MOORE TREES
Consulting Arborist

8th March 2024

Wollongong City Council
41 Burelli Street
Administration Building
Wollongong NSW 2500
FAO: Nyrie Davis-Raiss

Site: 357-363 Crown Street, Wollongong NSW 2500
Re: Updated Arboricultural Impact Review of Heritage Item 6290 and associated impacts from the proposed DA-2023/156, 357-363 Crown Street Wollongong.

This report has been commissioned by Wollongong City Council. This report is an updated Arboricultural Impact Assessment (AIA) Review of Heritage Item 6290 and associated impacts from the proposed plans for DA-2023/156, site located at 357-363 Crown Street Wollongong, NSW 2500. My previous report dated 26 April 2024 should be read in conjunction with this report.

This scope of this report comprises assessment of the amended plans and potential impacts that may occur from level changes, soil hydrology changes, canopy impacts and photosynthesis requirements. The plans and documents assessed for this report are listed in Section 2 of this report. The proposed works involve the demolition of existing structures and the construction of a high-rise development along Gladstone Street and Crown Streets, Wollongong. I have been provided updated plans for this project.

I confirm I have read the Expert Witness Code (Schedule 7, pursuant to the Uniform Civil Procedure Rules, 2005) and agree to be bound and abide by the Code should this report be used in a Court of Law.

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1. INTRODUCTION: The subject tree assessed for this report is a Moreton Bay Fig tree *(Ficus macrophylla),* located in the rear of 363 Crown Street, Wollongong ("Tree"). The subject tree is numbered as Tree 6 within the *Arboricultural Impact Assessment Report by Seasoned Tree Consulting* dated 16th December 2022. An *Arboricultural Statement by Seasoned Tree Consulting* dated 31st October 2023 was also provided. The *Arboricultural Statement* was undertaken as a review of the updated plans. The Tree is listed as Heritage Item 6290 under Schedule 5 of the WLEP.

In summary, the previous key points in my original report (April 2024) were listed as follows;

a) Unquantifiable shade impacts from the new towers.

b) The overall design under Tree 6 is ambitious in that the predicted high use of the area is not ideal in terms of the lawn (growing in a heavily shaded area) paths and seating contribute to a high human use outdoor area. Another potential ongoing problem using the area directly below this tree as a high use open space area is the Grey-headed flying-fox *(Pteropus poliocephalus)* that are known to roost and eat the fig fruits on this species.

c) The inaccurate canopy dimensions, on plan, show that the tree canopy will in fact clash with the building and require extensive pruning. This extent of pruning will not comply with any pruning class detail in the Standards Australia, 2007, *Pruning of amenity trees* AS 4373, 2007.

d) It could be argued, in my opinion, that the proposed works do not meet the objectives of certain sections of the Wollongong Local Environmental Plan 2009 regarding Sections 4.3 *Height of Buildings.* Part C and 5.10 *Heritage conservation.*

2. PLANS AND DOCUMENTS:

- An *Arboricultural Statement by Seasoned Tree Consulting* dated 31st October 2023.
- Architectural Plans by BKA Architecture marked project 22003 Rev 02 dated 5/11/2023 reference A303, A304, A 101, A102, A103, A206, A207, A413, A413.1, A415, A416, A417; and
- Landscape Architects plans by Conzept marked Rev C dated 3.11.23 titled Public Domain Plan, GF + L2 Hardscape Plan, and GF + L2 Landscape Plan 2.

3. OBSERVATIONS: The subject tree is large mature Moreton Bay Fig *(Ficus macrophylla)*. The Tree Protection Zone (TPZ) calculation for this tree is based on the Australian Standard *Protection of trees on development sites,* AS 4970, 2009. Within this Standard, a TPZ maximum is considered to be fifteen (15) metres. It should be noted that this does not constitute that works can automatically occur on the fifteen (15) metre mark, as there are many other factors that are required to be assessed such as changes in shading, overall changes in soil hydrology, reflective heat off building surfaces and distances required for temporary scaffolding guidelines as required in *Australian Standard (Scaffolding) 1576.1, 2010 and Scaffolding Code of Practice 2009-Safe work Australia*. Within AS 4970 it is also detailed that the TPZ can be greater than fifteen (15) metres where crown protection is required (Section 3.2).

