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# Arboricultural Impact Assessment Report

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## Site Location:

1-5 Nelson Road Lindfield NSW

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**Prepared for:** Castle Hill No. 3 Pty Ltd

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**Prepared by:** Jack Williams & Alex Kurath  
Urban Arbor Pty Ltd

**Reference:** 250520\_1-5 Nelson\_AIA

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**Date Prepared:** 20 May 2025

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## **1. INTRODUCTION**

- 1.1 Urban Arbor have been instructed by Castle Hill No. 3 Pty Ltd to inspect all significant trees located at the site and prepare an Arboricultural Impact Assessment Report in relation to a development at the site.
- 1.2 Below is a list of all documents and information provided to assist in preparing this report:
  - A. Detail and Level Survey, Harrison Friedman & Associates, 10 April 2025.
  - B. Architectural Drawings, DKO, Concept only, no date or revision number.
- 1.3 The site and tree inspections were carried out on 22 April 2025 by Alex Kurath. Access was available to the subject site and adjoining public areas only. All tree data contained in this report was collected during this site inspection. This report has been written by Jack Williams.

## **2. SCOPE OF THE REPORT**

- 2.1 This report has been undertaken to meet the following objectives:
  - 2.1.1 Conduct a ground level visual assessment of all significant trees located within 5 metres of development works. For the purpose of this report, a significant tree is a tree with a height equal to or greater than 5 metres.
  - 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 in accordance with AS4970-2009 for any tree to be retained during the development.

### 3. LIMITATIONS

- 3.1 The observations and recommendations are based on the site inspections identified in section 1 only. The findings of this report are based on the observations and site conditions at the time of inspection.
- 3.2 All of the observations were carried out from ground level. The accuracy of the assessment of the subject trees structural condition and health is limited to the visibility of the tree at the time of inspection.
- 3.3 The tree inspection was visual from ground level only. No soil or tissue testing was carried out as part of the tree inspection. None of the surrounding surfaces adjacent to trees were lifted or removed during the tree inspections.
- 3.4 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.
- 3.5 While an assessment of the subject trees estimate useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of the trees at the site.
- 3.6 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.
- 3.7 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.*
- 3.8 Urban Arbor neither guarantees, nor is it responsible for, the accuracy of information provided by others that is contained within this report.
- 3.9 All diagrams, plans, and photographs included in this report are visual aids only and are not to scale unless otherwise indicated.
- 3.10 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):
- Tree common name.
  - Tree botanical name.
  - Tree age class.
  - DBH (Trunk/stem diameter at breast height/1.4m) – millimetres.
  - Estimated height – metres.
  - Estimated crown spread (radius of crown) – metres.
  - Health.
  - Structural condition.
  - Amenity value.
  - Estimated remaining contribution years (SULE)<sup>1</sup>.
  - Retention value (Tree AZ)<sup>2</sup>.
  - Notes/comments
- 4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer 1994)<sup>3</sup>
- 4.3 Trunk diameter was measured using a DBH tape or in some cases estimated. The trunk diameter of all trees in adjoining sites has been 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 information was imported into (GIS) PT-mapper Pro software. This software was used to measure/calculate all encroachment estimates included in this report.
- 4.5 All DBH measures, tree protection zones, and structural root zones were calculated in accordance with the methods set out in AS4970 'Protection of trees on development sites' (2009) in a Microsoft Excel spreadsheet.
- 4.6 Details of how the observations in this report have been assessed are listed in the appendices.

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<sup>1</sup> Barrell, J. (2001), 'SULE: Its use and status in the new millennium' in *Management of Mature Trees proceedings of the 4<sup>th</sup> NAAA*

<sup>2</sup> Barrell Tree Consultancy, *Tree AZ Version 10.10-ANZ*, <http://www.treeaz.com/>.

<sup>3</sup> Mattheck, C & Breloer, H., *The body language of trees – A handbook for failure analysis*, The Stationary Office, London, England (1994)

## 5. SITE LOCATION AND BRIEF DESCRIPTION

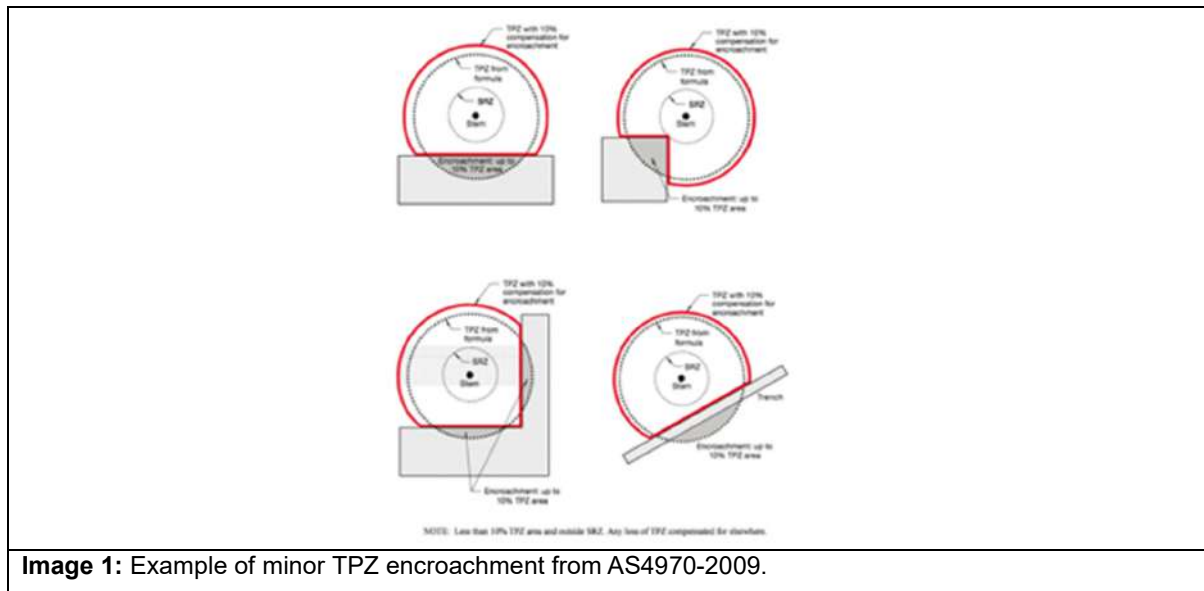
- 5.1 The site is located in the Ku-ring-gai Local Government Area (LGA) and all trees at the site are subject to protection under the Ku-ring-gai Local Environmental Plan (LEP) 2015<sup>4</sup> and Development Control Plan (DCP) 2024.<sup>5</sup>
- 5.2 The site is located within the Crown Blocks Conservation Area heritage conservation area in the Heritage Layer of the NSW Planning Portal Spatial Viewer.
- 5.3 Proposed works assessed in this report include the demolition of the existing structures and construction of one building and driveway only.

## 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 extent 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 4.
- 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 influence 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 the 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

<sup>4</sup> Ku-ring-gai Local Environmental Plan 2015, <https://legislation.nsw.gov.au/view/whole/html/inforce/current/epi-2015-0134>, accessed 31 October 2024.

