



Arboricultural Impact Assessment Report

Site location:

IC3 Super West Data Centre
17-23 Talavera Road Macquarie Park
NSW

Prepared for:

GIDDIS Project Management

Prepared by: Jack Williams

Urban Arbor Pty Ltd

Ref: 220921_17-23 Talavera Rd_AIA_R8

Date prepared: 21 September 2022 - Revision 8

Table of Contents

1. INTRODUCTION	3
2. SCOPE OF THE REPORT	4
3. LIMITATIONS.....	5
4. METHODOLOGY	6
5. SITE LOCATION AND BRIEF DESCRIPTION	7
6. GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES	7
7. OBSERVATIONS.....	12
8. ASSESSMENT OF CONSTRUCTION IMPACTS	13
9. CONCLUSIONS	25
10. RECOMMENDATIONS.....	26
11. TREE PROTECTION REQUIREMENTS.....	27
12. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION	33
13. BIBLIOGRAPHY/REFERENCES.....	34
14. LIST OF APPENDICES.....	35

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Site Address: IC3 Super West Data Centre, 17-23 Talavera Road, Macquarie Park, NSW.

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

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1. INTRODUCTION

- 1.1 Urban Arbor have been appointed by Macquarie Data Centres (MDC) to undertake an Arboricultural Impact Assessment for the proposed development of the Macquarie Park Data Centre Campus IC3 Super West site at 17-23 Talavera Road, Macquarie Park.
- 1.2 This Arboricultural Impact Assessment report serves to support the State Significant Development Application (SSDA) relating to the proposed development.
- 1.3 Below is a list of all documents and information provided for assessment in this report;
 - A) Detail and Survey, Veris, Issue 7 - 12 August 2021
 - B) General Arrangement Plan, GIDDIS Project Management, Issue B - 16 September 2022.
 - C) Arboricultural Impact Assessment, Arboreport, 11 May 2018.
 - D) Stormwater Trunk Design (drawings C102.41), Northrop, Revision 3 - 20 June 2022.
- 1.4 The site and tree inspections were carried out on 18 August 2021. Access was available to the subject site and adjoining public areas only. GIDDIS Project Management have advised that two trees have been removed under separate permit application since the site inspection was carried out, including tree 115 and 119, both trees have therefore been deleted from the report.
- 1.5 This Arboricultural Impact Assessment report has been prepared by Jack Williams on behalf of Macquarie Data Centres (MDC) C/- GIDDIS Project Management.
- 1.6 The following Arboricultural Impact Assessment report has been produced to support the Environmental Impact Statement (EIS) prepared by Willowtree Planning PTY Ltd (Willowtree Planning). The EIS has been submitted to the New South Wales (NSW) Department of Planning, Industry and Environment (DPIE), in support of an application for State Significant Development (SSD), for the construction and operation of a data centre, involving earth works, provision of infrastructure and expansion of an existing data centre at 17 – 23 Talavera Road, Macquarie Park (Lot 527 DP 752035).
- 1.7 The proposal represents an extension to the approved data centre (LDA/2018/0322) to allow for additional data storage capacity at the subject site, improving the overall operational efficiencies and provision of technology services to customers and the wider locality. The proposal involves the construction and operation of an expansion to an existing data centre located at 17-23 Talavera Road, Macquarie Park (Lot 527 in DP 752035), comprising:
 - a five-storey building
 - ancillary office space and staff amenities
 - a back-up power system
 - associated infrastructure, car parking, loading docks and landscaping

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1.8 The subject site is located within the City of Ryde Local Government Area (LGA). The proposal seeks to operate 24 hours per day, seven (7) days per week.

1.9 The particulars of this proposal are summarised below:

- Minor earthworks involving cut and fill works
- Infrastructure comprising civil works and utilities servicing
- Construction of a five (5) storey building extension, comprising up to:
 - 14 data halls
 - 18 back up generators
 - Fitout of the building for use as a data centre (on an as-needs basis)

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 10 metres of proposed 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 The location of development works assessed is discussed in section 5.2. The development works assessed include the following;

- Cut and fill
- Fences and/or retaining walls
- Car park and driveway
- Easement Trench
- Any encroachment into the TPZ and SRZ of trees within 10 metres of the development area.

2.1.3 Determine the trees estimated contribution years and remaining useful life expectancy and award the trees a retention value.

2.1.4 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).

2.1.5 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 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.
- 3.6 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.*
- 3.7 All diagrams, plans and photographs included in this report are visual aids only and are not to scale unless otherwise indicated.
- 3.8 Alteration of this report invalidates the entire report.

4. METHODOLOGY

- 4.1 The following information was collected during the assessment of the subject tree(s).
- 4.1.1 Tree common name
 - 4.1.2 Tree botanical name
 - 4.1.3 Tree age class
 - 4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m) - millimetres.
 - 4.1.5 Estimated height - metres
 - 4.1.6 Estimated crown spread (diameter of crown) - metres
 - 4.1.7 Health
 - 4.1.8 Structural condition
 - 4.1.9 Amenity value
 - 4.1.10 Estimated remaining contribution years (SULE)¹
 - 4.1.11 Retention value (Tree AZ)²
 - 4.1.12 Notes/comments
- 4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).³
- 4.3 Tree diameter was measured using a DBH tape or in some cases estimated. Tree height and tree canopy spread was measured with a clinometer or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tools used during the assessment were a nylon mallet, compass, camera and a steel probe.
- 4.4 All information was imported into our computerised geographical information system (GIS) PT-mapper pro. This software was used to measure/calculate all encroachment estimates included in this report.
- 4.5 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009).⁴
- 4.6 Details of how the observations in this report have been assessed are listed in the appendices.

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

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

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

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

5. SITE LOCATION AND BRIEF DESCRIPTION

5.1 The site is located in the suburb of North Ryde, New South Wales, which is located within the City of Ryde Local Government Area (LGA) and all trees at the site are subject to protection under the Ryde Local Environmental Plan (LEP) 2014⁵ and Development Control Plan (DCP) 2014.⁶ The site is not located inside a Heritage Conservation Area, does not form part of a heritage item and is not listed as environmental heritage in the LEP heritage maps.⁷

5.2 Site Description: The site is described as Lot 527 DP 752035, commonly known as 17 – 23 Talavera Road, Macquarie Park. The site has a total area of approximately 20,000m², with access achieved via Talavera Road.

The site forms part of the Macquarie Park Corridor, which is the strategic centre of Macquarie Park, being a health and education precinct and an important economic and employment powerhouse in Sydney's North District.

The site is described through its current commercial setting as an existing Data Centre (LDA/2018/0322), adjoining surrounding commercial premises along Talavera Road, and forming part of the wider Macquarie Park Corridor.

The site is situated approximately 12.5 km northwest of the Sydney CBD and 11.3 km northeast of Parramatta. It is within close proximity to transport infrastructure routes (predominantly the bus and rail networks), as well as sharing direct links with the wider regional road network, including Talavera Road, Lane Cove Road, Epping Road and the M2 Motorway.

These road networks provide enhanced connectivity to the subject site and wider locality. Additionally, the site is located within close proximity to active transport links, such as bicycle routes, providing an additional mode of accessible transport available to the subject site.

⁵ Ryde Local Environmental Plan 2014, <https://www.legislation.nsw.gov.au/view/html/inforce/current/epi-2014-0608#>.

⁶ Ryde Development Control Plan 2014, <http://www.ryde.nsw.gov.au/Business-and-Development/Planning-Controls/Development-Control-Plan>.

⁷ Ryde LEP Heritage map - Sheet HER_004, https://eplanningdlprod.blob.core.windows.net/pdfmaps/6700_COM_HER_004_010_20201022.pdf, accessed 20 August 2021.

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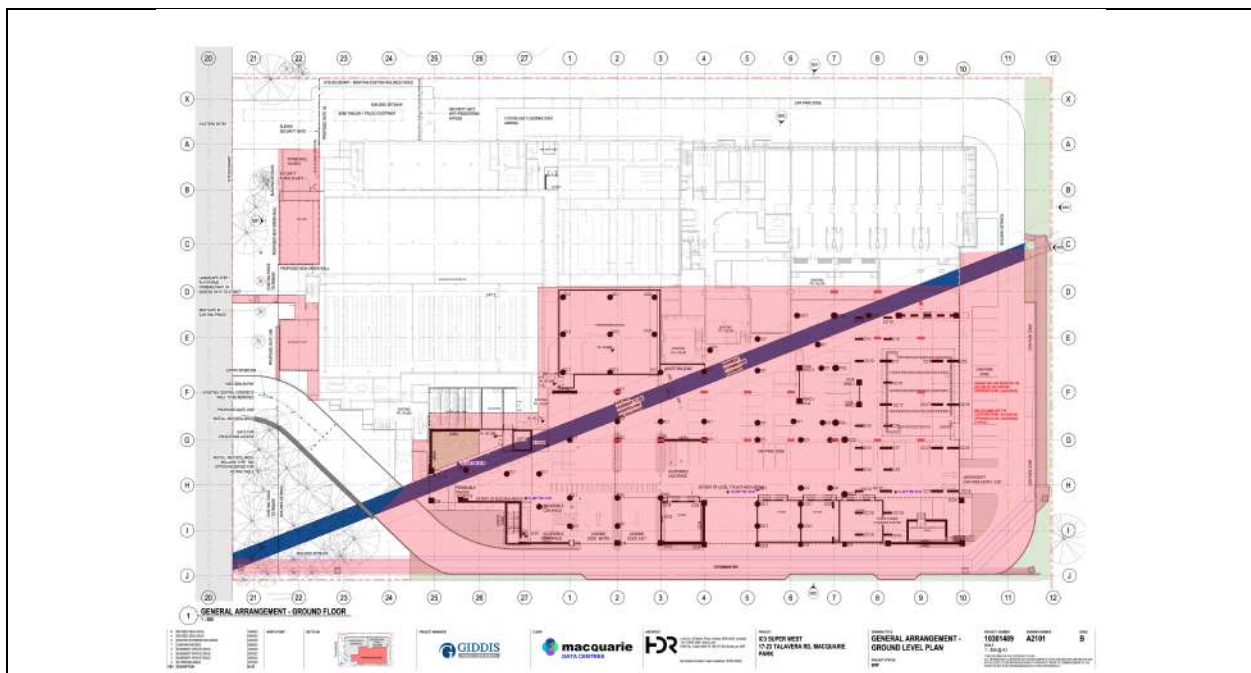
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The site 17 – 23 Talavera Road, Macquarie Park, being Lot 527 DP 752035.

