Moore Trees
Arboricultural Services
ABN 90887347745

ARBORICULTURAL DEVELOPMENT IMPACT AND TREE PROTECTION REPORT

Shoalhaven Hospital –
Acute Services Building Project
North Street and Scenic Drive
NOWRA NSW 2541
Lot 1 DP 1043088, Lot 1 DP 1128
777, Lot 2 DP 1128777, Part 7300 DP 1132679
JULY 2022
FINAL (Updated 30th August 2022)

Prepared for: Health Infrastructure
c/o Johnstaff

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Summary

This report has been compiled for Health Infrastructure c/o Johnstaff, Level 5, 9 Castlereagh Street, Sydney NSW 2000. This Arborist Report has been requested for the SSDA submission in association with proposed works for the Acute Services Building project at Shoalhaven Hospital. This Arborist Report refers to seventy four (74) trees.

This report contains the following information based on Shoalhaven 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.

Based on the plans provided trees to be removed are numbered as 56, 61-73, 89-100. All other trees are possible to retain.

Trees 51, 53 and 55 are exotic species and could potentially be removed to allow more curtilage around the native specimens (See Note 3, Tree Protection Plan).

These are several small saplings planted along the existing car park area that have not been individually detailed in this report as they were not considered significant (See Note 4, Tree Protection Plan).

Trees 98-101 are not shown on the project plans. These trees should be included (See Note 5, Tree Protection Plan).

The street trees along Shoalhaven Street will be much harder to try to retain due to their proximity to the kerb and gutter and the surface woody roots that are present. The new footpath proposed along North Street will have minimal impact, however Trees 57 – 60 along Shoalhaven Street will be impacted unless levels can be raised so as not to sever roots on these trees. This detail will need to be clearly shown on construction plans. Further assessment of the impact to these trees may be required.

A small playground area is proposed between Trees 40 and 46. Any trenching for services such as for new lighting and/or water fountains shall be kept outside of any TPZ area of adjoining trees.

A Tree Protection Plans (Plans 3 and 3a), included in this report, shows the trees proposed to be retained. These plans are attached in Appendix 1. It is recommended that signage is used for tree protection areas. A sample tree protection sign has been included in Appendix 6.

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VERSION CONTROL

Date of Issue	Details
8 June 2022	Draft 1 issued
23 June 2022	Updated for additional trees
27 June 2022	Updated for driveway entry impacts
18th July 2022	Final version
30th August 2022	Section 3.16 for Trees 61 and 62 added

1 INTRODUCTION

1.1 This report has been conducted to assess the health and condition of seventy four (74) trees within the site study area at Shoalhaven Hospital. This report has been prepared for Health Infrastructure c/o Johnstaff, Level 5, 9 Castlereagh Street, Sydney NSW 2000 as required for as required for the State Significant Development Application (SSDA) submission in association with the proposed Acute Services Building development project works.

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.

Although this report has been prepared for a SSDA, the Shoalhaven City Council Development Application guidelines for Arboricultural Reports has been used as a basis for data collection for the project. 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 (Acute Services Building) site is located at Shoalhaven Hospital on the corner of Scenic Drive and North Street, Nowra, known as Lot 1 DP 1043088, Lot 1 DP 1128777, Lot 2 DP 1128777, Part 7300 DP 1132679 (Crown land). The study area can be seen in Diagram 2. The proposed development site from herein will be referred to as "the Site".

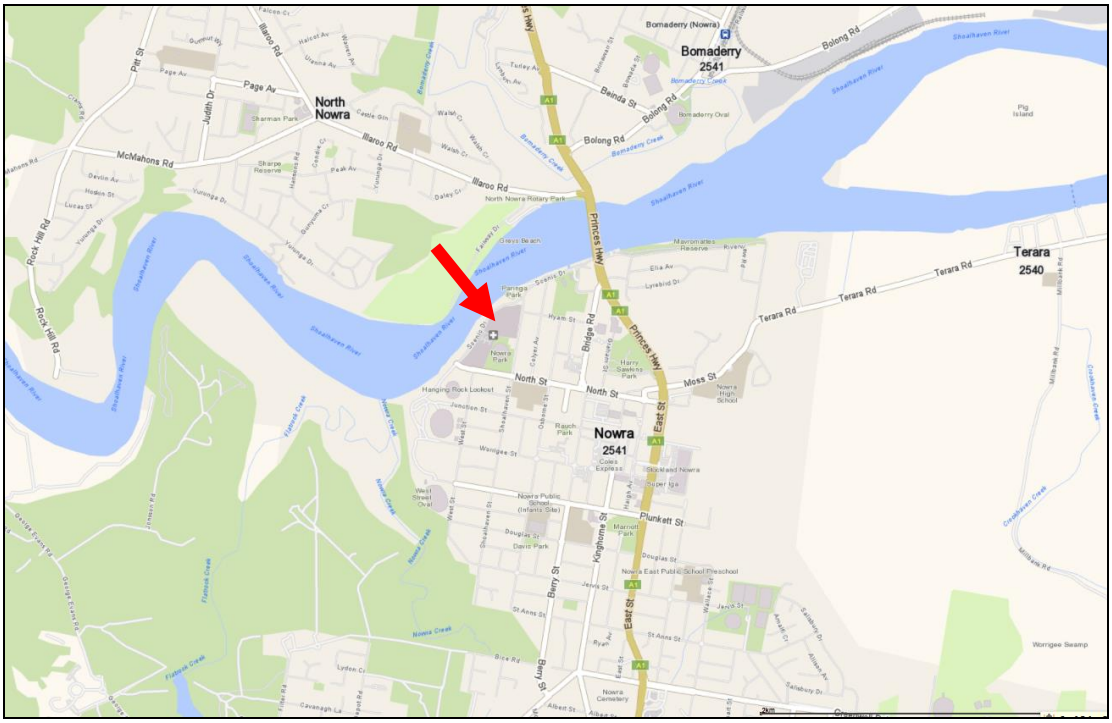


Diagram 1: Location of subject site, Shoalhaven Hospital (Red arrow) (whereis.com.au, 2022)

Diagram 2: Location of the study area for the proposed Acute Services Building project (blue). The red area is the location of a proposed childcare centre that form part of a Local Development Application (Google Earth, 2022)

1.3 SEARs Reporting: The State Government Planning Secretary's Environmental Assessment Requirement (SEARs) for Shoalhaven Hospital Redevelopment – Acute Services Building project was issued by the Department of Planning, Industry and Environment on 23 February 2022. Point 8 in the Issue and Assessment Requirements SEARs table for this project (application number SSD-35999468) sets out the Arboricultural matters for this report.

Health Infrastructure NSW (HI) is the applicant for the proposed Shoalhaven Hospital Redevelopment at Scenic Drive, Nowra in the City of Shoalhaven Local Government Area (LGA). The proposal is State Significant Development (SSD) for the purposes of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and section 14(a) of

Schedule 1 of the *State Environmental Planning Policy (Planning Systems) 2021* (Planning Systems SEPP) as it involves development for the purposes of a hospital with a capital investment value in excess of $30 million. The Shoalhaven Hospital Redevelopment seeks to deliver significantly enhanced acute services, as well as a new campus main entry and drop-off area.

The proposed Acute Services Building will be located south and east of the hospital's existing cluster of buildings at will address Shoalhaven Street to the hospital's east. The development is proposed to be located on the site of the existing Shoalhaven Community Pre-school (which will be separately relocated) and part of the former Nowra Park. The proposed Shoalhaven Hospital Redevelopment under this SSD relates primarily to the development of a new hospital building and its ancillary works. The scope includes a new 7-level building of about 31,000m2 GFA, with rooftop plant and helipad, generally accommodating the following:

Level 00	Back of House (BOH), Loading Dock, Kitchen, plant, Pharmacy, Staff amenities, Mortuary, and plant.
Level 01	Front of House (FOH), Emergency Department (ED), Medical Imaging, and Cafe
Level 02	Operating Suites & Endoscopy, Central Sterile Supply Department (CSSD), and linkway to Block B
Level 03	Coronary Care Unit (CCU), Close Observation Unit (COU), Intensive Care Unit (ICU), cultural centre, and plant
Level 04	In-Patient Unit (IPU), Mental Health, and plant
Level 05	In-Patient Unit (IPU)
Level 06	In-Patient Unit (IPU)
Level 07	Rooftop plant
Level 08	Helipad

This generally results in 279 new beds and treatment spaces across a range of departments, eight new operating theatres, and two new endoscopy theatres. The works include a new ambulance entry from Shoalhaven Street, new public and servicing accessway off North Street, and separate loading dock entry and mortuary parking off Shoalhaven Street. A range of infrastructure and civil engineering works are proposed as well as demolition of existing structures within the footprint of the new building and/or on the existing hospital campus where a new linkway connection is proposed. Earthworks will be necessitated within the building's footprint and immediate environs.

Subdivision of the balance of Lot 104 (the former Nowra Park) remaining and consolidation of the existing pre-school lot into the hospital lot is also proposed.

A number of selected trees will require removal. Other significant trees will be retained and protected. Replacement planting at a minimum rate of 1:1 is proposed.

In preparing this Report, the following SEARs requirements have been addressed for Shoalhaven Hospital Redevelopment – Acute Services Building project. Most matters have been addressed within this report, with the exception to matters that are required to be addressed by the Landscape Architect.Please see Table 1 below.

