

Moore Trees  
Arboricultural Services

ABN 90887347745

# Arboricultural Development Assessment Report

Lilyfield Skate Plaza  
Leichhardt Park  
70 Mary Street  
Lilyfield NSW 2040  
February 2022  
*Final*



Member 2022



Prepared for: Inner West Council

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## Summary

This report has been compiled for Inner West Council. The report concerns a proposed development project for Lilyfield Skate Plaza, Leichhardt Park. This Arborist Report refers to sixty eight (68) trees.

This report contains the following information required in Inner West Council Development guidelines:-

- 1) All trees were assessed for Safe Useful Life Expectancy (SULE).
- 2) Genus and species identification of each tree.
- 3) Impact of the proposed development on each tree.
- 4) Impact of retaining tree on the proposed development.
- 5) The Tree Protection Zone (TPZ) for each tree to be retained.
- 6) Any branch or root pruning that may be required for trees.

Based on the plans provided, trees that appear possible to retain are numbered as 1, 3, 4, 5, 14, 15, 16, 27-34, 39, 60, 62-66, 68. Trees that require removal are numbered as 2, 6-13, 17-26, 35-38, 41-59, 61 and 67.

The trees that are proposed to be retained will require tree protection measures to be implemented prior to works occurring. A Tree Protection Plan, included in this report, shows the trees proposed to be retained. This plan is attached in Appendix 1. It is recommended that signage is used for tree protection areas. A sample tree protection sign has been included in Appendix 6.

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## **VERSION CONTROL**

<b>Date of Issue</b>	<b>Details</b>
29 August 2019	Draft 1 issued
19 September 2019	Draft 2 issued
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# 1 INTRODUCTION

- 1.1 This report has been conducted to assess the health and condition of sixty eight (68) trees located just south of Leichhardt Park. This report has been prepared for Inner West Council as required for the construction of a skate park at this site.

The purpose of this report is to collect the appropriate tree related data on the subject trees and to provide advice and recommendations to the design and possible construction alternatives to aid against any adverse impacts on the subject trees' to be retained health.

The subject trees were assessed for their health and condition. Also included in this report are tree protection measures that will help retain and ensure that the long term health of the trees to be retained are not adversely affected by the proposed development in the future.

- 1.2 As specified in the Inner West Council Development Application guidelines the following data was collected for each tree:

- 1) A site plan locating all trees over three (3) metres in height, including all street trees.
- 2) All trees were assessed for Safe Useful Life Expectancy (SULE), health and amenity value.
- 3) Genus and species identification of each tree.
- 4) Impact of the proposed development on each tree.
- 5) The Tree Protection Zone (TPZ) calculated for each tree to be retained.
- 6) Any branch or root pruning that may be required for trees.

Also noted for the purpose of this report were:

- Health and Vigour; using foliage colour and size, extension growth, presence of deadwood, dieback and epicormic growth throughout the tree.
- Structural condition using visible evidence of bulges, cracks, leans and previous pruning.
- The suitability of the tree taking into consideration the proposed development.
- Age rating; Over-mature (>80% life expectancy), Mature (20-80% life expectancy), Young, Sapling (<20% life expectancy).

**1.3 Location:** The proposed project site is located just south of Leichhardt Oval #3. The proposed development site from herein will be referred to as "the Site".



**Diagram 1:** Location of subject site, (Red arrow) (Google maps, 2019)



**Diagram 2:** Location of subject site in 1943 (Sixmaps, 2019). The image shows that the site appears to have been used for industrial purposes and was devoid of any vegetation in 1943. With colonial colonisation of Sydney, this area was cleared of all native vegetation.

## 2 METHODOLOGY

- 2.1** To record the health and condition of the trees, a Visual Tree Assessment (VTA) was undertaken on the subject trees on 20<sup>th</sup> August 2019. This method of tree evaluation is adapted from Matheny and Clark, 1994 and is recognised by The International Society of Arboriculture. Individual tree assessments are listed in Appendix 2 of this report. All inspections were undertaken from the ground. No diagnostic devices were used on these trees.
- 2.2 Height:** The heights and distances within this report have been measured with a Bosch DLE 50 laser measure.
- 2.3 Tree Protection Zones (TPZ):** The TPZ is the principal 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. TPZ's have been calculated for each tree to determine construction impacts. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites*, AS 4970, 2009.
- 2.4 Structural Root Zone (SRZ):** The SRZ is a specified distance measured from the trunk that is set aside for the protection of tree roots, both structural and fibrous. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The TPZ and SRZ are measured as a radial measurement from the trunk. No roots should be severed within this area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 5.
- 2.5 Safe Useful Life Expectancy (SULE):** The subject trees were assessed for a Safe Useful Life Expectancy (SULE). The SULE rating for each tree can be seen the Tree Assessment Schedule (Appendix 2). A detailed explanation of SULE can be found in Appendix 3.

**2.6 Documents and Plans provided:** For this Arborist Report I was given a site plan of the location, undertaken by Norton Survey Partners reference 50111 sheet 1 dated 29-11-18 and Enlocus Contingency Option A, reference 1821 Plans 02A dated 18.01.2022 including:

DRAWING LIST:			
Title Page & Drawing Index	1821_CD000	DETAILS	
General Notes	1821_CD001	Engineering Details 01	1821_CD200
CONSTRUCTION PLANS		Engineering Details 02	1821_CD201
Existing Conditions Plan	1821_CD002	Engineering Details 03	1821_CD202
Demolition Plan	1821_CD003	Engineering Details 04	1821_CD203
Site Plan	1821_CD004	Engineering Details 05	1821_CD204
Surface Finishes Plan	1821_CD006-A	Drainage Details 01	1821_CD205
Surface Finishes Plan	1821_CD006-B	Carpark Details 01	1821_CD210
Levels Plan	1821_CD007-A	FABRICATION	
Levels Plan	1821_CD007-B	Steel Shelter Details 01	1821_CD300
Drainage Plan	1821_CD008	Steel Shelter Details 02	1821_CD301
Setout Plan	1821_CD009-A	Balustrade/Handrail Plan	1821_CD310
Setout Plan	1821_CD009-B	Balustrade Details 01	1821_CD311
Dimensions Plan	1821_CD010-A	Entrance Signage	1821_CD320
Dimensions Plan	1821_CD010-B	LANDSCAPE WORKS	
Steel Plan	1821_CD011	Planting Plan	1821_CD400
Concrete Joints Plan	1821_CD012-A	Planting Details	1821_CD401
Concrete Joints Plan	1821_CD012-B		
SECTIONS			
Section Key Plan	1821_CD100		
Sections 01	1821_CD101		
Sections 02	1821_CD102		
Retaining Wall Plan	1821_CD110		
Retaining Wall Sections	1821_CD111		

The plans showed the tree trunk locations and individual tree numbering.

