Moore Trees
Arboricultural Services

ABN 90887347745

Arboricultural Impact Assessment Report
&
Tree Protection Plan and Specification

Charles Street Square
Charles Street Parramatta
NSW 2150
February 2019
(updated September 2020)
DRAFT 4

Member 2020

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Prepared for:
Spackman Mossop Michaels,
115 Flinders Street Surry Hills,
Sydney NSW 2010

Prepared by:
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ISA, Arboriculture Australia
Registered Consultant

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VERSION CONTROL

Date of Issue	Details
22 February 2019	Version 1 issued
24 September 2019	Version 2 issued
18th November 2019	Version 3 issued
6th September 2020	Version 4 issued

1 INTRODUCTION

1.1 This Arboricultural Impact Assessment (AIA) and Tree Protection Plan and Specification has been written for trees that are in and around the Charles Street Square study area. This report assesses the potential impacts to fourteen (14) trees located in and around the Charles Street riverfront area. The study area for this project can be seen in Diagram 2. This report has been prepared for Spackman Mossop Michaels, 115 Flinders Street Surry Hills, Sydney NSW 2010 (hereinafter referred to as "the Client").

1.2 It should be noted that since the initial inspection in 2019, Trees 6, 7, 9, 12, 18, 19, 20, 21, 22, 25 and 26 have been removed, either through storm events, building works or pest and disease issues. The only trees now remaining are numbered as 1, 2, 3, 4, 5, 8, 10, 11, 13, 14, 15, 16, 17 and 23. A large development adjacent to Trees 18-22 has resulted in these trees being removed.

1.3 The purpose of this report is to collect the appropriate tree related data on the subject trees and to provide advice on the categorization of the site trees in order to assist in potential design layouts.

1.4 This AIA follows the industry best practice requirements for Consulting Arborists and contains the following information:-

a) Reviewing the Architectural Drawings and assessing the potential impact of the proposed development on existing trees to be retained, including assessment of any proposed incursions to the canopy and/or root zone;
b) Advising the project representative if further investigations, such as root investigations or internal diagnostic testing is required;
c) Recommending modifications to the design or construction methods where appropriate to minimise adverse impact on trees considered worthy of retention including recommended setbacks or other measures to avoid adverse impacts;
d) Preparing a plan showing the trees to be removed and retained together with their respective identification number based on the site survey. Trees to be removed shall be shown with a bold dashed line;
e) Providing recommendations for tree protection measures to ensure the retention of healthy trees as appropriate ; and
f) Review and comment on the final design arrangement.

1.5 **The site:** The subject site is known as Charles Street Square and is located on the southern side of the Parramatta River (Diagram 1). The subject site, including tree numberings, can be seen in the Tree Plan (Appendix 1). The proposed development site from herein will be referred to as "the Site".

1.6 **Documents and information provided:** For this AIA Report I was given a Site Location plan and Architectural plan set of the proposed design by Lahznimmo Architects marked Proj 18-17 200724 A- REF – 01 Rev 02 Sheets 01-05 dated 24/7/2020. This AIA Report has been assessed against these plans.