<sup>5</sup> Ku-ring-gai Development Control Plan, <https://www.krg.nsw.gov.au/Planning-and-development/Planning-policies-and-guidelines/Ku-ring-gai-Development-Control-Plan>, accessed 31 October 2024.



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

- 6.4 **Major Encroachment into the 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 sized 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 4 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 3, where the indicative tree protection zone (TPZ) and structural root zone (SRZ) has been calculated for each of the subject trees. The TPZ and SRZ should be measured in radius from the centre of the trunk. Each of the subject trees have been awarded a retention value based on the observations using the Tree AS method. 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 Appendix 4 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.
- 7.2 **Site Plan:** In Appendix 1, two site plans have been prepared, where the tree information including canopy spread, TPZ, and SRZ have been overlaid onto the site plans. The following site plans are included:
- 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 surfacing only. Proposed soil level changes have not been identified in the information provided and have therefore not been assessed. All soft landscaping should be completed in accordance with section 11.10.

Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
1	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
2	<i>Cedrus deodara</i>	A1	10.7	359.7	3.4	Major	The proposed building will encroach into the TPZ by 26% (92.6m <sup>2</sup> ) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Remove
3	<i>Camellia japonica</i>	Z10	2.0	12.6	1.6	None	No proposed encroachment into the TPZ. This is a small tree located in close proximity to the existing dwelling that is likely to be impacted during the demolition works.	Remove
4	<i>X Cupressocyparis leylandii</i>	Z10	6.0	113.1	2.6	None	The tree is located in an adjoining site. No proposed encroachment into the TPZ.	Retain and protect
5	<i>Acer buergerianum</i>	A1	4.2	55.4	2.4	Footprint	The trunk is located within the footprint of the proposed building.	Remove
6	<i>Angophora costata</i>	A1	6.0	113.1	2.7	Minor	The proposed building will encroach into the TPZ by 2% (2.4m <sup>2</sup> ) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be significantly impacted.	Retain and protect
7	<i>Syagrus romanzoffiana</i>	A1	3.0	28.3	NA	None	No proposed encroachment into the TPZ.	Retain and protect

Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
8	<i>Acmena smithii</i>	A1	4.4	60.8	2.1	None	The tree is located in an adjoining site. No proposed encroachment into the TPZ.	Retain and protect
9	<i>Plumeria spp</i>	Z1	2.3	16.6	1.8	Footprint	The trunk is located within the footprint of the proposed building.	Remove
10	<i>Camellia japonica</i>	Z1	2.0	12.6	1.6	Footprint	The trunk is located within the footprint of the proposed building.	Remove
11	<i>Polyspora axillaris</i>	Z10	3.2	32.2	2.2	None	No proposed encroachment into the TPZ.	Retain and protect
12	<i>Juniperus spp</i>	Z1	3.9	47.8	2.3	None	No proposed encroachment into the TPZ.	Retain and protect
13	<i>Magnolia x soulangeana</i>	Z1	2.0	12.6	1.6	None	No proposed encroachment into the TPZ.	Retain and protect
14	<i>Jacaranda mimosifolia</i>	A1	3.9	47.8	2.2	None	No proposed encroachment into the TPZ.	Retain and protect
15	<i>Callistemon salignus</i>	Z4	4.9	75.4	2.4	Major	The proposed building will encroach into the TPZ by 33% (24.6m <sup>2</sup> ) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Remove
16	<i>Cedrus deodara</i>	A1	5.6	98.5	2.6	Footprint	The trunk is located within the footprint of the proposed building.	Remove
17	<i>Viburnum odoratissimum</i>	Z1	4.4	60.8	2.4	Footprint	The trunk is located within the footprint of the proposed building.	Remove
18	<i>Brachychiton acerifolius</i>	A1	6.1	116.9	2.7	Minor	The proposed building will encroach into the TPZ by 3% (3.2m <sup>2</sup> ) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be significantly impacted.	Retain and protect

Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
19	<i>Lagerstroemia indica</i>	A1	5.2	84.9	2.5	Footprint	The trunk is located within the footprint of the proposed building.	Remove
20	<i>Lagerstroemia indica</i>	A1	4.5	63.6	2.4	Footprint	The trunk is located within the footprint of the proposed building.	Remove
21	<i>Phoenix canariensis</i>	A1	3.0	28.3	NA	Footprint	The trunk is located within the footprint of the proposed building.	Remove
22	<i>Waterhousea floribunda</i>	Z5	5.3	88.2	2.4	Footprint	The trunk is located within the footprint of the proposed building.	Remove
23	<i>Fraxinus angustifolia</i> 'Raywood'	A1	4.3	58.1	2.3	Footprint	The trunk is located within the footprint of the proposed building.	Remove
24	<i>Waterhousea floribunda</i>	A1	4.1	52.8	2.2	Footprint	The trunk is located within the footprint of the proposed building.	Remove
26	<i>Waterhousea floribunda</i>	A1	3.0	28.3	2.0	Major	The proposed building will encroach into the TPZ by 35% (9.9m <sup>2</sup> ) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Remove
27	<i>Waterhousea floribunda</i>	A1	4.4	60.8	2.3	Major	The proposed building will encroach into the TPZ by 14% (8.8m <sup>2</sup> ) but not into the SRZ, which is major TPZ encroachment and indicates that the condition of the tree will potentially be impacted.  However, it is only 4% over the threshold of minor encroachment, indicating that the overall root loss will be acceptable and not significantly impact the tree's life expectancy. Measures can be undertaken to offset the impact of root loss, such as installing temporary irrigation during and post development works to stimulate new root growth. The tree can be retained in a viable condition.	Retain and protect*

Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
25	<i>Acmena smithii</i>	Z10	2.0	12.6	1.9	Footprint	The trunk is located within the footprint of the proposed building.	Remove
28	<i>Fraxinus angustifolia</i> 'Raywood'	Z4	4.8	72.4	2.4	Major	The proposed building will encroach into the TPZ by 21% (91.5m <sup>2</sup> ) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Remove
29	<i>Phoenix canariensis</i>	A1	3.5	38.5	NA	None	No proposed encroachment into the TPZ.	Retain and protect
30	<i>Acmena smithii</i>	Z1	2.6	21.2	1.9	Minor	The proposed building will encroach into the TPZ by 8% (1.7m <sup>2</sup> ) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be significantly impacted.	Retain and protect
31	<i>Acmena smithii</i>	Z1	2.9	26.4	1.9	Footprint	The trunk is located within the footprint of the proposed building.	Remove
32	<i>Polyspora axillaris</i>	A1	6.2	120.8	2.7	Major	The proposed driveway will encroach into the TPZ by 38% (45.5m <sup>2</sup> ) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Remove
33	<i>Callistemon viminalis</i>	Z1	2.2	15.2	1.8	Footprint	The trunk is located within the footprint of the proposed driveway.	Remove
34	<i>Magnolia x soulangeana</i>	A2	5.9	109.4	2.5	Minor	The proposed driveway will encroach into the TPZ by 10% (11.2m <sup>2</sup> ) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be significantly impacted.	Retain and protect
35	<i>Jacaranda mimosifolia</i>	A1	7.5	176.7	2.7	None	No proposed encroachment into the TPZ.	Retain and protect
36	<i>Camellia japonica</i>	Z1	2.0	12.6	1.6	Footprint	The trunk is located within the footprint of the proposed building.	Remove