**2.7 Impact Assessment:** An impact assessment was conducted on the site trees. This was conducted by assessing the site survey and concept plan provided by Inner West Council. The plans provided were assessed for the following:

- Reduced Level (R.L.) at base of tree.
- Incursions into the Tree Protection Zone (TPZ).
- Assessment of the likely impact of the works.

### 3 RELEVANT BACKGROUND INFORMATION

- 3.1** The site is located at the southern end of Leichhardt Oval 3 and bounded by a road that runs along the harbour edge, being Maligawal Street, and Frazer Street is to the east. A small car park area is along the southern boundary. Prior to becoming a public park the area appears to have been used for fishing and industrial purposes (Diagram 2). The proposed works entail construction of a new skate park within the study area. Tree species within the site include Bangalay (*Eucalyptus botryoides*), Sydney red gum (*Angophora costata*), Swamp mahogany (*Eucalyptus robusta*), River she oak (*Casuarina cunninghamiana*), and two (2) Tallowwood (*Eucalyptus microcorys*).
- 3.2** Soil for the area would be considered highly modified. As seen in Diagram 2, all native vegetation has been removed over time and filling and altering of the original harbours edge has occurred. As a result, what lies below ground level could be highly variable in terms of soils, fill material and general refuse.
- 3.3** **Environmental Significance:** Although now part of Inner West Council, Tree related governance is covered within Section C of the Leichardt Council Development Control Plan (DCP) 2013. Section C1.14 (Tree Management) States; *Leichhardt Council is committed to the protection and management of a healthy urban forest within the Leichhardt Local Government Area (LGA). The urban forest contributes to the character of the municipality and provides significant ecological, climatic, aesthetic, economic and cultural benefits to the Leichhardt community...*
- 3.4** Section C1.14.3, Prescribed trees states “A prescribed tree is:
- a) a tree of more than six (6) metres in height and having a trunk diameter of more than 200 millimetres when measured at a height of 1.4m from the ground, growing on privately owned land; or
  - b) a tree that is or forms part of a Heritage Item or is within a Heritage Conservation Area; but
  - c). excludes any tree listed as an exempt species as outlined within C1.14.2.

- 3.5 Illegal tree removal:** It was noted that several of the site trees have been attempted to be ring barked, most likely for harbour views. These trees are numbered as 6, 7 and 8. Also of note, within the same sight line from Frazer Street, are dead and dying trees within Tree group 9-13. Residents should be informed that damaging or removing public trees can result in heavy fines. Local Government does have the authority to issue on the spot fines known as penalty infringement notices (PINS) starting from \$3,000 or can elect to have a potential tree damaging incident addressed in the Local Court. Recent cases, for example, include two (2) mature trees removed for development (Sutherland Shire Council (SSC) v Palamara, 2008) costing \$4,500 in fines and \$5,000 in court costs. SSC v El-Hage, 2010 concerning illegal tree removal of a single tree costing \$31,500 in fines and \$5,000 in costs. Poisoning trees can also incur substantial fines (SSC v Hill) resulted in a single tree fine that totalled \$14,000 plus a \$10,000 bond for a replacement tree. All of the above cases resulted in a criminal conviction for the guilty parties.
- 3.6 The Site Trees:** The site was inspected on 20<sup>th</sup> August 2019. Each tree has been given a unique number for this site and can be viewed on the Tree Protection Plan (Appendix 1). Tree 2 was missing from this plan so the new sapling has been numbered as Tree 2. This plan is based on the plan provided by Inner West Council.
- 3.7** Trees 1, 3, 4, 5, 6, 7, and 8 are growing as a group and share codominant canopies with each other. Most have asymmetrical canopy development due to their proximity of growing to each other (Plate 1). Tree 1 has an extreme canopy bias of ten (10) metres, which appears to have developed possibly due to growing next to a larger tree that is no longer present. Tree 1 has branching development problems by way of large branches that are rubbing and single leader that is trying to self-correct, causing it to clash with another lateral branch.



**Plate 1:** Image showing Trees 1, 3-8. P. Vezgoff

- 3.8** Tree 4 has a large wound on the south-eastern side of the stem, and it appears lignified however there is evidence of Longicorn beetle damage and wound wood development is occurring, but this is also being attacked by borers. Trees 5, 6, 7 and 8 appear to have suffered ring bark damage around the basal area at some stage as evidenced by the wounding that has occurred and created extensive wounds around the circumference of the base of each one of these trees (Plate 2). It is difficult to determine the extent of damage, however it appears to be more than 5 years old and the canopies do not show evidence of cambial damage such as major dieback and poor foliage vigour.



**Plate 2:** Image showing old ringbarking damage. P. Vezgoff

**3.9** There is minor scattered deadwood and minor dieback throughout the canopies of this group of trees however this could readily be removed.

**3.10** Trees 9-13 are located in the south-west corner and Tree 11 is no longer present, it is a stump which has been partially removed from the ground. Tree 10 is dead and appears to have died fairly recently, however there is no evidence of any poisoning or vandalism at the base of this tree (Plate 3). There is a power pole within three (3) metres of the base of the tree that has meter boxes attached to either side of it and it is possible roots may have been severed with any works from these meter boxes, that may have affected this tree. Trees 12 and 13 are reasonably suppressed specimens with limbs growing against each other, due to their proximity to each other.



