



TREE MANAGEMENT CONSULTING ARBORICULTURISTS

AMENDED ARBORICULTURAL IMPACT ASSESSMENT

for

Cassandra Kiss
TERRIOR
Level 2, 79 Myrtle Street
CHIPPENDALE NSW 2008

SITE ADDRESS

ROUSE HILL ANGLICAN COLLEGE
7 WORCESTER ROAD
ROUSE HILL

1 AUGUST 2022

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**INSTITUTE OF AUSTRALIAN
CONSULTING ARBORICULTURISTS**



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1 INTRODUCTION

- 1.1 This Arboricultural Impact Assessment (AIA) prepared by Urban Forestry Australia (UFA) was commissioned by Cassandra Kiss of Terior, on behalf of the Rouse Hill Anglican College (RHAC). The 'site' for the purpose of this AIA is identified as the area in the south and south east part of the college grounds, as depicted in **Appendix A**.
- 1.2 This AIA is to accompany an application to the New South Wales Department of Planning and Environment to modify the approved State Significant Development (SSD) No. 8006 for a seniors' studies building and a proposed realignment of an existing carpark turning head.
- 1.3 The purpose of this report is to identify the potential impacts the proposed modification may have on fifteen (15) trees namely Trees 1 – 10 adjacent to the existing carpark and turning head, and Trees 14, 15, 17, 19 and 20 (noting Trees 16 and 18 have previously been removed), adjacent to the existing kindergarten buildings to be demolished.
- 1.4 The 15 trees are all *Eucalyptus tereticornis* (Forest Red Gum) a component species of the nationally threatened ecological community known as Cumberland Plain Woodland.
- 1.5 This report gives recommendations for tree retention or removal and provides guidelines for tree protection and maintenance.
- 1.6 Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible; however, I can neither guarantee nor be responsible for the accuracy of information provided by others.
- 1.7 This AIA is not intended as an assessment of any impacts on trees by any proposed future development of the site, other than the current application to modify the SSD.
- 1.8 This report is not intended to be a comprehensive tree *risk* assessment; however, the report may make recommendations, where appropriate, for further assessment, treatment or testing of trees where potential structural problems have been identified, or where below ground investigation may be required.

2 METHODOLOGY

- 2.1 This AIA takes account of prescribed trees pursuant to Part A Clause 4.3 *Tree preservation* of Blacktown City Council Development Control Plan 2015 (DCP).
- 2.2 I am familiar with the site and trees having undertaken several site inspections since 2014, with updated tree assessments undertaken in July and August 2017.
- 2.3 I have not been out to the site to reassess tree health and condition or re-measure the trees' dimensions. I have added 100mm onto the trunk diameters of each tree measured in 2017 based on an estimated average of 20mm annual trunk diameter increase each for actively growing trees. The tree trunk diameter measured at 1.4m above ground level provides the figure on which the Structural Root Zone¹ (SRZ) and Tree Protection Zone² (TPZ) offsets are determined for each tree under the Australian Standard 4970-2009 *Protection of trees on development sites* (AS4970).
- 2.4 No *aerial inspections*, *root mapping* or woody tissue testing were undertaken as part of the tree assessments in 2017. Information contained in this tree report covers only the trees that were examined and reflects the condition of those trees at the time of inspection.
- 2.5 Plans and documents referenced for the preparation of this report include:
- *Arboricultural Impact Assessment* by Urban Forestry Australia dated August 2017
 - *Tree Risk Assessment* prepared by Urban Forestry Australia dated July – December 2017
 - Plan set (15 sheets) titled *SSDA Resubmission Mod Draft 3* by Terrior dated 4 April 2022
 - AS4970-2009 *Protection of trees on development sites*, Standards Australia.
- 2.6 The subject trees are shown on a marked-up excerpt of a 2014 site plan. This marked-up plan is attached as the Tree Location Plan at **Appendix E**.

¹ The Structural Root Zone (SRZ) refers to the radial distance in metres measured from the centre of the tree stem, which defines the critical area required to maintain stability of the tree in the ground. The SRZ is a nominally circular offset based on the AS4970 formula and is intended as a guide as the true SRZ may not be symmetrical in shape and area where there are existing obstructions to or confinement of lateral root growth, e.g. built and natural structures such as walls, rocky outcrops, etc.

² Tree Protection Zone (TPZ). Refers to the radial distance in metres measured from the centre of the tree stem which defines the tree protection zone for a tree to be retained and be able to cope with disturbance without adverse effect on its health. As defined under 3.2 of AS4970, the TPZ is calculated for a tree by multiplying its Diameter at Breast Height x 12. The TPZ is also the combination of the root area and crown area to be protected, which may be greater than the calculated radius under 3.2 of AS4970.