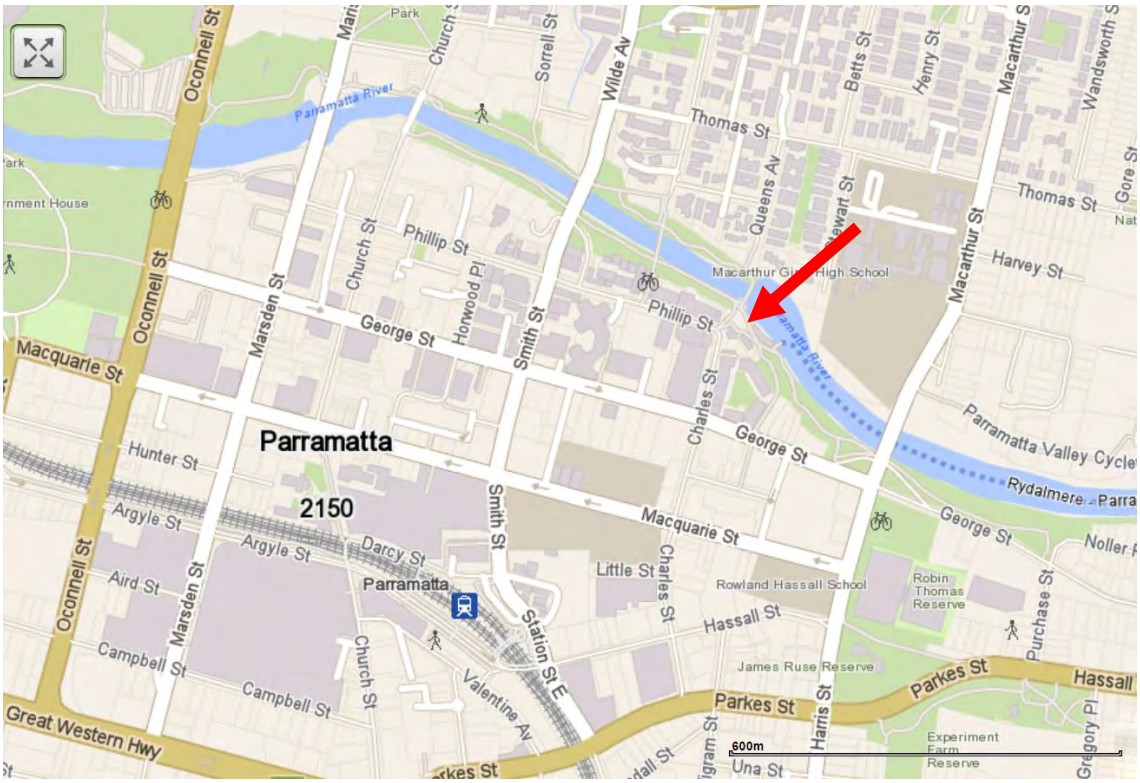


Diagram 1: Location of subject site (Red arrow) (whereis.com.au, 2019)

Diagram 2: Location of the study area (Google Earth, 2019).

Diagram 3: Location of subject site in 1943 (Six maps 2019)

1.7 The Site trees: The site tree images are shown in Table 1. They were also part of a categorization process that rated them from a high, medium or low retention rating.

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 30th January 2019 and a further inspection on 28th 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 in tabulated format. All inspections were undertaken from the ground. No diagnostic devices were used on these trees.

2.2 **Tree Protection Zones (TPZ):** The Tree Protection Zone (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. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites,* AS 4970, 2009. The Tree Protection Zones are shown in the Tree Impact Plan (Plan 1, Appendix 1)

2.3 **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. SRZ areas are also shown in (Plan 1 Appendix 1). 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.

2.4 **Tree Significance & Retention Value:** The Tree Significance & Retention Value used in this report is known as the Significance of a Tree, Assessment Rating System or STARS© system created by the Australian Institute of Consulting Arboriculturists (IACA). As noted by IACA, this system is a free to use system by Arboriculturists as at the date of this report. This system allows a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments (Draper and Richards 2009). The system uses a scale of *High, Medium and Low significance* in the landscape. Once the landscape significance

of an individual tree has been defined, the retention value can be determined. The Retention Value is selected between *High, Medium, Low and Priority for removal.* The Matrix can be seen in Appendix 3.

2.5 Tree Retention Value Plans: All trees have been allocated a Tree Retention Value. These values have been applied to the colour coded plan in Appendix 1 (Tree Retention Plan 1). Since the initial inspection, Trees 6, 7, 9, 12, 18, 19, 20, 21, 22, 25 and 26 have been removed, either through storm events, building works or pest and disease issues.

2.6 Impact Assessment: The site survey and plans provided by Spackman Mossop Michaels Pty Ltd were assessed for the following:

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

2.7 Terms: The following terms have been used in this report and due the extent of various disciplines involved on a project of this size, basic terminologies have been used as described below;

***Foot print*:** The term footprint will relate to any proposed structure located above Ground Level (GL) that may potentially affect the root zone of any tree or tree itself. The structure may be as small as a rubbish bin or as large as an area of paving.

***Excavation*:** This includes trenching, trenching and batters, footings for walls, trenching for services, pipes, lighting telecommunications.

***Hand dug*:** Excavation to occur by hand so as not to damage or sever any roots associated with nearby trees. In general, the Project Arborist inspects or supervises this work.

***TPZ encroachments*:** The Australian Standard *Protection of trees on development sites,* (AS 4970) recommends no more than 10% encroachment unless the TPZ can be compensated elsewhere and contiguous with the TPZ. Any encroachment greater than 10% is considered a major encroachment. In this instance the Project Arborist is required to demonstrate that the tree would still remain viable due to the >10% encroachment.

Table 1: Tree images: Charles Street Square, Parramatta

Tree	Species	Image
1	Jacaranda *(Jacaranda mimosifolia)*	

2 and 3	Sydney red gum *(Angophora costata)*	
4 and 5	Sydney red gum *(Angophora costata)*	

8	Brushbox *(Lophostemon confertus)*	
10, 11	Blueberry ash *(Elaeocarpus reticulatus)*	

13	Spotted gum *(Corymbia maculata)*	

14	Spotted gum *(Corymbia maculata)*	

15	Spotted gum *(Corymbia maculata)*	
16	Spotted gum *(Corymbia maculata)*	

17	Port jackson fig *(Ficus rubiginosa)*	

3 RELEVANT BACKGROUND INFORMATION

3.1 **The Site Trees:** The site was inspected on 30th January 2019 and a further inspection on 28th August 2020. Each tree has been given a unique number for this site and can be viewed on the Plans attached in Appendix 1. The site is located on the southern side of Parramatta River. It is a heavily modified site with hard surface terracing, landscaping, commercial outdoor eatery and bar area as well as public open space and a ferry terminal. As seen in Diagram 3 no vegetation from 1943 still exists. All of the site trees have been planted within the last approximately 30 years. A total of fourteen (14) trees were assessed for this report.

3.2 Each tree was assessed for a retention value based on the criteria detailed in the Methodology (Section 2.6). Each tree's value is individually listed in Appendix 2 (Field Data Schedule) with final recommendations for the remaining trees in Section 4 (Recommendations) of this report.

