



Arboricultural Impact Assessment Report

Site location:

25 Laitoki Road
Terrey Hills NSW

Prepared for:

Narla Environmental Pty Ltd

Prepared by: Bryce Claassens

Urban Arbor Pty Ltd

Date: 17 December 2018

Ref: 18/12/17/25LRTH

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Site Address: 25 Laitoki Road, NSW.

Prepared for: Narla Environmental Pty Ltd

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 17 December 2018.

1. INTRODUCTION

- 1.1 Urban Arbor have been instructed by Narla Environmental to provide an Arboricultural Impact Assessment Report in relation to trees located on the site and adjoining neighbouring sites in relation to a proposed development.
- 1.2 Below is a list of all documents and information provided to Urban Arbor to assist in preparing this report.
 - A) Plan Showing Boundaries Relative Heights and Physical Features, Bee & Lethbridge, Ref: 20773, Sheet No. 1-3, 12 December 2018.
 - B) Site Analysis, Playoust Churcher Architects, Drawing Number: A100, 9 November 2018.
 - C) Elevations and Basement, Playoust Churcher Architects, Drawing Number: A101, 9 November 2018.
 - D) Ground and First Floor Plans, Playoust Churcher Architects, Drawing Number: A102, 13 December 2018. And with a trunk diameter greater than 150mm (measured at 1.4m above ground level).
- 1.3 The trees were inspected during two site visits on 14 November 2018 and 15 November 2018. Access was available to the subject site and adjoining public areas only. All tree data contained in this report was collected during these site inspections.
- 1.4 The subject site is densely vegetated and at the time of the inspection, the majority of trees at the site had not been surveyed. It was not practical to survey all trees greater than 5 metres in height, only trees with a height greater than 5 metres and a trunk diameter greater than 150mm have been identified in this report. There are several dead trees of these dimensions that have not been included in the report; all dead trees are exempt from protection under the LEP and DCP. All trees included in this report have been marked with metal tags and corresponding tree numbers.

2. SCOPE OF THE REPORT

- 2.1 This report has been undertaken to meet the following objectives.
 - 2.1.1 Conduct a visual assessment of all significant trees located within 10 metres of development works from ground level. For the purpose of this report, a significant tree is a tree with a height equal to or greater than 5 metres and a trunk diameter greater than 150mm (measured at 1.4m above ground level).
 - 2.1.2 Determine the trees estimated contribution years and remaining, useful life expectancy and award the trees a retention value.
 - 2.1.3 Provide an assessment of the potential impact the proposed development is likely to cause to the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).
 - 2.1.4 Specify tree protection measures for trees to be retained in accordance with AS4970-2009.

3. LIMITATIONS

- 3.1 The observations and recommendations are based on the site inspections identified in the introduction (section 1) and the access available at the time of inspection. Findings of this report are based on the observations and site conditions at the time inspection.
- 3.2 All of the observations were carried out from ground level and none of the surrounding surfaces were lifted or removed during the inspection. No tests were carried out to the subject trees or surrounding area during the inspection.
- 3.1 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.
- 3.2 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.
- 3.3 Tree identification is based on accessible visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where tree species is unknown, it is indicated with an *spp.*
- 3.4 All diagrams, plans and photographs included in this report are visual aids only, and are not to scale unless otherwise indicated.
- 3.5 Urban Arbor neither guarantees, nor is it responsible for, the accuracy of information provided by others that is contained within this report.
- 3.6 While an assessment of the subject trees estimated useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of trees at the site.
- 3.7 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.
- 3.8 Alteration of this report invalidates the entire report.

4. METHODOLOGY

4.1 The following information was collected during the assessment of the subject tree(s).

4.1.1 Tree common name

4.1.2 Tree botanical name

4.1.3 Tree age class

4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres.

4.1.5 Estimated height - metres

4.1.6 Estimated crown spread (diameter of crown) - metres

4.1.7 Health

4.1.8 Structural condition

4.1.9 Amenity value

4.1.10 Estimated remaining contribution years (SULE)¹

4.1.11 Retention value (Tree AZ)²

4.1.12 Notes/comments

4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).³

4.3 Tree diameter was measured using a DBH tape or in some cases estimated. Tree height and tree canopy spread was measured with a clinometer or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tool used during the assessment was a digital camera.

4.4 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009) ⁴ and in some cases estimated. See appendices for information.

4.5 Details of how the observations in this report have been assessed are listed in the appendices.

¹ Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, <http://www.treeaz.com/>.

² Barrell Tree Consultancy, *Tree AZ version 10.04-ANZ*, <http://www.treeaz.com/>.

³ Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (2015).

⁴ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009).

5. SITE LOCATION AND BRIEF DESCRIPTION

- 5.1 The subject site is located in the Northern Beaches Local Government Authority (LGA) area, and all trees at the site are subject to protection by the Warringah Local Environmental Plan (LEP) 2011⁵ and Warringah Development Control Plan (DCP) 2011⁶. The site is not located inside a Heritage Conservation Area and does not form part of a heritage item/listed as environmental heritage in the LEP heritage maps.⁷
- 5.2 Proposed demolition works include the removal of the existing dwelling, structures, hard surfaces and outbuildings. Proposed development works include the construction of a new seniors living complex including houses, apartments, basement car park, driveways, bridge, hard surfacing pathway, retaining walls and additional structures.

6. GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES

- 6.1 **Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection. Additional information about the TPZ is included in appendix 3.

⁵ Warringah Local Environmental Plan 2011 <https://legislation.nsw.gov.au/#/view/EPI/2011/649/historical2016-03-11/full>, accessed 4 December 2018.

⁶ Warringah Development Control Plan 2011, <https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=DCP>, accessed 4 December 2018.

⁷ Warringah LEP Heritage map - Sheet HER_006, https://legislation.nsw.gov.au/maps/55c38209-8e2f-48ca-aae6-0319cddb42dd/1800_COM_HER_006_020_20130423.pdf, accessed 4 December 2018.

6.2 Structural Root Zone (SRZ): This is the area around the base of a tree required for the tree's stability in the ground. An area larger than the SRZ always needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula; $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ. See the appendices for more information about the SRZ.

6.3 Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

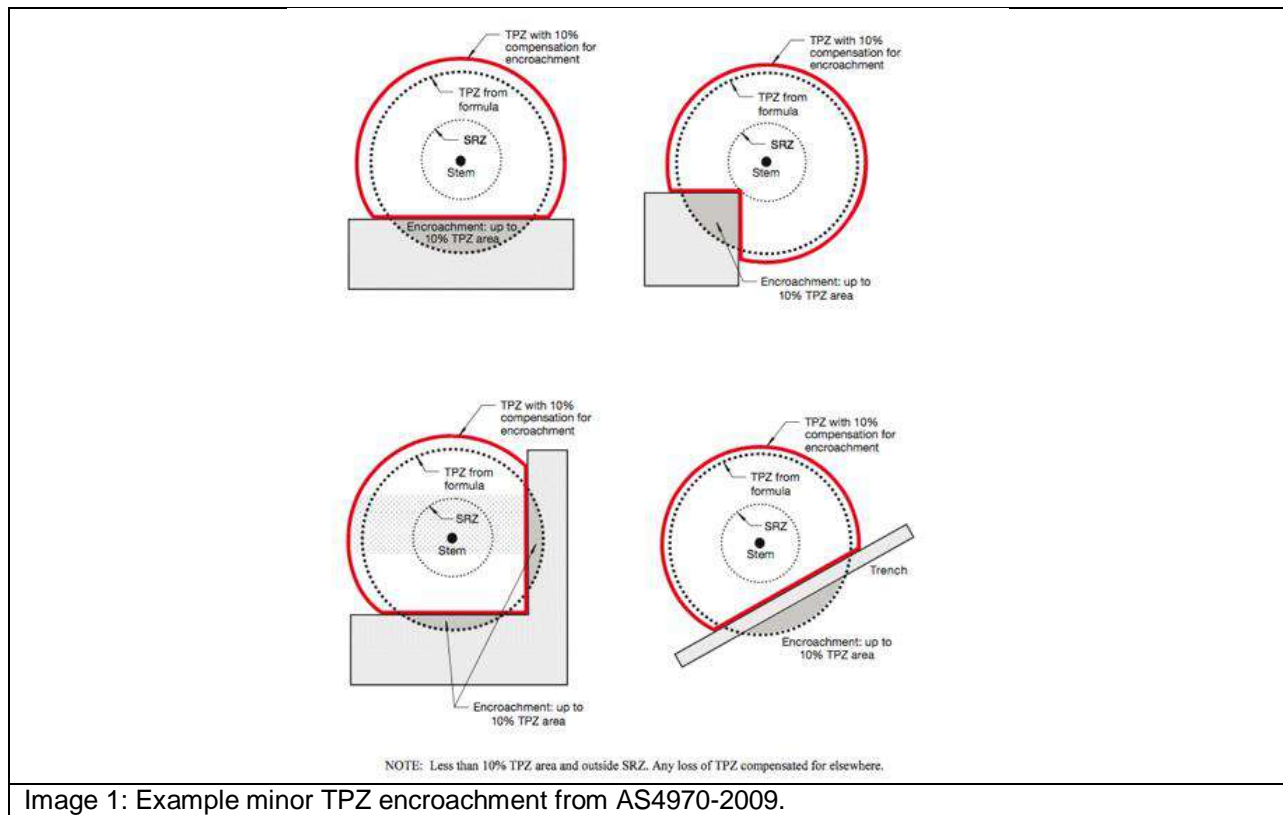


Image 1: Example minor TPZ encroachment from AS4970-2009.

6.4 Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted. Root investigations may be required to identify roots that will be impacted during major TPZ encroachment (see appendix 3 for more information in relation to root investigations).

7. OBSERVATIONS

7.1 Tree information: Details of each individual tree assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in appendix 2, where the indicative tree protection zone (TPZ) for the subject trees has been calculated. The TPZ and SRZ should be measured in radius from the centre of the trunk. The subject trees have been awarded a retention value based on the observations during the site inspection. The system used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The Tree AZ categories sheet (Barrell Tree Consultancy) has been included in the appendices to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline. This information has been summarised below.

7.2 Site Plan: Site plans have been included in appendix 1, where the indicative TPZ/SRZ of the trees assessed has been overlaid onto received plans provided by the client to assist with understanding tree constraints at the site and how the impact to trees has been assessed. The following plans are included in appendix 1;

- Appendix 1A: Existing Site Plan
- Appendix 1B: Proposed Site Plan

8. ASSESSMENT OF CONSTRUCTION IMPACTS

8.1 Table 1: In the table below, the impact of the proposed development has been assessed for all trees included in the report. The assessed TPZ encroachments include proposed structures and hard landscaping only. All soft landscaping should be completed in accordance with section 11.10.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
1	<i>Robinia pseudoacacia</i>	Z3	3.4	36.3	2.1	None	Located within nature strip. Exempt species. No proposed TPZ encroachment.	Retain and protect.
2	<i>Corymbia gummifera</i>	A1	6.6	136.8	2.7	Major	The proposed hard surface pathway will encroach into the TPZ by 32% (44.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
3	<i>Pittosporum undulatum</i>	A1	5.3	88.2	2.5	Major	The proposed hard surface pathway will encroach into the TPZ by 27% (23.6m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
4	<i>Pittosporum undulatum</i>	A1	3.6	40.7	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
5	<i>Pittosporum undulatum</i>	A1	3.9	47.8	2.5	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
6	<i>Pittosporum undulatum</i>	A1	3.6	40.7	2.1	Major	The proposed hard surface pathway will encroach into the TPZ by 44% (17.9m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
7	<i>Angophora costata</i>	A1	6.0	113.1	2.6	Major	The proposed basement excavations will encroach into the TPZ by 32% (17.9m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove.
8	<i>Pittosporum undulatum</i>	A1	4.7	69.4	2.7	Major	The proposed hard surface pathway will encroach into the TPZ by 39% (27.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
9	<i>Pittosporum undulatum</i>	A1	4.1	52.8	2.5	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
10	<i>Cinnamomum camphora</i>	Z3	11.1	387.1	3.4	Major	The proposed hard surface pathway and block B terrace houses will encroach into the TPZ by 20% (75.6m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. The tree is an exempt species and should not be a constraint to the development.	Remove.

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11	<i>Pittosporum undulatum</i>	Z5	3.8	45.4	2.1	Minor	The proposed hard surface pathway will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree. The tree was displaying poor structural condition at the time of the inspection with a column of significant internal decay from base to 2.5m and the loss of the central leader. The tree is recommended for removal due to existing condition only and should be replaced with a tree that will contribute to the landscape for a longer period of time.	Remove.
12	<i>Cinnamomum camphora</i>	Z3	8.4	221.7	4.4	Minor	The proposed hard surface pathway will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree. Exempt species possible to remove if preferred.	Retain and protect.
13	<i>Ceratopetalum gummiferum</i>	A1	3.1	30.2	2.1	None	No proposed TPZ encroachment.	Retain and protect.
14	<i>Jacaranda mimosifolia</i>	Z3	2.6	21.2	1.9	None	No proposed TPZ encroachment.	Retain and protect.
15	<i>Eucalyptus spp</i>	ZZ 4	6.0	113.1	2.6	Major	The proposed hard surface pathway will encroach into the TPZ by 11% (12.6m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is a dead tree and is recommended for removal due to its current condition.	Remove.
16	<i>Corymbia gummifera</i>	A1	4.2	55.4	2.3	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
17	<i>Pittosporum undulatum</i>	ZZ 5	5.3	88.2	2.4	Major	The trunk of the tree is located directly adjacent to the proposed hard surface pathway and the proposed driveway. The tree is a dead tree and is recommended for removal due to its current condition.	Remove.
18	<i>Eucalyptus racemosa</i>	Z5	13.2	547.4	3.6	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.

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19	<i>Melaleuca armillaris</i>	A1	8.7	237.8	3.3	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
20	<i>Eucalyptus sieberi</i>	A1	11.3	401.1	3.7	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway and directly adjacent to the block A terrace houses.	Remove.
21	<i>Angophora costata</i>	A1	3.0	28.3	1.9	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
22	<i>Corymbia gummifera</i>	A1	3.8	45.4	2.1	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
23	<i>Eucalyptus spp</i>	ZZ 5	8.3	216.4	3.3	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
24	<i>Allocasuarina littoralis</i>	A1	2.9	26.4	1.9	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
25	<i>Allocasuarina littoralis</i>	Z9	4.2	55.4	2.2	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
26	<i>Allocasuarina littoralis</i>	A1	2.9	26.4	1.9	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
27	<i>Eucalyptus sieberi</i>	ZZ 4	12.5	490.9	3.7	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
28	<i>Acacia spp</i>	Z4	3.0	28.3	2.0	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
29	<i>Acacia spp</i>	Z9	2.7	22.9	2.1	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
30	<i>Eucalyptus piperita</i>	A1	3.6	40.7	2.1	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.
31	<i>Acacia spp</i>	Z9	2.6	21.2	2.0	Footprint	The trunk of the tree is located within the footprint of the block A terrace houses.	Remove.

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32	<i>Acacia spp</i>	Z4	4.3	58.1	2.5	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
33	<i>Cupressus sempervirens</i>	Z3	3.6	40.7	2.0	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
34	<i>Unknown spp</i>	ZZ 4	7.2	162.9	2.8	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
35	<i>Eucalyptus botryoides</i>	A1	5.4	91.6	2.5	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
36	<i>Eucalyptus spp</i>	ZZ 4	10.8	366.4	3.3	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
37	<i>Angophora costata</i>	A1	4.1	52.8	2.2	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
38	<i>Archontophoenix cunninghamiana</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
39	<i>Archontophoenix cunninghamiana</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
40	<i>Archontophoenix cunninghamiana</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
41	<i>Casuarina cunninghamiana</i>	A1	5.0	78.5	2.4	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
42	<i>Casuarina cunninghamiana</i>	A1	3.6	40.7	2.1	Major	The trunk of the tree is located adjacent to basement excavations for the apartment block E and adjacent to the proposed driveway. The tree is recommended for removal due to development impacts.	Remove.
43	<i>Casuarina cunninghamiana</i>	A1	3.6	40.7	2.1	Major	The trunk of the tree is located adjacent to basement excavations for the apartment block E and adjacent to the proposed driveway. The tree is recommended for removal due to development impacts.	Remove.