Key issue	**Requirement**	**Relevant report section**

8. Trees and Landscaping
• Assess the number, location, condition and significance of trees to be removed and retained and note any existing canopy coverage to be retained on site.
• Provide a detailed site-wide landscape plan, that:
  • Details the proposed site planting, including location, number and species pf plantings, heights of trees at maturity and proposed canopy coverage.
  • Provides evidence that opportunities to retain significant trees have been explored and/or informs the plan.
  • Demonstrates how the proposed development would:
  • Contribute to long term landscape setting in respect of the site and streetscape.
  • Mitigate the urban heat island effect and ensure appropriate comfort levels on site.
  • Contribute to the objective of increased urban tree canopy cover.
  • Maximise opportunities for green infrastructure, consistent with *Greener Places.*
		Refer section 3 of this Report

Table 1: SEARs reporting table – Shoalhaven Hospital – Acute Services Building project

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 16th November 2020 and on 3rd June 2022. 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.* It does not include smaller trees and shrubs.

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

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

2.5 **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 this area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 5.

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 4.

2.7 **Plans and information provided:** For this Arboricultural Report I refer to the following documents:

- Watermain Relocation plan by Jacobs marked draft #SK001-SK005, undated; and
- Excerpt of plan showing proposed playground area dated 14.6.22; and
- Overall plan by Congrad Garrett marked project # 20278 dwg #ASB-DD-DR-AR-220001 issue 15 dated 3.6.22 and Proposed site plan issue 10 dated 14.4.22;

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

2.8 **Tree Significance & Retention Value:** The Tree Significance & Retention Value used in this report is known as the Significance of a Tree, Assessment Rating System or STARS© system created by the Australian Institute of Consulting Arboriculturists (IACA). As noted by IACA, this system is a free to use system by Arboriculturists as at the date of this report. This system allows a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments (Draper and Richards 2009). The system uses a scale of *High, Medium and Low significance* in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. The Retention Value is selected between *High, Medium, Low and Priority for removal.* The Matrix can be seen in Appendix 3.

2.9 Tree Retention Value Plans: All trees have been allocated a Tree Retention Value. These values have been applied to the colour coded plan in Appendix 1 (Tree Retention Plan 1). No trees assessed for this project were allocated the value of *Priority for removal.*

2.10 Impact Assessment: An impact assessment was conducted on the site trees. This was conducted by assessing the site survey and plans provided by the Client. Plan 2, Appendix 1, shows where incursions to TPZ areas occur. 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.

3 RELEVANT BACKGROUND INFORMATION

3.1 The subject property is known as Shoalhaven Hospital, North Street and Scenic Drive, Nowra NSW 2541. The site consists of an operational hospital and tall open eucalypt woodland that has been maintained to a certain extent of large, grassed areas. Also present are clumps of regenerating eucalypt saplings and native and weed shrubs. This Report includes Trees numbered 12-14, 31-101, as numbered in a previous Arboricultural Report (Moore Trees dated April 2021).

3.2 Soil mapping of Illawarra area by Hazelton and Tille (1990) indicates the actual study area as being highly disturbed and urbanised. The river edge along Scenic Drive is mapped as Pulpit Rock. Pulpit Rock is detailed as rugged sandstone cliffs on top of Nowra Sandstone with Talus slopes. Vegetation is partially cleared with sections of low open woodland. The soils are often discontinuous Lithosols and yellow podzolic soils (Hazelton and Tille 1990).

3.3 **Zoning:** The site is zoned as SP2 and RE1 based on the Shoalhaven Local Environmental Plan 2014 (LEP 2014). These being SP2 *Infrastructure* and RE1 *Public Recreation.*

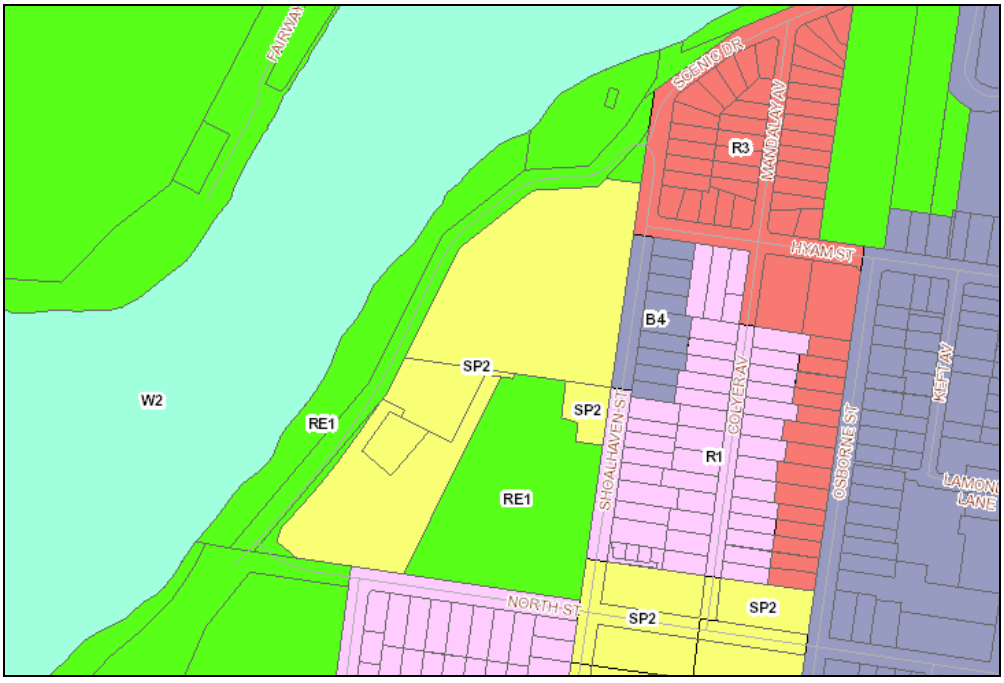


Diagram 4: SCC LGA zoning map (SCC 2022)

3.4 **The Site Trees:** The site was inspected on 16th November 2020 and on 3rd June 2022. Each tree has been given a unique number for this site and can be viewed on the Tree Plan (Appendix 1).

3.5 The site trees within the study area are mostly mature native examples. There are several exotic species growing on site that consist of Camphor laurel *(Cinnamomum camphora),* Kaffir plum *(Harpephyllum caffrum),* Radiata pine *(Pinus radiata).* There is a small collection of mixed exotic specimens within a small, sheltered area along Shoalhaven Street. These exotic species were all given a low retention rating.

3.6 Shoalhaven Street has Brushbox specimens planted as street trees along the road verge (Trees 57-62). These trees provide good visual amenity to the streetscape, however they have grown with raised exposed woody roots that are some distance higher than the kerb and gutter that they are near (Plate 1). Any large scale development works will require this damaged kerb and gutter to be repaired and this will be difficult to do if trying to retain these trees along Shoalhaven Street.

Plate 1: Image showing Trees 57-62 along Shoalhaven Street and the woody surface roots clearly evident. P. Vezgoff

3.7 The large mature specimens along North Street are probably the more significant trees within the site (Plate 2). These trees are generally in good health and condition and provide a good visual screen between the site and nearby residential dwellings. If any of these trees are retained the area should be retained as garden area, and not a high use pedestrian area, due to the potential for limb failure from these trees.

Plate 2: Image showing the large mature specimens along North Street . P. Vezgoff

3.8 The trees in and around the childcare centre are mostly natives but are smaller specimens that could be replaced if necessary (Plates 3 and 4). Trees 72 and 73 are two (2) large Radiata Pines that look impressive in their open location however they are in decline and do not have a very long life expectancy (Plate 5).

Plate 3: Image showing exotic specimens 64 and 65. P.Vezgoff.

Plate 4: Image showing Trees 66-71. P.Vezgoff.

Plate 5: Image showing Trees 72 and 73 . P. Vezgoff

3.9 Tree 50 is a large mature Blackbutt *(Eucalyptus pilularis)*. This tree has a very large broad canopy that is almost twenty (20) metres radius (Plate 6). This tree would be considered to be the most significant individual tree on site. This tree would appear to be one of the larger site constraints due to the size and age of the tree. Examination of the lower stem shows that there are wounds on this tree that may indicate it is an Aboriginal scar tree (Plate 7). Specialist advice should be sought to confirm this. This tree, based on its size and branching development, could be as old as 300 years.

3.10 Trees 98, 99 and 100 are London Plane Trees *(Platanus × acerifolia)*. These trees are exotic species, in good health and condition (Plates 8, 9 and 10). 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. Trees 98 and 99 show a history of lopping and as such have developed a poor branching structure.

