Moore Trees
Arboricultural Services

ARBORICULTURAL REPORT & TREE PROTECTION SPECIFICATION

SANCTUARY POINT LIBRARY
Paradise Beach Road
Lots 944-947 in DP 27857
and Lot 4 in DP 806393
13th December 2021
FINAL
Updated 23 February 2023

Prepared for: Brewster Hjorth Architects

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

Member 2023

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

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VERSION CONTROL

Date of Issue	Details
16 September 2021	Draft 1 issued
18 November 2021	Final version issued
13th December 2021	Updated for planners' advice
10th February 2023	Updated for Dept Planning comments
23 February 2023	Updated for further comments and retain T16-19

1 INTRODUCTION

1.1 This report has been conducted to assess the health and condition of sixty three (63) individual trees and one group of trees (Tree group 64) located on the corner of Paradise Beach Road and Kerry Street, Sanctuary Point NSW 2540. This report has been prepared for Brewster Hjorth Architects, Level 1, 4-14 Foster Street, Surry Hills NSW 2010 as required for a Development Application with Shoalhaven City Council Shoalhaven City Council at this site.

This updated report addresses the DA Assessing Panel requests regarding the subject Trees 49, 56 and 57, including review of documentation and current plans and detail any additional tree protection measures to limit existing trees being damaged from construction impacts.

The purpose of this report is to collect the appropriate tree related data on the subject trees and to provide advice and recommendations to the design and possible construction alternatives to aid against any adverse impacts on the health of the subject trees' to be retained.

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.
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.

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 on the corner of Paradise Beach Road and Kerry Street, Sanctuary Point NSW 2540, known as Lots 944-947 in DP 27857 and Lot 4 in DP 806393. The proposed development site from herein will be referred to as "the Site".

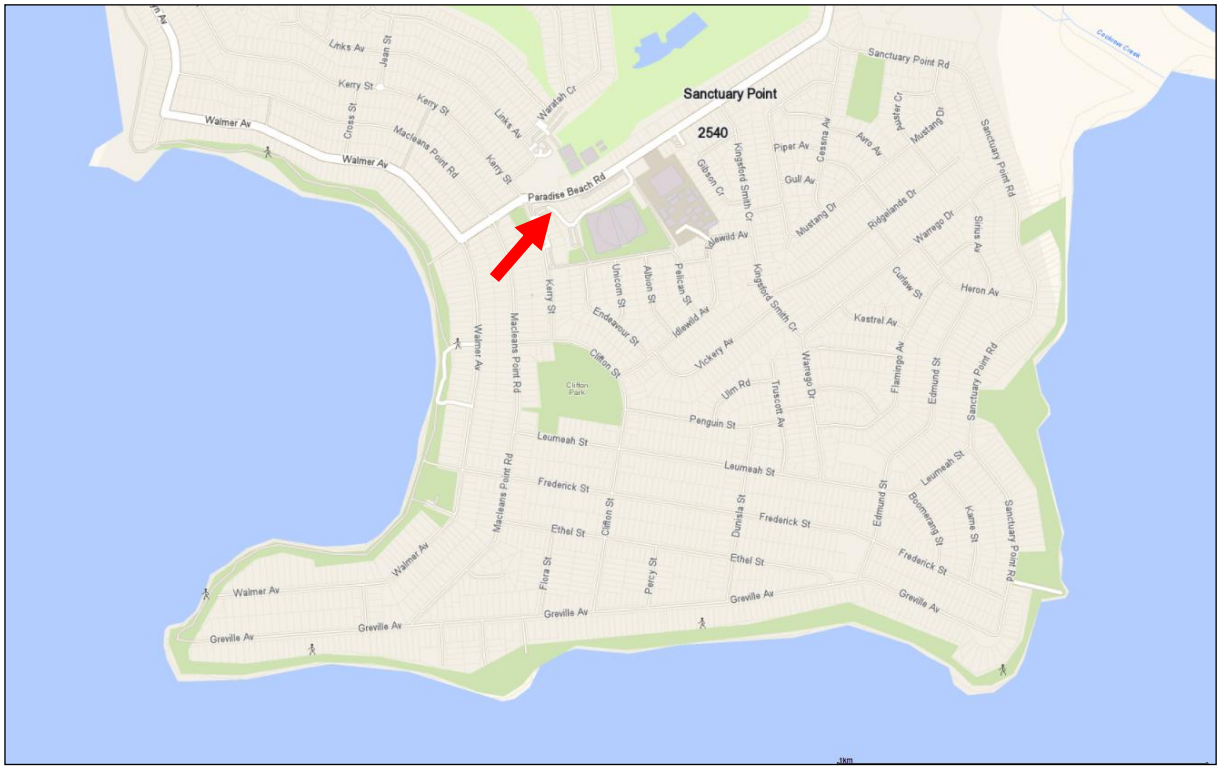


Diagram 1: Location of subject site (Red arrow) (whereis.com.au, 2021)

Diagram 2: Location of the study area (Google Earth, 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 8th 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 Shoalhaven Development Control Plan (SDCP) 2014 detailed in Chapter G4: *Tree & Vegetation Management.*

The purpose of this Chapter is to prescribe trees and other vegetation under clause 5.9(2) of the Shoalhaven Local Environment Plan (SLEP) 2014. Where a tree or other vegetation is prescribed in this Chapter a person must not ringbark, cut down, top, lop, remove, injury or wilfully destroy the tree or other vegetation without a development consent granted by Council (clause 5.9(3) of SLEP).

There are some exemptions, however these do not apply for this project. The following trees or other vegetation are prescribed:

1. All trees and other vegetation located on an area mapped by this Chapter which includes:

a) Land which is mapped as a 'paper subdivision' in the Chapter G4 maps; or

b) Trees or other vegetation that are:

i. less than 50 metres from the bank of a creek or water body deemed Category 1 (large creek/river) as defined by the SLEP 2014; or

ii. less than 30 metres from the bank of a creek or water body deemed Category 2 as defined by the SLEP 2014; or

iii. verified as supporting an EEC; or

iv. mapped as supporting rainforest vegetation species; or

v. mapped on the scenic preservation overlay of SLEP 2014; or

vi. within 30 metres from a rural road boundary.

2. All trees and other vegetation located on publicly owned or managed land; or

3. Where the tree in question is a *Toona australis* (Red Cedar); or

4. Where the tree contains a hollow; or

5. Where the tree or other vegetation is a heritage listed item or within a heritage conservation area under the SLEP 2014; or

6. All trees in an urban area.

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. The TPZ distances are listed in the Tree Schedule (Appendix 2).

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. The TPZ distances are listed in the Tree schedule (Appendix 2).A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 4.

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

2.7 Impact Assessment: An impact assessment was conducted on the site trees. This was conducted by assessing the site survey and plans provided by Brewster Hjorth 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.
- Location of sediment controls in relation to TPZ areas
- Location of stockpile areas in relation to TPZ areas
- Canopy clearance for scaffolding Australian Standard (Scaffolding) 1576.1, 2010 and Scaffolding Code of Practice 2009-Safe work Australia.

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

- Site plan by SET Consultants marked ref. 21341/1 sheets 1-3 dated 25/11/2020: and
- DA set by BHA marked DA00-DA10 dated 20/02/2023.
- Existing Trees Plan with new car park layout by TBLA dated 9.2.2023, Project No. 20-03 7W
- Plans by Westlake Civil & Structural Engineers marked 20606/C09H dated 13.02.2022
- TBLA Existing Trees Plan and Tree Replacement Plan dated 23.02.2023.

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

3 RELEVANT BACKGROUND INFORMATION

3.1 The site is located on the corner of Paradise Beach Road and Kerry Street. It consists of a local shopping area and associated car parking areas. The proposed works entail the construction of a new community library within the area that contains Trees numbered as 1-35.

3.2 **OEH Native vegetation Mapping:** The online Native Vegetation Regulatory (NVR) Map was prepared by OEH under Part 5A of the amended *Local Land Services Act 2013* (LLS Act) and supporting regulation.

The Native Vegetation Regulatory Map is a tool to give landholders certainty when planning future management of their land. The Map is a regulatory requirement. Part 5A of the Local Land Services Act 2013 (LLS Act), requires the Chief Executive of the Office of Environment and Heritage (OEH) to prepare and maintain a Native Vegetation Regulatory (NVR) Map.