5.3 Description of Development Works Assessment: The proposed development works assessed in this report include the development of the IC3 Super West Data Centre building and associated access road/landscaping modification. There was an existing approved development ongoing at the site at the time of inspection. The image below has been prepared by GIDDIS Project Management, and shows the extent/areas of development works assessed in this report, indicated by the red shading. Only trees within 10 metres of these development works have been identified and assessed.



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The report also includes an assessment of the proposed easement realignment works. The easement realignment works assessed in the report include the construction of a 2100mm diversion. GIDDIS Project Management have advised that to install the pipe in the easement, an open trench will be required, that will measure 4.5m in width and 5m in depth, the trench is indicated in blue on the image above. Generally when installing services in the TPZ of trees, the impact to the tree can be significantly reduced by using tree sensitive methods to reduce root loss. AS4790-2009 recommends that 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. However, GIDDIS Project Management have advised that these methods will not be suitable and all roots will have to be severed within the trench. In section 8, the impact assessment to trees by the easement is based on the assumption that all roots will have to be severed within the footprint of the easement/services trench.

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

- 6.1 Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection. Additional information about the TPZ is included in appendix 3.
- 6.2 Structural Root Zone (SRZ):** 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 needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula; $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ. See the appendices for more information about the SRZ.
- 6.3 Minor encroachment into TPZ:** Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

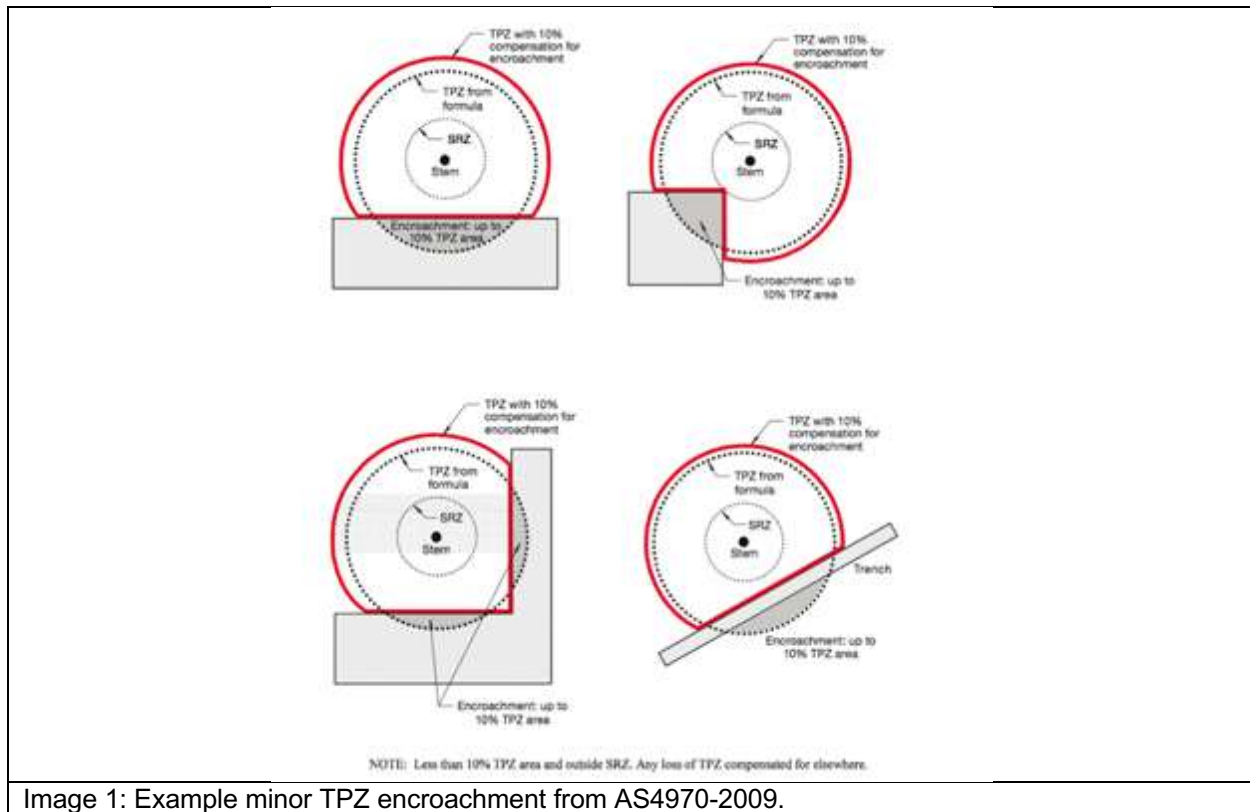


Image 1: Example minor TPZ encroachment from AS4970-2009.

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

7. OBSERVATIONS

- 7.1 **Tree information:** Details of each individual tree assessed, including the observations taken during the site inspection, can be found in the tree inspection schedule in Appendix 2, where the indicative tree protection zone (TPZ) 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 AZ 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 3 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 plans provided. The following site plans are included;
- Appendix 1A: Existing Site Plan
 - Appendix 1B: Proposed Site Plan (proposed easement and shoring works only)

8. ASSESSMENT OF CONSTRUCTION IMPACTS

8.1 Table 1: In the table below the impact of proposed development to all trees included in the report has been discussed.

Tree ID	Botanical Name	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
1	<i>Eucalyptus robusta</i>	Z1	2.3	16.6	1.8	Major	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 23% (3.8m ²) 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
2	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.6	Major	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 29% (3.6m ²) 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>Casuarina glauca</i>	A1	3.5	38.5	2.1	Major	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 39% (15.1m ²) 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
4	<i>Casuarina glauca</i>	Z10	2.4	18.1	1.8	None	No encroachment into the TPZ.	Retain and protect
5	<i>Eucalyptus saligna</i>	AA	6.0	113.1	2.6	Minor	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 3% (3.7m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
6	<i>Eucalyptus microcorys</i>	A1	6.6	136.8	2.7	Minor	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 6% (7.9m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
7	<i>Syncarpia glomulifera</i>	Z1	2.4	18.1	1.8	None	No encroachment into the TPZ.	Retain and protect
8	<i>Eucalyptus saligna</i>	A1	2.6	21.2	1.8	None	No encroachment into the TPZ.	Retain and protect
9	<i>Eucalyptus robusta</i>	Z10	4.3	58.1	2.3	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove

Tree ID	Botanical Name	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
10	<i>Eucalyptus robusta</i>	A1	4.2	55.4	2.2	Major	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 36% (19.9m ²) 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
11	<i>Eucalyptus spp</i>	AA	6.5	132.7	2.7	Major	A proposed boundary fence encroaches into the TPZ by more than 10% but not into the SRZ. To minimise the impact to the tree, any footings for the boundary fence should be located to avoid significant roots (roots greater than 40mm in diameter). All excavations for the fence footings should be carried out manually in accordance with section 11, under the supervision of the project Arborist.	Retain and protect
12	<i>Lophostemon confertus</i>	A1	4.9	75.4	2.4	Minor	The proposed boundary fence encroaches into the TPZ by less than 5% but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
13	<i>Eucalyptus punctata</i>	A2	3.8	45.4	2.1	None	No encroachment into the TPZ.	Retain and protect
14	<i>Acacia elata</i>	A1	5.8	105.7	2.5	Major	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 41% (43.8m ²) 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
15	<i>Lophostemon confertus</i>	A1	4.8	72.4	2.3	None	No encroachment into the TPZ.	Retain and protect
16	<i>Casuarina glauca</i>	A1	4.1	52.8	2.2	None	No encroachment into the TPZ.	Retain and protect
17	<i>Eucalyptus saligna</i>	AA	8.2	211.2	2.9	Major	The central concrete wall within the existing road will be removed in the TPZ. This works occur in an area that encroaches into the TPZ by less than 10% and the tree will not be significantly impacted. A proposed boundary fence also encroaches into the TPZ by more than 10% and into the SRZ. To minimise the impact to the tree, any footings for the boundary fence should be located to avoid significant roots (roots greater than 40mm in diameter). All excavations for the fence footings should be carried out	Retain and protect

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							manually in accordance with section 11, under the supervision of the project Arborist.	
18	<i>Eucalyptus saligna</i>	AA	6.5	132.7	2.7	None	No encroachment into the TPZ.	Retain and protect
19	<i>Casuarina glauca</i>	A1	4.6	66.5	2.3	None	No encroachment into the TPZ.	Retain and protect
20	<i>Casuarina glauca</i>	A1	4.4	60.8	2.3	None	No encroachment into the TPZ.	Retain and protect
21	<i>Casuarina glauca</i>	Z4	4.0	50.3	2.2	None	No encroachment into the TPZ.	Retain and protect
22	<i>Eucalyptus saligna</i>	AA	8.6	232.4	3.0	None	No encroachment into the TPZ.	Retain and protect
23	<i>Casuarina glauca</i>	AA	7.8	191.1	2.9	Major	The proposed access road and a retaining wall encroach into the TPZ by 3% (5.7m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted. The proposed easement trench and shoring wall encroaches into the TPZ by approximately 4% (6.7m ²) but not into the SRZ, bringing the total TPZ encroachment to 7%, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
24	<i>Eucalyptus punctata</i>	A2	6.6	136.8	2.7	Major	The proposed easement trench and shoring wall encroaches into the TPZ by approximately 14% (18.8m ²) but 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 for minor TPZ encroachment. The tree can be retained in a viable condition providing that measures are taken to compensate for the loss of root area, including installing temporary irrigation during the development to stimulate new root growth.	Retain and protect
25	<i>Eucalyptus saligna</i>	A2	4.0	50.3	2.2	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove

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Tree ID	Botanical Name	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
26	<i>Eucalyptus pilularis</i>	A1	4.2	55.4	2.2	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
27	<i>Casuarina glauca</i>	A1	3.7	43.0	2.1	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
28	<i>Eucalyptus microcorys</i>	Z10	2.8	24.6	1.8	None	No encroachment into the TPZ.	Retain and protect
29	<i>Eucalyptus microcorys</i>	Z1	2.0	12.6	1.6	Minor	The proposed access road and a retaining wall encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
30	<i>Eucalyptus microcorys</i>	Z1	2.0	12.6	1.6	Minor	The proposed access road and a retaining wall encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
31	<i>Eucalyptus microcorys</i>	Z1	2.0	12.6	1.6	None	No encroachment into the TPZ.	Retain and protect
32	<i>Lophostemon confertus</i>	A1	4.8	72.4	2.4	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
33	<i>Casuarina glauca</i>	A1	3.6	40.7	2.1	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
34	<i>Casuarina glauca</i>	Z10	2.4	18.1	1.8	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
35	<i>Casuarina glauca</i>	A1	3.8	45.4	2.1	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
36	<i>Eucalyptus saligna</i>	A1	3.7	43.0	2.1	Major	The proposed access road and retaining wall encroach into the TPZ by 33% (14.2m ²) 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
37	<i>Casuarina glauca</i>	Z10	2.3	16.6	1.8	Major	The proposed access road, easement trench and shoring wall encroaches into the TPZ by more than 40% 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

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38	<i>Eucalyptus microcorys</i>	A1	3.2	32.2	2.0	Minor	The proposed access road, easement trench and a retaining wall encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
39	<i>Casuarina glauca</i>	A1	2.0	12.6	1.7	Minor	The proposed access road, easement trench and a retaining wall encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
40	<i>Eucalyptus microcorys</i>	A2	3.5	38.5	2.1	Minor	The proposed access road, easement trench and a retaining wall encroach into the TPZ by less than 5% (1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
41	<i>Eucalyptus sideroxylon</i>	A1	4.7	69.4	2.3	Footprint	The trunk is located within the footprint of the proposed access road/easement trench.	Remove
42	<i>Casuarina glauca</i>	Z10	2.0	12.6	1.6	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
43	<i>Eucalyptus microcorys</i>	A1	2.5	19.6	1.8	None	No encroachment into the TPZ.	Retain and protect
44	<i>Casuarina glauca</i>	A1	3.8	45.4	2.1	Footprint	The trunk is located within the footprint of the proposed hard surfacing.	Remove
45	<i>Angophora costata</i>	Z10	3.3	34.2	2.2	Footprint	The trunk is located within the footprint of the proposed hard surfacing.	Remove
46	<i>Casuarina glauca</i>	A1	2.8	24.6	1.8	Footprint	The trunk is located within the footprint of the proposed hard surfacing.	Remove
47	<i>Angophora costata</i>	AA	8.4	221.7	2.9	Major	The proposed access road, a retaining wall and the IC3 building encroach into the TPZ by 61% (134.9m ²) 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
48	<i>Casuarina glauca</i>	A1	4.6	66.5	2.3	Footprint	The trunk is located within the footprint of the proposed building.	Remove
49	<i>Acacia spp</i>	Z1	2.0	12.6	1.5	Footprint	The trunk is located within the footprint of the proposed access road.	Remove

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Tree ID	Botanical Name	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
50	<i>Acacia spp</i>	Z1	2.5	19.6	1.8	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
51	<i>Eucalyptus saligna</i>	AA	6.1	116.9	2.6	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
52	<i>Eucalyptus microcorys</i>	A1	3.0	28.3	1.9	Minor	A proposed retaining wall encroach into the TPZ by less than 5% (1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
53	<i>Acacia spp</i>	Z1	2.0	12.6	1.5	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
54	<i>Eucalyptus saligna</i>	AA	4.7	69.4	2.3	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
55	<i>Casuarina glauca</i>	A1	4.2	55.4	2.2	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
56	<i>Eucalyptus saligna</i>	AA	4.9	75.4	2.4	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
57	<i>Dead tree</i>	Z4	3.0	28.3	1.9	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
58	<i>Syzygium spp</i>	Z1	2.0	12.6	1.5	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
59	<i>Acacia spp</i>	Z1	2.0	12.6	1.5	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
60	<i>Acacia spp</i>	Z1	2.2	15.2	1.7	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
61	<i>Casuarina glauca</i>	A2	4.4	60.8	2.3	Footprint	The trunk is located within the footprint of the proposed building.	Remove
62	<i>Eucalyptus spp</i>	A2	3.7	43.0	2.1	Footprint	The trunk is located within the footprint of the proposed building.	Remove

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Tree ID	Botanical Name	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
63	<i>Corymbia citriodora</i>	AA	10.7	359.7	3.3	Footprint	The trunk is located within the footprint of the proposed building.	Remove
64	<i>Casuarina glauca</i>	A1	3.4	36.3	2.1	Footprint	The trunk is located within the footprint of the proposed building.	Remove
65	<i>Casuarina glauca</i>	Z10	2.3	16.6	1.7	Footprint	The trunk is located within the footprint of the proposed building.	Remove
66	<i>Eucalyptus punctata</i>	A1	6.8	145.3	2.7	Footprint	The trunk is located within the footprint of the proposed building.	Remove
67	<i>Casuarina glauca</i>	A1	2.4	18.1	1.8	None	No encroachment into the TPZ.	Retain and protect
68	<i>Syzygium spp</i>	Z1	2.1	13.9	1.7	Footprint	The trunk is located within the footprint of the proposed access road and easement trench.	Remove
69	<i>Lophostemon confertus</i>	A1	4.6	66.5	2.3	Footprint	The trunk is located within the footprint of the proposed access road and easement trench.	Remove
70	<i>Casuarina glauca</i>	A1	6.4	128.7	2.7	Footprint	The trunk is located within the footprint of the proposed building.	Remove
71	<i>Angophora floribunda</i>	A1	5.6	98.5	2.5	Footprint	The trunk is located within the footprint of the proposed building.	Remove
72	<i>Corymbia citriodora</i>	AA	8.3	216.4	3.0	Footprint	The trunk is located within the footprint of the proposed building.	Remove
73	<i>Corymbia citriodora</i>	AA	10.1	320.5	3.2	Footprint	The trunk is located within the footprint of the proposed building.	Remove
74	<i>Syzygium spp</i>	Z1	2.0	12.6	1.7	Footprint	The trunk is located within the footprint of the proposed access road and easement trench.	Remove
75	<i>Lophostemon confertus</i>	A1	2.9	26.4	1.9	Footprint	The trunk is located within the footprint of the proposed access road and easement trench.	Remove
76	<i>Eucalyptus saligna</i>	Z4	6.4	128.7	2.7	Footprint	The trunk is located within the footprint of the proposed access road and easement trench.	Remove

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Tree ID	Botanical Name	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
77	<i>Eucalyptus saligna</i>	A2	7.1	158.4	2.8	Footprint	The trunk is located within the footprint of the proposed access road and easement trench.	Remove
78	<i>Eucalyptus saligna</i>	AA	10.9	373.3	3.4	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
79	<i>Syzygium spp</i>	Z1	2.7	22.9	1.9	Footprint	The trunk is located within the footprint of the proposed access road.	Remove
80	<i>Lophostemon confertus</i>	A1	2.9	26.4	1.9	Major	The proposed road, easement trench and shoring wall encroaches into the TPZ by 18% (4.7m ²) 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
81	<i>Lophostemon confertus</i>	A1	3.7	43.0	2.1	Major	The proposed road, easement trench and shoring wall encroaches into the TPZ by 24% (10.2m ²) 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
82	<i>Lophostemon confertus</i>	A1	4.2	55.4	2.2	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
83	<i>Lophostemon confertus</i>	A1	4.4	60.8	2.3	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
84	<i>Lophostemon confertus</i>	A1	4.7	69.4	2.5	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
85	<i>Lophostemon confertus</i>	AA	6.5	132.7	2.7	Footprint	The trunk is located within the footprint of the proposed easement trench.	Remove
86	<i>Eucalyptus saligna</i>	AA	11.4	408.3	3.4	Minor	The tree is located in an adjoining site. The proposed easement trench and headwall encroach into the TPZ by approximately 4% (16.9m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
87	<i>Brachychiton discolor</i>	A1	4.1	52.8	2.2	Minor	The tree is located in an adjoining site. The proposed easement trench and headwall encroach into the TPZ by approximately 2% (<1m ²) but not into the	Retain and protect

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							SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	
88	<i>Lophostemon confertus</i>	AA	5.4	91.6	2.5	Minor	The tree is located in an adjoining site. The proposed easement trench and shoring wall encroaches into the TPZ by approximately 2% (1.5m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
89	<i>Lophostemon confertus</i>	AA	4.8	72.4	2.4	None	No encroachment into the TPZ.	Retain and protect
90	<i>Eucalyptus saligna</i>	AA	7.8	191.1	2.9	Minor	The tree is located in an adjoining site. The proposed easement trench and shoring wall encroaches into the TPZ by approximately 2% (3m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
91	<i>Eucalyptus saligna</i>	A1	2.5	19.6	1.8	Major	The tree is located in an adjoining site. The proposed easement trench and shoring wall encroaches into the TPZ by 19% (3.7m ²) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Tree in adjoining site potentially impacted
92	<i>Eucalyptus microcorys</i>	AA	8.4	221.7	3.0	Major	The tree is located in an adjoining site. The proposed access road, shoring wall and the easement trench encroach into the TPZ by 31% (68.3m ²) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Tree in adjoining site potentially impacted
93	<i>Casuarina glauca</i>	A1	4.2	55.4	2.3	Major	The tree is located in an adjoining site. The proposed access road, a retaining wall and the easement trench encroach into the TPZ by 35% (19.2m ²) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Tree in adjoining site potentially impacted
94	<i>Casuarina glauca</i>	A1	5.1	81.7	2.4	Major	The tree is located in an adjoining site. The proposed access road, a retaining wall and the easement trench encroach into the TPZ by 35% (28.4m ²) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted.	Tree in adjoining site potentially impacted

