

Moore Trees
Arboricultural Services

ABN 90887347745

Arboricultural Development Assessment Report

Nepean Hospital
Total Asset Management (TAM)
Child & Adolescent Mental Health
Services (CAMHS) project
Kingswood NSW 2747
Updated May 2022
Final



Member 2022

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

Prepared for: Health Infrastructure
c/o CBRE
Level 21, 363 George St
Sydney NSW 2000

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

Summary

This report has been compiled for Health Infrastructure c/o CBRE P/L, Level 21, 363 George Street, Sydney NSW 2000. The report concerns a proposed Development Application for Nepean Hospital, Total Asset Management (TAM) and Child & Adolescent Mental Health Services (CAMHS) project. This Arborist Report refers to fifty one (51) trees.

This report contains the following information:-

- 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) calculated.
- 6) Any branch or root pruning that may be required for trees.

Based on the plans provided, Trees 82 and 83 require removal as they are located within the proposed building footprint. Trees 128-139 will be required to be removed as they are located within the area of the proposed Total Asset Management building.

Trees 78-81 are very close to the proposed works, however it should be possible to retain these trees, provided the levels at the base can be retained. No services are to trench through the TPZ of these trees. Any complex landscape designs that require concrete footings are to be avoided below these trees.

All other site trees are possible to retain.

Table of Contents

VERSION CONTROL

Date of Issue	Details
31 July 2020	Draft 1 issued
3 February 2021	Draft 2 issued for Architecturals
19 February 2021	Draft 3 issued (updated to retain T84-87)
28 th April 2022	Draft 4, addition of TAMS area.
23 rd May 2022	Final version Report issued.

	Page
1 INTRODUCTION	4
2 METHODOLOGY	7
3 RELEVANT BACKGROUND INFORMATION	9
4 RECOMMENDATIONS	16
5 TREE PROTECTION	18
 Appendices	
1 Tree Protection Plan	21
2 Tree Health and Condition Schedule	23
3 SULE methodology	29
4 TPZ and SRZ methodology	30
5 Tree Protection Fencing Specifications	32
6 Tree Protection Signs	34
7 TPZ and SRZ explanations	37
8 Tree structure information diagram	38
9 Explanatory notes	39
10 Bibliography	40
11 Curriculum Vitae	41

1 INTRODUCTION

- 1.1 This report has been conducted to assess the health and condition of a group of trees located at the entry to Nepean Hospital, Kingswood NSW 2747 for the Total Asset Management (TAM) and Child & Adolescent Mental Health Services (CAMHS) project. This Arborist Report refers to fifty one (51) trees. This report has been prepared for Health Infrastructure c/o CBRE P/L, Level 21, 363 George Street, Sydney NSW 2000 as required for a Review of Environmental Factors (REF) for the project study area.

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

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. Shrubs have not been included.
- 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 works.
- 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 Arborist Report I was provided plans by Veris marked job number 203037, Revision B, sheets 1-10 dated 12/05/2022.

1.3 Location: The proposed development site is located Kingswood NSW 2747, known as Nepean Hospital (Diagram 1). The proposed project study area from herein will be referred to as “the Site”.

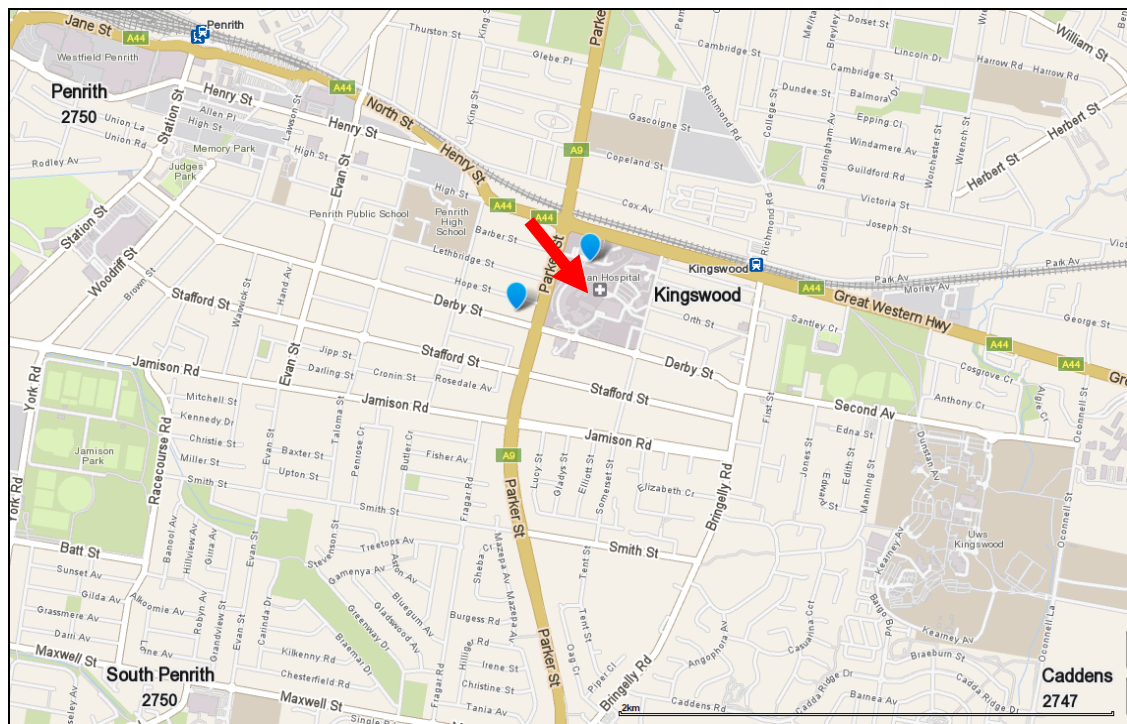


Diagram 1: Location of the site, Nepean Hospital (Red arrow) (whereis.com.au, 2022)