It is noted that the new designs provided for this updated report include a new landscape design and altered building designs.

Plate 1: Image showing the subject tree from the north and the asymmetrical canopy. P. Vezgoff

Plate 2: Image showing the subject tree from the east. P. Vezgoff

Plate 3: Image showing the existing building heights to the north. P. Vezgoff

Plate 4: Image showing main stem. P. Vezgoff

4. ASSESSMENT OF UPDATED PLANS AND DOCUMENTS: The works proposed within the TPZ include the demolition of all existing hard surfacing, basement excavation and multi-level car park construction. The previous landscape design of the area directly below the tree included stepping stones, turfing, planting, seating and a timber deck (Diagram 1). The updated landscape design by Conzept Landscape design shows most of the TPZ area in relation to the new works will be lawn (Diagram 3).

The updated landscape design, under Tree 6, will have a greater impact than the previous plan, that incorporated more garden areas to limit human traffic and garden beds, which would have helped with better soil health and condition. It will be extremely unlikely that any lawn will grow within such a high shade area. The required lawn management practices (mowing) will create ongoing compaction issues to the roots of this tree.

Diagram 1: Part plan of the previous landscape design below Tree 6 (Canvas landscape Architects).

The Arborist Report by Seasoned Tree Consulting (STC) details the canopy spread as being symmetrical at 15 fifteen (15) metres, whereas the actual distances measured by myself are asymmetrical and were measured as radial distances of twenty (20) metres to the north, fifteen (15) metres to the south, seventeen (17) metres to the east and fifteen (15) metres to the west. As a result, the tree canopy is not drawn accurately on the plans and has only been represented as a symmetrical circle (Diagram 3 and 4).

I have adapted part plan of sheet A101 to demonstrate this issue in Diagram 4. I have overlaid a scale chart to illustrate the twenty (20) metre canopy span in relation to the basement excavation. This clearly shows the canopy will be impacted by piering/shoring works. These machines, required for these works, are quite tall and require adequate vertical clearance for safe and proper operation. Also see Diagram 5.

Plate 5: Image showing the fifteen (15) metre mark in relation to the canopy. P. Vezgoff

