

Moore Trees
Arboricultural Services

ABN 90887347745

Arboricultural Development Assessment Report

Addendum

282–298 and 302-304 Lawrence Hargrave Drive
Thirroul NSW 2515
Lot 103 DP 706867, Lot 1 240526
Lot 2 DP 534253
March 2021
FINAL



Member 2021



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Summary

This report has been compiled for Loucas Architects. The report concerns a proposed Development Application for 282-298 and 302-304 Lawrence Hargrave Drive, Thirroul NSW 2515.

This report is an addendum to identify additional trees in and around the existing Plaza and adjoining park to the site, being W.F. Jackson Park. Forty seven (47) trees have been included in this addendum, of which thirty nine (39) trees and several native species have been previously included in the Arboricultural Impact Assessment Report by Paul Shearer Consulting dated 6th August 2020.

This report contains the following information required in Wollongong City Council Development guidelines:-

- 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 for each tree.
- 6) Any branch or root pruning that may be required for trees.
- 7) List trees within fifteen (15) metres of the site boundary.

Trees 1-5, 7, 13, 11, 12, 15, 19, 20, 24-35, 37, 40, 41, 43, 44, 45, 48 are proposed to be removed.

The Trees within WF Jackson Park will require tree protection fencing. A site-specific tree protection plan and specifications will be required to ensure trees to be retained will be protected during the construction process. This report can be updated for this purpose.

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VERSION CONTROL

Date of Issue	Details
3 March 2021	Draft 1 issued
12 March 2021	Draft 2 issued
18 March 2021	Final version issued

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1 INTRODUCTION

1.1 This report has been conducted to assess the health and condition of forty seven (47) trees located at 282-298 and 302-304 Lawrence Hargrave Drive, Thirroul NSW 2515. This report has been prepared for Loucas Architects of U3 Suite 309, 7-9 Gibbons Street, Redfern NSW 2016 as required for a Development Application with Wollongong City Council at this site.

This report is an addendum to identify additional trees in and around the existing Plaza and adjoining park to the site, being W.F. Jackson park. Forty seven (47) trees have been included in this addendum, of which thirty nine (39) trees and several native species have been previously included in the Arboricultural Impact Assessment Report by Paul Shearer Consulting dated 6th August 2020.

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.

As specified in the Wollongong City Council Development Application guidelines the following data was collected for each tree:

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

Also noted for the purpose of this report were:

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

1.2 Location: The proposed development site is located at 282-298 and 302-304 Lawrence Hargrave Drive, Thirroul NSW 2515, known as Lot 103 DP 706867, Lot 1 DP 240526 and Lot 2 DP 534253. The proposed development site from herein will be referred to as "the Site".



Diagram 1: Location of subject site, 282-298 and 302-304 Lawrence Hargrave Drive, Thirroul NSW 2515 (Red arrow) (whereis.com.au, 2021)

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 22nd February 2021. 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 This report is only concerned with trees on the site that come under the Tree management permit policy that is part of the Wollongong City Council Development Control Plan, 2009 (Chapter E17 Preservation and management of Trees and vegetation). Under this Chapter (E17), a person must not ringbark, cut down, top, lop, remove, injure or wilfully destroy any prescribed tree or other vegetation, without development consent or a permit being granted by Council. Refer to Part 3 (Chapter E17) Definitions for the meaning of ‘prescribed tree’ and ‘prescribed other vegetation’. Two application processes have been established to deal with the assessment and approval for prescribed trees:

a) Tree Management Permit (generally for individual/small scale tree removal and pruning in urban areas) - refer to Council’s website for the Tree Management Permit Policy;

b) Development consent via either Complying Development or Development Application. This Chapter of the DCP should be read in conjunction with clauses 5.10 Heritage conservation, 5.11 Bush fire hazard reduction work and 7.2 Natural resource sensitivity – biodiversity of Wollongong Local Environmental Plan 2009.

This Report is required as per clause (b) via a Development Application for the site. This report takes no account of any tree or shrub under three (3) metres in height.

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

2.4 Tree Protection Zone (TPZ): The TPZ is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. TPZ's have been calculated for each tree to determine construction impacts. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites*, AS 4970, 2009. Only the Tree Protection Zones are shown in the Tree Plan (Appendix 1) for the Trees in the adjoining park.

2.5 Structural Root Zone (SRZ): The SRZ is a specified distance measured from the trunk that is set aside for the protection of tree roots, both structural and fibrous. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The TPZ and SRZ are measured as a radial measurement from the trunk. No roots should be severed within the SRZ area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 4.

2.6 Safe Useful Life Expectancy (SULE): The subject trees were assessed for a Safe Useful Life Expectancy (SULE). The SULE rating for each tree can be seen in the Tree Assessment Schedule (Appendix 2). A detailed explanation of SULE can be found in Appendix 3.

2.7 Plans and information provided: For this Arboricultural Report I was supplied the following documents:

- Detail and Contour Survey site plan by BPS Surveyors marked Ref # 1381-DET2 Sheets 1-10, Issue D dated 17 July 2020;
- Site Plan (A-020) and Architectural drawing set by Loucas Architects marked Pn 17002 dated 26/2/2021 Rev C.

I have not been provided any plans for engineering specifications or service diagrams for the site.

