained roots would be encapsulated by concrete pier/post holes shall be sleeved to protect roots.

Root pruning and excavations shall be undertaken as outlined within Section 1.17.

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1.15 Underground Services

Installation of underground services within the TPZ shall be supervised by the Project Arborist. Wherever possible, underground services shall not be located within the TPZ.

Where underground services run through the TPZ of trees to be retained, hand /hydro-vacuum excavation methods shall be used to minimise damage to tree roots. When undertaking hydro-vacuum excavation, the tip of the high pressure lance is not to be pointed directly at roots at close range to avoid the removal or damage to bark. It is essential that the bark of roots remain intact.

If roots (>25mmø) are encountered during the excavation works, these roots should be retained in an undamaged condition and advice sought from the Project Arborist. In section of trench where roots (>25mmø) are present and are to be retained, the services shall be either be re-routed or where falls permit, feed below these roots.

Where underground services cannot be re-routed, thrust (trenchless) boring may be used within the TPZ areas. Excavations for starting and receiving pits for thrust boring equipment shall be located outside the TPZ. The top of the pipe being installed must be installed at a minimum depth of 600mm below existing grade. Techniques involving external lubrication of the boring head with materials other than water (e.g. oil, bentonite, etc.) shall be avoided.

Root pruning and excavations shall be undertaken as outlined within Section 1.17.

1.16 Shrub and Groundcover Planting

The planting locations with the TPZ shall remain flexible to avoid damage to roots. In some cases, small stock may be the only suitable size for planting within the TPZ. Planting shall be carefully undertaken by hand using hand tools only to prevent damage to tree roots.

1.17 Excavations & Root Pruning

Excavations and root pruning within the TPZ shall be supervised by the Project Arborist. Excavations within the TPZ shall be avoided wherever possible.

Excavations within the TPZ shall be undertaken by hand or using hydro vacuum excavation methods (or similar approved device) to protect tree roots. If there is any delay between excavation works and backfilling, exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times.

Roots to be pruned shall be cleanly severed with sharp pruning implements to ensure a smooth wound face, free from tears. Severance of structural roots (>25mmø) within the Structural Root Zone is not recommended as it may lead to tree destabilisation. **All root pruning requires approval from the Project Arborist.**

No over excavation, benching or battering should be permitted when excavating adjacent to or within TPZ areas.

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Appendix 6: Typical Tree Protection Details

Adapted from *AS 4970-2009 Protection of Trees on Development Sites*
(Source: Institute of Australian Consulting Arboriculturists)