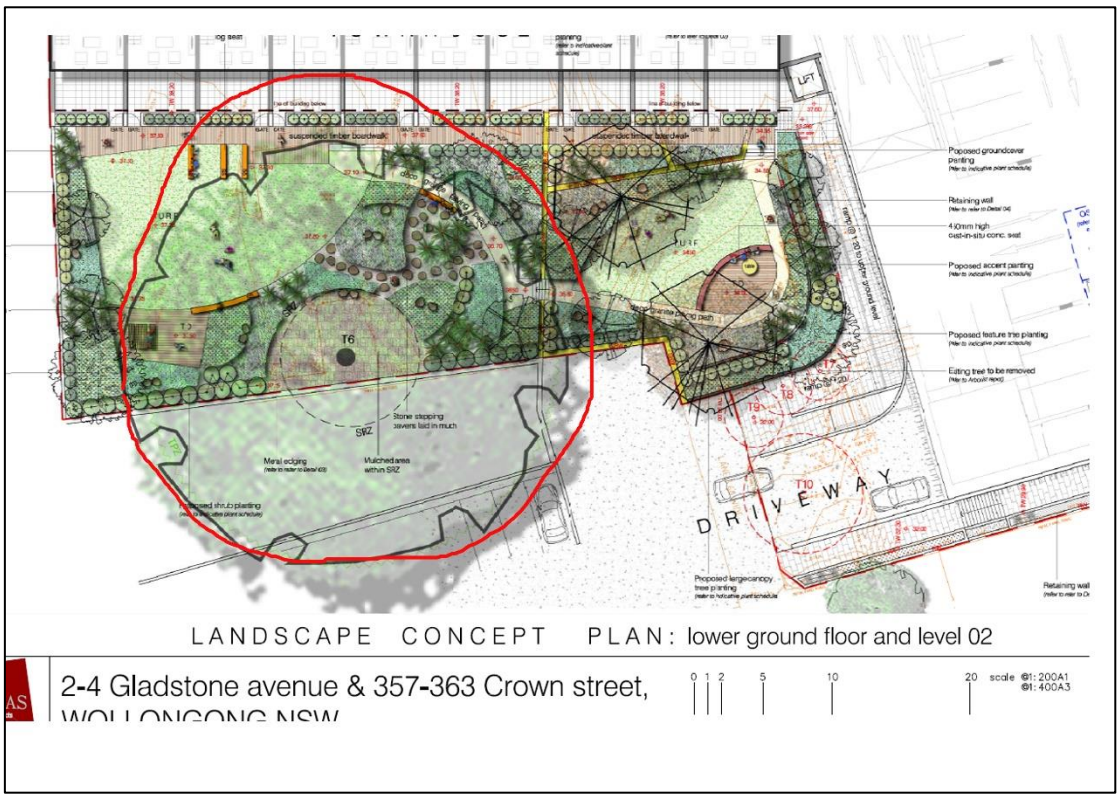


Diagram 2: Moore Trees' mark up of the actual canopy size in red (Canvas landscape Architects).

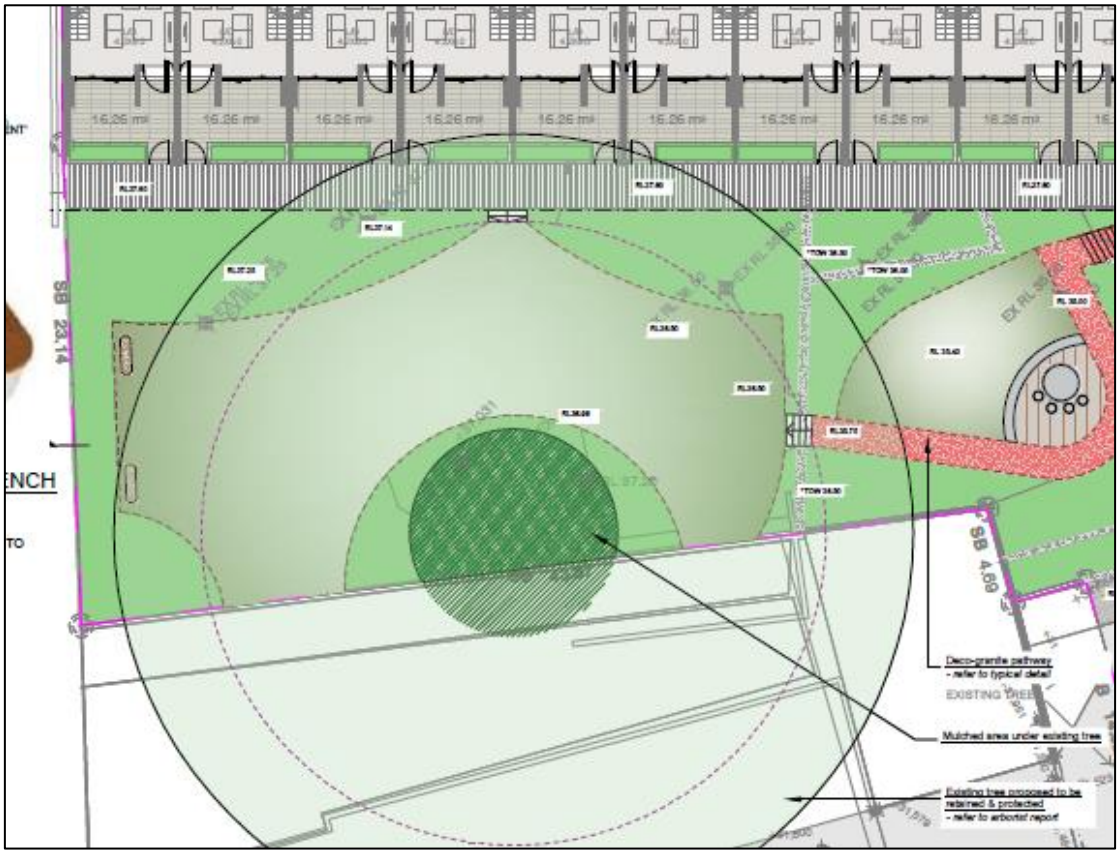


Diagram 3: Part plan showing lawn under most of the northern canopy. To the south is car park associated with an adjoining property (Conzept landscape Architects).