**Plate 3:** Image showing Trees 9-13. P. Vezgoff

**3.11** Trees 17-26 form a dense group of vegetation with much suckering occurring from the Casuarinas which is quite normal for this species (Plate 4). Within this group is a Swamp Mahogany (*Eucalyptus robusta*), being Tree 19, and it is potentially not a long term viable specimen. This tree is possibly beginning to develop included stems.



**Plate 4:** Image showing Trees 17-26. P. Vezgoff

**3.12** Trees 27-29 are growing along the road (Plate 5). They have asphalt virtually up to the base of these trees. There is extensive woody root growth occurring with some disruption to the asphalt forming. Considering their location, and the harsh conditions in which they are growing, these trees are in reasonable condition. It is unlikely that they would tolerate any resurfacing works that might occur around the base of them. As individual specimens they would not be considered significant.



**Plate 5:** Image showing Trees 27-29. P. Vezgoff

- 3.13** Tree 35 appears that it might have been vandalised via ring barking at some stage, but the vandalism has been unsuccessful as this tree is continuing to grow with no ill effects from the vandalism.
- 3.14** Trees 29 – 38 are another group of Casuarinas with two (2) of the larger specimens that are dead and appear to have died from abiotic causes. Trees 56-67 are another group of Casuarinas, all in good health and condition with minor twiggy die back, all growing codominant with each other. Trees 50-55 are also a group of Casuarinas, all in good health and condition with minor twiggy die back, all growing codominant with each other.
- 3.15** Tree 41 is growing as a solitary specimen near the car park. This tree does have a section of mechanical damage in the base, likely caused from cars parking nearby and banging against it on a regular basis. There is possible decay in the base of this tree.
- 3.16** Trees 42-49 are a group of Casuarinas in good health and condition, all growing as a clump, with a lot of exposed woody roots with this group of trees. They are growing on the corner of the site and disrupting the asphalt quite substantially (Plate 6). There is much suckering occurring at the base of these trees which is quite normal for the species.



**Plate 6:** Image showing the base of Trees 42-49. P. Vezgoff

**3.17 Safe Useful Life Expectancy (SULE)** is a method of evaluating individual trees. The evaluation is a subjective assessment, not an absolute judgement, because the nature of trees and opinions on trees can vary greatly. SULE assessments are made only by those who are experienced and knowledgeable in tree management. SULE is generally accepted and used world-wide as a method of evaluating trees. Each category has a number of sub-categories. These sub-categories should always be recorded to help future users of the information appreciate the reason for each allocation decision. It is normal to have instances where trees will not fit neatly into a single SULE category. The assessment of the site trees would find them within a rating range of 1a; *Structurally sound trees located in positions that can accommodate for future growth* and 2c; *Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting*. Ultimately, the site trees would have more value as groups rather than individual specimens.

**3.18** The trees were assessed as below for the Significance of a Tree, Assessment Rating System or STARS©. The STARS© Matrix can be seen in Appendix 4.

Retention Value	High (Priority for retention)	Medium (Consider for retention)	Low (Consider for removal)	Priority for removal
Tree No.	1, 4-8, 14	9, 12, 13, 15-18, 20-32, 34-36, 38-68	2, 3, 19, 33	10, 11, 37

**Table 2:** Retention Value of STARS©

**3.19 Impacts:** Based on the plans provided, trees that appear possible to retain are numbered as 1, 3, 4, 5, 14, 15, 16, 27-34, 39, 60, 62-66, 68. Trees that require removal are numbered as 2, 6-13, 17-26, 35-38, 41-59, 61 and 67.

**3.20** The trees to be removed are probably not more than thirty (30) years old. The installation of the skate park is a long term asset for the local community and as such new landscaping could potentially increase the canopy cover within this area through new planting.

**3.21** Soil remediation will be required if the site is contaminated with asbestos. This will have an impact on the trees to be retained.

## 4 RECOMMENDATIONS

- 4.1 A Project Arborist should be appointed to oversee the arboricultural related works for the project. The Project Arborist should be used for arboricultural certification services and also used as a point of contact should any questions arise during the project. As specified in AS 4970, 2009, a Project Arborist is a person with a minimum Australian Qualification Framework (AQF) level 5 Diploma of Arboriculture or Horticulture qualification.
- 4.2 Based on the plans provided trees that appear possible to retain are numbered as 1, 3, 4, 5, 14, 15, 16, 27-34, 39, 60, 62-66, 68. Trees that require removal are numbered as 2, 6-13, 17-26, 35-38, 41-59, 61 and 67.
- 4.3 Of the trees to be retained, the plans should show that there are to be no grade changes within the TPZ area for each tree.
- 4.4 All plans should clearly show the tree numbering from this report
- 4.5 Prior to any demolition or any tree removal works, the identification of the correct trees to be retained/removed should be confirmed by the site Arborist.
- 4.6 **Trees to be retained** will require tree protection fencing as specified in Section 5.3 of this report. This fencing will be located at the Tree Protection Zones (TPZ) listed in the Tree Schedule (Appendix 2). The specifications for a TPZ are in Section 5.4 of this report.
- 4.7 Should the site be found to contain asbestos, soil remediation will be required. Asbestos soil remediation often involves either capping of the contaminated soil or total soil removal. When trees are involved this can often slow, if not stop, construction whilst remediation processes are undertaken. Remediation also involves altering the soil up to the base of the tree, which in turn can affect the health and or structure of the tree. Should the soil on site be found to be contaminated, further Arboricultural advice will be required.

## 5 TREE PROTECTION

**5.1 Trees to be protected:** Trees 1, 3, 4, 5, 14, 15, 16, 27-34, 39, 60, 62-66, 68 will be required to be fenced for protection. All fencing shall be installed as specified in Section 5.2 (Tree Protection – Implementation of Tree Protection Zone). Indicative locations of the fencing are shown in the Tree Protection Plan (Appendix 1).

**5.2 Implementation of Tree Protection Zone:** All tree protection works should be carried out before the start of demolition or building work. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be erected as shown in the Tree Protection Plan (Appendix 1). Specifications for this fencing are shown in Tree Protection Fencing Specifications (Appendix 5).

**5.3 The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ):** The TPZ is implemented to ensure the protection of the trunk and branches of the subject tree. The TPZ is based on the Diameter at Breast Height (DBH) of the tree. The SRZ is also a radial measurement from the trunk used to protect and restrict damage to the roots of the tree.