2.8 Impact Assessment: An impact assessment was conducted on the site trees. This was conducted by assessing the site survey and plans provided by Loucas Architects. The plans provided were assessed for the following:

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

3 RELEVANT BACKGROUND INFORMATION

- 3.1** The site contains a commercial “Plaza” building and associated car parking. The majority of the trees are located on the railway side of the carpark, and around the western and southern sides behind the Coles building.
- 3.2 Environmental Significance:** All trees in the Wollongong Local Government Area are protected and cannot be removed without the adequate requirements being met. Specifications relating to what can and cannot be removed are detailed in the Wollongong City Council Development Control Plan (DCP), 2009 in Chapter E17 ‘*Preservation of trees & management of trees and vegetation*’. This DCP protects all trees above three (3) metres in height with a girth of twenty (20) centimetres or more, measured at a distance of one hundred (100) centimetres above the ground.
- 3.3 Illegal tree removal:** Damaging or removing trees can result in heavy fines. Local Government does have the authority to issue on the spot fines known as penalty infringement notices (PINS) starting from \$3,000 or can elect to have a potential tree damaging incident addressed in the Local Court. Recent cases, for example, include two (2) mature trees removed for development (Sutherland Shire Council (SSC) v Palamara, 2008) costing \$4,500 in fines and \$5,000 in court costs. SSC v El-Hage, 2010 concerning illegal tree removal of a single tree costing \$31,500 in fines and \$5,000 in costs. Poisoning trees can also incur substantial fines (SSC v Hill) resulted in a single tree fine that totalled \$14,000 plus a \$10,000 bond for a replacement tree. All of the above cases resulted in a criminal conviction for the guilty parties.

3.4 Zoning: The site is zoned as B2 based on the Wollongong Local Environmental Plan 2009 (LEP 2009). These being B2 *Local centre* (Diagram 3).

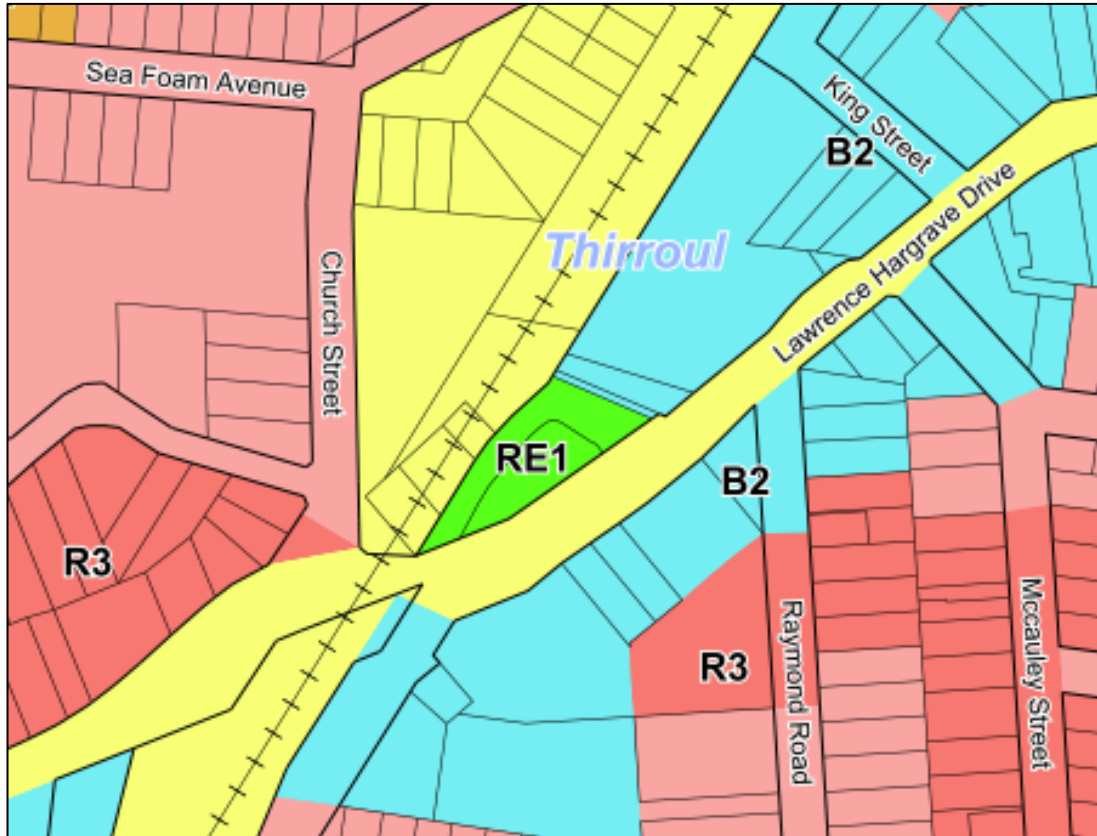


Diagram 3: WCC LGA zoning map (WCC Intra maps 2021)