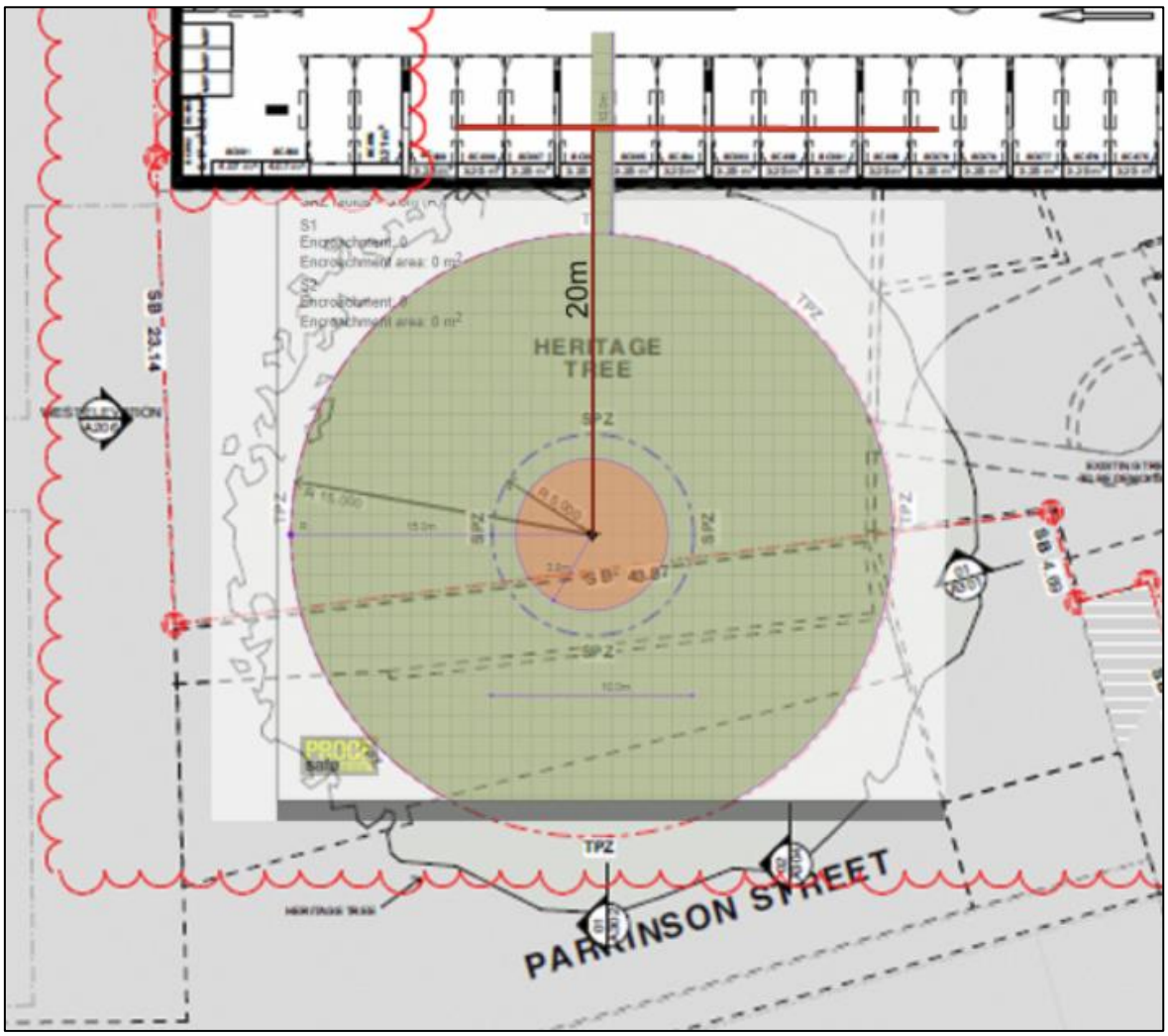


Diagram 4: Adapted plan of sheet A101. I have overlaid a scale chart to illustrate the 20m canopy span in relation to the basement excavation. This clearly shows the canopy will be impacted by piering/shoring works. Also to be considered is that this work is not precise, and the excavations are expected to be even closer to the tree than shown along the thick black line.

Plans show that towers to the east and north of the tree will cast extensive shadows onto the tree that it has never experienced before. As shown in Plate 3, due to the low building heights of Crown Street, the tree currently has good solar access for most of the day, throughout most of the year. The updated shadow diagrams provided as part of this review show that extensive shadowing will still be cast from these proposed structures although it is noted there has been a slight improvement with the redesign.

The Arboricultural Statement by Seasoned Tree Consulting dated 31st October 2023 was also provided. It states two (2) points that I do not agree with. It states the following;

> *All Architectural plans for Lower Ground, Ground and Upper Ground all show a large reduction of scale of development away from the tree. The tree will now not require any pruning. The closest portion of the building is now 20.6m from the Centrepoint of the tree, with the maximum canopy spread to the north being 20.0m.*
>
> This may be true for the upper storeys of the proposed building design however the construction of the basement will almost certainly conflict with the canopy of this tree.
>
> Also stated;
>
> *..These mitigation strategies plus the removal of all the bitumen and hard surfacing within the TPZ areas will more than offset the slight reduction in sunlight from the development of the towers.*
>
> The reduction in sunlight and the removal of bitumen to increase root growth and soil health are two (2) separate biological processes. Increased shading, I would argue, would not offset anything except to decrease root production due to the reduced photosynthesis occurring.

Trees depend on the sun to photosynthesize effectively. When photosynthesis takes place, water that has been absorbed by the tree's roots is carried to leaves where it comes in contact with the layers of chlorophyll. At the same time, air, containing carbon dioxide, is taken into leaves via leaf pores and exposed to sunlight, resulting in a very important chemical reaction. Water is broken down into its oxygen and hydrogen elements, and it combines with carbon dioxide in the chlorophyll to form sugar.

AS 4970 states in section B2.2, Leaves;
The main function of leaves is photosynthesis, that is, the production of sugars. The sugars produced by the leaves (and any other green tissue) are the source of chemical energy for all living cells in the entire plant and, as such, are essential for the normal functioning and survival of the tree. Anything that directly or indirectly damages the leaves will interfere with photosynthesis.