The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) have been measured from the centre of the trunk. The following activities shall be avoided within the TPZ and SRZ of the trees to be retained;

- Erecting site sheds or portable toilets.
- Trenching, ripping or cultivation of soil (with the exception of approved foundations and underground services).
- Soil level changes or fill material (pier and beam or suspended slab construction are acceptable).
- Storage of building materials.
- Disposal of waste materials, solid or liquid.

- 5.4 Tree Damage:** If the retained trees are damaged a qualified Arborist should be contacted as soon as possible. The Arborist will recommend remedial action so as to reduce any long term adverse effect on the tree's health.
- 5.5 Signage:** It is recommended that signage is attached to the tree protection fencing. A sample sign has been attached in Appendix 6. This sign may be copied and laminated then attached to any TPZ fencing.
- 5.6 Root Pruning:** If excavations are required within a TPZ this excavation shall be done by hand to expose any roots. Any roots under fifty (50) millimetres in diameter may be pruned cleanly with a sharp saw. Tree root systems are essential for the health and stability of the tree.
- 5.7 Arborist Certification:** It is recommended that the contractor supply Council or the Principal Certifying Authority with certification from the Project Arborist three (3) times during the construction phase of the development in order to verify that retained trees have been correctly retained and protected as per the conditions of consent and Arborist's recommendations. The certification is to be conducted by a Qualified Consulting Arborist with AQF level 5 qualifications that has current membership with either Arboriculture Australia (AA) or Institute of Australian Consulting Arboriculturists (IACA). Arborist certification is recommended:
- (1) Before the commencement of demolition or construction to confirm the fencing has been installed;
  - (2) At mid-point of the construction phase;
  - (3) At completion of the construction phase.

These "Hold points" should be included in any tender documentation for the project.

If you have any questions in relation to this report please contact me.



**Paul Vezgoff**

Consulting Arborist

Dip Arb (Dist), Arb III, Hort cert, AA, ISA

28<sup>th</sup> August 2019

Updated 7 February 2022



**Appendix 1**

**Plan 1**

**Tree Protection Plan**



# Tree protection plan

## Moore Trees



Tree to be retained



Tree to be removed

Tree canopies not to scale and are indicative only.



**Fence.** Implementation of tree protection zone (TPZ). All tree protection works should be carried out before the start of demolition or building works. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be erected



Date: 7th February 2022  
Drawn: P.Vezgoff  
Site Address: Leichhardt Skate Park  
Frazer Street  
Lilyfield NSW 2040

## Appendix 2

# **Tree health & condition** **assessment schedule**

## TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – Lilyfield Skate Plaza, Leichhardt Park

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
1	Bangalay (Eucalyptus botryoides)	10	10	0.38	95	No visual defects	2c removed for more suitable planting	Good	Mature	Asymmetrical canopy to the north crossed branches	4.6	2.4
2	Sydney red gum (Angophora costata)	2	0.4	0.03	95	No visual defects	5a Small tree <5 m in height.	Good	Sapling	New tree in lawn area	0.4	0.8
3	Swamp mahogany (Eucalyptus robusta)	10	6	0.35	95	Fruiting body (Small)	2a May only live for 15-40 years	Fair	Mature		4.2	2.3
4	Bangalay (Eucalyptus botryoides)	11	6	0.4	95	No visual defects	1a >40 years	Good	Mature	Old lignified wound on south side of lower stem borer damage noted	4.8	2.4
5	Bangalay (Eucalyptus botryoides)	8	4	0.28	95	No visual defects	2c removed for more suitable planting	Fair	Mature	Suppressed	3.4	2.1
6	Bangalay (Eucalyptus botryoides)	8	4	0.28	95	No visual defects	2c removed for more suitable planting	Fair	Mature	Suppressed. Old ring bark damage	3.4	2.1
7	Swamp mahogany (Eucalyptus robusta)	10	6.6	0.45	80	Dead wood <50mm	3a May only live for 5-15 years.	Fair	Mature	Scattered dead wood .Southerly stem bias. Old ring bark damage	5.4	2.5
8	Bangalay (Eucalyptus botryoides)	7.5	5	0.4	90	Dead wood <50mm	3a May only live for 5-15 years.	Fair	Mature	Scattered dead wood. Easterly stem bias. Old ring bark damage	4.8	2.4
9	Swamp mahogany (Eucalyptus robusta)	13	9	0.5	80	No visual defects	2a May only live for 15-40 years	Fair	Mature		6	2.6
10	Swamp mahogany (Eucalyptus robusta)	12	6	0.3	0		4a Dead, dying or declining.	Dead	Overmature		3.6	2.2
11	Stump	0	0	0.3	0		4a Dead, dying or declining.	Dead	Overmature	Old stump	3.6	2.2
12	Swamp mahogany (Eucalyptus robusta)	9	6	0.27	80	No visual defects	2a May only live for 15-40 years	Fair	Mature	Asymmetrical southerly bias	3.2	2.1

