
Arboricultural Impact Assessment Report



Site location:
3A & 3B Smalls Road Ryde
NSW

Prepared for: Conrad Gargett Ancher
Mortlock Woolley

Prepared by: Jack Williams &
Bryce Claassens
Priority Tree Services
Date Prepared: 11 August 2017
Ref: 17/08/11/3BSRR

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Report on trees at: Smalls Road Site, 3B Smalls Road, Ryde, NSW.

Prepared for: Conrad Gargett Ancher Mortlock Woolley.

Prepared by: Bryce Claassens & Jack Williams, Priority Tree Services, sales@prioritytrees.com.au, (02) 9482 5353.

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1. EXECUTIVE SUMMARY

- 1.1 This report assesses the impact of a proposed development at the subject site to one hundred and fifty (150) trees located at the site, in accordance with AS4970 Protection of trees on development sites (2009).
- 1.2 In appendix 1 I have prepared a site plan, where I have overlaid the indicative TPZ/SRZ of the trees I assessed onto the proposed site plan provided by the client to assist with understanding tree constraints at the site and how the impact to trees has been assessed. This plan also shows site-specific tree protection.
- 1.3 Fifty-two (52) trees have been identified that will have to be removed to accommodate the development. Thirty four (34) of these trees are higher value category A retention value trees (Five of these trees have been awarded an increased 'AA' retention value rating due their high amenity and long SULE). Eighteen (18) of these trees are lower value category Z retention value trees that are not worthy of being a constraint to the development. See section 12.5 for trees to be removed.
- 1.4 An additional eight (8) trees have been identified to be removed in the landscape drawings, however each of these trees will be subject to an acceptable/minor impact from the development and could be retained. Each of these trees are identified as 'remove*' in the recommendations. These trees include tree 7, 43, 50, 51, 53, 88 121 and 131. Tree 50, 51, 53, 88, 121 and 131 are higher value category A retention value trees (tree 121 has been awarded an increased 'AA' retention value rating due to its high amenity and long SULE). Tree 7 and 43 are lower value category Z retention value trees.
- 1.5 Six (6) trees have been identified that will have to be removed to mitigate associated risks outlined in the Tree Hazard Assessment Report by Urban Arbor, dated 18 January 2017. These trees are all lower value category Z retention value trees including tree 14, 45, 59, 198A, 198B and 205.
- 1.6 All other trees assessed (eighty-four trees in total) have been identified to be retained and will be subject to an acceptable/minor impact from the development, providing all development works inside of the trees TPZ are carried out in accordance with this document. Each of these trees must be protected for the duration of the development in accordance with AS4970-2009 (see section 12 for more information).
- 1.7 All recommendations in this report are subject to approval by the relevant authorities and/or tree owners.

2. INTRODUCTION

- 2.1 Priority Tree Services have been instructed by Conrad Gargett Ancher Mortlock Woolley to inspect all significant trees located within or directly adjacent to the proposed works area and provide an Arboricultural Report in relation to a proposed development.
- 2.2 Below I have listed all documents and information used to assess the impact to trees in this report;
- A) Tree Hazard Assessment Report, Urban Arbor, 18 January 2017
 - B) Landscape Architectural Drawings, Conrad Gargett Ancher Mortlock Woolley, Smalls Road, Ryde Public School, Internal Project No. 16321, no date provided, including the following documents;
 - Tree Retention and Removal Plan, Drawing No. L0002.
 - VMP Tree Schedule, Drawing No. L0003.
 - Existing Site and Demolition Plan, Drawing No. 1003, Rev B.
 - Surface Finished Plan, Sheet 1, Drawing No. L0101, Rev A.
 - Finishes Schedule, Drawing No. L0011.
- 2.3 The trees were inspected during two site inspections on 25 July 2017 and 26 July 2017. Access was available to the subject site and adjoining public areas only. All tree data contained in this report was collected during this site inspection.
- 2.4 All tree numbers allocated in this report have been duplicated from the tree removal plan (Drawing No. L0002). There are several trees at site in the proposed development area that had not been identified on this plan, which are subject to protection under the Ryde LEP and DCP. Some of these trees have been included in this assessment, however only trees with a trunk diameter greater than 200mm meet criteria for inclusion. Each of these trees has been allocated a letter within the tree identification number, for example tree 74A is a tree that was not identified on the survey or site plans.

3. SCOPE OF THE REPORT

- 3.1 This report has been undertaken to meet the following objectives.
- 3.1.1 Conduct a visual assessment from ground level of all trees with a height equal or greater than 5 metres and a trunk diameter greater than 200mm, within the 'extent of works areas' identified in the landscape drawings (see section 2 for list of landscape drawing documents).
 - 3.1.2 Determine the trees estimated contribution years and remaining, useful life expectancy and award the trees a retention value.
 - 3.1.3 Provide an assessment of the potential impact the proposed development is likely to cause to the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).

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3.1.4 Specify tree protection measures in accordance with AS4970-2009 for any tree to be retained during the development.

4. LIMITATIONS

- 4.1 My observations and recommendations are based on one site inspection. The findings of this report are based on the observations and site conditions at the time of inspection.
- 4.2 All of my observations were carried out from ground level. I did not lift or remove any of the surrounding surfaces. I did not carry out any tests on the subject trees. I did not carry out any soil tests.
- 4.1 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.
- 4.2 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.
- 4.3 Tree identification is based on accessible visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where tree species is unknown, it is indicated with an *spp.*
- 4.4 All diagrams, plans and photographs included in this report are visual aids only, and are not to scale unless otherwise indicated.
- 4.5 Priority Tree Services neither guarantees, nor is it responsible for, the accuracy of information provided by others that is contained within this report.
- 4.6 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.
- 4.7 Alteration of this report invalidates the entire report.

5. METHODOLOGY

5.1 The following information was collected during the assessment of the subject tree(s) for development purposes.

- Tree common name
- Tree botanical name
- Tree age class
- DBH (Trunk/Stem diameter at breast height/1.4m) - millimetres.
- Estimated height - metres
- Estimated crown spread (diameter of crown) - metres
- Health
- Structural condition
- Amenity value
- Estimated remaining contribution years (SULE)¹
- Retention value (Tree AZ)²
- Notes/comments

5.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994), level 1.³

5.3 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 I used during the assessment were a nylon mallet, compass, camera and a steel probe.

5.4 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.

5.5 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

5.6 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).

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6. SITE LOCATION & BRIEF DESCRIPTION

6.1 The site is located in the suburb of Ryde, New South Wales. The site is located in the Ryde City Council LGA and all trees at the site are subject to protection under the Ryde Local Environmental Plan (RLEP) and Development Control Plan (RDCP) 2014.⁵ The site is not located inside a Heritage Conservation Area or form part of a heritage item or listed as environmental heritage in the RLEP heritage map. No trees at the site are listed on the significant tree register.

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

- 7.1 **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 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. In the appendices I have included additional information about the TPZ including information about calculating the TPZ and examples of TPZ encroachment.
- 7.2 **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. 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 appendices for more information about the SRZ.
- 7.3 **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.

⁵ Ryde Local Environmental Plan and Development Control Plan 2014, <http://www.legislation.nsw.gov.au/> Accessed 10 August 2017

7.4 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.

8. OBSERVATIONS

- 8.1 Tree information:** Details of each individual tree I have assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in appendix 2, where I have calculated the indicative tree protection zone (TPZ) for the subject trees. The TPZ and SRZ should be measured in radius from the centre of the trunk. I awarded the subject trees a retention value based on my observations. 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. I have included the Tree AZ categories sheet (Barrell Tree Consultancy) in the appendices to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline. This information has been summarised below.
- 8.2 Site plan:** In appendix 1 I have prepared a site plan, where I have overlaid the indicative TPZ/SRZ of the trees I assessed onto the proposed site plan provided by the client to assist with understanding tree constraints at the site and how the impact to trees has been assessed. This plan also shows site-specific tree protection.

9. ASSESSEMENT OF CONSTRUCTION IMPACTS

9.1 Table 1: In the table below I have discussed the impact of proposed development to all trees included in the report.

Tree ID	Botanical Name	Retention Value	TPZ Radius (m)	TPZ area (m ²)	SRZ Radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
7	<i>Cupressus macrocarpa</i>	Z9	12.0	452.4	3.4	None	Located in neighbouring property to the West. Tree identified to be removed on the demolition plan. No encroachment into TPZ. Neighbours tree that does not need to be removed for risk or for the proposed development.	Remove*
14	<i>Eucalyptus saligna</i>	Z4	11.4	408.3	3.3	None	Located in the Cerebral Palsy Alliance site. No encroachment into TPZ. However, tree has extensive dieback throughout the canopy with large dead branches overhanging the building and car park. The majority of the remaining live crown is epicormic stress growth, which is likely to become defective in the future. A large fungal bracket was identified on the trunk, indicating infection by a fungal pathogen, which is likely to be the cause of the crown dieback. Therefore, the tree is in decline and is recommended for removal due to associated risk.	Remove#
15	<i>Eucalyptus spp</i>	A1	7.0	152.2	2.7	None	Located in the Cerebral Palsy Alliance site. No encroachment into TPZ. Removal of adjacent tree 14 may affect future wind loading of tree.	Retain and protect
16	<i>Eucalyptus saligna</i>	Z9	13.2	547.4	3.6	None	Located in the Cerebral Palsy Alliance site. No encroachment into TPZ. Significant cambium damage/wounding is present on the North side of the trunk, indicating decay. Further internal decay testing is recommended to determine if the tree is structurally compromised.	Retain and protect
17	<i>Lophostemon confertus</i>	A1	3.7	42.0	2.5	None	Located in the Cerebral Palsy Alliance site. No encroachment into TPZ.	Retain and protect
43	<i>Jacaranda mimosifolia</i>	Z10	3.8	46.3	2.5	None	Located in the Cerebral Palsy Alliance site. Tree identified to be removed on the demolition plan. No encroachment into TPZ. If desired, tree retention is possible.	Remove*

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45	<i>Corymbia citriodora</i>	Z5	5.0	79.8	2.6	None	Located in the Cerebral Palsy Alliance site. No encroachment into TPZ. However, the trunk of the tree has previously failed or has been lopped at 7m, with a primary branch becoming the dominant stem with upright form. A decay column has formed at the point of the failed/removed stem, which extends into the union of the branch that has become dominant. This union appears structurally compromised and is a weak point in the tree that is likely to cause failure in the future. No suitable pruning option to alleviate the probability of failure from the defect and the tree is recommended for removal due to associated risk.	Remove#
50	<i>Cupaniopsis anacardioides</i>	A1	3.4	36.3	2.1	Major	Tree identified to be removed on demolition plan. If desired, tree retention is possible.	Remove*
51	<i>Lophostemon confertus</i>	A1	3.8	45.4	2.1	Major	Tree identified to be removed on demolition plan. If desired, tree retention is possible.	Remove*
52	<i>Eucalyptus nicholii</i>	Z4	6.7	141.0	2.7	Major	The proposed sandstone seating and concrete edge encroach into the TPZ by 31%, but not into the SRZ. This is considered to be a major encroachment. The trees health is currently in decline, therefore the tree will not respond well to the proposed works within the TPZ and the tree will not remain viable for retention.	Remove
53	<i>Grevillea robusta</i>	A2	3.2	32.2	2.0	Major	Tree identified to be removed on demolition plan. If desired, tree retention is possible.	Remove*
55	<i>Grevillea robusta</i>	A1	5.9	109.4	2.6	None	No encroachment into TPZ.	Retain and protect
56	<i>Ficus microcarpa var. hillii</i>	AA1	9.6	289.5	3.0	None	No encroachment into TPZ.	Retain and protect
57	<i>Lophostemon confertus</i>	Z4	5.9	109.4	2.7	None	No encroachment into TPZ.	Retain and protect
57A	<i>Corymbia gummifera</i>	AA1	3.6	40.7	2.1	None	Not marked on received plans. No encroachment into TPZ.	Retain and protect
58	<i>Liquidamber styraciflua</i>	A1	5.8	105.7	2.6	None	No encroachment into TPZ.	Retain and protect
59	<i>Eucalyptus nicholii</i>	Z4	7.2	162.9	2.8	None	Tree identified for removal on demolition plan. No encroachment into TPZ. However, the trees health was in decline at the time of the inspection with over 20% deadwood throughout the crown. Several large fungal brackets were identified on the trunk, indicating infection by a fungal pathogen, which is likely to be the cause of the crown dieback. The species is known to develop decay quickly when infected by fungal pathogens. Therefore, the tree is in decline and is recommended for removal due to associated risk.	Remove#

