Moore Trees
Arboricultural Services

ABN 90887347745

Arboricultural Development Assessment Report

Kogarah War Memorial Pool
Carss Park NSW 2221
September 2020
Final

Prepared for: Georges River Council

Prepared by: Paul Vezgoff
Consulting Arborist
ISA, AA
Arboriculture Australia
Registered Consultant

Member 2020

PO Box 3114 Austinmer NSW 2515
Ph: 0242 680 425
Mob: 0411 712 887
Email: enquiries@mooretrees.com.au
Web: www.mooretrees.com.au

Summary

This report has been compiled for Georges River Council, Georges River Civic Centre, Corner MacMahon and Dora Streets, Hurstville NSW 2220. The report concerns a proposed Development Application for Kogarah War Memorial Pool, Carwar Ave, Blakehurst NSW 2221. This Arborist Report refers to ninety seven (97) trees.

This report contains the following information for each trees near the project area:-

1) All trees were assessed for Safe Useful Life Expectancy (SULE).
2) Genus and species 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 demolition works and soil remediation required, Trees required to be removed are numbered as 14-16, 33-62, 74-86, 88-93, 97. The majority of these trees are exotic specimens.

The larger trees near the demolition works are numbered as 23, 24, 27 and 32. These trees are three (3) Tallowwood *(Eucalyptus microcorys)* and a single Port Jackson fig *(Ficus rubiginosa)* and are in good health and condition. The TPZ varies on these trees and they are located within the remediation area so could potentially be impacted by the works. Soil remediation techniques can vary and with the roots of these trees growing within the top 900mm of soil profile a site specific tree management process is required. For this project a Geofabric marker layer will extend up to the base of the trunks of the trees to be retained within the remediation area. A layer of 150mm of topsoil and woodchip around the base of the trunk will occur followed the cap increasing to 0.5 m thickness and comprising compacted imported fill with topsoil and a turf or woodchip layer at the surface level. This capping type process will occur to the area below Trees 23, 24, 27 and 32 to the extent of the drip line.

The demolition of the existing vegetation and bulk earth works will require tree protection fencing so that any damage to the surrounding vegetation to be retained is minimised. The storage of building materials, meal rooms and car parking should be clearly nominated on construction documents for this project.

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VERSION CONTROL

Date of Issue	Details
19th August 2020	Draft 1 issued
25th September 2020	Final issue

1 INTRODUCTION

1.1 This report has been conducted to assess the health and condition of ninety seven (97) individual trees located at Kogarah War Memorial Pool, Carwar Ave, Blakehurst NSW 2221. This report has been prepared for Georges River Council, Georges River Civic Centre, Corner MacMahon and Dora Streets, Hurstville NSW 2220 as required for the project requirements that consist of demolition of existing structures.

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).

1.2 Documents and information provided: For this Arboricultural Report I was given a site layout level survey plan of the location, undertaken by Map & Survey reference 5104 24/0702/2020. The plan showed the site layout.

1.3 Location: The project site is located within the Carss Park area at Carwar Ave, Blakehurst and was previously known as the Kogarah War Memorial Pool or Carss Park Pool. The project area from herein will be referred to as "the Site".