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 Prepared by: Jack Williams & Alex Kurath, Urban Arbor Pty Ltd, [sales@urbanarbor.com.au](mailto:sales@urbanarbor.com.au), (02) 8004 2802  
 Date Prepared: 20 May 2025

Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
37	<i>Camellia japonica</i>	Z1	2.0	12.6	1.8	Footprint	The trunk is located within the footprint of the proposed building.	Remove
38	<i>Camellia japonica</i>	Z1	2.0	12.6	1.8	Footprint	The trunk is located within the footprint of the proposed building.	Remove
39	<i>Lagerstroemia indica</i>	Z1	3.6	40.7	1.9	None	No proposed encroachment into the TPZ.	Retain and protect
40	<i>Syzygium australe</i>	Z10	2.0	12.6	1.6	None	No proposed encroachment into the TPZ.	Retain and protect
41	<i>Syzygium australe</i>	Z1	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
42	<i>Buckinghamia celsisima</i>	Z1	2.0	12.6	1.7	None	No proposed encroachment into the TPZ.	Retain and protect
43	<i>Syzygium australe</i>	Z10	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
44	<i>Syzygium australe</i>	Z10	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
45	<i>Syzygium australe</i>	Z10	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
46	<i>Syzygium australe</i>	Z10	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
47	<i>Syzygium australe</i>	Z10	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
48	<i>Unknown species</i>	Z1	2.0	12.6	1.6	None	No proposed encroachment into the TPZ.	Retain and protect
49	<i>Cyathea cooperi</i>	Z1	2.0	12.6	NA	None	No proposed encroachment into the TPZ.	Retain and protect

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Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
50	<i>Syncarpia glomulifera</i>	A1	11.5	415.5	3.1	Footprint	The trunk is located within the footprint of the proposed building.	Remove
51	<i>Camellia japonica</i>	Z1	2.0	12.6	1.6	Footprint	The trunk is located within the footprint of the proposed building.	Remove
52	<i>Howea forsteriana</i>	Z1	2.0	12.6	NA	Footprint	The trunk is located within the footprint of the proposed building.	Remove
53	<i>Jacaranda mimosifolia</i>	Z10	5.2	84.9	2.5	Footprint	The trunk is located within the footprint of the proposed building.	Remove
54	<i>Phoenix canariensis</i>	A1	3.5	38.5	NA	Footprint	The trunk is located within the footprint of the proposed building.	Remove
55	<i>Cyathea cooperi</i>	Z1	2.0	12.6	NA	Footprint	The trunk is located within the footprint of the proposed building.	Remove
56	<i>Howea forsteriana</i>	Z1	2.5	19.6	NA	None	No proposed encroachment into the TPZ.	Retain and protect
57	<i>Lophostemon confertus</i>	A1	6.7	141.0	2.7	None	No proposed encroachment into the TPZ.	Retain and protect
58	<i>Phoenix canariensis</i>	A1	3.5	38.5	NA	None	No proposed encroachment into the TPZ.	Retain and protect
59	<i>Phoenix canariensis</i>	A1	3.5	38.5	NA	None	No proposed encroachment into the TPZ.	Retain and protect
60	<i>Livistona australis</i>	A1	2.5	19.6	NA	None	No proposed encroachment into the TPZ.	Retain and protect
61	<i>Archontophoenix cunninghamiana</i>	Z1	2.5	19.6	NA	None	No proposed encroachment into the TPZ.	Retain and protect
62	<i>Syncarpia glomulifera</i>	A1	7.0	153.9	2.8	None	No proposed encroachment into the TPZ.	Retain and protect

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Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
63	<i>Syncarpia glomulifera</i>	A1	6.6	136.8	2.7	None	No proposed encroachment into the TPZ.	Retain and protect
64	<i>Syncarpia glomulifera</i>	A1	5.8	105.7	2.5	None	No proposed encroachment into the TPZ.	Retain and protect
65	<i>Cyathea cooperi</i>	Z1	3.0	28.3	NA	Minor	The proposed building will encroach into the TPZ by 7% (2.1m <sup>2</sup> ), which is minor TPZ encroachment and indicates that the tree will not be significantly impacted.	Retain and protect
66	<i>Phoenix canariensis</i>	Z1	3.5	38.5	NA	None	No proposed encroachment into the TPZ.	Retain and protect
67	<i>Syzygium australe</i>	Z1	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
68	<i>Syzygium australe</i>	Z1	2.0	12.6	1.5	None	No proposed encroachment into the TPZ.	Retain and protect
69	<i>Jacaranda mimosifolia</i>	A1	4.3	58.1	2.3	None	The tree is located in an adjoining site. No proposed encroachment into the TPZ.	Retain and protect
G1	<i>X Cupressocyparis leylandii</i>	Z10	2.0	12.6	1.6	None	The group is located in an adjoining site. No proposed encroachment into the TPZ.	Retain and protect
G2	<i>X Cupressocyparis leylandii</i>	Z10	2.0	12.6	1.6	None	No proposed encroachment into the TPZ.	Retain and protect
G3	<i>X Cupressocyparis leylandii</i>	Z10	2.0	12.6	1.7	None	No proposed encroachment into the TPZ.	Retain and protect
G4	<i>X Cupressocyparis leylandii</i>	Z10	2.5	19.6	1.9	Footprint	The group is located within the footprint of the proposed building.	Remove
G5	<i>X Cupressocyparis leylandii</i>	Z10	2.0	12.6	1.6	Footprint	The group is located within the footprint of the proposed building.	Remove
G6	<i>Syzygium australe</i>	Z1	2.0	12.6	1.5	Footprint	The group is located within the footprint of the proposed building.	Remove

Site Location: 1-5 Nelson Road Lindfield NSW  
 Prepared for: Castle Hill No. 3 Pty Ltd  
 Prepared by: Jack Williams & Alex Kurath, Urban Arbor Pty Ltd, [sales@urbanarbor.com.au](mailto:sales@urbanarbor.com.au), (02) 8004 2802  
 Date Prepared: 20 May 2025

Tree ID	Species	Retention Value	TPZ Radius (m)	TPZ Area (m <sup>2</sup> )	SRZ Radius (m)	TPZ Encroachment	Discussion/Conclusion	Recommendation
G7	<i>X Cupressocyparis leylandii</i>	Z1	2.2	15.2	1.8	Footprint	The group is located within the footprint of the proposed building.	Remove

## 9. CONCLUSIONS

### 9.1 Table 2: Summary of the impact to trees by the development.

Impact	Reason	Category A	Category Z	Total
		A	Z	
Trees recommended to be removed	Building construction, new surfacing and/or proximity to structures, or trees in poor condition	2, 5, 16, 19, 20, 21, 23, 24, 26, 32, 50, 54 (Twelve trees)	3, 9, 10, 15, 17, 22, 25, 28, 31, 33, 36, 37, 38, 51, 52, 53, 55, G4, G5, G6, G7, (Seventeen trees and four groups)	<b>29 trees and 4 groups</b>
Trees recommended to be retained	Removal of existing surfacing/structures will not impact the viability of the trees	6, 7, 8, 14, 18, 27, 29, 34, 35, 57, 58, 59, 60, 62, 63, 64, 69 (Seventeen trees)	1, 4, 11, 12, 13, 30, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 56, 61, 65, 66, 67, 68, G1, G2, G3 (Twenty-three trees and two groups)	<b>40 trees and 3 groups</b>