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
13	Swamp mahogany (Eucalyptus robusta)	8	4	0.15	95	No visual defects	2c removed for more suitable planting	Fair	Mature	Suppressed. Rubbing stems with tree 12	1.8	1.8
14	Tallowwood (Eucalyptus microcorys)	14	6	0.4	95	No visual defects	1a >40 years	Fair	Mature		4.8	2.4
15	River she oak (Casuarina cunninghamiana)	11	2.5	0.2	0		4a Dead, dying or declining.	Dead	Dead		2.4	1.9
16	River she oak (Casuarina cunninghamiana)	14	3	0.25	95	No visual defects	1a >40 years	Good	Mature		3	2.1
17	River she oak (Casuarina cunninghamiana)	13	2.5	0.25	95	No visual defects	1a >40 years	Good	Mature		3	2.1
18	River she oak (Casuarina cunninghamiana)	14	3	0.25	95	No visual defects	1a >40 years	Good	Mature		3	2.1
19	Swamp mahogany (Eucalyptus robusta)	13	5	250, 180	80	Included codom stems	2c removed for more suitable planting	Fair	Mature		3.6	2.2
20	River she oak (Casuarina cunninghamiana)	14	3	0.25	95	No visual defects	1a >40 years	Good	Mature		3	2.1
21	River she oak (Casuarina cunninghamiana)	6	1.5	0.1	95	No visual defects	1a >40 years	Good	Mature	Suppressed	1.2	1.6
22	River she oak (Casuarina cunninghamiana)	6	1.5	0.1	95	No visual defects	1a >40 years	Good	Mature	Suppressed	1.2	1.6
23	River she oak (Casuarina cunninghamiana)	11	3	0.29	95	No visual defects	2c removed for more suitable planting	Fair	Mature		3.5	2.2
24	River she oak (Casuarina cunninghamiana)	11	3	0.29	95	No visual defects	2c removed for more suitable planting	Fair	Mature		3.5	2.2
25	Tallowwood (Eucalyptus microcorys)	10	5	0.24	95	No visual defects	2c removed for more suitable planting	Good	Mature	Suppressed asymmetrical bias to the south	2.9	2
26	River she oak (Casuarina cunninghamiana)	11	3	200, 200	95	No visual defects	2c removed for more suitable planting	Fair	Mature	Multi stemmed specimen	3.5	2.2
27	River she oak (Casuarina cunninghamiana)	9	2	0.25	95	No visual defects	2c removed for more suitable planting	Fair	Mature		3	2.1

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
28	River she oak (Casuarina cunninghamiana)	9	2	0.25	95	No visual defects	2c removed for more suitable planting	Fair	Mature		3	2.1
29	River she oak (Casuarina cunninghamiana)	11	2.5	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
30	River she oak (Casuarina cunninghamiana)	11	2.5	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
31	River she oak (Casuarina cunninghamiana)	9	1.5	0.13	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.6
32	River she oak (Casuarina cunninghamiana)	11	2.5	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
33	River she oak (Casuarina cunninghamiana)	9	1.5	0.13	0	No visual defects	4a Dead, dying or declining.	Dead	Overmature		1.6	1.6
34	River she oak (Casuarina cunninghamiana)	9	1.5	0.13	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.6
35	River she oak (Casuarina cunninghamiana)	9	1.5	0.13	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.6
36	River she oak (Casuarina cunninghamiana)	11	2.5	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
37	River she oak (Casuarina cunninghamiana)	11	2.5	0.2	0	Dead wood >50mm	4a Dead, dying or declining.	Dead	Dead		2.4	1.9
38	River she oak (Casuarina cunninghamiana)	8	1	0.1	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.2	1.6
39	River she oak (Casuarina cunninghamiana)	9	2	0.18	95	No visual defects	2c removed for more suitable planting	Fair	Mature		2.2	1.9
41	Swamp mahogany (Eucalyptus robusta)	10	5.5	0.38	90	No visual defects	2c removed for more suitable planting	Poor	Mature	Old wound at base	4.6	2.4
42	River she oak (Casuarina cunninghamiana)	11	2.5	0.24	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	2.9	2

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
43	River she oak (Casuarina cunninghamiana)	9	1	0.12	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	1.4	1.6
44	River she oak (Casuarina cunninghamiana)	5	0.5	0.11	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	1.3	1.3
45	River she oak (Casuarina cunninghamiana)	9	1	0.12	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	1.4	1.6
46	River she oak (Casuarina cunninghamiana)	11	2.5	0.24	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	2.9	2
47	River she oak (Casuarina cunninghamiana)	9	1.5	0.15	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	1.8	1.8
48	River she oak (Casuarina cunninghamiana)	12	3	0.29	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	3.5	2.2
49	River she oak (Casuarina cunninghamiana)	12	3	0.3	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group near the car park area causing minor disruption to asphalt surface	3.6	2.2
50	River she oak (Casuarina cunninghamiana)	13	3	0.45	95	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen	5.4	2.5
51	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
52	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
53	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
54	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
55	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
56	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
57	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
58	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
59	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
60	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
61	River she oak (Casuarina cunninghamiana)	12	2.5	0.15	95	No visual defects	2c removed for more suitable planting	Good	Mature		1.8	1.8
62	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
63	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
66	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
67	River she oak (Casuarina cunninghamiana)	12	2.5	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.4	1.9
68	River she oak (Casuarina cunninghamiana)	13	3	0.3	95	No visual defects	2c removed for more suitable planting	Good	Mature		3.6	2.2

**KEY**

**Tree No:** Relates to the number allocated to each tree for the Tree Plan.

**Height:** Height of the tree to the nearest metre.

**Spread:** The average spread of the canopy measured from the trunk.

**DBH:** Diameter at breast height. An industry standard for measuring trees at 1.4 metres above ground level, this measurement is used to help calculate Tree Protection Zones.

**Live Crown Ratio:** Percentage of foliage cover for a particular species.

<b>Age Class:</b> Young:	Recently planted tree	Semi-mature:< 20% of life expectancy
Mature:	20-90% of life expectancy	Over-mature:>90% of life expectancy

**SULE:** See SULE methodology in the Appendix 3

**Tree Protection Zone (TPZ):** The minimum area set aside for the protection of the trees trunk, canopy and root system throughout the construction process. Breaches of the TPZ will be specified in the recommendations section of the report.

**Structural Root Zone (SRZ):** The SRZ is a specified distance measured from the trunk that is set aside for the protection of the trees roots both structural and fibrous.

## Appendix 3

### SULE categories (after Barrell, 2001)<sup>1</sup>

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

updated 01/04/01)

1 (Barrell, J. (2001) "SULE: Its use and status into the new millennium" in *Management of mature trees*, Proceedings of the 4<sup>th</sup> NAAA Tree Management Seminar, NAAA, Sydney.

## Appendix 4

### **Tree Significance - Assessment Criteria**

#### **1. High Significance in landscape**

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ - tree is appropriate to the site conditions.

#### **2. Medium Significance in landscape**

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.