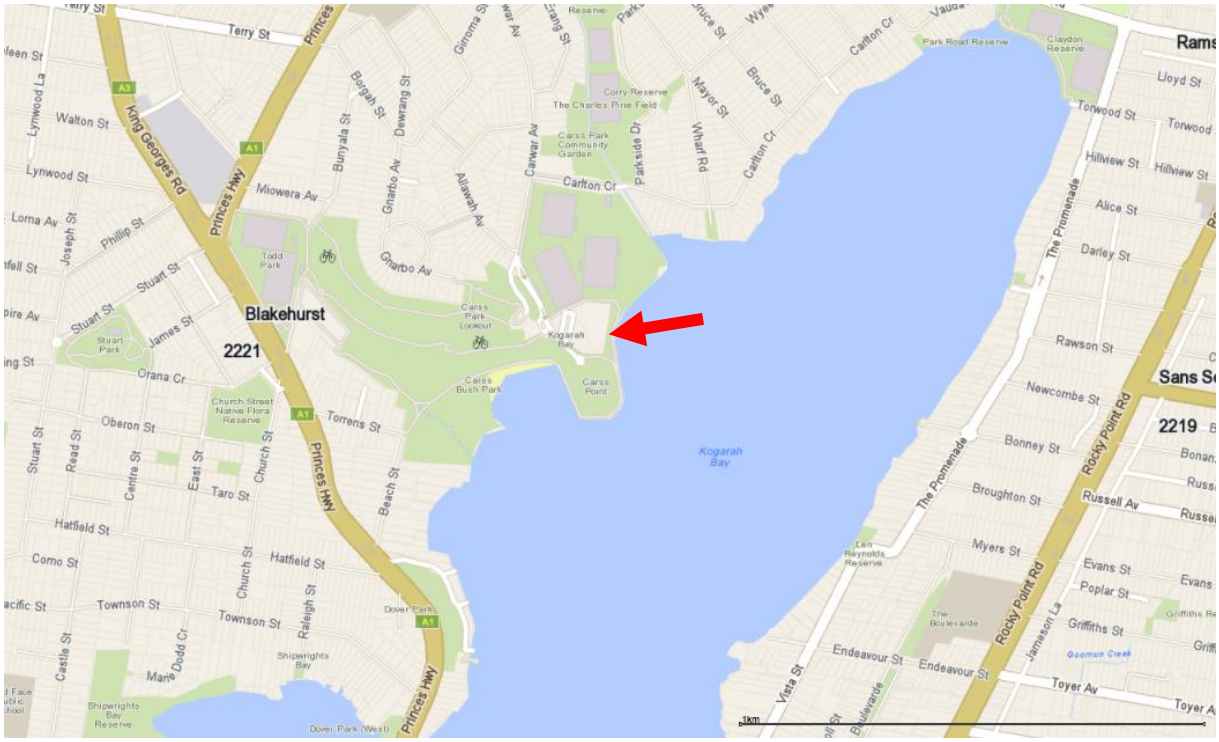

Diagram 1: Location of subject site, Red arrow (whereis.com.au, 2020).

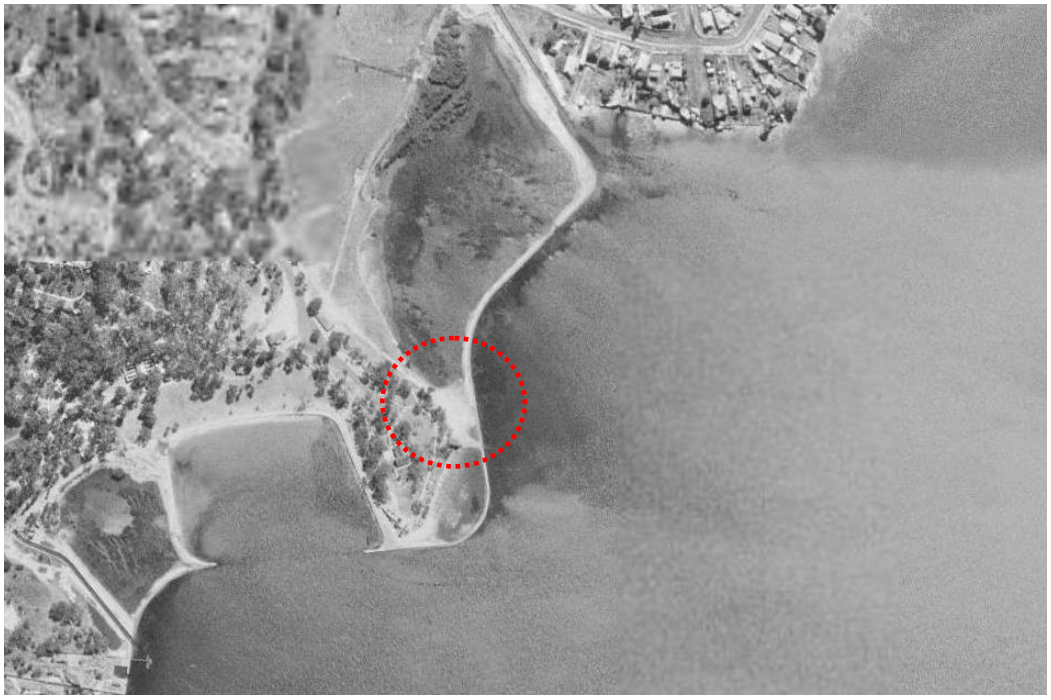

Diagram 2: Location of subject site in 1943 (RTA, from the skies 2007).

The project area is within the red circle.

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 3rd August 2020. 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 trees were selected due to their proximity to the project works and potential to be near the storage of materials and demolition areas. All inspections were undertaken from the ground. No diagnostic devices were used on these trees.

2.2 This report is only concerned with trees on the site that come under the Tree management permit policy that is part of the Georges River Council Development Control Plan.

2.3 **Height:** The heights and distances within this report have been measured with a Bosch DLE 50 laser measure.

2.4 **Tree Protection Zone (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 the site trees to determine construction impacts. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites*, AS 4970, 2009.

2.5 **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 4.

2.6 **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 in the Tree Assessment Schedule (Appendix 2). A detailed explanation of SULE can be found in Appendix 3.

2.7 **Impact Assessment:** An impact assessment was conducted on the site trees. This was conducted by assessing the site survey and plans provided by SJB Planning. Soil remediation works and the potential impacts have also been assessed. 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 Kogarah War Memorial Pool is located in the southern Sydney suburb of Blakehurst near Kogarah Bay. The site contains the existing swimming pool, building and associated structures. The proposed works assessed for this report is the demolition and removal of all man-made structures.

3.2 **Environmental Significance**: All trees in the Georges River Council Local Government Area are protected and cannot be removed without the adequate requirements being met. Specifications relating to what can and cannot be removed are detailed in the Georges River Council Development Control Plan (DCP). This DCP protects all trees above three (3) metres in height with a girth of thirty (30) centimetres or more, measured at a distance of four hundred and fifty (450) centimetres above the ground.