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44	<i>Eucalyptus spp</i>	A1	6.6	136.8	2.7	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
45	<i>Acacia spp</i>	A1	3.1	30.2	2.0	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
46	<i>Eucalyptus spp</i>	ZZ 4	9.0	254.5	3.0	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
47	<i>Syrargus romanzoffianum</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
48	<i>Syrargus romanzoffianum</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
49	<i>Washingtonia robusta</i>	Z3	2.0	12.6	NA	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
50	<i>Syrargus romanzoffianum</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
51	<i>Syrargus romanzoffianum</i>	Z3	3.0	28.3	NA	Footprint	The trunk of the tree is located within the footprint of the block E apartments.	Remove.
52	<i>Cupressus spp</i>	Z3	7.2	162.9	2.7	Major	Located in the adjoining property to the North. The proposed hard surface pathway will encroach into the TPZ by 22% (44.3m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
53	<i>Cupressus spp</i>	Z3	2.8	24.6	1.8	None	Located in the adjoining property to the North. No proposed TPZ encroachment.	Retain and protect.
54	<i>Corymbia gummifera</i>	A1	3.7	43.0	2.1	None	Located in the adjoining property to the North. No proposed TPZ encroachment.	Retain and protect.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
55	<i>Banksia serrata</i>	A1	5.3	88.2	2.4	Minor	Located in the adjoining property to the North. The proposed hard surface pathway will encroach into the TPZ by 9% (8.2m ²) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect.
56	<i>Pittosporum undulatum</i>	A1	5.3	88.2	2.8	Major	The proposed hard surface pathway will encroach into the TPZ by 26% (22.9m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
57	<i>Corymbia gummifera</i>	A1	5.9	109.4	2.6	Minor	The proposed hard surface pathway will encroach into the TPZ by 9% (9.4m ²) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect.
58	<i>Acacia elata</i>	A1	4.4	60.8	2.3	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
59	<i>Robinia pseudoacacia</i>	Z3	4.1	52.8	2.2	None	No proposed TPZ encroachment. Exempt species.	Retain and protect.
60	<i>Casuarina cunninghamiana</i>	A1	6.0	113.1	2.6	None	No proposed TPZ encroachment.	Retain and protect.
61	<i>Eucalyptus piperita</i>	A1	8.4	221.7	2.9	None	No proposed TPZ encroachment.	Retain and protect.
62	<i>Acacia elata</i>	Z4	9.4	277.6	3.0	Minor	The proposed hard surface pathway will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
63	<i>Eucalyptus piperita</i>	A4	13.4	564.1	3.6	Major	The proposed hard surface pathway, driveway will and block E apartments will encroach into the TPZ by 43% (244.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts. The tree is a large specimen that may be worthy of protection due to ecological significance, and it could be possible to retain the tree through tree sensitive design and construction.	Remove.
64	<i>Acacia elata</i>	A1	3.6	40.7	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
65	<i>Casuarina glauca</i>	A1	3.4	36.3	2.0	Major	The trunk of the tree is located directly adjacent to the proposed driveway/bridge.	Remove.
66	<i>Liquidamber styraciflua</i>	Z3	2.9	26.4	1.9	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
67	<i>Liquidamber styraciflua</i>	Z3	2.8	24.6	1.8	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
68	<i>Platanus x hispanica</i>	Z10	9.6	289.5	3.1	Minor	The proposed hard surface pathway and block F apartments will encroach into the TPZ by 10% (30.1m ²) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect.
69	<i>Unknown spp</i>	Z4	3.0	28.3	2.0	None	No proposed TPZ encroachment. Dead tree recommended for removal due to current condition.	Remove.
70	<i>Casuarina glauca</i>	A1	8.4	221.7	2.9	None	No proposed TPZ encroachment.	Retain and protect.
71	<i>Casuarina glauca</i>	A1	5.2	84.9	2.4	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
72	<i>Casuarina glauca</i>	A1	5.4	91.6	2.4	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
73	<i>Casuarina glauca</i>	A1	2.4	18.1	2.2	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
74	<i>Casuarina glauca</i>	A1	5.2	84.9	2.4	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
75	<i>Casuarina glauca</i>	A1	5.6	98.5	2.5	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
76	<i>Casuarina glauca</i>	A1	2.8	24.6	2.1	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
77	<i>Casuarina glauca</i>	A1	4.4	60.8	2.4	Footprint	The trunk of the tree is located within the footprint of the block F apartments.	Remove.
78	<i>Eucalyptus piperita</i>	AA 1	10.8	366.4	3.4	Major	The trunk of the tree is located directly adjacent to the basement excavations of the block F and C apartments.	Remove.
79	<i>Pittosporum undulatum</i>	A1	4.2	55.4	2.3	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
80	<i>Eucalyptus piperita</i>	ZZ 4	10.6	353.0	3.2	Major	The trunk of the tree is located directly adjacent to the basement excavations of the block C apartments. Dead tree that should not be a constraint to the development.	Remove.
81	<i>Eucalyptus spp</i>	ZZ 4	6.2	120.8	2.7	Major	The trunk of the tree is located directly adjacent to the basement excavations of the block C apartments. Dead tree that should not be a constraint to the development.	Remove.
82	<i>Allocasuarina littoralis</i>	A1	3.5	38.5	2.2	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
83	<i>Corymbia gummifera</i>	A1	3.7	43.0	2.2	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
84	<i>Unknown spp</i>	ZZ 4	3.5	38.5	2.4	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.

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85	<i>Allocasuarina littoralis</i>	Z4	3.5	38.5	2.1	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
86	<i>Allocasuarina littoralis</i>	Z4	3.7	43.0	2.4	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
87	<i>Corymbia gummifera</i>	ZZ 4	4.1	52.8	2.2	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
88	<i>Unknown spp</i>	ZZ 4	5.9	109.4	2.6	Footprint	The trunk of the tree is located within the footprint of the block C apartments.	Remove.
89	<i>Acacia spp</i>	A1	2.4	18.1	1.8	Footprint	The trunk of the tree is located within the footprint of the block A apartments.	Remove.
90	<i>Allocasuarina littoralis</i>	A2	4.0	50.3	2.2	Footprint	The trunk of the tree is located within the footprint of the block A apartments.	Remove.
91	<i>Allocasuarina littoralis</i>	A1	3.4	36.3	2.1	Footprint	The trunk of the tree is located within the footprint of the block A apartments.	Remove.
92	<i>Eucalyptus sieberi</i>	A1	4.8	72.4	2.4	Major	The proposed hard surface pathway and block A apartments will encroach into the TPZ by 44% (31.9m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove.
93	<i>Eucalyptus sieberi</i>	A1	4.0	50.3	2.2	Major	The proposed hard surface pathway and block A apartments will encroach into the TPZ by 34% (17.2m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove.
94	<i>Eucalyptus piperita</i>	A1	5.4	91.6	2.7	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
95	<i>Allocasuarina littoralis</i>	A1	3.1	30.2	2.1	None	No proposed TPZ encroachment.	Retain and protect.

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96	<i>Eucalyptus piperita</i>	A1	8.2	211.2	2.9	Major	The proposed hard surface pathway and block A apartments will encroach into the TPZ by 15% (32.3m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
97	<i>Allocasuarina littoralis</i>	ZZ 4	4.0	50.3	2.2	Major	The proposed hard surface pathway will encroach into the TPZ by 15% (32.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
98	<i>Allocasuarina littoralis</i>	A1	3.4	36.3	2.3	Major	The proposed hard surface pathway will encroach into the TPZ by 46% (32.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is located on a slope and it appears that a significant retaining wall would be required to support the hard surface pathway, however the detail of this structure is unknown. The tree is recommended for removal due to development impacts.	Remove.
99	<i>Allocasuarina littoralis</i>	A1	3.2	32.2	2.1	Major	The proposed hard surface pathway will encroach into the TPZ by 29% (9.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is located on a slope and it appears that a significant retaining wall would be required to support the hard surface pathway, however the detail of this structure is unknown. The tree is recommended for removal due to development impacts.	Remove.
100	<i>Eucalyptus sieberi</i>	A1	3.1	30.2	2.0	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
101	<i>Allocasuarina littoralis</i>	ZZ 4	3.1	30.2	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.

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102	<i>Eucalyptus spp</i>	ZZ 4	3.7	43.0	2.1	Major	The proposed hard surface pathway will encroach into the TPZ by 29% (12.5m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
103	<i>Corymbia gummifera</i>	A1	4.4	60.8	2.3	None	No proposed TPZ encroachment.	Retain and protect.
104	<i>Eucalyptus piperita</i>	A1	5.5	95.0	2.5	Major	The proposed hard surface pathway will encroach into the TPZ by 41% (39.2m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is located on a slope and it appears that a significant retaining wall would be required to support the hard surface pathway, however the detail of this structure is unknown. The tree is recommended for removal due to development impacts.	Remove.
105	<i>Eucalyptus piperita</i>	A1	4.4	60.8	2.3	Major	The proposed hard surface pathway will encroach into the TPZ by 42% (25.4m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is located on a slope and it appears that a significant retaining wall would be required to support the hard surface pathway, however the detail of this structure is unknown. The tree is recommended for removal due to development impacts.	Remove.
106	<i>Eucalyptus piperita</i>	Z9	3.5	38.5	2.0	Major	The proposed hard surface pathway will encroach into the TPZ by 13% (5.1m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is located on a slope and it appears that a significant retaining wall would be required to support the hard surface pathway, however the detail of this structure is unknown. The tree is recommended for removal due to development impacts.	Remove.
107	<i>Acacia parramattensis</i>	A1	2.4	18.1	1.8	Footprint	The trunk of the tree is located within the footprint of the block A apartments.	Remove.

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108	<i>Eucalyptus piperita</i>	Z4	5.3	88.2	2.7	Major	The proposed hard surface pathway will encroach into the TPZ by 29% (12.5m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree was in decline at the time of the inspection and should not be a constraint to the development. The tree is recommended for removal due to development impacts.	Remove.
109	<i>Eucalyptus spp</i>	ZZ 4	5.5	95.0	2.5	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
110	<i>Eucalyptus pilularis</i>	A1	7.7	186.3	2.9	Minor	Located in the adjoining property to the South. The proposed hard surface pathway will encroach into the TPZ by 6% (12.5m ²) but not into the SRZ. This is considered to be a minor and acceptable TPZ and the proposed works will not significantly impact the tree.	Retain and protect.
111	<i>Eucalyptus pilularis</i>	Z9	2.6	21.2	1.8	None	No proposed TPZ encroachment.	Retain and protect.
112	<i>Banksia integrifolia</i>	A1	2.9	26.4	1.9	None	No proposed TPZ encroachment.	Retain and protect.
113	<i>Eucalyptus robusta</i>	A2	5.6	98.5	2.5	Major	The proposed hard surface pathway and block A apartments will encroach into the TPZ by 12% (11.8m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
114	<i>Eucalyptus robusta</i>	A2	5.5	95.0	2.5	Minor	Located in the adjoining property to the South. The proposed hard surface pathway will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ and the proposed works will not significantly impact the tree.	Retain and protect.

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115	<i>Eucalyptus robusta</i>	A2	6.5	132.7	2.6	Minor	Located in the adjoining property to the South. The proposed hard surface pathway will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ and the proposed works will not significantly impact the tree.	Retain and protect.
116	<i>Eucalyptus robusta</i>	A1	6.0	113.1	2.6	None	No proposed TPZ encroachment.	Retain and protect.
117	<i>Eucalyptus robusta</i>	A1	6.0	113.1	2.6	None	No proposed TPZ encroachment.	Retain and protect.
118	<i>Salix alba</i>	Z5	6.2	120.8	2.5	None	No proposed TPZ encroachment. The tree is regrowth from fallen tree and is an exempt species. Possible to remove if preferred.	Retain and protect.
119	<i>Salix alba</i>	Z5	5.8	105.7	2.4	None	No proposed TPZ encroachment. The tree is regrowth from fallen tree and is an exempt species. Possible to remove if preferred.	Retain and protect.
120	<i>Salix alba</i>	Z3	8.9	248.8	3.0	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
121	<i>Salix alba</i>	Z3	5.5	95.0	2.5	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
122	<i>Salix alba</i>	Z3	4.4	60.8	2.3	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
123	<i>Acer negundo</i>	Z3	5.6	98.5	2.5	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
124	<i>Acacia elata</i>	A1	4.6	66.5	2.3	None	No proposed TPZ encroachment.	Retain and protect.
125	<i>Cyathea cooperi</i>	A1	3.0	28.3	NA	None	No proposed TPZ encroachment.	Retain and protect.
126	<i>Pittosporum undulatum</i>	Z4	2.9	26.4	1.9	None	No proposed TPZ encroachment.	Retain and protect.

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127	<i>Angophora costata</i>	Z4	8.0	201.1	3.2	Minor	The proposed community centre and duplex house 9 will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect.
128	<i>Cyathea cooperi</i>	A1	3.0	28.3	NA	None	No proposed TPZ encroachment.	Retain and protect.
129	<i>Eucalyptus spp</i>	ZZ 4	12.5	490.9	3.5	Major	The proposed community centre will encroach into the TPZ by 19% (95.0m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
130	<i>Salix alba</i>	Z3	3.7	43.0	2.1	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
131	<i>Salix alba</i>	Z5	5.9	109.4	2.6	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
132	<i>Cyathea cooperi</i>	A1	3.0	28.3	NA	None	No proposed TPZ encroachment.	Retain and protect.
133	<i>Salix alba</i>	Z3	15.0	706.9	4.2	Minor	The proposed community centre will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
134	<i>Eucalyptus spp</i>	ZZ 4	4.7	69.4	2.3	None	No proposed TPZ encroachment. The tree is dead and is recommended for removal due to its current condition.	Remove.
135	<i>Salix alba</i>	Z5	7.6	181.5	3.2	Major	The proposed bridge will encroach into the TPZ by 20% (95.0m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.
136	<i>Acacia elata</i>	ZZ 4	5.9	109.4	2.5	Major	The proposed community centre will encroach into the TPZ by 29% (31.7m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.

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137	<i>Angophora costata</i>	A2	6.4	128.7	3.0	Major	The trunk of the tree is located directly adjacent to the proposed bridge. The tree is recommended for removal due to development impacts.	Remove.
138	<i>Acacia elata</i>	ZZ 4	3.1	30.2	2.0	Footprint	The trunk of the tree is located within the footprint of the proposed bridge.	Remove.
139	<i>Acacia elata</i>	ZZ 4	4.2	55.4	2.2	Footprint	The trunk of the tree is located within the footprint of the proposed bridge.	Remove.
140	<i>Eucalyptus sieberi</i>	ZZ 4	8.3	216.4	3.0	Major	The trunk of the tree is located directly adjacent to the proposed bridge. The tree is dead and should not be a constraint to the development. The tree is recommended for removal due to development impacts.	Remove.
141	<i>Acacia parramattensis</i>	A1	2.9	26.4	1.9	None	No proposed TPZ encroachment.	Retain and protect.
142	<i>Pittosporum undulatum</i>	A1	2.9	26.4	2.1	None	No proposed TPZ encroachment.	Retain and protect.
143	<i>Eucalyptus sieberi</i>	ZZ 4	8.2	211.2	2.9	Major	The proposed bridge will encroach into the TPZ by 11% (23.1m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
144	<i>Eucalyptus piperita</i>	A1	7.1	158.4	2.8	Minor	The proposed bridge will encroach into the TPZ by 10% (15.1m ²) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect.
145	<i>Eucalyptus piperita</i>	AA 1	10.2	326.9	3.1	Major	The proposed bridge will encroach into the TPZ by 24% (78.7m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed bridge must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
146	<i>Salix alba</i>	Z3	2.9	26.4	1.9	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.