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60	<i>Schinus molle</i>	Z1	2.9	26.4	1.9	None	No encroachment into TPZ.	Retain and protect
61	<i>Liquidamber styraciflua</i>	Z9	8.8	243.3	3.1	None	No encroachment into TPZ.	Retain and protect
70	<i>Syzygium oleosum</i>	A1	4.7	69.4	2.3	None	No encroachment into TPZ.	Retain and protect
70A	<i>Syzygium oleosum</i>	A1	2.9	26.4	1.9	None	Not marked on received plans. No encroachment into TPZ.	Retain and protect
71	<i>Eucalyptus creba</i>	A1	4.8	72.4	2.4	None	No encroachment into TPZ.	Retain and protect
72	<i>Syzygium oleosum</i>	A1	4.1	52.8	2.2	None	No encroachment into TPZ.	Retain and protect
73	<i>Waterhousia floribunda</i>	A1	3.8	45.4	2.3	None	No encroachment into TPZ.	Retain and protect
74	<i>Cupaniopsis anacardioides</i>	A1	3.6	40.7	2.1	Major	To be removed on demolition plan. Trunk is located adjacent to proposed hard surfacing and building foundations.	Remove
74A	<i>Caesalpinia ferrea</i>	Z4	4.2	55.4	2.1	Major	Not marked on received plans. Trunk is located adjacent to proposed hard surfacing and building foundations.	Remove
75	<i>Grevillea robusta</i>	A1	4.9	75.4	2.4	None	No encroachment into TPZ.	Retain and protect
76	<i>Grevillea robusta</i>	Z2	7.2	162.9	2.8	Major	Demolition of adjacent building is likely to destabilize the tree.	Remove
77	<i>Tristaniopsis laurina</i>	A1	5.3	87.6	2.3	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
78	<i>Tristaniopsis laurina</i>	A1	2.8	24.7	2.0	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
79	<i>Tristaniopsis laurina</i>	A1	3.5	38.0	2.1	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
80	<i>Tristaniopsis laurina</i>	A1	3.0	28.3	1.9	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
81	<i>Tristaniopsis laurina</i>	A1	2.5	20.0	1.8	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
82	<i>Tristaniopsis laurina</i>	A1	4.1	52.3	2.1	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
83	<i>Tristaniopsis laurina</i>	A1	3.6	40.7	2.0	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
84	<i>Tristaniopsis laurina</i>	A1	2.8	23.9	1.9	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove

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85	<i>Tristaniopsis laurina</i>	A1	3.4	35.5	1.9	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
86	<i>Tristaniopsis laurina</i>	A1	2.4	18.1	2.0	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
87	<i>Tristaniopsis laurina</i>	A1	2.8	23.9	1.9	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
88	<i>Tristaniopsis laurina</i>	A1	3.1	30.6	2.0	None	Tree identified to be removed on demolition plan. No TPZ encroachment. If desired, tree retention is possible.	Remove*
94	<i>Corymbia maculata</i>	AA1	5.8	105.7	2.6	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
95	<i>Corymbia maculata</i>	AA1	6.5	132.7	2.7	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
96	<i>Lophostemon confertus</i>	A1	3.0	28.3	1.9	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
97	<i>Liquidamber styraciflua</i>	A1	5.6	98.5	2.6	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
98	<i>Cupressus spp</i>	Z4	4.2	55.4	2.1	Major	The proposed hard surfaced access path will encroach into the TPZ by 12% (6.7m ²), but not into the SRZ. This is considered to be a major encroachment. The trees health is currently in decline, therefore the tree will not respond well to the proposed works within the TPZ and the tree will not remain viable for retention.	Remove

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99	<i>Liquidamber styraciflua</i>	A1	7.8	191.1	2.9	Major	The proposed hard surfaced access path will encroach into the TPZ by 7% (13.1m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment under AS4970-2009 and will not significantly impact the tree. Remaining works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
100	<i>Corymbia maculata</i>	AA1	7.4	172.0	2.9	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
101	<i>Liquidamber styraciflua</i>	A2	6.1	116.9	2.7	Major	The proposed hard surfaced access path will encroach into the TPZ by 9% (10.3m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment under AS4970-2009 and will not significantly impact the tree. Remaining works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
102	<i>Bauhinia spp</i>	Z9	5.6	98.5	2.5	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. In some areas of the TPZ the landscaping will be replacing existing hard surface, therefore the condition of the tree may improve due to enhanced root growth conditions by increasing the availability of water, nutrients and air to the root system by reducing the percentage of the TPZ that is covered by hard surfacing.	Retain and protect
103	<i>Lophostemon confertus</i>	AA1	5.4	91.6	2.6	Footprint	To be removed on demolition plan. Trunk is located within the footprint of the proposed building.	Remove
104	<i>Caesalpinia ferrea</i>	A1	3.0	28.3	2.0	Major	To be removed on demolition plan. The proposed building will encroach into the TPZ by 35% (9.8m ²), and into the SRZ. This is considered to be a major encroachment, and if structural roots are severed within the SRZ the trees stability could be compromised. Under the current proposed development the tree will not remain viable for retention.	Remove

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105	<i>Caesalpinia ferrea</i>	A1	3.2	32.2	1.9	Major	To be removed on demolition plan. The proposed building will encroach into the TPZ by 54% (17.5m ²), and into the SRZ. This is considered to be a major encroachment, and if structural roots are severed within the SRZ the trees stability could be compromised. Under the current proposed development the tree will not remain viable for retention.	Remove
106	<i>Syzygium oleosum</i>	A1	2.9	26.4	1.9	Major	To be removed on demolition plan. Trunk is located adjacent to proposed hard surfacing.	Remove
107	<i>Syzygium oleosum</i>	A1	3.1	30.2	2.0	Major	To be removed on demolition plan. Trunk is located adjacent to proposed hard surfacing.	Remove
108	<i>Cupaniopsis anacardioides</i>	A1	4.3	58.1	2.3	Major	The proposed sandstone seating wall will encroach into the TPZ by 5% (3.1m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and providing the sandstone seating wall is constructed in accordance with section 9.3.1, it will not significantly impact the tree. Remaining works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
109	<i>Eucalyptus spp</i>	A1	4.8	72.4	2.4	Major	Proposed hard surfacing will encroach into the TPZ by 9% (6.4m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment as a single element and will not significantly impact the tree. The proposed gravel swale encroaches into the TPZ by 21%, however the gravel swale is a permeable material and providing the gravel swale is installed in accordance with section 9.3.5, it will not significantly impact the tree. Remaining encroachments include sandstone seating wall and amenity planting areas. Providing these are installed in accordance with section 9.3.1 and 9.3.4, the tree will not be significantly impacted.	Retain and protect

110	<i>Eucalyptus paniculata</i>	A1	5.5	95.0	2.6	Major	The proposed hard surfacing will encroach into the TPZ by 23% (22.2m ²), but not into the SRZ. This is considered to be a major encroachment, however, providing the hard surfacing is installed in accordance with section 9.3.2, the tree will not be significantly impacted. Remaining works inside the TPZ include concrete edging and landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the concrete edge must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
111	<i>Eucalyptus pilularis</i>	Z5	7.4	172.0	2.9	Major	The proposed hard surfacing will encroach into the TPZ by 11% (19.2m ²), but not into the SRZ. This is considered to be a major encroachment, however, providing the hard surfacing is installed in accordance with section 9.3.2, the tree will not be significantly impacted. Remaining works inside the TPZ include concrete edging and landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the concrete edge must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
111 A	<i>Waterhousia floribunda</i>	A1	4.1	52.8	2.1	Major	Not marked on received plans. Works inside the TPZ include concrete edging and landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the concrete edge must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
112	<i>Eucalyptus paniculata</i>	A1	7.8	191.1	3.0	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
113	<i>Cupaniopsis anacardioides</i>	A1	3.1	30.2	2.0	Footprint	To be removed on demolition plan. Trunk is located adjacent to proposed building.	Remove
114	<i>Corymbia citriodora</i>	AA1	7.6	181.5	3.0	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove

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115	<i>Lophostemon confertus</i>	A1	5.8	105.7	2.5	Major	The proposed gravel swale encroaches into the TPZ by 13%, however the gravel swale is a permeable material and providing the gravel swale is installed in accordance with section 9.3.5, it will not significantly impact the tree. Remaining encroachments include sandstone seating wall and amenity planting areas. Providing these are installed in accordance with section 9.3.1 and 9.3.4, the tree will not be significantly impacted.	Retain and protect
116	<i>Syzygium oleosum</i>	A1	2.6	21.2	1.9	Major	Proposed hard surfacing encroaches into the TPZ by 8% (1.7m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment as a single element and will not significantly impact the tree. Remaining encroachments include sandstone seating wall and amenity planting areas. Providing these are installed in accordance with section 9.3.1 and 9.3.4, the tree will not be significantly impacted.	Retain and protect
117	<i>Eucalyptus scoparia</i>	A2	5.2	84.9	2.4	Major	Works inside the TPZ include sandstone seating walls, concrete edging and landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the sandstone seating and concrete edge must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
118	<i>Eucalyptus microcorys</i>	Z9	6.2	120.8	2.6	Major	The proposed hard surfacing will encroach into the TPZ by 27% (33.1m ²), but not into the SRZ. This is considered to be a major encroachment, however, providing the hard surfacing is installed in accordance with section 9.3.2, the tree will not be significantly impacted. Remaining works inside the TPZ include sandstone seating walls and landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the sandstone seating wall must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
119	<i>Cupaniopsis anacardioides</i>	A1	3.7	43.0	2.2	Major	Proposed hard surfacing encroaches into the TPZ by 8% (3.25m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment as a single element and will not significantly impact the tree. Remaining encroachments include sandstone seating walls and amenity planting areas. Providing these are installed in accordance with section 9.3.1 and 9.3.4, the tree will not be significantly impacted.	Retain and protect

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120	<i>Ficus benjamina</i>	Z3	3.7	43.0	2.0	Major	The proposed hard surfacing will encroach into the TPZ by 12% (35.1m ²), but not into the SRZ. This is considered to be a major encroachment, however, providing the hard surfacing is installed in accordance with section 9.3.2, the tree will not be significantly impacted. Remaining works inside the TPZ include sandstone seating walls, concrete edging and landscaping to create a turfed area and new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the sandstone seating walls and concrete edging must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
121	<i>Corymbia maculata</i>	AA1	6.2	120.8	2.8	Minor	To be removed on demolition plan. The proposed building encroaches into the TPZ by 3% (4.2m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment under AS4970-2009 and will not significantly impact the tree. Remaining works inside the TPZ include landscaping to create a turfed area and new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Tree has been awarded an increased 'AA' retention value and can be retained with no design changes.	Remove*
121 A	<i>Lophostemon confertus</i>	A1	3.6	40.7	2.2	Major (landscape only)	Not marked on received plans. Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
122	<i>Eucalyptus punctata</i>	Z10	3.4	36.3	2.1	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
123	<i>Casuarina glauca</i>	Z4	4.8	72.4	2.5	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
124	<i>Melaleuca styphelioides</i>	A1	6.0	113.1	2.6	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
125	<i>Lophostemon confertus</i>	Z10	3.1	30.2	2.1	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
126	<i>Acacia spp</i>	Z5	4.1	52.8	2.2	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
127	<i>Eucalyptus robusta</i>	Z10	3.8	45.4	2.2	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove

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128	<i>Eucalyptus globulus</i>	A1	10.8	366.4	3.4	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
129	<i>Eucalyptus saligna</i>	Z4	5.0	78.5	2.5	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
130	<i>Eucalyptus saligna</i>	Z9	2.6	21.2	2.1	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
131	<i>Eucalyptus saligna</i>	A2	3.8	45.4	2.4	Minor	To be removed on demolition plan. The proposed building encroaches into the TPZ by less than 1%. If desired, tree retention is possible.	Remove*
132	<i>Eucalyptus saligna</i>	A1	4.8	72.4	2.4	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
133	<i>Liquidamber styraciflua</i>	A1	5.9	109.4	2.6	Major	The proposed hard surfaced access path will encroach into the TPZ by 7% (7.5m ²), but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment under AS4970-2009 and will not significantly impact the tree. Remaining works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4.	Retain and protect
134	<i>Eucalyptus creba</i>	AA1	4.2	55.4	2.3	Major (landscape only)	Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. In some areas of the TPZ the landscaping will be replacing existing hard surface, therefore the condition of the tree may improve due to enhanced root growth conditions by increasing the availability of water, nutrients and air to the root system by reducing the percentage of the TPZ that is covered by hard surfacing.	Retain and protect
134 A	<i>Bauhinia spp</i>	Z10	3.7	43.0	2.0	Major (landscape only)	Not marked on received plans. Works inside the TPZ include landscaping to create a turfed area and a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. In some areas of the TPZ the landscaping will be replacing existing hard surface, therefore the condition of the tree may improve due to enhanced root growth conditions by increasing the availability of water, nutrients and air to the root system by reducing the percentage of the TPZ that is covered by hard surfacing.	Retain and protect

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134 B	<i>Bauhinia spp</i>	Z2	3.2	32.2	2.7	Footprint	Not marked on received plans. Trunk is located within footprint of proposed hard surfacing.	Remove
135	<i>Pinus patula</i>	AA1	9.4	277.6	3.3	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed hard surfacing.	Remove
136	<i>Eucalyptus scoparia</i>	A1	8.2	211.2	3.0	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed hard surfacing.	Remove
137	<i>Bauhinia spp</i>	Z2	4.1	52.8	2.7	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
138	<i>Bauhinia spp</i>	Z10	3.6	40.7	2.1	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
139	<i>Callistemon saligna</i>	A1	3.6	40.7	2.1	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
140	<i>Grevillea robusta</i>	A1	2.5	19.6	1.9	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed hard surfacing.	Remove
141	<i>Callistemon viminalis</i>	A1	3.4	36.3	2.0	Major	The proposed hard surfacing will encroach into the TPZ by 10% (3.7m ²), but not into the SRZ. This is considered to be a minor and acceptable encroachment and providing the hard surfacing is installed in accordance with section 9.3.2, the tree will not be significantly impacted. Remaining works inside the TPZ include sandstone seating walls and landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the sandstone seating walls and concrete edging must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect

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142	<i>Eucalyptus cinerea</i>	A1	6.0	113.1	2.8	Major	The proposed hard surfacing will encroach into the TPZ by 3% (3m ²), but not into the SRZ. This is considered to be a minor and acceptable encroachment and providing the hard surfacing is installed in accordance with section 9.3.2, the tree will not be significantly impacted. Remaining works inside the TPZ include sandstone seating walls, concrete edging, sandstone boulders and landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. Installation of the sandstone seating walls and concrete edging must be in accordance with section 9.3.1. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.3 and 9.3.4. Installation of the sandstone boulders must be in accordance with section 9.3.5.	Retain and protect
143	<i>Eucalyptus scoparia</i>	A1	6.0	113.1	2.6	Major	To be removed on demolition plan. Trunk is located adjacent to proposed building.	Remove
144	<i>Corymbia maculata</i>	AA1	6.6	136.9	2.8	Footprint	To be removed on demolition plan. Trunk is located within footprint of proposed building.	Remove
145	<i>Lophostemon confertus</i>	A1	3.5	38.0	2.2	None	No encroachment into TPZ.	Retain and protect
146	<i>Lophostemon confertus</i>	A1	2.4	18.1	1.9	None	No encroachment into TPZ.	Retain and protect
147	<i>Melaleuca styphelioides</i>	A1	3.8	46.3	2.4	None	No encroachment into TPZ.	Retain and protect
148	<i>Lophostemon confertus</i>	Z10	2.4	18.1	1.8	None	No encroachment into TPZ.	Retain and protect
149	<i>Lophostemon confertus</i>	Z10	2.0	13.1	1.7	None	No encroachment into TPZ.	Retain and protect
150	<i>Melaleuca styphelioides</i>	A1	4.0	50.2	2.4	None	No encroachment into TPZ.	Retain and protect
151	<i>Lophostemon confertus</i>	Z10	2.5	20.0	1.8	None	No encroachment into TPZ.	Retain and protect
152	<i>Lophostemon confertus</i>	A1	2.8	23.9	1.9	None	No encroachment into TPZ.	Retain and protect
153	<i>Lophostemon confertus</i>	A1	2.9	26.1	2.0	None	No encroachment into TPZ.	Retain and protect
154	<i>Caesalpinia ferrea</i>	A1	4.4	60.8	2.3	None	No encroachment into TPZ.	Retain and protect

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155	<i>Eucalyptus sideroxylon</i>	AA1	7.2	162.9	2.8	None	No encroachment into TPZ.	Retain and protect
156	<i>Caesalpinia ferrea</i>	A1	2.8	24.6	1.8	Footprint	Trunk is located in the footprint of the proposed extension of the car park.	Remove
157	<i>Caesalpinia ferrea</i>	A1	3.9	47.8	2.1	Footprint	Trunk is located in the footprint of the proposed extension of the car park.	Remove
158	<i>Liquidamber styraciflua</i>	A2	5.6	98.5	2.6	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
159	<i>Ficus microcarpa var. hillii</i>	A1	7.8	191.1	3.4	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
160	<i>Acacia binervia</i>	A1	2.6	21.2	1.8	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
161	<i>Tristaniopsis laurina</i>	Z10	3.8	45.4	2.4	Minor (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
162	<i>Liquidamber styraciflua</i>	Z9	7.0	153.9	2.8	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
163	<i>Camellia Sasanqua</i>	Z2	3.6	40.7	2.0	None	No encroachment into TPZ.	Retain and protect
164	<i>Bauhinia spp</i>	Z5	3.6	40.7	2.1	None	No encroachment into TPZ.	Retain and protect
165	<i>Callistemon viminalis</i>	Z5	3.7	43.0	2.2	None	No encroachment into TPZ.	Retain and protect
166	<i>Melaleuca styphelioides</i>	Z2	4.6	66.5	2.4	Footprint	Trunk is located in the footprint of the proposed extension of the car park.	Remove

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167	<i>Cupressus torulosa</i>	Z2	6.5	132.7	2.7	Footprint	Trunk is located in the footprint of the proposed extension of the car park.	Remove
168	<i>Syzygium paniculatum</i>	Z2	7.8	191.1	2.9	Major	To be removed on demolition plan. Trunk is located adjacent to proposed hard surfacing. Demolition of existing building will destabilize the tree.	Remove
169	<i>Cupressus sempervirens</i>	Z10	4.9	75.4	2.4	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
170	<i>Liquidamber styraciflua</i>	A1	6.8	145.3	2.8	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
171	<i>Eucalyptus paniculata</i>	Z4	2.9	26.4	1.9	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
172	<i>Cupressus spp</i>	Z1	4.8	72.4	2.3	Major (landscape only)	Works inside the TPZ include landscaping to create a new amenity planting bed, which will have minimal impact to the tree providing existing soil grades are not significantly altered. All landscaping inside the TPZ must be undertaken in accordance with section 9.3.4.	Retain and protect
173	<i>Bauhinia spp</i>	Z2	4.4	60.8	2.4	None	No encroachment into TPZ.	Retain and protect
174	<i>Bauhinia spp</i>	Z2	3.6	40.7	2.1	None	No encroachment into TPZ.	Retain and protect
175	<i>Caesalpinia ferrea</i>	A1	2.6	21.2	2.3	Major	To be removed on demolition plan. Trunk is located adjacent to the proposed building.	Remove
175 A	<i>Caesalpinia ferrea</i>	Z10	2.4	18.1	1.7	Major	To be removed on demolition plan. Trunk is located adjacent to the proposed building.	Remove
176	<i>Lophostemon confertus</i>	AA1	4.9	75.4	2.4	Major	To be removed on demolition plan. Trunk is adjacent to the proposed extension of the car park.	Remove
177	<i>Lophostemon confertus</i>	AA1	4.1	52.8	2.2	None	No encroachment into TPZ.	Retain and protect
178	<i>Lophostemon confertus</i>	AA1	4.3	58.1	2.3	None	No encroachment into TPZ.	Retain and protect

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179	<i>Syzygium oleosum</i>	A1	2.9	26.4	1.9	None	No encroachment into TPZ.	Retain and protect
180	<i>Tristaniopsis laurina</i>	A1	6.0	113.1	2.5	Major	To be removed on demolition plan. Trunk is adjacent to the proposed extension of the car park.	Remove
181	<i>Tristaniopsis laurina</i>	A1	4.8	72.4	2.3	Major	To be removed on demolition plan. Trunk is adjacent to the proposed extension of the car park.	Remove
182	<i>Lophostemon confertus</i>	A1	5.0	78.5	2.4	None	No encroachment into TPZ.	Retain and protect
183	<i>Acmena smithii</i>	A1	5.4	91.6	2.4	None	No encroachment into TPZ.	Retain and protect
198	<i>Grevillea robusta</i>	A1	5.4	91.6	2.5	None	No encroachment into TPZ.	Retain and protect
198 A	<i>Eucalyptus nicholii</i>	Z4	6.6	136.8	2.7	None	Not marked on received plans. No encroachment into TPZ. However, the trees health was in decline at the time of the inspection with over 20% deadwood throughout the crown. Several large fungal brackets were identified on the trunk, indicating infection by a fungal pathogen, which is likely to be the cause of the crown dieback. The species is known to develop decay quickly when infected by fungal pathogens. Therefore, the tree is in decline and is recommended for removal due to associated risk.	Remove#
198 B	<i>Eucalyptus haemastoma</i>	Z5	7.2	162.9	2.8	None	Not marked on received plans. No encroachment into TPZ. However, the tree leans significantly to the North, towards the parking bays. A significant cavity opening has been identified where the trunk lean is most significant, indicating internal decay. Due to the lean of the trunk, the cavity is in a location of the trunk that is subject to increased loading force and would become a likely point of failure even if decay was not present. The cavity is likely to cause trunk failure at this point in the future, therefore the tree is recommended for removal due to associated risk.	Remove#
201	<i>Lophostemon confertus</i>	A1	2.3	16.6	1.8	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
202	<i>Lophostemon confertus</i>	A1	2.4	18.1	1.8	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect

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203	<i>Lophostemon confertus</i>	A1	4.7	69.4	2.3	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
204	<i>Lophostemon confertus</i>	A1	2.3	16.6	1.8	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
205	<i>Eucalyptus spp</i>	Z9	7.4	172.0	2.9	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. However, there is a significant bark wound at 6m, indicating internal decay. A fungal bracket has also been identified in the wound, indicating infection by a fungal pathogen. The structural condition of the tree could not be determined through the visual inspection; therefore, further investigations are recommended. If further investigations are not feasible, the tree is recommended for removal based on associated risk.	Remove#
206	<i>Grevillea robusta</i>	Z9	3.5	38.5	2.1	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
207	<i>Corymbia maculata</i>	A1	3.2	32.2	2.1	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
208	<i>Corymbia maculata</i>	A1	2.0	12.6	1.7	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
209	<i>Corymbia maculata</i>	A1	6.2	120.8	2.7	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
210	<i>Corymbia maculata</i>	AA1	4.1	52.8	2.2	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect

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211	<i>Corymbia maculata</i>	AA1	6.0	113.1	2.7	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect
212	<i>Corymbia maculata</i>	A1	4.2	55.4	2.3	None	Located adjacent to the entrance of the Cerebral Palsy Alliance site. Not correctly plotted on survey. No proposed works within TPZ. If future works are proposed within the TPZ, trees in this area must be surveyed correctly.	Retain and protect

Notes

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

Remove*: Tree identified to be removed in landscape drawings, but could be retained in a viable condition with minor or no design modifications.

Remove#: Tree identified for mitigation action due to associated risks outlined in the Tree Hazard Assessment Report by Urban Arbor, dated 18 January 2017.

9.2 General Landscaping Requirements

New landscaping is proposed inside the TPZ of the majority of the trees at the site. If the trees are to be retained in a viable condition, the landscaping must be undertaken in a tree sensitive method to ensure trees are adversely impacted by the landscape construction.

- 9.2.1 Structural Root Zone: This is the area of structural woody roots around the base of trunk required for tree stability. No roots greater than 30mm inside the SRZ should be severed or damaged, unless the impact of the root pruning has been assessed and approved by the project Arborist.
- 9.2.2 Soil Grades: Existing soil grades inside the TPZ of trees to should not be significantly altered, to minimise impact to the trees root system. The existing soil grades inside the TPZ must be lowered by more than 50mm, as this could result in removing significant fibrous root mass, impacting the trees health and vigour. Where soil grades must be lowered by more than 50mm, consultation is required from the project Arborist to assess the impact to the individual tree(s). Soil level increases should also be minimised, as this can restrict the availability of water, nutrients and air to root system below. Soil level must not be increased by more than 100mm inside the TPZ, unless assessed and approved by the project Arborist.
- 9.2.3 Soil compaction: As described in AS4970-2009, apart from the actual removal of roots during excavation or trenching, soil compaction is one of the major causes of root damage on development sites. Compaction is defined as the loss of large pore spaces (macropores) within the soil with a net loss of total pore space. Macropores are essential for the exchange of gases between the soil air and the atmosphere (aeration) and the removal of excess water from the soil (drainage). Soil compaction must be minimised during the development works.
- 9.2.4 Demolition/Removal of existing hard surfaces/structures: 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/hard surface 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 lowest layers of sub base of are to be carefully removed in maximum 50mm to minimise potential damage to the underlying root system. Existing turf must be removed manually inside the TPZ.
- 9.2.5 Soil preparation: Any cultivation of soil inside the TPZ of trees to be retained in preparation for laying turf/grass must be undertaken manually. The soil should be carefully forked through, and approximately 20% organic matter introduced to improve soil condition. Roots greater than 30mm in diameter should be retained. After any existing hard surfaces are and sub based are removed, good quality top soil free of contaminants should be used to fill in the excavated area and bring flush with surrounding levels within new landscape areas. Soil must be imported and spread manually, when the underlying soil conditions are dry to avoid compaction of the soil profile.

9.2.6 Sub base Materials: Where sub base is used inside the TPZ of trees to be retained, sub base material should be a coarse aggregate/granular material that does not restrict the flow of water and air to the root system below. A layer of permeable geotextile fabric should be placed over the soil surface, between the soil and lowest level of sub base. Where hard surfaces are being replaced with new hard surfacing, the lowest layers of sub base should be retained and re used to avoid unnecessary root disturbance.

9.3 Site Specific Landscaping Specifications

9.3.1 Sandstone Seating Walls/Concrete Edging: Where these are located inside the TPZ of trees to be retained, special care is required during the construction to ensure trees are not impacted. If excavation is required to construct a continuous strip footing, the project arborist must assess the impact of any required root pruning to the condition of the tree. Where practical, sub base must be located no more than 50mm below existing soil grades to minimise required root pruning. If the root pruning will impact the tree, the location of the sandstone seating or concrete edging will have to be modified to avoid the root, or the root should be bridged over using a lintel or similar.