Council has comprehensive tree management processes in place, including an over-arching Tree Management Policy and the relevant sections of Council's Development Control Plans (DCPs) is available on the website under *Kogarah DCP Part B - General Controls B2 - Preservation of Trees and Vegetation.*

3.3 **State Environmental Planning Policy No.19 Bushland in Urban Areas:** The general aims and objectives of State Environmental Planning Policy No.19 – Bushland in Urban Areas (SEPP 19) as it applies to the Georges River Council Local Government Area is to protect and preserve bushland. SEPP 19 recognises the value of native bushland to the community as part of the natural heritage. It also recognised the aesthetic value of bushland as a means of softening the urban fabric. Natural bushland areas are also valued as recreational, educational and for their scientific value to the community. SEPP 19 outlines specific aims some of which are:

a) To protect the remnants of plant communities which were once characteristic of the land.

b) To retain bushland in parcels of a size and configuration that will enable the existing plant and animal communities to survive in the long term.

c) To protect rare and endangered flora and fauna species.

d) To protect habitats for native flora and fauna.

e) To protect wildlife corridors and vegetation links with other nearby bushland.

Future reference should be made to this policy when any development is proposed that could impact the bushland within Kogarah War Memorial Pool.

It should be noted that the Kogarah War Memorial Pool site would not be considered a natural bushland area as it has been heavily modified and has numerous exotic tree, shrub and weed species located within the site.

3.4 **The Site Trees:** The site was inspected on 3rd August 2020. Each tree has been given a unique number for this site and can be viewed on the Tree Protection Plan (Appendix 1). This plan is based on the plan provided by SJB Planning.

3.5 Trees 1- 21 are located around the existing car park with the numbering commencing with the mature *Eucalyptus* specimens that line the edge of the Park. Tree species in this car park area is diverse and includes Tallowwood *(Eucalyptus microcorys),* Sydney blue gum *(Eucalyptus saligna),* Forest red gum *(Eucalyptus tereticornis),* Bangalay *(Eucalyptus botryoides),* Coastal banksia *(Banksia integrifolia),* River she oak *(Casuarina cunninghamiana).* The only exotic specimens in this area are three (3) Black locust *(Robinia pseudoacacia 'Frisia')* that have been planted along the front of the Pool building (Plate 1). To the south of the pool building is a large unmanaged specimen of Date palm *(Phoenix canariensis).* This palm is numbered as 94.

Plate 1: Image showing Trees 14-16 (*Robinia sp*.). P. Vezgoff

3.6 Along the southern vehicle entry to the site are the larger native specimens being Trees 23, 24, 27 and 32. These species consist of Tallowwood *(Eucalyptus microcorys)*, Port jackson fig *(Ficus rubiginosa)*, Forest Oak *(Allocasurina torulosa).* The Ficus has suffered from mechanical damage over the years however it is worthy of retention (Plate 2). The Tallowwood specimens within the pool grounds are large prominent specimens that are worthy of retaining, provided the soil remediation works do not impact these trees (Plate 3).

Plate 2: Image showing Port jackson fig *(Ficus rubiginosa)* by the side gate. P. Vezgoff

Plate 3: Image showing Tree 32. P. Vezgoff

3.7 Other trees within the Pool area, that are mostly exotic specimens, consist of Kentia Palm *(Howea fosteriana),* Dypsis decaryi, Hill's weeping fig *(Ficus microcarpa var. Hillii),* Native daphne *(Pittosporum undulatum),* Umbrella tree *(Shefflera actinophylla),* Cocos palm *(Syagrus romanzoffiana),* Jacaranda *(Jacaranda mimosifolia)* and a row of several Mexican fan palms *(Washingtonia robusta).*

Plate 4: Image showing some of the many exotic specimens surrounding the pool garden area. P. Vezgoff

3.8 Along the foreshore area is a row of what is mostly Forest Oak *(Allocasurina torulosa)* with some individual semi mature *Eucalyptus* specimens. Many of these specimens are of a stunted nature and are not very tall (Plate 5). The dense vegetation along the northern boundary of the pool and the park appear to be shrubs that have long since died due to being overrun by vigorous *Bougainvillea* plants.

Plate 5: Image showing the trees along the foreshore area. P. Vezgoff

3.9 **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.

In general, the site trees were mostly assessed as being in good health and condition with long ratings being 1a and 2a but the exotic specimens for the purpose of this project would be considered to have a 2c rating that being; 2c *removed for more suitable planting.*

3.10 **Impacts:** Based on the demolition works and soil remediation required Trees required to be removed are numbered as 14-16, 33-62, 74-86, 88-93, 97. The majority of these trees are exotic specimens.

3.11 The larger trees near the demolition works are numbered as 23, 24, 27 and 32. These trees are three (3) Tallowwood *(Eucalyptus microcorys)* and a single Port Jackson fig *(Ficus rubiginosa)* and are in good health and condition. The TPZ varies on these trees and they are located within the remediation area so could potentially be impacted by the works.

3.12 Soil remediation techniques can vary and with the roots of these trees growing within the top 900mm of soil profile a site specific tree management process is required. For this project a Geofabric marker layer will extend up to the base of the trunks of the trees to be retained within the remediation area. A layer of 150mm of topsoil and woodchip around the base of the trunk will occur followed the cap increasing to 0.5 m thickness and comprising compacted imported fill with topsoil and a turf or woodchip layer at the surface level. This capping type process will occur to the area below Trees 23, 24, 27 and 32 to the extent of the drip line.

3.13 The demolition of the existing vegetation and bulk earth works will require tree protection fencing so that any damage to the surrounding vegetation to be retained is minimised. The storage of building materials, meal rooms and car parking should be clearly nominated on construction documents for this project.