Diagram 2: Location of the study area (Google earth, 2022)

2.1 METHODOLOGY

- 2.1** To record the health and condition of the trees, a Visual Tree Assessment (VTA) was undertaken on the subject trees on 1st July 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 inspections were undertaken from the ground. No diagnostic devices were used on these trees.
- 2.2 Height:** The heights and distances within this report have been measured with a Bosch DLE 50 laser measure.
- 2.3 Tree Protection Zones (TPZ):** The TPZ is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. TPZ's have been calculated for each tree to determine construction impacts. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites*, AS 4970, 2009.
- 2.4 Structural Root Zone (SRZ):** The SRZ is a specified distance measured from the trunk that is set aside for the protection of tree roots, both structural and fibrous. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The TPZ and SRZ are measured as a radial measurement from the trunk. No roots should be severed within this area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 4.
- 2.5 Safe Useful Life Expectancy (SULE):** The subject trees were assessed for a Safe Useful Life Expectancy (SULE). The SULE rating for each tree can be seen the Tree Assessment Schedule (Appendix 2). A detailed explanation of SULE can be found in Appendix 3.

2.6 Impact Assessment: An impact assessment was conducted on the site trees. This was conducted by assessing the plans provided by CBRE Project Management. The plans provided were assessed for the following:

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

3 RELEVANT BACKGROUND INFORMATION

- 3.1** The Nepean Hospital is located on the corner of Parker Street and Barber Avenue and is part of the Nepean Hospital complex. The project study area is located at the entry driveway off Derby Street (Diagram 2). The proposed works entail demolition of existing buildings and car park area and construction of a new Total Asset Management (TAM) building and Child and Adolescent Mental Health Services (CAMHS) buildings.
- 3.2 Environmental Significance:** A Tree Protection Order (TPO) applies to the whole of the Penrith Local Government Area and is part of the Penrith City Council Local Environmental Plan, 2010. This TPO protects all trees above three (3) metres in height.
- 3.3 The Site Trees:** The site was inspected on 1st July 2020. The existing numbering from a previous report for the Nepean Hospital campus has been maintained. The subject trees for this report and study area can be viewed on the Tree Protection Plan. All site trees have been tagged to correspond with the Tree Protection Plan. The numbering is not consecutive as several trees have been removed since the initial report.
- 3.4** All trees have been individually assessed however Tree group 122 have been grouped together, and not individually assessed, as they are all the same species and approximately the same dimensions, located near the car park area.
- 3.5** Trees 78-81 are all large mature Grey box (*Eucalyptus moluccana*). Apart from some very minor dead wood, these trees were found to be in good health and condition (Plate 1). These trees would be considered to be significant trees to the site.



Plate 1: Image showing Trees 78-81 along the northern portion of the study area. P.Vezgoff

- 3.6** Trees 82 and 83 are both Grey box (*Eucalyptus moluccana*) in good health and condition (Plate 3). Again, these trees would be considered to be significant trees to the site. The first and second order branches of Trees 78-83 are free of any cracks, splits or fruiting bodies. 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. These trees would be considered to have 95% live canopies. The basal area and woody root zones were free of any ground heaving, or lifting.
- 3.7** Trees 88-90 are large shrubs rather than trees. These trees would be considered to be less significant trees to the site (Plate 3). Most of these specimens are in good health and condition with some minor dieback occurring (Plate 4).



Plate 2: Image showing Trees 82 (Left) and 83 (Right). P.Vezgoff



Plate 3: Image showing Trees 83 (left) and Trees 88-90. P.Vezgoff



Plate 4: Image showing Trees 88-90. P.Vezgoff



Plate 5: Image showing Trees 100 and 101. P.Vezgoff

3.8 Trees 100 and 101 are also Grey box (*Eucalyptus moluccana*) that are in good health and condition (Plate 5). These trees would be considered to be significant trees to the site.

3.9 Trees 84-86 are Grey box (*Eucalyptus moluccana*) and Broad leaved paperbark these trees were found in to be in good health and condition (Plate 6). These trees would be considered to be less significant trees in relation to some of the larger trees on site.