3.3 **Environmental Significance**: : A Tree Preservation Order (TPO) applies to the whole of the Parramatta Local Government Area. This TPO applies to any tree or palm, whether indigenous, endemic, exotic or introduced species which has a height equal to or exceeding five (5) metres, not being a cycad palm or mangrove; any cycad or mangrove irrespective of dimensions, or any bushland.

3.4 Tree 1 is a small sapling, Jacaranda *(Jacaranda mimosifolia)* species. It is the only exotic tree of the subject trees assessed for the site. It would not be considered significant and could readily be replaced. Trees 2 and 3 are mature Angophora specimens (Plate 1) in excellent health and condition however it is noted that an old stump to the west of Tree 2 that appears to have been the same species, show signs of a decay pathogen as evidenced by the long strings of cellulose remaining within the stump.

Plate 1: Image showing Trees 2 and 3. P.Vezgoff

3.5 Trees 4, 5 and 8 are located within a raised garden area (Plate 2). Tree 8 is a large Brush Box *(Lophostemon confertus)* specimen.

Plate 2: Image showing Trees 4, 5 and 8 are located within a raised garden area. P. Vezgoff.

3.6 Trees 10, 11 are both mature Blueberry Ash *(Elaeocarpus reticulatus)* in excellent health and condition (Plate 3) however are currently within a construction site. These trees have jasmine climbing up the trunks that has been planted as ground cover below them. It is recommended that the jasmine is removed, should these trees be retained.

Plate 3: Image showing Blueberry Ash *(Elaeocarpus reticulatus)* numbered as Trees 10, 11. P. Vezgoff.

3.7 Trees 13, 14, 15, 16 and 23 are all Spotted Gum *(Eucalyptus maculata)* in excellent health and condition. Tree 17 is a mature Port Jackson fig in excellent health and condition. It has extensive new growth with a broad domed canopy and is one of the more significant trees on site. A large mulched area has been set aside for this tree and as such this is healthy growing environment is reflected in the canopy (Plate 4). Tree 15 has suffered several failures possibly from a storm event. Trees 13, 14 and 16, the main trunks, first and second order branches are free of any cracks , splits or fruiting bodies on these trees. Old pruning wounds are showing good occlusion, a sign that the trees are photosynthesizing effectively. New extension growth was noted with leaf colour showing good vitality on all trees. These trees would be considered to have 95% live canopies. The basal area and woody root zones were all free of any ground heaving, or lifting.

Plate 4: Image showing Tree 17 the large *Ficus* specimen on site. P. Vezgoff.

Plate 5: Image showing Tree 15 (left) and 13 (right). P. Vezgoff.

Plate 6: Image showing Tree 15. Plans show a walkway and low retaining wall to the left of this tree. P. Vezgoff

3.8 With regards to the TPZ and SRZ distances calculated for the remaining site trees, these will need to be taken into consideration with potential designs. The Australian Standard *Protection of trees on development sites,* (AS 4970) recommends no more than 10% encroachment unless the TPZ can be compensated elsewhere and contiguous with the TPZ. Breaches of the TPZ greater than 10% are considered a major encroachment. Root mapping (nondestructive exploration for roots) could also be undertaken in order to confirm, or not, the presence of roots in a particular location.

3.9 At the initial inspection, the trees were assessed as below for the Significance of a Tree, Assessment Rating System (STARS)©. The STARS© Matrix can be seen in Appendix 3. Since the initial inspection, Trees 6, 7, 9, 12, 18, 19, 20, 21, 22, 25 and 26 have been removed, either through storm events, building works or pest and disease issues.

Significance Scale	**1 (High)**	**2 (Medium)**	**3 (Low)**
Tree No.	2, 3, 4, 5, 8, 13, 14, 16, 17, 23	1, 10, 11, 12, 15, 18-22, 25, 26	7, 9, 24

Table 2: Significance Scale of STARS©

Retention Value	**High (Priority for retention)**	**Medium (Consider for retention)**	**Low (Consider for removal)**
Tree No.	2, 3, 4, 5, 8, 13, 14, 16, 17, 23	1, 10, 11, 12, 15, 18-22, 25, 26	7, 9, 24

Table 3: Retention Value of STARS©

These Retention Values have been applied to the colour coded plan in Appendix 1 to the trees that were present at the initial inspection (Tree Retention Plan, Plan 1). A large portion of the park trees were assessed as *High*. As individual specimens 10, 11, 12, 18, 19, 20 were assessed as slightly less significant. Since the initial inspection, Trees 12, 18, 19, and 20 are no longer present. Trees 9 and 24 were assessed as being in heavy decline and are no longer present.

Of concern is the decay pathogen that appears to be present within an old stump near Tree 2. A tissue test with the Royal Botanic Gardens Pathology department (approx. $200 per test) would confirm what pathogen is present and make site management recommendations. In some instances, soil pathogens can be spread through disturbance.

A soil sample would be required for this testing. This testing would confirm whether a decay pathogen is present, and whether it is a Wood Decay Fungi (WDF) or soil pathogen which may affect future plantings. A WDF would not be of great concern however should the soil contain *Phytophthora cinnamomia* or *Armillaria luteobubalina* then further site specific treatments may have to be implemented. Should the option to test be undertaken, it should be completed at the earliest opportunity due to the length of time testing requires.