- 3.5 The Site Trees:** The site was inspected on 22nd February 2021. Each tree has been given a unique number for this site and can be viewed on the Tree Plan (Appendix 1). This plan is based on the plan provided by Loucas Architects, undertaken by BPS Surveyors.
- 3.6** Trees 1-36 are growing along an embankment. Fifteen (15) of these trees were included in the Paul Shearer Report. The species identified along this embankment include; Cabbage tree palm (*Livistona australis*), Cheese tree (*Glochidion ferdinandi*), Illawarra flame tree (*Brachychiton acerifolius*), Melaleuca (*Melaleuca linariifolia*) and also weed species being Hackberry (*Celtis australis*), Camphor laurel (*Cinnamomum camphora*), Large leaf privet (*Ligustrum lucidum*) and Date palm (*Phoenix canariensis*). Of these trees there are several of the Cheese trees that should be retained if possible. Tree 37 is a suppressed Acacia that is surrounded by weed growth at the rear of the Coles building.
- 3.7** Along the southern boundary are Trees 40, 41, 43, 44 and 45. These trees are engulfed by weed growth and would not be considered significant to the site. The species are Hackberry (*Celtis australis*), White cedar (*Melia azedarach*).
- 3.8** Directly behind the Coles building is a steep slope that contains Trees 48 and 49 along with dense weed growth consisting of *Tecoma stans*, *Lantana camara*, Hackberry (*Celtis australis*) (Tree 49, Plate 7) and thickets of Tiger Grass (*Thysanolaena maxima*) a weed from Thailand. Plate 8 shows two (2) Illawarra flame trees (*Brachychiton acerifolius*) that are growing at the top of the steep embankment but within the railway property.
- 3.9** Within W.F Jackson Park are Trees 38, 39, 42, 46 and 47. These trees are all in good health and condition and consist of Port jackson fig (*Ficus rubiginosa*), Blueberry ash (*Elaeocarpus reticulatus*), Trident maple (*Acer palmatum*), with Tree 39, the Norfolk Island Pine, (Tree 5 in the Paul Shearer Report) being the largest tree closest to the site.
- 3.10 Exempt trees:** Wollongong City Council lists several species of trees as being exempt from the provisions of the TMCP under Section 3 of the TMCP. Trees numbered as 6-9, 11, 12, 15, 19, 20, 21, 26-31, 45 are all various weed species that consist of Hackberry (*Celtis australis*), Camphor laurel (*Cinnamomum camphora*), Large leaf privet (*Ligustrum lucidum*) and Date palm (*Phoenix canariensis*).

3.11 Impacts: Trees 6-9, 11, 12, 15, 19, 20, 21, 26-31, 45 should be considered for removal as they are weeds. Based on the plans provided Trees 1-5, 7, 13, 11, 12, 15, 19, 20, 24-35, 37, 40, 41, 43, 44, 45, 48 are proposed to be removed.

3.12 The more significant trees in WF Jackson Park, being Trees 38, 39 and 47 have TPZ areas that fall slightly within the site however these TPZ incursions are well under 10% that, based on AS4970 is considered minimal.

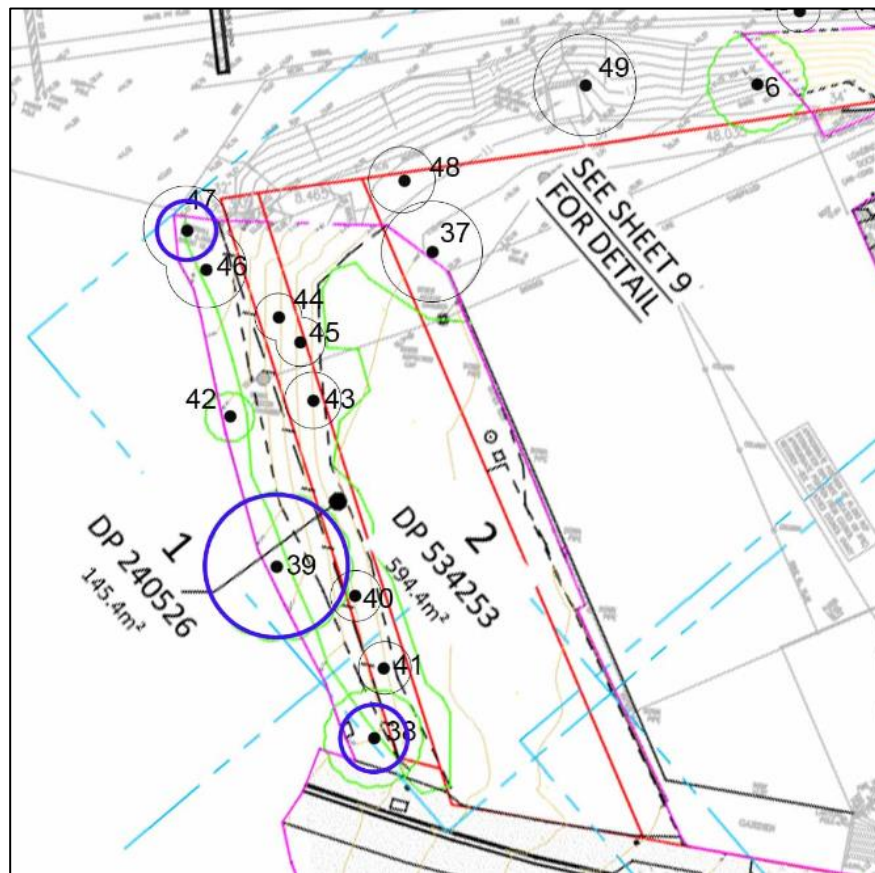


Diagram 4: Part of the Tree Plan showing the TPZ distances (Blue circles) for the more significant trees in WF Jackson Park, being Trees 38, 39 and 47.