Plate 6: Image showing Trees 84-86. P.Vezgoff

3.10 Trees 103-120 are located to the south of the proposed building area that should be well away from any works. These trees are all semi to mature specimens that consist of Tallowwood (*Eucalyptus microcorys*), Broad leaved paperbark (*Melaleuca quinquenervia*), *Hymenosporum flavum*, Chinese tallow tree (*Triadica sebifera*). These trees were found in to be in good health and condition (Plate 2). These trees would be considered to be less significant trees to the site as individual specimens, but do have value as a group (Plate 7). Around the car park area are Trees 122-140 that are all semi mature *Eucalyptus* specimens that are in good health and condition, with the exception of Trees 125 and 128 that are in poor condition.



Plate 7: Image showing Trees 106-115. P.Vezgoff



Plate 8: Image showing Trees 123-130 along the car park area. P.Vezgoff

3.11 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 trees were mostly assessed as being in good health. Some of the larger trees would be considered to have a 1a rating, *Structurally sound trees located in positions that can accommodate for future growth*; whereas the smaller specimens would be considered to have a 2a, *May only live for 15-40 years* and 2c rating, *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*.

3.12 Impacts: Based on the plans provided Trees 82 and 83 require removal as they are located within the proposed building footprint. Trees 128-139 will be required to be removed as they are located within the area of the proposed Total Asset Management building.

3.13 Trees 78-81 are very close to the proposed works however it should be possible to retain these trees, provided the levels at the base can be retained. No services are to trench through the TPZ of these trees. Any complex landscape designs that require concrete footings are to be avoided below these trees.

3.14 All other site trees are possible to retain.

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 82, 83 and 128-139 are proposed to be removed. All other trees appear possible to retain.
- 4.3** Trees not located near the works (south of Tree 87) will require tree protection fencing as specified in Section 5.2 of this report. Trees 78-81 shall be fenced prior to demolition works occurring. Trees 78-81 shall also require trunk protection (See Section 5.3). The specifications for a TPZ are in Section 5.3 of this report.
- 4.4 Building material storage:** Areas on the site shall have to be set aside for the exclusive use of:
- Construction access points
 - Position of site sheds and latrines and temporary services
 - Storage of materials

These points are to be outside of any TPZ area. Any area set aside for the stockpiling of soil and waste shall have the appropriate erosion control measures around this area as specified by an engineer. These erosion control measures shall be monitored and maintained regularly throughout the construction period of the site. These measures are to restrict any waste material entering the TPZ areas of the trees to be retained.

- 4.5 Tree removal:** All tree work shall be carried out by a qualified Arborist and work shall be completed following AS 4373 (Pruning of Amenity Trees, 2007).

- 4.6** Studies in many old and recent investigations have shown the positive influence that trees have on people's mental health. As the new proposal is a Child and Adolescent Mental Health building, the retention and protection of the more significant trees is highly recommended for such a project.
- 4.7** No trees were assessed as being dangerous or hazardous in any way. With regards to the leaf drop and shedding of small branches from the subject trees the Land & Environment Court does not consider these issues enough to warrant the removal of a tree. Generally speaking they are considered '*the natural process of a tree*'.
- 4.8** Should the site be found to contain asbestos soil remediation will be required. Asbestos soil remediation often involves either capping of the contaminated soil or total soil removal. When trees are involved this can often slow if not stop construction whilst remediation processes are undertaken. Remediation also involves altering the soil up to the base of the tree which in turn can affect the health and or structure of the tree. Should the soil on site be found to be contaminated further Arboricultural advice will be required.

5 TREE PROTECTION

- 5.1** Trees to be protected: Trees 78-81 and trees located south of Tree 87 will be required to be fenced for protection. All fencing shall be installed as specified in Section 5.2 (Tree Protection – Implementation of Tree Protection Zone). Indicative locations of the fencing are shown in the Tree Protection Plan (Appendix 1).
- 5.2 TPZ fencing:** 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 Individual trunk protection:** Trees 78-81 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 Image 1 for an example of trunk protection.



Image 1: Example of trunk protection with sign attached, recommended for Trees 78-81. P. Vezgoff.

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 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 Root Zone Protection: Following demolition Ply sheeting should be placed over the root zone of Trees 78-81 to reduce compaction over the root zone whilst works are occurring. The area for ply sheeting can be seen in the Tree Protection Plan.

5.7 TPZ signage: TPZ signage is recommended on every second panel of TPZ fencing. TPZ signage is attached to the tree protection fencing. A sample sign has been attached in Appendix 6. This sign may be copied and laminated then attached to any TPZ fencing.

5.8 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.

5.9 Arborist Certification: The Contractor is recommended to supply the Principal Certifying Authority with certification from the Project Arborist three (3) times during the construction phase of the development (as outlined in Council's Development Control Plan, 2009), 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 and trunk protection 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

23rd May 2022

Appendix 1

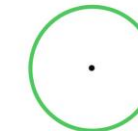
Plan 1

Tree Protection Plan

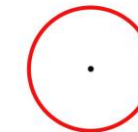


Moore Trees

Tree protection plan



Tree to be retained



Tree to be removed



Ply Sheeting. Ply sheeting to be placed over the root zone to the extent of the drip line. Sheeting to be 19mm thick 1200mm x 2400mm. Sheeting to remain until all construction works are completed.