4 RECOMMENDATIONS

4.1 As shown in the Tree Retention Value Plan (Appendix 1), all of the remaining site trees are worthy of retention and all contribute to the streetscape and visual amenity of the area. Trees 2 and 3 may potentially become infected with the decay pathogen from the stump in the ground and as such could be removed, if necessary and replaced.

4.2 Based on the plans provided, Trees to be removed are numbered as 4, 5, 8 and 13. Trees 1, 2, 3, 10, 11, 14, 15, 16, 17, 23 appear possible to retain. Since the initial inspection in 2019 for this Report, Trees 6, 7, 9, 12, 18, 19, 20, 21, 22, 25 and 26 have been removed either through storm events, building works or pest and disease.

4.3 The plans show works to occur within the TPZ of Tree 15 (Plate 6). These works include removal of the existing turf and footpath and the construction of paving or concrete within the TPZ of Tree 15.

4.4 **Mechanised excavation:** A flat bucket attachment on the excavator can be used within the TPZ area of Tree 15 to locate roots, provided levels are reduced by small increments so as not to damage any roots found. Should any roots >50mm be located, hand excavation will follow. This is to ensure that no roots within the TPZ are to be cut or damaged that are >50mm in diameter. A spotter must be present to monitor what roots are revealed.

4.5 **New Paving:** New paving is proposed for the path to the west of Tree 15. Some surface roots may be encountered from this tree. Any excavation for the paving base within the SRZ area of Tree 15 that will uncover roots greater than fifty (50) millimetres the clearing around these roots shall be undertaken by hand. Any roots found fifty (50) millimetres in diameter or less than, may be cleanly severed with a sharp saw. Any root found >50mm the Project Arborist shall be contacted for further advice if it is interfering with the approved designs.

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 the locations shown in the Tree Protection Plan. The specifications for a TPZ are in Section 5.3 of this report.

4.7 Trees 2 and 3 will require trunk protection as specified in Section 5.4 of this report. This trunk protection will be required due to the proximity of heavy equipment operating near these trees to create the terracing. It is important to protect the bark on trees. Bark is a very effective barrier that helps to protect trees from pest, disease and decay pathogens.

4.8 Incursions of the TPZ and SRZ distances are possible however this will require assessment of the proposed designs. With any park upgrade, changes in surface levels are expected. It should be remembered that important fine feeder roots will be located within the top three hundred (300) millimetres of soil profile and, as such, the quantity of incursion would have to be calculated and assessed on an individual tree basis. Roots will be present below the footpath paved surfaces and care will be required for the installation of any stormwater drainage for this park.

4.9 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 heath and or structure of the tree. Should the soil on site be found to be contaminated, further Arboricultural advice will be required and this report will require updating.

5 TREE PROTECTION

5.1 Trees to be protected: Trees to be retained will be required to be fenced for protection. All fencing shall be installed as specified in Section 5.3 (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 6).

5.3 Individual trunk protection: Trees 2 and 3 will require trunk protection. This is achieved by attaching lengths of timber (75mm x 50mm x 2000mm) fastened around the trunk. Geotextile fabric or carpet underlay shall be wrapped around the trunk prior to the timbers being attached. These timbers are to be fastened with hoop iron strapping and not attached directly into the bark of the tree. These timbers are only to be removed when all construction is complete. See Plate A below for an example of trunk protection.

Plate A.

5.4 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.

5.5 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.

5.6 Signage: It is recommended that signage is attached to the tree protection fencing. A sample sign has been attached in Appendix 7. This sign may be copied and laminated then attached to any TPZ fencing.

5.7 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. A hand dig area can be seen in the Tree Protection Plan, Plan 2. Severed roots shall be treated with Steriprune®, available at most large Hardware Stores.

5.8 Soil compaction: Mulch has been recommended to be placed within the TPZ areas. This is to help reduce soil compaction and moisture retention for the trees that are to be retained. The area for mulch can be seen in the Tree Protection Plan (Appendix 1). Mulch is to be no thicker than one hundred (100) millimetres in depth and spread evenly across the TPZ area.

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

23rd September 2019
Updated 4 September 2019

www.mooretrees.com.au

Appendix 1

Plans

Plan 1 Tree retention values

Plan 2 TPZ and SRZ distances

Plan 3 Tree Protection Plan

Baseplan provided by spackman mossop michaels

Tree Retention Values

MOORE TREES

Moore Trees

Plan 1

High

Medium

Low

Note: The tree condition plan is seperate to the SULE categories that have been allocated to the site trees.

The Tree Significance & Retention Value used in this report is known as the Significance of a Tree, Assessment Rating System or STARS© system created by the Australian Institute of Consulting Arboriculturists (IACA). See Appendix 3 within the report for the full assessment specification.