The NVR Map generally covers rural land in NSW. It categorises land where management of native vegetation can occur without approval or where management of native vegetation may be carried out in accordance with Part 5A of the LLS Act. A summary of categories used in the NVR Map is shown below (Table 1). The site is mapped as *Excluded land.*

Colour	Category	Definition
Blue	**Category 1** Unregulated Land	Rural lands where clearing is not regulated by the Part 5A of the LLS Act. Other legislation may apply.
Yellow	**Category 2** Regulated Land	Rural lands where clearing is regulated and can be carried out in accordance with the Part 5A of the LLS Act or other legislation. This includes complying with the Codes and Allowable activities.
Orange	**Category 2** Vulnerable Regulated Land	Rural land where clearing of native vegetation is more restricted than on other Category 2 land. This includes steep and highly erodible lands and riparian land and special category land (as declared).
Pink	**Category 2** Sensitive Regulated Land	Rural lands where clearing of native vegetation is more restricted than other Category 2 land. This includes lands that are Sensitive Lands due to factors such as the presence of coastal wetlands, littoral rainforests, rainforest, or land that is subject to protection covenants such as conservation or incentive property vegetation plans.
Grey	Excluded Land	Land not regulated by the Part 5A of the LLS Act. This land includes urban zones, environmental conservation zones and R5 large lot residential as gazetted under a Local Environment Plan (LEP). It also includes public conservation lands such as National Parks and State Forests.

Table 1: Categories used in the NVR Map (OEH 2021)

Diagram 3: Native Vegetation Regulatory Map (OEH 2021)

3.3 **The Site Trees:** The site was inspected on 8th February 2021. Each tree has been given a unique number for this site and can be viewed on the Tree Retention Values Plan (Appendix 1). This site plan is based on the plan provided by Brewster Hjorth Architects.

3.4 The species on site consist of Water gum *(Tristaniopsis laurina)*, Swamp oak *(Casuarina glauca)*, River oak *(Casuarina cunninghamiana)*, Spotted gum *(Corymbia maculata)*, Bloodwood *(Corymbia gumiffera)*, Sydney peppermint *(Eucalyptus piperita)*, White stringy bark *(Eucalyptus globoidia)* Scribbly gum *(Eucalyptus sclerophylla)*. The majority of the large mature specimens were Spotted gums.

3.5 In and around the proposed library area are Trees 1-10 and 20-35 including Swamp oak *(Casuarina glauca)* and Water gum *(Tristaniopsis laurina)*, with the largest specimen in this area being Tree 7, a Spotted gum. Tree 7 is visually prominent from the streetscape and several road junctions.

Plate 1: Image showing Tree 7 being visually prominent from the streetscape and several road junctions.

3.6 Trees 9-11 are very tall trees located on the adjoining property to the east (Plate 3). These trees have codominant canopies and are visually prominent from the streetscape. The TPZ and SRZ for these trees will extend across the existing driveway entry and any services that will require excavation in this area will need to be assessed carefully.

Plate 2: Trees 1-6 being less significant trees to the site. P. Vezgoff.

Plate 3: Trees 9-11 are located off site but are large significant trees. P. Vezgoff

3.7 Trees 20-25 (Plate 4) are a small group of mostly Spotted gums near the existing building. These trees are in good health and condition. They have value as a group but not as individual specimens.

Plate 4: Trees 20-25 have value as a group but not as individual specimens.

3.8 As with Trees 20-25, Trees 26-29 are a small group of mostly Spotted gums also near the existing building. These trees are in good health and condition. They have value as a group but not as individual specimens (Plate 5).

Plate 5: Trees 26-29 are good as a group but not as individual specimens.

3.9 Trees 31 and 32 have suffered from storm damage and will not recover from their current condition. Below these trees is coppice regrowth and smaller weed species emerging in this area.

3.10 Trees 33-35 are in good health and condition (Plate 6). The main trunks, first and second order branches 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 a 95% live canopy. The basal area and woody root zone were free of any ground heaving, or lifting. As the area below these trees is traversed with desire lines mostly due to be located between the shops and the car park area. Associated compaction is also occurring below these trees.

3.11 Along the entry driveway are several large mature Spotted gums in good health and condition. This area is the larger car park area for the site and generally only has trees around the perimeter of the car park (Plate 7). South of Tree 16 are the trees numbered as 41 through to Tree group 64. This area is an open space with a central lawn area and a perimeter on the western edge of various *Eucalyptus* specimens. The southern boundary is dense growth that is mature along with sapling undergrowth (Plate 8). Species in this area include: Spotted gum *(Corymbia maculata),* Bloodwood *(Corymbia gumiffera),* Sydney peppermint *(Eucalyptus piperita),* White stringy bark *(Eucalyptus globoidia)* and Scribbly gum *(Eucalyptus sclerophylla).*

Plate 6: Trees 33-35 are in good health and condition with codominant canopies.

Plate 7: Trees 13 and 14 on the left and Trees 16 and 17 on the right of the image (P. Vezgoff).

Plate 8: Image showing the vegetation to the south of the study area that extends to Centaur Avenue. P. Vezgoff.

3.12 **Impacts:** Based on the plans provided, trees to be removed for the purpose of the project are numbered as Trees 1-11, 14, 25-37, 39, 49-52. All other trees appear possible to retain.

3.13 Determining a size of root that is acceptable to sever or not is not a definitive answer. A fifty (50) millimetre root severed on a fifteen (15) metre tall tree may have little or no impact. Severing a fifty (50) millimetre root on a tree that is eight (8) metres tall may cause a section of the canopy to die off, and the same size root on a one (1) meter tall tree may kill it. In general, a fifty (50) millimetre root is generally accepted as being the maximum size of root to sever on a semi-mature to mature tree without seeking further arboricultural advice and is aimed at giving the constructing crew a process of quantifying a root and being able to make a decision on site rather than the need for further design changes. It also limits overzealous root pruning.

3.14 Based on my calculations using Google Earth polygon shape layers the following calculations were made. These calculations are approximate only. The total area for the site is 11,012 square metres (Diagram 4). The total area of canopy cover for the site is approximately 3,930 square metres. The total area of canopy proposed to be removed is 1878.7 square metres (Diagram 5). The remaining canopy cover will be 2052 square metres (Diagram 5). As a percentage, the remaining canopy cover for the site will be 52.2% of the existing vegetation and 47.8% of the site canopy will be removed.