Plate 6: Image showing Tree 50 possibly the oldest tree on site. P. Vezgoff

Plate 7: Image showing the old scars on Tree 50. P. Vezgoff

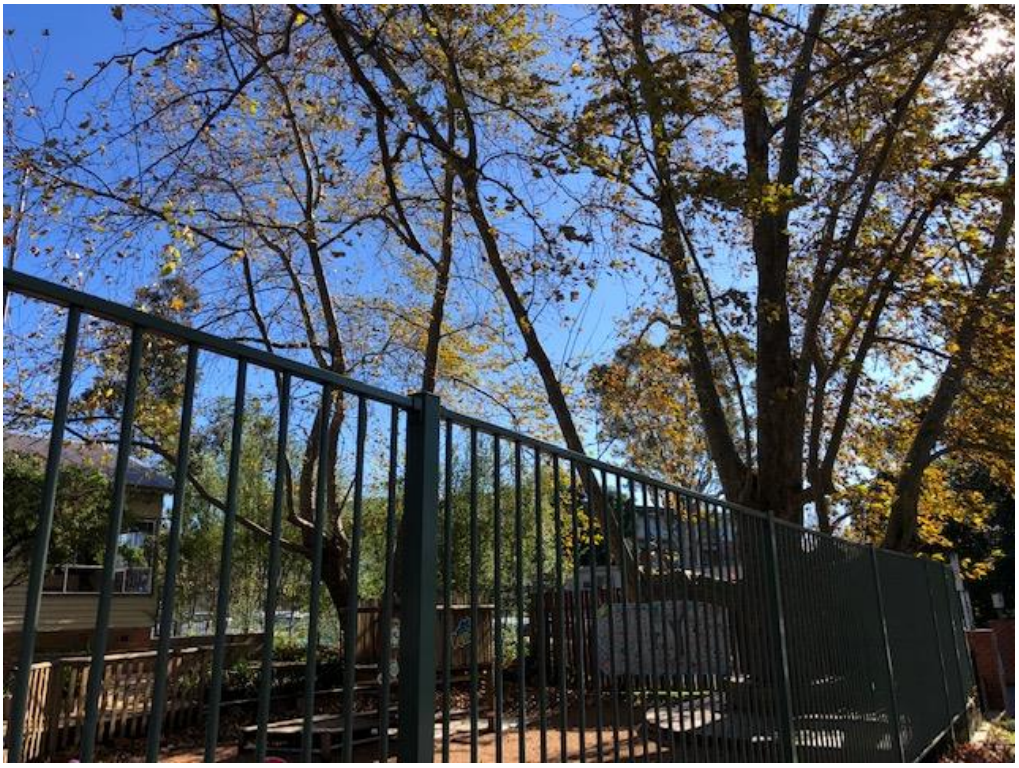


Plate 8: Image showing Trees 98 and 100. P.Vezgoff.

Plate 9: Image showing Trees 98 and 100. P.Vezgoff.

Plate 10: Image showing Tree 99, Tree 101 to the left of image. P.Vezgoff.

3.11 **Exempt species:** Several of the site tree species are listed as being exempt from the Shoalhaven TPO (Appendix 1-Exempt species). Exempt species on site include Radiata Pine (*Pinus radiata*), however the site trees are over ten (10) metres in height and are still protected by the SCC TPO.

3.12 No particular planting theme appears to have been initiated in this Reserve, with the exception that the majority of trees are native species. Many of the site trees will have grafted root zones which is good for stability issues should root loss be necessary, however root loss due to designs should try to be avoided where possible.

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

3.14 The trees were assessed as below for the Significance of a Tree, Assessment Rating System or STARS©. The STARS© Matrix can be seen in Appendix 3.

Significance Scale	**1 (High)**	**2 (Medium)**	**3 (Low)**
Tree No.	12-14, 30, 32, 33, 35-44, 47, 50, 52, 54, 57-62, 74-89, 101	56, 65-71, 98, 99, 100	31, 34, 45, 46, 48, 49, 51, 53, 55, 63, 64, 72, 73, 90-97

Table 1: Significance Scale of STARS©

These Retention Values have been applied to the colour coded plan in Appendix 1 (Tree Retention Plan, Plan 1). The retention values are as follows;

High: *These trees are considered important for retention and should be retained and protected if possible.*

Medium: *These trees may be retained and protected. These trees are considered less critical however their retention be a priority with removal if all other alternatives have been considered and exhausted.*

Low: *These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.*

3.15 **Impacts:** Based on the plans provided Trees 63-73 and 98-100 are located within the building footprint and as such are required to be removed.

3.16 Trees 61 and 62 are two street trees that are both Brushbox *(Lophostemon confertus)* and will be impacted by the works to an extent where they will require removal (See Section 3.20).

3.17 Other trees impacted by TPZ incursions are Tree 32 that has a 30% incursion due to the new entry road. This tree will tolerate this disturbance however levels requiring excavation should be adjusted so as to keep any excavation as shallow as possible.

3.18 Tree 56 is located in an area where the levels will be raised for the entry ramp and as such will increase levels around the base of this tree that will only result in collar rot and long term tree death. Also impacted near this entry area is Tree 61 that shows as having driveway excavations up to the base of this tree. This will not allow this tree to be realistically retained.

3.19 Tree 59 has an incursion that will sever woody surface roots of an entry path, however the tree should tolerate this incursion as the Brush box is a hardy species.

3.20 A new water main will impact Trees 56, 61 and 62. The deep excavations through the TPZ areas of these trees will not allow these trees to remain viable, and as such they will require removal. Where the main connects to existing pipes this is very close to the canopy of Tree 50, the most significant tree on site. Care will need to be taken with machinery working below this tree (See Recommendations, Section 4.6).

3.21 The new footpath proposed along North Street will have minimal impact, however Trees 57 – 60 along Shoalhaven Street will be impacted unless levels can be raised so as not to sever roots on these trees. As shown in Plate 11 there are extensive surface roots from Trees 57-60 that, unless the existing levels can be retained, these trees may have to be considered for removal.

Plate 11: Image showing Trees 57-60 along Shoalhaven Street and the woody surface roots clearly evident. P. Vezgoff

3.22 Trees 74-77, 86-97 are located in the proposed bulk oxygen area and will be impacted due to the proposed works that include driveway construction and trenching relating to below grade piping. Works in this area require the removal of Trees 89-97 and possibly Tree 74. Tree 74 may be possible to retain however this may need to be determined once the driveway excavations commence. If woody roots are required to be severed then Tree 74 will require removal (See Note 1 on Impact Plan 2a). It should be noted that Trees 74, 76 and 77 have been categorised as significant to the street scape.

3.23 Trees 89-97 also require removal in this area, however these trees were assessed as having a low significance.

3.24 A small playground area is proposed between Trees 40 and 46. Although no detailed design has been provided generally these small playgrounds do not require deep excavations for equipment however trenches for new lighting and water fountains shall be kept outside of any TPZ area.

3.25 All other trees should be possible to retain.

3.26 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.

4 RECOMMENDATIONS

4.1 As shown in the Tree Retention Value Plan (Plan 1, Appendix 1), majority of the site trees are worthy of retention. The trees along North Street provide a dense block of vegetation that provides visual amenity to the street scape and also a visual screen between residential dwellings and the Hospital site.

4.2 Based on the plans provided trees to be removed are numbered as 56, 61-73, 89-100 with the possibility of Tree 74 based on site excavations once works commence. All other trees are possible to retain.

4.3 The street trees along Shoalhaven Street will be much harder to try to retain due to their proximity to the kerb and gutter and the surface woody roots that are present. The new footpath proposed along North Street will have minimal impact, however Trees 57 – 60 along Shoalhaven Street will be impacted unless levels can be raised so as not to sever roots on these trees. This detail will need to be clearly shown on construction plans. Further assessment of the impact to these trees may be required.

4.4 A small playground area is proposed between Trees 40 and 46. Any trenching for services such as for new lighting and/or water fountains shall be kept outside of any TPZ area of adjoining trees.

4.5 For the purpose of this report, I have categorised Tree 50 as having a high significance rating for its current status. In terms of long term planning this tree may live for another forty (40) years however all trees do not live forever and at some stage this tree will enter senescence where dieback and the shedding of limbs will be part of this senescing process. Level changes and altering the surface hydrology around this tree is likely to speed up this senescing process. It will be important that the existing levels are retained and that the pedestrian path is designed so that water does not pool within the TPZ area (See Note 1, Tree Protection Plan). Potentially this tree could be retained however the entire area under the drip line should be planted out as garden area (Plate 12) in order to

reduce the element of risk from limbs that may fail from a tree of this age. The current plans show the area being turf (See Note 2, Tree Protection Plan).

Plate 12: Image showing an example of a planted out garden area below a large mature tree (Architectureau 2022).

4.6 Where the main connects to existing pipes this is very close to the canopy of Tree 50, the most significant tree on site. Care will need to be taken with machinery working below this tree. The roots for this tree will be located in the top nine hundred (900) millimetres of soil profile. A flat bucket excavator shall be used to excavate the trench within the TPZ of Tree 50 to ensure no roots greater than one hundred (100) millimetres are severed. Roots greater than one hundred (100) millimetres will be retained and the pipes threaded under the roots. A spotter shall be used for these works to ensure roots greater than one hundred (100) millimetres are retained and the canopy of Tree 50 is not impacted. The Project Arborist shall supervise these works.

4.7 Tree 74 may be possible to retain however this will need to be determined once the driveway excavations commence. If woody roots are required to be severed, then Tree 74 will require removal. The Project Arborist should be consulted to make this decision.

4.8 Trees to be retained will require tree protection fencing and signage along with trunk protection for the street trees.

4.9 **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.

4.10 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 have been supplied the TPZ distances in this report previously, 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.

4.11 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.

4.12 Trees 51, 53 and 55 are exotic species and could potentially be removed to allow more curtilage around the native specimens (See Note 3, Tree Protection Plan).

4.13 There are several small saplings planted along the existing car park area that have not been individually detailed in this report as they were not considered significant (See Note 4, Tree Protection Plan).