CHARLES STREET SQUARE

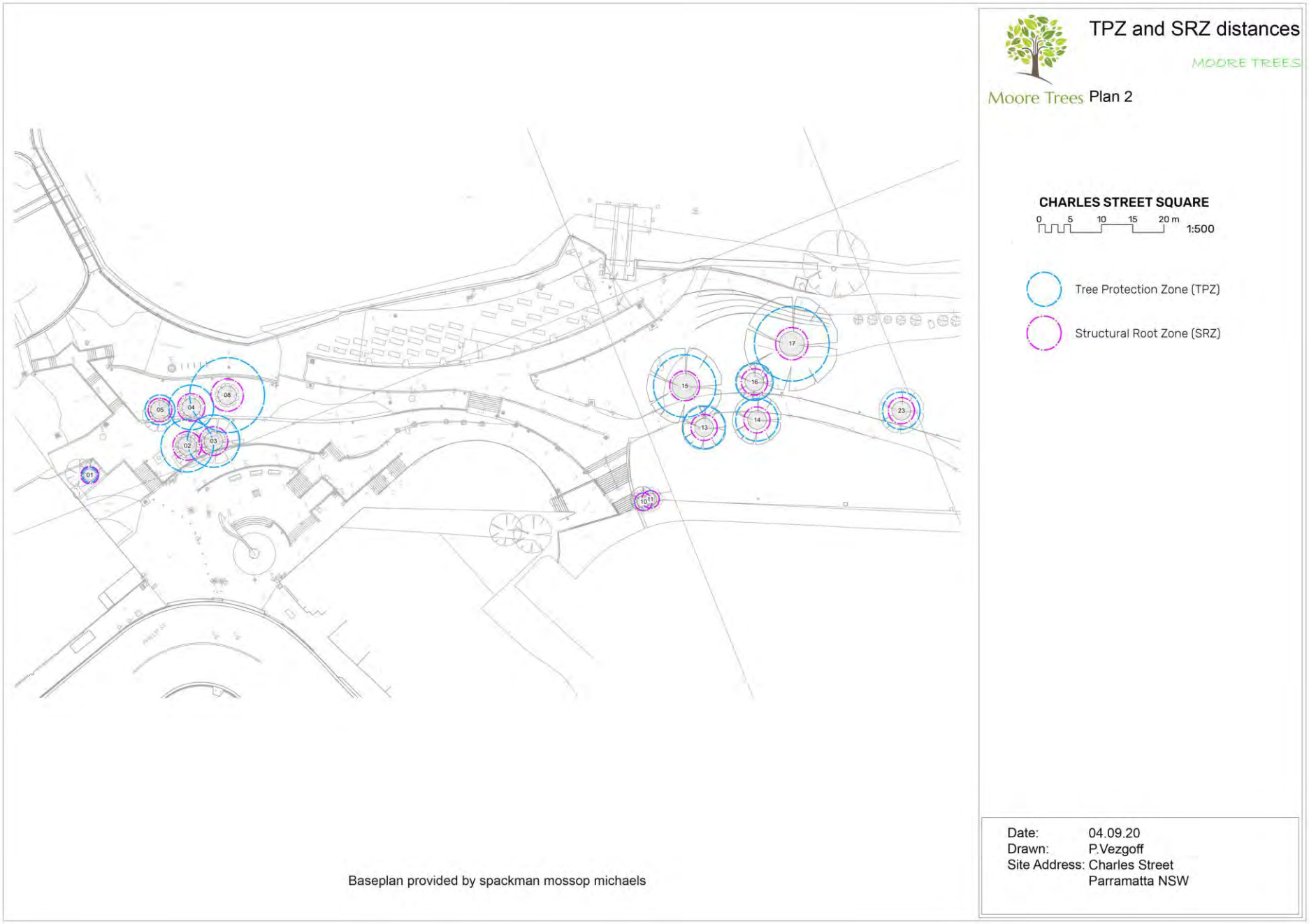
0 5 10 15 20 m 1:500

Tree Protection Zone (TPZ)

Structural Root Zone (SRZ)

Tree no longer present

Date: 08.09.2020
Drawn: P.Vezgoff
Site Address: Charles Street
Parramatta NSW


TPZ and SRZ distances
MOORE TREES
Moore Trees Plan 2
CHARLES STREET SQUARE
0 5 10 15 20 m
1:500
Tree Protection Zone (TPZ)
Structural Root Zone (SRZ)
Baseplan provided by spackman mossop michaels
Date: 04.09.20
Drawn: P.Vezgoff
Site Address: Charles Street
Parramatta NSW

Tree protection plan

Moore Trees Plan 3

Tree to be retained

Tree to be removed

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 errected

Location of possible root pruning. This area is to be excavated by hand to a depth of 400mm to expose any roots. If roots under 50mm are encountered they can be severed cleanly with a sharp saw. If roots over 50mm are encountered then a qualified arborist should be consulted for further advice.

Trunk protection. Lengths of timber (75mm x 50mm x 2000) shall be fastened to the trunk or overhead branches that are greater than 80mm in diameter. These timbers are to be fastened with hoop iron strapping and not fixed directly onto the trunk of the tree.