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 required to be removed are numbered as 14-16, 33-62, 74-86, 88-93, 97.

4.3 The fencing around Tree 87 shall be extended (As shown on the Tree Protection Plan) once all other vegetation has been removed below this tree.

4.4 A flat bucket excavator could be used for the removal of the top 100-150mm of soil however no closer than one (1) metre to the trunk. Capping can occur up to the trunk however fill shall not mound against the basal area of the trunk. Any fill over the TPZ area to be free draining, sand based, and not high in organic matter.

4.5 Construction documentation should also show recommended temporary storage areas for the site including spoil areas, car parking areas and work shed areas for the duration of the project. These should all be located outside of the TPZ areas listed in the Tree Schedule (Appendix 2).

4.6 Trees to be retained will require tree protection fencing as specified in Section 5.2 of this report. This fencing will be located at the Tree Protection Zones (TPZ) listed in the Tree Schedule (Appendix 2) or as shown in the locations shown in the Tree Protection Plan. The specifications for a TPZ are in Section 5.3 of this report.

5 TREE PROTECTION

5.1 Trees to be protected: Trees to be retained will require individual fencing. 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. TPZ and SRZ distances are all listed in the Tree Schedule (Appendix 2). 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 on every third panel.

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:** Construction documentation should show hold points for the contractor to comply with regarding the protection of the site trees. 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 project 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.

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

18 August 2020
Updated 25 September 2020

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Appendix 1

Plan 1

Tree Protection Plan

Tree protection plan

Moore Trees

Tree to be retained

Tree to be removed

Exotic species

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:	24.9.2020
Drawn:	P.Vezgoff
Site Address:	Kogarah War Memorial Pool Carrs Park NSW

Appendix 2

Tree health & condition assessment schedule

TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – Kogarah War Memorial Pool