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95	<i>Eucalyptus saligna</i>	AA	8.4	221.7	3.0	Minor	The easement trench encroaches into the TPZ by 8% (17.6m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
96	<i>Eucalyptus saligna</i>	AA	6.0	113.1	2.6	None	No encroachment into the TPZ.	Retain and protect
97	<i>Eucalyptus saligna</i>	A1	5.4	91.6	2.5	None	No encroachment into the TPZ.	Retain and protect
98	<i>Syncarpia glomulifera</i>	A1	2.4	18.1	1.8	None	No encroachment into the TPZ.	Retain and protect
99	<i>Eucalyptus saligna</i>	A1	2.6	21.2	1.8	Minor	A proposed retaining wall and the easement trench encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
100	<i>Eucalyptus saligna</i>	AA	5.4	91.6	2.5	Minor	A proposed retaining wall and the easement trench encroach into the TPZ by 3% (2.8m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
101	<i>Eucalyptus spp</i>	AA	4.3	58.1	2.3	Minor	A proposed retaining wall and the easement trench encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
102	<i>Eucalyptus spp</i>	Z10	2.0	12.6	1.6	Minor	A proposed retaining wall and the easement trench encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
103	<i>Eucalyptus spp</i>	A1	3.2	32.2	2.0	Minor	A proposed retaining wall encroaches into the TPZ by 6% (1.9m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
104	<i>Syncarpia glomulifera</i>	Z1	2.0	12.6	1.7	Minor	A proposed retaining wall and the easement trench encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
105	<i>Ligustrum lucidum</i>	Z3	3.1	30.2	2.1	None	No encroachment into the TPZ.	Retain and protect

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106	<i>Corymbia citriodora</i>	AA	4.8	72.4	2.4	Minor	A proposed retaining wall and the easement trench encroach into the TPZ by less than 5% (<1m ²) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
107	<i>Syncarpia glomulifera</i>	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
108	<i>Casuarina glauca</i>	A1	2.0	12.6	1.7	None	No encroachment into the TPZ.	Retain and protect
109	<i>Casuarina glauca</i>	A1	2.6	21.2	1.8	None	No encroachment into the TPZ.	Retain and protect
110	<i>Casuarina glauca</i>	A1	3.0	28.3	1.9	None	No encroachment into the TPZ.	Retain and protect
111	<i>Syncarpia glomulifera</i>	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
112	<i>Casuarina glauca</i>	A1	2.0	12.6	1.7	None	No encroachment into the TPZ.	Retain and protect
113	<i>Syncarpia glomulifera</i>	A1	2.7	22.9	2.0	None	No encroachment into the TPZ.	Retain and protect
114	<i>Syncarpia glomulifera</i>	A1	3.6	40.7	2.1	None	No encroachment into the TPZ.	Retain and protect
116	<i>Elaeocarpus reticulatus</i>	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
117	<i>Elaeocarpus reticulatus</i>	Z1	2.0	12.6	1.6	None	No encroachment into the TPZ.	Retain and protect
118	<i>Elaeocarpus reticulatus</i>	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
120	<i>Callistemon viminalis</i>	A1	3.6	40.7	2.5	None	No encroachment into the TPZ.	Retain and protect

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121	<i>Elaeocarpus reticulatus</i>	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
122	<i>Callistemon viminalis</i>	A1	2.7	22.9	2.1	None	No encroachment into the TPZ.	Retain and protect
123	<i>Callistemon viminalis</i>	A1	3.5	38.5	2.4	Minor	The proposed boundary fence encroaches into the TPZ by less than 5% but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
124	<i>Callistemon viminalis</i>	A1	3.3	34.2	2.4	None	No encroachment into the TPZ.	Retain and protect
125	<i>Eucalyptus saligna</i>	AA	5.4	91.6	2.5	Footprint	The trunk is located within the footprint of a proposed road.	Remove
126	<i>Eucalyptus saligna</i>	AA	6.0	113.1	2.6	Footprint	The trunk is located within the footprint of a proposed plant building.	Remove
G1	<i>Casuarina glauca</i> , <i>Waterhousea floribunda</i> , <i>Acacia</i> spp	A1	-	-	-	Footprint	This a group of trees that have not been individually identified on the detail and level survey. The group is partially located within the footprint of the proposed access road. If any trees within this group are to be retained, they will need to be individually surveyed and the impact to each tree assessed.	Remove

9. CONCLUSIONS

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

Impact	Reason	Category A Tree numbers		Category Z Tree numbers	Total trees
		AA	A	Z	
Trees recommended to be removed	Building construction, new surfacing and/or proximity to proposed structures, or trees in poor condition	47, 51, 54, 56, 63, 72, 73, 78, 85, 125, 126 (11 trees)	3, 10, 14, 25, 26, 27, 32, 33, 35, 36, 41, 44, 46, 48, 55, 61, 62, 64, 66, 69, 70, 71, 75, 77, 80, 81, 82, 83, 84, G1 (29 trees and 1 group)	1, 2, 9, 34, 37, 42, 45, 49, 50, 53, 57, 58, 59, 60, 65, 68, 74, 76, 79, (19 trees)	59 trees and 1 group
Tree located in adjoining site potentially impacted	Building construction, new surfacing and/or proximity to proposed structures	92 (1 tree)	91, 93, 94, (3 trees)	None	4 trees
Trees recommended to be retained	Removal of existing surfacing/structures and/or installation of new surfacing/structures will not impact the viability of the trees	5, 11, 17, 18, 22, 23, 86, 88, 89, 90, 95, 96, 100, 101, 106 (15 trees)	6, 8, 12, 13, 15, 16, 19, 20, 24, 38, 39, 40, 43, 52, 67, 87, 97, 98, 99, 103, 108, 109, 110, 112, 113, 114, 120, 122, 123, 124 (30 trees)	4, 7, 21, 28, 29, 30, 31, 102, 104, 105, 107, 111, 116, 117, 118, 121 (16 trees)	61 trees

10. RECOMMENDATIONS

- 10.1 This report assesses the impact of a proposed development at the subject site to all significant trees located inside or adjoining the site located within ten metres of the proposed development works. One-hundred and twenty-four individual trees and one group 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 plans provided. The following site plans are included;
 - Appendix 1A: Existing Site Plan
 - Appendix 1B: Proposed Site Plan (proposed easement and shoring works only)
- 10.3 Fifty-nine individual trees and one group of trees have been recommended for removal to accommodate the development works, including tree 1, 2, 3, 9, 10, 14, 25, 26, 27, 32, 33, 34, 35, 36, 37, 41, 42, 44, 45, 46, 47, 48, 49, 50, 51, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 125, 126 and G1. See section 9.1 for a list of trees by retention value.
- 10.4 A further four trees have been identified that are located in adjoining sites that will potentially be impacted by the proposed development works, including tree 91, 92, 93 and 94. See section 9.1 for a list of trees by retention value.
- 10.5 The other sixty-one trees assessed in this report can be retained in a viable condition, including tree 4, 5, 6, 7, 8, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 28, 29, 30, 31, 38, 39, 40, 43, 52, 67, 86, 87, 88, 89, 90, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 116, 117, 118, 120, 121, 122, 123 and 124. See section 9.1 for a list of trees by retention value.
- 10.6 All trees to be retained must be protected in accordance with AS4970-2009, details of which are included in section 11.
- 10.7 No landscape plan has been assessed in this report. See section 11.10 for general guidance in relation to minimising the impact of proposed landscaping to retained trees and replacement tree planting.
- 10.8 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 in accordance with AS4970-2009, see section 11.11 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 (Appendix 1) drawing must also be made available to any contractor prior to works commencing and during any on site operations.
- 11.2 **Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience, and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.
- 11.3 **Tree work:** All tree work 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 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 carryout 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 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. See section 11.6 for requirements of tree protection.
- Tree 4, 5, 6, 7, 8, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 28, 29, 30 and 31: Protective fencing should be aligned as close as practical to the existing road/parking bays or proposed retaining wall/road (whichever is closest to the trunk) prior to demolition. After demolition, the fencing should be realigned as close as practical to proposed retaining wall/road. TPZ signage on fencing. Mulch in fenced area of TPZ (within site only). The fencing should be relocated for the easement works under the approval of the project arborist, who should specify temporary tree protection requirements during these works.
 - Tree 38, 39, 40, 43, 52, 67, 86, 87, 88, 89, 90, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113 and 114: These trees are all located in adjoining sites to the West and North. The boundary fence will provide protection in areas where development works are proposed adjacent to

Site Address: IC3 Super West Data Centre, 17-23 Talavera Road, Macquarie Park, NSW.

Prepared for: GIDDIS Project Management.

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

Date prepared: 21 September 2022 - Revision 8.

the boundary. In any location where the retaining wall proposed steps in from boundary, fencing should be aligned as close as practical to the proposed retaining wall in the TPZ of trees. TPZ signage on fencing. Mulch any areas between the boundary and protective fence.

- Tree 116, 117, 118, 120, 121, 122, 123 and 124: Protective fencing should be aligned at the extent of the TPZ radius of each tree/adjacent to the site boundary. TPZ signage on fencing. Mulch in fenced area of TPZ (within site only).