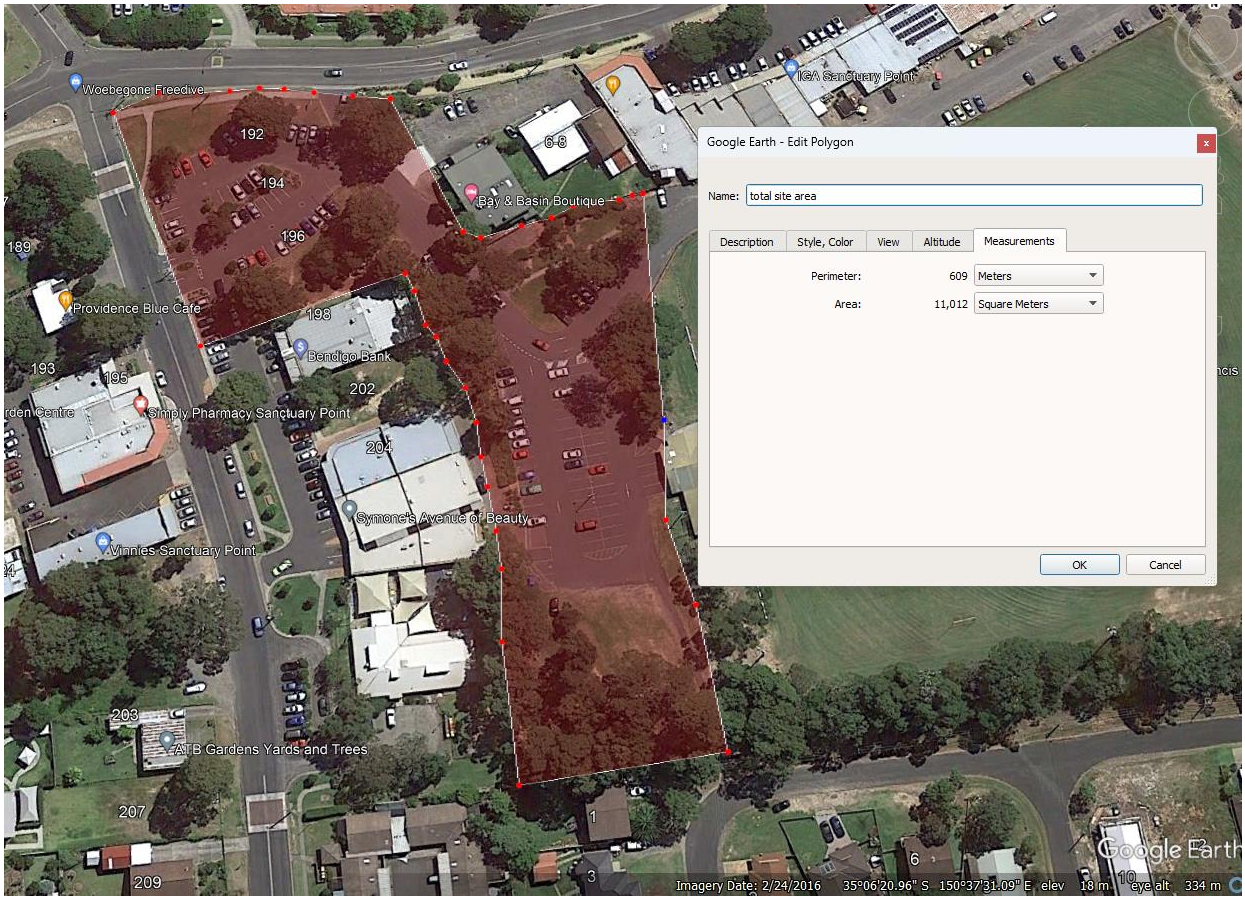


Diagram 4: Image showing the total area calculation being approximately 11,012 square metres (Google Earth)

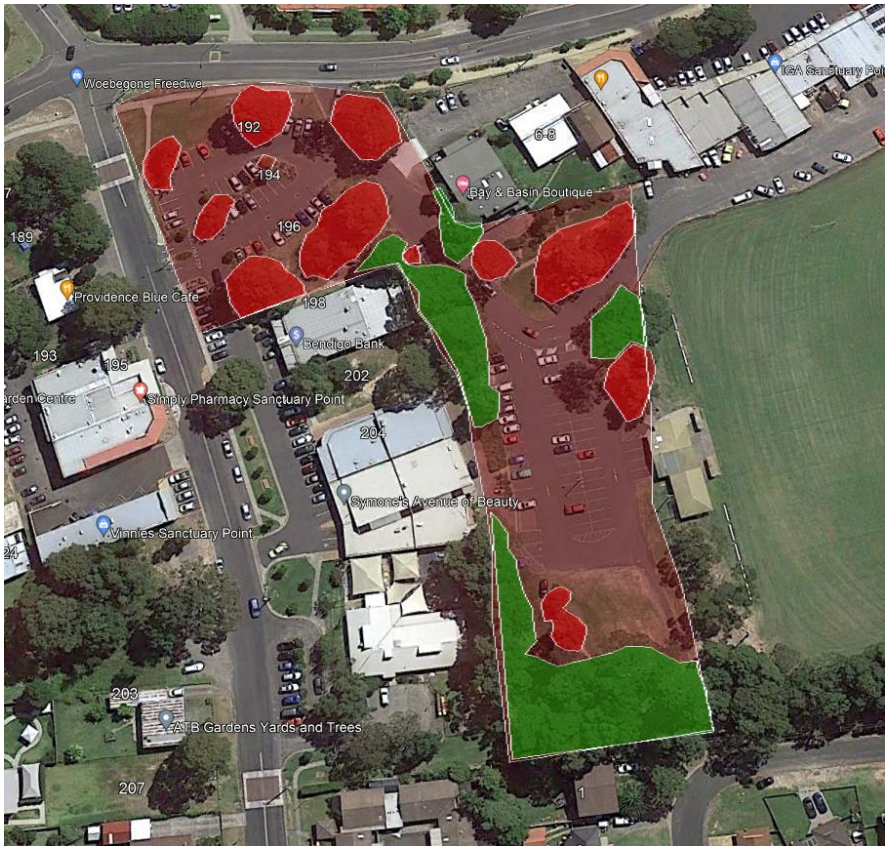


Diagram 5: As a percentage, the remaining canopy cover for the site will be 52.2% of the existing vegetation and 47.8% of the site canopy will be removed.

3.15 Based on the updated drawings Trees 53 and 57 will now be retained (Diagram 8 and 9). The northern portion of the TPZ of these trees will have a minor incursion that calculates to 13.2% for Tree 53 and 14% for Tree 57. These incursion are reasonably shallow and as such there will be no detrimental impacts from the new design to Trees 53 and 57.

3.16 New incursions are noted for Trees 41 and 43 (Diagrams 6 and 7). These incursions calculate to 14.9% for Tree 41 and 24.9% for Tree 43. Again, these incursions are reasonably shallow but not ideal. Improving the remaining TPZ area below these trees with mulch and soil amelioration will help them cope with these incursions.

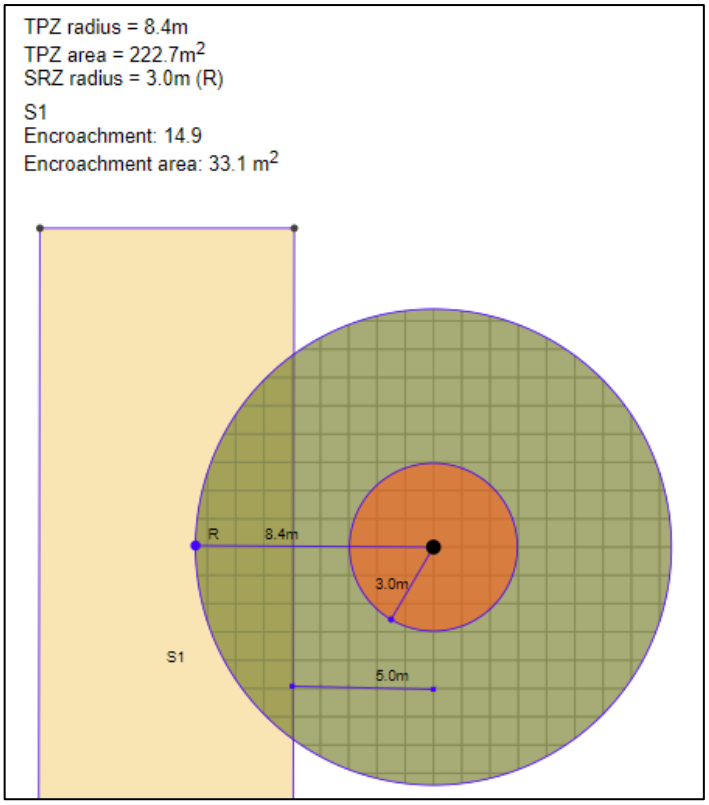


Diagram 6: TPZ incursion calculation for Tree 41 showing an incursion of 14.9%.

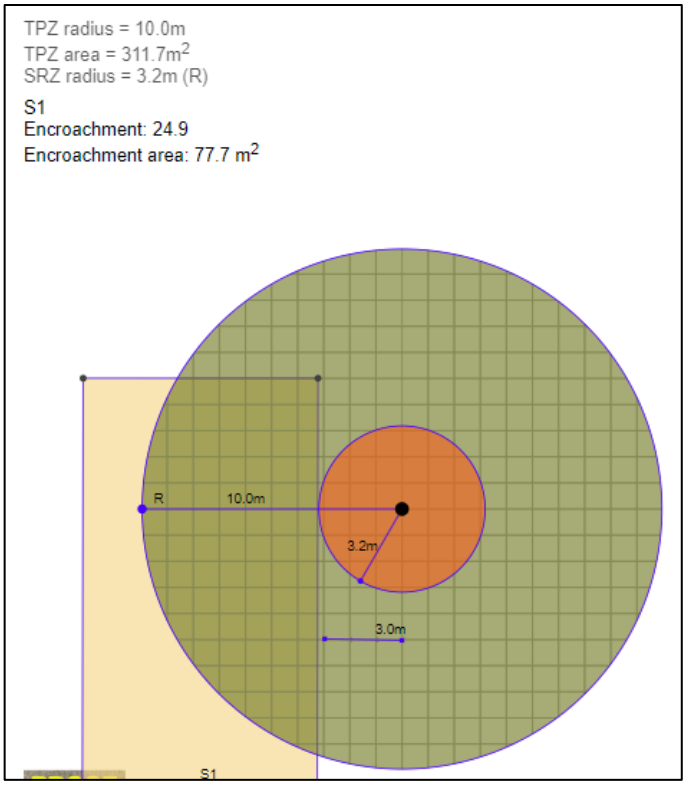


Diagram 7: TPZ incursion calculation for Tree 43 showing an incursion of 24.9%.