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
1	Tallowwood (Eucalyptus microcorys)	14	11	0.85	95	No visual defects	1a >40 years	Good	Mature		10.2	3.1		
2	Tallowwood (Eucalyptus microcorys)	12	8	0.55	95	No visual defects	1a >40 years	Good	Mature		6.6	2.7		
3	Sydney blue gum (Eucalyptus saligna)	14	11	0.85	95	No visual defects	1a >40 years	Good	Mature		10.2	3.1		
4	Sydney blue gum (Eucalyptus saligna)	13	6	0.42	100	No visual defects	1a >40 years	Good	Mature		5	2.4		
5	Forest red gum (Eucalyptus tereticornis)	13	5.5	0.42	100	No visual defects	1a >40 years	Good	Mature		5	2.4		
6	River she oak (Casuarina cunninghamiana)	16	9	0.75	100	No visual defects	1a >40 years	Good	Mature		9	3		
7	Bangalay (Eucalyptus botryoides)	6.5	3.5	0.18	95	No visual defects	1a >40 years	Good	Mature		2.2	1.9		
8	Coastal banksia (Banksia integrifolia)	9	4.5	0.26	95	No visual defects	1a >40 years	Good	Mature		3.1	2.1		
9	Swamp mahogany (Eucalyptus robusta)	13	5.5	0.72	95	No visual defects	1a >40 years	Good	Mature		8.6	2.9		
10	River she oak (Casuarina cunninghamiana)	10	5.5	0.42	100	No visual defects	1a >40 years	Good	Mature		5	2.4		
11	Coastal banksia (Banksia integrifolia)	6	3	0.19	80	No visual defects	2a May only live for 15-40 years	Fair	Mature		2.3	1.9		
12	River she oak (Casuarina cunninghamiana)	13	7	0.58	100	No visual defects	1a >40 years	Good	Mature		7	2.7		
13	River she oak (Casuarina cunninghamiana)	6	3.5	0.19	100	No visual defects	1a >40 years	Good	Mature		2.3	1.9		
14	Black locust (Robinia pseudoacacia 'Frisia')	8	4.8	0.34	90	No visual defects	2c removed for more suitable planting	Good	Mature		4.1	2.3		
15	Black locust (Robinia pseudoacacia 'Frisia')	7	4	0.3	90	No visual defects	2c removed for more suitable planting	Good	Mature		3.6	2.2		
16	Black locust (Robinia pseudoacacia 'Frisia')	8	4.8	0.34	90	No visual defects	2c removed for more suitable planting	Good	Mature		4.1	2.3		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
17	River she oak (Casuarina cunninghamiana)	10	5	0.3	100	No visual defects	1a >40 years	Good	Mature		3.6	2.2		
18	River she oak (Casuarina cunninghamiana)	6	3.5	0.19	100	No visual defects	1a >40 years	Good	Mature		2.3	1.9		
19	River she oak (Casuarina cunninghamiana)	10	5	0.26	100	No visual defects	1a >40 years	Good	Mature		3.1	2.1		
20	Bangalay (Eucalyptus botryoides)	7	3.8	0.27	100	No visual defects	1a >40 years	Good	Mature		3.2	2.1		
21	Bangalay (Eucalyptus botryoides)	9	6	0.32	90	No visual defects	1a >40 years	Good	Mature	Low branching specimen	3.8	2.2		
22	Port jackson fig (Ficus rubiginosa)	14	12	0.85	90	No visual defects	1a >40 years	Good	Mature		10.2	3.1		
23	Port jackson fig (Ficus rubiginosa)	14	12	0.85	90	No visual defects	2a May only live for 15-40 years	Fair	Mature	Twin stems with mechanical damage on the main stems mine die back	10.2	3.1		
24	Tallowwood (Eucalyptus microcorys)	19	11	0.9	100	No visual defects	1a >40 years	Good	Mature		10.8	3.1		
25	Sydney red gum (Angophora costata)	8	4.5	0.24	90	No visual defects	1a >40 years	Good	Mature		2.9	2		
26	Forest Oak (Allocasurina torulosa)	6.5	3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Part of a group along fence line	2.4	1.9		
27	Tallowwood (Eucalyptus microcorys)	19	11	0.8	100	Dead wood >50mm	1a >40 years	Good	Mature		9.6	3.1		
27	Forest Oak (Allocasurina torulosa)	6.5	3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Part of a group along fence line	2.4	1.9		
28	Forest Oak (Allocasurina torulosa)	6.5	3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Part of a group along fence line	2.4	1.9		
29	Forest Oak (Allocasurina torulosa)	6.5	3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Part of a group along fence line	2.4	1.9		
30	Forest Oak (Allocasurina torulosa)	6.5	3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Part of a group along fence line	2.4	1.9		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
32	Tallowwood (Eucalyptus microcorys)	21	13	1.1	100	No visual defects	1a >40 years	Good	Mature		13.2	3.5		
33	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
34	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
35	Melaleuca bracteata	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
36	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
37	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
38	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
39	Eucalyptus sp	8	3.3	0.3	95	No visual defects	2a May only live for 15-40 years	Good	Mature		3.6	1.9		
40	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
41	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along	2.4	1.9		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
										the fence line				
42	Swamp oak (Casuarina glauca)	9	4	0.47	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	5.6	1.9		
43	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
44	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
45	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
46	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
47	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
48	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
49	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
50	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
51	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
52	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
53	Bracelet honey myrtle (Melaleuca armillaris)	7	4	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature		2.4	1.9		
54	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
55	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
56	Coastal banksia (Banksia integrifolia)	5.5	4	0.15	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	1.8	1.9		
57	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
58	Bracelet honey myrtle (Melaleuca armillaris)	6	4.5	0.25	95	No visual defects	3a May only live for 5-15 years.	Fair	Mature		3	1.9		
59	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen	2.4	1.9		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
										growing along the fence line				
60	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
61	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
62	Forest Oak (Allocasurina torulosa)	6	3.3	0.2	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	2.4	1.9		
63	Forest Oak (Allocasurina torulosa)	4	3.3	0.15	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	1.8	1.9		
64	Bracelet honey myrtle (Melaleuca armillaris)	4	6.5	0.25	95	No visual defects	4a Dead, dying or declining.	Poor	Mature	Stems have split.	3	1.9		
65	Bracelet honey myrtle (Melaleuca armillaris)	6	4	0.15	95	No visual defects	2a May only live for 15-40 years	Good	Mature		1.8	1.9		
66	Tallowwood (Eucalyptus microcorys)	11	9	0.55	80	No visual defects	2a May only live for 15-40 years	Fair	Mature		6.6	2.7		
67	Tallowwood (Eucalyptus microcorys)	12.5	9	0.45	70	No visual defects	3a May only live for 5-15 years.	Fair	Mature	Canopy in decline	5.4	2.5		
68	Tallowwood (Eucalyptus microcorys)	11	9	0.53	90	No visual defects	2a May only live for 15-40 years	Good	Mature		6.4	2.6		
69	Tallowwood (Eucalyptus microcorys)	12	8	0.6	90	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	7.2	2.8		
70	Tallowwood (Eucalyptus microcorys)	12	8	0.7	90	No visual defects	2a May only live for 15-40 years	Good	Mature		8.4	2.9		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
71	Sydney blue gum (Eucalyptus saligna)	14	8	0.7	90	No visual defects	2a May only live for 15-40 years	Good	Mature		8.4	2.9		
72	Sydney blue gum (Eucalyptus saligna)	14	8	0.7	95	No visual defects	2a May only live for 15-40 years	Good	Mature	Multi stemmed specimen growing along the fence line	8.4	2.9		
73	Sydney blue gum (Eucalyptus saligna)	15	9	0.75	95	No visual defects	1a >40 years	Good	Mature		9	3		
74	Kentia Palm (Howea fosteriana)	4.5	2	0.12	100	No visual defects	1a >40 years	Good	Mature		1.4	1.4		
75	Dypsis decaryi	4	2	0.12	100	No visual defects	1a >40 years	Good	Mature	Triangle palm	1.4	1.4		
76	Dypsis decaryi	4	2	0.12	100	No visual defects	1a >40 years	Good	Mature	Triangle palm	1.4	1.4		
77	Hill's weeping fig (Ficus microcarpa var. Hillii)	11	8	0.6	95	No visual defects	2c removed for more suitable planting	Good	Mature	Variegated specimen	7.2	2.8		
78	Native daphne (Pittosporum undulatum)	5.5	3.5	0.26	80	No visual defects	2c removed for more suitable planting	Fair	Mature	Multi stemmed specimen, Shrub rather than tree. Low significance.	3.1	2.1		
79	Umbrella tree (Shefflera actinophylla)	7	4	0.35	100	No visual defects	3c Removed for a better specimen.	Good	Mature	Weed species. Multi stemmed specimen. Shrub rather than tree. Low significance.	4.2	2.3		
80	Native daphne (Pittosporum undulatum)	5.5	3.5	0.26	80	No visual defects	2c removed for more suitable planting	Fair	Mature	Multi stemmed specimen. Shrub rather than tree. Low significance.	3.1	2.1		
81	Native daphne (Pittosporum undulatum)	5.5	3.5	0.22	80	No visual defects	2c removed for more suitable planting	Fair	Mature	Shrub rather than tree. Low significance.	2.6	2		
82	Umbrella tree (Shefflera actinophylla)	7	4	0.35	100	No visual defects	3c Removed for a better specimen.	Good	Mature	Weed species. Multi stemmed	4.2	2.3		