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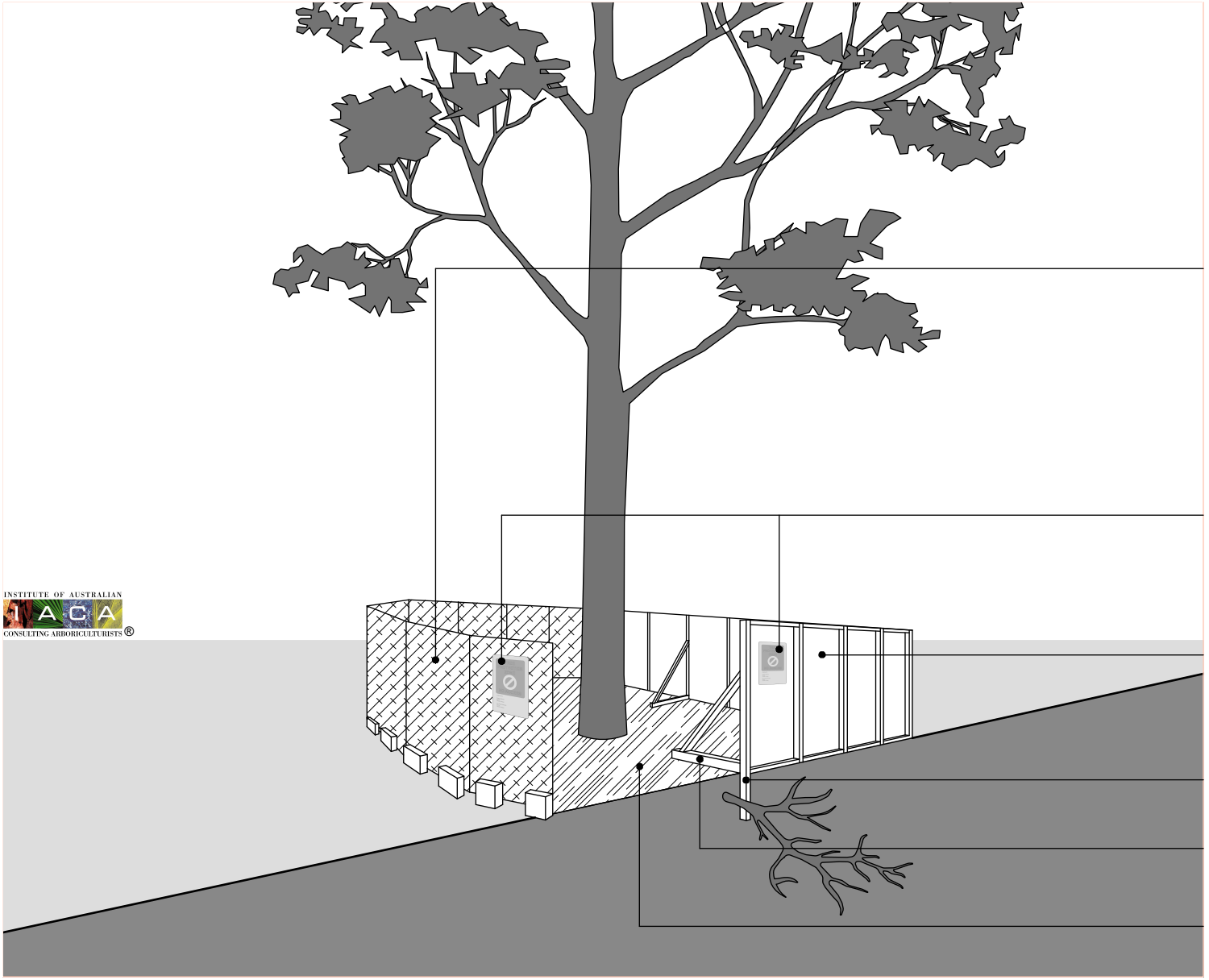


Note:
No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

Option 1 - Fencing
1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

Installation of supports should avoid damaging roots.