#### **3. Low Significance in landscape**

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

#### **Environmental Pest / Noxious Weed Species**

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

#### **Hazardous/Irreversible Decline**

- The tree is structurally unsound and/or unstable and is considered potentially dangerous, - The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

**The tree is to have a minimum of three (3) criteria in a category to be classified in that group.**

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
Legend for Matrix Assessment		<div> <div> <div>INSTITUTE OF AUSTRALIAN</div> <div>IACA</div> <div>CONSULTING ARBORICULTURISTS</div> </div> </div>				
		<b>Priority for Retention (High)</b> - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.				
		<b>Consider for Retention (Medium)</b> - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.				
		<b>Consider for Removal (Low)</b> - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.				
		<b>Priority for Removal</b> - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.				

Legend for Matrix Assessment.

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, [www.iaca.org.au](http://www.iaca.org.au)

## Appendix 5

# **TPZ and SRZ methodology**

### **Determining the Tree Protection Zone (TPZ)**

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

$$\text{TPZ} = \text{DBH} \times 12$$

Where

DBH = trunk diameter measured at 1.4 metres above ground

Radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 metres no greater than 15 metres (except where crown protection is required.). Some instances may require variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 metre outside the crown projection.

### **Determining the Structural Root Zone (SRZ)**

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

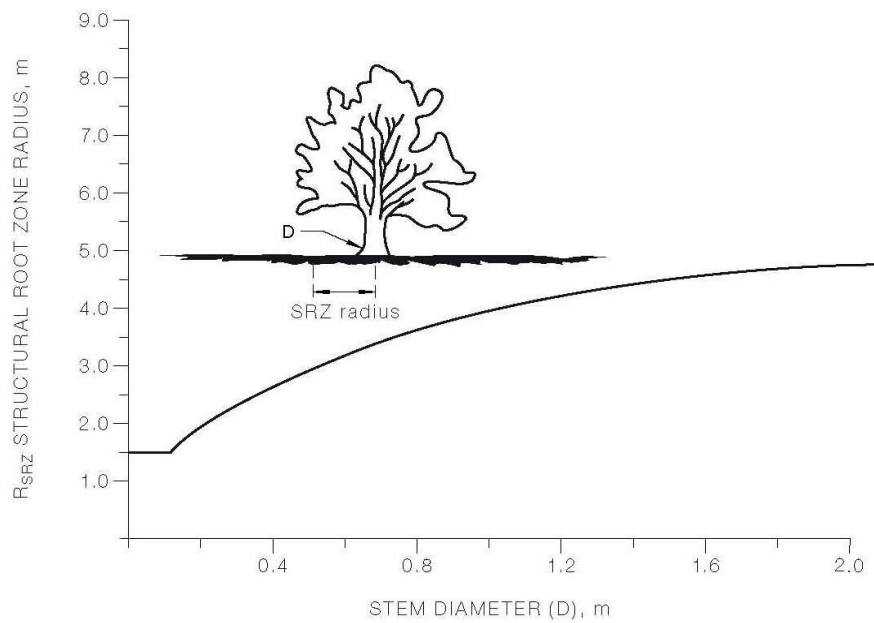
There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1. Root investigation may provide more information on the extent of these roots.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64$$

Where

$D$  = trunk diameter, in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15m will be 1.5m (see Figure 1).



The curve can be expressed by the following formula:  
 $R_{SRZ} = (D \times 50)^{0.42} \times 0.64$

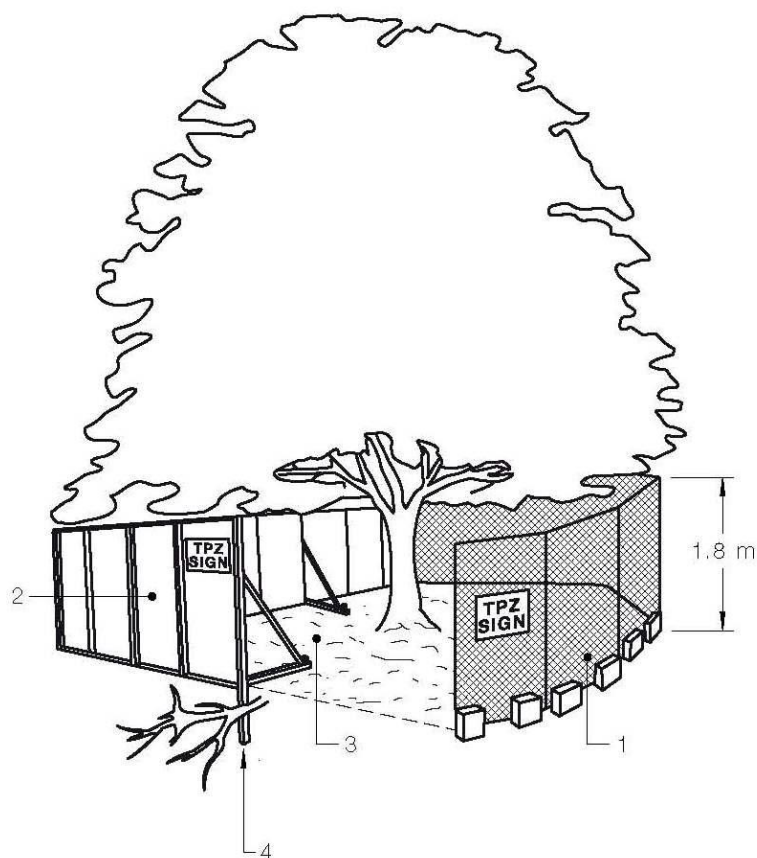
**FIGURE 1 - STRUCTURAL ROOT ZONE**

*Notes:*

- 1  $R_{SRZ}$  is the structural root zone radius.
- 2  $D$  is the stem diameter measured immediately above root buttress.
- 3 The SRZ for trees less than 0.15 metres diameter is 1.5 metres.
- 4 The SRZ formula and graph do not apply to palms, other monocots, cycads and tree ferns.
- 5 This does not apply to trees with an asymmetrical root plate.