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)	Native	Exotic
										specimen				
83	Native daphne (Pittosporum undulatum)	5.5	3.5	0.2	80	No visual defects	2c removed for more suitable planting	Fair	Mature	Multi stemmed specimen. Shrub rather than tree. Low significance.	2.4	1.8		
84	Cocos palm (Syagrus romanzoffiana)	11	2.5	0.18	95	No visual defects	3c Removed for a better specimen.	Good	Mature		2.2	1.6		
85	Cocos palm (Syagrus romanzoffiana)	10	2.5	0.2	95	No visual defects	3c Removed for a better specimen.	Good	Mature		2.4	1.6		
86	Cocos palm (Syagrus romanzoffiana)	10	2.5	0.25	95	No visual defects	3c Removed for a better specimen.	Good	Mature		3	1.8		
87	Jacaranda (Jacaranda mimosifolia)	9	5	0.25	90	No visual defects	2c removed for more suitable planting	Good	Mature		3	2.1		
88	Mexican fan palm (Washingtonia robusta)	15	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group	3	1.8		
89	Mexican fan palm (Washingtonia robusta)	15	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group	3	1.8		
90	Mexican fan palm (Washingtonia robusta)	15	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group	3	1.8		
91	Mexican fan palm (Washingtonia robusta)	16	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group	3	1.8		
92	Mexican fan palm (Washingtonia robusta)	15	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group	3	1.8		
93	Mexican fan palm (Washingtonia robusta)	18	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Part of a group	3	1.8		
94	Date palm (Phoenix canariensis)	18	3	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	Two growing together	3	1.8		
95	Bangalay (Eucalyptus botryoides)	5	2	0.13	100	No visual defects	2a May only live for 15-40 years	Good	Sapling	On grass verge	1.6	1.4		
96	Norfolk Island Pine (Araucaria heterophylla)	4	1	0.1	100	No visual defects	5a Small tree <5 m in height.	Good	Sapling	On grass verge	1.2	1.2		
97	Bangalay (Eucalyptus botryoides)	5	2	0.1	100	No visual defects	2c removed for more suitable planting	Fair	Sapling		1.2	1.4		

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.

Age Class:	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)[1]

SULE Category	Description
Long	*Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.*
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.
Medium	*Trees that appeared to be retainable at the time of assessment for 15-40 years with an acceptable level of risk.*
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.
Short	*Trees that appeared to be retainable at the time of assessment for 5-15 years with an acceptable level of risk.*
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.
Remove	*Trees that should be removed within the next five years.*
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.
Small	*Small or young trees that can be reliably moved or replaced.*
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 4th NAAA Tree Management Seminar, NAAA, Sydney.

Appendix 4

TPZ and SRZ methodology

Determining the Tree Protection Zone (TPZ)

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

TPZ = DBH x 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.

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).