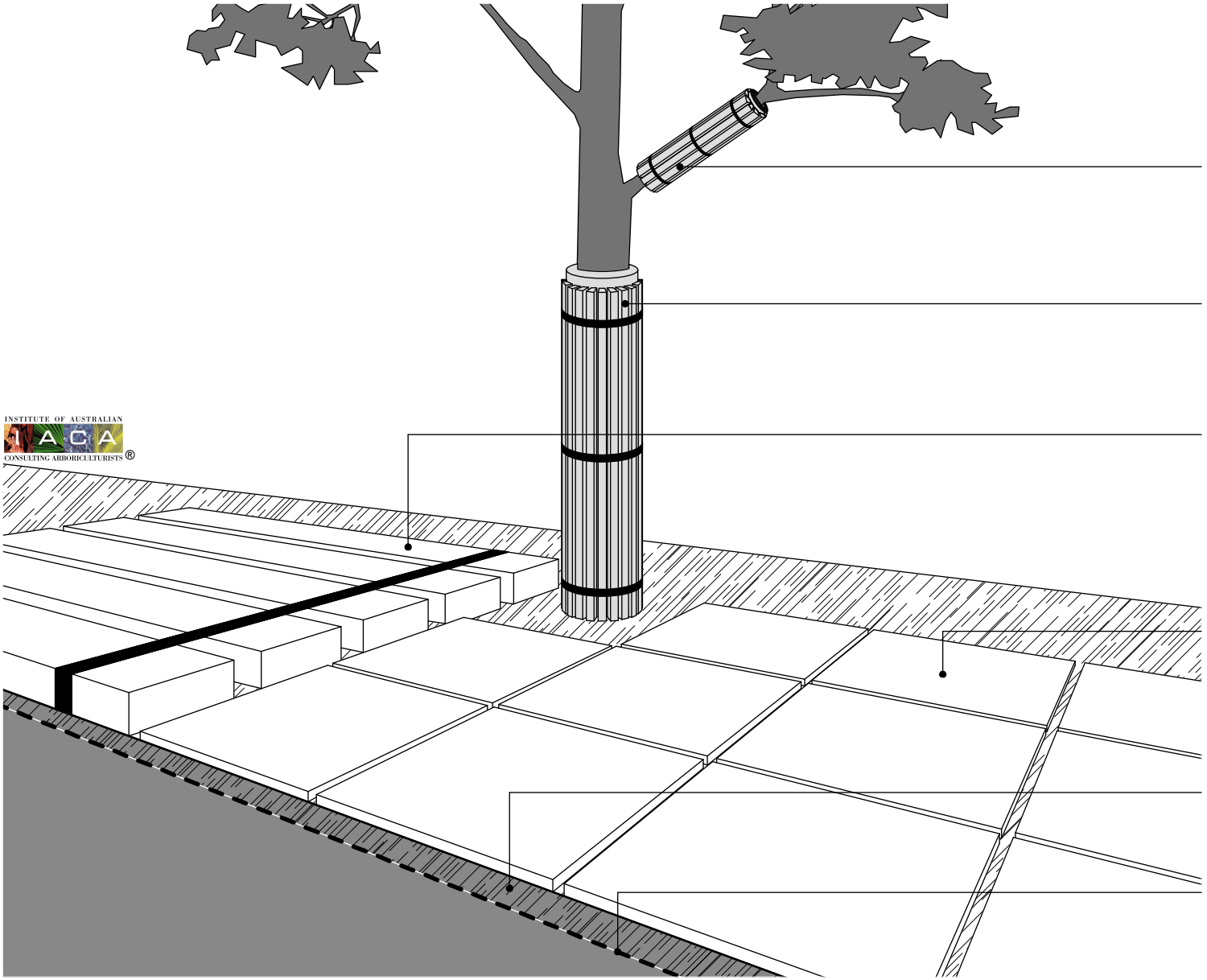
Bracing is permissible within the TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TPZ.

03

Tree Protection Fencing

Not to Scale



Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.

Trunk Protection - use boards and padding to prevent damage to bark (minimum 2m). Boards are to be strapped, not screwed or nailed to the trunk.

Ground Protection - use device strapped over mulch or aggregate layer. Ground protection device should be of a suitable thickness to prevent soil compaction and root damage.

Steel plates (or approved equivalent) with or without mulch or aggregate layer below.