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



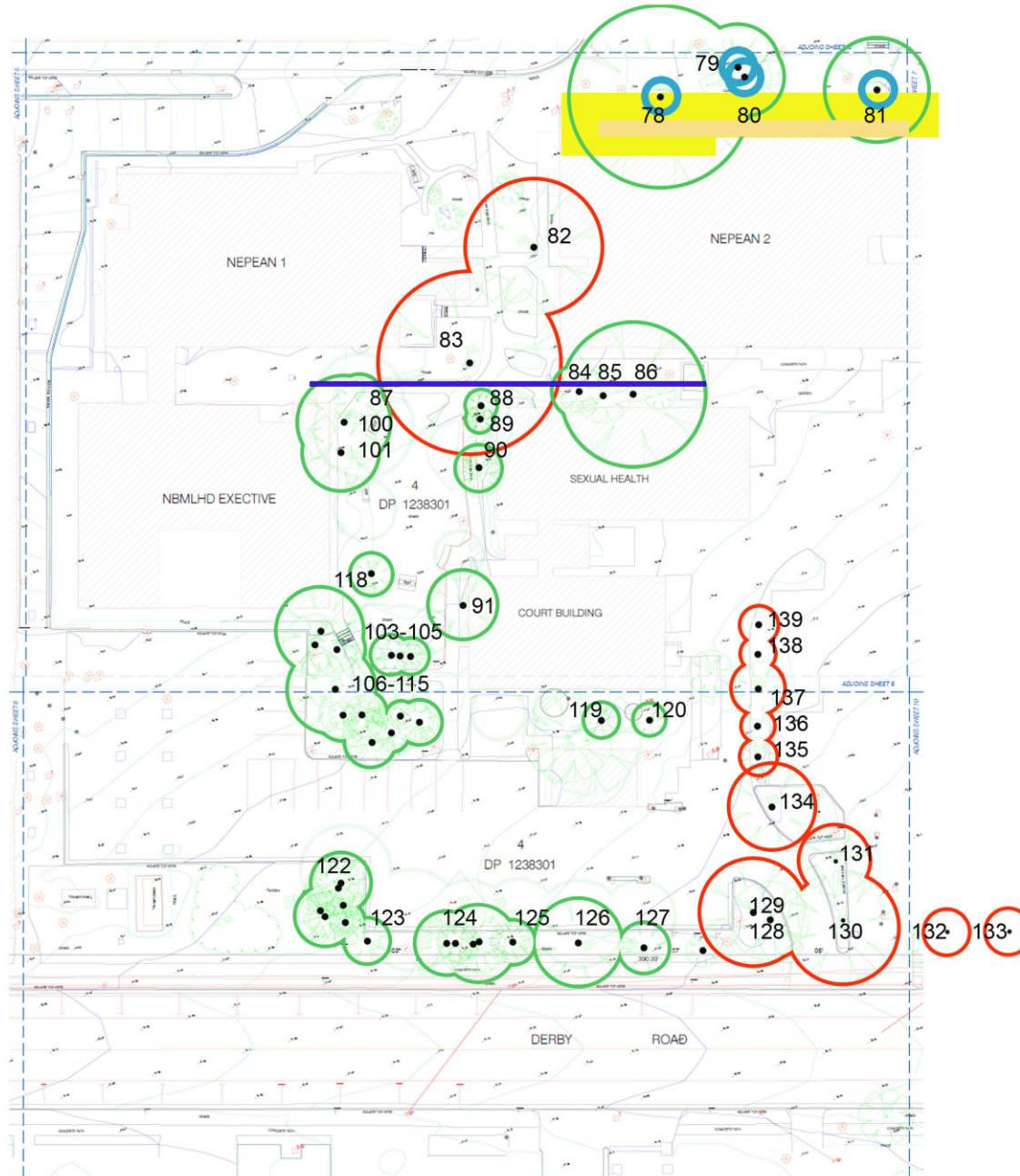
Trunk protection. Lengths of timber (75mm x 50mm x 2000) shall be fastened to the trunk or overhead branches that are greater than 80mm in diameter. These timbers are to be fastened with hoop iron strapping and not fixed directly onto the trunk of the tree.



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.



Date: 23.5.2022
 Drawn: P.Vezgoff
 Site Address: Nepean Hospital
 Derby Street, Kingwood



Appendix 2

Tree health & condition **assessment schedule**

TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – *Nepean Hospital, TAM/CAMHS*