## Appendix 6

# **Tree protection fencing** **specifications**



**LEGEND:**

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

**Figure 1:** Protective fencing as specified in AS 4970, 2009.

## Appendix 7

# **Tree protection sign** **sign sample**

# Tree Protection Zone

Fence not to be moved without approval from Arborist

Within this fence there is to be

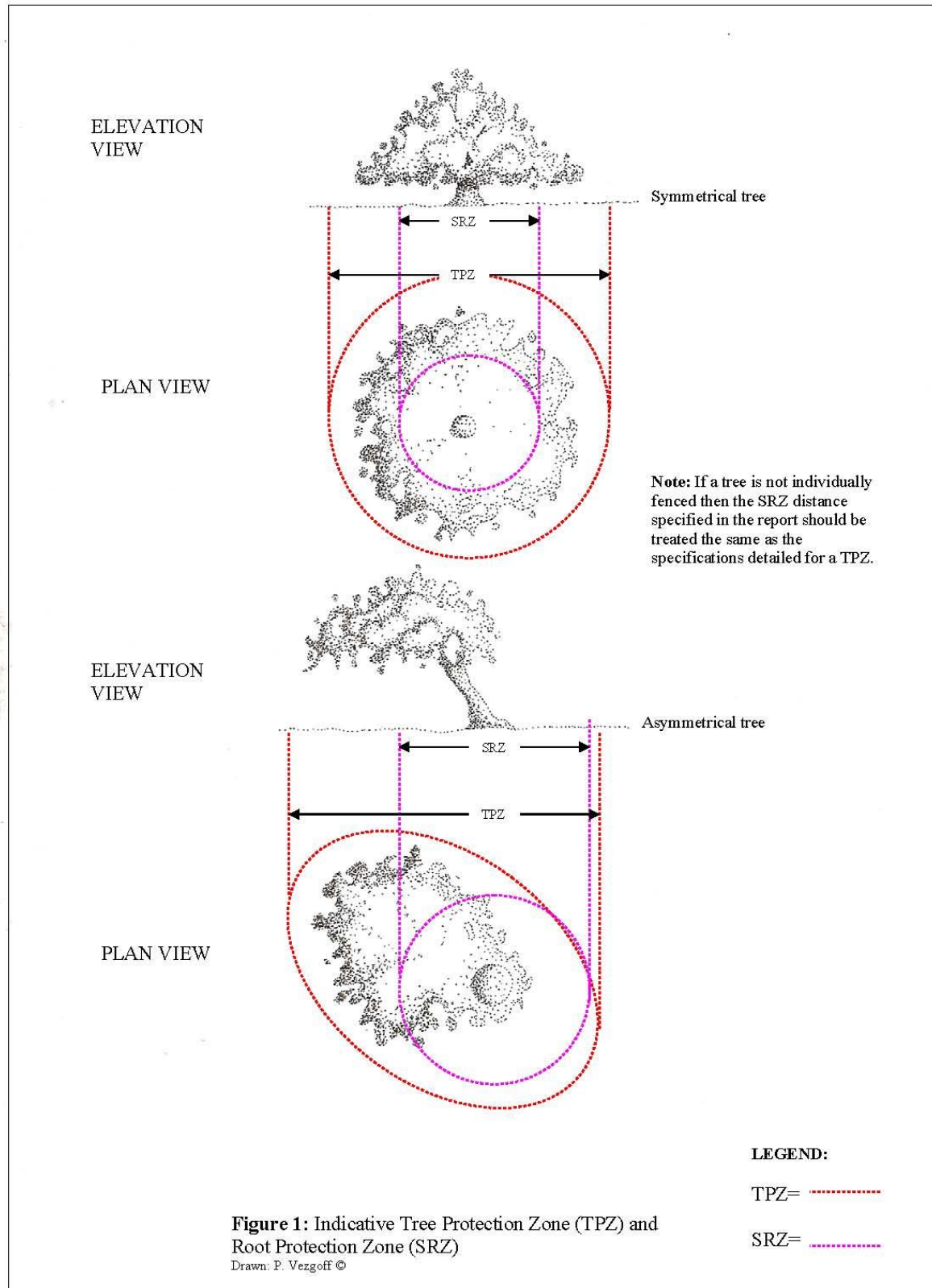
**NO**

Storage of materials

Trenching or excavation

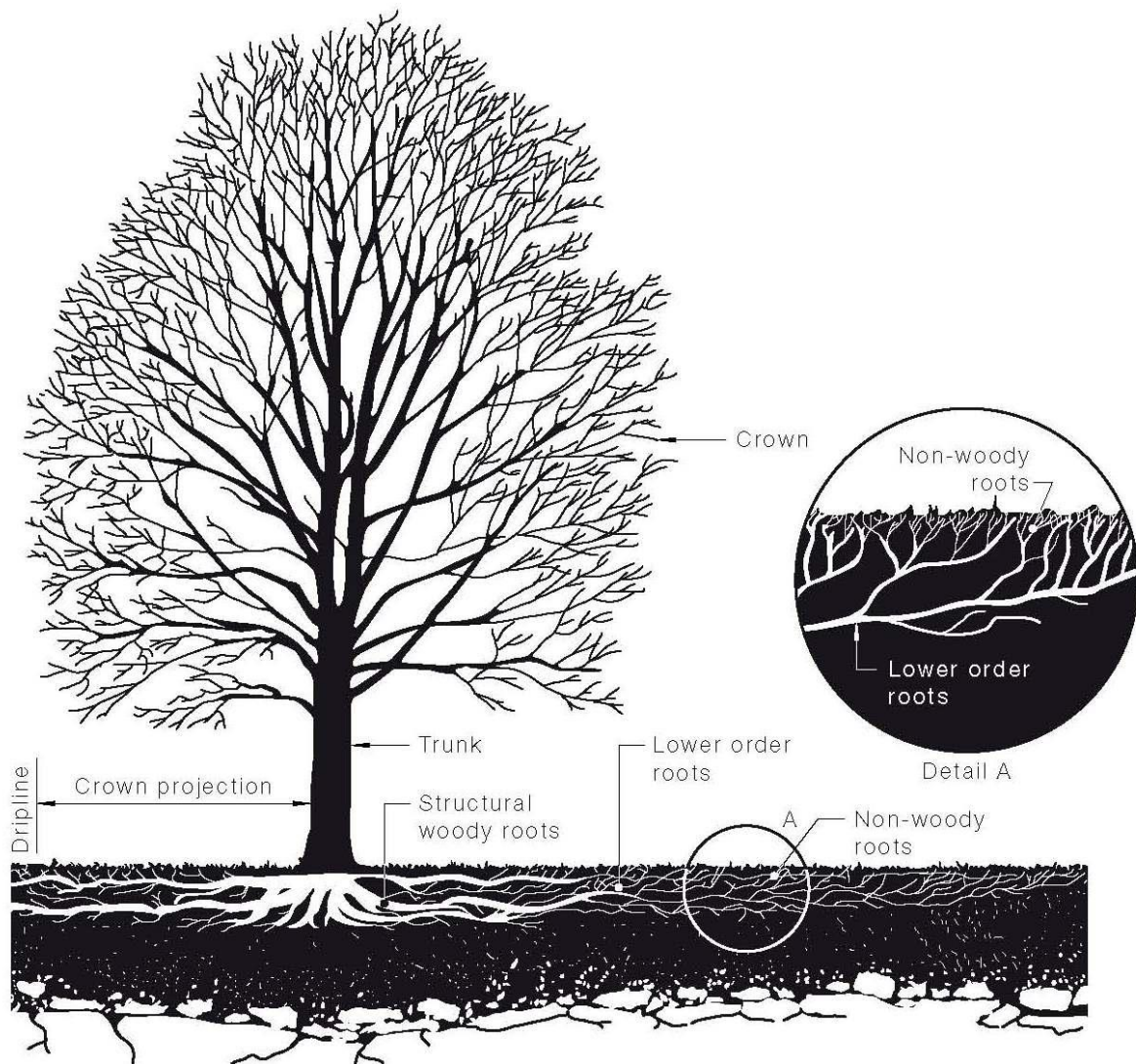
Washing of tools or equipment

## Appendix 8



## Appendix 9

### Tree structure information diagram



**Figure 2:** Structure of a tree in a normal growing environment (AS 4970, 2009.).

## Appendix 10

### Explanatory Notes

- **Mathematical abbreviations:** > = Greater than; < = Less than.
- **Measurements/estimates:** All dimensions are estimates unless otherwise indicated. Less reliable estimated dimensions are indicated with a '?'.
- **Species:** The species identification is based on visual observations and the common English name of what the tree appeared to be is listed first, with the botanical name after in brackets. In some instances, it may be difficult to quickly and accurately identify a particular tree without further detailed investigations. Where there is some doubt of the precise species of tree, it is indicated with a '?' after the name in order to avoid delay in the production of the report. The botanical name is followed by the abbreviation sp if only the genus is known. The species listed for groups and hedges represent the main component and there may be other minor species not listed.
- **Height:** Height is estimated to the nearest metre.
- **Spread:** The maximum crown spread is visually estimated to the nearest metre from the centre of the trunk to the tips of the live lateral branches.
- **Diameter:** These figures relate to 1.4m above ground level and are recorded in centimetres. If appropriate, diameter is measure with a diameter tape. 'M' indicates trees or shrubs with multiple stems.
- **Estimated Age:** Age is estimated from visual indicators and it should only be taken as a provisional guide. Age estimates often need to be modified based on further information such as historical records or local knowledge.
- **Distance to Structures:** This is estimated to the nearest metre and intended as an indication rather than a precise measurement.

## Appendix 11

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## **EDUCATION and QUALIFICATIONS**

- 2013 / 2018 – ISA TRAQ qualification
- 2007 – Diploma of Arboriculture (AQF Cert V) Ryde TAFE. (Distinction)