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147	<i>Salix alba</i>	Z3	6.8	145.3	3.0	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
148	<i>Salix alba</i>	Z3	4.7	69.4	2.3	None	No proposed TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
149	<i>Eucalyptus sieberi</i>	A1	4.3	58.1	2.2	None	No proposed TPZ encroachment.	Retain and protect.
150	<i>Eucalyptus piperita</i>	A1	4.7	69.4	2.3	None	No proposed TPZ encroachment.	Retain and protect.
151	<i>Eucalyptus sieberi</i>	A1	3.7	43.0	2.1	None	No proposed TPZ encroachment.	Retain and protect.
152	<i>Eucalyptus sieberi</i>	A1	6.2	120.8	2.7	None	No proposed TPZ encroachment.	Retain and protect.
153	<i>Eucalyptus sieberi</i>	A1	5.5	95.0	2.5	None	No proposed TPZ encroachment.	Retain and protect.
154	<i>Acacia elata</i>	A1	3.0	28.3	2.1	None	No proposed TPZ encroachment.	Retain and protect.
155	<i>Acacia elata</i>	A1	8.6	232.4	3.1	None	No proposed TPZ encroachment.	Retain and protect.
156	<i>Eucalyptus sieberi</i>	A1	4.1	52.8	2.2	None	No proposed TPZ encroachment.	Retain and protect.
157	<i>Eucalyptus sieberi</i>	A1	4.4	60.8	2.3	None	No proposed TPZ encroachment.	Retain and protect.
158	<i>Eucalyptus sieberi</i>	A1	3.7	43.0	2.1	None	No proposed TPZ encroachment.	Retain and protect.
159	<i>Acacia spp</i>	Z4	5.3	88.2	2.4	None	No proposed TPZ encroachment.	Retain and protect.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
160	<i>Eucalyptus sieberi</i>	A1	4.6	66.5	2.3	None	No proposed TPZ encroachment.	Retain and protect.
161	<i>Eucalyptus sieberi</i>	A1	3.8	45.4	2.2	None	No proposed TPZ encroachment.	Retain and protect.
162	<i>Eucalyptus spp</i>	ZZ 4	8.2	211.2	2.9	None	No proposed TPZ encroachment. The tree is dead and is recommended for removal due to its current condition.	Remove.
163	<i>Eucalyptus sieberi</i>	AA 1	10.1	320.5	3.2	None	No proposed TPZ encroachment.	Retain and protect.
164	<i>Eucalyptus sieberi</i>	ZZ 4	5.9	109.4	2.5	None	No proposed TPZ encroachment. The tree is dead and is recommended for removal due to its current condition.	Remove.
165	<i>Eucalyptus sieberi</i>	ZZ 4	6.6	136.8	2.7	Minor	The proposed hard surface pathway will encroach into the TPZ by less than 5%. This is considered to be a minor TPZ encroachment. The tree is dead and is recommended for removal due to its current condition.	Remove.
166	<i>Salix alba</i>	Z3	10.1	320.5	3.2	Major	The proposed hard surface pathway will encroach into the TPZ by 12% (38.3m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.
167	<i>Cupressus spp</i>	Z3	8.4	221.7	2.8	Major	The proposed hard surface pathway will encroach into the TPZ by 32% (71.6m ²) and into the SRZ. The proposed house 8 will encroach into the TPZ by a further 20% (44.9m ²) and into the SRZ, bringing the total TPZ encroachment to 52%. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.

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168	<i>Corymbia gummifera</i>	A1	5.8	105.7	2.5	Major	The proposed hard surface pathway will encroach into the TPZ by 22% (23.0m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed works must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
169	<i>Salix alba</i>	Z3	7.3	167.4	2.8	Major	The proposed hard surface will encroach into the TPZ by 21% (35.7m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.
170	<i>Salix alba</i>	Z4	5.3	88.2	2.5	Minor	The proposed hard surface will encroach into the TPZ by 9% (8.2m ²) but not into the SRZ. This is considered to be a minor TPZ encroachment. The tree is an exempt species. Possible to remove if preferred.	Retain and protect.
171	<i>Salix alba</i>	Z3	6.7	141.0	2.7	Major	The proposed hard surface will encroach into the TPZ by 27% (36.1m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.
172	<i>Salix alba</i>	Z3	8.2	211.2	2.9	Major	The proposed hard surface will encroach into the TPZ by 32% (67.5m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.
173	<i>Eucalyptus spp</i>	ZZ 4	5.8	105.7	2.5	Major	The proposed hard surface will encroach into the TPZ by 36% (38.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
174	<i>Eucalyptus spp</i>	ZZ 4	5.8	105.7	2.5	Major	The proposed hard surface will encroach into the TPZ by 27% (28.8m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
175	<i>Salix alba</i>	Z3	8.1	206.1	3.6	Major	The proposed hard surface will encroach into the TPZ by 28% (58.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is an exempt species and should not be a constraint to the development.	Remove.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
176	<i>Banksia serrata</i>	A1	4.3	58.1	2.3	Footprint	The trunk of the tree is located within the footprint of house 5.	Remove.
177	<i>Eucalyptus sieberi</i>	A1	4.1	52.8	2.2	Footprint	The trunk of the tree is located within the footprint of house 4.	Remove.
178	<i>Eucalyptus spp</i>	ZZ 4	5.9	109.4	2.5	Major	The proposed hard surface will encroach into the TPZ by 17% (18.9m ²) but not into the SRZ. This is considered to be a major TPZ encroachment. The tree is dead and should not be a constraint to the development.	Remove.
179	<i>Eucalyptus botryoides</i>	A1	2.4	18.1	1.9	Major	The proposed hard surface pathway will encroach into the TPZ by 7% (1.4m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the stability of the tree. For the tree to remain viable for retention, the proposed hard surface pathway must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
180	<i>Angophora costata</i>	Z4	2.5	19.6	1.9	Major	The proposed hard surface will encroach into the TPZ by 27% (5.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment. The tree is advanced stages of decline and should not be a constraint to the development.	Remove.
181	<i>Eucalyptus sieberi</i>	Z4	6.3	124.7	3.0	Footprint	The trunk of the tree is located within the footprint of house 1.	Remove.
182	<i>Eucalyptus sieberi</i>	ZZ 4	6.7	141.0	3.3	Footprint	The trunk of the tree is located within the footprint of house 1.	Remove.
183	<i>Eucalyptus spp</i>	ZZ 4	4.1	52.8	2.2	Footprint	The trunk of the tree is located within the footprint of house 1.	Remove.
184	<i>Eucalyptus spp</i>	ZZ 4	2.9	26.4	2.1	Footprint	The trunk of the tree is located within the footprint of house 1.	Remove.
185	<i>Acacia parramattensis</i>	A1	3.0	28.3	2.1	Major	The trunk of the tree is located directly adjacent to the footprint of house 1 and house 2.	Remove.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
186	<i>Acacia parramattensis</i>	A1	3.8	45.4	2.3	Footprint	The trunk of the tree is located within the footprint of house 2.	Remove.
187	<i>Acacia parramattensis</i>	A1	2.8	24.6	2.1	Footprint	The trunk of the tree is located within the footprint of house 2.	Remove.
188	<i>Acacia parramattensis</i>	A1	3.2	32.2	2.1	Footprint	The trunk of the tree is located within the footprint of house 2.	Remove.
189	<i>Acacia parramattensis</i>	A1	2.6	21.2	2.1	Footprint	The trunk of the tree is located within the footprint of house 1.	Remove.
190	<i>Acacia parramattensis</i>	A1	2.5	19.6	2.1	Footprint	The trunk of the tree is located within the footprint of house 2.	Remove.
191	<i>Acacia parramattensis</i>	A1	2.5	19.6	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
192	<i>Eucalyptus spp</i>	ZZ 4	2.9	26.4	2.0	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
193	<i>Eucalyptus spp</i>	ZZ 4	3.1	30.2	2.0	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
194	<i>Acacia parramattensis</i>	A1	2.8	24.6	2.2	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
195	<i>Acacia parramattensis</i>	A1	3.1	30.2	2.2	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
196	<i>Acacia parramattensis</i>	A1	2.5	19.6	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
197	<i>Acacia parramattensis</i>	A1	2.3	16.6	1.9	Major	The proposed House 2 will encroach into the TPZ by 7% (1.2m ²) and into the SRZ. The proposed driveway will encroach into the TPZ by a further 10% (1.7m ²) and into the SRZ, bringing the total TPZ encroachment to 17%. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove.
198	<i>Eucalyptus piperita</i>	A1	2.3	16.6	1.8	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
199	<i>Eucalyptus spp</i>	ZZ 4	6.5	132.7	2.9	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
200	<i>Acacia parramattensis</i>	A1	3.1	30.2	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
201	<i>Eucalyptus spp</i>	ZZ 4	8.9	248.8	3.8	Major	The trunk of the tree is located directly adjacent to the footprint of the proposed driveway and duplex house 12. The tree is a dead tree and should not be a constraint to the development.	Remove.
202	<i>Acacia spp</i>	ZZ 4	3.6	40.7	2.1	Minor	The proposed duplex house 12 will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment. The tree is dead and is recommended due to its current condition. The tree is to be replaced with a tree that will contribute to the landscape for a longer period of time.	Remove.
203	<i>Eucalyptus sieberi</i>	A1	4.3	58.1	2.6	None	No proposed TPZ encroachment.	Retain and protect.
204	<i>Acacia parramattensis</i>	A1	2.5	19.6	1.9	None	No proposed TPZ encroachment.	Retain and protect.
205	<i>Eucalyptus sieberi</i>	ZZ 4	9.0	254.5	2.9	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 11.	Remove.
206	<i>Acacia parramattensis</i>	A1	2.5	19.6	1.8	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
207	<i>Acacia parramattensis</i>	A1	3.1	30.2	2.2	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
208	<i>Eucalyptus sieberi</i>	A1	5.0	78.5	2.6	Major	The proposed duplex house 11 will encroach into the TPZ by 43% (33.7m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove.
209	<i>Acacia parramattensis</i>	A1	2.6	21.2	1.9	None	No proposed TPZ encroachment.	Retain and protect.
210	<i>Eucalyptus sieberi</i>	Z4	3.1	30.2	2.3	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 11.	Remove.
211	<i>Acacia elata</i>	Z4	7.0	153.9	3.1	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 11.	Remove.
212	<i>Acacia elata</i>	Z4	7.2	162.9	3.2	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 11.	Remove.
213	<i>Eucalyptus spp</i>	ZZ 4	8.3	216.4	3.4	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 11.	Remove.
214	<i>Eucalyptus spp</i>	ZZ 4	7.6	181.5	3.5	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 9.	Remove.
215	<i>Acacia parramattensis</i>	A1	2.5	19.6	1.9	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 9.	Remove.
216	<i>Eucalyptus spp</i>	ZZ 4	6.9	149.6	3.2	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 10.	Remove.
217	<i>Acacia elata</i>	A1	2.3	16.6	1.8	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 9.	Remove.
218	<i>Eucalyptus spp</i>	ZZ 4	7.9	196.1	3.3	Footprint	The trunk of the tree is located within the footprint of the proposed duplex house 10.	Remove.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
219	<i>Acacia parramattensis</i>	A1	3.5	38.5	2.7	Footprint	The trunk of the tree is located within the footprint of the proposed driveway.	Remove.
220	<i>Acacia parramattensis</i>	A1	3.5	38.5	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed community centre.	Remove.
221	<i>Eucalyptus sieberi</i>	ZZ 4	7.7	186.3	3.1	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
222	<i>Eucalyptus sieberi</i>	A1	3.8	45.4	2.4	Footprint	The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove.
223	<i>Allocasuarina littoralis</i>	Z10	2.2	15.2	1.8	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
224	<i>Eucalyptus sieberi</i>	A1	5.8	105.7	3.1	Major	Located on nature strip. The proposed hard surface pathway will encroach into the TPZ by 12% (12.5m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed hard surfacing must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*
225	<i>Pittosporum undulatum</i>	A1	4.2	55.4	2.5	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
226	<i>Banksia serrata</i>	A1	4.1	52.8	2.3	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
227	<i>Eucalyptus spp</i>	ZZ 4	3.7	43.0	2.2	None	Located on nature strip. No proposed TPZ encroachment. Dead tree.	Retain and protect.
228	<i>Acacia spp</i>	ZZ 4	6.5	132.7	2.7	None	Located on nature strip. No proposed TPZ encroachment. Dead tree.	Retain and protect.
229	<i>Robinia pseudoacacia</i>	Z3	2.8	24.6	1.9	None	Located on nature strip. No proposed TPZ encroachment. Exempt species.	Retain and protect.

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
230	<i>Robinia pseudoacacia</i>	Z3	2.5	19.6	1.8	None	Located on nature strip. No proposed TPZ encroachment. Exempt species.	Retain and protect.
231	<i>Pittosporum undulatum</i>	Z3	3.4	36.3	2.1	Major	Located on nature strip. Exempt species. The proposed entrance driveway and hard surface pathway will encroach into the TPZ by 46% (16.8m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surfacing must be constructed on or above existing soil grades and in accordance with section 11.10 of this report. The tree is an exempt species but if tree removal were necessary, council permission would still be required to remove the tree, as it is located on the nature strip.	Retain and protect*
232	<i>Pittosporum undulatum</i>	Z3	4.0	50.3	2.0	Major	Located on nature strip. Exempt species. The proposed entrance driveway will encroach into the TPZ by 14% (16.8m ²) but not into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition of the tree. For the tree to remain viable for retention, the proposed hard surfacing must be constructed on or above existing soil grades and in accordance with section 11.10 of this report. The tree is an exempt species but if tree removal were necessary, council permission would still be required to remove the tree, as it is located on the nature strip.	Retain and protect*
233	<i>Corymbia maculata</i>	A1	5.2	84.9	2.6	Major	Located on nature strip. The proposed entrance driveway and hard surface pathway will encroach into the TPZ by 11% (9.3m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. For the tree to remain viable for retention, the proposed hard surfacing must be constructed on or above existing soil grades and in accordance with section 11.10 of this report.	Retain and protect*

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234	<i>Angophora costata</i>	A1	3.0	28.3	2.1	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
235	<i>Pittosporum undulatum</i>	A1	3.7	43.0	3.3	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
236	<i>Robinia pseudoacacia</i>	Z3	2.8	24.6	2.1	None	Located on nature strip. No proposed TPZ encroachment. Exempt species.	Retain and protect.
237	<i>Pittosporum undulatum</i>	A1	2.0	12.6	1.9	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
238	<i>Pittosporum undulatum</i>	Z3	4.3	58.1	2.4	None	Located on nature strip. No proposed TPZ encroachment. Exempt species.	Retain and protect.
239	<i>Pittosporum undulatum</i>	A1	3.2	32.2	2.2	None	Located on nature strip. No proposed TPZ encroachment.	Retain and protect.
240	<i>Fraxinus raywoodii</i>	Z4	4.6	66.5	2.6	None	Located on nature strip. No proposed TPZ encroachment. Exempt species.	Retain and protect.

Notes

TPZ Encroachment Percentage: TPZ encroachment percentages are based on new structures (i.e. buildings, retaining walls) and hard surfaces only. New soft landscaping, such as turf or amenity planting areas have not been included in the calculation for TPZ encroachment.

Retain and protect* = Proposed hard surfacing must be constructed on or above grade and in accordance with section 11.10 of this report for the tree to remain viable for retention.