4.14 Trees 98-101 are not shown on the project plans. These trees should be included (See Note 5, Tree Protection Plan).

5 TREE PROTECTION

5.1 Trees to be protected: Trees to be retained will be required to be fenced for protection. All fencing shall be installed as specified in Section 5.2 (Tree Protection – Implementation of Tree Protection Zone). Indicative locations of the fencing are shown in the Tree Protection Plan (Plan 3, Appendix 1).

5.2 Implementation of Tree Protection Zone: All tree protection works should be carried out before the start of demolition or building work. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be erected as shown in the Tree Protection Plan (Appendix 1). Specifications for this fencing are shown in Tree Protection Fencing Specifications (Appendix 5) and are based on The Australian Standard *Protection of trees on development sites,* AS 4970, 2009.

5.3 Individual trunk protection: Street trees numbered as 57-60, 62, 74-77 and 101 will require trunk protection to be installed prior to any demolition works occurring. This is achieved by attaching lengths of timber (75mm x 50mm x 2000mm) fastened around the trunk. Geotextile fabric or carpet underlay shall be wrapped around the trunk prior to the timbers being attached. These timbers are to be fastened with hoop iron strapping and not attached directly into the bark of the tree. These timbers are only to be removed when all construction is complete. See Plate 12 for an example of trunk protection. This trunk protection is based on The Australian Standard *Protection of trees on development sites,* AS 4970, 2009.

Plate 12: Example of trunk protection with sign attached, recommended for the street trees. P. Vezgoff.

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

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

5.5 Tree Damage: If the retained trees are damaged, a qualified Arborist should be contacted as soon as possible. The Arborist will recommend remedial action so as to reduce any long term adverse effect on the tree's health.

5.6 Signage: It is recommended that signage is attached to the tree protection fencing. A sample sign has been attached in Appendix 6. This sign may be copied and laminated then attached to any TPZ fencing area and at least on every fifth fencing panel.

5.7 **Root Pruning:** If excavations are required within a TPZ this excavation shall be done by hand to expose any roots. Any roots under fifty (50) millimetres in diameter may be pruned cleanly with a sharp saw. Tree root systems are essential for the health and stability of the tree. Severed roots shall be treated with Steriprune®, available at most large Hardware Stores.

5.8 **Arborist Certification:** It is recommended that the contractor supply 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 tender 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 trunk protection 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

30th August 2022

Appendix 1

Plans

Plan 1 Tree retention values

Plan 2 & 2a Tree Impact Plans

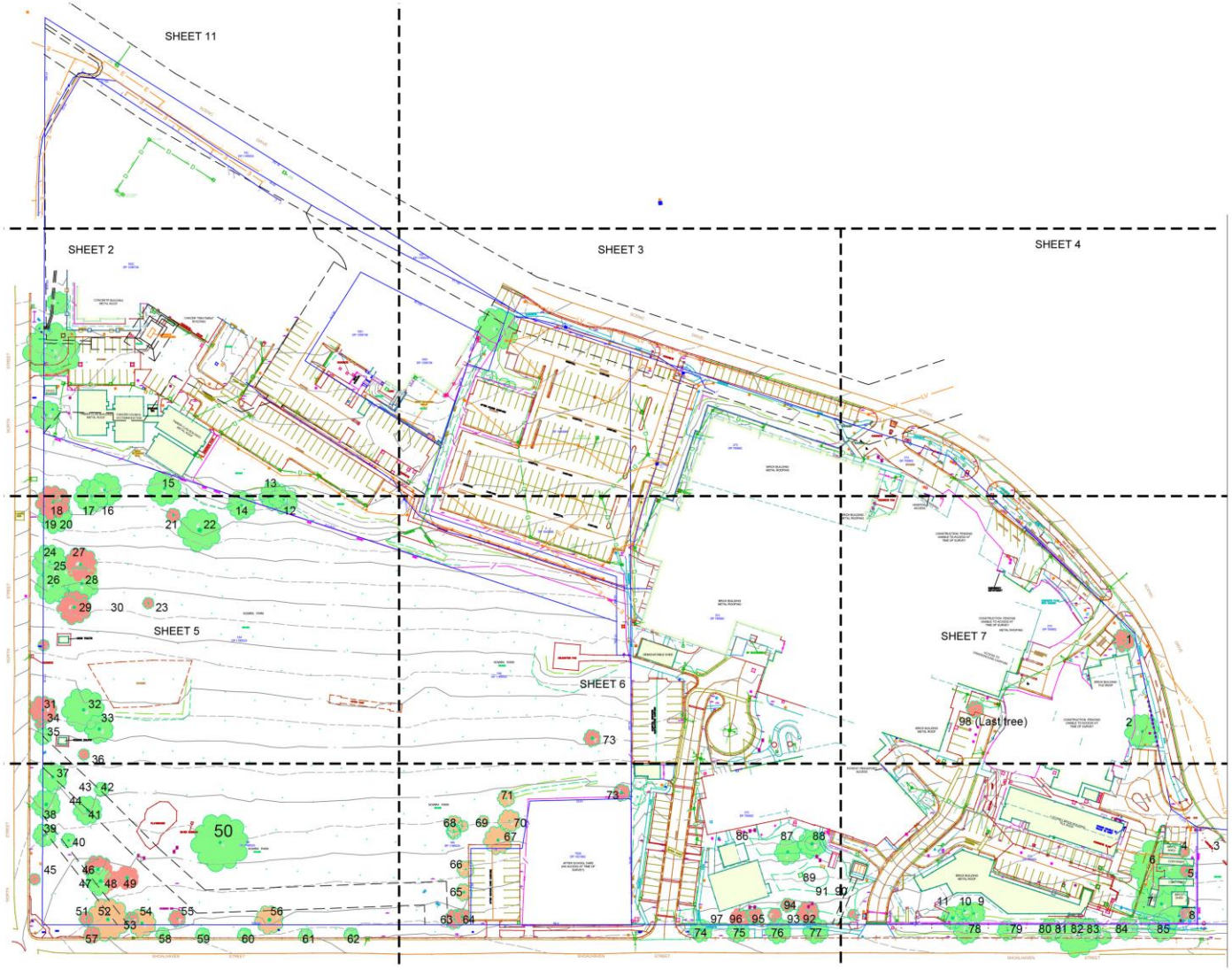
Plan 3 & 3a Tree Protection Plan

Tree Retention Values

MOORE TREES

Moore Trees

Plan 1



High

Medium

Low

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

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

Date: 19.03.2021
Drawn: P.Vezgoff
Site Address: Shoalhaven Hospital
Nowra NSW

Impact Assessment

Moore Trees

Plan 2

Client: NSW Government Health — Illawarra Shoalhaven Local Health District

Works within TPZ area

Date: 16.06.22
Drawn: P.Vezgoff
Site Address: Shoalhaven District Memorial Hospital Nowra NSW

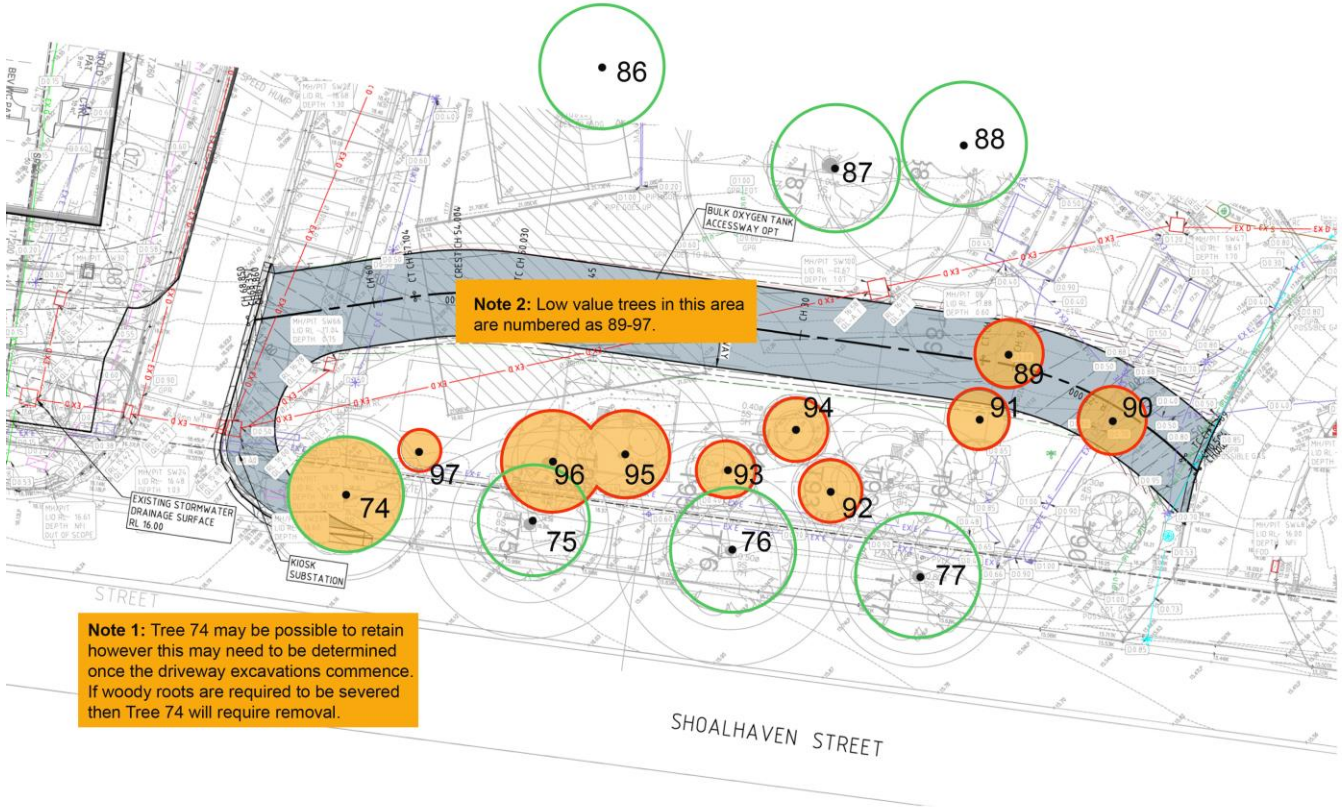
Impact Assessment

Moore Trees

Plan 2a

Tree to be retained

Tree to be removed



Note 2: Low value trees in this area are numbered as 89-97.