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:

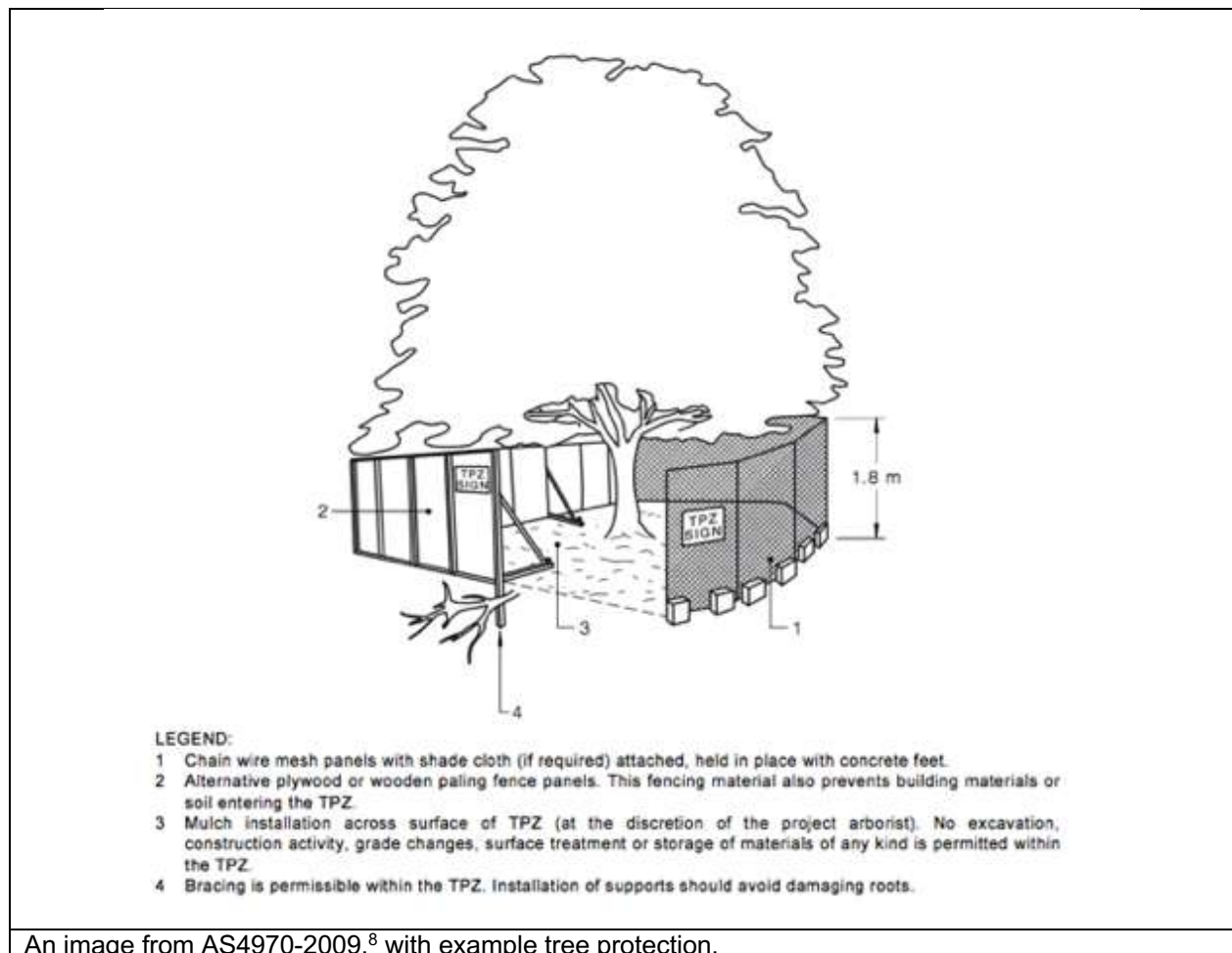
- Tree protection zone/No access.
- This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
- The name, address, and telephone number of the developer/builder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

11.6.4 Mulch: Any areas of the TPZ located inside the subject site 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

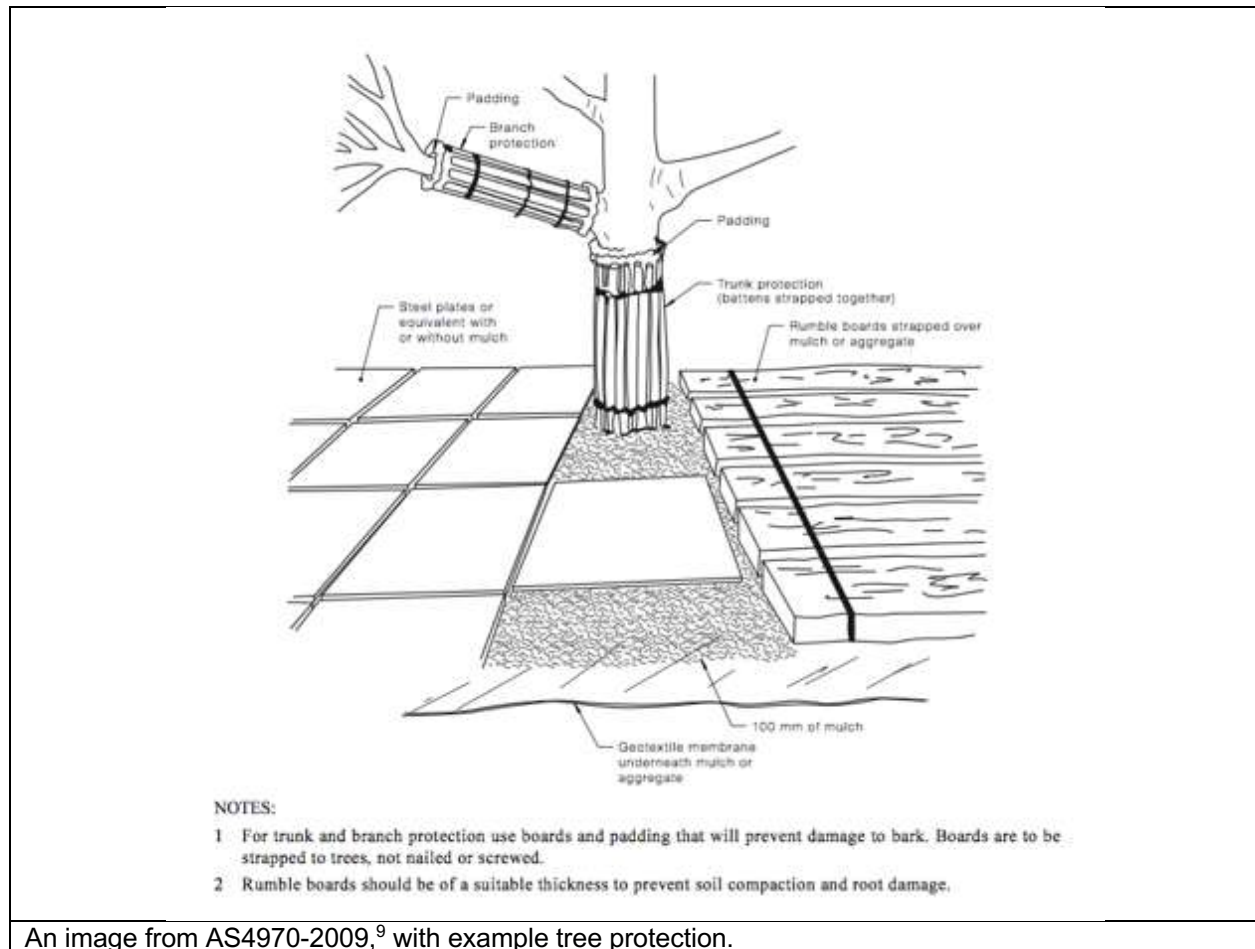
to be using the area, additional protection will be required such as rumble boards or track mats to spread the weight of the vehicle and avoid load points. Ground protection is to be specified and approved by the project Arborist as required.

- 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.



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

⁸ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.
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An image from AS4970-2009,⁹ with example tree protection.

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

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

⁹ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.
Site Address: IC3 Super West Data Centre, 17-23 Talavera Road, Macquarie Park, NSW.
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- 11.8 Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the 'top down, pull back' method.
- 11.9 Excavations:** The project Arborist must supervise and certify that all excavations and root pruning are in accordance with AS4373-2007 and AS4970-2009. For continuous strip footings, first manual excavation is required along the edge of the structures closest to the subject trees. Manual excavation should be a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by project Arborist). Next roots must be pruned back in accordance with AS4373-2007. After all root pruning is completed, machine excavation is permitted within the footprint of the structure. For tree sensitive footings, such as pier and beam, all excavations inside the TPZ must be manual. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. No pruning of roots greater 30mm in diameter is to be carried out without approval of the project arborist. All pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3. Root pruning is to be a clean cut with a sharp tool in accordance with AS4373 Pruning of amenity trees (2007).¹⁰ The tree root is to be pruned back to a branch root if possible. Make a clean cut and leave as small a wound as possible.
- 11.10 Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to 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 11.9.
 - 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 AS2303-2015 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.

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

- 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, considerer pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.
 - New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are 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 constructed carefully to avoid impacting significant roots. The location of fence posts should be flexible to allow for the retention of root greater than 40mm 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 service pipes 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 hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principal contractor should be responsible for implementing all tree protection requirements.

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. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. 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.	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.	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



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Site Location: 17-23 Talavera Rd
Macquarie Park NSW

SCALE :
1 : 250 @ A1

DATE :
5/7/2022



Plan Title: Appendix 1A -
Existing Site Plan

Prepared by: Jack Williams, Urban Arbor Pty Ltd

(A) EASEMENT TO DRAIN SEWAGE 4 WIDE AND
(B) EASEMENT TO DRAIN WATER 6.095 WIDE (D
(C) EASEMENT TO DRAIN WATER 3.5 WIDE (DP
(D) EASEMENT TO DRAIN WATER 2.0 WIDE (DP
(E) RESTRICTION ON THE USE OF LAND (DP 1
(F) RESTRICTION ON THE USE OF LAND (DP 6
(G) POSITIVE COVENANT (AH 14/7858)
(H) EASEMENT FOR ELECTRICITY AND OTHER PU
(I) RIGHT OF WAY LEASE A543686
(J) EASEMENT FOR ELECTRICITY PURPOSES A55