Date: 03.09.2020
Drawn: P.Vezgoff
Site Address: Charles Street
Parramatta NSW

Appendix 2

Tree Field Data Schedule

TREE FIELD DATA SCHEDULE – Charles Street Square

Tree	Species	Height (m)	Spread (m)	DBH (m)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
1	Jacaranda (Jacaranda mimosifolia)	7	1	0.1	100	No visual defects	2c removed for more suitable planting	Good	Sapling		1.2	1.4
2	Sydney red gum (Angophora costata)	17	6	0.35	95	Dead wood <50mm	1a >40 years	Excellent	Mature	Concrete over root zone with rubber infill.	4.2	2.3
3	Sydney red gum (Angophora costata)	17	6	0.35	95	No visual defects	1a >40 years	Excellent	Mature	Concrete over root zone with rubber infill.	4.2	2.3
4	Sydney red gum (Angophora costata)	17	4	0.3	95	No visual defects	1a >40 years	Good	Mature	Within garden area	3.6	2.2
5	Sydney red gum (Angophora costata)	7	3.5	0.2	95	No visual defects	1a >40 years	Good	Mature	Within garden area	2.4	1.9
8	Brushbox (Lophostemon confertus)	13	6	0.5	95	No visual defects	1a >40 years	Good	Mature	Garden area	6	2.6
10	Blueberry ash (Elaeocarpus reticulatus)	6	2	0.12	100	No visual defects	1a >40 years	Excellent	Mature	Jasmine growing up trunk	1.4	1.4
11	Blueberry ash (Elaeocarpus reticulatus)	6	2	0.12	100	No visual defects	1a >40 years	Excellent	Mature	Jasmine growing up trunk	1.4	1.4
13	Spotted gum (Corymbia maculata)	13	5	0.28	95	Storm damage	1a >40 years	Good	Mature	100 mm first order branch failure at 3.5 m	3.4	2.1
14	Spotted gum (Corymbia maculata)	15	5	0.28	95	Storm damage	1a >40 years	Good	Mature	60 mm first order branch failure at 3.5 m south side	3.4	2.1
15	Spotted gum (Corymbia maculata)	16	7	0.42	95	Storm damage	2b 40+, safety or nuisance	Fair	Mature	Multiple limb failures possibly from a micro burst within the area. Branch caught in canopy	5	2.4
16	Spotted gum (Corymbia maculata)	17	6	0.25	95	No visual defects	1a >40 years	Good	Mature		3	2.1
17	Port jackson fig (Ficus rubiginosa)	13	9	0.5	100	No visual defects	1a >40 years	Excellent	Mature		6	2.6
23	Spotted gum (Corymbia maculata)	17	6	0.25	95	No visual defects	1a >40 years	Good	Mature		3	2.1

KEY

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

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

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

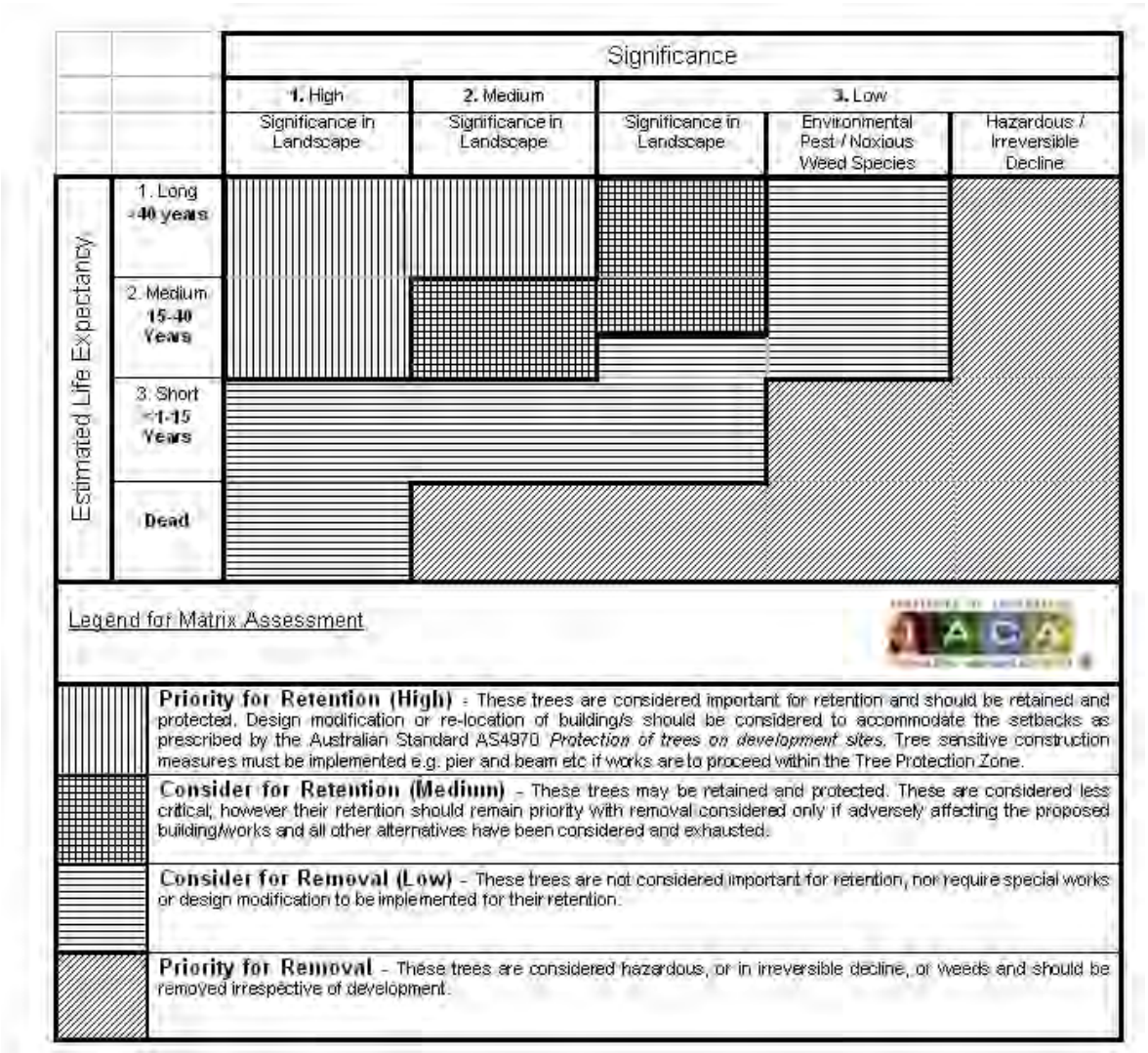
- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