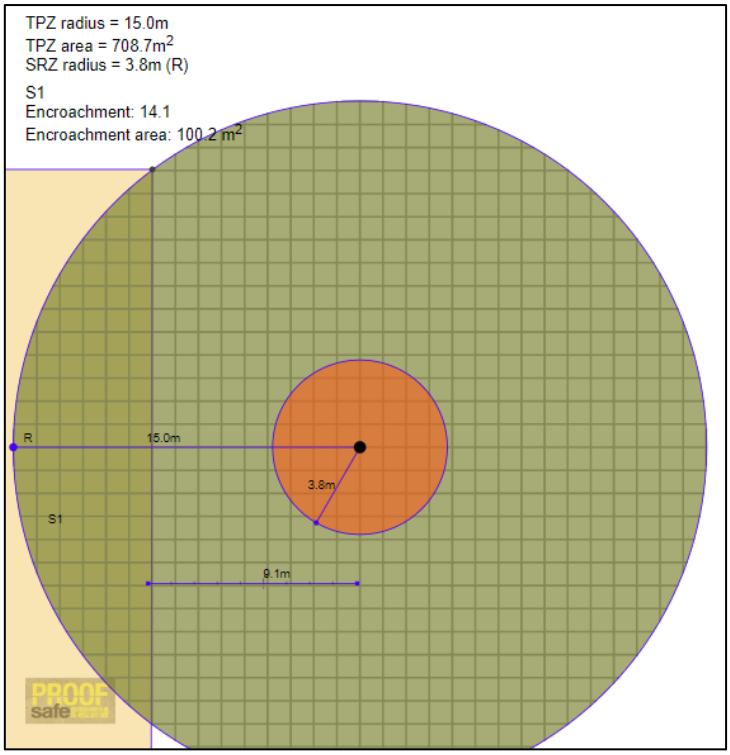


Diagram 8: TPZ incursion calculation for Tree 57 showing an incursion of 14%.

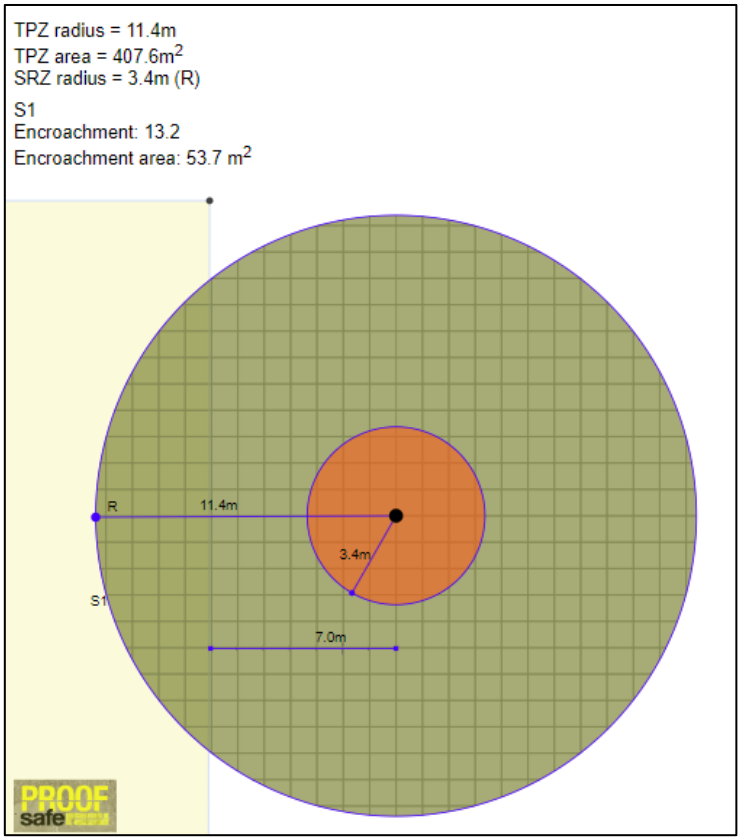


Diagram 9: TPZ incursion calculation for Tree 53 showing an incursion of 13.2%.

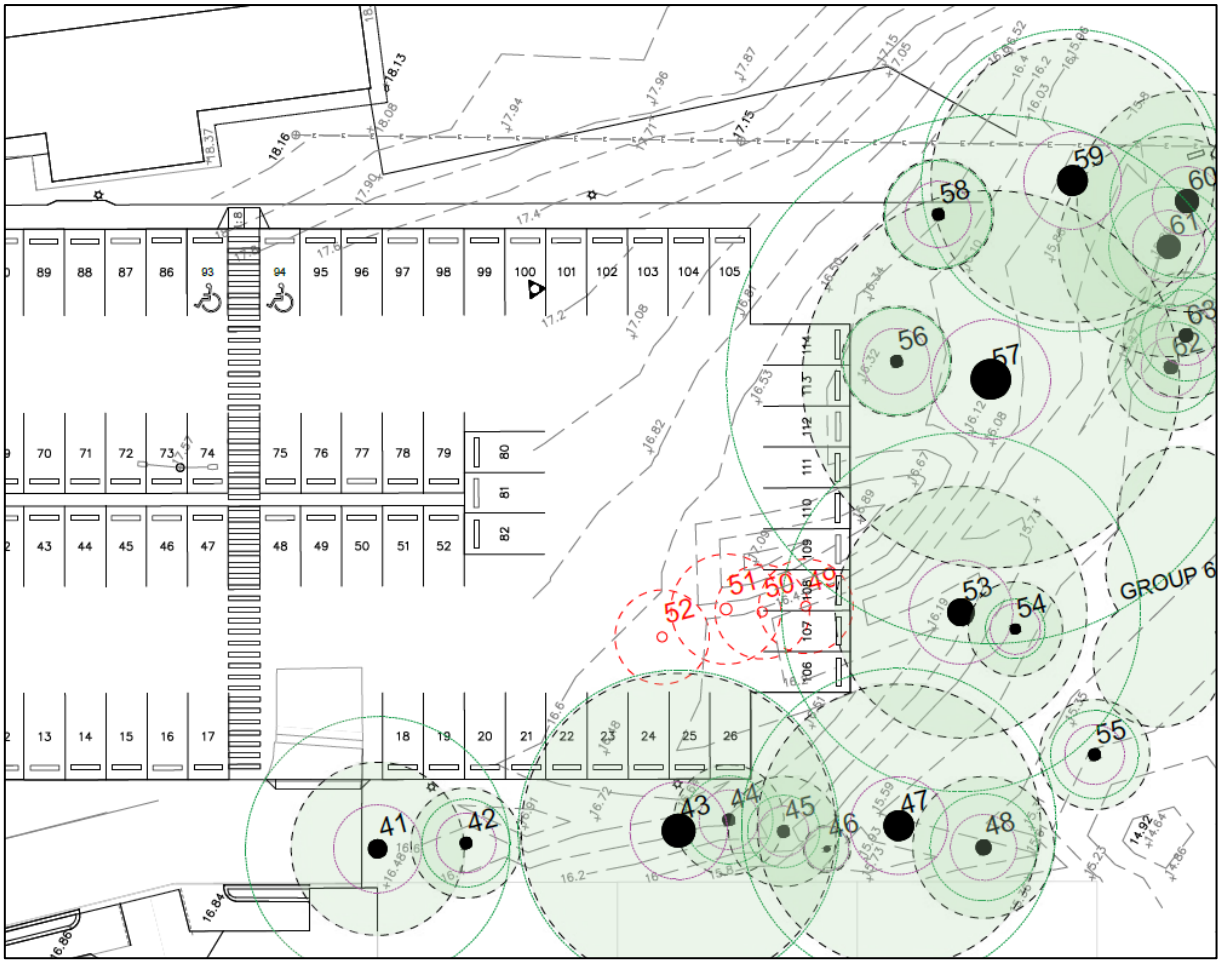


Diagram 10: Part plan showing the TPZ distances (Green circles) in relation to the site trees (TBLA Part Plan).

4 RECOMMENDATIONS

4.1 Based on the plans provided Trees to be removed are numbered as 1-11, 14, 25-37, 39, 49-52. All other trees appear possible to retain.