Note 1: Tree 74 may be possible to retain however this may need to be determined once the driveway excavations commence. If woody roots are required to be severed then Tree 74 will require removal.

Client: NSW Government Health Illawarra Shoalhaven Local Health District

Works within TPZ area

Date: 27.06.22
Drawn: P.Vezgoff
Site Address: Shoalhaven District Memorial Hospital Nowra NSW

Tree Protection Plan

Moore Trees

Plan 3

Client: NSW GOVERNMENT Health Illawarra Shoalhaven Local Health District

Fence. Implementation of tree protection zone (TPZ). All tree protection works should be carried out before the start of demolition or building works. It is recommended that chain mesh fencing with a minimum height of 1.8 metres be errected

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.

Works within TPZ area

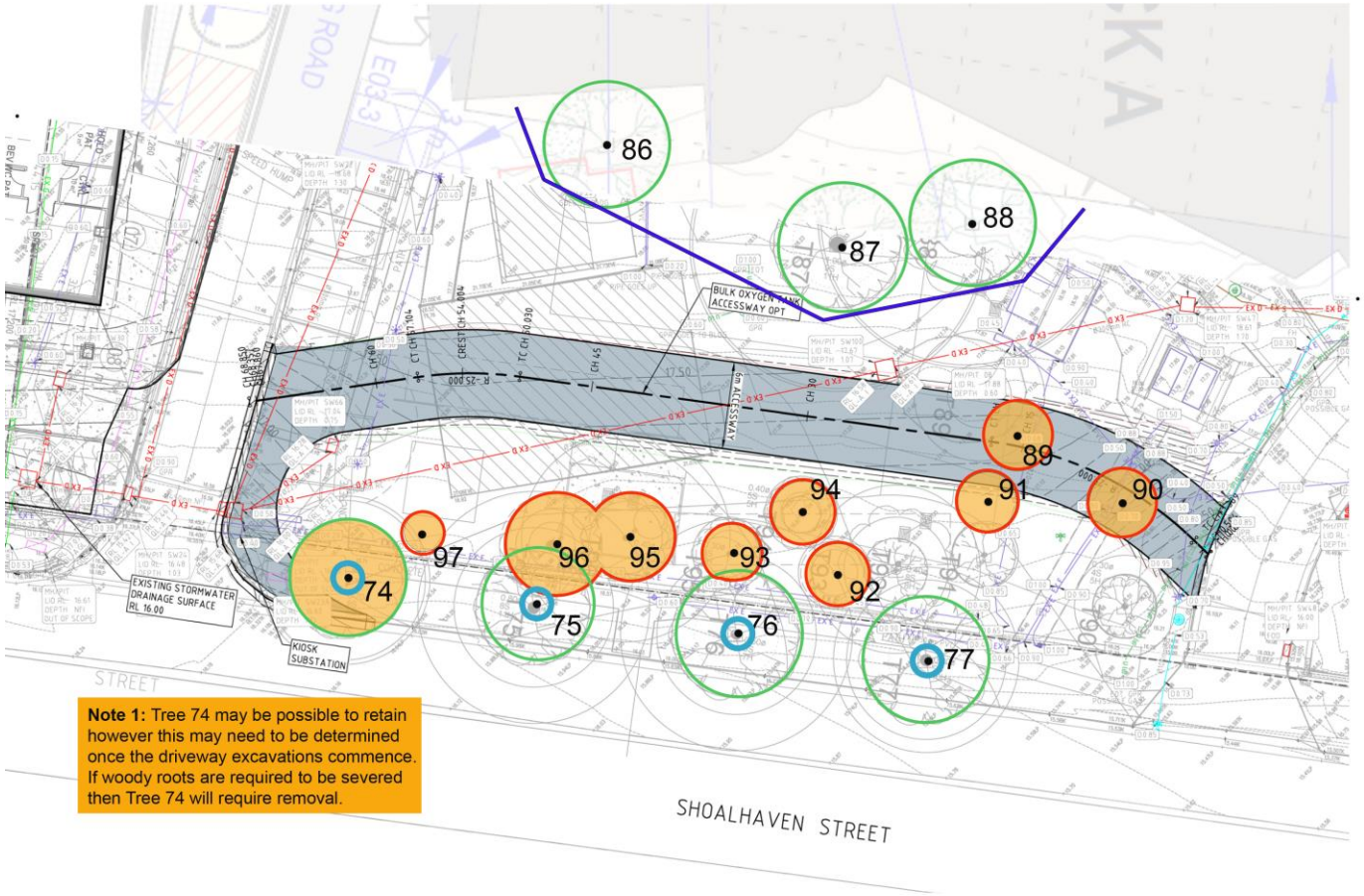
Tree to be retained

Tree to be removed

Date: 20.04.22
Drawn: P.Vezgoff
Site Address: Shoalhaven District Memorial Hospital Nowra NSW

Tree protection plan

Moore Trees Plan 3a



Tree to be retained

Tree to be removed

Note 1: Tree 74 may be possible to retain however this may need to be determined once the driveway excavations commence. If woody roots are required to be severed then Tree 74 will require removal.

Client: NSW GOVERNMENT Health Illawarra Shoalhaven Local Health District

Fence. Implementation of tree prote (TPZ). All tree protection works sho out before the start of demolition or works. It is recommended that chain with a minimum height of 1.8 metre

Trunk protection. Lengths of timbe 50mm x 2000) shall be fastened to overhead branches that are greater diameter. These timbers are to be fi hoop iron strapping and not fixed di trunk of the tree.

Works within TPZ area

Tree to be retained

Tree to be removed

Date: 16.06.22
Drawn: P.Vezgoff
Site Address: Shoalhaven District Memorial Hospital Nowra NSW

Appendix 2

Tree health & condition assessment schedule

TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE – Shoalhaven Hospital Redevelopment Project - Acute Services Building

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
12	Blackbutt (Eucalyptus pilularis)	25	12	0.5	0.6	95	No visual defects	1a >40 years	Good	Mature		6	2.6
13	Corymbia gumiffera	25	13	0.95	1.1	95	No visual defects	1a >40 years	Good	Mature	Slight easterly lean	11.4	3.3
14	Blackbutt (Eucalyptus pilularis)	22	12	0.9	0.95	95	No visual defects	1a >40 years	Good	Mature	Scattered dead wood. Old limb failures.	10.8	3.1
31	Camphor laurel (Cinnamomum camphora)	17	7	0.34	0.44	95	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	4.1	2.3
32	Blackbutt (Eucalyptus pilularis)	20	12	0.9	1.1	95	No visual defects	1a >40 years	Good	Mature	4mCallitrus at base	10.8	3.3
33	Blackbutt (Eucalyptus pilularis)	20	10	0.9	1.1	95	No visual defects	1a >40 years	Good	Mature	Acacia and camphor at base	10.8	3.3
34	Camphor laurel (Cinnamomum camphora)	12	4	0.18	0.2	95	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	2.2	1.6
35	Cheese tree (Glochidion ferdinandi)	7	5	0.3	0.4	95	No visual defects	1a >40 years	Good	Mature	Acmena smithii at base	3.6	2.2
36	Bangalay (Eucalyptus botryoides)	11	35	0.27	0.37	90	No visual defects	1a >40 years	Fair	Mature	Suppressed	3.2	2.1
37	Blackbutt (Eucalyptus pilularis)	20	10	0.9	1.1	95	No visual defects	1a >40 years	Good	Mature	Acacia and camphor at base	10.8	3.3
38	Swamp mahogany	18	10	0.98	1.1	90	No visual	2a May only live for	Fair	Mature		11.8	3.3