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.



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**

Appendix 4

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.
4b	Dangerous trees because of instability or loss of adjacent trees
4c	Dangerous trees because of structural defects
4d	Damaged trees 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.
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.

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 5

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).

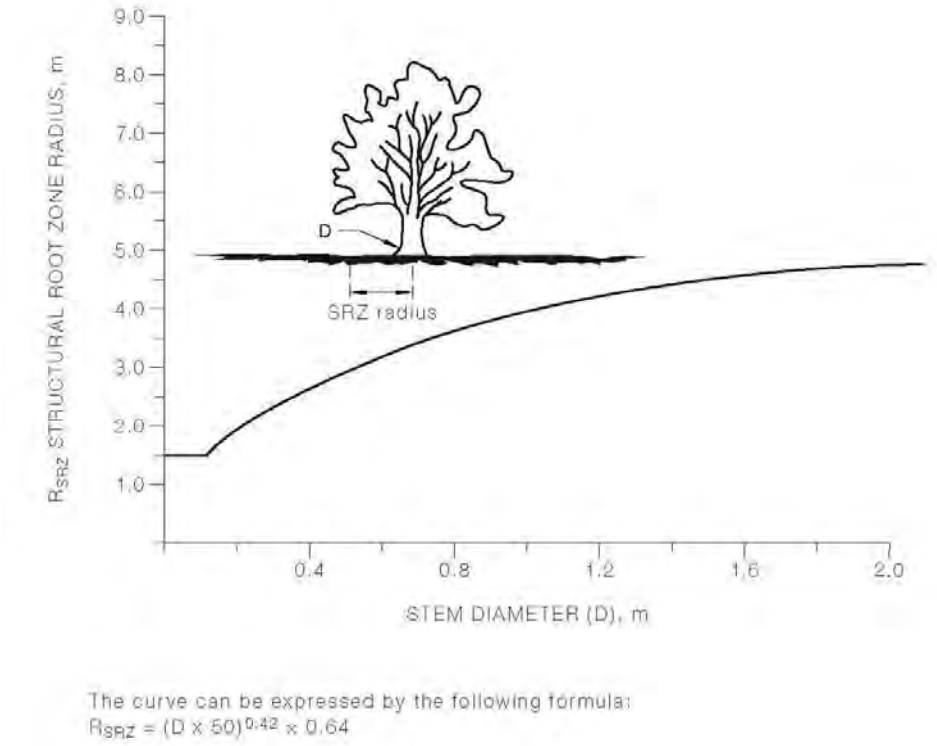


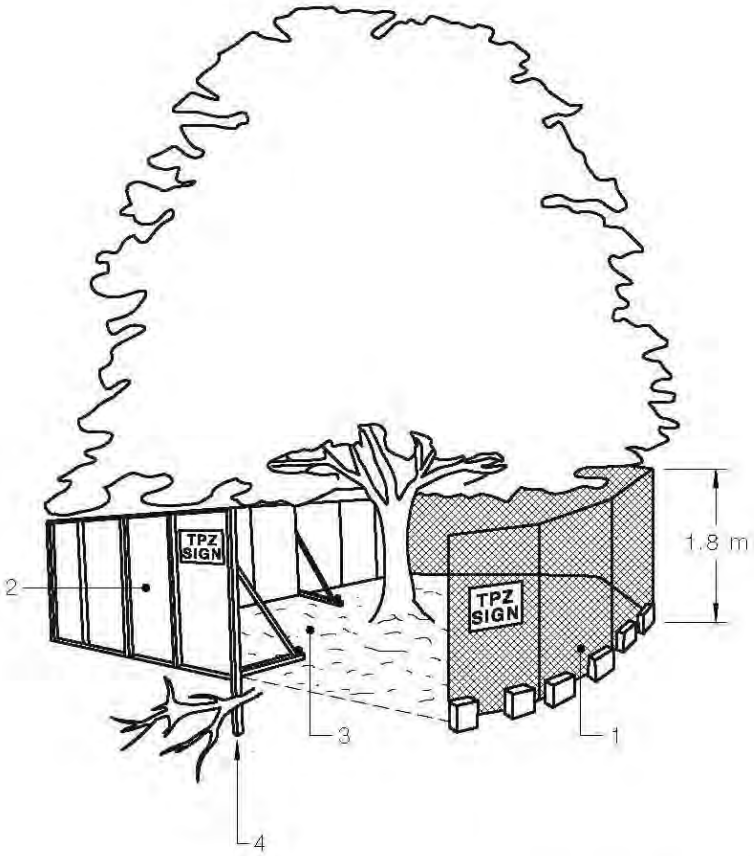
FIGURE 1 - STRUCTURAL ROOT ZONE

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 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

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 8