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** Trees 1-5, 7, 13, 11, 12, 15, 19, 20, 24-35, 37, 40, 41, 43, 44, 45, 48 are proposed to be removed.
- 4.3** The Trees within WF Jackson Park will require tree protection fencing. A site-specific tree protection plan and specifications will be required to ensure trees to be retained will be protected during the construction process. This report can be updated for this purpose.
- 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** The location of services may potentially impact on the site trees and their root systems. Strip trenching through TPZ areas can sever roots, thus destabilising trees. All disciplines that have to plan service locations that require trenching shall be supplied the TPZ distances in this report so that major incursions of greater than 10% can be avoided. These disciplines may include but not be limited to; stormwater design, gas, water and electricity locations.

- 4.6** In general, a 10% encroachment of a TPZ is possible. Further incursions into the TPZ for each tree will require further assessment once the plans have progressed.
- 4.7** If there are any questions regarding how close a structure or path can be to any of the site trees, then Moore Trees shall be contacted.

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

A handwritten signature in blue ink, appearing to read "Paul Vezgoff".

Paul Vezgoff

Consulting Arborist

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

18 March 2021

5 IMAGES



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



Plate 2: Image showing along the railway land. P. Vezgoff.



Plate 3: Image showing the Date palm weed species (Trees 26 and 27) . P. Vezgoff.



Plate 4: Image showing sapling growth (under 3m in height) below Tree 24. P. Vezgoff.



Plate 5: Image showing Tree 39 (right) and the dense weed growth within the site. P. Vezgoff.



Plate 6: Image showing Tree 46 and 47 amongst the weeds. P. Vezgoff.



Plate 7: Image showing Tree 49. P. Vezgoff.



Plate 8: Image showing Trees 50 and 51 on railway property at the top of the embankment. P. Vezgoff.

Appendix 1

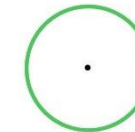
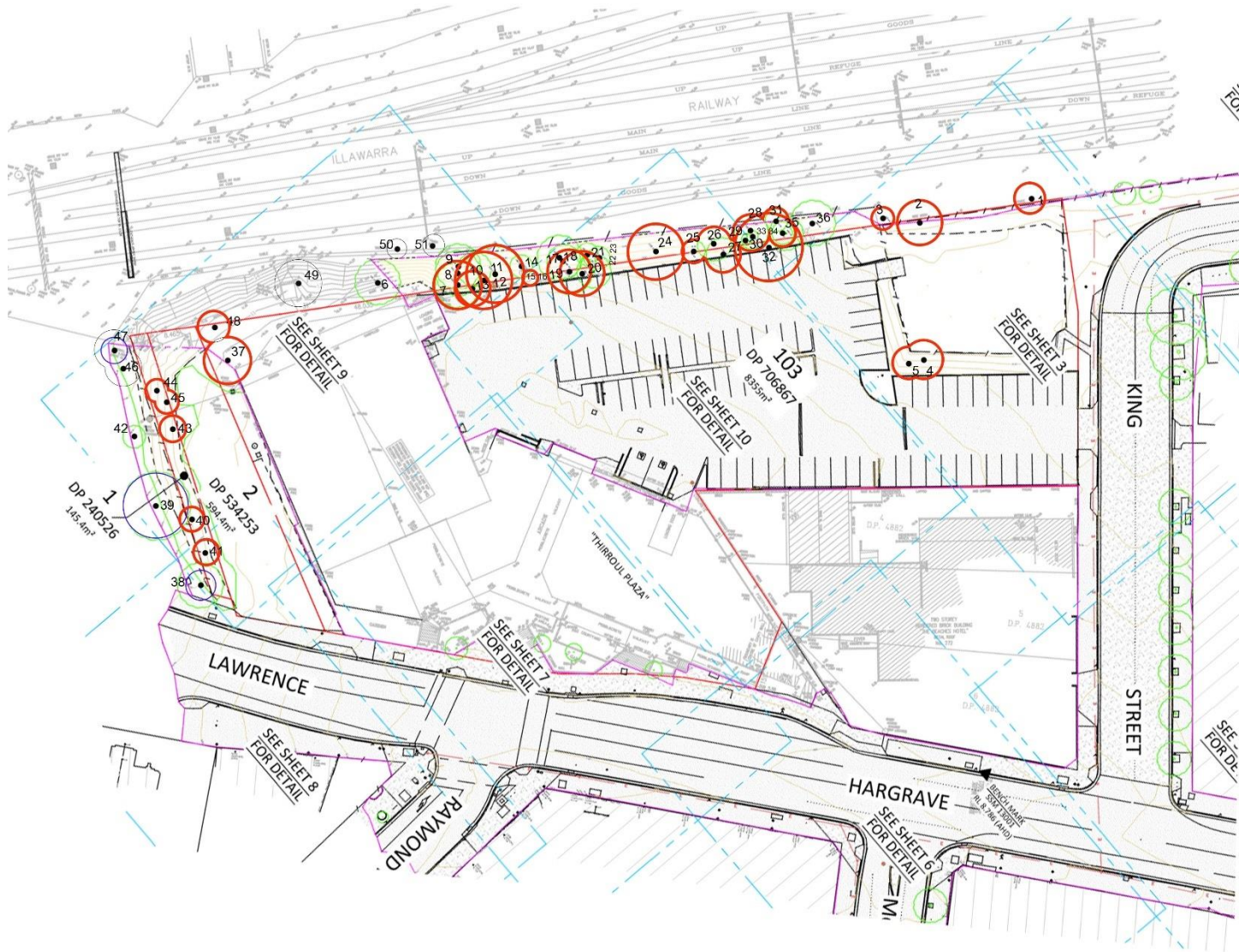
Plan 1