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
	(Eucalyptus robusta)						defects	15-40 years					
39	Swamp mahogany (Eucalyptus robusta)	18	10	0.98	1.1	90	No visual defects	2a May only live for 15-40 years	Fair	Mature		11.8	3.3
40	Cheese tree (Glochidion ferdinandi)	17	6	0.75	0.85	95	No visual defects	1a >40 years	Good	Mature		9	3
41	Blackbutt (Eucalyptus pilularis)	20	10	0.9	1.1	95	No visual defects	1a >40 years	Good	Mature	Old mechanical wound at base	10.8	3.3
42	Camphor laurel (Cinnamomum camphora)	16	6	0.45	0.55	95	No visual defects	2c removed for more suitable planting	Good	Mature	Weed	6.2	2.7
43	Bangalay (Eucalyptus botryoides)	11	6	0.27	0.37	90	No visual defects	1a >40 years	Fair	Mature	Suppressed	3.2	2.1
44	Bangalay (Eucalyptus botryoides)	9	5	0.19	0.25	90	No visual defects	1a >40 years	Fair	Mature	Suppressed	2.3	1.8
45	Weeping bottle brush (Callistemon viminalis)	4.5	2	0.27	0.37	95	No visual defects	2c removed for more suitable planting	Good	Mature	Lopped for wires	3.2	2.1
46	Camphor laurel (Cinnamomum camphora)	18	11	0.9	0.98	90	No visual defects	1a >40 years	Good	Mature		10.8	3.2
47	Swamp mahogany (Eucalyptus robusta)	19	11	1.2	1.5	80	No visual defects	2a May only live for 15-40 years	Fair	Mature		14.4	3.8
48	Camphor laurel (Cinnamomum camphora)	13	7	0.6	0.7	90	No visual defects	1a >40 years	Good	Mature		7.2	2.8
49	Camphor laurel (Cinnamomum	19	11	1	1.1	90	No visual defects	1a >40 years	Good	Mature		12	3.3

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
	camphora)												
50	Blackbutt (Eucalyptus pilularis)	25	20	2.7	3	90	No visual defects	1a >40 years	Fair	Mature	Large mechanical wounds and termite damage possible scar tree	32.4	5.1
51	Kaffir plum (Harpephyllum caffrum)	7	5	0.45	0.55	80	No visual defects	2c removed for more suitable planting	Fair	Mature		5.4	2.5
52	Swamp mahogany (Eucalyptus robusta)	19	9	1.3	1.5	80	No visual defects	2a May only live for 15-40 years	Fair	Mature	Coppice camphor at base	15.6	3.8
53	Kaffir plum (Harpephyllum caffrum)	7	5	0.32	0.42	80	No visual defects	2c removed for more suitable planting	Fair	Mature		3.8	2.2
54	Swamp mahogany (Eucalyptus robusta)	19	9	1.3	1.5	80	No visual defects	2a May only live for 15-40 years	Fair	Mature	Coppice camphor at base	15.6	3.8
55	Kaffir plum (Harpephyllum caffrum)	7	5	0.45	0.55	80	No visual defects	2c removed for more suitable planting	Fair	Mature		5.4	2.5
56	Brushbox (Lophostemon confertus)	13	7	0.9	1	95	No visual defects	1a >40 years	Good	Mature		10.8	3.2
57	Brushbox (Lophostemon confertus)	16	7	0.48	0.58	95	No visual defects	1a >40 years	Good	Mature	Extensive woody roots along Kerb line	5.8	2.6
58	Brushbox (Lophostemon confertus)	16	7	0.55	0.65	95	No visual defects	1a >40 years	Good	Mature	Extensive woody roots along Kerb line	6.6	2.7

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
59	Brushbox (Lophostemon confertus)	16	7	0.55	0.65	95	No visual defects	1a >40 years	Good	Mature	Extensive woody roots along Kerb line	6.6	2.7
60	Brushbox (Lophostemon confertus)	12	7	0.55	0.65	95	No visual defects	1a >40 years	Good	Mature	Extensive woody roots along Kerb line	6.6	2.7
61	Brushbox (Lophostemon confertus)	16	7	0.55	0.65	95	No visual defects	1a >40 years	Good	Mature	Extensive woody roots along Kerb line	6.6	2.7
62	Brushbox (Lophostemon confertus)	18	7	0.55	0.65	95	No visual defects	1a >40 years	Good	Mature	Extensive woody roots along Kerb line	6.6	2.7
63	Kaffir plum (Harpephyllum caffrum)	6	5	0.55	0.65	95	No visual defects	2c removed for more suitable planting	Good	Mature	Kaffir	6.6	2.7
64	Pinus patula	13	5.5	0.58	0.68	95	No visual defects	2a May only live for 15-40 years	Good	Mature		7	2.7
65	Radiata pine (Pinus radiata)	16	5.5	0.75	0.85	70	No visual defects	4a Dead, dying or declining.	Poor	Mature		9	3
66	Sydney red gum (Angophora costata)	9	5.5	0.3	0.4	95	No visual defects	1a >40 years	Good	Mature		3.6	2.2
67	Sydney blue gum (Eucalyptus saligna)	18	10	0.85	0.95	95	No visual defects	1a >40 years	Good	Mature		10.2	3.1
68	Sydney blue gum (Eucalyptus saligna)	17	6	0.35	0.45	95	No visual defects	1a >40 years	Good	Mature	Group of 9	4.2	2.3
69	Sydney blue gum (Eucalyptus saligna)	17	6	0.35	0.45	95	No visual defects	1a >40 years	Good	Mature	Surrounded by saplings	4.2	2.3
70	Sydney blue gum	16	5.5	0.42	0.52	95	No visual	1a >40 years	Good	Mature	Surrounded by	5	2.4

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
	(Eucalyptus saligna)						defects				saplings		
71	Sydney blue gum (Eucalyptus saligna)	18	6.5	0.53	0.63	95	No visual defects	1a >40 years	Good	Mature	Surrounded by saplings	6.4	2.6
72	Radiata pine (Pinus radiata)	19	5.5	0.82	0.92	80	Dead wood >50mm	3a May only live for 5-15 years.	Fair	Mature		9.8	3.1
73	Radiata pine (Pinus radiata)	18	5	1.1	1.2	80	Dead wood >50mm	3a May only live for 5-15 years.	Fair	Mature		13.2	3.5
74	Brushbox (Lophostemon confertus)	13	5.8	0.46	0.56	95	No visual defects	1a >40 years	Good	Mature		5.5	2.5
75	Brushbox (Lophostemon confertus)	13	5.5	0.67	0.77	95	No visual defects	1a >40 years	Good	Mature		8	2.9
76	Brushbox (Lophostemon confertus)	13	5.5	0.67	0.77	95	No visual defects	1a >40 years	Good	Mature		8	2.9
77	Brushbox (Lophostemon confertus)	13	5.5	0.53	0.63	95	No visual defects	1a >40 years	Good	Mature		6.4	2.6
78	Brushbox (Lophostemon confertus)	12	3	0.29	0.39	95	No visual defects	1a <40 years	Good	Mature	Street tree on grass verge	3	2.1
79	Brushbox (Lophostemon	12	3	.3, .26	5	95	No visual defects	1a <40 years	Good	Mature	Street tree on grass verge	3.6	2.2

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
	confertus)												
80	Brushbox (Lophostemon confertus)	12	3	0.34	0.45	95	No visual defects	1a <40 years	Good	Mature	Street tree on grass verge	3.6	2.2
81	Blackbutt (Eucalyptus pilularis)	13	7	0.45	0.55	60	Included bark	3c Removed for a better specimen.	Fair	Mature	Mechanical damage from vehicles	5.8	2.6
82	Brushbox (Lophostemon confertus)	12	3	0.29	0.39	95	No visual defects	1a <40 years	Good	Mature	Street tree on grass verge	3	2.1
83	Blackbutt (Eucalyptus pilularis)	12	4.4	0.26	0.36	90	No Value	3c Removed for a better specimen.	Fair	Mature	Malformed trunk due to suppression.	3	2.1
84	Blackbutt (Eucalyptus pilularis)	13	5	0.36	0.46	90	No Value	1a <40 years	Fair	Mature		3	2.1
85	Brushbox (Lophostemon confertus)	11	3	0.33	0.43	95	No visual defects	1a <40 years	Good	Mature	Street tree on grass verge. Old wound in basal area.	3	2.1
86	Jacaranda (Jacaranda mimosifolia)	8	5.4	0.22	0.32	95	No visual defects	2c removed for more suitable planting	Good	Mature		2.6	2
87	Spotted gum (Corymbia maculata)	20	10	0.85	0.95	0	No visual defects	1a >40 years	Good	Mature		10.2	3.1
88	Spotted gum (Corymbia maculata)	20	10	0.85	0.95	0	No visual defects	1a >40 years	Good	Mature		10.2	3.1
89	Evergreen ash (Fraxinus griffithii)	8.5	4.5	0.18	0.25	100	No visual defects	2c removed for more suitable planting	Good	Mature		2.2	1.8
90	Jacaranda (Jacaranda mimosifolia)	6.5	3.5	0.18	0.25	95	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen	2.2	1.8
91	Evergreen ash (Fraxinus griffithii)	8.5	2.3	0.19	25	90	No visual defects	2c removed for more suitable planting	Fair	Mature		2.3	12.4
92	Evergreen ash (Fraxinus griffithii)	5.5	5.8	0.3	0.4	80	No visual defects	2c removed for more suitable planting	Good	Mature		3.6	2.2

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	Defects	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
93	Japanese maple (Acer palmatum)	4.5	2.5	0.13	0.18	90	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.6
94	Gleditsia	5.8	2.5	0.12	0.18	95	No visual defects	2c removed for more suitable planting	Good	Mature		1.4	1.6
95	Japanese maple (Acer palmatum)	4.5	2.5	0.13	0.18	90	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.6
96	Port jackson fig (Ficus rubiginosa)	10	5.5	0.6	0.7	100	No visual defects	2c removed for more suitable planting	Good	Mature	Multi stemmed specimen hemi epiphyte on old stump	7.2	2.8
97	Japanese maple (Acer palmatum)	3	2.5	0.13	0.18	90	No visual defects	2c removed for more suitable planting	Good	Mature		1.6	1.6
98	Tuckeroo (Cupaniopsis anacardioides)	9	6	0.25	0.35	100	No visual defects	1a >40 years	Good	Mature		3	2.1
100	London Plane (Platanus × acerifolia)	17	8	0.6	0.7	100	No visual defects	2c removed for more suitable planting	Good	Mature	Tree located in child care centre	10	3
101	Brushbox (Lophostemon confertus)	16	5	0.46	0.56	95	No visual defects	1a >40 years	Good	Mature		5.5	2.5