9.3.2 New Paving/Decorative Gravel/Hard Surfaces: To ensure that tree root systems are not significantly impacted, all new hard surfaces should be constructed on or above existing soil grades. If the new hard surface is replacing an existing hard surface, the existing sub base should be retained where possible to minimise root disturbance. Compaction of lowest sub base materials must be minimised, as this can cause soil compaction and impact the health of trees. Sub base must be in accordance with section 9.2.6.

9.3.3 Turf Cells/Amenity Grass: Soil preparation must be in accordance with section 9.2.5. Roots greater than 30mm in diameter should be retained. Water saving crystals must not be used in the TPZ of trees to be retained, as these can draw moisture from tree roots and damage the trees health.

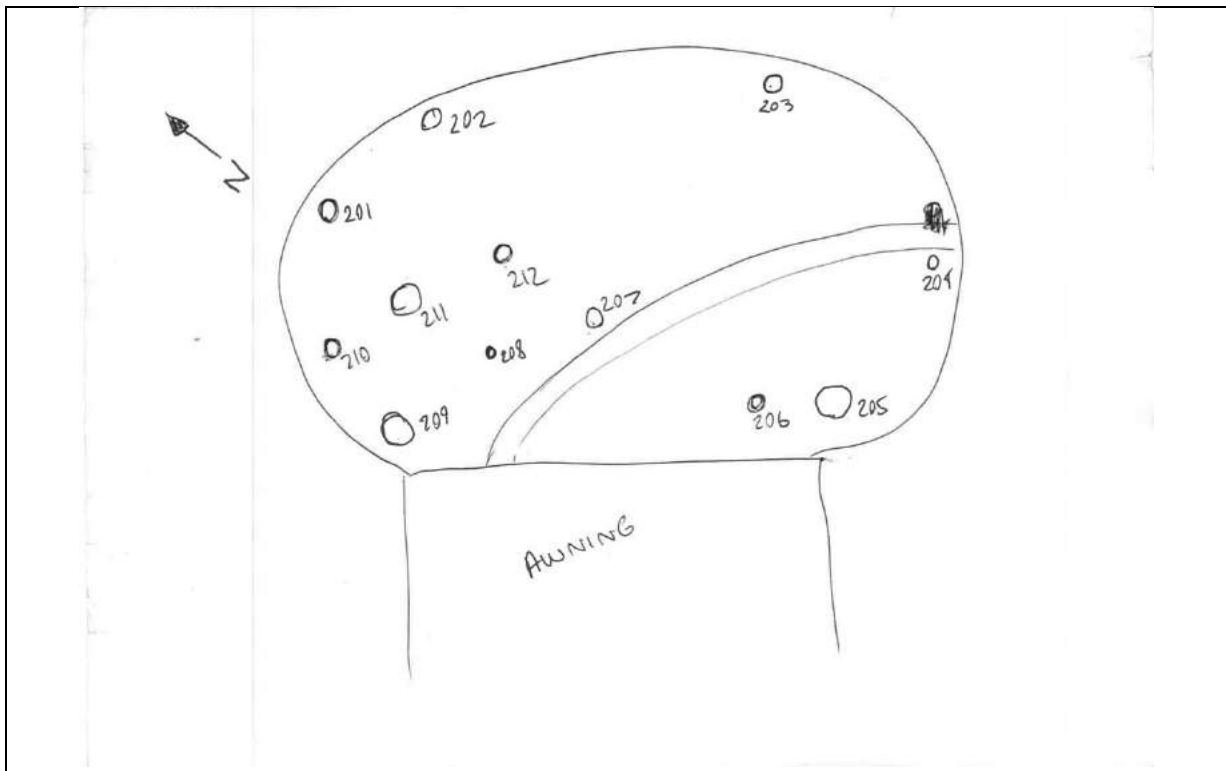
9.3.4 Amenity Planting Areas: The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter. Any replacement trees must be selected in accordance with AS2303-2015 Tree stock for landscape use. Soil preparation in accordance with section 9.2.5.

9.3.5 Gravel Swale/Sandstone Boulders: Where practical, the river pebbles for the gravel swale and sandstone boulders must be installed above grade. Where this is not possible the depth of the gravel swale and sandstone boulders must not exceed 50mm below existing soil grades, to minimise required root pruning. If the root pruning will impact the tree, the location of the gravel swale and sandstone boulders will have to be modified to avoid the root.

9.3.6 Drainage pipes/Underground services: Where possible underground services and drainage pipes should be located outside the TPZ of trees to be retained. Where this is not possible, they 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. Section 4.5.5 of AS4970-2009 says that 'The

directional drilling bore should be at least 600 mm deep. The project Arborist should assess the likely impacts of boring and bore pits on retained trees. For manual excavation of trenches the project Arborist should advise on roots to be retained and should monitor the works'.⁶ Roots greater than 30mm should be retained and the pipe threaded above/below the roots to allow for their retention.

- 9.3.7 Tree 201-212: These trees are located in the Cerebral Palsy Alliance site. The trees are numbered tree 19, 20, 21, 22, 23, 24 28, 29 and 30 on the tree removal and retention plan. However, the trees in this location have been incorrectly plotted on the tree removal and retention plan, the trees present on site do not match trees identified on the plan. Therefore, it is recommended the trees in this area are re assessed in relation to trees to be retained. The image below is a basic sketch showing the location of trees within the group. As there are additional trees, Priority Tree Services have assigned a new tree number to each tree, sequential from 201 to 212.



⁶ Council Of Standards Australia, AS 4970 Protection of trees on development sites (2009) page 18.

10. CONCLUSIONS

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

Impact	Reason	Category A		Category Z
		AA	A	Z
Trees to be removed	Unacceptable impact from building construction, new surfacing and/or proximity.	56, 57A, 94, 95, 100, 134, 155, 177, 178, 210, 211 (Eleven trees)	74, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 104, 105, 106, 107, 112, 113, 124, 128, 136, 139, 140, 143, 156, 157, 175, 180, 181 (Twenty nine trees)	52, 74A, 76, 98, 122, 123, 125, 126, 127, 129, 130, 134B, 137, 138, 166, 167, 168, 175A (Eighteen trees)
Trees to be removed in landscape drawings, which could be retained in a viable condition with no/minimal design modifications	Removal of existing surfacing/structures and/or installation of new surfacing/structures	121 (One tree)	50, 51, 53, 88, 131 (Five trees)	7, 43 (Two trees)
Tree to be removed, identified in the Tree Hazard Assessment Report by Urban Arbor	Recommendations to mitigate associated risk	(None)	(None)	14, 45, 59, 198A, 198B, 205 (Six trees)
Trees to be retained subject to acceptable development impact	Removal of existing surfacing/structures and/or installation of new surfacing/structures	56, 57A, 94, 95, 100, 134, 155, 177, 178, 210, 211 (Eleven trees)	15, 17, 55, 58, 70, 70A, 71, 72, 73, 75, 96, 97, 99, 101, 108, 109, 110, 111A, 115, 116, 117, 119, 121A, 132, 133, 141, 142, 145, 146, 147, 150, 152, 153, 154, 158, 159, 160, 170, 179, 182, 183, 198, 201, 202, 203, 204, 207, 208, 209, 212 (Fifty trees)	16, 57, 60, 61, 102, 111, 118, 120, 134A, 148, 149, 151, 161, 162, 163, 164, 165, 169, 171, 172, 173, 174, 206 (Twenty three trees)

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11. RECOMMENDATIONS

- 11.1 This report assesses the impact of a proposed development at the subject site to one hundred and fifty (150) trees located at the site, in accordance with AS4970 Protection of trees on development sites (2009).
- 11.2 In appendix 1 I have prepared a site plan, where I have overlaid the indicative TPZ/SRZ of the trees I assessed onto the proposed site plan provided by the client to assist with understanding tree constraints at the site and how the impact to trees has been assessed. This plan also shows site-specific tree protection.
- 11.3 Fifty-two (52) trees have been identified that will have to be removed to accommodate the development. Thirty four (34) of these trees are higher value category A retention value trees (Five of these trees have been awarded an increased 'AA' retention value rating due their high amenity and long SULE). Eighteen (18) of these trees are lower value category Z retention value trees that are not worthy of being a constraint to the development. See section 12.5 for trees to be removed.
- 11.4 An additional eight (8) trees have been identified to be removed in the landscape drawings, however each of these trees will be subject to an acceptable/minor impact from the development and could be retained. Each of these trees are identified as 'remove*' in the recommendations. These trees include tree 7, 43, 50, 51, 53, 88 121 and 131. Tree 50, 51, 53, 88, 121 and 131 are higher value category A retention value trees (tree 121 has been awarded an increased 'AA' retention value rating due to its high amenity and long SULE). Tree 7 and 43 are lower value category Z retention value trees.
- 11.5 Six (6) trees have been identified that will have to be removed to mitigate associated risks outlined in the Tree Hazard Assessment Report by Urban Arbor, dated 18 January 2017. Each of these trees are identified as 'remove#' in the recommendations. These trees are all lower value category Z retention value trees including tree 14, 45, 59, 198A, 198B and 205.
- 11.6 All other trees assessed (eighty-four trees in total) have been identified to be retained and will be subject to an acceptable/minor impact from the development, providing all development works inside of the trees TPZ are carried out in accordance with this document. Each of these trees must be protected for the duration of the development in accordance with AS4970-2009 (see section 12 for more information).
- 11.7 All recommendations in this report are subject to approval by the relevant authorities and/or tree owners.

12. TREE PROTECTION REQUIREMENTS

- 12.1 **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 proposed site plan (PSP - Appendix 1) drawing must also be made available to any contractor prior to works commencing and during any on site operations.
- 12.2 **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.
- 12.3 **Tree work:** All tree work must be carried out by a qualified and experienced Arborist with a minimum of AQF level 2 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).
- 12.4 **Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. I recommend site inspections on a monthly frequency.
- 12.5 **Site Specific Tree Protection Recommendations:** The table below provides recommendations for each tree, including site specific tree protection requirements. All tree to be retained must be protected in accordance with general requirements of AS4970-2009 of for the duration of the development, details of which are discussed in further details in this section of the report.

Tree ID	Botanical Name	TPZ Radius (m)	SRZ Radius (m)	Recommendations
7	<i>Cupressus macrocarpa</i>	12.0	3.4	Remove*. Possible to retain.
14	<i>Eucalyptus saligna</i>	11.4	3.3	Remove# due to associated risk identified in Tree Hazard Assessment Report by Urban Arbor.
15	<i>Eucalyptus spp</i>	7.0	2.7	Retain. No fencing required. Set back significantly from proposed works.
16	<i>Eucalyptus saligna</i>	13.2	3.6	Retain. No fencing required. Set back significantly from proposed works.
17	<i>Lophostemon confertus</i>	3.7	2.5	Retain and protect. TPZ fencing to run along the perimeter of the TPZ (3.7m radius from centre of trunk) within site only. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
43	<i>Jacaranda mimosifolia</i>	3.8	2.5	Remove*. Possible to retain.
45	<i>Corymbia citriodora</i>	5.0	2.6	Remove# due to associated risk identified in Tree Hazard Assessment Report by Urban Arbor.

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50	<i>Cupaniopsis anacardioides</i>	3.4	2.1	Remove*. Possible to retain.
51	<i>Lophostemon confertus</i>	3.8	2.1	Remove*. Possible to retain.
52	<i>Eucalyptus nicholii</i>	6.7	2.7	Remove and replace.
53	<i>Grevillea robusta</i>	3.2	2.0	Remove*. Possible to retain.
55	<i>Grevillea robusta</i>	5.9	2.6	Retain. No fencing required. Set back significantly from proposed works.
56	<i>Ficus microcarpa var. hillii</i>	9.6	3.0	Retain. No fencing required. Set back significantly from proposed works.
57	<i>Lophostemon confertus</i>	5.9	2.7	Retain. No fencing required. Set back significantly from proposed works.
57A	<i>Corymbia gummifera</i>	3.6	2.1	Retain. No fencing required. Set back significantly from proposed works.
58	<i>Liquidamber styraciflua</i>	5.8	2.6	Retain. No fencing required. Set back significantly from proposed works.
59	<i>Eucalyptus nicholii</i>	7.2	2.8	Remove# due to associated risk identified in Tree Hazard Assessment Report by Urban Arbor.
60	<i>Schinus molle</i>	2.9	1.9	Retain. No fencing required. Set back significantly from proposed works.
61	<i>Liquidamber styraciflua</i>	8.8	3.1	Retain. No fencing required. Set back significantly from proposed works.
70	<i>Syzygium oleosum</i>	4.7	2.3	Retain and protect. Fencing to encompass trees grouped 70, 70A, 71, 72, 73 and 198. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
70A	<i>Syzygium oleosum</i>	2.9	1.9	Retain and protect. Fencing to encompass trees grouped 70, 70A, 71, 72, 73 and 198. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
71	<i>Eucalyptus creba</i>	4.8	2.4	Retain and protect. Fencing to encompass trees grouped 70, 70A, 71, 72, 73 and 198. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
72	<i>Syzygium oleosum</i>	4.1	2.2	Retain and protect. Fencing to encompass trees grouped 70, 70A, 71, 72, 73 and 198. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
73	<i>Waterhousia floribunda</i>	3.8	2.3	Retain and protect. Fencing to encompass trees grouped 70, 70A, 71, 72, 73 and 198. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
74	<i>Cupaniopsis anacardioides</i>	3.6	2.1	Remove and replace.
74A	<i>Caesalpinia ferrea</i>	4.2	2.1	Remove and replace.
75	<i>Grevillea robusta</i>	4.9	2.4	Retain and protect. Fencing to encompass the perimeter of the TPZ (4.9m radius from centre of trunk). Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
76	<i>Grevillea robusta</i>	7.2	2.8	Remove and replace.
77	<i>Tristaniopsis laurina</i>	5.3	2.3	Remove and replace.
78	<i>Tristaniopsis laurina</i>	2.8	2.0	Remove and replace.
79	<i>Tristaniopsis laurina</i>	3.5	2.1	Remove and replace.