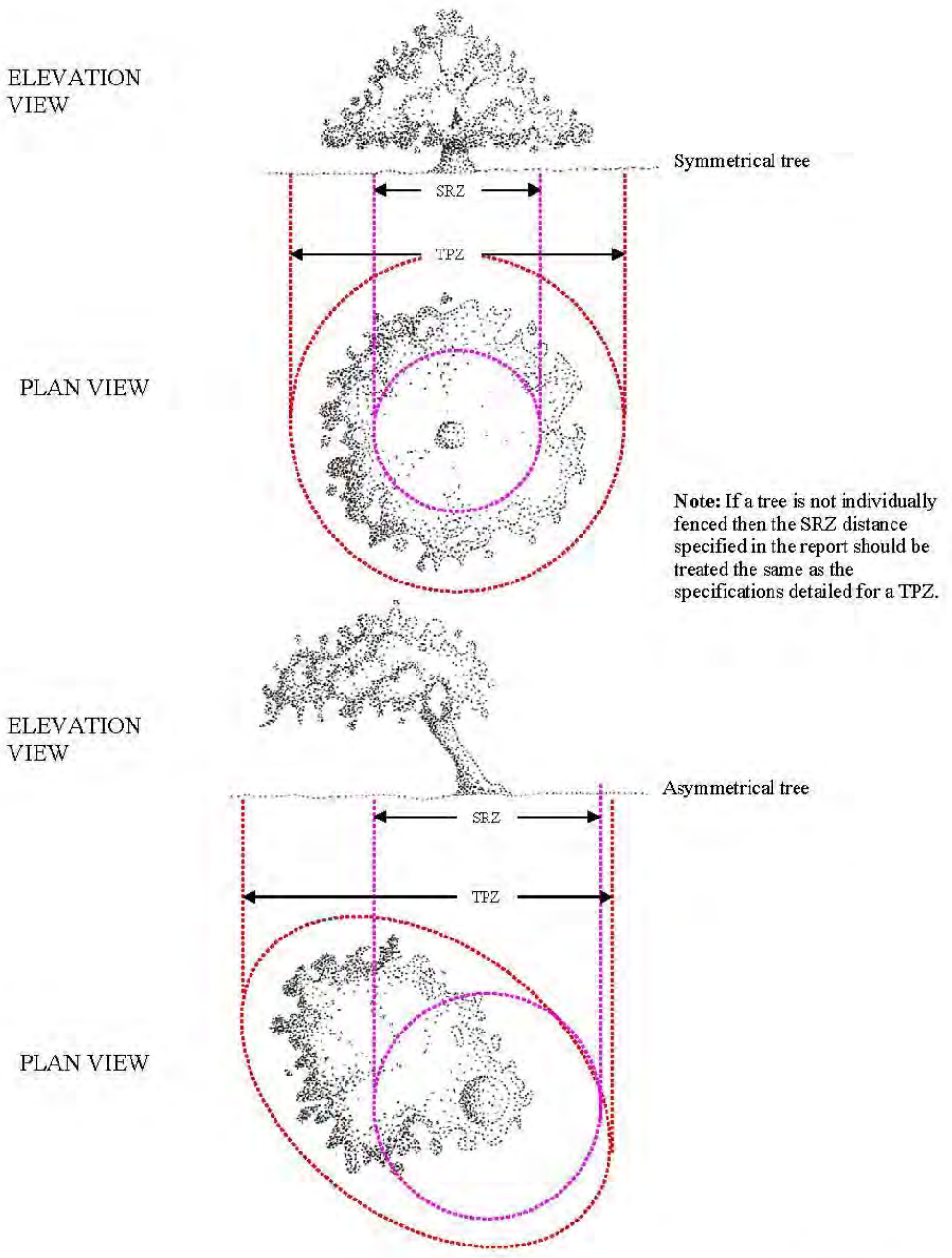


Figure 1: Indicative Tree Protection Zone (TPZ) and Root Protection Zone (SRZ)
Drawn: P. Vezgoff ©

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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- 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
Tree asset management, programmed inspection, inventory and condition surveys of council trees, hazard and risk appraisal, Tree root damage investigation and reporting, assessment of impacts of capital works projects on council trees.
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
TEAM LEADER
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**

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- 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).