9. CONCLUSIONS

9.1 **Table 2:** Summary of the impact to trees during the development;

Impact	Reason	Category A		Category Z	
		AA	A	Z	ZZ
Trees to be removed	Building construction, new surfacing and/or proximity, or dead trees.	78 (One tree)	4, 5, 7, 9, 16, 19, 20, 21, 22, 24, 26, 30, 35, 37, 41, 42, 43, 44, 45, 58, 63, 64, 65, 71, 72, 73, 74, 75, 76, 77, 79, 82, 83, 89, 90, 91, 92, 93, 94, 98, 99, 100, 104, 105, 107, 137, 176, 177, 185, 186, 187, 188, 189, 190, 191, 194, 195, 196, 197, 198, 200, 206, 207, 208, 215, 217, 219, 220, 222 (Sixty-nine trees)	10, 11, 18, 25, 28, 29, 31, 32, 33, 38, 39, 40, 47, 48, 49, 50, 51, 66, 67, 69, 85, 86, 106, 108, 135, 166, 167, 169, 171, 172, 175, 180, 181, 210, 211, 212 (Thirty-six trees)	15, 17, 23, 27, 34, 36, 46, 80, 81, 84, 87, 88, 97, 101, 102, 109, 129, 134, 136, 138, 139, 140, 143, 162, 164, 165, 173, 174, 178, 182, 183, 184, 192, 193, 199, 201, 202, 205, 213, 214, 216, 218, 221 (Forty-three trees)
Retained trees subject to TPZ encroachment greater than 10%	Installation of new hard surface pathway, driveway or bridge.	145 (One tree)	2, 3, 6, 8, 56, 96, 113, 168, 179, 224, 233 (Eleven trees)	52, 231, 232 (Three trees)	None
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures and that are located outside the APZ area.	163 (One tree)	13, 54, 55, 57, 60, 61, 70, 95, 103, 110, 112, 114, 115, 116, 117, 124, 125, 128, 132, 141, 142, 144, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 160, 161, 203, 204, 209, 225, 226, 234, 235, 237, 239 (Forty-three trees)	1, 12, 14, 53, 59, 62, 68, 111, 118, 119, 120, 121, 122, 123, 126, 127, 130, 131, 133, 146, 147, 148, 159, 170, 223, 229, 230, 236, 238, 240 (Thirty trees)	227, 228 (Two trees)

10. RECOMMENDATIONS

- 10.1 This report assesses the impact of a proposed development at the subject site to two hundred and forty (240) trees located either inside or adjoining the site, in accordance with AS4970 Protection of trees on development sites (2009).
- 10.2 Site plans have been included in appendix 1, where the indicative TPZ/SRZ of the trees assessed has been overlaid onto received plans provided by the client to assist with understanding tree constraints at the site and how the impact to trees has been assessed. The following plans are included in appendix 1;
 - Appendix 1A: Existing Site Plan
 - Appendix 1B: Proposed Site Plan
- 10.3 One hundred and forty-nine (149) trees have been recommended for removal due to impacts from the proposed development works or due to their current condition. Seventy (70) of these trees are higher value category A retention value trees. Seventy-nine (79) of these trees are lower value category Z retention value trees. Refer to table 2 (section 9.1) for tree numbers within this category.
- 10.4 Fifteen (15) trees will be subject to TPZ encroachments greater than 10%, including tree 2, 3, 6, 8, 52, 56, 96, 113, 145, 168, 179, 224, 231, 232 and 233. These trees will remain viable for retention providing the proposed hard surfacing within the TPZ is constructed on or above grade and in accordance with section 11.10.
- 10.5 The remaining seventy-six (76) trees will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition. Refer to table 2 (section 9.1) for tree numbers within this category.
- 10.6 All trees to be retained must be protected for the duration of development, (including demolition and landscaping, in accordance with AS4970-2009). See section 11 for more information.
- 10.7 No landscape plan has been assessed in this report. See section 11.10 for general landscape guidance when working within the TPZ of trees to be retained.
- 10.8 No services plan has been assessed in this report. Where possible underground services must be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention.
- 10.9 This report does not provide approval for tree removal or pruning works. All recommendations in this report are subject to approval by the relevant authorities and/or tree owners. This report should be submitted as supporting evidence with any tree removal/pruning or development application.

11. TREE PROTECTION REQUIREMENTS

- 11.1 Use of this report:** All contractors must be made aware of the tree protection requirements prior to commencing works at the site. This report and a copy of the site plan (Appendix 1) drawings must also be made available to any contractor prior to works commencing and during any on site operations.
- 11.2 Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience, and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.
- 11.3 Tree work:** All tree work must be carried out by a qualified and experienced Arborist with a minimum of AQF level 2 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).
- 11.4 Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. I recommend site inspections on a one-month frequency.
- 11.5 Site Specific Tree Protection Recommendations:** Tree protection fencing should be located at the extent of the TPZ perimeter for all trees to be retained that are located within 10m of proposed works and construction traffic areas. Tree protection is to be specified and approved by the project arborist recommendations. All trees to be retained must be protected in accordance with general requirements of AS4970-2009 for the duration of the development, details of which are discussed in further details in this section of the report.
- 11.6 Tree protection Specifications:** It is the responsibility of the principle contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing.
- 11.6.1 Protective fencing:** Site specific tree protection requirements are discussed in table section 11.5. Where it is not feasible to install fencing at the specified location due to factors such restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Where the installation of fencing is unfeasible due to restrictions on space, trunk and branch protection will be required (see below). The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing must only

be removed for the landscaping phase and must be authorised by the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.

11.6.2 TPZ signage: Tree protection signage is to be attached to the protective fencing, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:

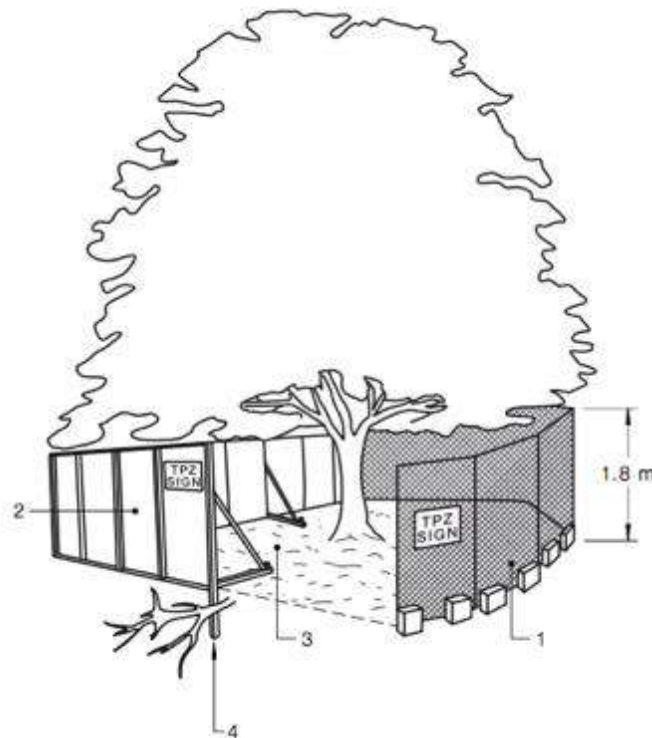
- Tree protection zone/No access.
- This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
- The name, address, and telephone number of the developer/builder and project Arborist

11.6.3 Trunk and Branch Protection: The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie wire, or strapping and connections finished or covered to protect pedestrians from injury. The hessian and timber planks must not be fixed to the tree in any instance. The trunk and branch protection shall be installed prior to any work commencing on site and shall be maintained in good condition for the entire development period.

11.6.4 Mulch: Any areas of the TPZ located inside the subject site (only trees to be retained directly adjacent to site works must be mulched to a depth of 75mm with good quality composted wood chip/leaf mulch.

11.6.5 Ground Protection: Ground protection is required to protect the underlying soil structure and root system in areas where it is not practical to restrict access to whole TPZ, while allowing space for construction. Ground protection must consist of good quality composted wood chip/leaf mulch to a depth of between 150-300mm, laid on top of geo textile fabric. If vehicles are to be using the area, additional protection will be required such as rumble boards or track mats to spread the weight of the vehicle and avoid load points. Ground protection is to be specified by the project Arborist as required.

11.6.6 Temporary irrigation: Temporary irrigation should be set up in the TPZ of all trees to be retained, and should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum one hour daily throughout all stages of the development.

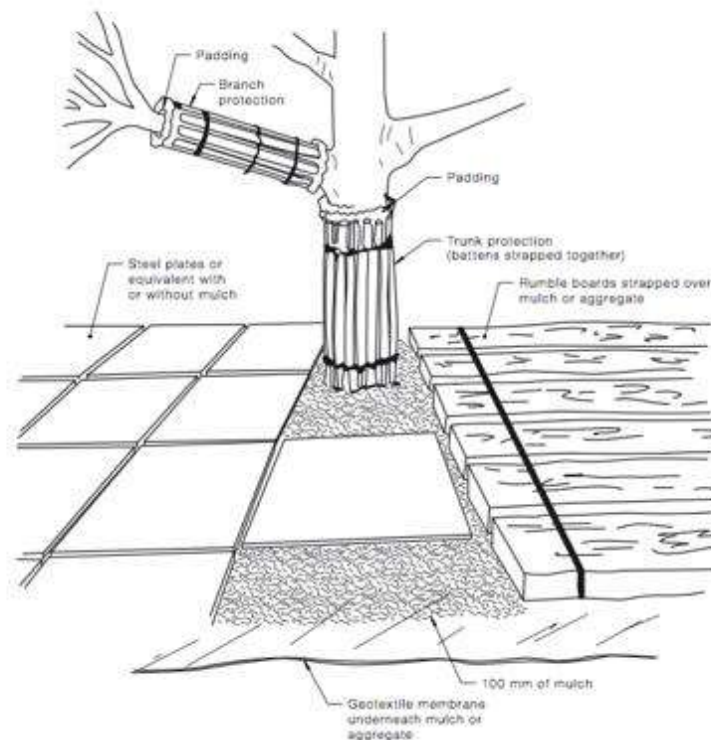


LEGEND:

- 1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
- 2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
- 3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
- 4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

An image from AS4970-2009,⁸ with example tree protection.

⁸ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.



NOTES:

1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2. Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

An image from AS4970-2009,⁹ with example tree protection.

11.7 Restricted activities inside TPZ: The following activities must be avoided inside the TPZ of all trees to be retained unless approved by the project Arborist. If at any time these activities cannot be avoided an alternative must be agreed in writing with the project Arborist to minimise the impact to the tree.

- A) Machine excavation.
- B) Ripping or cultivation of soil.
- C) Storage of spoil, soil or any such materials
- D) Preparation of chemicals, including preparation of cement products.
- E) Refueling.
- F) Dumping of waste.
- G) Wash down and cleaning of equipment.
- H) Placement of fill.
- I) Lighting of fires.
- J) Soil level changes.
- K) Any physical damage to the crown, trunk, or root system.
- L) Parking of vehicles.

⁹ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.

- 11.8 Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the 'top down, pull back' method.
- 11.9 Excavations:** The project Arborist must supervise and certify that all excavations and root pruning are in accordance with AS4373-2007 and AS4970-2009. For continuous strip footings, first manual excavation is required along the edge of the structures closest to the subject trees. Manual excavation should be a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by project Arborist). Next roots must be pruned back in accordance with AS4373-2007. After all root pruning is completed, machine excavation is permitted within the footprint of the structure. For tree sensitive footings, such as pier and beam, all excavations inside the TPZ must be manual. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. No pruning of roots greater 30mm in diameter is to be carried out without approval of the project arborist. All pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3. Root pruning is to be a clean cut with a sharp tool in accordance with AS4373 Pruning of amenity trees (2007).¹⁰ The tree root is to be pruned back to a branch root if possible. Make a clean cut and leave as small a wound as possible.
- 11.10 Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimize the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 100mm or increased by more than 100mm (300mm increase is acceptable if using a coarse free draining material) without assessment by a consulting Arborist.
 - New retaining walls should be avoided. Where new retaining walls are proposed inside the TPZ of trees to be retained, they should be constructed from tree sensitive material, such as timber sleepers, that require minimal footings/excavations. If brick retaining walls are proposed inside the TPZ, considerer pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.
 - New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are

¹⁰ Council Of Standards Australia, AS 4373 *Pruning of amenity trees* (2007) page 18

proposed, they should be constructed on or above existing soil grades to minimise root disturbance and consider using a permeable surface. Footpaths should be located outside the SRZ where possible.

- Where fill/sub base is used inside the TPZ, fill material should be a coarse granular material that does not restrict the flow of water and air to the root system below. This type of material will also reduce the impact of soil compaction during construction.
- The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter.

11.11 Sediment and Contamination: All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.

11.12 Tree Wounding/Injury: Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.

11.13 Completion of Development Works: After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

12. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION

12.1 Hold Points: Below is a sequence of hold points requiring project Arborist certification throughout the development process. It provides a list of hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principle contractor should be responsible for implemented all tree protection requirements.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. I recommend site inspections on a monthly frequency.	On-going throughout the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the project Arborist.	Demolition	
Project Arborist to supervise all manual excavations and root pruning inside the TPZ of any tree to be retained. Project Arborist to approve all pruning of roots greater than 30mm inside TPZ. All root pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3.	Construction	
Project Arborist to certify that all underground services including storm water inside TPZ of any tree to be retained have been installed in accordance with AS4970-2009.	Construction	
All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the project Arborist to minimise the impact to trees.	Construction/ Landscape	
After all demolition, construction and landscaping works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of development	

13. BIBLIOGRAPHY/REFERENCES

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14. LIST OF APPENDICES

The following are included in the appendices:

Appendix 1A - Existing Site Plan

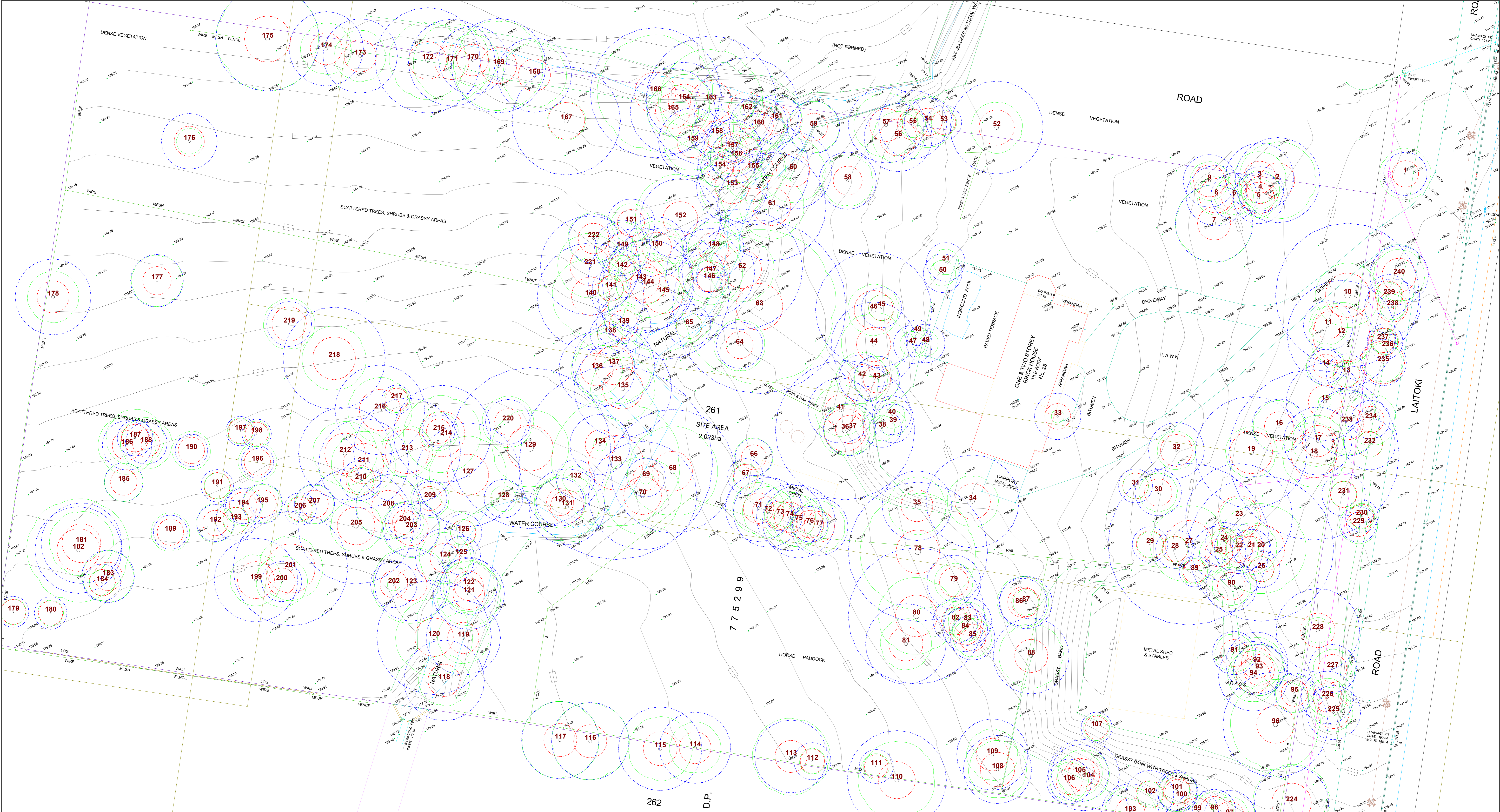
Appendix 1B - Proposed Site Plan

Appendix 2 - Tree Inspection Schedule

Appendix 3 - Further information of methodology



Bryce Claassens
Diploma of Arboriculture (AQF5)
Cert III Landscape Construction
Member Arboriculture Australia
QTRA Registered User