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80	<i>Tristaniopsis laurina</i>	3.0	1.9	Remove and replace.
81	<i>Tristaniopsis laurina</i>	2.5	1.8	Remove and replace.
82	<i>Tristaniopsis laurina</i>	4.1	2.1	Remove and replace.
83	<i>Tristaniopsis laurina</i>	3.6	2.0	Remove and replace.
84	<i>Tristaniopsis laurina</i>	2.8	1.9	Remove and replace.
85	<i>Tristaniopsis laurina</i>	3.4	1.9	Remove and replace.
86	<i>Tristaniopsis laurina</i>	2.4	2.0	Remove and replace.
87	<i>Tristaniopsis laurina</i>	2.8	1.9	Remove and replace.
88	<i>Tristaniopsis laurina</i>	3.1	2.0	Remove*. Possible to retain.
94	<i>Corymbia maculata</i>	5.8	2.6	Retain and protect. Fencing to encompass trees grouped 94, 95, 96 and 121A. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
95	<i>Corymbia maculata</i>	6.5	2.7	Retain and protect. Fencing to encompass trees grouped 94, 95, 96 and 121A. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
96	<i>Lophostemon confertus</i>	3.0	1.9	Retain and protect. Fencing to encompass trees grouped 94, 95, 96 and 121A. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
97	<i>Liquidamber styraciflua</i>	5.6	2.6	Retain and protect. Fencing to encompass TPZ perimeter (5.6m radius from centre of trunk) within site only. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
98	<i>Cupressus spp</i>	4.2	2.1	Remove and replace.
99	<i>Liquidamber styraciflua</i>	7.8	2.9	Retain and protect. Fencing to encompass trees grouped 99 and 100 within site only. Fencing to the North East of tree 99 to run along the line of the proposed hard surfacing. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
100	<i>Corymbia maculata</i>	7.4	2.9	Retain and protect. Fencing to encompass trees grouped 99 and 100 within site only. Fencing to the North East of tree 99 to run along the line of the proposed hard surfacing. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
101	<i>Liquidamber styraciflua</i>	6.1	2.7	Retain and protect. Fencing to encompass trees grouped 101 and 102 within site only. Fencing to run along the edge of the existing driveway and along the edge of the proposed entrance path to the West of 101. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
102	<i>Bauhinia spp</i>	5.6	2.5	Retain and protect. Fencing to encompass trees grouped 101 and 102 within site only. Fencing to run along the edge of the existing driveway and

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				along the edge of the proposed entrance path to the West of 101. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
103	<i>Lophostemon confertus</i>	5.4	2.6	Remove and replace.
104	<i>Caesalpinia ferrea</i>	3.0	2.0	Remove and replace.
105	<i>Caesalpinia ferrea</i>	3.2	1.9	Remove and replace.
106	<i>Syzygium oleosum</i>	2.9	1.9	Remove and replace.
107	<i>Syzygium oleosum</i>	3.1	2.0	Remove and replace.
108	<i>Cupaniopsis anacardioides</i>	4.3	2.3	Retain and protect. Fencing to encompass trees grouped 108, 109, 110, 111, 111A, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
109	<i>Eucalyptus spp</i>	4.8	2.4	Retain and protect. Fencing to encompass trees grouped 108, 109, 110, 111, 111A, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
110	<i>Eucalyptus paniculata</i>	5.5	2.6	Retain and protect. Fencing to encompass trees grouped 108, 109, 110, 111, 111A, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
111	<i>Eucalyptus pilularis</i>	7.4	2.9	Retain and protect. Fencing to encompass trees grouped 108, 109, 110, 111, 111A, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
111A	<i>Waterhousia floribunda</i>	4.1	2.1	Retain and protect. Fencing to encompass trees grouped 108, 109, 110, 111, 111A, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
112	<i>Eucalyptus paniculata</i>	7.8	3.0	Remove and replace.
113	<i>Cupaniopsis anacardioides</i>	3.1	2.0	Remove and replace.
114	<i>Corymbia citriodora</i>	7.6	3.0	Remove and replace.
115	<i>Lophostemon confertus</i>	5.8	2.5	Retain and protect. Fencing to encompass trees grouped 108, 109, 110, 111, 111A, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
116	<i>Syzygium oleosum</i>	2.6	1.9	Retain and protect. Fencing to encompass trees grouped 108, 109, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
117	<i>Eucalyptus scoparia</i>	5.2	2.4	Fencing to encompass trees grouped 117, 118 and 120. Fencing only to be moved for demolition and landscaping under the supervision and approval of

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				project Arborist.
118	<i>Eucalyptus microcorys</i>	6.2	2.6	Fencing to encompass trees grouped 117, 118 and 120. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
119	<i>Cupaniopsis anacardioides</i>	3.7	2.2	Retain and protect. Fencing to encompass trees grouped 108, 109, 115, 116 and 119. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
120	<i>Ficus benjamina</i>	3.7	2.0	Fencing to encompass trees grouped 117, 118 and 120. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
121	<i>Corymbia maculata</i>	6.2	2.8	Remove*. Possible to retain.
121A	<i>Lophostemon confertus</i>	3.6	2.2	Retain and protect. Fencing to encompass trees grouped 94, 95, 96 and 121A. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
122	<i>Eucalyptus punctata</i>	3.4	2.1	Remove and replace.
123	<i>Casuarina glauca</i>	4.8	2.5	Remove and replace.
124	<i>Melaleuca styphelioides</i>	6.0	2.6	Remove and replace.
125	<i>Lophostemon confertus</i>	3.1	2.1	Remove and replace.
126	<i>Acacia spp</i>	4.1	2.2	Remove and replace.
127	<i>Eucalyptus robusta</i>	3.8	2.2	Remove and replace.
128	<i>Eucalyptus globulus</i>	10.8	3.4	Remove and replace.
129	<i>Eucalyptus saligna</i>	5.0	2.5	Remove and replace.
130	<i>Eucalyptus saligna</i>	2.6	2.1	Remove and replace.
131	<i>Eucalyptus saligna</i>	3.8	2.4	Remove*. Possible to retain.
132	<i>Eucalyptus saligna</i>	4.8	2.4	Retain and protect. Fencing to encompass TPZ perimeter (4.8m radius from centre of trunk). Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
133	<i>Liquidamber styraciflua</i>	5.9	2.6	Retain and protect. Fencing to encompass trees grouped 133, 134 and 134A within site only. Fencing to run along the edge of the existing driveway and along the edge of the proposed entrance path to the East of 133. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
134	<i>Eucalyptus creba</i>	4.2	2.3	Retain and protect. Fencing to encompass trees grouped 133, 134 and 134A within site only. Fencing to run along the edge of the existing driveway and along the edge of the proposed entrance path to the East of 133. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
134A	<i>Bauhinia spp</i>	3.7	2.0	Retain and protect. Fencing to encompass trees grouped 133, 134 and 134A within site only. Fencing to run along the edge of the existing

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				driveway and along the edge of the proposed entrance path to the East of 133. Fencing only to be moved for demolition of the existing driveway and landscaping under the supervision and approval of project Arborist.
134B	<i>Bauhinia spp</i>	3.2	2.7	Remove and replace.
135	<i>Pinus patula</i>	9.4	3.3	Remove and replace.
136	<i>Eucalyptus scoparia</i>	8.2	3.0	Remove and replace.
137	<i>Bauhinia spp</i>	4.1	2.7	Remove and replace.
138	<i>Bauhinia spp</i>	3.6	2.1	Remove and replace.
139	<i>Callistemon saligna</i>	3.6	2.1	Remove and replace.
140	<i>Grevillea robusta</i>	2.5	1.9	Remove and replace.
141	<i>Callistemon viminalis</i>	3.4	2.0	Fencing to encompass trees grouped 141 and 142. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
142	<i>Eucalyptus cinerea</i>	6.0	2.8	Fencing to encompass trees grouped 141 and 142. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
143	<i>Eucalyptus scoparia</i>	6.0	2.6	Remove and replace.
144	<i>Corymbia maculata</i>	6.6	2.8	Remove and replace.
145	<i>Lophostemon confertus</i>	3.5	2.2	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
146	<i>Lophostemon confertus</i>	2.4	1.9	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
147	<i>Melaleuca styphelioides</i>	3.8	2.4	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
148	<i>Lophostemon confertus</i>	2.4	1.8	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
149	<i>Lophostemon confertus</i>	2.0	1.7	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
150	<i>Melaleuca styphelioides</i>	4.0	2.4	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152

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				and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
151	<i>Lophostemon confertus</i>	2.5	1.8	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
152	<i>Lophostemon confertus</i>	2.8	1.9	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
153	<i>Lophostemon confertus</i>	2.9	2.0	Retain and protect. Fencing to encompass trees grouped 145, 146, 147, 148, 149, 150, 151, 152 and 153, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
154	<i>Caesalpinia ferrea</i>	4.4	2.3	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
155	<i>Eucalyptus sideroxylon</i>	7.2	2.8	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
156	<i>Caesalpinia ferrea</i>	2.8	1.8	Remove and replace.
157	<i>Caesalpinia ferrea</i>	3.9	2.1	Remove and replace.
158	<i>Liquidamber styraciflua</i>	5.6	2.6	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
159	<i>Ficus microcarpa var. hillii</i>	7.8	3.4	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
160	<i>Acacia binervia</i>	2.6	1.8	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
161	<i>Tristaniopsis laurina</i>	3.8	2.4	Retain and protect. Fencing to encompass trees

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				grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
162	<i>Liquidamber styraciflua</i>	7.0	2.8	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
163	<i>Camellia Sasanqua</i>	3.6	2.0	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
164	<i>Bauhinia spp</i>	3.6	2.1	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
165	<i>Callistemon viminalis</i>	3.7	2.2	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
166	<i>Melaleuca styphelioides</i>	4.6	2.4	Remove and replace.
167	<i>Cupressus torulosa</i>	6.5	2.7	Remove and replace.
168	<i>Syzygium paniculatum</i>	7.8	2.9	Remove and replace.
169	<i>Cupressus sempervirens</i>	4.9	2.4	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
170	<i>Liquidamber styraciflua</i>	6.8	2.8	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
171	<i>Eucalyptus paniculata</i>	2.9	1.9	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
172	<i>Cupressus spp</i>	4.8	2.3	Retain and protect. Fencing to encompass trees grouped 158, 159, 160, 161, 162, 169, 170, 171 and 172, within site only. Fencing to run along the edge of the existing driveway. Fencing only to be

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				moved for demolition and landscaping under the supervision and approval of project Arborist.
173	<i>Bauhinia spp</i>	4.4	2.4	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
174	<i>Bauhinia spp</i>	3.6	2.1	Retain and protect. Fencing to encompass trees grouped 154, 155, 163, 164, 165, 173 and 174. Fencing to run along the edge of the existing driveway. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
175	<i>Caesalpinia ferrea</i>	2.6	2.3	Remove and replace.
175A	<i>Caesalpinia ferrea</i>	2.4	1.7	Remove and replace.
176	<i>Lophostemon confertus</i>	4.9	2.4	Remove and replace.
177	<i>Lophostemon confertus</i>	4.1	2.2	Retain and protect. Fencing to encompass the TPZ perimeter of trees grouped 177, 178 and 179. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
178	<i>Lophostemon confertus</i>	4.3	2.3	Retain and protect. Fencing to encompass the TPZ perimeter of trees grouped 177, 178 and 179. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
179	<i>Syzygium oleosum</i>	2.9	1.9	Retain and protect. Fencing to encompass the TPZ perimeter of trees grouped 177, 178 and 179. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
180	<i>Tristaniopsis laurina</i>	6.0	2.5	Remove and replace.
181	<i>Tristaniopsis laurina</i>	4.8	2.3	Remove and replace.
182	<i>Lophostemon confertus</i>	5.0	2.4	Retain and protect. Fencing to encompass TPZ perimeter within site only (5m radius from centre of trunk). Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
183	<i>Acmena smithii</i>	5.4	2.4	Retain and protect. Fencing to encompass TPZ perimeter within site only (5.4m radius from centre of trunk). Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
198	<i>Grevillea robusta</i>	5.4	2.5	Retain and protect. Fencing to encompass trees grouped 70, 70A, 71, 72, 73 and 198. Fencing only to be moved for demolition and landscaping under the supervision and approval of project Arborist.
198A	<i>Eucalyptus nicholii</i>	6.6	2.7	Remove# due to associated risk identified in Tree Hazard Assessment Report by Urban Arbor.
198B	<i>Eucalyptus haemastoma</i>	7.2	2.8	Remove# due to associated risk identified in Tree Hazard Assessment Report by Urban Arbor.