### 9.2 Temporary Irrigation to Offset Root Loss Tree 27: Temporary irrigation will be required to stimulate new root growth to assist with offsetting the impact of root loss in the TPZ. Temporary irrigation should consist of the following specifications;

- The irrigation should be maintained in adequate functional condition for the duration of the development.
- The irrigation should be installed to distribute water throughout the whole of the TPZ area.
- The irrigation should be set to a timing or soil moisture monitoring system.
- The irrigation should be installed and maintain by qualified arborist/horticulturalist with a minimum AQF level 3.
- The soil moisture in the TPZ should be monitored and adjustments to the rate of watering should be modified as required. The soil moisture should be maintained at no less than 60% of the field capacity of the soil.
- Timing of the irrigation should ensure that the water is not lost to evaporation. Avoid irrigating in the middle of the day when evaporative demand is highest.

### 9.3 Bulk Earthworks - Soil Level Modifications (Cut and Fill): No bulk earthworks or soil level modification plan has been assessed in this report. All bulk earthworks or soil level modification plans should be subject to review by a consulting Arborist. Cut and fill can significantly impact trees, as the per following;

- Cut: A tree's root system is generally located far shallower in the soil than is normally considered, and should be thought of as a 'root plate'. The majority of a tree's root growth is usually found in the upper 600mm of the soil closest to the surface, but a percentage of the roots will extend deeper in the soil. An image has been included below that is taken from AS4970-2009, and provides an example of the structure of a tree's root system. Any significant cut/lowering the soil level in the TPZ can impact the tree. The only way to identify the precise impact to a tree's root system by cut in the TPZ is by carrying out detailed root investigation to

identify the individual significant roots. No detailed root investigations have been undertaken as part of the assessment.

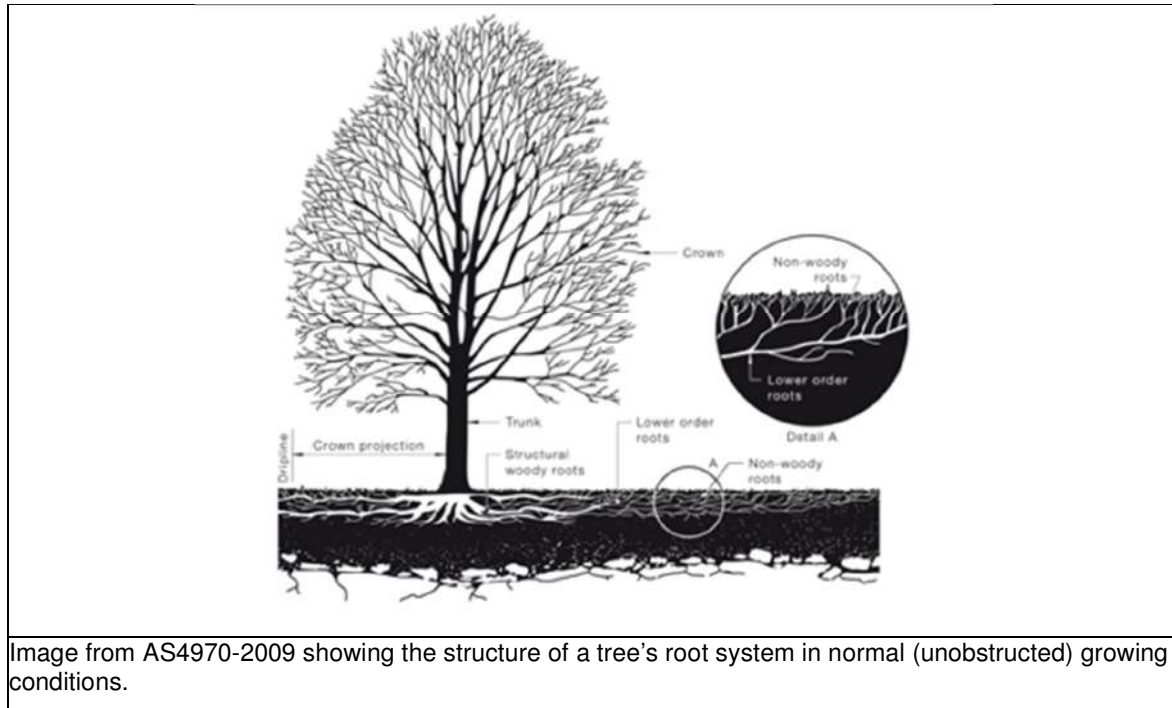


Image from AS4970-2009 showing the structure of a tree's root system in normal (unobstructed) growing conditions.

- **Fill:** Tree roots require air, water, and nutrients to function properly. Increasing the soil level in the TPZ can impact the trees by reducing the availability of water, nutrients and air to the trees underlying root system and can cause the decline of a trees health and vigour. Placing fill directly against the trunk of a tree can potentially cause collar rot. Collar rot forms when soil against the trunk of the tree accelerates sapwood or heartwood decay.<sup>6</sup>

<sup>6</sup> Dunster, Julian A., Thomas Smiley, Nelda Matheny, and Sharon Lilly, *Tree Risk Assessment Manual*, Champaign, Illinois: International Society of Arboriculture (2013), page 108.