Tree Plan

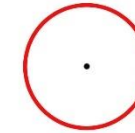


Tree Impact Plan

Moore Trees



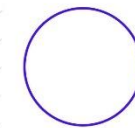
Tree to be retained



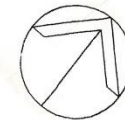
Tree to be removed

Removals: 1-5, 7, 13, 11, 12, 15, 19, 20, 24-35, 37, 40, 41, 43, 44, 45, 48

Weed species: 6-9, 11, 12, 15, 19, 20, 21, 26-31, 45, 48



Tree Protection Zone (TPZ). TPZ area based on AS 4970. See *Recommendations and Tree Protection* section of Arborist Report.



Date:	18.03.21
Drawn:	P.Vezgoff
Site Address:	303-304 & 282-298 Lawrence Hargrave Drive Thirroul NSW 2515

Appendix 2

Tree health & condition
assessment schedule

TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – 282-298 and 302-304 Lawrence Hargrave Drive, Thirroul NSW 2515

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
1	Cabbage tree palm (<i>Livistona australis</i>)	11	2.5	0.25	0.35	100	No visual defects	1a >40 years	Good	Mature		3	2.1
2	Cheese tree (<i>Glochidion ferdinandi</i>)	6	4.5	0.45	0.55	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen	5.4	2.5
3	Illawarra flame tree (<i>Brachychiton acerifolius</i>)	5.5	2.5	0.32	0.42	100	No visual defects	2c removed for more suitable planting	Good	Mature		3.8	2.2
4	<i>Acmena smithii</i>	5.5	2	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen coppice	1.2	1.6
5	<i>Melaleuca (Melaleuca linariifolia)</i>	4.5	2	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen coppice	1.2	1.6
6	Hackberry (<i>Celtis australis</i>)	6	3.5	0.13	0.23	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	1.6	1.7
7	Camphor laurel (<i>Cinnamomum camphora</i>)	8	4	0.3	0.4	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	3.6	2.2
8	Camphor laurel (<i>Cinnamomum camphora</i>)	8	4	0.3	0.4	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	3.6	2.2
9	Camphor laurel (<i>Cinnamomum camphora</i>)	8	4	0.3	0.4	100	No visual defects	2c removed for more suitable planting	Good	Mature		3.6	2.2
10	Native daphne (<i>Pittosporum undulatum</i>)	6.5	2.5	0.15	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.8	1.8
11	Camphor laurel (<i>Cinnamomum camphora</i>)	8	4	0.3	0.4	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	3.6	2.2
12	Large leaf privet (<i>Ligustrum lucidum</i>)	6.5	4	0.35	0.45	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	4.2	2.3
13	<i>Acacia maidenii</i>	5.5	2	0.13	0.23	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.7
14	Cheese tree (<i>Glochidion ferdinandi</i>)	4.5	2	0.12	0.22	100	No visual defects	2c removed for more suitable planting	Good	Sapling		1.4	1.7
15	Large leaf privet (<i>Ligustrum lucidum</i>)	4.5	1.5	0.17	0.27	100	No visual defects	2c removed for more suitable planting	Good	Sapling	Weed	2	1.8
16	Cheese tree (<i>Glochidion ferdinandi</i>)	4.5	2	0.12	0.22	100	No visual defects	2c removed for more suitable planting	Good	Sapling		1.4	1.7
17	Native daphne (<i>Pittosporum undulatum</i>)	5	3	0.26	0.36	100	No visual defects	2c removed for more suitable planting	Good	Mature		3.1	2.1

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
19	Large leaf privet (Ligustrum lucidum)	5	3	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	1.2	1.6
20	Camphor laurel (Cinnamomum camphora)	8	4	0.3	0.4	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	3.6	2.2
21	Camphor laurel (Cinnamomum camphora)	6	2.5	0.18	0.28	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	2.2	1.9
22	Native daphne (Pittosporum undulatum)	5.5	2.5	0.12	0.22	90	No visual defects	2c removed for more suitable planting	Good	Mature		1.4	1.7
23	Native daphne (Pittosporum undulatum)	5.5	2.5	0.19	0.29	90	No visual defects	2c removed for more suitable planting	Good	Mature		2.3	1.9
24	Cheese tree (Glochidion ferdinandi)	9	3.5	0.17	27	100	No visual defects	2c removed for more suitable planting	Good	Mature		2	12.8
25	Native daphne (Pittosporum undulatum)	4.3	1.5	0.12	0.22	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.4	1.7
26	Date palm (Phoenix canariensis)	7	5	0.6	0.7	100	No visual defects	2c removed for more suitable planting	Good	Mature	Self seeded weed	7.2	2.8
27	Date palm (Phoenix canariensis)	2.2	2.5	0.5	0.6	100	No visual defects	2c removed for more suitable planting	Good	Mature	Self seeded weed	6	2.6
28	Camphor laurel (Cinnamomum camphora)	5	0.5	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	1.2	1.6
29	Camphor laurel (Cinnamomum camphora)	5	0.5	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	1.2	1.6
30	Camphor laurel (Cinnamomum camphora)	5	0.5	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	1.2	1.6
31	Camphor laurel (Cinnamomum camphora)	6	2.5	0.23	0.33	100	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	2.8	2
32	Acacia maidenii	9	5	0.45	0.55	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen .25,.2,.15	5.4	2.5
33	Acacia maidenii	3	1	0.06	0.16	100	No visual defects	2c removed for more suitable planting	Good	Sapling		0.7	1.5
34	Native daphne (Pittosporum undulatum)	6	2.5	0.18	0.28	100	No visual defects	2c removed for more suitable planting	Good	Mature		2.2	1.9
35	Acacia maidenii	7	2.5	0.17	0.27	100	No visual defects	2c removed for more suitable planting	Good	Mature		2	1.8