Tree	Species	Height (m)	Spread (m)	DBH (mm)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (mm)
78	Grey box (Eucalyptus moluccana)	18	12	700	80	Dead wood <50mm	2a May only live for 15-40 years	Good	Mature		8400
79	Coast grey box (Eucalyptus bosistoana)	15	8	350	80	Dead wood <50mm	2a May only live for 15-40 years	Good	Mature		4200
80	Grey box (Eucalyptus moluccana)	8	7	300	80	Dead wood <50mm	2a May only live for 15-40 years	Good	Mature	Suppressed under tree79	3600
81	Grey box (Eucalyptus moluccana)	18	10	400	80	Dead wood >50mm	2a May only live for 15-40 years	Good	Mature		4800
82	Grey box (Eucalyptus moluccana)	19	10	700	70	Dead wood <50mm	2a May only live for 15-40 years	Good	Mature		8400
83	Grey box (Eucalyptus moluccana)	20	12	1000	80	Included codom stems	2a May only live for 15-40 years	Good	Mature		12000
84	Broad leaved paperbark (Melaleuca quinquenervia)	4	4	100	80	No visual defects	2a May only live for 15-40 years	Good	Mature		1200
85	Grey box (Eucalyptus moluccana)	7	4	100	80	No visual defects	2c removed for more suitable planting	Good	Mature		1200
86	Grey box (Eucalyptus moluccana)	15	12	450	80	Included codom stems	2a May only live for 15-40 years	Good	Mature		5400
87	Hymenosporum flavum	3.5	2	.05	95	No visual defects	2c removed for more suitable planting	Good	Sapling	Twin stems	1200
88	Hymenosporum flavum	6	3	100	80	No visual defects	2c removed for more suitable planting	Good	Mature		1200
89	Melaleuca decora	6	3	300	70	No visual defects	2a May only live for 15-40 years	Good	Mature		3600
90	Melaleuca decora	6	3	300	70	No visual defects	2a May only live for 15-40 years	Good	Mature		3600
91	Chinese tallow tree (Triadica	7	5	250	70	No visual defects	2a May only live for 15-40 years	Good	Mature		3000

Tree	Species	Height (m)	Spread (m)	DBH (mm)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (mm)
	sebifera)										
100	Grey box (Eucalyptus moluccana)	15	12	400	80	No visual defects	2a May only live for 15-40 years	Good	Mature		4800
101	Grey box (Eucalyptus moluccana)	15	10	350	80	Included codom stems	2a May only live for 15-40 years	Good	Mature		4200
103	Melaleuca styphelioides	8	4	150	90	Included codom stems	2a May only live for 15-40 years	Good	Mature		1800
104	Melaleuca styphelioides	8	4	150	90	Included codom stems	2a May only live for 15-40 years	Good	Mature		1800
105	Melaleuca styphelioides	8	4	150	90	Included codom stems	2a May only live for 15-40 years	Good	Mature		1800
106	Grey box (Eucalyptus moluccana)	8	6	200	80	No visual defects	2a May only live for 15-40 years	Good	Mature		2400
107	Grey box (Eucalyptus moluccana)	10	6	200	80	No visual defects	2a May only live for 15-40 years	Good	Mature		2400
108	Hoop pine (Araucaria cunninghamii)	12	6	250	80	No visual defects	1a >40 years	Good	Mature		3000
109	Willow Bottle brush (Callistemon salignus)	6	4	100	80	Included codom stems	2a May only live for 15-40 years	Good	Mature		1200
110	Hoop pine (Araucaria cunninghamii)	12	6	250	80	No visual defects	1a >40 years	Good	Mature		3000
111	Willow Bottle brush (Callistemon salignus)	5	2	100	70	No visual defects	2a May only live for 15-40 years	Good	Mature	X7 trees	1200
112	White cedar (Melia azedarach)	5	5	100	70	No visual defects	2a May only live for 15-40 years	Good	Mature		1200
113	Red ironbark (Eucalyptus sideroxylon)	6	3	150	90	No visual defects	1a >40 years	Good	Mature		1800
114	White cedar (Melia azedarach)	8	5	300	70	No visual defects	2a May only live for 15-40 years	Good	Mature		3600
115	Weeping bottle brush (Callistemon viminalis)	5	4	150	80	No visual defects	2a May only live for 15-40 years	Good	Mature		1800
119	White cedar (Melia azedarach)	8	8	350	70	Included codom stems	2a May only live for 15-40 years	Good	Mature		4200
120	Red ironbark (Eucalyptus sideroxylon)	12	5	300	90	Stem wounds on upper branches	2a May only live for 15-40 years	Good	Mature	Dangerous over	3600

Tree	Species	Height (m)	Spread (m)	DBH (mm)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (mm)
										building	
122	Lemon-scented gum tree (Corymbia citriodora)	10	5	150	90	No visual defects	1a >40 years	Good	Mature	Group of 8	1800
123	Melaleuca bracteata	8	4	150	80	Included codom stems	2a May only live for 15-40 years	Good	Mature	Group of 4	1800
124	Melaleuca bracteata	8	4	150	80	Included codom stems	2a May only live for 15-40 years	Good	Mature	Group of 4	1800
125	Forest red gum (Eucalyptus tereticornis)	20	6	350	70	No visual defects	2a May only live for 15-40 years	Poor	Mature		4200
126	Grey box (Eucalyptus moluccana)	8	6	100	80	No visual defects	1a >40 years	Good	Mature		1200
127	Grey box (Eucalyptus moluccana)	6	2	100	80	No visual defects	1a >40 years	Good	Mature		1200
128	Argyle apple (Eucalyptus cineria)	6	6	300	80	No visual defects	3c Removed for a better specimen.	Poor	Mature	Pruned from wires	3600
129	Grey box (Eucalyptus moluccana)	15	7	350	80	No visual defects	1a >40 years	Good	Mature		4200
130	Grey box (Eucalyptus moluccana)	12	7	350	80	No visual defects	1a >40 years	Good	Mature		4200
131	Grey box (Eucalyptus moluccana)	15	7	350	80	No visual defects	1a >40 years	Good	Mature		4200
132	Grey box (Eucalyptus moluccana)	7	5	150	70	No visual defects	1a >40 years	Good	Mature	Pruned to clear wires	1800
133	Grey box (Eucalyptus moluccana)	7	2	80	80	No visual defects	1a >40 years	Good	Mature	Pruned to clear wires	960
134	Grey box (Eucalyptus moluccana)	12	7	350	80	No visual defects	1a >40 years	Good	Mature	Has had reduction pruning	4200
135	Grey box (Eucalyptus moluccana)	15	5	350	80	Included codom stems	1a >40 years	Good	Mature		4200
136	White cedar (Melia azedarach)	6	5	250	70	No Value	2a May only live for 15-40 years	Good	Mature		3000