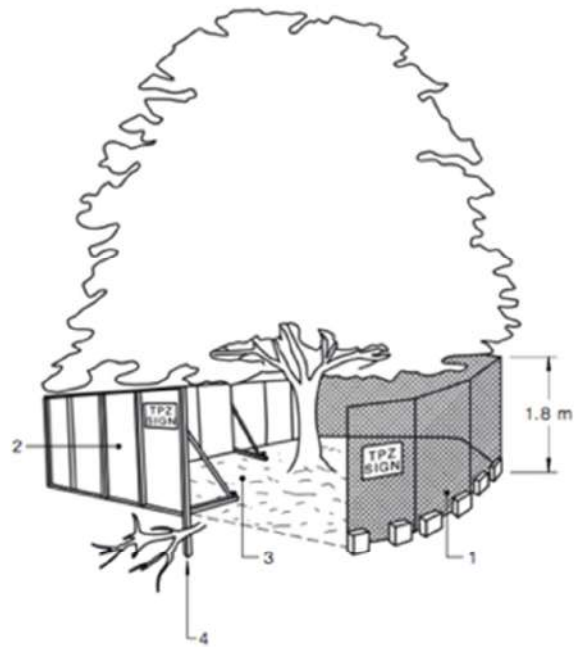
## 10. RECOMMENDATIONS

- 10.1 This report assesses the impact of a proposed development at the subject site to all significant trees located within 5 metres of the development works. Sixty-nine individual trees and seven groups of trees have been identified and assessed.
- 10.2 In Appendix 1, two site plans have been prepared, where the tree information including canopy spread, TPZ, and SRZ have been overlaid onto the site plans. The following site plans are included:
- Appendix 1A: Existing Site Plan
  - Appendix 1B: Proposed Site Plan
- 10.3 Twenty-nine individual trees and four groups have been recommended for removal to accommodate the development works, including tree 2, 3, 5, 9, 10, 15, 16, 17, 19, 20, 21, 22, 23, 24, 26, 25, 28, 31, 32, 33, 36, 37, 38, 50, 51, 52, 53, 54, 55, G4, G5, G6 and G7. See section 9.1 for a table of trees by retention value.
- 10.4 The other trees can be retained in a viable condition, including tree 1, 4, 6, 7, 8, 11, 12, 13, 14, 18, 27, 29, 30, 34, 35, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, G1, G2 and G3
- 10.5 All trees to be retained must be protected in accordance with AS4970-2009, details of which are included in section 11. Only generic tree protection is included in section 11, site specific tree protection requirements will be specified in the final version of the report when the design layout is determined.
- 10.6 No landscape plan has been assessed in this report. See section 11.10 for general guidance to minimising the impact of proposed landscaping to retained trees and replacement tree planting.
- 10.7 No services plan has been assessed in this report. All services plans should be subject to review by a consulting Arborist. Where possible, underground services should 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 with AS4970-2009, see section 11.11 for more information.
- 10.8 No bulk earthworks or soil level modifications drawings have been assessed in this report. See section 9.2 for more information.
- 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 the 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 plans in Appendix 1 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 of 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 should be carried out by a qualified and experienced Arborist with a minimum of AQF Level 3 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 the principal 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 carry out regular site inspections to ensure works are carried out in accordance with this document throughout the development process. Site inspections are recommended on a monthly frequency throughout the development.
- ~~11.5 **Site Specific Tree Protection Recommendations:** It is the responsibility of the principal 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 an 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 **Tree Protection Specifications:**
- 11.6.1 **Trunk and Branch Protection:** The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm x 1800mm 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.
- 11.6.2 **Protective fencing:** The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing should only be removed for the landscaping phase, and this should be approved by the project Arborist. 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. Any modifications to the fencing locations must be approved by the project Arborist.

- 11.6.3 **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
- 11.6.4 **Mulch:** Any areas of the TPZ located inside the subject site not covered by existing structures/hard surfacing must be mulched to a depth of 75mm with good quality mulch. Mulch must not be built-up around the trunk the trees as it can cause collar rot.
- 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, with timber/plywood boards overlaid. 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 and approved by the project Arborist as required.
- 11.6.6 **Temporary irrigation:** Temporary irrigation 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.

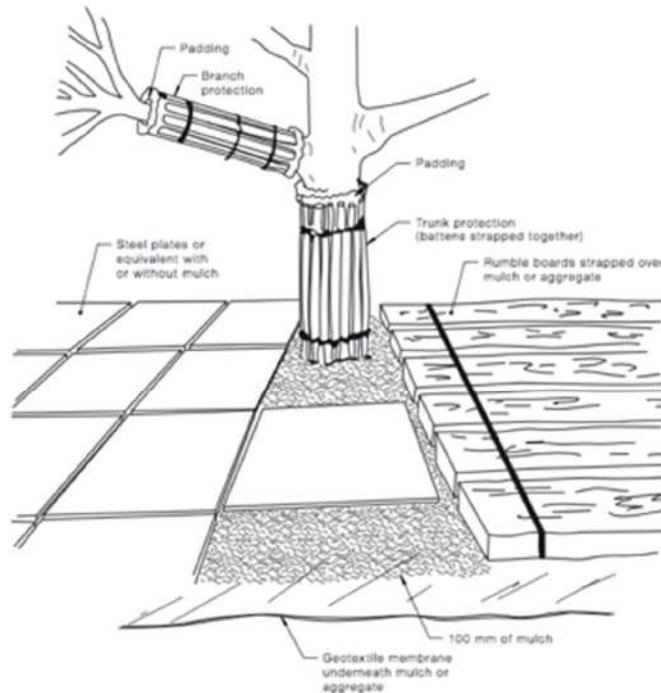


**LEGEND:**

- 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.

**Image 8:** An image from AS4970-2009,<sup>7</sup> with example tree protection fencing.

<sup>7</sup> Council of Standards Australia, *AS 4970 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.

**Image 9:** An image from AS4970-2009,<sup>8</sup> with example tree protection.

**11.7 Restricted Activities inside the 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 trees/

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

<sup>8</sup> Council of Standards Australia, AS 4970 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 completed to a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by the 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 than 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).<sup>9</sup> 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 minimise the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.
- All excavations for landscaping works should be manual and in accordance with section 5.9.
  - Replacement planting for all trees recommended for removal should be incorporated into the landscape plan. It is recommended that at minimum one tree for each tree proposed to be removed are planted to maintain/increase overall canopy cover at the site when mature. Any replacement tree must be selected in accordance with AS2303-2018 Tree stock for landscape use.
  - 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 40mm in diameter.
  - Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 50mm or increased by more 100mm 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, consider pier and beam type footings to bridge significant roots that are critical

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<sup>9</sup> Council Of Standards Australia, AS 4373 *Pruning of amenity trees* (2007) page 18

- 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 tree's root system. Where they are 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 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.
  - Any new fencing in the TPZ of trees should be constructed carefully to avoid impacting significant roots. The location of fence posts should be flexible to allow for the retention of roots greater than 30mm in diameter. The base of fence panels should be located above existing soil grades.
- 11.11 **Underground Services:** Where possible underground services should 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. No roots greater than 30mm in diameter should be severed during the installation of services unless approved in writing by the project Arborist.
- 11.12 **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.
- 11.13 **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.
- 11.14 **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 holds points that must be check 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 principal contractor should be responsible for implementing all tree protection measures.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre-construction site meeting with principal 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.	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. Site inspections are recommended 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. This includes the areas discussed in section 6.	Construction	
Project Arborist to approve relocation of tree protection for landscaping. 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. This includes the areas discussed in section 6.	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.
- Appendix 4: Glossary of Terms.