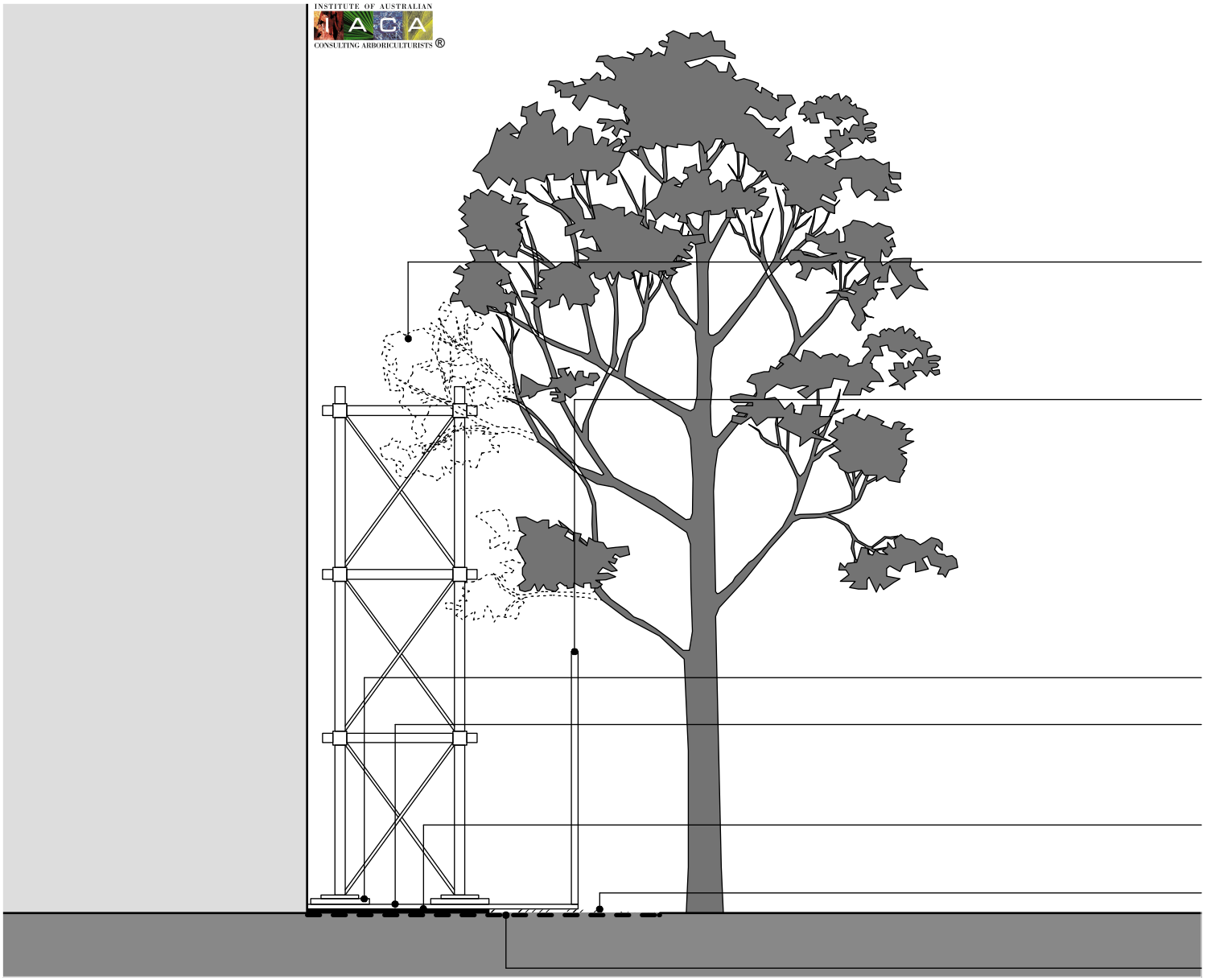
Maximum 100mm and minimum 50mm depth mulch or aggregate layer.

Geotextile fabric underneath mulch or aggregate layer.

04

Examples of Branch, Trunk and Ground Protection

Not to Scale



Branches may require pruning to erect scaffolding. Pruning may be subject to local regulations. Flexible branches should be tied back in preference to pruning.

Minimum 1.8m high hoarding. Temporary fencing may be incorporated into scaffolding as either containment screening or as hoarding.

Note:
If excavation is required for installation of support post for fencing, the Project Arborist should assess any pruning of roots greater than 20mm diameter.

Scaffold planks

Boards or plywood to be installed over mulch or aggregate layer for any areas requiring access within the TPZ.

Soleplate over geotextile. No excavation for soleplate within TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer within TPZ.

Geotextile fabric

05

Indicative Scaffolding within a Tree Protection Zone (TPZ)

Not to Scale