Tree	Species	Height (m)	Spread (m)	DBH (mm)	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (mm)
137	River she oak (Casuarina cunninghamiana)	6	3	150	90	No visual defects	1a >40 years	Good	Mature		1800
138	River she oak (Casuarina cunninghamiana)	15	4	350	90	No visual defects	1a >40 years	Good	Mature		4200
139	River she oak (Casuarina cunninghamiana)	6	5	100	80	No visual defects	1a >40 years	Good	Mature		1200
140	Grey box (Eucalyptus moluccana)	6	3	100	90	No visual defects	1a >40 years	Good	Mature		1200

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 tree’s roots both structural and fibrous.

Appendix 3

SULE categories (after Barrell, 2001)¹

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

updated 01/04/01)

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

Appendix 4

TPZ and SRZ methodology

Determining the Tree Protection Zone (TPZ)

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

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

Where

DBH = trunk diameter measured at 1.4 metres above ground

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

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

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

Determining the Structural Root Zone (SRZ)

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

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

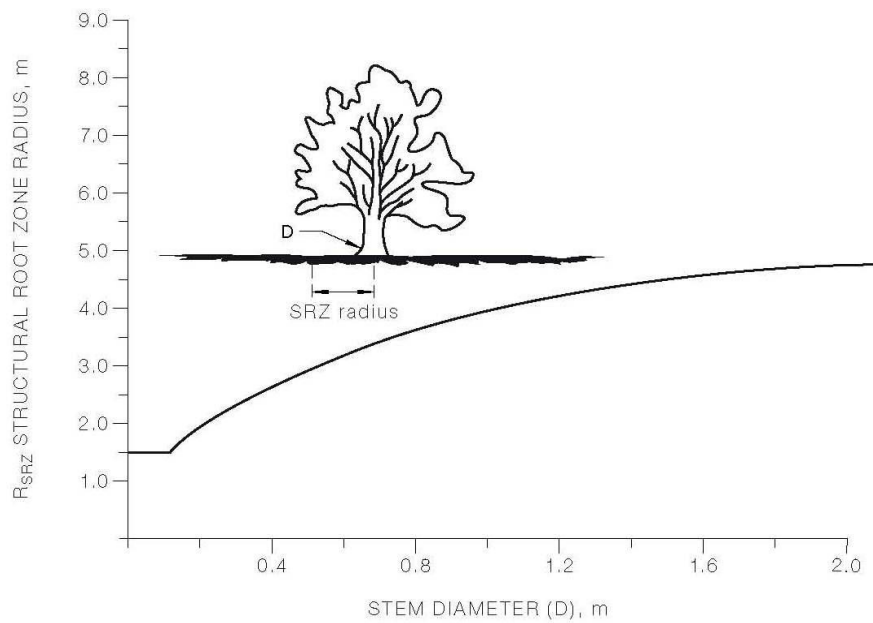
There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the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

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

Where

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

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



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

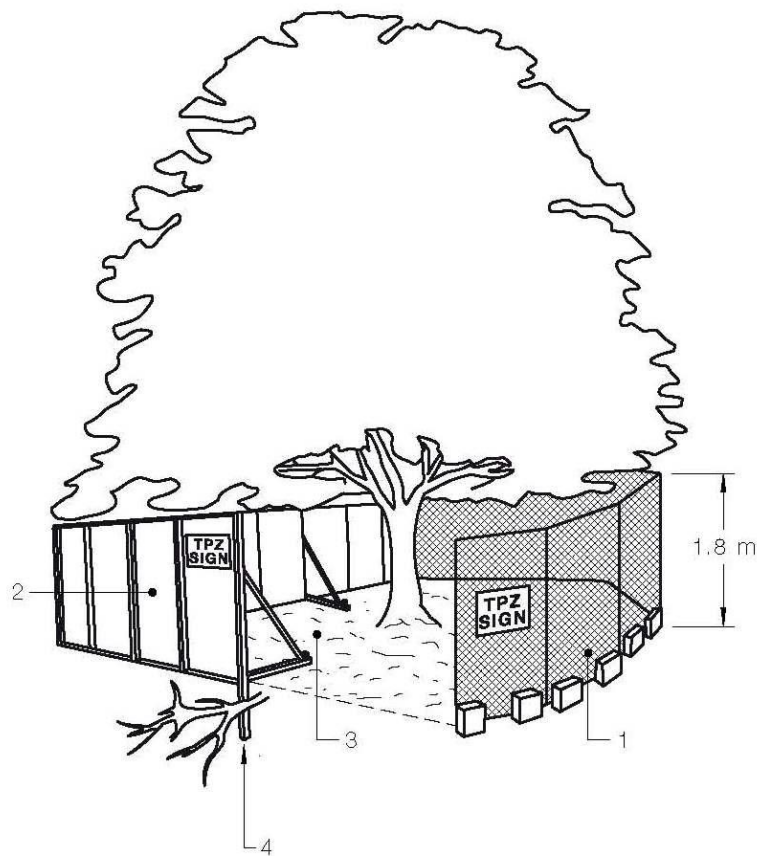
FIGURE 1 - STRUCTURAL ROOT ZONE

Notes:

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

Appendix 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**

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

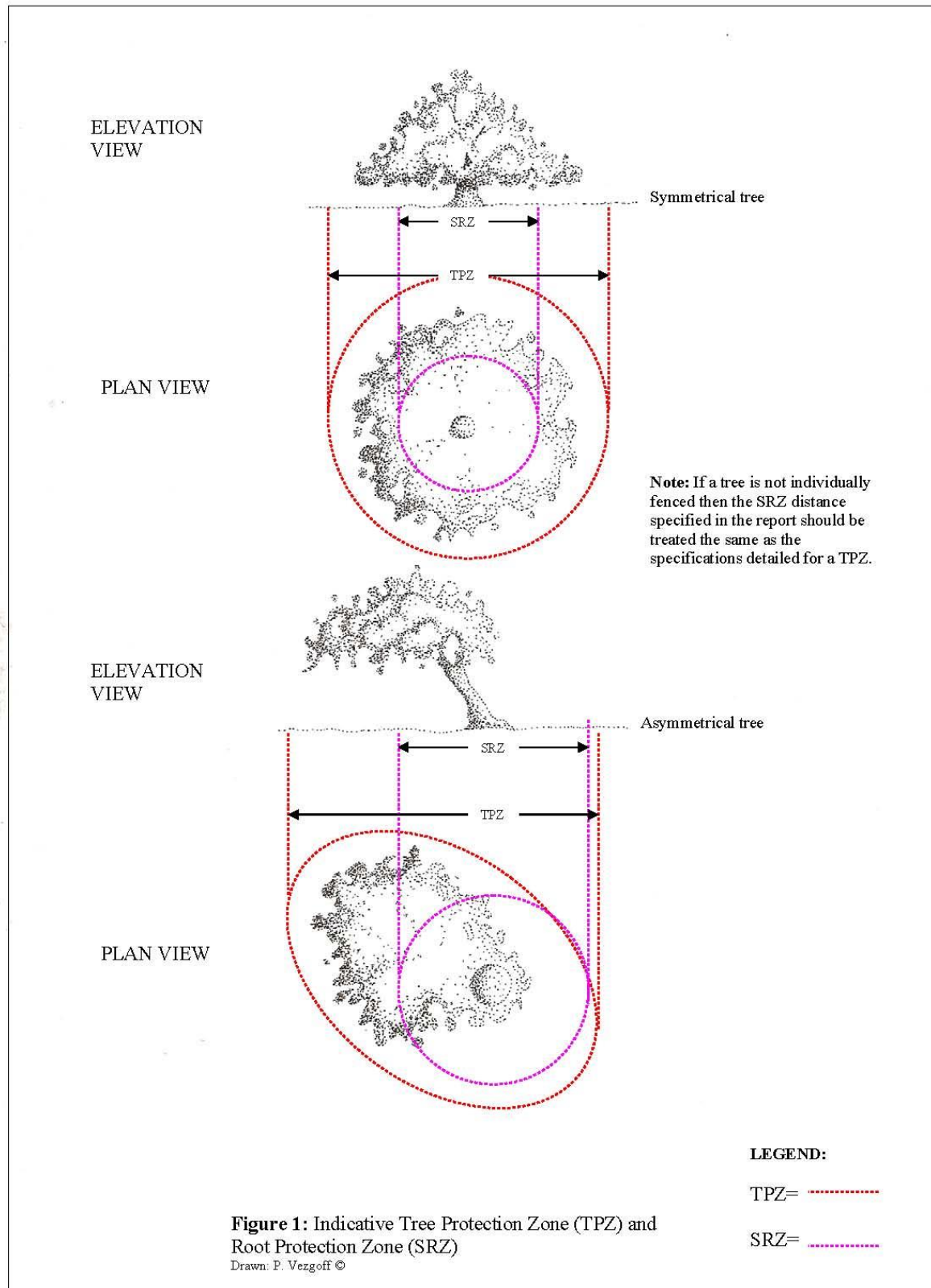
Tree Trunk Protection

Protection not to be removed until all construction works completed.