Urban Arbor Pty Ltd

PO Box 450, Turrumurra, NSW, 2074
sales@urbanarbor.com.au, (02) 8004 2802

**Site Location: 25 Laitoki Road
Terrey Hills, NSW.**

SCALE :
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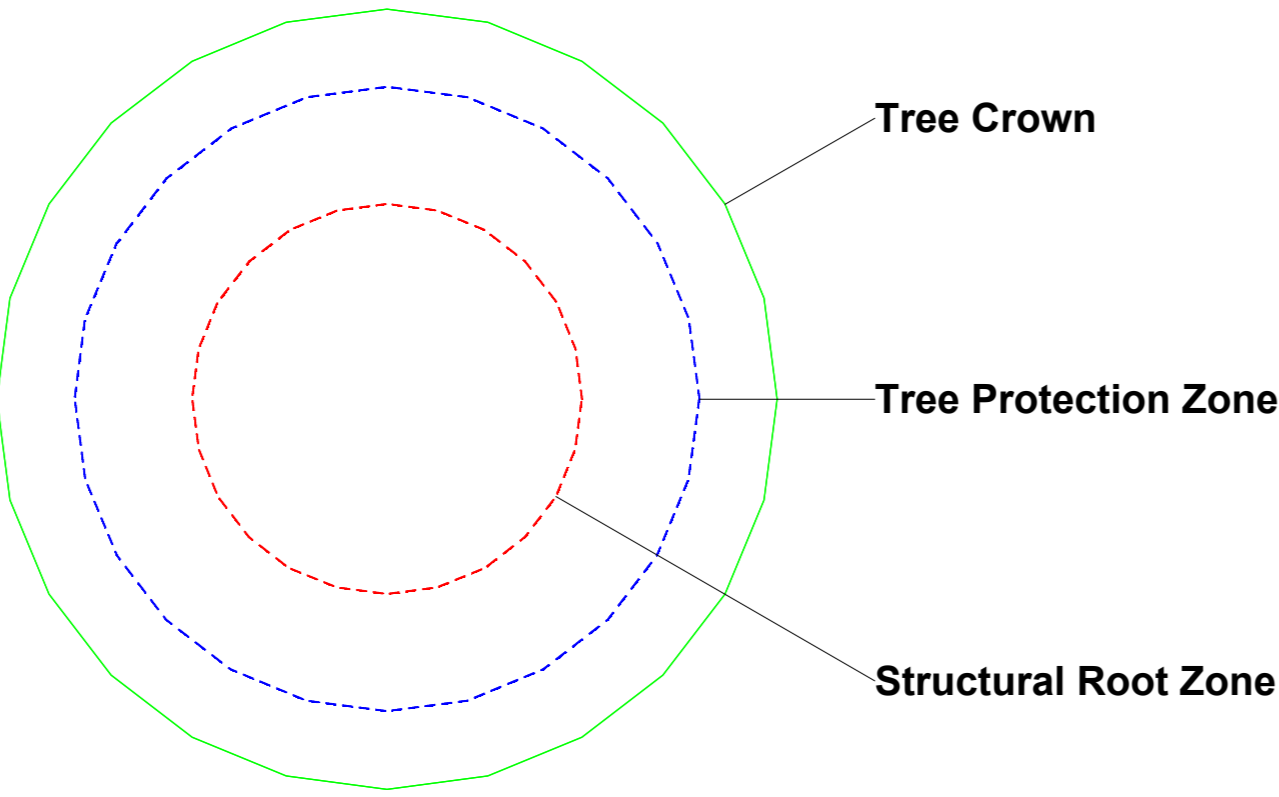
DATE :
12/14/2018

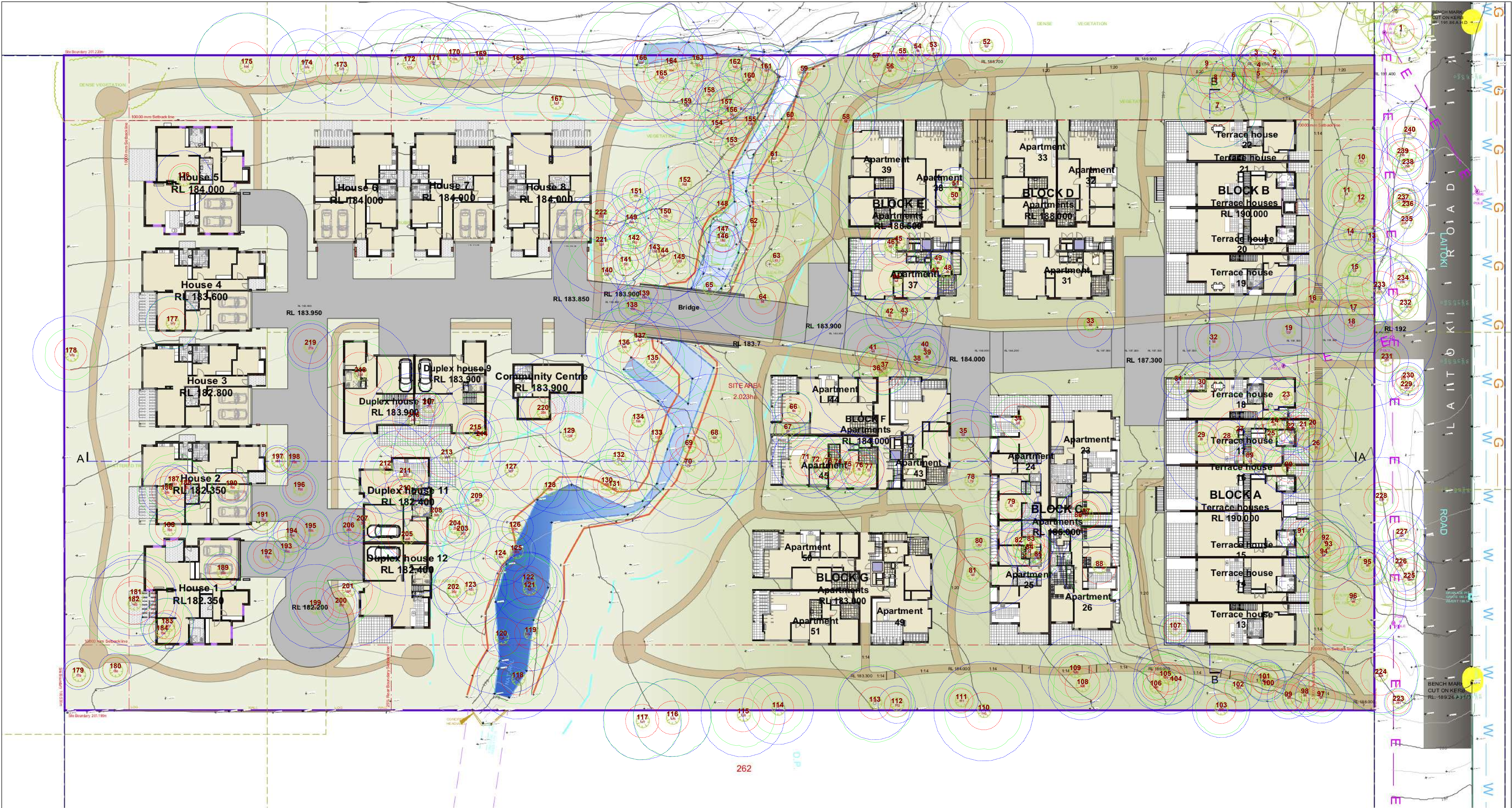
Appendix 1A - Existing Site Plan
Ref: 18/12/17/25LRTH

URBAN ARBOR
The Trusted Name in Tree Management

Prepared by Bryce Claassens

Tree Legend





Urban Arbor Pty Ltd

PO Box 450, Turrumurra, NSW, 2074
sales@urbanarbor.com.au, (02) 8004 2802

Site Location: 25 Laitoki Road
Terrey Hills, NSW.

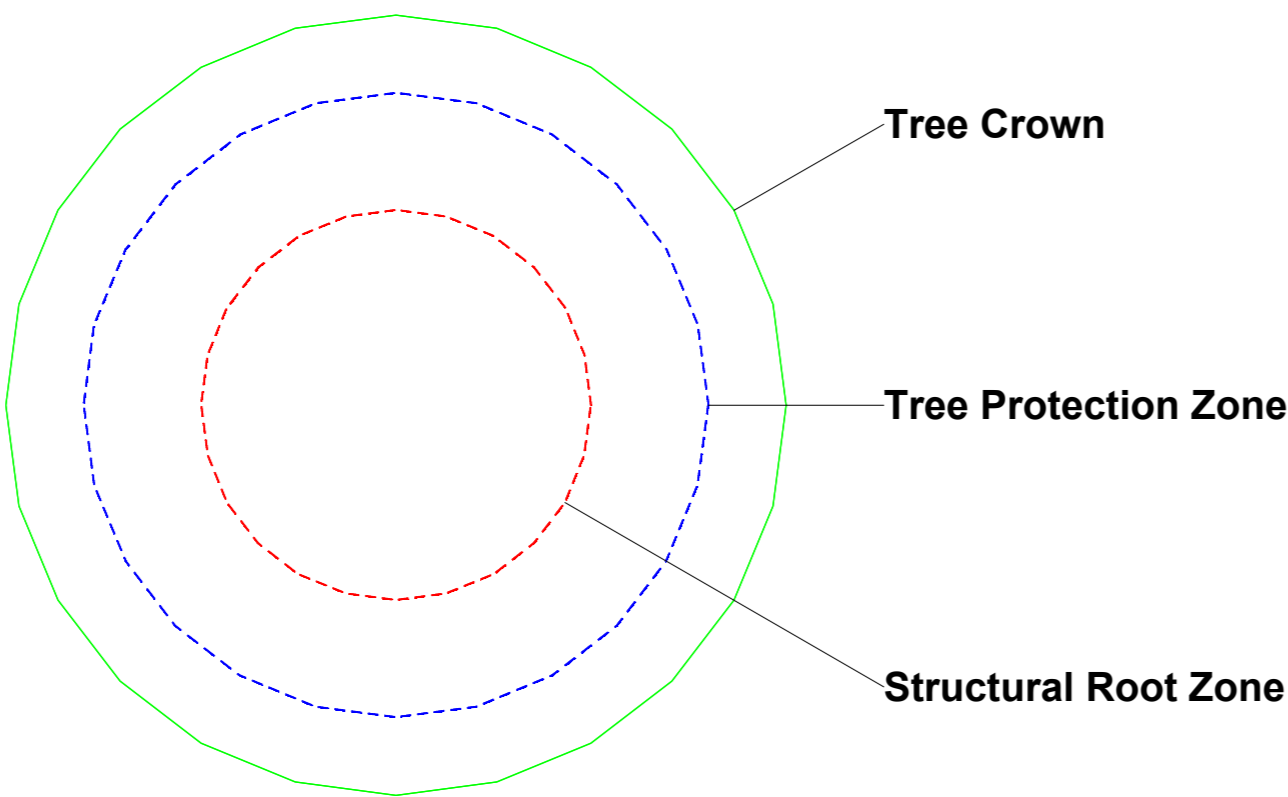
SCALE : 1 : 200 @ A0
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Appendix 1B - Proposed Site Plan
Ref: 18/12/17/25LRTH



Prepared by Bryce Claassens

Tree Legend



Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
1	Robinia	<i>Robinia pseudoacacia</i>	Mature	9	4	280					280	320	Good	Good	Low	2. Medium	Z3	3.4	2.1	Located within nature strip. Exempt species.
2	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	16	6	550					550	600	Good	Good	High	1. Long	A1	6.6	2.7	None.
3	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	10	4	440					440	500	Good	Fair	Medium	2. Medium	A1	5.3	2.5	Co-dominant stems at 1.5m with minor bark inclusion.
4	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	300					300	350	Good	Good	Medium	1. Long	A1	3.6	2.1	None.
5	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	220	240				326	500	Good	Good	Medium	1. Long	A1	3.9	2.5	None.
6	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	10	3	300					300	320	Good	Good	Medium	1. Long	A1	3.6	2.1	None.
7	Smooth Barked Apple	<i>Angophora costata</i>	Mature	17	6	500					500	550	Good	Fair	High	2. Medium	A1	6.0	2.6	Fungal bracket at base of tree. Termite mudding up trunk. No indicators of significant internal decay.
8	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	240	310				392	600	Good	Good	Medium	1. Long	A1	4.7	2.7	Co-dominant stems at base.
9	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	170	220	200			342	500	Good	Fair	Medium	2. Medium	A1	4.1	2.5	Multi stem tree at base.
10	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	10	5	600	300	400	500		927	1100	Good	Fair	Low	2. Medium	Z3	11.1	3.4	Dieback of internal stems with significant decay. Exempt species.
11	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	320					320	350	Good	Poor	Low	4. Remove	Z5	3.8	2.1	Column of significant internal decay from base to 2.5m. Loss of central leader.
12	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	10	5	300	300	400	300	250	702	2000	Good	Fair	Low	2. Medium	Z3	8.4	4.4	Multi stem tree. Exempt species.
13	NSW Christmas Bush	<i>Ceratopetalum gummiferum</i>	Mature	6	2	260					260	340	Good	Fair	Medium	2. Medium	A1	3.1	2.1	Cavity at base of trunk with relatively good response growth adjacent to wound.
14	Blue Jacaranda	<i>Jacaranda mimosifolia</i>	Mature	8	3	220					220	260	Good	Fair	Low	2. Medium	Z3	2.6	1.9	Trunk lean with surface roots lifting. Exempt species.
15	Eucalypt	<i>Eucalyptus spp</i>	Dead	10	1	500					500	550	Dead	Poor	Medium	4. Remove	ZZ4	6.0	2.6	Dead tree.
16	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	14	4	350					350	400	Good	Good	High	1. Long	A1	4.2	2.3	None.
17	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Dead	8	4	440					440	480	Dead	Poor	Low	4. Remove	ZZ5	5.3	2.4	Dead tree.
18	Hard Leaved Scribbly Gum	<i>Eucalyptus racemosa</i>	Veteran	11	5	1100					1100	1200	Fair	Poor	Very High	4. Remove	Z5	13.2	3.6	Low foliage density for species. Co-dominant stems with significant dieback of south stem leading to large amount of internal decay.
19	Bracelet Honey Myrtle	<i>Melaleuca armillaris</i>	Mature	9	4	400	600				721	1000	Good	Fair	Medium	2. Medium	A1	8.7	3.3	Failure of small primary branch to the west.
20	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	16	7	500	800				943	1300	Good	Fair	Very High	2. Medium	A1	11.3	3.7	Co-dominant stems with failure of east stem, failure does not appear to be affecting west stem.
21	Smooth Barked Apple	<i>Angophora costata</i>	Mature	10	4	250					250	270	Good	Good	High	1. Long	A1	3.0	1.9	None.
22	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	10	3	320					320	350	Good	Good	High	1. Long	A1	3.8	2.1	None.
23	Eucalypt	<i>Eucalyptus spp</i>	Dead	11	3	480	500				693	1000	Dead	Poor	Medium	4. Remove	ZZ5	8.3	3.3	Dead tree.
24	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	9	2	240					240	280	Good	Good	Medium	1. Long	A1	2.9	1.9	None.
25	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	9	3	350					350	360	Good	Fair	Medium	3. Short	Z9	4.2	2.2	Curve in trunk at 1m. Loss of central leader.
26	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	9	2	240					240	280	Good	Good	Medium	1. Long	A1	2.9	1.9	None.
27	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	16	6	1000	300				1044	1300	Dead	Poor	Medium	4. Remove	ZZ4	12.5	3.7	Dead tree.
28	Wattle	<i>Acacia spp</i>	Mature	9	2	250					250	300	Poor	Fair	Low	3. Short	Z4	3.0	2.0	Low foliage density for species. Tree is in advanced stages of decline.
29	Wattle	<i>Acacia spp</i>	Mature	9	2	170	150				227	350	Good	Fair	Low	3. Short	Z9	2.7	2.1	Co-dominant stems with bark inclusion.
30	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	9	3	300					300	330	Good	Good	High	1. Long	A1	3.6	2.1	None.
31	Wattle	<i>Acacia spp</i>	Mature	7	2	220					220	300	Fair	Fair	Low	3. Short	Z9	2.6	2.0	Low foliage density for species. Co-dominant stems with western stem removed.
32	Wattle	<i>Acacia spp</i>	Mature	9	3	230	250	110			357	500	Fair	Fair	Low	3. Short	Z4	4.3	2.5	Low foliage density for species with North stem dead. Tree is in early stages of decline.
33	Italian Cypress	<i>Cupressus sempervirens</i>	Mature	7	1	300					300	300	Good	Good	Low	2. Medium	Z3	3.6	2.0	Exempt species.
34	Unknown	<i>Unknown spp</i>	Dead	14	4	600					600	650	Dead	Poor	Low	4. Remove	ZZ4	7.2	2.8	Dead tree.
35	Bangalay	<i>Eucalyptus botryoides</i>	Mature	10	4.5	450					450	500	Good	Good	High	1. Long	A1	5.4	2.5	Growing adjacent to rock retain.