4.2 A Tree Protection Plans can be found in Appendix 1 (Plans 2 and 3). This Plan only covers the area of the site where trees require protection. Tree removals and retentions can be seen in Plan 4 (Appendix 1).

4.3 Numbered trees to be retained should be shown on the architectural site plans.

4.4 Levels within the TPZ of Trees 13, 38, 53 and 57 (to be retained) shall be retained as they currently are. The new road works are close to these trees and any large reduction in levels may damage structural woody roots of these trees.

4.5 **Tree construction protection:** Trees 20-24 and 41-48 and 53-64 will require tree protection fencing as specified in Section 5.3 of this report. The specifications for a TPZ are in Section 5.4 of this report.

4.6 **Trunk protection:** Tree 13 will require trunk protection as specified in Section 5.3 of this report. This trunk protection will be required due to the proximity of heavy equipment operating near these trees. It is important to protect the bark on trees. Bark is a very effective barrier that helps to protect trees from pest, disease and decay pathogens.

4.7 **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.

4.8 **Service Trenching:** 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.

4.9 Should the site be found to contain asbestos, soil remediation will be required. Asbestos soil remediation often involves either capping of the contaminated soil or total soil removal. When trees are involved, this can often slow if not stop construction whilst remediation processes are undertaken. Remediation also involves altering the soil up to the base of the tree which in turn can affect the 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 20-24, 41-48 and 53-64 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 Plans (Appendix 1, Plan 2 and 3).

5.2 Implementation of Tree Protection Zone: All tree protection works should be carried out before the start of demolition or building work. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be erected as shown in the Tree Protection Plan (Appendix 1). Specifications for this fencing are shown in Tree Protection Fencing Specifications (Appendix 5).

5.3 Individual trunk protection: Tree 13 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.

5.4 Instructional videos: Alternatively, you can view the Moore Trees short instructional films on the links below. These films are a quick onsite reference for builders, project managers and architects.

Film #1, Trunk Protection

https://www.youtube.com/watch?v=ehcFre6bp74

Film #2, Tree Protection Fencing

https://www.youtube.com/watch?v=ffMabxLN9nU

5.5 **The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ):** The TPZ is implemented to ensure the protection of the trunk and branches of the subject tree. The TPZ is based on the Diameter at Breast Height (DBH) of the tree. The SRZ is also a radial measurement from the trunk used to protect and restrict damage to the roots of the tree.

The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) have been measured from the centre of the trunk. TPZ and SRZ distances are all listed in the Tree Schedule (Appendix 2). The following activities shall be avoided within the TPZ and SRZ of the site 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.

5.6 **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.

5.7 **Signage:** It is recommended that signage is attached to the tree protection fencing. A sample sign has been attached in Appendix 6. This sign may be copied and laminated then attached to any TPZ fencing.

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. Severed roots shall be treated with Steriprune®, available at most large Hardware Stores.

5.9 Soil compaction: Mulch has been recommended to be placed within the TPZ area of Trees 20-25 and 41-48 and 53-64 to be retained. This is to help reduce soil compaction and moisture retention for the trees that are to be retained. The area for mulch can be seen in the Tree Protection Plan (Appendix 1). Mulch is to be no thicker than 100mm in depth and spread evenly across the TPZ area.

5.10 Arborist Certification: It is recommended that the Construction contractor supply Council or the Principal Certifying Authority with certification from the Project Arborist three (3) times during the construction phase of the development 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 application of mulch and fencing has been installed;
(2) At mid-point of the construction phase;
(3) At completion of the construction phase.

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

Paul Vezgoff, Consulting Arborist
Dip Arb (Dist), Arb III, Hort cert, AA, ISA
18 November 2021
Updated 23 February 2023

Appendix 1

Plan 1

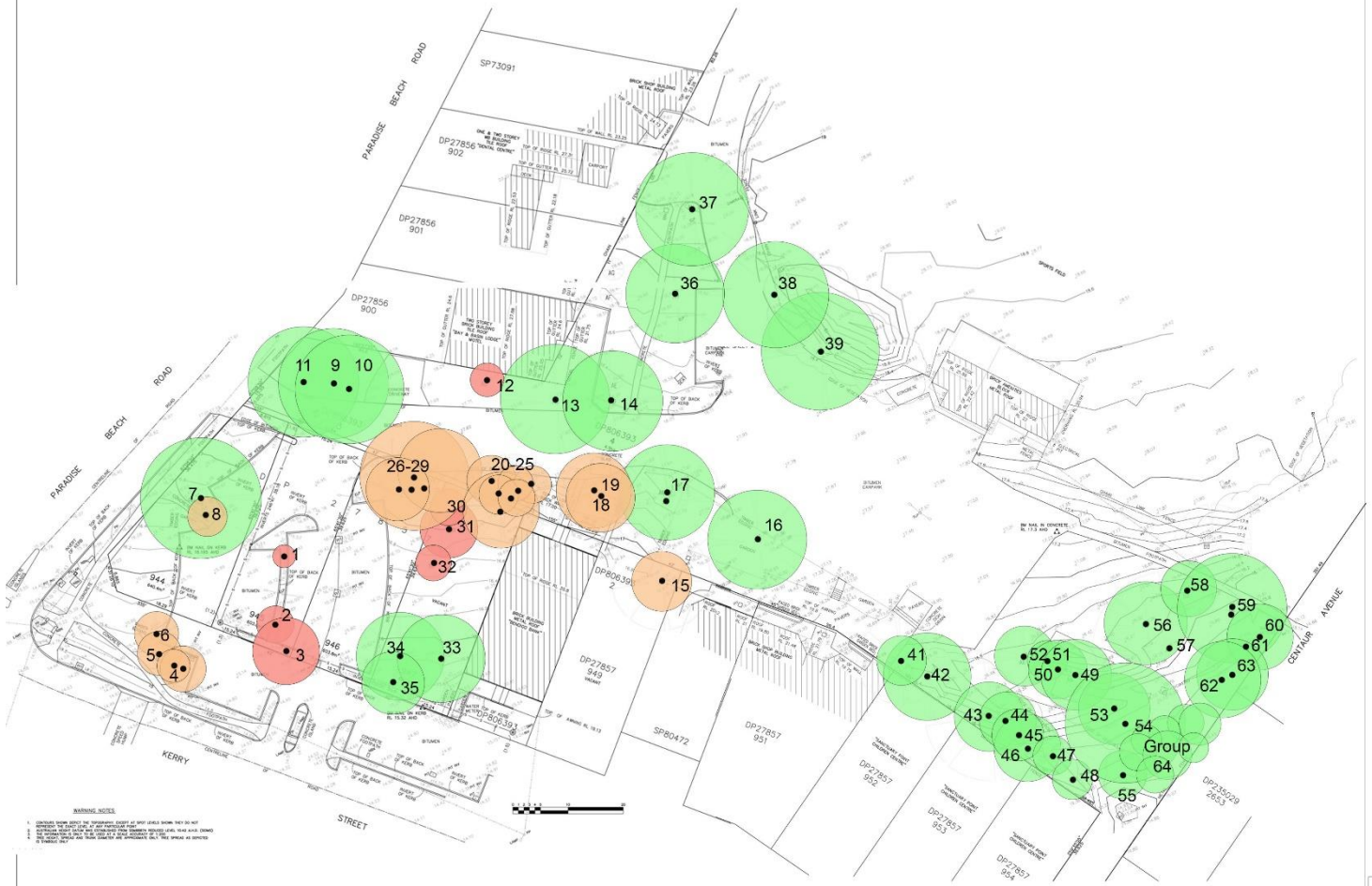
Tree Retention Values

Plans 2 and 3

Tree Protection Plan

Plan 4

Tree Removal and Retention



Tree Retention Values

MOORE TREES

Moore Trees

Plan 1

High	7, 9-11, 13, 14,16, 17, 33-64
Medium	4-6, 8, 15, 18-29
Low	1-3, 12, 30-32

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

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

Date:	22.02.2021
Drawn:	P.Vezgoff
Site Address:	Corner of Paradise Beach Road & Kerry Street, Sanctuary Point

Tree protection plan

Plan 2

Moore Trees

Tree to be retained

Tree to be removed

Mulching. Area recommended for mulching. Prior to any demolition or construction work mulch shall be applied to a depth of 100mm to this area for the duration of the construction period. Once construction is complete the mulch shall be reduced to a depth of no greater than 70mm.