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201	<i>Lophostemon confertus</i>	2.3	1.8	Retain. No fencing required. Set back significantly from proposed works.
202	<i>Lophostemon confertus</i>	2.4	1.8	Retain. No fencing required. Set back significantly from proposed works.
203	<i>Lophostemon confertus</i>	4.7	2.3	Retain. No fencing required. Set back significantly from proposed works.
204	<i>Lophostemon confertus</i>	2.3	1.8	Retain. No fencing required. Set back significantly from proposed works.
205	<i>Eucalyptus spp</i>	7.4	2.9	Remove# due to associated risk identified in Tree Hazard Assessment Report by Urban Arbor.
206	<i>Grevillea robusta</i>	3.5	2.1	Retain. No fencing required. Set back significantly from proposed works.
207	<i>Corymbia maculata</i>	3.2	2.1	Retain. No fencing required. Set back significantly from proposed works.
208	<i>Corymbia maculata</i>	2.0	1.7	Retain. No fencing required. Set back significantly from proposed works.
209	<i>Corymbia maculata</i>	6.2	2.7	Retain. No fencing required. Set back significantly from proposed works.
210	<i>Corymbia maculata</i>	4.1	2.2	Retain. No fencing required. Set back significantly from proposed works.
211	<i>Corymbia maculata</i>	6.0	2.7	Retain. No fencing required. Set back significantly from proposed works.
212	<i>Corymbia maculata</i>	4.2	2.3	Retain. No fencing required. Set back significantly from proposed works.

12.6 Tree protection Specifications: It is the responsibility of the principle contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing.

12.6.1 Protective fencing: Site specific tree protection requirements are discussed in table section 12.5. Where it is not feasible to install fencing at the specified location due to factors such restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Where the installation of fencing is unfeasible due to restrictions on space, trunk and branch protection will be required (see below). The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing must only be removed for the landscaping phase and must be authorised by the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.

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

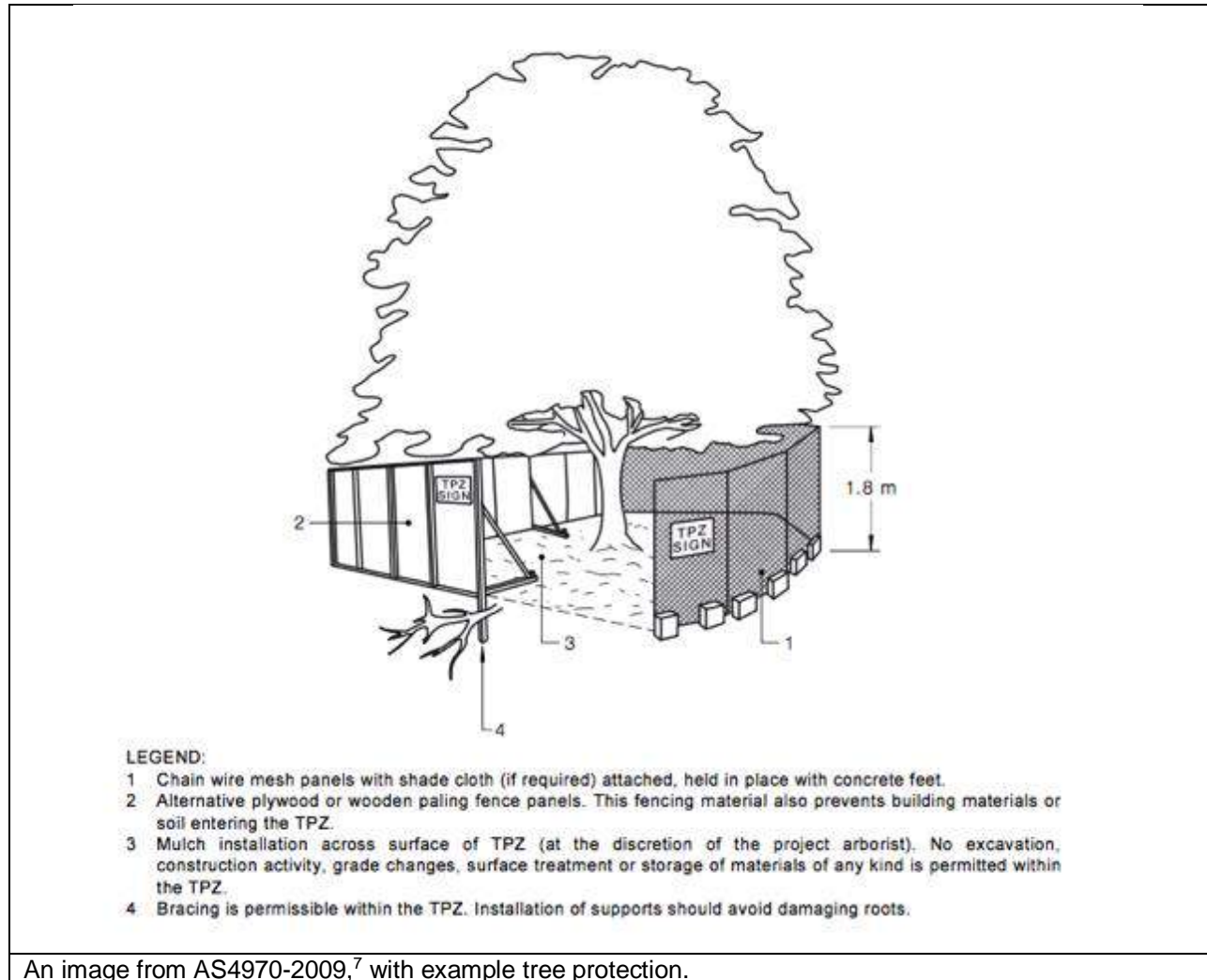
- Tree protection zone/No access.

- This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
- The name, address, and telephone number of the developer/builder and project Arborist

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

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

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



An image from AS4970-2009,⁷ with example tree protection.

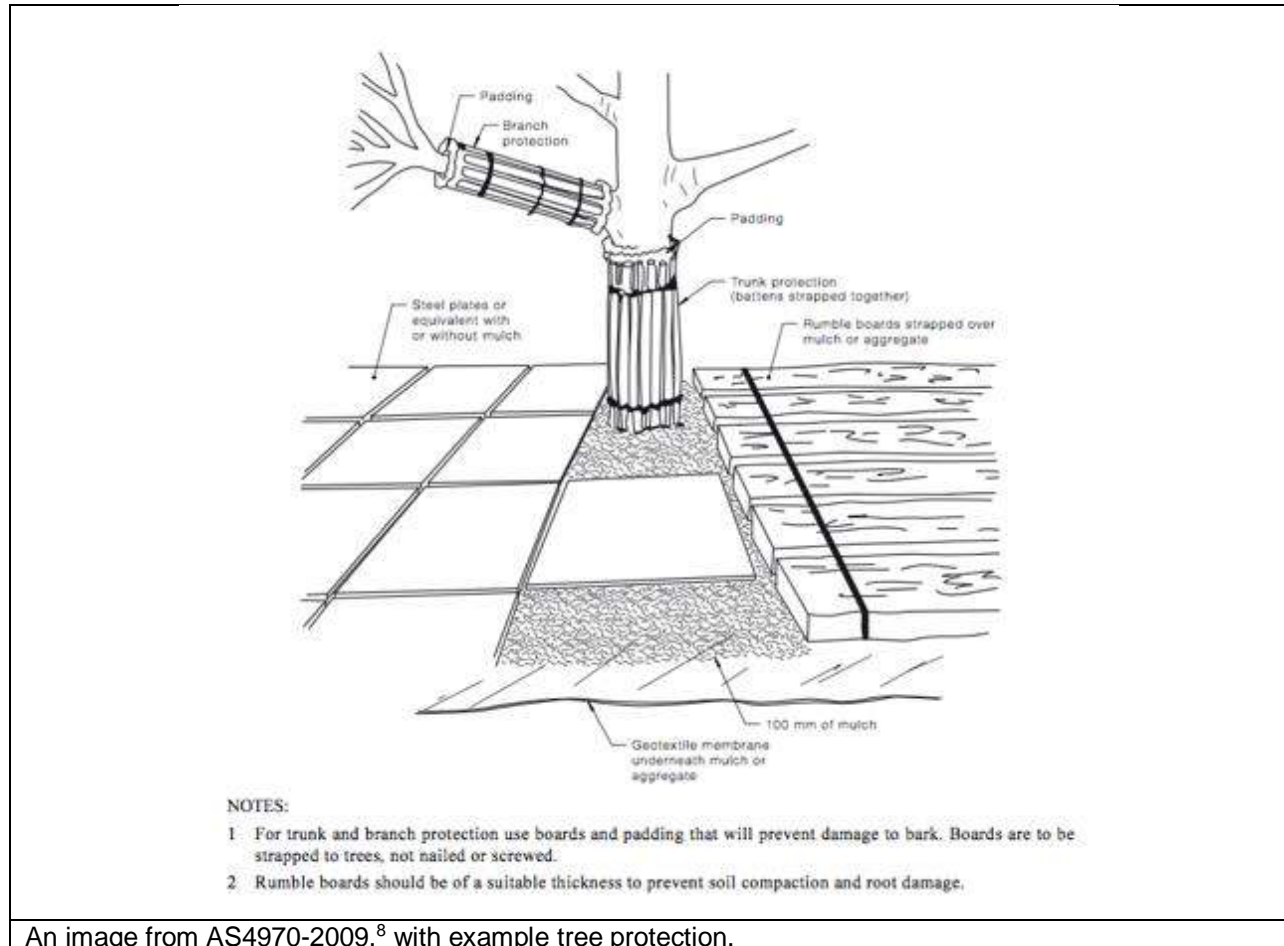
⁷ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.

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

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

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

⁸ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.
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- 12.8 **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.
- 12.9 **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 10mm 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).⁹ 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.
- 12.10 **Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimize the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 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

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

root disturbance and consider using a permeable surface. Footpath 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.
- The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter.

- 12.11 **Sediment and Contamination:** All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.
- 12.12 **Tree Wounding/Injury:** Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.
- 12.13 **Completion of Development Works:** After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

13. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION

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

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. I recommend site inspections on a monthly frequency.	On-going throughout the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the project Arborist.	Demolition	
Project Arborist to supervise all manual excavations 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 10mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3.	Construction	
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	

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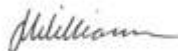
15. LIST OF APPENDICES

The following are included in the appendices:

Appendix 1 - Proposed Site Plan with Tree Protection

Appendix 2 - Tree inspection schedule

Appendix 3 - Definition of Methodology



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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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
7	Monterey Cypress	<i>Cupressus macrocarpa</i>	Mature	10	7	1000			1000	1100	Good	Fair	Medium	2. Medium	Z9	12.0	3.4	Previous failure of stems. previous poor pruning. located in neighbouring property.
14	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	20	8	950			950	1000	Fair	Poor	Medium	4. Remove	Z4	11.4	3.3	Extensive die back in upper crown. fungal bracket in trunk at 1m. epicormic growth through crown. tagged 7.
15	Eucalypt	<i>Eucalyptus spp</i>	Mature	16	6	580			580	600	Good	Good	High	2. Medium	A1	7.0	2.7	Removal of adjacent trees may affect wind loading. Tagged 8.
16	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Mature	16	9	1100			1100	1200	Good	Fair	High	3. Short	Z9	13.2	3.6	Trunk bulging indicates decay. evidence of termite activity in trunk. Tagged 9.
17	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	7	4	230	200		305	490	Good	Good	Medium	1. Long	A1	3.7	2.5	Co dominant stems with relatively good form at union.
43	Blue Jacaranda	<i>Jacaranda mimosifolia</i>	Mature	6	5	320			320	500	Good	Fair	Medium	3. Short	Z10	3.8	2.5	Poor overall form. large epicormic growth.
45	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	10	5	420			420	550	Good	Poor	Medium	Small/Young	Z5	5.0	2.6	Poor overall structure with low potential for future improvement. adjacent to childrens play area. tagged 36.
50	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	8	3	280			280	320	Good	Fair	Medium	1. Long	A1	3.4	2.1	Co dominant stems with good open form union.
51	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	9	3	320			320	340	Good	Good	Medium	1. Long	A1	3.8	2.1	Co dominant stems at 4m.
52	Black Peppermint	<i>Eucalyptus nicholii</i>	Mature	12	5	560			560	600	Fair	Fair	Medium	3. Short	Z4	6.7	2.7	Health in early decline.
53	Silky Oak	<i>Grevillea robusta</i>	Semi-mature	11	3	270			270	310	Fair	Good	Low	2. Medium	A2	3.2	2.0	Low foliage density for species.
55	Silky Oak	<i>Grevillea robusta</i>	Mature	15	4	490			490	560	Good	Fair	Medium	2. Medium	A1	5.9	2.6	Co dominant stems.
56	Hills Weeping Fig	<i>Ficus microcarpa var. hillii</i>	Mature	11	7	800			800	800	Good	Fair	Medium	1. Long	AA1	9.6	3.0	None.
57	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	9	4	400	290		494	600	Fair	Good	Medium	3. Short	Z4	5.9	2.7	Low foliage density for species.
57A	Red Bloodwood	<i>Corymbia gummifera</i>	Mature	11	3	300			300	350	Good	Good	Medium	1. Long	AA1	3.6	2.1	Not marked on survey.
58	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	10	4	480			480	560	Good	Good	Medium	2. Medium	A1	5.8	2.6	None.
59	Black Peppermint	<i>Eucalyptus nicholii</i>	Mature	8	4	600			600	700	Poor	Fair	Medium	4. Remove	Z4	7.2	2.8	Health in decline. Fungal brackets.
60	Peppercorn	<i>Schinus molle</i>	Mature	4	2	240			240	260	Good	Good	Low	1. Long	Z1	2.9	1.9	None.
61	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	10	4	730			730	850	Good	Fair	Medium	3. Short	Z9	8.8	3.1	Co dominant stem previously removed has resulted in reduced overall form and epicormic regrowth. Trunk has bottlebutt indicating internal decay.
70	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Mature	8	4	390			390	440	Good	Good	Medium	1. Long	A1	4.7	2.3	None.
70A	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Semi-mature	7	3	240			240	280	Good	Good	Medium	1. Long	A1	2.9	1.9	Not marked on survey.
71	Narrow Leaved Ironbark	<i>Eucalyptus creba</i>	Mature	15	4	400			400	450	Good	Fair	High	2. Medium	A1	4.8	2.4	Bark inclusion at 9m.
72	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Mature	9	3	340			340	380	Good	Good	Medium	1. Long	A1	4.1	2.2	None.
73	Weeping Lilly Pilly	<i>Waterhousia floribunda</i>	Mature	8	3	320			320	400	Good	Fair	Medium	2. Medium	A1	3.8	2.3	Multiple bark inclusions.
74	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	8	3	300			300	340	Good	Fair	Medium	2. Medium	A1	3.6	2.1	Co dominant stems with bark inclusion.
74A	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	7	3	350			350	350	Poor	Fair	Low	4. Remove	Z4	4.2	2.1	Health declining, 30% crown die back. Trunk located within 3m of building. Not marked on survey.
75	Silky Oak	<i>Grevillea robusta</i>	Mature	14	4	410			410	470	Good	Good	Medium	1. Long	A1	4.9	2.4	None.
76	Silky Oak	<i>Grevillea robusta</i>	Mature	17	7	600			600	700	Good	Fair	Medium	3. Short	Z2	7.2	2.8	Trunk located within 3m of building. Trunk previously failed or topped at 6m, indicators of decay at base of regrowth.
77	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	3	440			440	440	Good	Fair	Medium	2. Medium	A1	5.3	2.3	Co dominant stems.
78	Water Gum	<i>Tristaniopsis laurina</i>	Mature	6	2	160	170		233	300	Good	Fair	Medium	2. Medium	A1	2.8	2.0	Co dominant stems.
79	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	2	290			290	320	Good	Good	Medium	1. Long	A1	3.5	2.1	None.
80	Water Gum	<i>Tristaniopsis laurina</i>	Mature	6	2	250			250	270	Good	Good	Medium	1. Long	A1	3.0	1.9	None.
81	Water Gum	<i>Tristaniopsis laurina</i>	Mature	5	2	210			210	230	Good	Good	Medium	1. Long	A1	2.5	1.8	None.

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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
82	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	2	340			340	340	Good	Good	Medium	1. Long	A1	4.1	2.1	None.
83	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	2	300			300	300	Good	Good	Medium	1. Long	A1	3.6	2.0	None.
84	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	2	230			230	260	Good	Good	Medium	1. Long	A1	2.8	1.9	None.
85	Water Gum	<i>Tristaniopsis laurina</i>	Mature	6	2	280			280	280	Good	Good	Medium	1. Long	A1	3.4	1.9	None.
86	Water Gum	<i>Tristaniopsis laurina</i>	Mature	8	2	200			200	290	Good	Good	Medium	1. Long	A1	2.4	2.0	None.
87	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	2	230			230	260	Good	Fair	Medium	2. Medium	A1	2.8	1.9	Asymetric crown shape.
88	Water Gum	<i>Tristaniopsis laurina</i>	Mature	7	2	260			260	290	Good	Fair	Medium	2. Medium	A1	3.1	2.0	Asymetric crown shape.
94	Spotted Gum	<i>Corymbia maculata</i>	Mature	22	7	480			480	550	Good	Fair	High	1. Long	AA1	5.8	2.6	Lowest primary branch has minor bark inclusion.
95	Spotted Gum	<i>Corymbia maculata</i>	Mature	23	7	540			540	620	Good	Good	High	1. Long	AA1	6.5	2.7	None.
96	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	8	3	250			250	280	Fair	Good	Medium	2. Medium	A1	3.0	1.9	Low foliage density for species.
97	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	14	4	470			470	550	Good	Fair	Medium	2. Medium	A1	5.6	2.6	Co dominant stems with bark inclusion at 8m.
98	Cypress	<i>Cupressus spp</i>	Mature	5	3	350			350	350	Poor	Poor	Low	4. Remove	Z4	4.2	2.1	DBH measured at ground. Foliage declining and multiple stems with weak unions.
99	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	16	6	650			650	740	Good	Good	Medium	1. Long	A1	7.8	2.9	None.
100	Spotted Gum	<i>Corymbia maculata</i>	Mature	22	6	620			620	730	Good	Good	High	1. Long	AA1	7.4	2.9	None.
101	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	14	5	510			510	600	Good	Fair	Medium	2. Medium	A2	6.1	2.7	Co dominant stem previous failed at 10m.
102	Bauhinia	<i>Bauhinia spp</i>	Mature	7	3	340	320		467	500	Good	Fair	Low	3. Short	Z9	5.6	2.5	Multiple bark inclusions.
103	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	10	4	450			450	570	Good	Good	Medium	1. Long	AA1	5.4	2.6	None.
104	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	7	3	250			250	300	Good	Good	Low	2. Medium	A1	3.0	2.0	None.
105	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	7	3	270			270	270	Good	Good	Low	2. Medium	A1	3.2	1.9	None.
106	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Semi-mature	7	3	240			240	270	Good	Fair	Medium	1. Long	A1	2.9	1.9	Co dominant stems.
107	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Semi-mature	7	3	260			260	300	Good	Good	Medium	1. Long	A1	3.1	2.0	None.
108	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	9	4	360			360	400	Good	Good	Medium	1. Long	A1	4.3	2.3	None.
109	Eucalypt	<i>Eucalyptus spp</i>	Mature	15	4	400			400	450	Good	Fair	Medium	1. Long	A1	4.8	2.4	Co dominant stems at 7m.
110	Grey Ironbark	<i>Eucalyptus paniculata</i>	Mature	17	6	460			460	560	Good	Good	High	1. Long	A1	5.5	2.6	None.
111	Blackbutt	<i>Eucalyptus pilularis</i>	Mature	15	7	620			620	720	Good	Poor	High	4. Remove	Z5	7.4	2.9	Ceal stem failed or removed, 2 adjacent stems now dominant. Decay/longicorn damage compromising the union of these stems. Tagged 50.
111A	Weeping Lilly Pilly	<i>Waterhousia floribunda</i>	Mature	8	3	340			340	340	Good	Good	Medium	1. Long	A1	4.1	2.1	Not marked on survey.
112	Grey Ironbark	<i>Eucalyptus paniculata</i>	Mature	20	7	650			650	800	Good	Fair	High	1. Long	A1	7.8	3.0	Co dominant stems that twist round each other and graft together.
113	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	8	3	260			260	300	Good	Good	Medium	1. Long	A1	3.1	2.0	None.
114	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	25	8	630			630	800	Good	Good	High	1. Long	AA1	7.6	3.0	Co dominant stems at 12m.
115	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	10	4	480			480	520	Good	Good	Medium	1. Long	A1	5.8	2.5	None.
116	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Semi-mature	7	3	220			220	260	Good	Fair	Medium	2. Medium	A1	2.6	1.9	Co dominant stems with included bark.
117	Wallangarra White Gum	<i>Eucalyptus scoparia</i>	Mature	13	4	430			430	470	Fair	Good	Medium	2. Medium	A2	5.2	2.4	Low foliage density for species.
118	Tallowood	<i>Eucalyptus microcorys</i>	Mature	17	5	520			520	580	Fair	Fair	Medium	3. Short	Z9	6.2	2.6	Fungal bracket in wound at 3m. Multiple second order branches have formed from epicormic shoots with weak attachment to parent branch. Tagged 49.
119	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	9	3	310			310	370	Good	Good	Medium	1. Long	A1	3.7	2.2	None.
120	Weeping Fig	<i>Ficus benjamina</i>	Mature	7	3	310			310	300	Good	Fair	Low	2. Medium	Z3	3.7	2.0	Exempt species.
121	Spotted Gum	<i>Corymbia maculata</i>	Mature	22	6	520			520	650	Good	Good	High	1. Long	AA1	6.2	2.8	None.

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Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
121A	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	9	3	300			300	370	Good	Good	Medium	1. Long	A1	3.6	2.2	Not marked on survey.
122	Grey Gum	<i>Eucalyptus punctata</i>	Mature	10	4	280			280	320	Fair	Fair	Medium	3. Short	Z10	3.4	2.1	Low foliage density for species. Significant cambium/longicorn damage at base of trunk.
123	Swamp Oak	<i>Casuarina glauca</i>	Mature	11	5	400			400	490	Poor	Fair	Medium	4. Remove	Z4	4.8	2.5	Health declining, 40% die back in crown.
124	Prickly Leaved Paperbark	<i>Melaleuca styphelioides</i>	Mature	10	5	500			500	550	Good	Good	Medium	1. Long	A1	6.0	2.6	Co dominant stems.
125	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	5	3	220	130		256	350	Fair	Fair	Low	3. Short	Z10	3.1	2.1	Supressed by adjacent tree.
126	Wattle	<i>Acacia spp</i>	Mature	3	3	340			340	370	Fair	Poor	Low	4. Remove	Z5	4.1	2.2	Co dominant that have partially failed at union.
127	Swamp Mahogany	<i>Eucalyptus robusta</i>	Semi-mature	7	3	320			320	380	Fair	Fair	Low	3. Short	Z10	3.8	2.2	Lowest primary branch failed. Poor overall shape/form with limited potential for improvement.
128	Tasmanian Blue Gum	<i>Eucalyptus globulus</i>	Mature	20	8	900			900	1050	Good	Good	Medium	1. Long	A1	10.8	3.4	Deadwood in lower crown.
129	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	10	6	420			420	490	Fair	Fair	Medium	4. Remove	Z4	5.0	2.5	Low foliage density in upper crown. Multiple previous failures, one of the previous failures is suspended against fence. Cambium damage near base of trunk.
130	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	8	3	220			220	320	Fair	Fair	Medium	3. Short	Z9	2.6	2.1	Significant cambium damage near base of trunk.
131	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	8	4	320			320	450	Fair	Fair	Medium	2. Medium	A2	3.8	2.4	Cambium damage on trunk.
132	Sydney Blue Gum	<i>Eucalyptus saligna</i>	Semi-mature	8	4	400			400	450	Good	Good	Medium	1. Long	A1	4.8	2.4	None.
133	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	13	5	490			490	570	Good	Good	Medium	1. Long	A1	5.9	2.6	None.
134	Narrow Leaved Ironbark	<i>Eucalyptus creba</i>	Mature	14	4	350			350	410	Good	Good	High	1. Long	AA1	4.2	2.3	None.
134A	Bauhinia	<i>Bauhinia spp</i>	Mature	7	3	310			310	310	Fair	Fair	Low	3. Short	Z10	3.7	2.0	None.
134B	Bauhinia	<i>Bauhinia spp</i>	Mature	8	3	210	160		264	600	Fair	Fair	Low	2. Medium	Z2	3.2	2.7	None.
135	Mexican Pine	<i>Pinus patula</i>	Mature	17	8	700	350		783	1000	Good	Good	Medium	1. Long	A1	9.4	3.3	Die back in crown.
136	Wallangarra White Gum	<i>Eucalyptus scoparia</i>	Mature	17	7	680			680	770	Fair	Good	Medium	2. Medium	A1	8.2	3.0	5% small diameter deadwood through crown.
137	Bauhinia	<i>Bauhinia spp</i>	Mature	8	3	170	140	260	341	600	Good	Fair	Low	2. Medium	Z2	4.1	2.7	None.
138	Bauhinia	<i>Bauhinia spp</i>	Mature	6	3	300			300	350	Good	Fair	Low	3. Short	Z10	3.6	2.1	Trunk located within 3m of building.
139	Willow Bottlebrush	<i>Callistemon saligna</i>	Mature	5	3	300			300	350	Fair	Fair	Medium	3. Short	A1	3.6	2.1	Fungal bracket at base of previously removed stem. Tagged 48.
140	Silky Oak	<i>Grevillea robusta</i>	Semi-mature	11	2	210			210	270	Good	Good	Low	1. Long	A1	2.5	1.9	None.
141	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	6	2	130	250		282	300	Good	Good	Low	2. Medium	A1	3.4	2.0	None.
142	Argyle Apple	<i>Eucalyptus cinerea</i>	Mature	15	7	500			500	650	Good	Good	Medium	2. Medium	A1	6.0	2.8	None.
143	Wallangarra White Gum	<i>Eucalyptus scoparia</i>	Mature	17	5	500			500	580	Good	Good	High	2. Medium	A1	6.0	2.6	Previous branch failures in crown.
144	Spotted Gum	<i>Corymbia maculata</i>	Mature	20	5	550			550	650	Good	Good	High	1. Long	AA1	6.6	2.8	None.
145	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	6	3	290			290	370	Good	Good	Medium	2. Medium	A1	3.5	2.2	Low soil volume for potential future root growth.
146	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	7	2	200			200	280	Good	Fair	Medium	2. Medium	A1	2.4	1.9	Dominated by adjacent trees. Low soil volume for potential future root growth.
147	Prickly Leaved Paperbark	<i>Melaleuca styphelioides</i>	Mature	5	3	320			320	480	Good	Good	Medium	2. Medium	A1	3.8	2.4	Co dominant stems. Low soil volume for potential future root growth.
148	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	6	3	200			200	220	Good	Fair	Medium	3. Short	Z10	2.4	1.8	Supressed by adjacent trees. Low soil volume for potential future root growth.
149	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	5	2	170			170	200	Good	Fair	Low	3. Short	Z10	2.0	1.7	Supressed by adjacent tree. Low soil volume for potential future root growth.
150	Prickly Leaved Paperbark	<i>Melaleuca styphelioides</i>	Mature	5	4	250	220		333	450	Good	Good	Medium	2. Medium	A1	4.0	2.4	Co dominant stems. Low soil volume for potential future root growth.