Map Legend

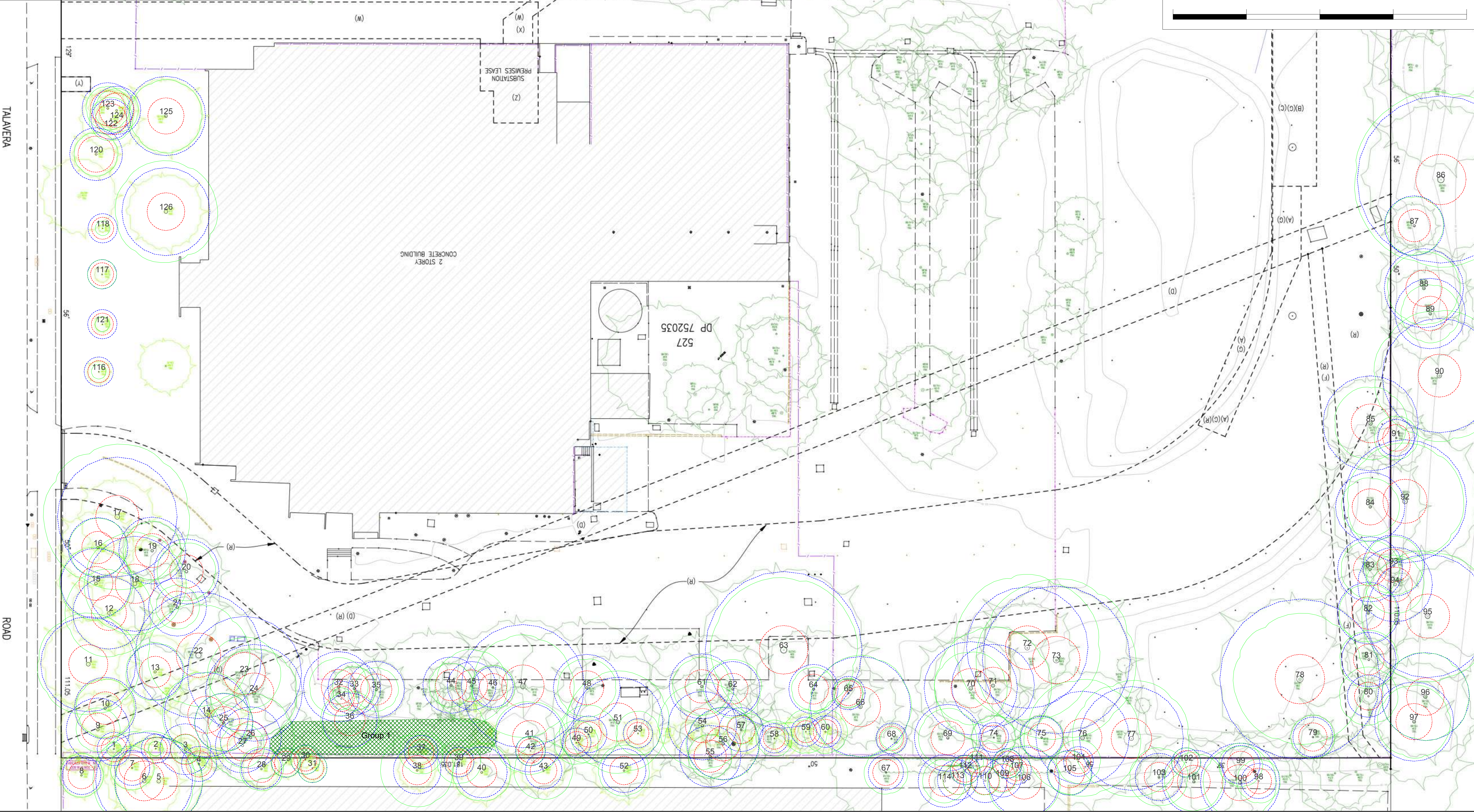
Tree Crown

Tree Protection Zone

Structural Root Zone

0

40m



Urban Arbor Pty Ltd

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Site Location: 17-23 Talavera Rd
Macquarie Park NSW

SCALE :
1 : 250 @ A1 DATE :
9/21/2022

Plan Title: Appendix 1B -
Proposed Site Plan

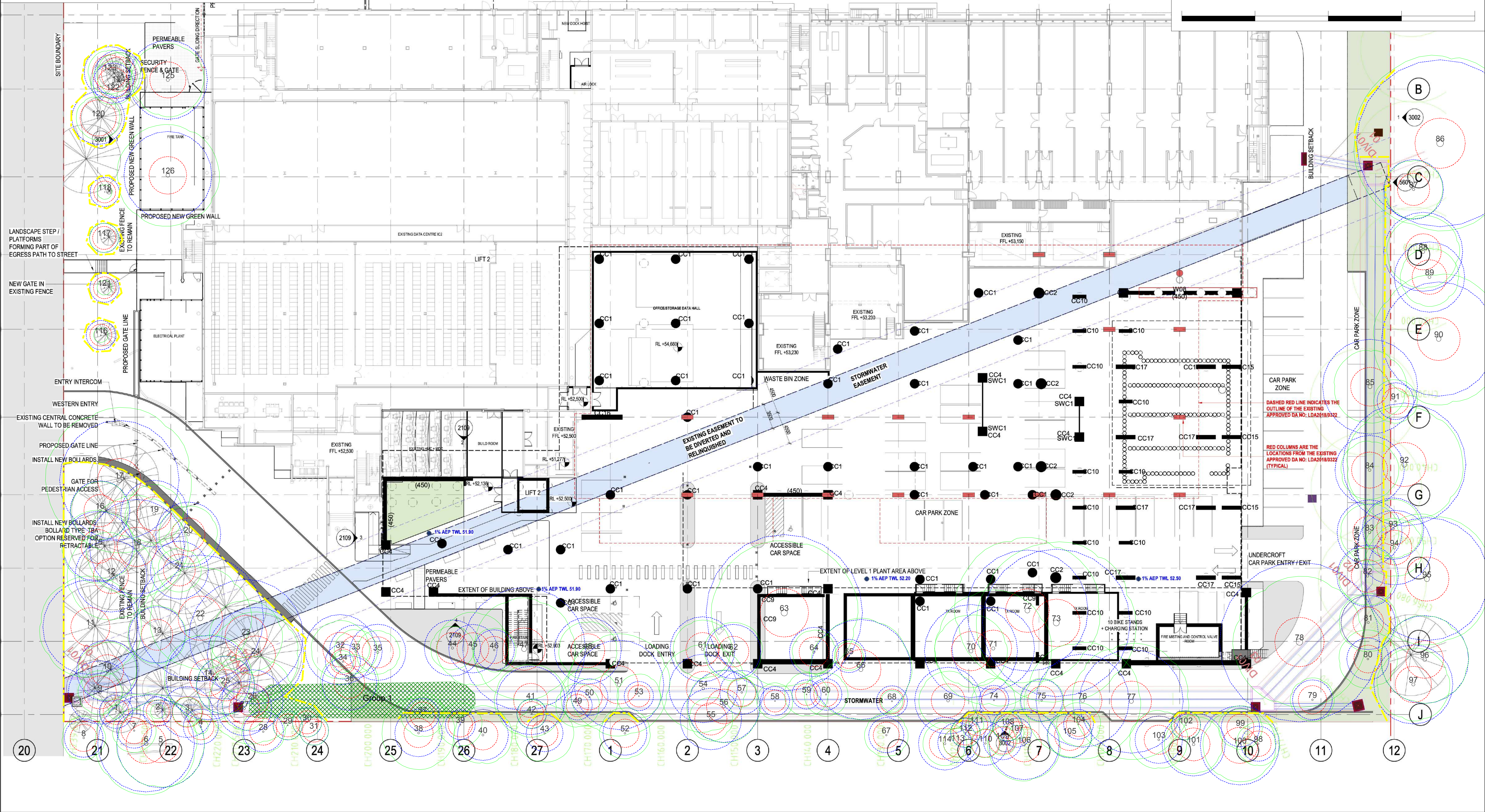
Prepared by: Jack Williams, Urban Arbor Pty Ltd