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
36	Eucalypt	<i>Eucalyptus spp</i>	Dead	10	4	900					900	1000	Dead	Poor	Medium	4. Remove	Z24	10.8	3.3	Dead tree.
37	Smooth Barked Apple	<i>Angophora costata</i>	Mature	13	4	340					340	380	Good	Good	High	1. Long	A1	4.1	2.2	None.
38	Bangalow Palm	<i>Archontophoenix cunninghamiana</i>	Mature	8	2	200					200	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
39	Bangalow Palm	<i>Archontophoenix cunninghamiana</i>	Mature	8	2	200					200	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
40	Bangalow Palm	<i>Archontophoenix cunninghamiana</i>	Mature	8	2	200					200	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
41	River She Oak	<i>Casuarina cunninghamiana</i>	Mature	14	4	420					420	480	Good	Good	High	1. Long	A1	5.0	2.4	Vine up trunk.
42	River She Oak	<i>Casuarina cunninghamiana</i>	Mature	12	4	300					300	330	Good	Good	Medium	1. Long	A1	3.6	2.1	None.
43	River She Oak	<i>Casuarina</i>	Mature	12	3.5	300					300	350	Good	Good	Medium	1. Long	A1	3.6	2.1	None.
44	Eucalypt	<i>Eucalyptus spp</i>	Mature	15	5	550					550	600	Good	Good	High	1. Long	A1	6.6	2.7	Base surrounded by lantana.
45	Wattle	<i>Acacia spp</i>	Mature	10	2	260					260	300	Good	Fair	Low	2. Medium	A1	3.1	2.0	Trunk lean.
46	Eucalypt	<i>Eucalyptus spp</i>	Dead	15	4	750					750	800	Dead	Poor	Medium	4. Remove	Z24	9.0	3.0	Dead tree.
47	Cocos Palm	<i>Syragrus romanzoffianum</i>	Mature	10	2	250					250	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
48	Cocos Palm	<i>Syragrus romanzoffianum</i>	Mature	15	2	250					250	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
49	Mexican Fan Palm	<i>Washingtonia robusta</i>	Mature	11	1	450					450	NA	Good	Good	Low	1. Long	Z3	2.0	NA	Exempt species.
50	Cocos Palm	<i>Syragrus romanzoffianum</i>	Mature	9	2	200					200	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
51	Cocos Palm	<i>Syragrus romanzoffianum</i>	Mature	9	2	200					200	NA	Good	Good	Low	1. Long	Z3	3.0	NA	Exempt species.
52	Cypress	<i>Cupressus spp</i>	Mature	15	4	600					600	640	Good	Good	Low	1. Long	Z3	7.2	2.7	Exempt species.
53	Cypress	<i>Cupressus spp</i>	Mature	9	2	230					230	250	Good	Good	Low	1. Long	Z3	2.8	1.8	Exempt species.
54	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	15	4	310					310	350	Fair	Good	High	2. Medium	A1	3.7	2.1	Reduced foliage density.
55	Old Man Banksia	<i>Banksia serrata</i>	Mature	9	2	440					440	460	Good	Good	High	1. Long	A1	5.3	2.4	None.
56	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	10	4	300	250	200			439	700	Good	Good	Medium	1. Long	A1	5.3	2.8	None.
57	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	19	5	490					490	550	Good	Good	High	1. Long	A1	5.9	2.6	None.
58	Cedar Wattle	<i>Acacia elata</i>	Mature	15	4	370					370	400	Good	Good	Medium	2. Medium	A1	4.4	2.3	None.
59	Robinia	<i>Robinia pseudoacacia</i>	Mature	11	4	340					340	360	Good	Good	Low	1. Long	Z3	4.1	2.2	Exempt species.
60	River She Oak	<i>Casuarina cunninghamiana</i>	Mature	18	5	500					500	550	Good	Good	High	1. Long	A1	6.0	2.6	None.
61	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	19	5	700					700	750	Good	Good	High	1. Long	A1	8.4	2.9	None.
62	Cedar Wattle	<i>Acacia elata</i>	Mature	18	5	780					780	800	Poor	Fair	Medium	4. Remove	Z4	9.4	3.0	Co-dominant stems with dieback of one stem. In decline.
63	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	19	12	1120					1120	1250	Good	Fair	Very High	2. Medium	A4	13.4	3.6	Cavity at base to north. Indication of significant internal decay. Large tree, may have ecological significance.
64	Cedar Wattle	<i>Acacia elata</i>	Mature	14	4	300					300	340	Good	Good	Medium	2. Medium	A1	3.6	2.1	None.
65	Swamp Oak	<i>Casuarina glauca</i>	Mature	12	2	280					280	300	Fair	Good	High	2. Medium	A1	3.4	2.0	Reduced foliage density.
66	Sweetgum	<i>Liquidamber styraciflua</i>	Semi-mature	9	3	240					240	280	Good	Fair	Low	2. Medium	Z3	2.9	1.9	Exempt species.
67	Sweetgum	<i>Liquidamber styraciflua</i>	Semi-mature	9	2	230					230	250	Good	Good	Low	2. Medium	Z3	2.8	1.8	Exempt species.
68	London Plane	<i>Platanus x hispanica</i>	Mature	7	7	800					800	840	Good	Fair	Medium	3. Short	Z10	9.6	3.1	Poor overall form.
69	Unknown	<i>Unknown spp</i>	Dead	9	1	250					250	300	Dead	Poor	Low	4. Remove	Z4	3.0	2.0	Dead tree.
70	Swamp Oak	<i>Casuarina glauca</i>	Mature	20	6	700					700	750	Good	Good	High	1. Long	A1	8.4	2.9	None.
71	Swamp Oak	<i>Casuarina glauca</i>	Mature	15	4	430					430	450	Good	Good	High	1. Long	A1	5.2	2.4	None.
72	Swamp Oak	<i>Casuarina glauca</i>	Mature	16	4	450					450	480	Good	Fair	High	2. Medium	A1	5.4	2.4	Co-dominant stems at 7m

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
73	Swamp Oak	<i>Casuarina glauca</i>	Mature	12	2	200					200	380	Good	Good	High	1. Long	A1	2.4	2.2	None.
74	Swamp Oak	<i>Casuarina glauca</i>	Mature	16	4	430					430	450	Good	Fair	High	2. Medium	A1	5.2	2.4	Co-dominant stems.
75	Swamp Oak	<i>Casuarina glauca</i>	Mature	16	4	470					470	500	Good	Good	High	1. Long	A1	5.6	2.5	None.
76	Swamp Oak	<i>Casuarina glauca</i>	Mature	15	3	230					230	350	Good	Good	High	1. Long	A1	2.8	2.1	None.
77	Swamp Oak	<i>Casuarina glauca</i>	Mature	16	4	370					370	450	Good	Good	High	1. Long	A1	4.4	2.4	None.
78	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	19	9	900					900	1050	Good	Good	Very High	1. Long	AA1	10.8	3.4	None.
79	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	350					350	400	Good	Good	Medium	1. Long	A1	4.2	2.3	None.
80	Sydney Peppermint	<i>Eucalyptus piperita</i>	Dead	15	6	880					880	950	Dead	Poor	Low	4. Remove	ZZ4	10.6	3.2	Dead tree.
81	Eucalypt	<i>Eucalyptus spp</i>	Dead	14	4	520					520	590	Dead	Poor	Low	4. Remove	ZZ4	6.2	2.7	Dead tree.
82	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	2	290					290	360	Good	Good	Medium	1. Long	A1	3.5	2.2	None.
83	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	16	3	310					310	360	Good	Good	High	1. Long	A1	3.7	2.2	None.
84	Unknown	<i>Unknown spp</i>	Dead	10	2	240	160				288	480	Dead	Poor	Low	4. Remove	ZZ4	3.5	2.4	Dead tree.
85	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	3	290					290	330	Fair	Good	Medium	3. Short	Z4	3.5	2.1	Apical dieback. Early stages of decline.
86	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	12	4	310					310	450	Fair	Fair	Medium	3. Short	Z4	3.7	2.4	Early stages of decline. Growing directly adjacent to dead tree.
87	Red Bloodwood	<i>Corymbia gummifera</i>	Dead	13	2	340					340	380	Dead	Poor	Low	4. Remove	ZZ4	4.1	2.2	Dead tree.
88	Unknown	<i>Unknown spp</i>	Dead	16	5	490					490	550	Dead	Poor	Low	4. Remove	ZZ4	5.9	2.6	Dead tree.
89	Wattle	<i>Acacia spp</i>	Mature	8	2	200					200	230	Good	Good	Low	2. Medium	A1	2.4	1.8	None.
90	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	3	330					330	360	Good	Fair	Medium	2. Medium	A2	4.0	2.2	Failure of co-dominant stems to the south. Failed stem is not affecting remaining stem.
91	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	3	280					280	340	Good	Good	High	1. Long	A1	3.4	2.1	None.
92	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	12	4	400					400	460	Good	Good	High	1. Long	A1	4.8	2.4	None.
93	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	15	4	330					330	360	Good	Good	High	1. Long	A1	4.0	2.2	None.
94	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	15	4	340	300				453	590	Good	Good	High	1. Long	A1	5.4	2.7	None.
95	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	3	260					260	320	Good	Good	Medium	1. Long	A1	3.1	2.1	None.
96	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	18	7	680					680	740	Good	Good	High	1. Long	A1	8.2	2.9	None.
97	Black She Oak	<i>Allocasuarina littoralis</i>	Dead	10	3	330					330	390	Dead	Poor	Low	4. Remove	ZZ4	4.0	2.2	Dead tree.
98	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	3	210	190				283	400	Good	Fair	Medium	2. Medium	A1	3.4	2.3	Co-dominant stems.
99	Black She Oak	<i>Allocasuarina littoralis</i>	Mature	10	2.5	270					270	340	Good	Good	Medium	1. Long	A1	3.2	2.1	None.
100	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	9	3	260					260	310	Good	Good	High	1. Long	A1	3.1	2.0	None.
101	Black She Oak	<i>Allocasuarina littoralis</i>	Dead	10	2	260					260	340	Dead	Poor	Low	4. Remove	ZZ4	3.1	2.1	Dead tree.
102	Eucalypt	<i>Eucalyptus spp</i>	Dead	11	2	310					310	350	Dead	Poor	Low	4. Remove	ZZ4	3.7	2.1	Dead tree.
103	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	11	4	370					370	410	Good	Good	High	1. Long	A1	4.4	2.3	Located in adjoining property.
104	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	10	4	460					460	510	Good	Good	High	1. Long	A1	5.5	2.5	None.
105	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	10	3.5	370					370	430	Good	Good	High	1. Long	A1	4.4	2.3	None.
106	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	10	3	290					290	310	Good	Fair	Medium	3. Short	Z9	3.5	2.0	Significant wound on North side of trunk. Asymmetric crown shape.
107	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	8	2	200					200	230	Good	Good	Medium	2. Medium	A1	2.4	1.8	None.
108	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	11	4.5	270	350				442	600	Poor	Fair	High	4. Remove	Z4	5.3	2.7	Co-dominant stems with east stem dead. Tree is in decline.
109	Eucalypt	<i>Eucalyptus spp</i>	Dead	11	4	460					460	530	Dead	Poor	Low	4. Remove	ZZ4	5.5	2.5	Dead tree.
110	Blackbutt	<i>Eucalyptus pilularis</i>	Mature	18	6	640					640	720	Good	Good	High	1. Long	A1	7.7	2.9	Located in adjoining property.
111	Blackbutt	<i>Eucalyptus pilularis</i>	Semi-mature	9	2	220					220	240	Fair	Fair	Medium	3. Short	Z9	2.6	1.8	Low foliage density for species. Wound at base of tree.
112	Coastal Banksia	<i>Banksia integrifolia</i>	Mature	9	2	240					240	260	Good	Good	Medium	1. Long	A1	2.9	1.9	Located in adjoining property.
113	Swamp Mahogany	<i>Eucalyptus robusta</i>	Mature	14	6	470					470	510	Fair	Fair	High	2. Medium	A2	5.6	2.5	Located in adjoining property. Low foliage density for species. Epicormic growth. Monitor health.