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	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
151	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	6	2	210			210	250	Good	Fair	Low	3. Short	Z10	2.5	1.8	Failure of central leader. suppressed by adjacent trees. Low soil volume for potential future root growth.
152	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	7	3	230			230	260	Good	Good	Medium	2. Medium	A1	2.8	1.9	Low soil volume for potential future root growth.
153	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	6	4	240			240	300	Good	Good	Medium	2. Medium	A1	2.9	2.0	Low soil volume for potential future root growth.
154	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	10	3	370			370	400	Good	Good	Low	2. Medium	A1	4.4	2.3	None.
155	Red Ironbark	<i>Eucalyptus sideroxylon</i>	Mature	17	6	600			600	700	Good	Fair	High	1. Long	AA1	7.2	2.8	Primary branch with bark inclusion at 8m.
156	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	6	2	230			230	250	Good	Good	Low	2. Medium	A1	2.8	1.8	None. Leopard
157	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	7	3	270	180		324	320	Good	Good	Low	2. Medium	A1	3.9	2.1	None. Leopard
158	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	14	6	470			470	550	Good	Fair	Medium	2. Medium	A2	5.6	2.6	Asymetric crown shape.
159	Hills Weeping Fig	<i>Ficus microcarpa var. hillii</i>	Mature	17	8	420	500		653	1050	Good	Fair	Medium	1. Long	A1	7.8	3.4	Asymetric crown shape.
160	Coastal Myall	<i>Acacia binervia</i>	Semi-mature	12	3	220			220	240	Good	Good	Medium	1. Long	A1	2.6	1.8	None.
161	Water Gum	<i>Tristaniopsis laurina</i>	Mature	5	3	200	160	180	313	450	Good	Fair	Low	2. Medium	Z10	3.8	2.4	Supressed by adjacent tree.
162	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	15	7	580			580	650	Good	Fair	Medium	3. Short	Z9	7.0	2.8	Central/stem trunk has failed at 7m, decay forming at point of failure. Tree only suitable for short term retention.
163	Sasanqua	<i>Camellia Sasanqua</i>	Mature	5	2	300			300	300	Good	Good	Low	2. Medium	Z2	3.6	2.0	None.
164	Bauhinia	<i>Bauhinia spp</i>	Mature	7	2	300			300	340	Fair	Fair	Low	3. Short	Z5	3.6	2.1	Trunk located within 3m of building.
165	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	8	2	310			310	370	Good	Fair	Low	3. Short	Z5	3.7	2.2	Trunk leans significantly. Trunk located within 3m of building.
166	Prickly Leaved Paperbark	<i>Melaleuca styphelioides</i>	Mature	12	3	380			380	450	Good	Good	Medium	1. Long	Z2	4.6	2.4	Trunk located within 3m of building.
167	Bhutan Cypress	<i>Cupressus torulosa</i>	Mature	16	2	540			540	600	Good	Fair	Medium	2. Medium	Z2	6.5	2.7	Asymetric crown shape. Trunk located within 3m of building.
168	Magneta Lilly Pilly	<i>Syzygium paniculatum</i>	Mature	15	7	650			650	750	Good	Good	High	1. Long	Z2	7.8	2.9	Trunk located within 2m of existing building.
169	Italian Cypress	<i>Cupressus sempervirens</i>	Mature	16	2	410			410	450	Fair	Fair	Medium	3. Short	Z10	4.9	2.4	Asymetric crown shape.
170	Sweetgum	<i>Liquidamber styraciflua</i>	Mature	16	7	570			570	670	Good	Fair	Medium	2. Medium	A1	6.8	2.8	Co dominant stems.
171	Grey Ironbark	<i>Eucalyptus paniculata</i>	Dead	8	3	240			240	270	Dead	Poor	Low	4. Remove	Z4	2.9	1.9	Dead tree.
172	Cypress	<i>Cupressus spp</i>	Mature	6	2	400			400	400	Good	Fair	Low	2. Medium	Z1	4.8	2.3	None.
173	Bauhinia	<i>Bauhinia spp</i>	Mature	8	3	370			370	450	Fair	Fair	Low	3. Short	Z2	4.4	2.4	Health in decline. Trunk located within 3m of building.
174	Bauhinia	<i>Bauhinia spp</i>	Mature	8	3	300			300	340	Good	Fair	Low	2. Medium	Z2	3.6	2.1	Trunk located within 3m of building.
175	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	7	3	180	120		216	400	Good	Good	Low	1. Long	A1	2.6	2.3	None.
175A	Leopard Tree	<i>Caesalpinia ferrea</i>	Mature	7	2	200			200	200	Fair	Fair	Low	3. Short	Z10	2.4	1.7	Dead stems. Not marked on survey.
176	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	11	4	410			410	460	Good	Good	Medium	1. Long	AA1	4.9	2.4	None.
177	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	11	3	340			340	380	Good	Good	Medium	1. Long	AA1	4.1	2.2	None.
178	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	10	3	360			360	400	Good	Good	Medium	1. Long	AA1	4.3	2.3	None.
179	Blue Lilly Pilly	<i>Syzygium oleosum</i>	Mature	5	2	240			240	260	Good	Good	Medium	1. Long	A1	2.9	1.9	None.
180	Water Gum	<i>Tristaniopsis laurina</i>	Mature	5	2	500			500	500	Good	Good	Low	2. Medium	A1	6.0	2.5	None.
181	Water Gum	<i>Tristaniopsis laurina</i>	Mature	5	2	400			400	400	Good	Good	Low	2. Medium	A1	4.8	2.3	None.
182	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	9	3	420			420	480	Good	Good	Medium	1. Long	A1	5.0	2.4	Asymetric crown shape.
183	Lilly Pilly	<i>Acmena smithii</i>	Mature	10	4	450			450	470	Good	Good	Medium	2. Medium	A1	5.4	2.4	Co dominant stems with significant bark inclusion.
198	Silky Oak	<i>Grevillea robusta</i>	Mature	15	4	450			450	500	Good	Good	Medium	1. Long	A1	5.4	2.5	None.
198A	Black Peppermint	<i>Eucalyptus nicholii</i>	Mature	13	8	550			550	600	Fair	Poor	Medium	4. Remove	Z4	6.6	2.7	2 large fungal bracket in main stem. die back in upper crown. tagged 45.

Appendix 2 - Tree Inspection Schedule

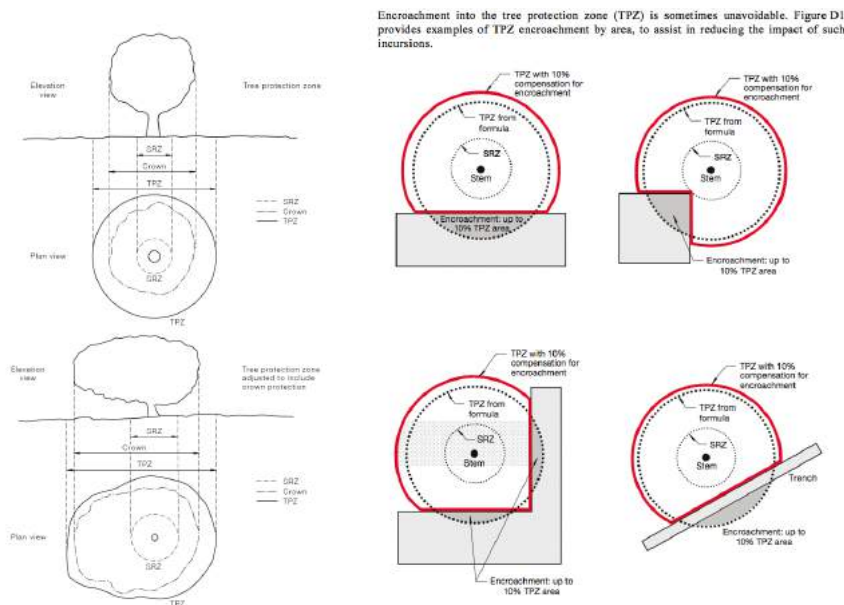
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
198B	Broad Leaved Scribbly Gum	<i>Eucalyptus haemastoma</i>	Mature	8	7	600			600	650	Good	Poor	Medium	4. Remove	Z5	7.2	2.8	Asymmetric crown shape over car park. Large cavity on upper side of trunk with additional decay higher up in stems. tagged 43.
201	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	7	2	190			190	230	Good	Good	Medium	1. Long	A1	2.3	1.8	None.
202	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	7	2	200			200	230	Good	Good	Medium	1. Long	A1	2.4	1.8	None.
203	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	8	3	390			390	420	Good	Good	Medium	1. Long	A1	4.7	2.3	None.
204	Queensland Brushbox	<i>Lophostemon confertus</i>	Semi-mature	7	2	190			190	220	Good	Good	Medium	1. Long	A1	2.3	1.8	None.
205	Eucalypt	<i>Eucalyptus spp</i>	Mature	17	4	620			620	710	Fair	Fair	High	3. Short	Z9	7.4	2.9	Tagged 26. Co dominant stems, one stem has spiral wound with fungal bracket, decay detection required to assess structure at wound if tree is to be retained..
206	Silky Oak	<i>Grevillea robusta</i>	Semi-mature	11	3	290			290	340	Good	Fair	Low	3. Short	Z9	3.5	2.1	Multiple bark inclusions.
207	Spotted Gum	<i>Corymbia maculata</i>	Semi-mature	11	3	270			270	320	Good	Good	Medium	1. Long	A1	3.2	2.1	Minor trunk lean.
208	Spotted Gum	<i>Corymbia maculata</i>	Semi-mature	10	2	170			170	200	Good	Good	Medium	1. Long	A1	2.0	1.7	None.
209	Spotted Gum	<i>Corymbia maculata</i>	Mature	15	7	520			520	600	Good	Fair	High	1. Long	A1	6.2	2.7	Asymmetric crown shape.
210	Spotted Gum	<i>Corymbia maculata</i>	Mature	17	3	340			340	390	Good	Good	High	1. Long	AA1	4.1	2.2	None.
211	Spotted Gum	<i>Corymbia maculata</i>	Mature	20	6	500			500	600	Good	Good	High	1. Long	AA1	6.0	2.7	None.
212	Spotted Gum	<i>Corymbia maculata</i>	Mature	18	5	350			350	400	Good	Fair	High	2. Medium	A1	4.2	2.3	Asymmetric crown shape.

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.

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

3. **Tree Age Class:** If can be difficult to determine the age of a tree without carrying out invasive tests that may damage the tree, so we have categorised there likely age class which is defined below;

- Young/Newly planted: Young or recently planted tree.
- Semi Mature: Up to 20% of the usual life expectancy for the species.
- Early mature/Mature: Between 20%-80% of the usual life expectancy for the species.
- Over mature: Over 80% of the usual life expectancy for the species.
- Dead: Tree is dead or almost dead.

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

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

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

<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. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may have a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	<ul style="list-style-type: none"> • The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree.

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

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

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

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

7. **Safe Useful Life Expectancy (SULE), (Barrel, 2001):** A 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 30mm 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 (manual excavations). Any excavations for the root investigations must carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.

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

TreeAZ Categories (Version 10.04-ANZ)

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

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

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

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

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

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

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

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

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

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

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

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

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Glossary of Terms

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

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

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

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

Branch:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Sapwood - Living xylem tissues

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Windthrow - The blowing over of a tree at its roots