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 Significance - Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ - tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

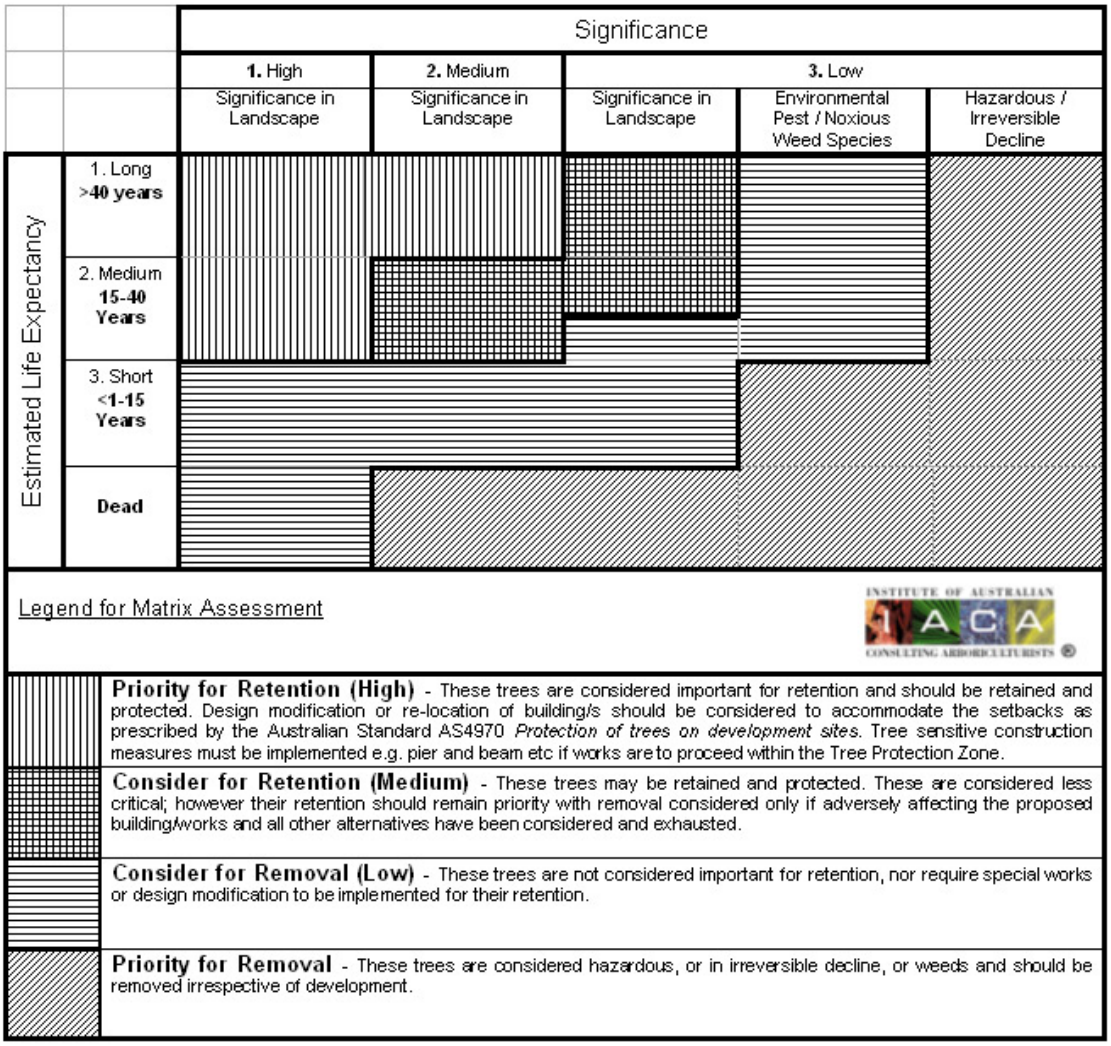
- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous, - The tree is

dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.



Legend for Matrix Assessment.

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, **www.iaca.org.au**

Appendix 4

SULE categories (after Barrell, 2001)[1]

SULE Category	Description
Long	*Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.*
1a	Structurally sound trees located in positions that can accommodate for future growth
1b	Trees that could be made suitable for retention in the long term by remedial tree care.
1c	Trees of special significance that would warrant extraordinary efforts to secure their long term retention.
Medium	*Trees that appeared to be retainable at the time of assessment for 15-40 years with an acceptable level of risk.*
2a	Trees that may only live for 15-40 years
2b	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons
2c	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.
2d	Trees that could be made suitable for retention in the medium term by remedial tree care.
Short	*Trees that appeared to be retainable at the time of assessment for 5-15 years with an acceptable level of risk.*
3a	Trees that may only live for another 5-15 years
3b	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
3c	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
3d	Trees that require substantial remedial tree care and are only suitable for retention in the short term.
Remove	*Trees that should be removed within the next five years.*
4a	Dead, dying, suppressed or declining trees 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 5

TPZ and SRZ methodology

Determining the Tree Protection Zone (TPZ)

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

TPZ = DBH x 12

Where

DBH = trunk diameter measured at 1.4 metres above ground

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

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

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

Determining the Structural Root Zone (SRZ)

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

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

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

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

Where

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

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

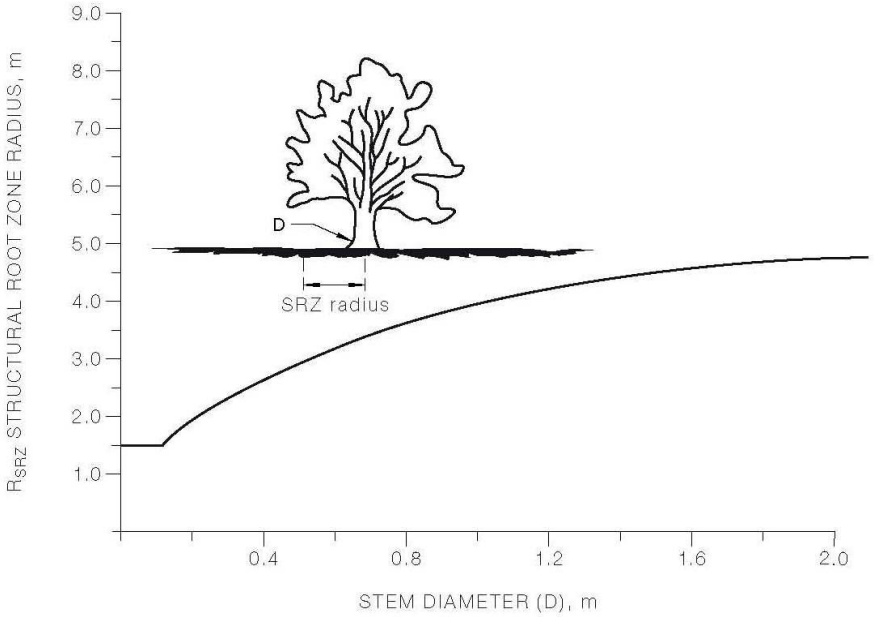


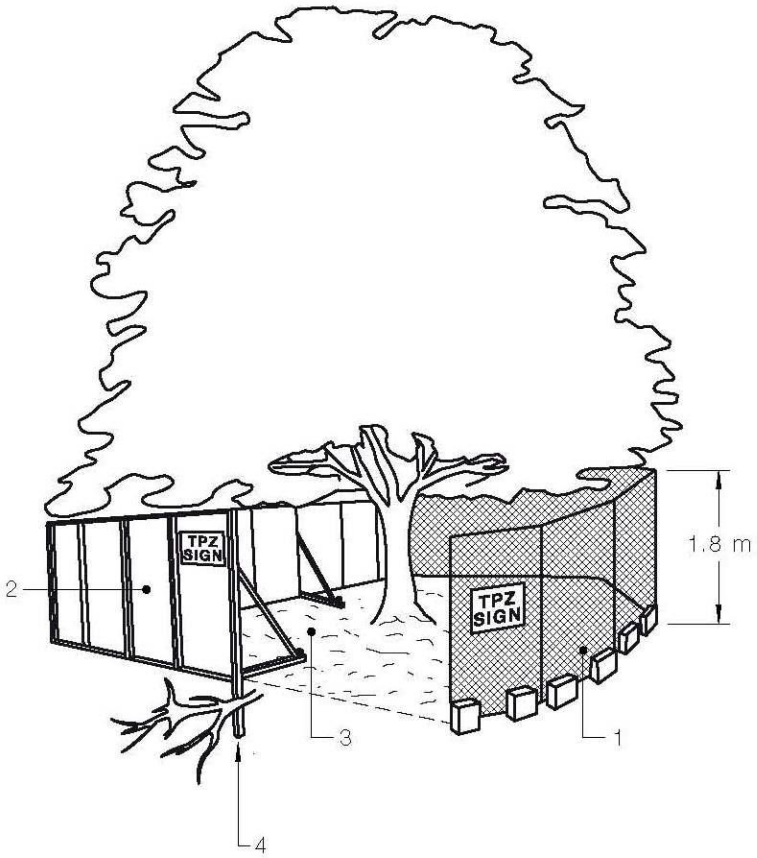
FIGURE 1 - STRUCTURAL ROOT ZONE

Notes:

1 R_{SRZ} is the structural root zone radius.
2 *D* is the stem diameter measured immediately above root buttress.
3 The SRZ for trees less than o.15 metres diameter is 1.5 metres.
4 The SRZ formula and graph do not apply to palms, other monocots, cycads and tree ferns.
5 This does not apply to trees with an asymmetrical root plate.