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ISA Member (International Society of Arboriculture)

Group of Trees

Tree Crown

Tree Protection Zone

Structural Root Zone

0

30m

Urban Arbor Pty Ltd

PO Box 450, Turramurra, NSW, 2074

sales@urbanarbor.com.au, (02) 8004 2802

Site Location: 1-5 Nelson Road, Lindfield, NSW

SCALE :  
1 : 200

DATE :  
30/04/2025

URBAN ARBOR

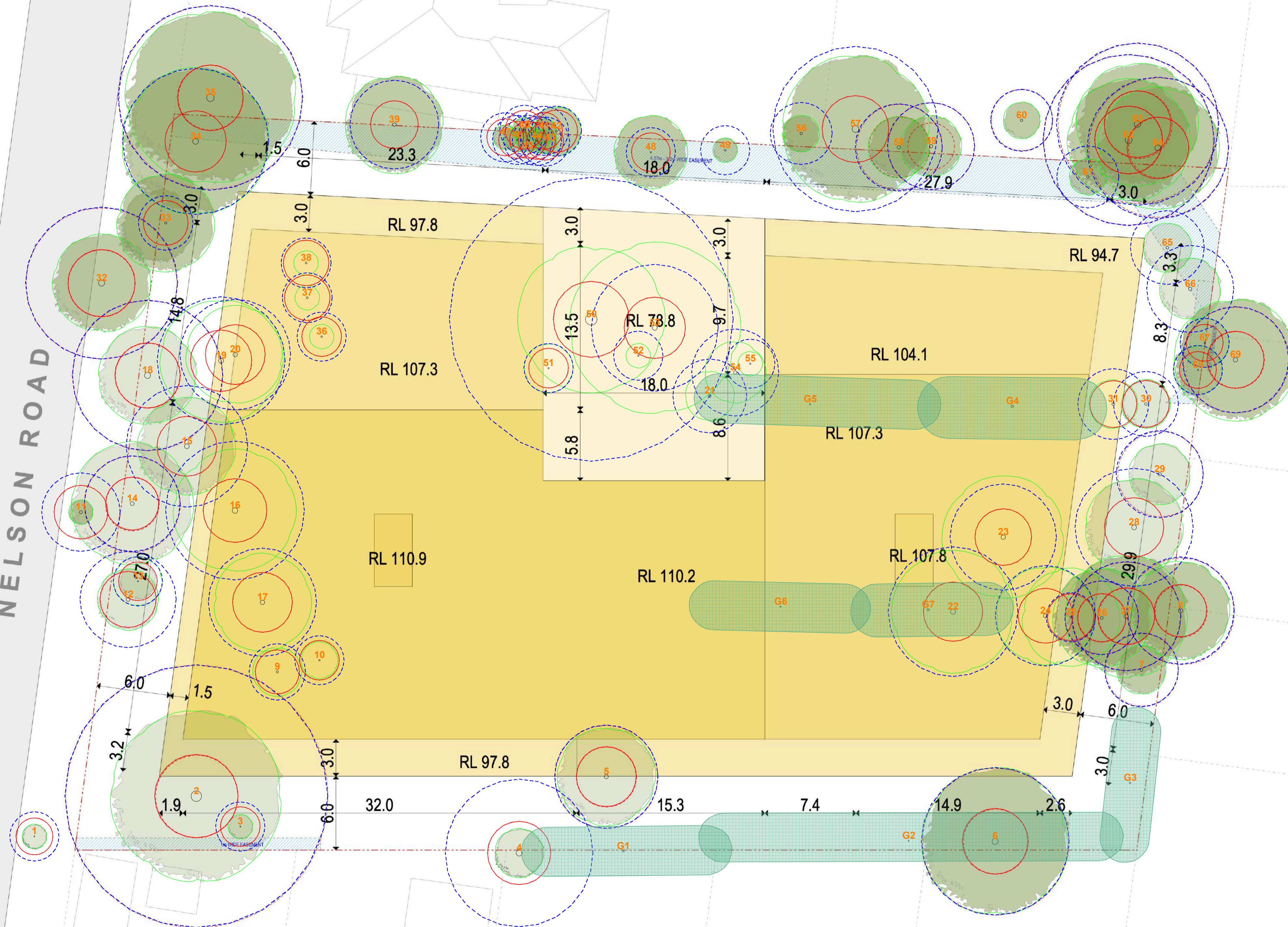
The Trusted Name in Tree Management

Prepared by: Bryce Claassens

Appendix 1A - Existing Site Plan

This figure is a detailed site plan for a residential property, showing existing buildings, landscaping, and tree management zones. The plan includes several 2 and 3 storey residences with tiled or metal roofs, a carport, a garage, and an outbuilding. Two tennis courts and two in-ground pools are also depicted. Numerous trees are shown, each with a unique identification number (e.g., 1, 2, 3, 5, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100). Each tree is surrounded by a red circle representing its crown, a blue dashed circle representing its protection zone, and a green dashed circle representing its structural root zone. The plan also shows various landscape features such as lawns, paths, and retaining walls. A scale bar indicates a distance of 30 meters. The plan is titled 'Appendix 1A - Existing Site Plan' and is prepared by Bryce Claassens for Urban Arbor Pty Ltd.

NELSON ROAD



**Tree Legend**

- Group of Trees
- Tree Crown
- Tree Protection Zone
- Structural Root Zone

0 30m

**Urban Arbor Pty Ltd**  
PO Box 450, Turrumurra, NSW, 2074  
sales@urbanarbor.com.au, (02) 8004 2802

Site Location: 1-5 Nelson Road, Lindfield, NSW

SCALE : 1 : 200 @ A1	DATE : 30/04/2025	<b>URBAN ARBOR</b> The Trusted Name in Tree Management
Prepared by: Bryce Claassens		