**Around the base of this tree there is to be
NO**

**Storage of materials
Trenching or excavation
Washing of tools or equipment**

Appendix 7



Appendix 8

Tree structure information diagram

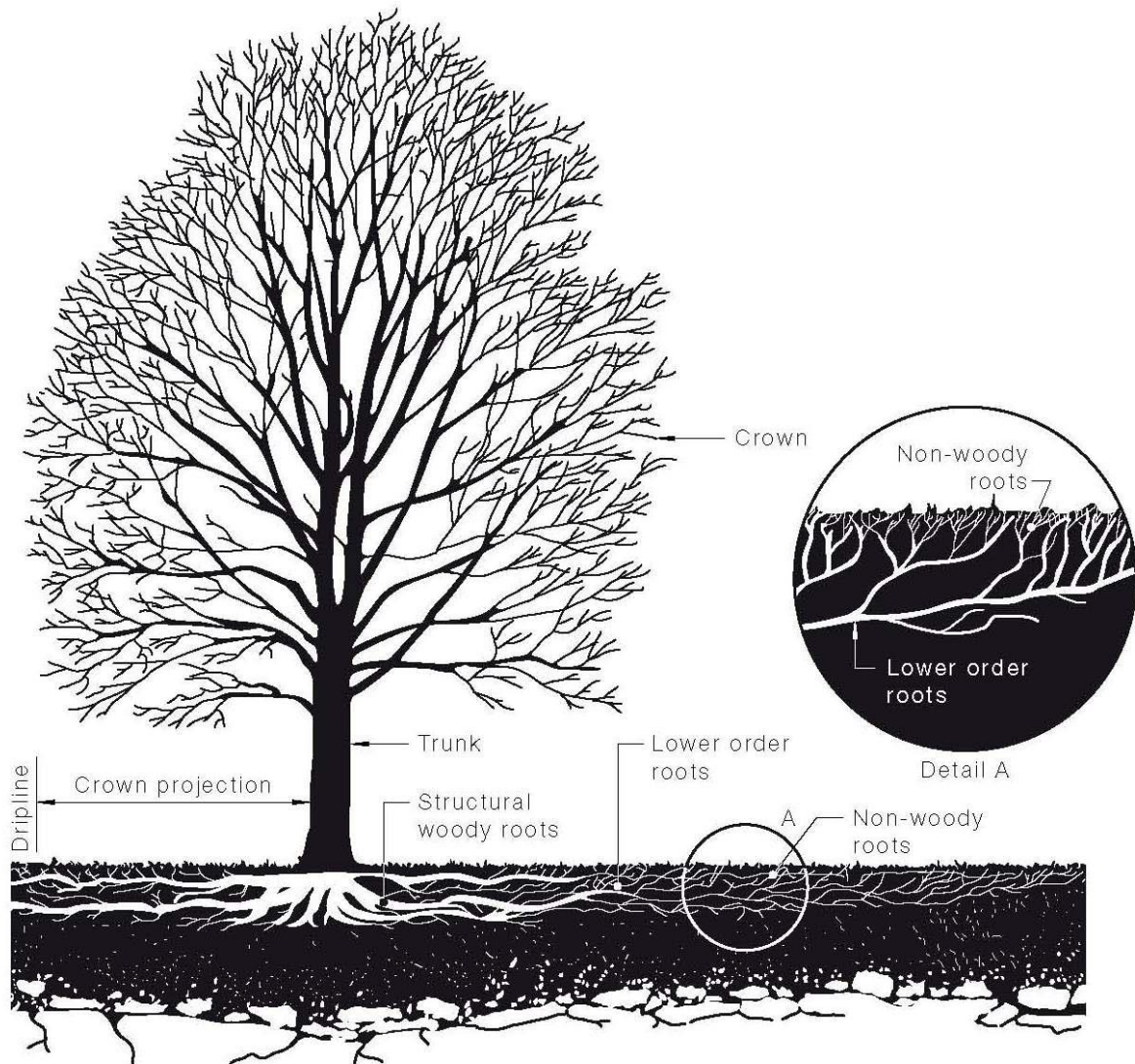


Figure 2: Structure of a tree in a normal growing environment (AS 4970, 2009.).

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

Bibliography

Draper D B & Richards P A (2009) *Dictionary for managing trees in urban environments*

CSIRO Publishing

Collingwood, Vic

Harris R.W, Clark J.R, Matheny N.P (1999). *Arboriculture*. Third edition.

Prentice Hall

New Jersey.

Matheny N.P & Clark J.R. (1994) *Evaluation of hazard trees in Urban areas*

Second edition, International Society of Arboriculture

Illinois.

Mattheck C & Breloer H (2003) *The Body Language of Trees: A handbook for failure*

analysis. Research for Amenity Trees No. 4,

Seventh edition, The Stationary Office, London.

Shigo A.L. (2002) *A New Tree Biology*.

Shigo and Trees, Associates, Durham, New Hampshire.

Standards Australia, 2007, *Pruning of amenity trees* AS 4373, 2007

Standards Australia Ltd

Sydney

Standards Australia, 2009. *Protection of trees on development sites*, AS 4970, 2009

Standards Australia Ltd

Sydney

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

- 2018/2013 – 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

TEAM LEADER

January 2003 – June 2005

September 2000 – January 2003

HORTICULTURALIST

October 1995 – September 2000

Northern Landscape Services

July to Oct 1995

Tradesman for Landscape Construction business

Paul Vezgoff Garden Maintenance (London, UK)

Sept 1991 to April 1995

CONFERENCES AND WORKSHOPS ATTENDED

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