Map Legend

- Fencing
- Tree Crown
- Tree Protection Zone
- Structural Root Zone

0 40m



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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
1	Swamp Mahogany	<i>Eucalyptus robusta</i>	Semi-mature	9	1	190				190	220	Good	Good	Low	1. Long	Z1	2.3	1.8	None.
2	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	8	1	150				150	170	Good	Good	Low	1. Long	Z1	2.0	1.6	None.
3	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	11	2	290				290	330	Good	Good	Medium	1. Long	A1	3.5	2.1	None.
4	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	7	1	200				200	230	Good	Fair	Medium	2. Medium	Z10	2.4	1.8	Suppressed.
5	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	20	6	500				500	550	Good	Good	High	1. Long	AA	6.0	2.6	None.
6	Tallowood	<i>Eucalyptus microcorys</i>	Mature	15	7	550				550	630	Good	Fair	High	1. Long	A1	6.6	2.7	Asymmetric crown shape.
7	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	7	3	200				200	230	Good	Good	Medium	1. Long	Z1	2.4	1.8	None.
8	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	11	3	220				220	250	Good	Fair	Medium	1. Long	A1	2.6	1.8	Co-dominant stems at 9m.
9	Swamp Mahogany	<i>Eucalyptus robusta</i>	Semi-mature	6	3	360				360	400	Fair	Poor	Medium	4. Remove	Z10	4.3	2.3	Main stem failed at 3m.
10	Swamp Mahogany	<i>Eucalyptus robusta</i>	Semi-mature	9	4	350				350	390	Good	Good	Medium	1. Long	A1	4.2	2.2	None.
11	Eucalypt	<i>Eucalyptus spp</i>	Mature	16	7	540				540	600	Good	Fair	High	1. Long	AA	6.5	2.7	Asymmetric crown shape and minor trunk lean.
12	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	14	6	410				410	460	Good	Fair	High	2. Medium	A1	4.9	2.4	Asymmetric crown shape. Co-dominant stems at 1.5m.
13	Grey Gum	<i>Eucalyptus punctata</i>	Mature	10	4	320				320	350	Fair	Good	High	2. Medium	A2	3.8	2.1	Reduced foliage density for species.
14	Cedar Wattle	<i>Acacia elata</i>	Mature	12	6	480				480	530	Good	Fair	Medium	2. Medium	A1	5.8	2.5	Asymmetric crown shape.
15	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	12	5	400				400	430	Good	Fair	Medium	2. Medium	A1	4.8	2.3	Asymmetric crown shape.
16	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	4	340				340	380	Good	Good	Medium	1. Long	A1	4.1	2.2	None.
17	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	21	10	680				680	760	Good	Good	High	1. Long	AA	8.2	2.9	Significant diameter deadwood.
18	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	22	7	540				540	610	Good	Good	High	1. Long	AA	6.5	2.7	None.
19	Swamp Oak	<i>Casuarina glauca</i>	Mature	12	4	380				380	430	Good	Good	Medium	1. Long	A1	4.6	2.3	DBH estimated.
20	Swamp Oak	<i>Casuarina glauca</i>	Mature	13	4	370				370	410	Good	Good	Medium	1. Long	A1	4.4	2.3	DBH estimated.
21	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	3	330				330	370	Poor	Poor	Low	4. Remove	Z4	4.0	2.2	Dead tree. DBH estimated.
22	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	22	7	720				720	810	Good	Good	High	1. Long	AA	8.6	3.0	DBH estimated.
23	Swamp Oak	<i>Casuarina glauca</i>	Mature	18	5	650				650	720	Good	Good	High	1. Long	AA	7.8	2.9	DBH estimated.
24	Grey Gum	<i>Eucalyptus punctata</i>	Mature	17	6	550				550	620	Fair	Fair	High	2. Medium	A2	6.6	2.7	DBH estimated. Trunk lean. Reduced foliage density for species. Co-dominant stems at 5m.
25	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	18	4	330				330	360	Good	Fair	High	2. Medium	A2	4.0	2.2	Co-dominant stems at 5m.
26	Blackbutt	<i>Eucalyptus pilularis</i>	Semi-mature	15	6	350				350	390	Good	Fair	High	2. Medium	A1	4.2	2.2	Asymmetric crown shape.
27	Swamp Oak	<i>Casuarina glauca</i>	Mature	18	3	310				310	340	Good	Good	Medium	1. Long	A1	3.7	2.1	None.
28	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	8	3	230				230	250	Good	Fair	Medium	2. Medium	Z10	2.8	1.8	Suppressed. Located in adjoining property.
29	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	6	2	150				150	170	Good	Good	Low	1. Long	Z1	2.0	1.6	Located in adjoining property.
30	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	6	2	150				150	170	Good	Good	Low	1. Long	Z1	2.0	1.6	Located in adjoining property.
31	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	6	2	140				140	170	Good	Fair	Low	2. Medium	Z1	2.0	1.6	Located in adjoining property. Trunk lean.
32	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	10	4	400				400	450	Good	Fair	Medium	1. Long	A1	4.8	2.4	Co-dominant stems at 3m. DBH estimated.
33	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	3	300				300	340	Good	Good	Medium	1. Long	A1	3.6	2.1	DBH estimated.
34	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	11	1.5	200				200	220	Fair	Fair	Medium	2. Medium	Z10	2.4	1.8	Not marked on survey. DBH estimated. Suppressed.
35	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	3	320				320	350	Good	Good	Medium	1. Long	A1	3.8	2.1	DBH estimated.
36	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	13	4	310				310	340	Good	Fair	Medium	1. Long	A1	3.7	2.1	Co-dominant stems at 6m.
37	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	10	3	190				190	220	Good	Poor	Medium	4. Remove	Z10	2.3	1.8	Trunk failed at 8m, weak/unstable regrowth.
38	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	13	5	270				270	300	Good	Good	Medium	1. Long	A1	3.2	2.0	Located in adjoining property.
39	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	9	3	170				170	200	Good	Good	Medium	1. Long	A1	2.0	1.7	Located in adjoining property.
40	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	12	4	290				290	320	Fair	Good	Medium	2. Medium	A2	3.5	2.1	Located in adjoining property. Low foliage density for species.
41	Red Ironbark	<i>Eucalyptus sideroxylon</i>	Mature	15	5	390				390	440	Good	Fair	High	1. Long	A1	4.7	2.3	Co-dominant stems at 3m.
42	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	8	2	170				170	190	Fair	Fair	Medium	2. Medium	Z10	2.0	1.6	Not marked on survey. Suppressed.
43	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	10	4	210				210	240	Good	Good	Medium	1. Long	A1	2.5	1.8	Located in adjoining property.
44	Swamp Oak	<i>Casuarina glauca</i>	Mature	13	3	320				320	350	Good	Good	Medium	1. Long	A1	3.8	2.1	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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
45	Smooth Barked Apple	<i>Angophora costata</i>	Semi-mature	13	5	200	190			276	370	Fair	Fair	Medium	3. Short	Z10	3.3	2.2	DBH estimated. Suppressed form and early decline.
46	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	9	3	230				230	250	Good	Good	Medium	1. Long	A1	2.8	1.8	DBH estimated.
47	Smooth Barked Apple	<i>Angophora costata</i>	Mature	16	7	700				700	730	Good	Good	High	1. Long	AA	8.4	2.9	Co-dominant stems at 1m. DBH estimated.
48	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	4	380				380	430	Good	Good	Medium	1. Long	A1	4.6	2.3	DBH estimated.
49	Wattle	<i>Acacia spp</i>	Semi-mature	6	3	150				150	160	Fair	Fair	Low	2. Medium	Z1	2.0	1.5	None.
50	Wattle	<i>Acacia spp</i>	Mature	8	4	210				210	220	Good	Fair	Medium	2. Medium	Z1	2.5	1.8	Asymmetric crown shape.
51	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	22	7	510				510	570	Good	Good	High	1. Long	AA	6.1	2.6	None.
52	Tallowood	<i>Eucalyptus microcorys</i>	Semi-mature	9	3.5	250				250	280	Good	Good	Medium	1. Long	A1	3.0	1.9	Located in adjoining property.
53	Wattle	<i>Acacia spp</i>	Semi-mature	6	3	120				120	140	Good	Fair	Low	2. Medium	Z1	2.0	1.5	None.
54	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	20	6	390				390	440	Good	Good	High	1. Long	AA	4.7	2.3	None.
55	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	3	350				350	380	Good	Good	Medium	1. Long	A1	4.2	2.2	None.
56	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	21	5	410				410	450	Good	Good	High	1. Long	AA	4.9	2.4	None.
57	Dead Tree	<i>Dead tree</i>	Dead	6	2	250				250	270	Dead	Poor	Low	4. Remove	Z4	3.0	1.9	Dead tree.
58	Lilly Pilly	<i>Syzygium spp</i>	Semi-mature	5	2.5	120				120	140	Good	Good	Low	1. Long	Z1	2.0	1.5	None.
59	Wattle	<i>Acacia spp</i>	Semi-mature	6	3	130				130	140	Fair	Good	Low	2. Medium	Z1	2.0	1.5	None.
60	Wattle	<i>Acacia spp</i>	Semi-mature	6	3	180				180	200	Good	Fair	Low	2. Medium	Z1	2.2	1.7	None.
61	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	4	370				370	410	Good	Fair	Medium	2. Medium	A2	4.4	2.3	Co-dominant stems at 4m with included bark at union. DBH estimated.
62	Eucalypt	<i>Eucalyptus spp</i>	Semi-mature	10	4	310				310	340	Fair	Fair	Medium	2. Medium	A2	3.7	2.1	Asymmetric crown shape. Minor dieback in upper crown. DBH estimated.
63	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	22	10	700	550			890	1000	Good	Good	High	1. Long	AA	10.7	3.3	DBH estimated. Co-dominant stems at 500mm. Previous branch failure.
64	Swamp Oak	<i>Casuarina glauca</i>	Mature	14	3	280				280	320	Good	Good	Medium	1. Long	A1	3.4	2.1	DBH estimated.
65	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	11	2	190				190	210	Fair	Fair	Medium	3. Short	Z10	2.3	1.7	Slender form. Significant wounds on trunk.
66	Grey Gum	<i>Eucalyptus punctata</i>	Mature	15	7	570				570	640	Good	Fair	High	1. Long	A1	6.8	2.7	Asymmetric crown shape.
67	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	13	3	200				200	230	Good	Good	Medium	1. Long	A1	2.4	1.8	Located in adjoining property.
68	Lilly Pilly	<i>Syzygium spp</i>	Semi-mature	6	1.5	120	130			177	200	Fair	Fair	Low	2. Medium	Z1	2.1	1.7	None.
69	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	10	4	380				380	420	Good	Good	Medium	1. Long	A1	4.6	2.3	None.
70	Swamp Oak	<i>Casuarina glauca</i>	Mature	16	5	530				530	610	Good	Fair	High	1. Long	A1	6.4	2.7	Unable to view canopy at time of inspection due to construction site awning.
71	Rough Barked Apple	<i>Angophora floribunda</i>	Mature	16	8	470				470	520	Good	Fair	High	2. Medium	A1	5.6	2.5	Unable to view canopy at time of inspection due to construction site awning. Asymmetric crown shape.
72	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	20	10	690				690	780	Good	Good	High	1. Long	AA	8.3	3.0	Co-dominant stems at 3m.
73	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	24	11	840				840	950	Good	Good	High	1. Long	AA	10.1	3.2	None.
74	Lilly Pilly	<i>Syzygium spp</i>	Semi-mature	7	3	170				170	200	Good	Good	Low	1. Long	Z1	2.0	1.7	None.
75	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	8	3	240				240	270	Good	Good	Medium	1. Long	A1	2.9	1.9	None.
76	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	23	8	530				530	590	Poor	Fair	High	4. Remove	Z4	6.4	2.7	Health in advanced stages of decline, likely caused by extensive wounding/longicorn damage at base of trunk.
77	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	22	8	590				590	650	Fair	Fair	High	2. Medium	A2	7.1	2.8	Fungal bracket in wound on trunk at 4m.
78	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	20	9	910				910	1050	Good	Fair	High	2. Medium	AA	10.9	3.4	Minor wounds at base of trunk.
79	Lilly Pilly	<i>Syzygium spp</i>	Semi-mature	7	3	150	170			227	280	Good	Good	Low	2. Medium	Z1	2.7	1.9	None.
80	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	9	4	240				240	270	Good	Good	Medium	1. Long	A1	2.9	1.9	None.
81	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	9	4	310				310	340	Good	Good	Medium	1. Long	A1	3.7	2.1	None.
82	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	9	4	350				350	390	Good	Good	Medium	1. Long	A1	4.2	2.2	None.
83	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	9	4	370				370	410	Good	Fair	Medium	2. Medium	A1	4.4	2.3	Asymmetric crown shape.
84	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	9	4	230	250	200		394	500	Good	Fair	Medium	1. Long	A1	4.7	2.5	DBH estimated. Asymmetric crown shape.