**Appendix 1B - Proposed Site Plan**

## 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	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	4	1	70	50				86	100	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	Located on nature strip.
2	Deodar Cedar	<i>Cedrus deodara</i>	Mature	17	7	890					890	1060	Good	Good	High	1. Long	A1	10.7	3.4	Asymmetric canopy to the West.
3	Japanese Camellia	<i>Camellia japonica</i>	Semi-mature	2.5	1	60	80	60			117	180	Good	Fair	Low	5. Small/Young	Z10	2.0	1.6	Regularly topped at 2m.
4	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Mature	5	2	500					500	550	Good	Fair	Low	2. Medium	Z10	6.0	2.6	Located on adjoining property. Tree forms part of hedgerow. Tree has been topped at 3m. DBH estimated.
5	Trident Maple	<i>Acer buergerianum</i>	Mature	9	4	350					350	480	Good	Good	Medium	1. Long	A1	4.2	2.4	None.
6	Smooth Barked Apple	<i>Angophora costata</i>	Mature	20	6	500					500	600	Good	Good	High	1. Long	A1	6.0	2.7	DBH estimated due to trunk being inaccessible.
7	Cocos Palm	<i>Syagrus romanzoffiana</i>	Mature	10	2	340					340	NA	Good	Good	Low	1. Long	A1	3.0	NA	Undesirable species in Ku-ring-gai, however, not exempt in heritage conservation areas.
8	Lilly Pilly	<i>Acmena smithii</i>	Mature	10	4	180	200	160	140	120	363	350	Good	Good	Medium	1. Long	A1	4.4	2.1	Located on adjoining property. DBH estimated.
9	Frangipani	<i>Plumeria spp</i>	Semi-mature	4	2	90	80	130	70		191	230	Good	Fair	Low	5. Small/Young	Z1	2.3	1.8	Not on survey. Asymmetric canopy to the West.
10	Japanese Camellia	<i>Camellia japonica</i>	Mature	3	1.5	50	70	60	60		121	180	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	None.
11	Fried Egg Plant	<i>Polyspora axillaris</i>	Mature	3	1	190	150	70	60	60	266	370	Good	Fair	Low	2. Medium	Z10	3.2	2.2	Heavily pruned and maintained as small tree. Previously lopped at 2m to achieve current height.
12	Juniper	<i>Juniperus spp</i>	Mature	9	2.5	150	290				326	410	Good	Fair	Low	5. Small/Young	Z1	3.9	2.3	Co-dominant stems.
13	Saucer Magnolia	<i>Magnolia x soulangeana</i>	Semi-mature	6	2	60	70	40	50		112	170	Good	Fair	Low	5. Small/Young	Z1	2.0	1.6	Asymmetric canopy to the SE.
14	Jacaranda	<i>Jacaranda mimosifolia</i>	Mature	12	5	180	270				324	360	Good	Good	Medium	1. Long	A1	3.9	2.2	None.
15	Willow Bottlebrush	<i>Callistemon salignus</i>	Mature	13	4	100	240	320			412	480	Fair	Fair	Medium	3. Short	Z4	4.9	2.4	Tree is in decline with approximately 30% live foliage.
16	Deodar Cedar	<i>Cedrus deodara</i>	Mature	16	5	470					470	560	Good	Good	Medium	1. Long	A1	5.6	2.6	None.
17	Sweet Viburnum	<i>Viburnum odoratissimum</i>	Mature	8	4	120	240	250			367	480	Good	Fair	Low	5. Small/Young	Z1	4.4	2.4	None.
18	Illawara Flame	<i>Brachychiton acerifolius</i>	Mature	14	4	510					510	590	Good	Fair	Medium	1. Long	A1	6.1	2.7	Heavily pruned on Southern side over drive. DBH measured at 1m.
19	Crepe Myrtle	<i>Lagerstroemia indica</i>	Mature	10	5	270	200	150	180	140	433	510	Good	Good	Medium	1. Long	A1	5.2	2.5	None.
20	Crepe Myrtle	<i>Lagerstroemia indica</i>	Mature	10	4	230	170	140	150	130	375	480	Good	Good	Medium	1. Long	A1	4.5	2.4	Asymmetric canopy to the NW.
21	Canary Palm	<i>Phoenix canariensis</i>	Mature	10	2	310					310	NA	Good	Good	Medium	1. Long	A1	3.0	NA	None.
22	Weeping Lilly Pilly	<i>Waterhousea floribunda</i>	Mature	12	5	330	290				439	470	Good	Poor	Medium	4. Remove	Z5	5.3	2.4	Active split at co-dominant stems near base.
23	Claret Ash	<i>Fraxinus angustifolia</i> 'Raywood'	Mature	13	5	360					360	420	Good	Good	Medium	1. Long	A1	4.3	2.3	None.
24	Weeping Lilly Pilly	<i>Waterhousea floribunda</i>	Mature	14	4	340					340	390	Good	Good	Medium	1. Long	A1	4.1	2.2	None.
26	Weeping Lilly Pilly	<i>Waterhousea floribunda</i>	Semi-mature	13	4	250					250	290	Good	Good	Medium	1. Long	A1	3.0	2.0	None.
27	Weeping Lilly Pilly	<i>Waterhousea floribunda</i>	Mature	14	5	370					370	430	Good	Good	Medium	1. Long	A1	4.4	2.3	None.
25	Lilly Pilly	<i>Acmena smithii</i>	Semi-mature	4	4	120	70	60	70		167	270	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.9	Recently cut back heavily.
28	Claret Ash	<i>Fraxinus angustifolia</i> 'Raywood'	Mature	14	4	400					400	470	Poor	Fair	Low	4. Remove	Z4	4.8	2.4	Advanced stage of decline with 10% live foliage.
29	Canary Palm	<i>Phoenix canariensis</i>	Mature	12	2.5	600					600	NA	Good	Good	Medium	1. Long	A1	3.5	NA	None.
30	Lilly Pilly	<i>Acmena smithii</i>	Semi-mature	9	2	220					220	270	Good	Good	Low	5. Small/Young	Z1	2.6	1.9	None.
31	Lilly Pilly	<i>Acmena smithii</i>	Semi-mature	9	2	240					240	270	Good	Good	Low	5. Small/Young	Z1	2.9	1.9	None.
32	Fried Egg Plant	<i>Polyspora axillaris</i>	Mature	5	4	220	260	230	260	170	515	630	Good	Fair	Medium	2. Medium	A1	6.2	2.7	Located on nature strip.
33	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	6	4	110	100	110			185	240	Fair	Fair	Low	5. Small/Young	Z1	2.2	1.8	None.
34	Saucer Magnolia	<i>Magnolia x soulangeana</i>	Mature	7	6	220	280	270	140	160	495	510	Fair	Good	Medium	2. Medium	A2	5.9	2.5	Reduced foliage density, likely associated with possum damage.
35	Jacaranda	<i>Jacaranda mimosifolia</i>	Mature	8	7	370	420	280			626	600	Good	Good	Medium	1. Long	A1	7.5	2.7	Located on adjoining property. DBH estimated.
36	Japanese Camellia	<i>Camellia japonica</i>	Mature	4	1	70	60	70	60	50	140	180	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	Not on survey.
37	Japanese Camellia	<i>Camellia japonica</i>	Mature	3	1	100	80	70	70	50	169	250	Good	Fair	Low	5. Small/Young	Z1	2.0	1.8	Not on survey.
38	Japanese Camellia	<i>Camellia japonica</i>	Mature	3	1	100	80	70	70	50	169	250	Good	Fair	Low	5. Small/Young	Z1	2.0	1.8	Not on survey.
39	Crepe Myrtle	<i>Lagerstroemia indica</i>	Mature	8	4	120	190	200			301	280	Good	Good	Low	5. Small/Young	Z1	3.6	1.9	DAB estimated.