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
114	Swamp Mahogany	<i>Eucalyptus robusta</i>	Mature	15	4	460					460	500	Fair	Fair	High	2. Medium	A2	5.5	2.5	Located in adjoining property. Low foliage density for species. Large diameter deadwood. Monitor health.
115	Swamp Mahogany	<i>Eucalyptus robusta</i>	Mature	18	5	540					540	580	Good	Fair	Medium	2. Medium	A2	6.5	2.6	Located in adjoining property. Fungal bracket (Phellinus spp) identified on north side of trunk. Monitor health.
116	Swamp Mahogany	<i>Eucalyptus robusta</i>	Mature	16	6	500					500	550	Good	Good	High	1. Long	A1	6.0	2.6	Located in adjoining property. DBH estimated. Could not assess base of tree.
117	Swamp Mahogany	<i>Eucalyptus robusta</i>	Mature	16	6	500					500	550	Good	Good	High	1. Long	A1	6.0	2.6	Located in adjoining property. DBH estimated. Could not assess base of tree.
118	White Willow	<i>Salix alba</i>	Mature	8	4	520					520	520	Good	Poor	Low	4. Remove	Z5	6.2	2.5	Located in deep watercourse. Regrowth from fallen tree. DBH estimated. Exempt species.
119	White Willow	<i>Salix alba</i>	Mature	8	4	480					480	480	Good	Poor	Low	4. Remove	Z5	5.8	2.4	Located in deep watercourse. Regrowth from fallen tree. DBH estimated. Exempt species.
120	White Willow	<i>Salix alba</i>	Mature	12	6	740					740	780	Good	Fair	Low	2. Medium	Z3	8.9	3.0	Significant trunk lean. Located in deep watercourse. DBH estimated. Exempt species.
121	White Willow	<i>Salix alba</i>	Mature	9	5	460					460	490	Good	Fair	Low	2. Medium	Z3	5.5	2.5	Trunk lean with asymmetric crown shape. Exempt species.
122	White Willow	<i>Salix alba</i>	Mature	10	4	370					370	410	Good	Fair	Low	2. Medium	Z3	4.4	2.3	Trunk lean with asymmetric crown shape. Exempt species.
123	Box Elder	<i>Acer negundo</i>	Mature	12	6	470					470	500	Good	Fair	Low	2. Medium	Z3	5.6	2.5	Suppressed by adjacent trees. Exempt species.
124	Cedar Wattle	<i>Acacia elata</i>	Mature	14	4	380					380	420	Good	Fair	Medium	2. Medium	A1	4.6	2.3	Deadwood through lower crown.
125	Australian Tree Fern	<i>Cyathea cooperi</i>	Mature	9	2	220					220	NA	Good	Good	Medium	1. Long	A1	3.0	NA	None.
126	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	2	240					240	280	Fair	Fair	Medium	3. Short	Z4	2.9	1.9	Growing directly adjacent to watercourse. Low foliage density for species. Early stages of decline.
127	Smooth Barked Apple	<i>Angophora costata</i>	Mature	16	6	670					670	920	Fair	Fair	High	3. Short	Z4	8.0	3.2	Low foliage density for species with apical dieback and epicormic growth. Tree is in early stages of decline.
128	Australian Tree Fern	<i>Cyathea cooperi</i>	Mature	9	2	200	120				233	NA	Good	Good	Medium	1. Long	A1	3.0	NA	None.
129	Eucalypt	<i>Eucalyptus spp</i>	Dead	18	6	1040					1040	1180	Dead	Poor	Medium	4. Remove	ZZ4	12.5	3.5	Dead tree.
130	White Willow	<i>Salix alba</i>	Mature	12	4	310					310	340	Good	Fair	Low	2. Medium	Z3	3.7	2.1	Significant trunk lean to the south. Exempt species.
131	White Willow	<i>Salix alba</i>	Mature	10	5	490					490	550	Good	Poor	Low	4. Remove	Z5	5.9	2.6	Large wound at base of trunk. Significant trunk lean to the east. Exempt species.
132	Australian Tree Fern	<i>Cyathea cooperi</i>	Mature	9.5	2	240					240	NA	Good	Good	Medium	1. Long	A1	3.0	NA	None.
133	White Willow	<i>Salix alba</i>	Mature	16	10	1800					1800	1800	Good	Fair	Low	2. Medium	Z3	15.0	4.2	Large multi stem tree. Trunk measured at ground. Exempt species.
134	Eucalypt	<i>Eucalyptus spp</i>	Dead	13	1	390					390	420	Dead	Poor	Low	4. Remove	ZZ4	4.7	2.3	Dead tree.
135	White Willow	<i>Salix alba</i>	Mature	12	5	630					630	890	Fair	Poor	Low	4. Remove	Z5	7.6	3.2	Co-dominant stems with complete failure of south stem. Low foliage density for species. Exempt species.
136	Cedar Wattle	<i>Acacia elata</i>	Dead	14	4	490					490	530	Dead	Poor	Low	4. Remove	ZZ4	5.9	2.5	Dead tree
137	Smooth Barked Apple	<i>Angophora costata</i>	Mature	17	6	360	390				531	780	Fair	Good	High	2. Medium	A2	6.4	3.0	Reduced foliage density. Monitor health.
138	Cedar Wattle	<i>Acacia elata</i>	Dead	14	2	260					260	300	Dead	Poor	Low	4. Remove	ZZ4	3.1	2.0	Dead tree.
139	Cedar Wattle	<i>Acacia elata</i>	Dead	13	3	350					350	390	Dead	Poor	Low	4. Remove	ZZ4	4.2	2.2	Dead tree.
140	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	13	6	690					690	780	Poor	Poor	Medium	4. Remove	ZZ4	8.3	3.0	Majority of crown is dead. Failure of central leader.
141	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	10	2	240					240	280	Good	Good	Medium	2. Medium	A1	2.9	1.9	None.
142	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	2	150	170	90			244	340	Good	Good	Medium	2. Medium	A1	2.9	2.1	Suppressed by adjacent trees.
143	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	17	4	680					680	740	Dead	Poor	Medium	4. Remove	ZZ4	8.2	2.9	Dead tree.
144	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	18	5	590					590	650	Good	Good	High	1. Long	A1	7.1	2.8	None.
145	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	18	9	850					850	850	Good	Good	Very High	1. Long	AA1	10.2	3.1	Co-dominant stems with relatively good form to union at 1m above grade.

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
146	White Willow	<i>Salix alba</i>	Mature	10	3	240					240	260	Good	Good	Low	2. Medium	Z3	2.9	1.9	Exempt species.
147	White Willow	<i>Salix alba</i>	Mature	15	5	420	380				566	810	Good	Good	Low	2. Medium	Z3	6.8	3.0	Exempt species.
148	White Willow	<i>Salix alba</i>	Mature	14	4	390					390	440	Good	Fair	Low	2. Medium	Z3	4.7	2.3	Trunk leans significantly to the north. Exempt species.
149	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	4	360					360	390	Good	Fair	High	2. Medium	A1	4.3	2.2	Trunk lean to north.
150	Sydney Peppermint	<i>Eucalyptus piperita</i>	Mature	19	4	390					390	420	Good	Good	High	1. Long	A1	4.7	2.3	None.
151	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	15	3	310					310	340	Good	Good	High	1. Long	A1	3.7	2.1	Minor trunk lean.
152	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	18	7	520					520	610	Good	Good	High	1. Long	A1	6.2	2.7	None.
153	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	18	5	460					460	490	Good	Good	High	1. Long	A1	5.5	2.5	None.
154	Cedar Wattle	<i>Acacia elata</i>	Mature	12	3	250					250	320	Good	Good	Medium	2. Medium	A1	3.0	2.1	None.
155	Cedar Wattle	<i>Acacia elata</i>	Mature	22	5	720					720	840	Good	Good	High	2. Medium	A1	8.6	3.1	Wound on south side of trunk, appears to have occluded well.
156	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	4	340					340	360	Good	Fair	High	2. Medium	A1	4.1	2.2	Significant trunk lean to the west.
157	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	21	4	370					370	410	Good	Good	High	1. Long	A1	4.4	2.3	None.
158	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	21	4	310					310	330	Good	Good	High	1. Long	A1	3.7	2.1	None.
159	Wattle	<i>Acacia spp</i>	Mature	16	4.5	440					440	480	Fair	Fair	Medium	3. Short	Z4	5.3	2.4	Low foliage density for species with 30% deadwood. Tree is in early stages of decline.
160	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	22	4	380					380	410	Good	Good	High	1. Long	A1	4.6	2.3	None.
161	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	4	320					320	360	Good	Fair	High	2. Medium	A1	3.8	2.2	Located on edge of watercourse. Curve in trunk.
162	Eucalypt	<i>Eucalyptus spp</i>	Dead	10	1	680					680	720	Dead	Poor	Medium	4. Remove	ZZ4	8.2	2.9	Dead tree.
163	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	22	8	840					840	910	Good	Good	Very High	1. Long	AA1	10.1	3.2	Minor deadwood through lower crown.
164	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	18	4	490					490	510	Dead	Poor	Low	4. Remove	ZZ4	5.9	2.5	Dead tree.
165	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	19	4	550					550	610	Dead	Poor	Low	4. Remove	ZZ4	6.6	2.7	Dead tree.
166	White Willow	<i>Salix alba</i>	Mature	17	9	840					840	920	Good	Good	Low	2. Medium	Z3	10.1	3.2	Located in adjoining property. Exempt species.
167	Cypress	<i>Cupressus spp</i>	Mature	12	3	700					700	700	Good	Fair	Low	2. Medium	Z3	8.4	2.8	Multi stem tree. Exempt species.
168	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	15	5	480					480	520	Good	Good	High	1. Long	A1	5.8	2.5	Located in adjoining property.
169	White Willow	<i>Salix alba</i>	Mature	17	7	610					610	680	Good	Good	Low	2. Medium	Z3	7.3	2.8	Located in adjoining property. Exempt species.
170	White Willow	<i>Salix alba</i>	Mature	16	4	440					440	490	Fair	Fair	Low	3. Short	Z4	5.3	2.5	Located in adjoining property. Early stages of decline. Exempt species.
171	White Willow	<i>Salix alba</i>	Mature	17	6	560					560	590	Good	Good	Low	2. Medium	Z3	6.7	2.7	Located in adjoining property. Exempt species.
172	White Willow	<i>Salix alba</i>	Mature	16	6	680					680	740	Good	Good	Low	2. Medium	Z3	8.2	2.9	Located in adjoining property. Exempt species.
173	Eucalypt	<i>Eucalyptus spp</i>	Dead	16	4	480					480	520	Dead	Poor	Low	4. Remove	ZZ4	5.8	2.5	Located in adjoining property. Dead tree.
174	Eucalypt	<i>Eucalyptus spp</i>	Dead	18	4	480					480	500	Dead	Poor	Low	4. Remove	ZZ4	5.8	2.5	Dead tree located in adjoining property.
175	White Willow	<i>Salix alba</i>	Mature	16	8	380	350	430			672	1200	Good	Fair	Low	2. Medium	Z3	8.1	3.6	Located in adjoining property. Previous branch failure. Exempt species.
176	Old Man Banksia	<i>Banksia serrata</i>	Mature	8	2	360					360	440	Good	Good	High	1. Long	A1	4.3	2.3	None.
177	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	10	4	340					340	380	Good	Good	High	1. Long	A1	4.1	2.2	None.
178	Eucalypt	<i>Eucalyptus spp</i>	Dead	10	4	490					490	510	Dead	Poor	Low	4. Remove	ZZ4	5.9	2.5	Dead tree.
179	Bangalay	<i>Eucalyptus botryoides</i>	Semi-mature	9	2	200					200	280	Good	Good	Medium	1. Long	A1	2.4	1.9	None.
180	Smooth Barked Apple	<i>Angophora costata</i>	Semi-mature	13	2	210					210	260	Poor	Fair	Low	4. Remove	Z4	2.5	1.9	Significant apical dieback. Tree in advanced stages of decline.
181	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	5	370	370				523	800	Poor	Fair	Medium	4. Remove	Z4	6.3	3.0	Co-dominant stems with south stem dead. Tree is in decline.
182	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	17	8	370	420				560	1000	Dead	Poor	Low	4. Remove	ZZ4	6.7	3.3	Dead tree with co-dominant stems at base.
183	Eucalypt	<i>Eucalyptus spp</i>	Dead	15	4	340					340	380	Dead	Poor	Low	4. Remove	ZZ4	4.1	2.2	Dead tree.
184	Eucalypt	<i>Eucalyptus spp</i>	Dead	13	2	240					240	320	Dead	Poor	Low	4. Remove	ZZ4	2.9	2.1	Dead tree.
185	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	10	3	250					250	320	Good	Fair	Medium	2. Medium	A1	3.0	2.1	Failure of co-dominant stems to east.

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
186	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	14	4.5	320					320	420	Good	Good	Medium	2. Medium	A1	3.8	2.3	None.
187	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	14	4.5	230					230	350	Good	Good	Medium	2. Medium	A1	2.8	2.1	None.
188	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	14	4	270					270	350	Good	Good	Medium	2. Medium	A1	3.2	2.1	Minor wound on trunk to west.
189	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	10	3	220					220	320	Good	Good	Medium	2. Medium	A1	2.6	2.1	None.
190	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	13	3	210					210	320	Good	Good	Medium	2. Medium	A1	2.5	2.1	None.
191	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	13	2	210					210	320	Good	Good	Medium	2. Medium	A1	2.5	2.1	None.
192	Eucalypt	<i>Eucalyptus spp</i>	Dead	14	3	240					240	290	Dead	Poor	Low	4. Remove	ZZ4	2.9	2.0	Dead tree.
193	Eucalypt	<i>Eucalyptus spp</i>	Dead	14	2	260					260	310	Dead	Poor	Low	4. Remove	ZZ4	3.1	2.0	Dead tree.
194	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	14	3	230					230	360	Good	Fair	Medium	2. Medium	A1	2.8	2.2	Co-dominant stems with bark inclusion.
195	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	14	3	260					260	360	Good	Good	Medium	2. Medium	A1	3.1	2.2	None.
196	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	12	3	210					210	320	Good	Fair	Medium	2. Medium	A1	2.5	2.1	Co-dominant stems at 6m with relatively good form to union.
197	Parramatta Wattle	<i>Acacia parramattensis</i>	Semi-mature	12	2	190					190	270	Good	Good	Low	2. Medium	A1	2.3	1.9	None.
198	Sydney Peppermint	<i>Eucalyptus piperita</i>	Semi-mature	12	2	190					190	230	Good	Good	Medium	1. Long	A1	2.3	1.8	None.
199	Eucalypt	<i>Eucalyptus spp</i>	Dead	14	4	540					540	710	Dead	Poor	Low	4. Remove	ZZ4	6.5	2.9	Dead tree.
200	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	11	4	260					260	340	Good	Good	Medium	2. Medium	A1	3.1	2.1	None.
201	Eucalypt	<i>Eucalyptus spp</i>	Dead	17	5	320	520	420			741	1400	Dead	Poor	Low	4. Remove	ZZ4	8.9	3.8	Dead tree three stems
202	Wattle	<i>Acacia spp</i>	Dead	15	1	300					300	350	Dead	Poor	Low	4. Remove	ZZ4	3.6	2.1	Dead tree.
203	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	4.5	360					360	580	Good	Good	High	1. Long	A1	4.3	2.6	None.
204	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	10	3	210					210	270	Good	Good	Medium	2. Medium	A1	2.5	1.9	None.
205	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	16	4	750					750	750	Dead	Poor	Low	4. Remove	ZZ4	9.0	2.9	Dead tree.
206	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	11	2	210					210	250	Good	Good	Medium	2. Medium	A1	2.5	1.8	None.
207	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	13	3	260					260	360	Good	Good	Medium	2. Medium	A1	3.1	2.2	None.
208	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	5	420					420	560	Good	Good	High	1. Long	A1	5.0	2.6	None.
209	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	12	3	220					220	260	Good	Good	Medium	2. Medium	A1	2.6	1.9	None.
210	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	17	2	260					260	410	Fair	Fair	Medium	3. Short	Z4	3.1	2.3	Apical dieback with epicormic growth. Tree is in early stages of decline.
211	Cedar Wattle	<i>Acacia elata</i>	Mature	20	5	580					580	880	Fair	Fair	Medium	3. Short	Z4	7.0	3.1	Low foliage density for species with apical dieback. Early stages of decline.
212	Cedar Wattle	<i>Acacia elata</i>	Mature	20	5	600					600	890	Poor	Fair	Medium	4. Remove	Z4	7.2	3.2	Tree in advanced stages of decline.
213	Eucalypt	<i>Eucalyptus spp</i>	Dead	18	4	600	340				690	1100	Dead	Poor	Low	4. Remove	ZZ4	8.3	3.4	Dead tree.
214	Eucalypt	<i>Eucalyptus spp</i>	Dead	17	6	520	360				632	1150	Dead	Poor	Low	4. Remove	ZZ4	7.6	3.5	Dead tree.
215	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	10	3	210					210	270	Good	Good	Medium	2. Medium	A1	2.5	1.9	None.
216	Eucalypt	<i>Eucalyptus spp</i>	Dead	16	5	240	360	380			576	920	Dead	Poor	Low	4. Remove	ZZ4	6.9	3.2	Dead tree.
217	Cedar Wattle	<i>Acacia elata</i>	Semi-mature	9	2	190					190	230	Good	Good	Low	2. Medium	A1	2.3	1.8	None.
218	Eucalypt	<i>Eucalyptus spp</i>	Dead	16	5	510	420				661	1000	Dead	Poor	Low	4. Remove	ZZ4	7.9	3.3	Dead tree.
219	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	10	4	210	100	100	150		294	600	Good	Good	Medium	2. Medium	A1	3.5	2.7	Multi stem.
220	Parramatta Wattle	<i>Acacia parramattensis</i>	Mature	11	4	0	290				290	320	Good	Good	Medium	2. Medium	A1	3.5	2.1	Minor trunk lean to the west.
221	Silvertop Ash	<i>Eucalyptus sieberi</i>	Dead	17	5	640					640	840	Dead	Poor	Low	4. Remove	ZZ4	7.7	3.1	Dead tree.
222	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	15	4	320					320	450	Good	Fair	High	2. Medium	A1	3.8	2.4	Trunk lean, partially caused by failure of adjacent tree.
223	Black She Oak	<i>Allocasuarina littoralis</i>	Semi-mature	8	2	180					180	220	Good	Fair	Low	3. Short	Z10	2.2	1.8	Located on nature strip. Pruned for power lines.
224	Silvertop Ash	<i>Eucalyptus sieberi</i>	Mature	16	6	360	320				482	830	Good	Good	High	1. Long	A1	5.8	3.1	Located on nature strip.
225	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	220	210	180			353	500	Good	Good	Medium	1. Long	A1	4.2	2.5	Located on nature strip.
226	Old Man Banksia	<i>Banksia serrata</i>	Mature	5	3	270	210				342	400	Good	Good	Medium	1. Long	A1	4.1	2.3	Located on nature strip.
227	Eucalypt	<i>Eucalyptus spp</i>	Dead	15	3	310					310	370	Dead	Poor	Low	4. Remove	ZZ4	3.7	2.2	Located on nature strip. Dead tree.