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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
85	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	12	5	540				540	590	Good	Good	Medium	1. Long	AA	6.5	2.7	None.
86	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	27	12	950				950	1100	Good	Good	Very High	1. Long	AA	11.4	3.4	Located in adjoining property.
87	Lacebark	<i>Brachychiton discolor</i>	Mature	8	4	340				340	380	Good	Good	Medium	1. Long	A1	4.1	2.2	Located in adjoining property.
88	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	13	5	450				450	500	Good	Good	High	1. Long	AA	5.4	2.5	Located in adjoining property.
89	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	14	4	400				400	450	Good	Good	High	1. Long	AA	4.8	2.4	Located in adjoining property.
90	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	25	9	650				650	750	Good	Good	High	1. Long	AA	7.8	2.9	Located in adjoining property.
91	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	15	3	210				210	240	Good	Good	Medium	1. Long	A1	2.5	1.8	Located in adjoining property.
92	Tallowood	<i>Eucalyptus microcorys</i>	Mature	20	8	700				700	800	Good	Fair	High	1. Long	AA	8.4	3.0	Located in adjoining property.
93	Swamp Oak	<i>Casuarina glauca</i>	Mature	11	4	350				350	400	Good	Fair	Medium	2. Medium	A1	4.2	2.3	Located in adjoining property. Asymmetric crown shape.
94	Swamp Oak	<i>Casuarina glauca</i>	Mature	12	4	350	240			424	450	Good	Fair	Medium	1. Long	A1	5.1	2.4	Located in adjoining property. Asymmetric crown shape.
95	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	26	9	700				700	800	Good	Good	High	1. Long	AA	8.4	3.0	None.
96	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	18	6	500				500	550	Good	Good	High	1. Long	AA	6.0	2.6	Located in adjoining property.
97	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	15	5	450				450	500	Good	Fair	High	2. Medium	A1	5.4	2.5	Located in adjoining property.
98	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	7	3	200				200	220	Good	Good	Medium	1. Long	A1	2.4	1.8	Not marked on survey. Located in adjoining property.
99	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	8	3	220				220	250	Good	Good	Medium	1. Long	A1	2.6	1.8	Not marked on survey.
100	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	18	5	450				450	500	Good	Good	High	1. Long	AA	5.4	2.5	None.
101	Eucalypt	<i>Eucalyptus spp</i>	Semi-mature	14	4	360				360	400	Good	Good	High	1. Long	AA	4.3	2.3	Located in adjoining property.
102	Eucalypt	<i>Eucalyptus spp</i>	Semi-mature	8	2	150				150	180	Good	Fair	Medium	2. Medium	Z10	2.0	1.6	Located in adjoining property. Not marked on survey. Trunk lean.
103	Eucalypt	<i>Eucalyptus spp</i>	Semi-mature	10	4	270				270	300	Good	Good	Medium	1. Long	A1	3.2	2.0	Located in adjoining property.
104	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	7	3	170				170	200	Good	Good	Medium	1. Long	Z1	2.0	1.7	Located in adjoining property. Not marked on survey.
105	Broad Leaved Privet	<i>Ligustrum lucidum</i>	Mature	7	3	190	170			255	320	Good	Fair	Very Low	2. Medium	Z3	3.1	2.1	Located in adjoining property. Not marked on survey. Exempt species.
106	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	16	5	400				400	450	Good	Fair	High	1. Long	AA	4.8	2.4	Located in adjoining property. Not marked on survey. Asymmetric crown shape.
107	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	7	1	130				130	150	Good	Good	Low	1. Long	Z1	2.0	1.5	Located in adjoining property. Not marked on survey.
108	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	9	2	170				170	200	Good	Good	Medium	1. Long	A1	2.0	1.7	Located in adjoining property. Not marked on survey.
109	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	12	2	220				220	250	Good	Good	Medium	1. Long	A1	2.6	1.8	Located in adjoining property. Not marked on survey.
110	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	13	2	250				250	270	Good	Good	Medium	1. Long	A1	3.0	1.9	Located in adjoining property. Not marked on survey.
111	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	6	1	130				130	150	Good	Good	Low	1. Long	Z1	2.0	1.5	Located in adjoining property. Not marked on survey.
112	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	12	2	170				170	200	Good	Good	Medium	1. Long	A1	2.0	1.7	Located in adjoining property. Not marked on survey.
113	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	8	2	200	110			228	300	Good	Good	Medium	1. Long	A1	2.7	2.0	Located in adjoining property. Not marked on survey.
114	Turpentine	<i>Syncarpia glomulifera</i>	Semi-mature	9	3	300				300	330	Good	Good	Medium	1. Long	A1	3.6	2.1	Located in adjoining property. Not marked on survey.
116	Blueberry Ash	<i>Elaeocarpus reticulatus</i>	Semi-mature	7	1	130				130	150	Good	Good	Low	1. Long	Z1	2.0	1.5	None.
117	Blueberry Ash	<i>Elaeocarpus reticulatus</i>	Semi-mature	6	2	150				150	170	Good	Good	Low	1. Long	Z1	2.0	1.6	None.
118	Blueberry Ash	<i>Elaeocarpus reticulatus</i>	Semi-mature	5	1	70				70	90	Good	Good	Low	1. Long	Z1	2.0	1.5	None.
120	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	7	3	150	140	130	130	300	500	Good	Good	Medium	1. Long	A1	3.6	2.5	None.
121	Blueberry Ash	<i>Elaeocarpus reticulatus</i>	Semi-mature	7	1	110				110	130	Good	Good	Low	1. Long	Z1	2.0	1.5	None.
122	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	7	3	150	140	100		228	350	Good	Good	Medium	1. Long	A1	2.7	2.1	None.
123	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	7	3	200	160	140		292	450	Good	Good	Medium	1. Long	A1	3.5	2.4	None.
124	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	7	3	160	150	130	100	274	450	Good	Good	Medium	1. Long	A1	3.3	2.4	None.
125	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	17	5	450				450	500	Good	Good	High	1. Long	AA	5.4	2.5	DBH estimated.
126	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	18	7	500				500	550	Good	Good	High	1. Long	AA	6.0	2.6	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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
G1	Swamp Oak, Weeping Lilly Pilly, Wattle	<i>Casuarina glauca</i> , <i>Waterhousea floribunda</i> , <i>Acacia spp</i>	Semi-mature	-	-	-				-	-	Good	Good	Medium	2. Medium	A1	-	-	Group of trees not individually marked on survey. There is estimated to be approximately 10 x <i>Casuarina glauca</i> , 5 x <i>Waterhousea floribunda</i> , and 5 x <i>Acacia spp</i> trees within the group.

Explanatory Notes

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

Structural Root Zone (SRZ) - $(DAB \times 50)^{0.42} \times 0.64$. 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.

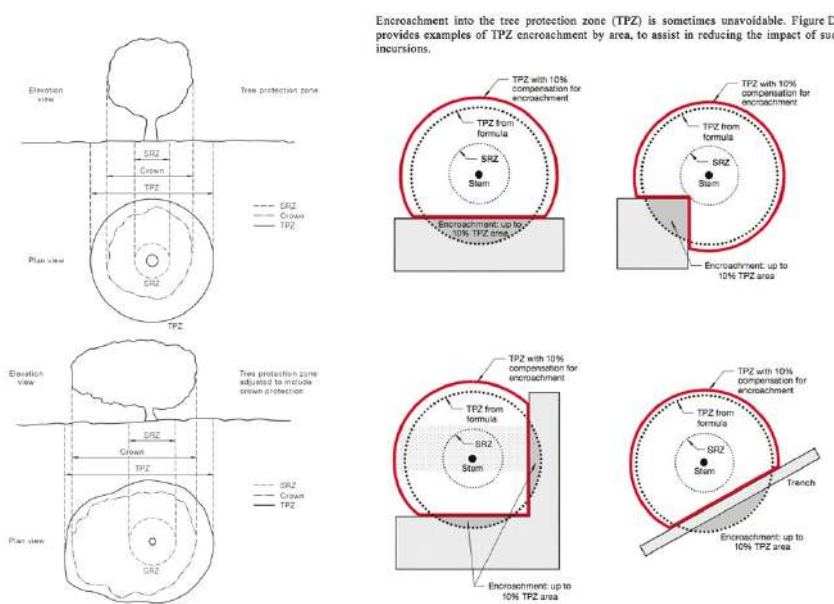
Retention Value: Tree AZ, see appendix 3 for categories.

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

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development. • Trees that have a life expectancy 40 or more years. 	<ul style="list-style-type: none"> • The tree is in average or above average health and condition and no remedial works are required except general maintenance.
Fair	<ul style="list-style-type: none"> • The tree may be starting to dieback or have over up to 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be signs of infection pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree. • Trees that may only live between 15 and 40 more years 	<ul style="list-style-type: none"> • The tree is in below average health and vigour and may require remedial works to improve the trees health.
Poor	<ul style="list-style-type: none"> • The may be in decline, have extensive dieback or have over 25% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health. • Trees that have useful life expectancy of less than 5 years. 	<ul style="list-style-type: none"> • The tree is displaying low levels of health and remedial action are unlikely to be sufficient to improve the health of the tree.
Dead	<ul style="list-style-type: none"> • The tree is dead or almost dead. 	<ul style="list-style-type: none"> • The tree should generally be removed.

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

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form. • Trees that have a life expectancy 40 or more years. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have structural defects. • The identified defects could potentially develop into more significant defects. • The tree may a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. • The tree may have suppressed form. • Trees that may only live between 15 and 40 more years 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.

Poor	<ul style="list-style-type: none"> • The tree has significant structural defects that cannot be alleviated. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. • Trees that have useful life expectancy of less than 5 years. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree and cannot be alleviated.
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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 size/dimensions of the tree.
 - The visibility of the tree to adjacent sites and visual prominence of the tree.
 - The age, growth rate and longevity of the tree.
 - The relationship between the tree and the site, including heritage and biodiversity status, or cultural/commentative trees.
 - Whether the tree is protected by any statutory conditions.
 - Whether tree is native, locally occurring or exotic.
 - The habitat value of the tree.
 - Whether the tree is considered a noxious weed or exempt 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 trees 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 40mm in diameter that are located along the edge of the structures footprint or in the location of footings. Root investigations must be carried out using non-invasive methods, such as manual excavations or ground penetrating radar (GPR). Any excavations for the root investigations must be carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.

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

TreeAZ Categories (Version 10.04-ANZ)

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

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

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

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

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

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

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

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

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

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

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

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

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

Glossary of Terms

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

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

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

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

Branch:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Sapwood - Living xylem tissues

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

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

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

SRZ (Structural Root Zone) - The area around the base of the tree required for the tree's 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