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
36	Cheese tree (Glochidion ferdinandi)	7	5	0.29	0.39	100	Storm damage	2c removed for more suitable planting	Good	Mature		3.5	2.2
37	Acacia maidenii	6	3	0.3	0.4	100	No visual defects	2c removed for more suitable planting	Good	Mature	Under dense vegetation	3.6	2.2
38	Illawarra flame tree (Brachychiton acerifolius)	5	3	0.2	0.3	100	No visual defects	1a >40 years	Good	Mature	Garden club memorial at base	2.4	1.9
39	Norfolk Island Pine (Araucaria heterophylla)	12	6	0.45	0.55	100	No visual defects	1a >40 years	Good	Mature		5.4	2.5
40	White cedar (Melia azedarach)	3.5	2.5	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Sapling		1.2	1.6
41	White cedar (Melia azedarach)	3.5	3	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Sapling	Multi stemmed specimen	1.2	1.6
42	Trident maple (Acer palmatum)	3.5	2.5	0.12	0.22	100	No visual defects	2c removed for more suitable planting	Good	Sapling	Twin stem	1.4	1.7
43	White cedar (Melia azedarach)	3.5	2.5	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Sapling		1.2	1.6
44	White cedar (Melia azedarach)	6.5	4	0.13	0.23	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen	1.6	1.7
45	Large leaf privet (Ligustrum lucidum)	6	3.5	0.12	0.22	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen	1.4	1.7
46	Blueberry ash (Elaeocarpus reticulatus)	5.5	2.5	0.1	0.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.2	1.6
47	Port jackson fig (Ficus rubiginosa)	8	2.5	0.14	0.24	100	No visual defects	1a >40 years	Good	Mature		1.7	1.8
48	Tecoma stans	4	3	.15	.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.2	1.6
49	Hackberry (Celtis australis)	5	3	.12	.2	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.2	1.6
50	Illawarra flame tree (Brachychiton acerifolius)	5	2.5	.2	.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	On railway side of fence. Almost growing into railway wires	1.2	1.6
51	Illawarra flame tree (Brachychiton acerifolius)	5	2.5	.2	.25	100	No visual defects	2c removed for more suitable planting	Good	Mature	On railway side of fence. Almost growing into railway wires	1.2	1.6

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

Significance: A tree's significance in the landscape. This may include but not be limited to visual amenity, historic value, local and site perspective. The tree may be native or it may also be native and endemic to the site. An exotic species such as a mature English Oak in excellent health and condition will be classed as having a higher significance than an over-mature native Forest Red Gum. The values are: High, Moderate, Low. Bushfire risk is not part of Significance rating.

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

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

Appendix 3

SULE categories (after Barrell, 2001)¹

SULE Category	Description
<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.

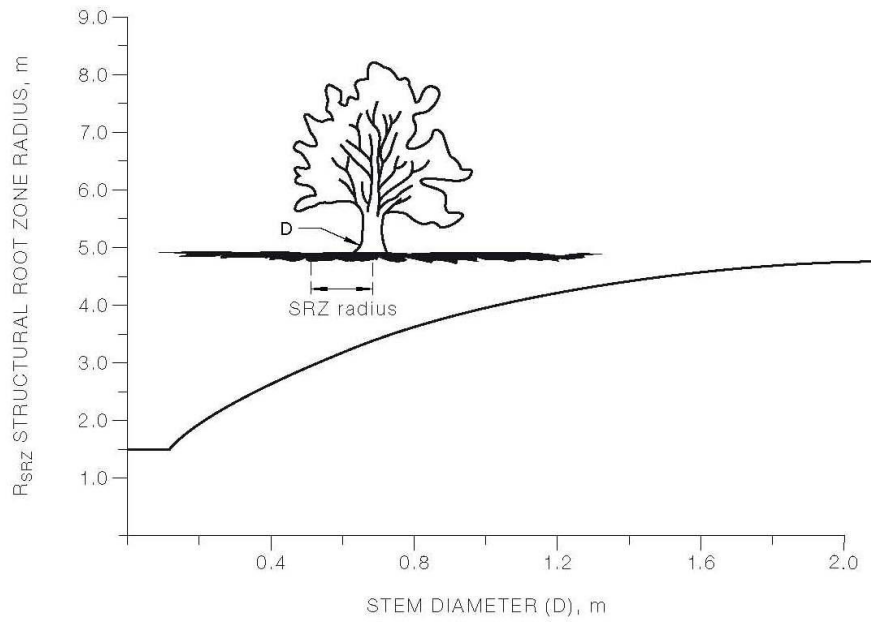
There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the 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:
 $R_{SRZ} = (D \times 50)^{0.42} \times 0.64$