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.

Date:	22.02.2022
Drawn:	P.Vezgoff
Site Address:	Corner of Paradise Beach Road & Kerry Street, Sanctuary Point

Tree protection plan

Plan 3

Moore Trees

Tree to be retained

Tree to be removed

Mulching. Area recommended for mulching. Prior to any demolition or construction work mulch shall be applied to a depth of 100mm to this area for the duration of the construction period. Once construction is complete the mulch shall be reduced to a depth of no greater than 70mm.

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.

Date:	10.02.2023
Drawn:	P.Vezgoff
Site Address:	Corner of Paradise Beach Road & Kerry Street, Sanctuary Point

Tree Removal and Retention Plan

Moore Trees

Plan 4

Date:	22. 02.2023
Drawn:	P.Vezgoff
Site Address:	Corner of Paradise Beach Road & Kerry Street, Sanctuary Point

Appendix 2

Tree health & condition assessment schedule

Table 3: TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – Sanctuary Point library project

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
1	Water gum (Tristaniopsis laurina)	4	2	0.12	0.15	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.4	1.4
2	Water gum (Tristaniopsis laurina)	4	2	0.12	0.15	100	No visual defects	2c removed for more suitable planting	Good	Mature		1.4	1.4
3	Swamp oak (Casuarina glauca)	7	4.6	0.25	0.3	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen	3	1.9
4	Swamp oak (Casuarina glauca)	8	3.5	0.18	0.2	100	No visual defects	2c removed for more suitable planting	Fair	Mature	Lopped for power lines. Coppice occurring	2.2	1.6
5	Swamp oak (Casuarina glauca)	8	3.5	0.18	0.2	100	No visual defects	2c removed for more suitable planting	Fair	Mature	Lopped for power lines. Coppice occurring. Multi stemmed specimen	2.2	1.6
6	Swamp oak (Casuarina glauca)	9	4.5	0.34	0.44	100	No visual defects	2c removed for more suitable planting	Good	Mature		4.1	2.3
7	Spotted gum (Corymbia maculata)	18	9	1.2	1.3	100	No visual defects	1a >40 years	Good	Mature		14.4	3.6
8	Swamp oak (Casuarina glauca)	5	1.5	0.12	0.18	180	No visual defects	2c removed for more suitable planting	Good	Sapling		1.4	1.6
9	Spotted gum (Corymbia maculata)	19	8	0.39	0.42	100	No visual defects	1a >40 years	Good	Mature		4.7	2.2
10	Spotted gum (Corymbia maculata)	19	8	0.65	0.75	100	No visual defects	1a >40 years	Good	Mature		7.8	2.8
11	Spotted gum (Corymbia maculata)	22	10	1.2	1.3	100	No visual defects	1a >40 years	Good	Mature	Likely habitat hollows , 1200x500	14.4	3.6
12	Acacia mearnsii	9	4	0.22	0.25	70	No visual defects	3a May only live for 5-15 years.	Fair	Mature	Extensive Borer damage	2.6	1.8
13	Spotted gum (Corymbia maculata)	17	6.8	0.61	0.71	95	No visual defects	1a >40 years	Good	Mature		7.3	2.8
14	Spotted gum (Corymbia maculata)	18	7	0.83	0.84	95	No visual defects	1a >40 years	Good	Mature		10	3
15	Spotted gum (Corymbia maculata)	17	6.8	0.42	0.52	95	No visual defects	1a >40 years	Good	Mature	Twin stems	5	2.4

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
16	Spotted gum (Corymbia maculata)	17	7	0.6	0.7	0	No visual defects	1a >40 years	Good	Mature		7.2	2.8
17	Spotted gum (Corymbia maculata)	19	10	0.85	0.95	95	No visual defects	1a >40 years	Good	Mature		10.2	3.1
18	Spotted gum (Corymbia maculata)	18	6	0.45	0.55	95	No visual defects	1a >40 years	Good	Mature		5.4	2.5
19	Spotted gum (Corymbia maculata)	20	8	0.85	0.95	95	No visual defects	1a >40 years	Good	Mature		10.2	3.1
20	Corymbia gumiffera	8.5	4	0.21	0.31	90	No visual defects	2c removed for more suitable planting	Fair	Mature	Twin stems	2.5	2
21	Spotted gum (Corymbia maculata)	18	6	0.45	0.55	95	No visual defects	1a >40 years	Good	Mature		5.4	2.5
22	Spotted gum (Corymbia maculata)	13	4.3	0.23	0.28	95	No visual defects	1a >40 years	Good	Mature		2.8	1.9
23	Spotted gum (Corymbia maculata)	13	4.3	0.3	0.35	95	No visual defects	1a >40 years	Good	Mature		3.6	2.1
24	Spotted gum (Corymbia maculata)	13	4.3	0.33	0.39	95	No visual defects	1a >40 years	Good	Mature		4	2.2
25	Sydney peppermint (Eucalyptus piperita)	9	3.5	0.25	0.29	90	No visual defects	2c removed for more suitable planting	Good	Mature		3	1.9
26	Spotted gum (Corymbia maculata)	17	6.8	0.72	0.82	95	No visual defects	1a >40 years	Good	Mature		8.6	2.9
27	Spotted gum (Corymbia maculata)	17	8	0.75	0.82	95	No visual defects	1a >40 years	Good	Mature		9	2.9
28	Spotted gum (Corymbia maculata)	10	5	0.28	0.32	95	No visual defects	1a >40 years	Good	Mature		3.4	2
29	Sydney peppermint (Eucalyptus piperita)	10	5	0.28	0.32	95	No visual defects	1a >40 years	Good	Mature		3.4	2
30	White stringy bark(Eucalyptus globoidia)	13	3.5	0.25	0.35	0	Storm damage	4a Dead, dying or declining.	Dead	Overmature		3	2.1
31	White stringy bark(Eucalyptus globoidia)	13	3.5	0.25	0.35	70	Storm damage	2c removed for more suitable planting	Poor	Mature		3	2.1
32	Spotted gum (Corymbia maculata)	2	2.5	0.2	0.25	95	No visual defects	1a >40 years	Good	Mature		2.4	1.8
33	Sydney peppermint (Eucalyptus piperita)	12	7	0.48	0.58	95	No visual defects	1a >40 years	Good	Mature		5.8	2.6

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
34	Spotted gum (Corymbia maculata)	18	6.6	0.65	0.75	95	No visual defects	1a >40 years	Good	Mature		7.8	2.8
35	Spotted gum (Corymbia maculata)	14	6.5	0.35	0.45	95	No visual defects	1a >40 years	Good	Mature		4.2	2.3
36	Spotted gum (Corymbia maculata)	17	9	0.78	0.85	95	No visual defects	1a >40 years	Good	Mature		9.4	3
37	Spotted gum (Corymbia maculata)	17	9	0.78	0.85	95	No visual defects	1a >40 years	Good	Mature		9.4	3
38	Spotted gum (Corymbia maculata)	16	7	0.48	0.58	95	No visual defects	1a >40 years	Good	Mature		5.8	2.6
39	Spotted gum (Corymbia maculata)	17	9	1.1	1.2	95	No visual defects	1a >40 years	Good	Mature		13.2	3.5
40											This number was duplicated and is referenced as T16		
41	Spotted gum (Corymbia maculata)	16	5.5	0.7	0.75	95	No visual defects	1a >40 years	Good	Mature		8.4	2.8
42	Spotted gum (Corymbia maculata)	10	3.5	0.23	0.28	95	No visual defects	1a >40 years	Good	Mature	Group of 9 similar size and condition	2.8	1.9
43	Spotted gum (Corymbia maculata)	19	10	0.85	0.89	95	No visual defects	1a >40 years	Good	Mature	Likely habitat hollows	10.2	3.1
44	Spotted gum (Corymbia maculata)	10	3.5	0.23	0.28	95	No visual defects	1a >40 years	Good	Mature		2.8	1.9
45	Spotted gum (Corymbia maculata)	8	3.5	0.19	0.2	95	No visual defects	1a >40 years	Good	Mature		2.3	1.6
46	Spotted gum (Corymbia maculata)	7	1.5	0.12	0.15	95	No visual defects	1a >40 years	Good	Sapling		1.4	1.4
47	White stringy bark(Eucalyptus globoidia)	17	9	0.83	0.93	70	No visual defects	3a May only live for 5-15 years.	Fair	Mature	In decline	10	3.1
48	Spotted gum (Corymbia maculata)	14	4.5	0.28	0.38	95	No visual defects	1a >40 years	Good	Mature	280 x 180	3.4	2.1
49	Spotted gum (Corymbia maculata)	10	3.5	0.32	0.42	95	No visual defects	1a >40 years	Good	Mature		3.8	2.2
50	Swamp oak (Casuarina glauca)	8	3	0.2	0.3	100	No visual defects	1a >40 years	Good	Mature	Suckering at base	2.4	1.9
51	Spotted gum (Corymbia maculata)	10	3.5	0.32	0.42	95	No visual defects	1a >40 years	Good	Mature		3.8	2.2