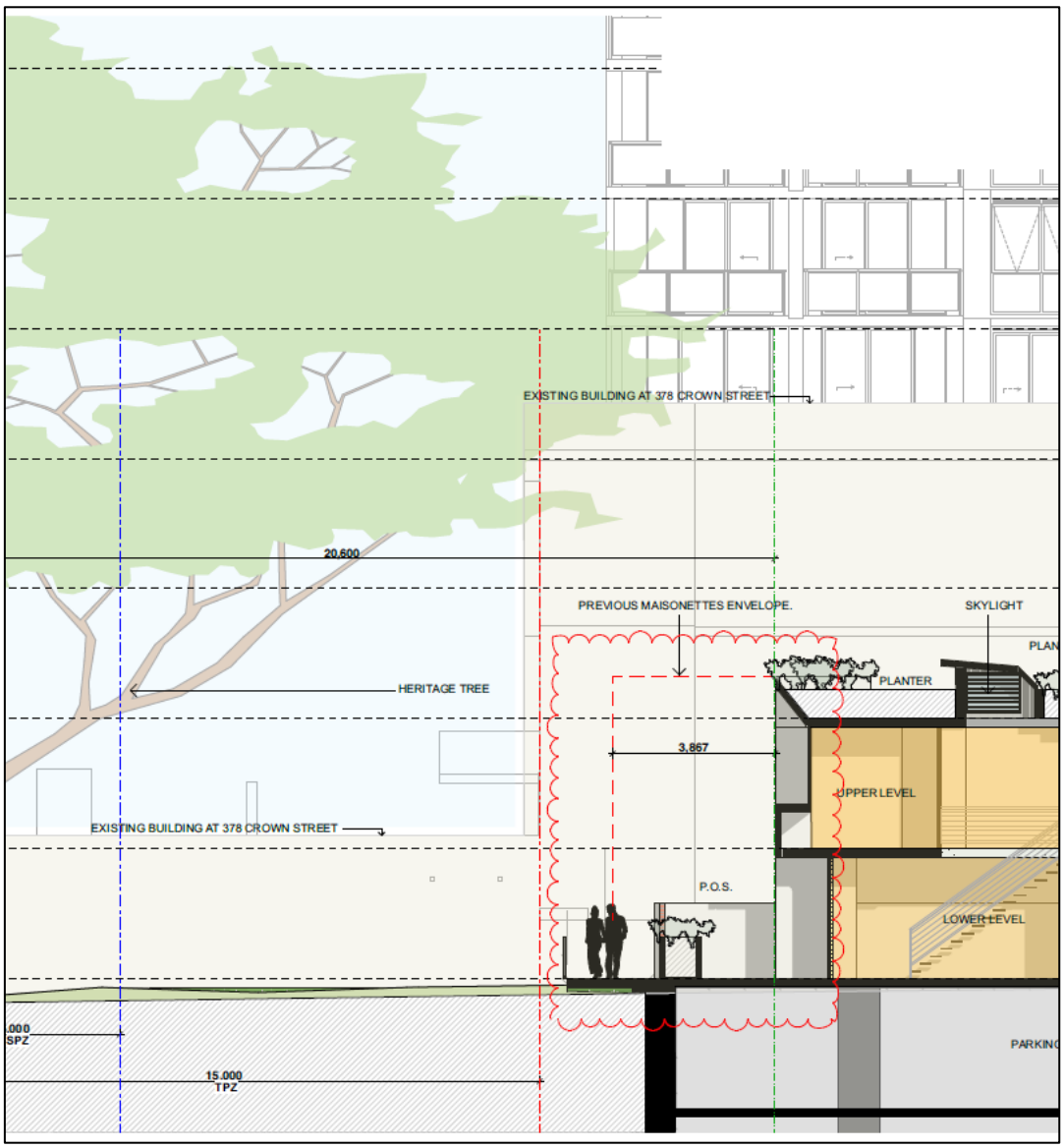


Diagram 5: Part plan of Drawing A304 showing the canopy spread 20m does not match the drawing. This section drawing also shows the basement in relation to the canopy in terms of the drill rig conflicting with the canopy.

6. CONCLUSIONS: Following assessment of updated plans I have made the following findings;

a) Although there appears to be a slight increase in solar access to the canopy the impacts of this tall building being placed on the northern side of this tree are difficult to quantify.

b) The updated landscape design under Tree 6 will have a greater impact than the previous plan, that incorporated more garden areas to limit human traffic and garden beds, which would have helped with better soil health and condition. The increase of the lawn area in the proposed design below this tree is not acceptable. It is extremely unlikely that any lawn will grow within such a high shade area. The required lawn management practices (mowing) will create ongoing compaction issues to the roots of this tree. Leaf drop from this species will also be a detrimental impact to a successful lawn. Another potential ongoing problem using the area directly below this tree as a high use open space area is the Grey-headed flying-fox *(Pteropus poliocephalus)* that are known to roost and eat the fig fruits on this species.

c) The basement excavation will require a large size drill rig that will be used to shore the wall sides. Based on the plans provided this equipment required (the drill rig) is likely to clash with the northern portion of the canopy. The current basement design will impact the canopy of this tree.