Appendix 6

Tree protection fencing specifications



LEGEND:

1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.

2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.

3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

Figure 1: Protective fencing as specified in AS 4970, 2009.

Appendix 7

Tree protection sign

sign sample

Moore Trees
Tree Consultancy
0411 712 887

Tree Protection Zone

Fence not to be moved without approval from Arborist

Within this fence there is to be

NO

Storage of materials

Trenching or excavation

Washing of tools or equipment

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 8

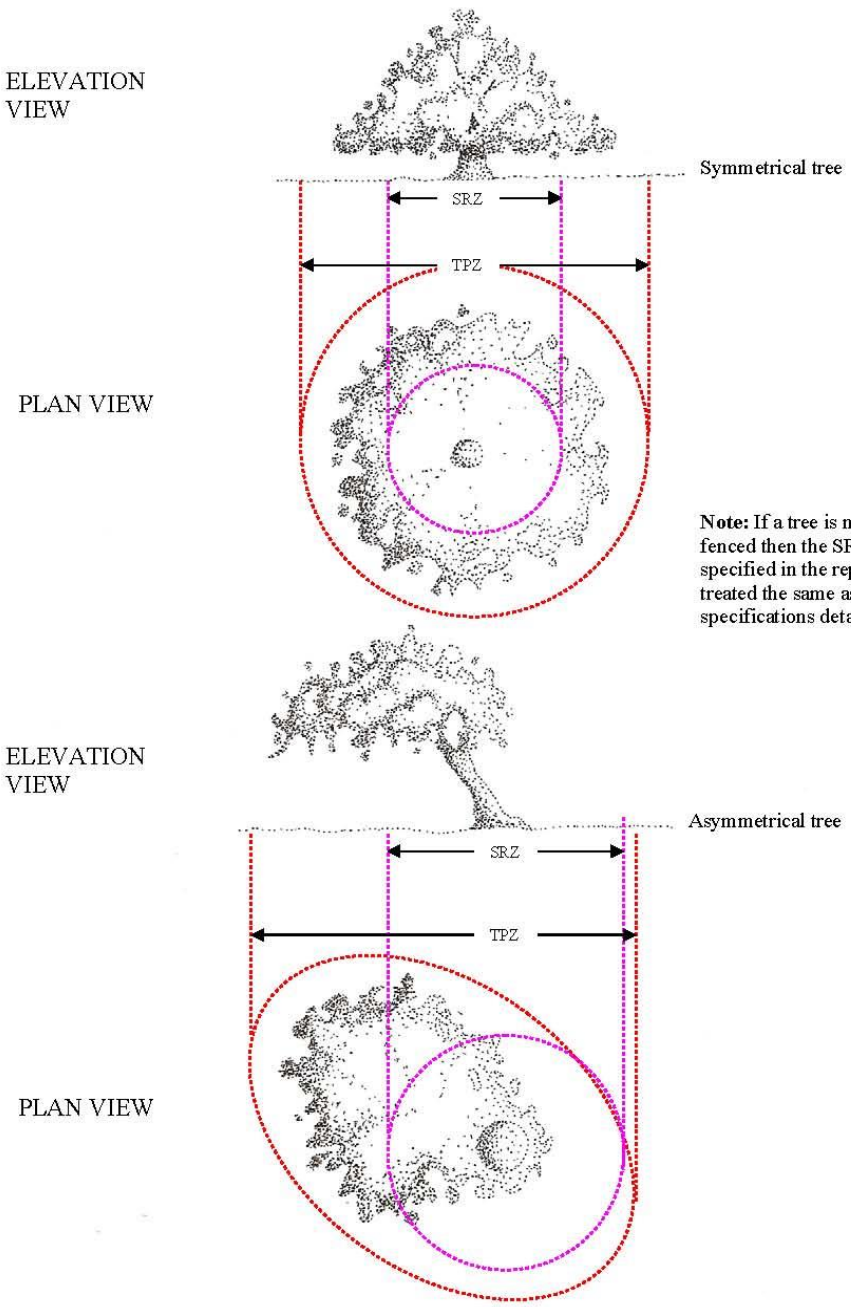


Figure 1: Indicative Tree Protection Zone (TPZ) and Root Protection Zone (SRZ)
Drawn: P. Vezgoff ©

Appendix 9

Tree structure information diagram

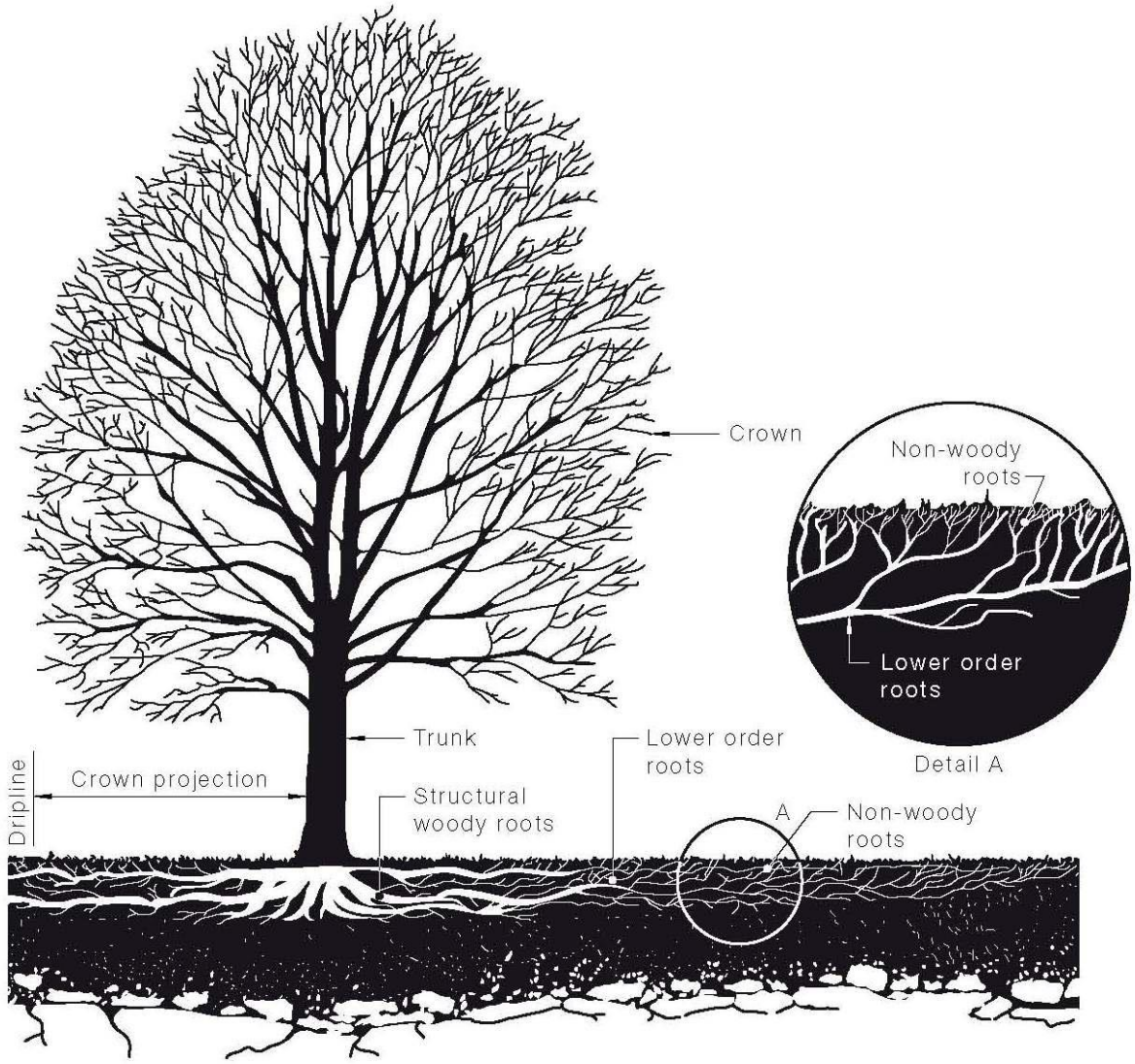


Figure 2: Structure of a tree in a normal growing environment (AS 4970, 2009.).

Appendix 10

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 11

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

Tree Consultancy and tree ultrasound. Tree hazard and risk assessment, Arborist development application reports
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ACTING COORDINATOR OF TREES MAINTENANCE
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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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January 2003 – June 2005
September 2000 – January 2003
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Northern Landscape Services **July to Oct 1995**

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- TRAQ Conference, Auckland NZ / Sydney (2013/2018)
- 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).