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
52	Swamp oak (Casuarina glauca)	8	3	0.29	0.3	100	No visual defects	1a >40 years	Good	Mature		3.5	1.9
53	Scribbly gum (Eucalyptus sclerophylla)	13	8	0.95	1.1	90	No visual defects	1a >40 years	Good	Mature		11.4	3.3
54	Spotted gum (Corymbia maculata)	7	3	0.16	0.18	95	No visual defects	1a >40 years	Good	Mature		1.9	1.6
55	Spotted gum (Corymbia maculata)	10	3.5	0.23	0.28	95	No visual defects	1a >40 years	Good	Mature		2.8	1.9
56	Spotted gum (Corymbia maculata)	10	3.5	0.28	0.38	95	No visual defects	1a >40 years	Good	Mature		3.4	2.1
57	Spotted gum (Corymbia maculata)	25	12	1.4	1.5	95	No visual defects	1a >40 years	Good	Mature	Likely habitat hollows	16.8	3.8
58	Spotted gum (Corymbia maculata)	10	3.5	0.28	0.38	95	No visual defects	1a >40 years	Good	Mature		3.4	2.1
59	Spotted gum (Corymbia maculata)	19	9	0.8	0.9	95	No visual defects	1a >40 years	Good	Mature		9.6	3.1
60	Spotted gum (Corymbia maculata)	18	7	0.41	0.42	95	No visual defects	1a >40 years	Good	Mature		4.9	2.2
61	Corymbia gumiffera	18	7	0.32	0.45	95	No visual defects	1a >40 years	Good	Mature		3.8	2.3
62	Spotted gum (Corymbia maculata)	13	4	0.24	0.29	95	No visual defects	1a >40 years	Good	Mature		2.9	1.9
63	Spotted gum (Corymbia maculata)	13	4	0.24	0.29	95	No visual defects	1a >40 years	Good	Mature		2.9	1.9
64	Group of mixed native species	10-18	4-8	.1-.250	.3	95	No visual defects	1a >40 years	Good	Mature	Scribbly gum (Eucalyptus sclerophylla)	8	3

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

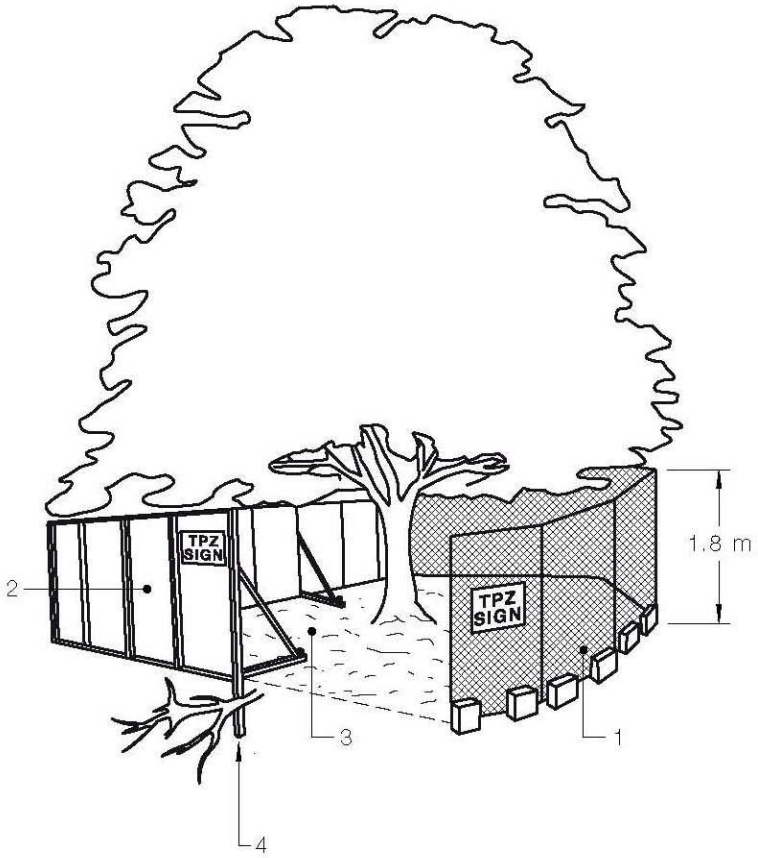
SULE: See SULE methodology in the Appendix 4

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

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

Appendix 3

Tree 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 4

Tree protection sign

sign sample

Moore Trees
Tree Consultancy
0411 712 887

Tree Protection Zone

Fence not to be moved without approval from Arborist

Within this fence there is to be

NO

Storage of materials

Trenching or excavation

Washing of tools or equipment

Moore Trees

Tree Consultancy
0411 712 887

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 5

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 6

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).