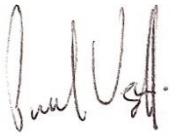
d) The tree canopy is still not shown accurately on drawings i.e. still drawn as a symmetrical circle. Diagram 5 shows the inaccurate section drawing of the canopy.

e) The tree protection specification for this tree is inadequate. Specifications for the surface removal, protection of the trunk and canopy should be site specific. Plans should clearly show that no level changes should occur following the removal of the hard surfaces within the TPZ. A long build period is projected so irrigation should also be specified. In summary a more thorough tree protection specification is required for this tree.

f) It could still be argued, in my opinion, that the proposed works do not meet the objectives of certain sections of the Wollongong Local Environmental Plan 2009 regarding Sections 4.3 *Height of Buildings.* Part c and 5.10 *Heritage conservation.*

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

Yours sincerely



Paul Vezgoff, Consulting Arborist
Dip Arb (Dist), Arb III, Hort cert, AA, ISA

Appendix 1

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 2

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).

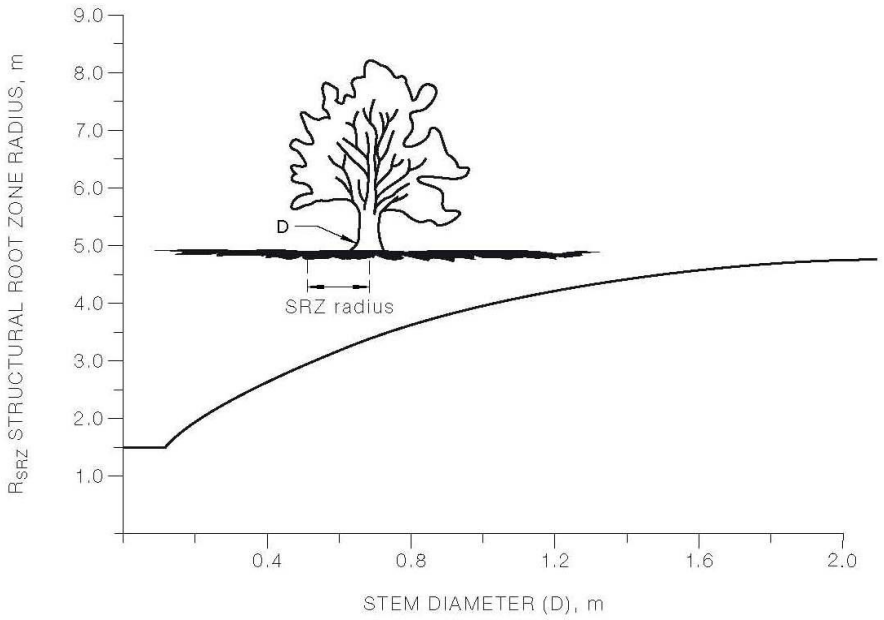


FIGURE 1 - STRUCTURAL ROOT ZONE

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 3

Bibliography

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Sydney

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Curriculum Vitae

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EDUCATION and QUALIFICATIONS

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

INDUSTRY EXPERIENCE

Moore Trees Arboricultural Services **January 2006 to date**

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

Woollahra Municipal Council **Oct 1995 to February 2008**

ARBORICULTURE TECHNICAL OFFICER
August 2005 – February 2008
ACTING COORDINATOR OF TREES MAINTENANCE
June – July 2005, 2006
Responsible for all duties concerning park and street trees. Prioritising work duties, delegation of work and staff supervision.
TEAM LEADER
January 2003 – June 2005
September 2000 – January 2003
HORTICULTURALIST
October 1995 – September 2000

Northern Landscape Services **July to Oct 1995**

Tradesman for Landscape Construction business

Paul Vezgoff Garden Maintenance (London, UK) **Sept 1991 to April 1995**

CONFERENCES AND WORKSHOPS ATTENDED

- TRAQ Conference, Auckland NZ / Sydney (2023)
- International Society of Arboriculture Conference (Canberra May 2017)
- QTRA Conference, Sydney Australia (November 2016)
- 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).