3 OBSERVATIONS AND DISCUSSION

3.1 Assessed Trees

- 3.1.1 15 prescribed trees were assessed or identified and are included in this report. Details of these are included in the Schedule of Assessed Trees—**Appendix D**.
- 3.1.2 The assessed trees and their respective *Retention Value* (RV) are identified in Table 1, below. Note: Refer to **Appendix B** for the methodology used to assess the Retention Value of a tree.

Table 1—Tree Identification and Retention Value, where **L** = Low, **M** = Medium, **H** = High.

Tree No.	Genus & species Common Name	RV	Tree No.	Genus & species Common Name	RV
1	Forest Red Gum	H	9	Forest Red Gum	H
2	Forest Red Gum	H	10	Forest Red Gum	H
3	Forest Red Gum	H	14	Forest Red Gum	M
4	Forest Red Gum	H	15	Forest Red Gum	L
5	Forest Red Gum	H	17	Forest Red Gum	L
6	Forest Red Gum	H	19	Forest Red Gum	M
7	Forest Red Gum	H	20	Forest Red Gum	H
8	Forest Red Gum	H			

3.2 Proposed Removal of Prescribed Trees

- 3.2.1 Three (3) Trees—4, 5 and 7 are proposed to be removed to accommodate the proposed new car park turning head. See Figure 2, page 9.
- 3.2.2 Three (3) Trees—14, 15 and 17 are proposed to be removed to accommodate the proposed seniors' school pavilion. See below Figure 1.

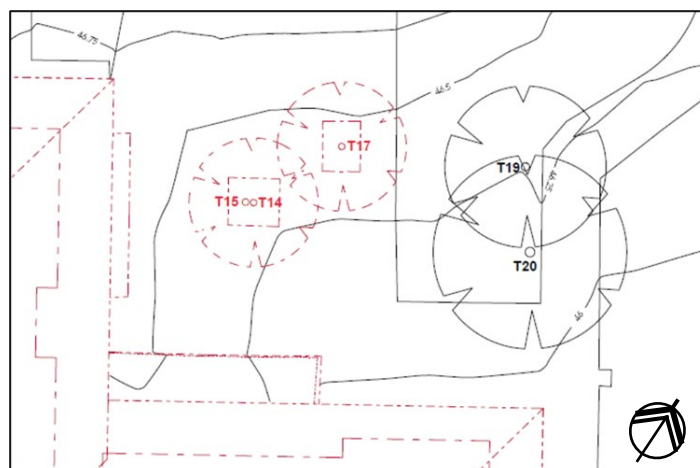


Figure 1
Trees 14, 15 and 17 in red; proposed to be removed.
Excerpt of Existing Site & Demolition Plan DD-10-02 by Terior, marked up by C. Mackenzie. Not to scale.

3.3 Proposed Tree Retention

3.3.1 Nine (9) Trees—1, 2, 3, 6, 8, 9, 10, 19 and 20 are to be retained.

3.4 Potential Impacts on Trees Proposed for Retention

3.4.1 Under the Australian Standard 4970-2009 *Protection of trees on development sites* (AS4970), encroachments less than 10% of the TPZ are considered to be minor. No specifications are provided in AS4970 for potential impacts of 10% or greater. This 10% is interpreted as the threshold figure, and the trigger where arboricultural investigations into TPZ encroachments beyond this figure need to be considered.

3.4.2 Disturbance within the SRZ, is generally not supported unless building design and/or root mapping demonstrates viable tree retention is possible.

3.4.3 The potential extent of TPZ impacts to protected trees to be retained can be generally rated using the *Impact Level Rating* ("ILR") Table 2, below.

Table 2: Guideline to the rating of impacts on trees to be retained.

Based on discussions with executive members of the Institute of Australian Consulting Arboriculturists.

IMPACT LEVEL RATING	
0	0 – 0.9% of root zone impacted – no impact of significance
L	1 to 10% of root zone impacted – low (minor) level of impact
L - M	>10 to 15% of root zone impacted – low (minor) to moderate level of impact
M	>15 to 20% of root zone impacted – moderate level of impact
M – H	>20 to 25% of root zone impacted – moderate to high level of impact
H	>25 to 35% of root zone impacted – high level of impact
S	>35% of root zone impacted – significant level of impact

3.4.4 **Tree 1**—SRZ = 3.1m^r; TPZ = 8.4m^r (222m²)

Structural Root Zone impacts:

- Nil encroachment (including disturbance offset of 1 – 1.5m outside footprint)

Tree Protection Zone impacts:

- An encroachment of approximately 7.1m² (disturbance offset only) or approximately 3.2% has been calculated (see Figure 1).
- Less than 10% puts the impact rating in the low (minor) category.

Pruning impacts:

- No pruning will be required to accommodate the works.