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
228	Wattle	<i>Acacia spp</i>	Dead	10	2	340	420				540	600	Dead	Poor	Low	4. Remove	ZZ4	6.5	2.7	Located on nature strip. Dead tree.
229	Robinia	<i>Robinia pseudoacacia</i>	Mature	8	3	230					230	260	Good	Good	Low	2. Medium	Z3	2.8	1.9	Located on nature strip. Exempt species.
230	Robinia	<i>Robinia pseudoacacia</i>	Semi-mature	5	2	210					210	250	Good	Good	Low	2. Medium	Z3	2.5	1.8	Located on nature strip. Dead tree.
231	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	7	2	280					280	320	Good	Fair	Low	2. Medium	Z3	3.4	2.1	Located on nature strip. Pruned for power lines. Exempt species under 8m tall.
232	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	6	2	260	210				334	300	Good	Fair	Low	2. Medium	Z3	4.0	2.0	Located on nature strip. Pruned for power lines. Exempt species under 8m tall.
233	Spotted Gum	<i>Corymbia maculata</i>	Mature	19	5	430					430	580	Good	Good	High	1. Long	A1	5.2	2.6	Located on nature strip.
234	Smooth Barked Apple	<i>Angophora costata</i>	Mature	16	4	250					250	320	Good	Good	High	1. Long	A1	3.0	2.1	Located on nature strip.
235	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	3	180	160	190			307	1000	Good	Good	Medium	2. Medium	A1	3.7	3.3	Multi stem tree. Located on nature strip.
236	Robinia	<i>Robinia pseudoacacia</i>	Mature	9	2	230					230	340	Good	Fair	Medium	2. Medium	Z3	2.8	2.1	Located on nature strip. Exempt species.
237	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	8	2	150					150	260	Good	Fair	Medium	2. Medium	A1	2.0	1.9	Located on nature strip.
238	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	6	2	250	260				361	450	Good	Fair	Low	2. Medium	Z3	4.3	2.4	Located on nature strip. Exempt species under 8m tall.
239	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Mature	9	2	270					270	360	Good	Good	Medium	2. Medium	A1	3.2	2.2	Located on nature strip.
240	Claret Ash	<i>Fraxinus raywoodii</i>	Mature	8	4	250	180	200	100		381	580	Fair	Fair	Low	3. Short	Z4	4.6	2.6	Located on nature strip. Low foliage density for species. Tree is in early stages of decline. Exempt species.

Explanatory Notes

Tree Species - Common name followed by botanical name. Where species is unknown it is indicated with an 'spp'.

Age Class - Veteran (V), Mature (M), Semi mature (SM), Young (Y), Dead (D).

Diameter at Breast Height (DBH) - Measured with a DBH tape or estimated at approximately 1.4m above ground level.

Diameter Above root Buttresses (DAB): Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.

Height - Height from ground level to top of crown. All heights are estimated unless otherwise indicated.

Spread - Radius of crown at widest section. All tree spreads are estimated unless otherwise indicated.

Tree Protection Zone (TPZ) - DBH x 12. Measured in radius from the centre of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 metre outside the crown projection.

Structural Root Zone (SRZ) - (DAB x 50)^{0.42} x 0.64. Measured in radius from the centre of the trunk. Rounded up to nearest 0.1m.

Health - Good/Fair/Poor/Dead

Structure - Good/Fair/Poor

Safe Useful Life Expectancy (SULE) - 1. Long (40+years), 2. Medium (15 - 40 years), 3. Short (5 - 15 years), 4. Remove (under 5 years), 5. Small/young.

Amenity Value - Very High/High/Medium/Low/Very Low.

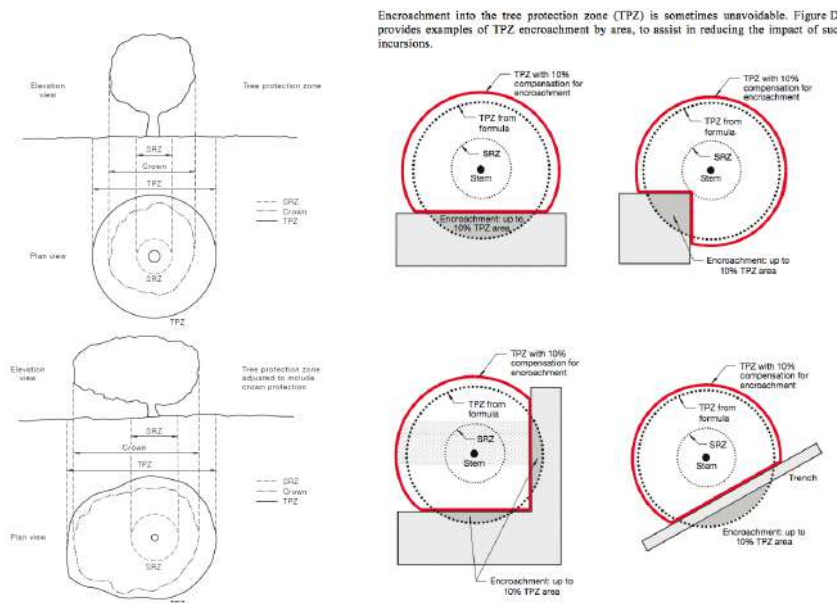
Retention Value: Tree AZ, see appendix 3 for categories.

Appendix 3 - Further Information of Methodology

1. **Tree Protection Zone:** The tree protection zone (TPZ) is the principle means of protecting trees on development sites. The TPZ is 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 radius of the TPZ is calculated for each tree by multiplying its DBH x 12. The derived value is measured in radius from the centre of the stem/trunk at ground level. A TPZ should not be less than 2.0 metres nor greater than 15 metres (except where crown protection is required). It is commonly observed that tree roots will extend significant further than the indicative TPZ, however the TPZ is an area identified AS4970-2009 to be extent where root loss or disturbance will generally not impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The tree protection also incorporates the SRZ (see below for more information about the SRZ). I have calculated the TPZ of palms, other monocots, cycads and tree ferns at one metre outside the crown projection. See appendices for additional information about the TPZ including information about calculating the TPZ and examples of TPZ encroachment.

Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted.



2. **Structural Root Zone:** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always need to be maintained to preserve a viable tree as it will only have a minor effect on the trees vigour and health. There are several factors that determine the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally work within the SRZ should be avoided.

An indicative SRZ radius can be determined from the diameter of the trunk measured immediately above the root buttresses. Root investigation could provide more information about the extent of the SRZ. The following formula should be used to calculate the SRZ.

SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = Diameter above root buttress).

3. **Tree Age Class:** If can be difficult to determine the age of a tree without carrying out invasive tests that may damage the tree, so we have categorised there likely age class which is defined below;
 - Young/Newly planted: Young or recently planted tree.
 - Semi Mature: Up to 20% of the usual life expectancy for the species.
 - Early mature/Mature: Between 20%-80% of the usual life expectancy for the species.
 - Over mature: Over 80% of the usual life expectancy for the species.
 - Dead: Tree is dead or almost dead.

4. **Health/Physiological Condition:** Below are examples conditions used when assigning a category for tree health.

Category	Example condition	Summary
Good	<ul style="list-style-type: none"> • Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development. 	<ul style="list-style-type: none"> • The tree is in above average health and condition and no remedial works are required.
Fair	<ul style="list-style-type: none"> • The tree may be starting to dieback or have over 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be early signs of pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree. 	<ul style="list-style-type: none"> • The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	<ul style="list-style-type: none"> • The tree may be in decline, have extensive dieback or have over 30% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health. 	<ul style="list-style-type: none"> • The tree is displaying low levels of health and removal or remedial works may be required.
Dead	<ul style="list-style-type: none"> • The tree is dead or almost dead. 	<ul style="list-style-type: none"> • The tree should generally be removed.

5. **Structural Condition:** Below are examples conditions used when assigning a category for structural condition.

Category	Example condition	Summary
Good	<ul style="list-style-type: none"> • Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may have a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	<ul style="list-style-type: none"> • The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree.

6. **Amenity Value:** To determine the amenity value of a tree we assess a number of different factors, which include but are not limited to the information below.

- The visibility of the tree to adjacent sites.
- The relationship between the tree and the site.
- Whether the tree is protected by any statutory conditions.
- The habitat value of the tree.
- Whether the tree is considered a noxious weed species.

The amenity value is rated using one of the following values.

- Very High
- High
- Moderate
- Low
- Very Low

7. **Safe Useful Life Expectancy (SULE), (Barrel, 2001):** A tree's safe useful life expectancy is determined by assessing a number of different factors including the health and vitality, estimated age in relation to expected life expectancy for the species, structural defects, and remedial works that could allow retention in the existing situation.

Category	Description
1. Long - Over 40 years	(a) Structurally sound trees located in positions that can accommodate future growth. (b) Trees that could be made suitable for retention in the long term by remedial tree care. (c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.
2. Medium - 15 to 40 years	(a) Trees that may only live between 15 and 40 more years. (b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that could be made suitable for retention in the medium term by remedial tree care.
3. Short - 5 to 15 years	(a) Trees that may only live between 5 and 15 more years. (b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.
4. Remove - Under 5 years	(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions. (b) Dangerous trees because of instability or recent loss of adjacent trees. (c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form. (d) Damaged trees that are clearly not safe to retain. (e) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (f) Trees that are damaging or may cause damage to existing structures within 5 years. (g) Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f). (h) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
5. Small/Young	(a) Small trees less than 5m in height. (b) Young trees less than 15 years old but over 5m in height. (c) Formal hedges and trees intended for regular pruning to artificially control growth.

8. **Root investigations:** The root investigations should identify roots greater than 30mm in diameter that are located along the edge of the structure's footprint or in the location of footings. Root investigations must be carried out using non-invasive methods (manual excavations). Any excavations for the root investigations must be carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.

9. **Retention Value:** The system I have used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The table below provides a brief description of each category.

TreeAZ Categories (Version 10.04-ANZ)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

- Z1** Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
- Z2** Too close to a building, i.e. exempt from legal protection because of proximity, etc
- Z3** Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

- Z4** Dead, dying, diseased or declining
- Z5** Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
- Z6** Instability, i.e. poor anchorage, increased exposure, etc
- Excessive nuisance:** Trees that are likely to be removed within 10 years because of unacceptable impact on people
- Z7** Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
- Z8** Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

- Z9** Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
- Z10** Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
- Z11** Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
- Z12** Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

- A1** No significant defects and could be retained with minimal remedial care
- A2** Minor defects that could be addressed by remedial care and/or work to adjacent trees
- A3** Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
- A4** Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

TreeAZ is designed by Barrell Tree Consultancy (www.barrelltreecare.co.uk) and is reproduced with their permission

Glossary of Terms

Abiotic - Pertaining to non-living agents; e.g. environmental factors

Adventitious shoots - Shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

Anchorage - The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree

Bark - A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem

Branch:

- **Primary**. A first order branch arising from a stem
- **Lateral**. A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches
- **Sub-lateral**. A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs

Branch collar - A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base

Brown-rot - A type of wood decay in which cellulose is degraded, while lignin is only modified

Buckling - An irreversible deformation of a structure subjected to a bending load

Buttress zone - The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions

Cambium - Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally

Canker - A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria

Compartmentalisation - The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region

Compressive loading - Mechanical loading which exerts a positive pressure; the opposite to tensile loading

Condition - An indication of the physiological condition of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree

Crown/Canopy - The main foliage bearing section of the tree

Crown lifting - The removal of limbs and small branches to a specified height above ground level

Crown thinning - The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure

Crown reduction/shaping - A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape

DAB (Diameter Above Buttress) - Trunk diameter measured above the root buttress

Defect - In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment

Dieback - The death of parts of a woody plant, starting at shoot-tips or root-tips

Disease - A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms

Dominance - In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also the tendency of a tree to maintain a taller crown than its neighbours

Dormant bud - An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so

Dysfunction - In woody tissues, the loss of physiological function, especially water conduction, in sapwood

DBH (Diameter at Breast Height) - Stem diameter measured at a height of 1.4 metres or the nearest measurable point. Where measurement at a height of 1.4 metres is not possible, another height may be specified

Deadwood - Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard

Epicormic shoot - A shoot having developed from a dormant or adventitious bud and not having developed from a first year shoot

Flush-cut - A pruning cut which removes part of the branch bark ridge and or branch-collar

Girdling root - A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue

Habit - The overall growth characteristics, shape of the tree and branch structure

Hazard beam - An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting

Heartwood/false-heartwood - The dead central wood that has become dysfunctional as part of the aging processes and being distinct from the sapwood

Heave - A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also the lifting of pavements and other structures by root diameter expansion; also the lifting of one side of a wind-rocked root-plate

Included bark (ingrown bark) - Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact

Lever arm - A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch

Lignin - The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification

Lions tailing - A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end-loading

Loading - A mechanical term describing the force acting on a structure from a particular source; e.g. the weight of the structure itself or wind pressure

Mycelium - The body of a fungus, consisting of branched filaments (hyphae)

Occlusion - The process whereby a wound is progressively closed by the formation of new wood and bark around it

Pathogen - A micro-organism which causes disease in another organism

Photosynthesis - The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products

Probability - A statistical measure of the likelihood that a particular event might occur

Pruning - The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs

Radial - In the plane or direction of the radius of a circular object such as a tree stem

Reactive Growth/Reaction Wood - Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)

Ring-barking - The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates below the area of damage. Almost inevitably results in the eventual death of the affected stem or branch above the damage

Root-collar - The transitional area between the stem/s and roots

Sapwood - Living xylem tissues

Soft-rot - A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole

Stem/s - Principle above-ground structural component(s) of a tree that supports its branches

Stress - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature

SRZ (Structural Root Zone) - The area around the base of the tree required for the trees stability in the ground

Subsidence - In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots

Taper - In stems and branches, the degree of change in girth along a given length

Targets - In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it

Topping - In arboriculture, the removal of the crown of a tree, or of a major proportion of it

Transpiration - The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells

TPZ (Tree Protection Zone) - A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development

Understory - This layer consists of younger individuals of the dominant trees, together with smaller trees and shrubs which are adapted to grow under lower light conditions

Veteran tree - Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem

Vigour - The expression of carbohydrate expenditure to growth (in trees)

White-rot - A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded

Wind exposure - The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity

Wind pressure - The force exerted by a wind on a particular object

Windthrow - The blowing over of a tree at its roots