- 1997 – Completed Certificate in Crane and Plant Electrical Safety
- 1996 – Attained Tree Surgeon Certificate (AQF Cert II) at Ryde TAFE
- 1990 – Completed two month intensive course on garden design at the Inchbald School of Design, London, United Kingdom
- 1990 – Completed patio, window box and balcony garden design course at Brighton College of Technology, United Kingdom
- 1989 – Awarded the Big Brother Movement Award for Horticulture (a grant by Lady Peggy Pagan to enable horticulture training in the United Kingdom)
- 1989 – Attained Certificate of Horticulture (AQF Cert IV) at Wollongong TAFE

## **INDUSTRY EXPERIENCE**

### **Moore Trees Arboricultural Services**

**January 2006 to date**

Tree Consultancy and tree ultrasound. Tree hazard and risk assessment, Arborist development application reports  
Tree management plans.

### **Woollahra Municipal Council**

**Oct 1995 to February 2008**

ARBORICULTURE TECHNICAL OFFICER

August 2005 – February 2008

ACTING COORDINATOR OF TREES MAINTENANCE

June – July 2005, 2006

Responsible for all duties concerning park and street trees. Prioritising work duties, delegation of work and staff supervision.  
TEAM LEADER

January 2003 – June 2005

September 2000 – January 2003

HORTICULTURALIST

October 1995 – September 2000

### **Northern Landscape Services**

**July to Oct 1995**

Tradesman for Landscape Construction business

### **Paul Vezgoff Garden Maintenance (London, UK)**

**Sept 1991 to April 1995**

## **CONFERENCES AND WORKSHOPS ATTENDED**

- International Society of Arboriculture Conference (Canberra May 2017)
- QTRA Conference, Sydney Australia (November 2016)
- TRAQ Conference, Auckland NZ / Sydney (2013/2018)
- International Society of Arboriculture Conference (Brisbane 2008)
- Tree related hazards: recognition and assessment by Dr David Lonsdale (Brisbane 2008)
- Tree risk management: requirements for a defensible system by Dr David Lonsdale (Brisbane 2008)
- Tree dynamics and wind forces by Ken James (Brisbane 2008)
- Wood decay and fungal strategies by Dr F.W.M.R. Schwarze (Brisbane 2008)
- Tree Disputes in the Land & Environment Court – The Law Society (Sydney 2007)
- Barrell Tree Care Workshop- Trees on construction sites (Sydney 2005).
- Tree Logic Seminar- Urban tree risk management (Sydney 2005)
- Tree Pathology and Wood Decay Seminar presented by Dr F.W.M.R. Schwarze (Sydney 2004)
- Inaugural National Arborist Association of Australia (NAAA) tree management workshop- Assessing hazardous trees and their Safe Useful Life Expectancy (SULE) (Sydney 1997).