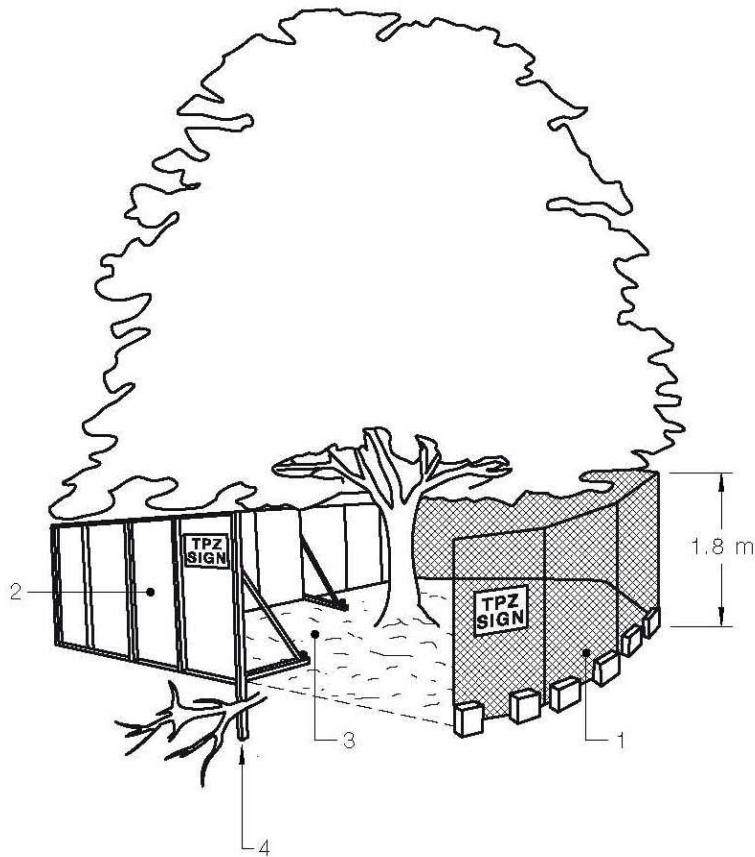
FIGURE 1 - STRUCTURAL ROOT ZONE

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

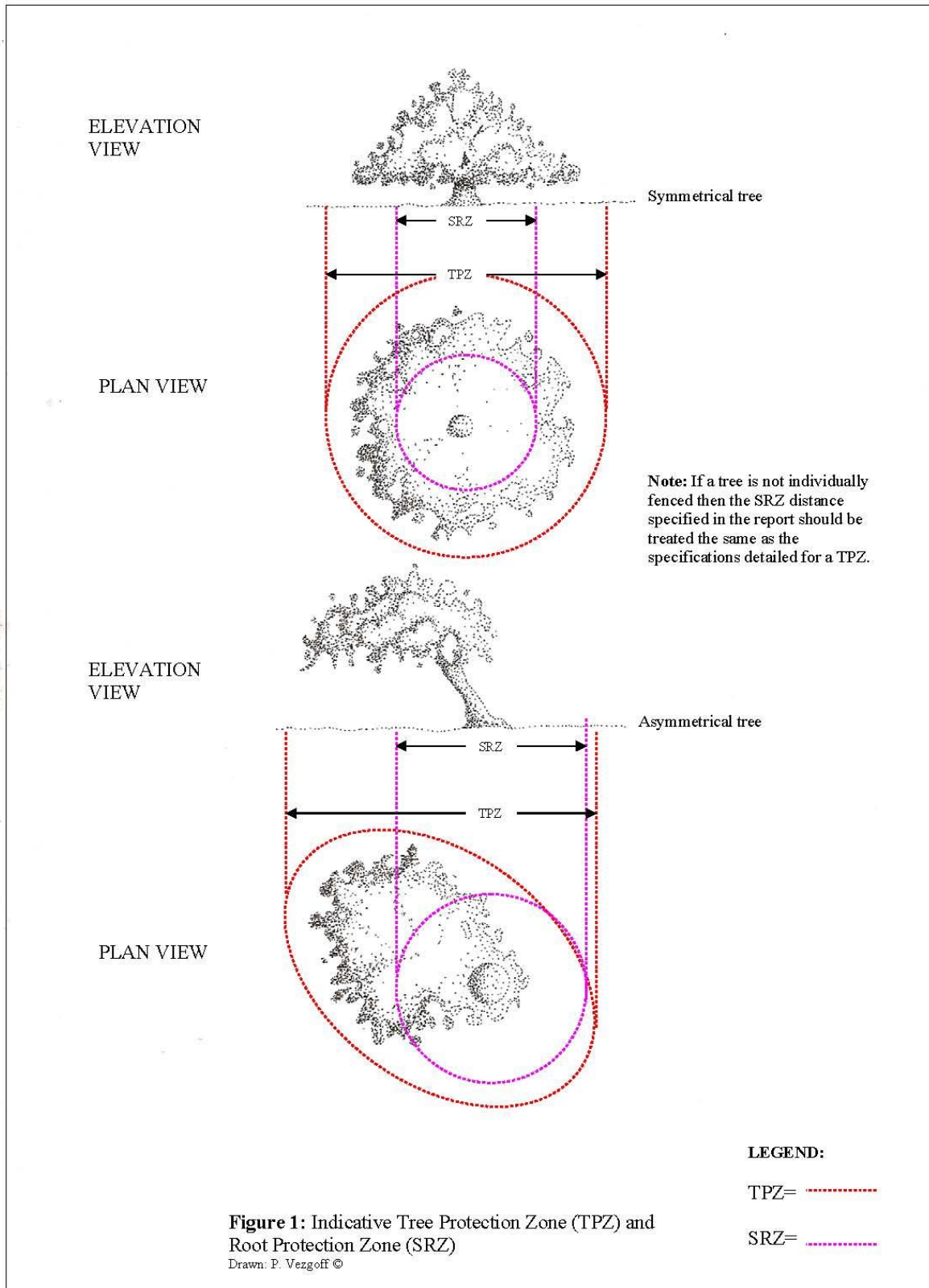
NO

Storage of materials

Trenching or excavation

Washing of tools or equipment

Appendix 7



Appendix 8

Tree structure information diagram

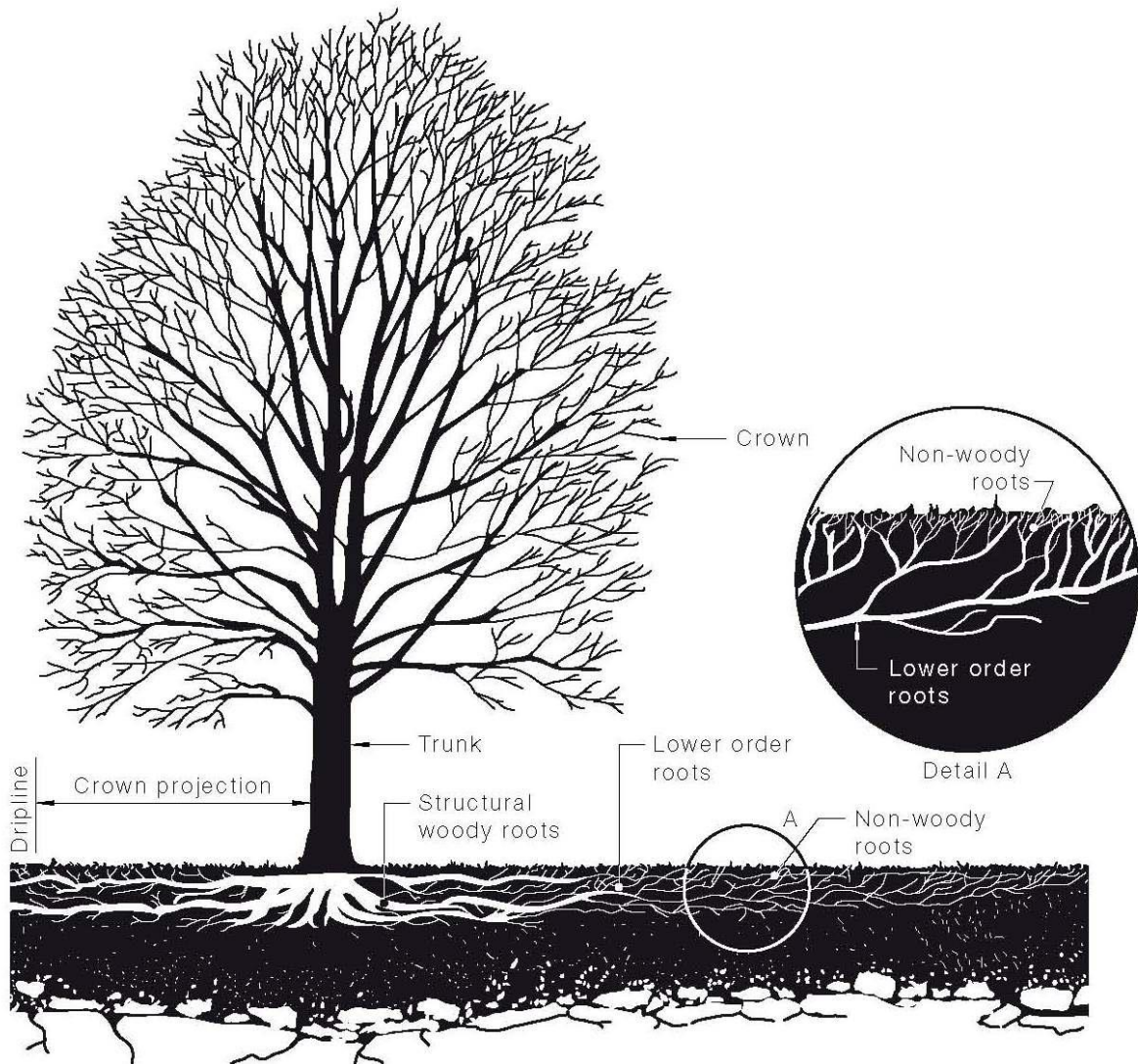


Figure 2: Structure of a tree in a normal growing environment (AS 4970, 2009.).

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

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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

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Moore Trees Arboricultural Services

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

Woollahra Municipal Council

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ARBORICULTURE TECHNICAL OFFICER

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

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October 1995 – September 2000

Northern Landscape Services

July to Oct 1995

Tradesman for Landscape Construction business

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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).