## 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
40	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	6	1	140					140	170	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.6	Not on survey. Located on adjoining property. DBH estimated.
41	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	6	1	100					100	140	Fair	Fair	Low	5. Small/Young	Z1	2.0	1.5	Not on survey. Located on adjoining property. DBH estimated.
42	Ivory Curl	<i>Buckinghamia celsisima</i>	Semi-mature	8	2	170					170	210	Good	Good	Low	5. Small/Young	Z1	2.0	1.7	Ivery curl Not on survey. Located on adjoining property. DBH estimated.
43	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	5	1	100					100	120	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.5	Regularly topped at 5m.
44	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	5	1	100					100	120	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.5	Regularly topped at 5m.
45	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	5	1	100					100	120	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.5	Regularly topped at 5m.
46	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	5	1	100					100	120	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.5	Regularly topped at 5m.
47	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	5	1	100					100	120	Fair	Fair	Low	5. Small/Young	Z10	2.0	1.5	Regularly topped at 5m.
48	Unknown species	<i>Unknown species</i>	Semi-mature	4	3	110	70	40			136	170	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	None.
49	Lacy Tree Fern	<i>Cyathea cooperi</i>	Mature	6	1	120	100				156	NA	Good	Good	Low	5. Small/Young	Z1	2.0	NA	Twin stemmed at base.
50	Turpentine	<i>Syncarpia glomulifera</i>	Mature	17	6	700	660				962	850	Good	Good	High	1. Long	A1	11.5	3.1	DAB estimated.
51	Japanese Camellia	<i>Camellia japonica</i>	Semi-mature	4	2	60	50	50	40	60	117	180	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	DAB estimated.
52	Kentea Palm	<i>Howea forsteriana</i>	Semi-mature	6	1	130					130	NA	Good	Good	Low	5. Small/Young	Z1	2.0	NA	None.
53	Jacaranda	<i>Jacaranda mimosifolia</i>	Mature	13	7	430					430	510	Good	Fair	Medium	2. Medium	Z10	5.2	2.5	Significant trunk lean to the the NW. Asymmetric canopy, with all foliage to the NW of the centre of trunk .
54	Canary Palm	<i>Phoenix canariensis</i>	Mature	12	2.5	520					520	NA	Good	Good	Medium	1. Long	A1	3.5	NA	None.
55	Lacy Tree Fern	<i>Cyathea cooperi</i>	Mature	6	1	120					120	NA	Good	Good	Low	5. Small/Young	Z1	2.0	NA	Not on survey.
56	Kentea Palm	<i>Howea forsteriana</i>	Semi-mature	7	1.5	120					120	NA	Good	Good	Low	5. Small/Young	Z1	2.5	NA	Located on adjoining property. DBH estimated.
57	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	18	6	560					560	620	Good	Good	High	1. Long	A1	6.7	2.7	Located on adjoining property. DBH estimated.
58	Canary Palm	<i>Phoenix canariensis</i>	Mature	13	2.5	500					500	NA	Good	Good	Medium	1. Long	A1	3.5	NA	Located on adjoining property.
59	Canary Palm	<i>Phoenix canariensis</i>	Mature	13	2.5	500					500	NA	Good	Good	Medium	1. Long	A1	3.5	NA	Located on adjoining property.
60	Cabbage Palm	<i>Livistona australis</i>	Mature	12	1.5	300					300	NA	Good	Good	Medium	1. Long	A1	2.5	NA	Located on adjoining property.
61	Bangalow Palm	<i>Archontophoenix cunninghamiana</i>	Semi-mature	6	1.5	180					180	NA	Good	Good	Low	5. Small/Young	Z1	2.5	NA	None.
62	Turpentine	<i>Syncarpia glomulifera</i>	Mature	20	5	580					580	650	Good	Fair	High	1. Long	A1	7.0	2.8	Located on adjoining property. Asymmetric due to adjacent trees with minor trunk lean. DBH estimated.
63	Turpentine	<i>Syncarpia glomulifera</i>	Mature	20	5	550					550	620	Good	Fair	High	1. Long	A1	6.6	2.7	Located on adjoining property. Asymmetric canopy and minor trunk lean due to adjacent trees. DBH estimated.
64	Turpentine	<i>Syncarpia glomulifera</i>	Mature	17	5	480					480	520	Good	Good	High	1. Long	A1	5.8	2.5	Located on adjoining property. DBH estimated.
65	Lacy Tree Fern	<i>Cyathea cooperi</i>	Mature	7	2	120	140	100	100		232	NA	Good	Good	Low	1. Long	Z1	3.0	NA	4 stems.
66	Canary Palm	<i>Phoenix canariensis</i>	Semi-mature	5	2.5	500					500	NA	Good	Good	Low	5. Small/Young	Z1	3.5	NA	None.
67	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	7	2	120					120	140	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
68	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	7	2	110					110	140	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
69	Jacaranda	<i>Jacaranda mimosifolia</i>	Mature	14	5	360					360	430	Good	Good	Medium	1. Long	A1	4.3	2.3	Located on adjoining property. DBH estimated.
G1	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Semi-mature	4	1	150					150	180	Good	Fair	Low	2. Medium	Z10	2.0	1.6	Located on adjoining property. Hedgerow of approximately 15 trees. Regularly topped at 3m and maintained as hedge. DBH estimated .
G2	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Semi-mature	3	1	100					100	170	Good	Fair	Low	2. Medium	Z10	2.0	1.6	Hedgerow of approximately 20 trees along side and back of court. Regularly topped at 2.5m to maintain as hedge. DBH estimated.
G3	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Semi-mature	4	1	140					140	200	Good	Fair	Low	2. Medium	Z10	2.0	1.7	Hedgerow consisting of 7 trees. Regularly topped and maintained as hedge. DBH estimated.
G4	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Semi-mature	7	1	210					210	260	Good	Fair	Low	2. Medium	Z10	2.5	1.9	Hedgerow of 7 trees. Regularly topped at 7m and maintained as a hedge. DBH estimated.
G5	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Semi-mature	4	1	120					120	170	Good	Fair	Low	5. Small/Young	Z10	2.0	1.6	Hedgerow of approximately 15 trees. Regularly topped at 4m and maintained as a hedge. DBH estimated.

## 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
G6	Brush Cherry	<i>Syzygium australe</i>	Semi-mature	4	1	60	70				92	160	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	Hedgerow of approximately 17 trees. Regularly topped at 4m and maintained as a hedge. DBH estimated.
G7	Leyland Cypress	<i>X Cupressocyparis leylandii</i>	Semi-mature	6	1	180					180	220	Fair	Fair	Low	5. Small/Young	Z1	2.2	1.8	Hedgerow of 6 trees. Regularly topped at 6m and maintained as a hedge. DBH estimated.

### Explanatory Notes

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

**Age Class** - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y).

**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)** -  $DBH \times 12$ . 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)** -  $(DAB \times 50)^{0.42} \times 0.64$ . 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.

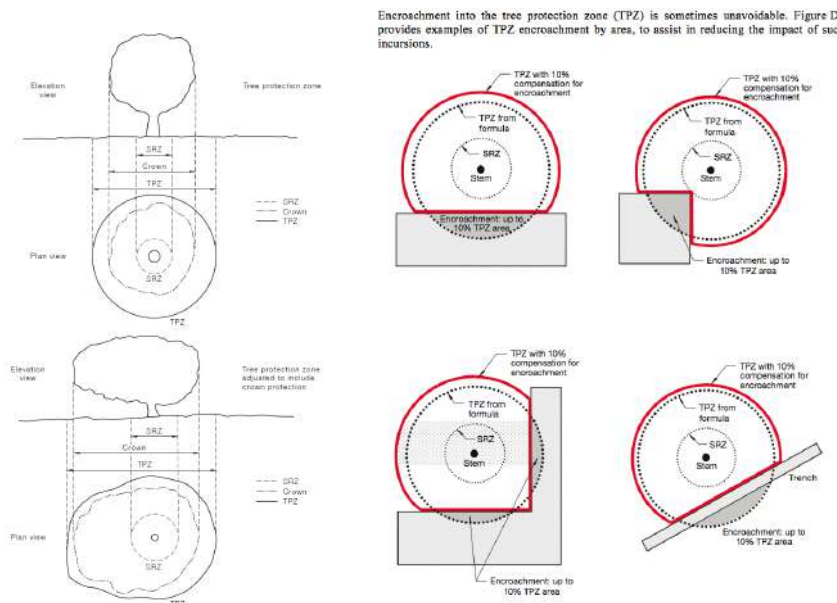
**Retention Value**: Tree AZ, see appendix 3 for categories.

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

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

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](http://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](http://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