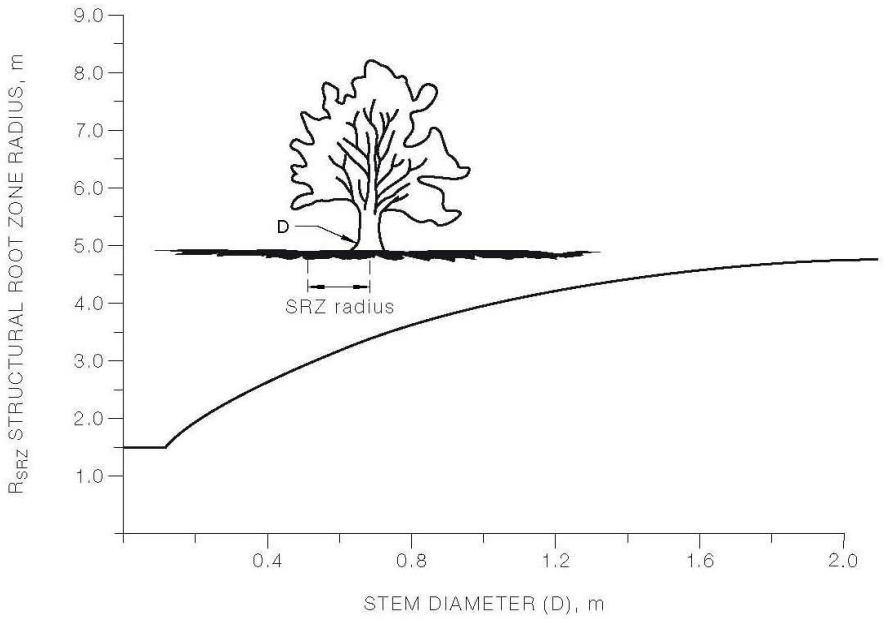


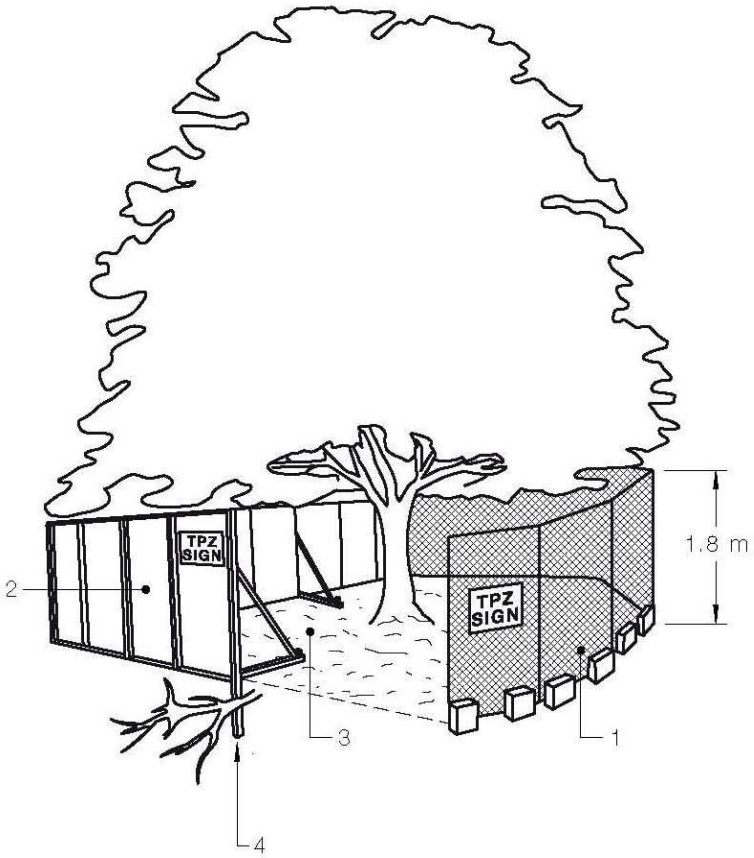
FIGURE 1 - STRUCTURAL ROOT ZONE

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 o.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 5