3.4.5 Tree 2—SRZ = 2.4m^r; TPZ = 4.8m^r (72m²)Structural Root Zone impacts:

- Nil encroachment (including disturbance offset of 1 – 1.5m outside footprint).

Tree Protection Zone impacts:

- An encroachment of approximately 4.6m² (including disturbance offset) or approximately 6.4% has been calculated (see Figure 2).
- Less than 10% puts the impact rating in the low (minor) category.

Pruning impacts:

- No pruning will be required to accommodate the works.

3.4.6 Tree 3—SRZ = 2.m^r; TPZ = 5.4m^r (92m²)Structural Root Zone impacts:

- Nil encroachment (including disturbance offset of 1 – 1.5m outside footprint)

Tree Protection Zone impacts:

- A *moderate* encroachment of approximately 17.8m² (including disturbance offset) or approximately 19.35% has been calculated (see Figure 2).

Pruning impacts:

- No pruning is anticipated for accommodating the works.

3.4.7 Tree 6—SRZ = 2.6m^r; TPZ = 6m^r (113m²)Structural Root Zone impacts:

- Nil encroachment (including disturbance offset of 1 – 1.5m outside footprint) but close to SRZ perimeter.

Tree Protection Zone impacts:

- An encroachment of approximately 22.7m² (including disturbance offset) or approximately 20% has been calculated (see Figure 2).
- This estimated *moderate* encroachment is within an acceptable range from an arboricultural perspective, provided machinery use is excluded within the disturbance zone.

Pruning impacts:

- No pruning will be required to accommodate the works.

3.4.8 Tree 8—SRZ = 3.1m^r; TPZ = 9m^r (255m²)**Structural Root Zone impacts:**

- Possible impacts; new footprint on SRZ perimeter, but likely disturbance into SRZ radius during new works.

Tree Protection Zone impacts:

- Existing encroachment of (i.e. parking and perimeter path) of 43.6m². This is a long-established paved area and unlikely to affect the notional TPZ impact figures.
- A *low to moderate* encroachment of approximately 38m² (including disturbance offset) or approximately 14.9% has been calculated via new works.
- The estimated encroachment is within an acceptable range from an arboricultural perspective, noting there will remain contiguous soil areas outside the tree's notional TPZ offset.

Pruning impacts:

- No pruning is anticipated for accommodating the works.

3.4.9 Tree 9—SRZ = 2.4m^r; TPZ = 4.8m^r (72m²)**Structural Root Zone impacts:**

- Nil encroachment if the existing path remains without replacement, etc. Works to alter the existing turning head footprint are just outside the notional SRZ offset.
- SRZ encroachment will result if the path is reconstructed and will require care to avoid damage to structural roots (if any) present beneath the existing path.

Tree Protection Zone impacts:

- An encroachment of approximately 9.7m² (not including disturbance offset) or approximately 13.5% has been calculated (see Figure 2).
- A *low to moderate* encroachment is within an acceptable range from an arboricultural perspective, however if the existing path is demolished and replaced it could result in an encroachment in the 28% range (and includes potential SRZ impacts), which is considered to be a high level of impact.

Pruning impacts:

- No pruning is anticipated to accommodating the works.

3.4.10 Tree 10—SRZ = 2.8m^r; TPZ = 6.6m^r (137m²)**Structural Root Zone impacts:**

- Nil encroachment if the existing path remains without replacement, etc.
- SRZ encroachment will result if the path is reconstructed and will require care to avoid damage to structural roots (if any) present beneath the existing path.

Tree Protection Zone impacts:

- An encroachment of approximately 4m² (not including disturbance offset) or approximately 3% has been calculated (see Figure 2).
- A *low* range of encroachment is within an acceptable range from an arboricultural perspective, however if the existing path is demolished and replaced it could result in an encroachment in the 28% range (and includes potential SRZ impacts), which is considered to be a high level of impact.

Pruning impacts:

- No pruning will be required to accommodate the works.