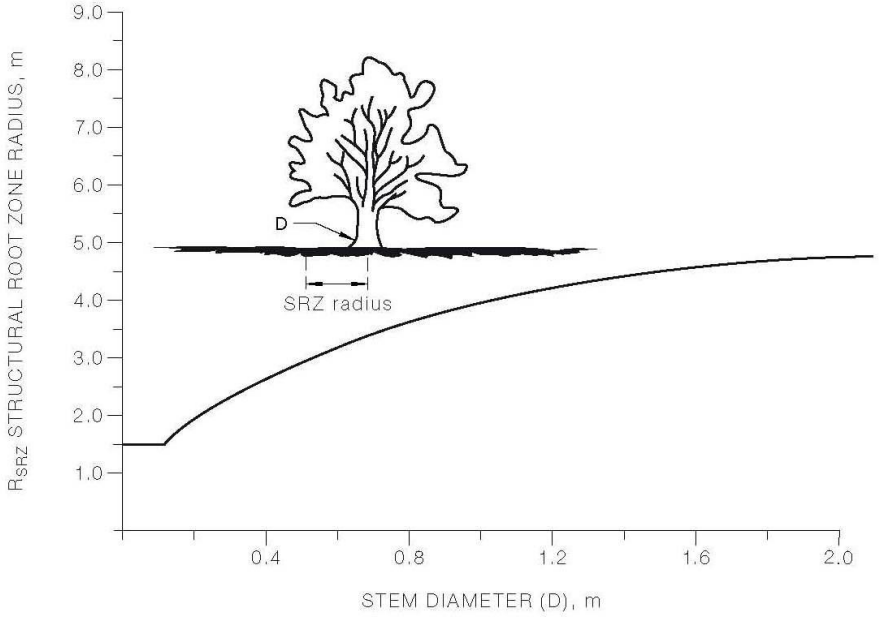


FIGURE 1 - STRUCTURAL ROOT ZONE

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 7

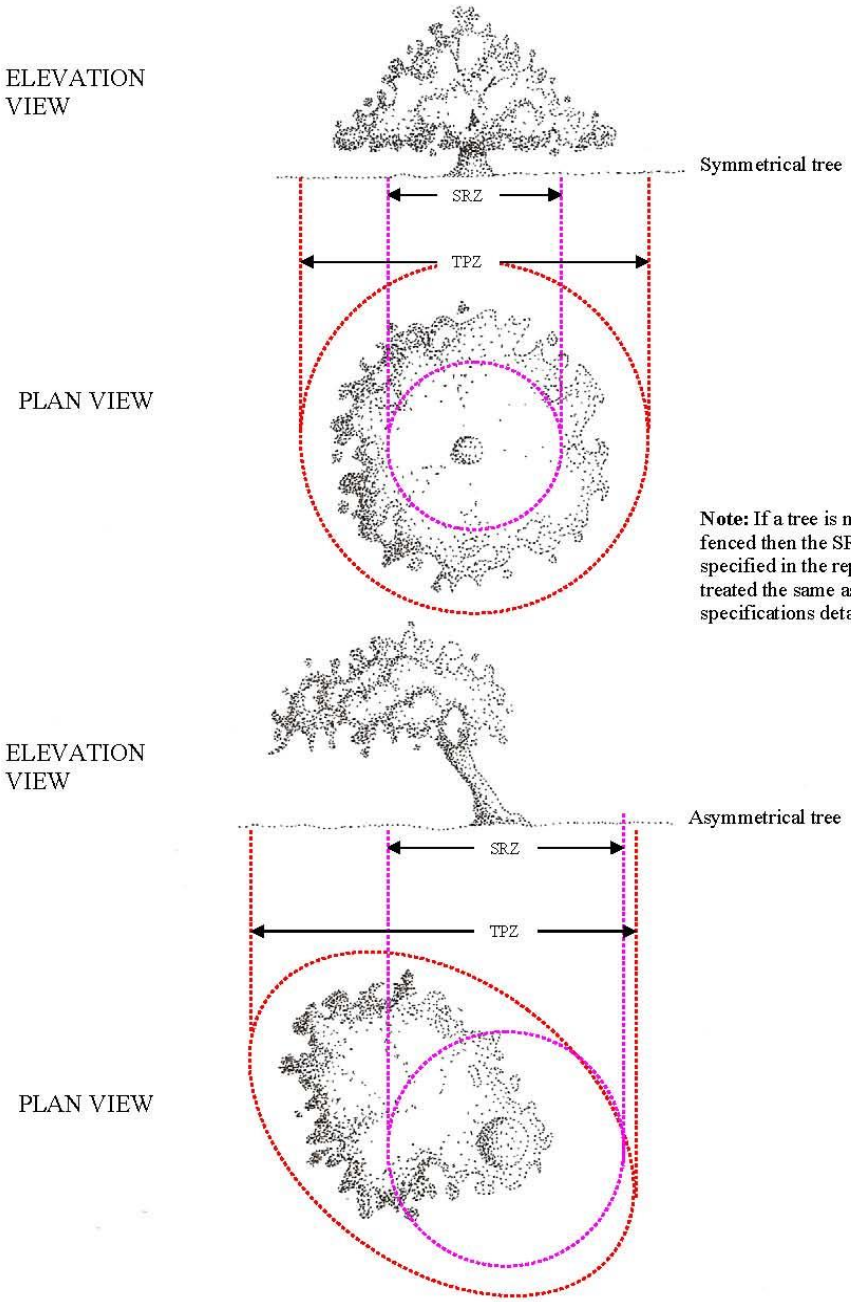


Figure 1: Indicative Tree Protection Zone (TPZ) and Root Protection Zone (SRZ)
Drawn: P. Vezgoff ©

Appendix 8

Tree structure information diagram

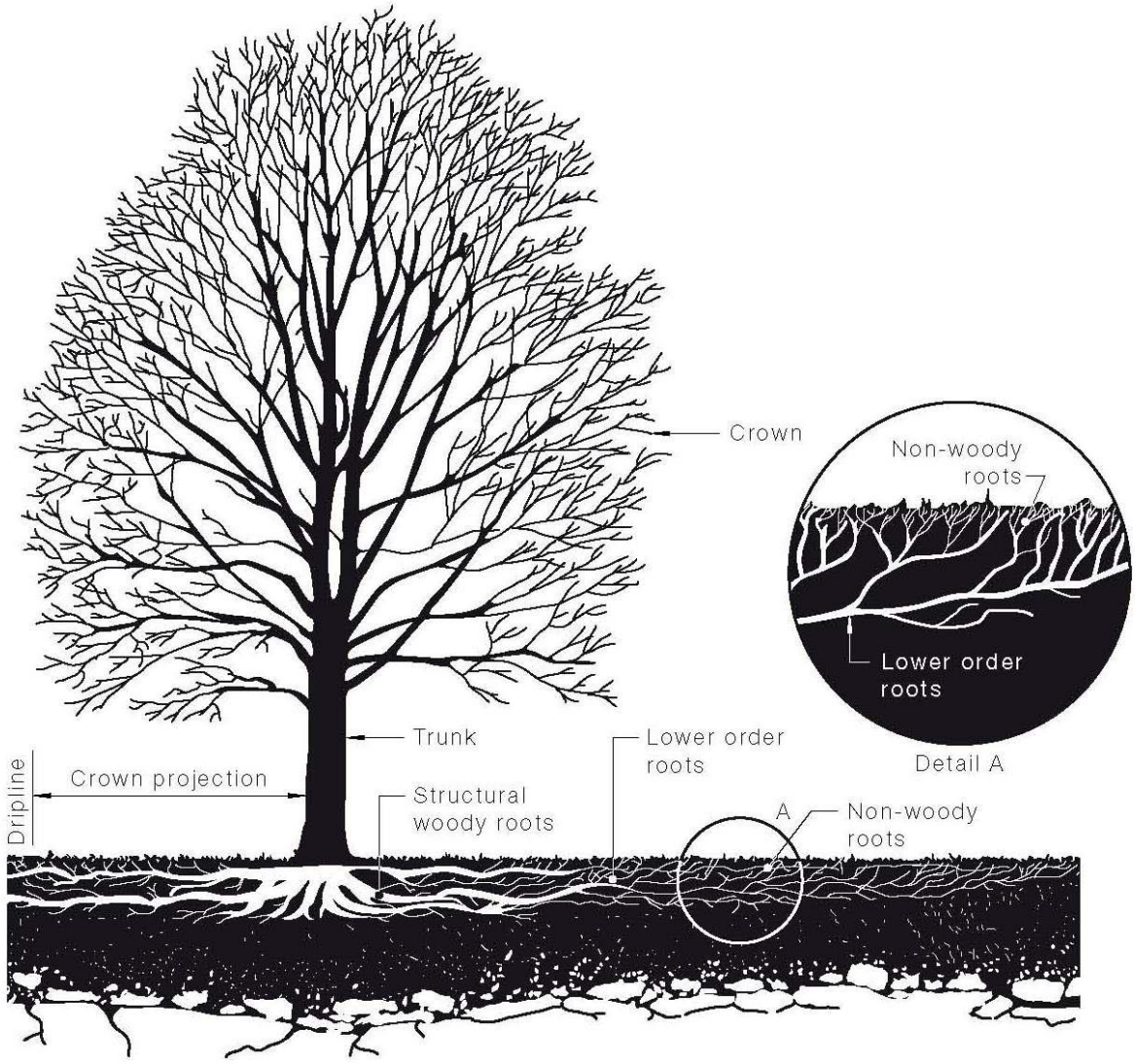


Figure 2: Structure of a tree in a normal growing environment (AS 4970, 2009.).

Appendix 9

Explanatory Notes

- **Mathematical abbreviations:** > = Greater than; < = Less than.

- **Measurements/estimates:** All dimensions are estimates unless otherwise indicated. Less reliable estimated dimensions are indicated with a '?'.

- **Species:** The species identification is based on visual observations and the common English name of what the tree appeared to be is listed first, with the botanical name after in brackets. In some instances, it may be difficult to quickly and accurately identify a particular tree without further detailed investigations. Where there is some doubt of the precise species of tree, it is indicated with a '?' after the name in order to avoid delay in the production of the report. The botanical name is followed by the abbreviation sp if only the genus is known. The species listed for groups and hedges represent the main component and there may be other minor species not listed.

- **Height:** Height is estimated to the nearest metre.

- **Spread:** The maximum crown spread is visually estimated to the nearest metre from the centre of the trunk to the tips of the live lateral branches.

- **Diameter:** These figures relate to 1.4m above ground level and are recorded in centimetres. If appropriate, diameter is measure with a diameter tape. 'M' indicates trees or shrubs with multiple stems.

- **Estimated Age:** Age is estimated from visual indicators and it should only be taken as a provisional guide. Age estimates often need to be modified based on further information such as historical records or local knowledge.

- **Distance to Structures:** This is estimated to the nearest metre and intended as an indication rather than a precise measurement.

Appendix 10

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.

Schwarze, F.W.M.R, Engels, J. Mattheck. C (2000) *Fungal strategies of wood decay in trees*
Springer-Verlag Berlin Heidelberg
Germany

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

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

INDUSTRY EXPERIENCE

Moore Trees Arboricultural Services **January 2006 to date**
Tree Consultancy and tree ultrasound. Tree hazard and risk assessment, Arborist development application reports
Tree management plans.

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

Northern Landscape Services **July to Oct 1995**
Tradesman for Landscape Construction business

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

CONFERENCES AND WORKSHOPS ATTENDED

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