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 6

Tree protection sign

sign sample

Moore Trees
Tree Consultancy
0411 712 887

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 7

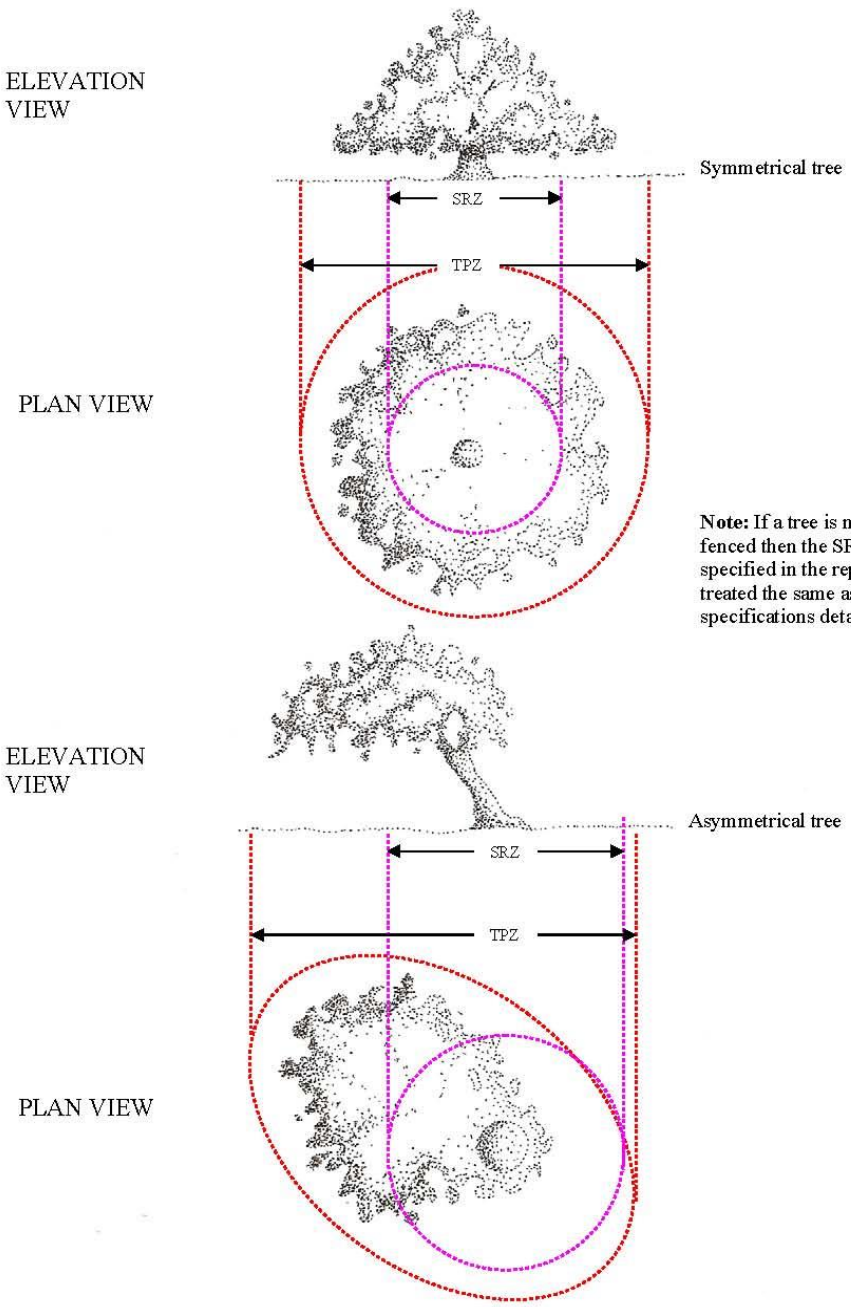


Figure 1: Indicative Tree Protection Zone (TPZ) and Root Protection Zone (SRZ)
Drawn: P. Vezgoff ©

Appendix 8

Tree structure information diagram

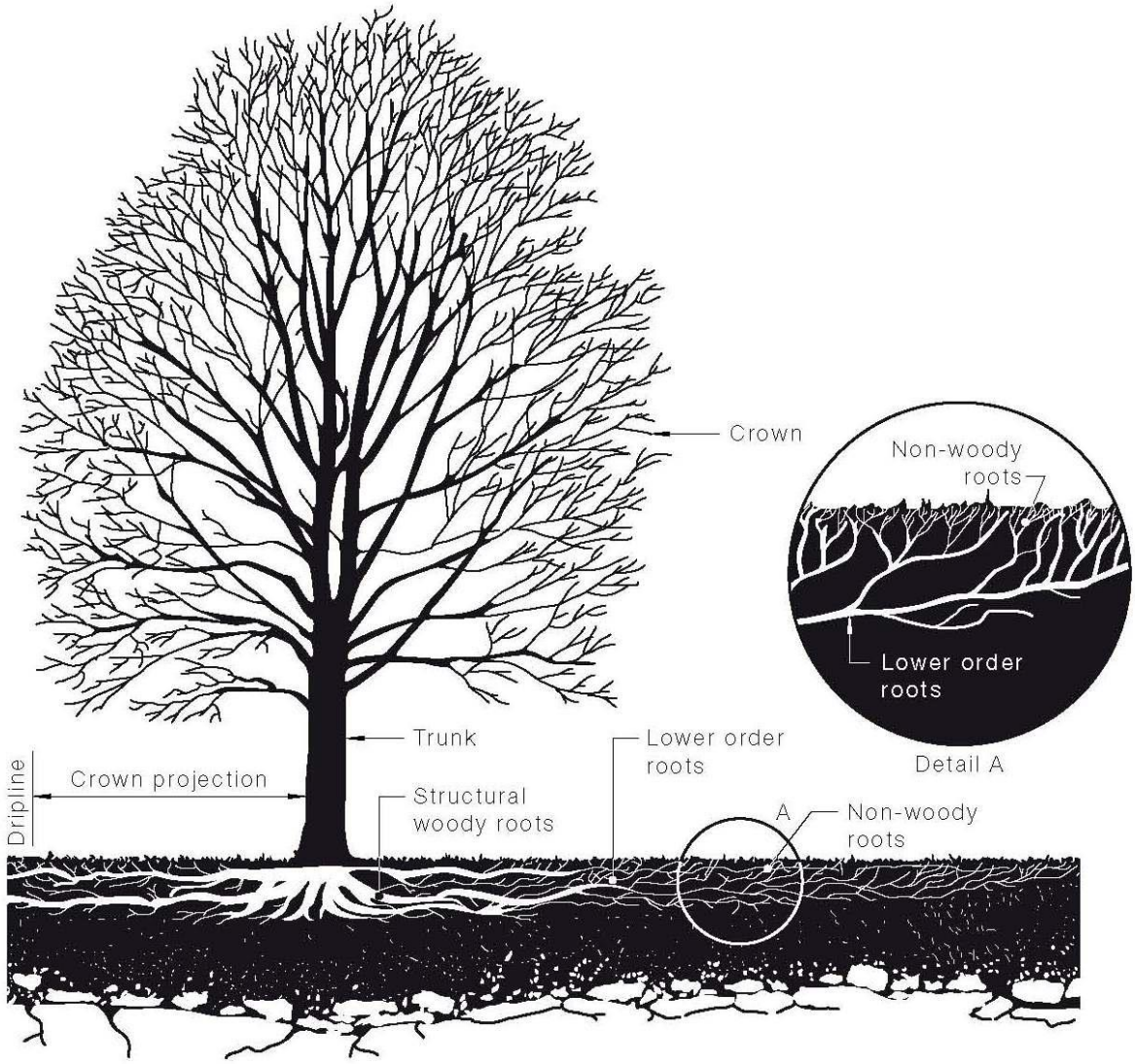


Figure 2: Structure of a tree in a normal growing environment (AS 4970, 2009.).

Appendix 9

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 10

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Curriculum Vitae

PAUL VEZGOFF - MOORE TREES P O Box 3114, Austinmer NSW 2515
P 0242 680 425 M 0411 712 887 E enquiries@mooretrees.com.au W www.mooretrees.com.au

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 Londsdale (Brisbane 2008)
- Tree risk management: requirements for a defensible system by Dr David Londsdale (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).