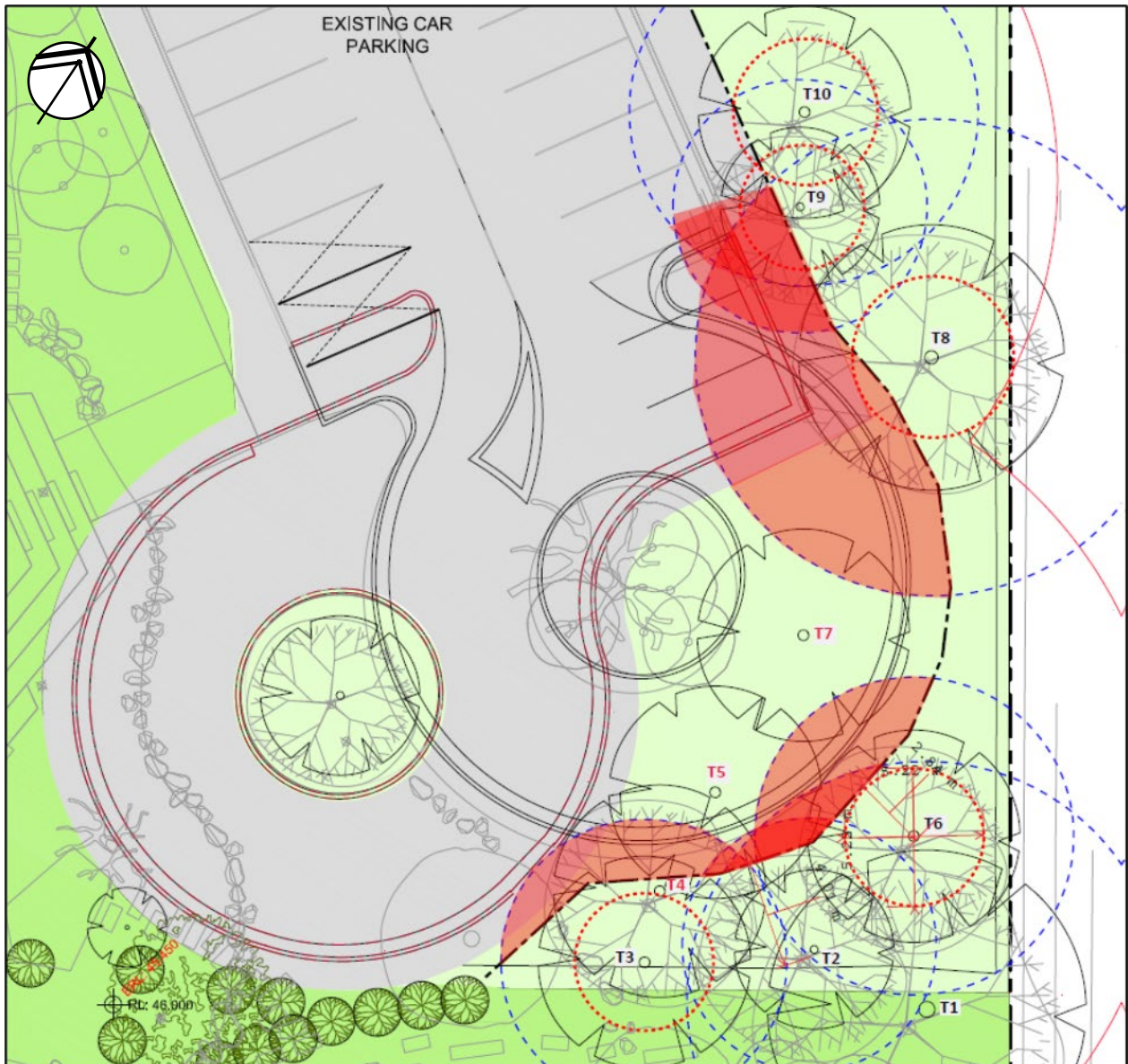


Figure 2

Illustrates the notional SRZ (inner red dashed circle) and TPZ (outer dashed blue circle) for Trees 3, 6, 8, 9 and 10. The red shaded area depicts the encroachment into the tree protection zone, noting that the encroachment also includes a roughly 1.5m wide disturbance zone beyond the actual built footprint, and this area will become available for tree root occupation after works are completed. Tree numbered 4, 5 and 7 (in red) are to be removed.

Not to scale. Excerpt of Proposed Landscape Plan MPSS-40-01 Rev 4, 04.02.22, marked up by C. Mackenzie.

3.4.11 Tree 19—SRZ = 2.8m^r; TPZ = 6.6m^r (137m²)Structural Root Zone impacts:

- Nil encroachment (including disturbance offset of 1 – 1.5m outside footprint).

Tree Protection Zone impacts:

- An encroachment of approximately 16.6m² (including disturbance zone) or approximately 12% has been calculated (see Figure 3).
- A *low to moderate* range of encroachment is identified, noting the disturbed area will be available for new root growth post-construction, and the actual encroachment will be in the low range and acceptable from an arboricultural perspective
- A proposed informal path through the TPZ is unlikely to involve any major disturbance or root loss in the TPZ area provided the existing levels are not altered by excavation and any fill is only a maximum of 150mm depth and of coarse material (i.e. not finer than the existing soil structure).

Pruning impacts:

- No pruning is anticipated to accommodate the proposed works.

3.4.12 Tree 20—SRZ = 3.2m^r; TPZ = 9.6m^r (290m²)Structural Root Zone impacts:

- Nil encroachment (including disturbance offset of 1 – 1.5m outside footprint).

Tree Protection Zone impacts:

- An encroachment of approximately 60.35m² (including disturbance zone) or approximately 21% has been calculated (see Figure 3).
- A *moderate to high* range of encroachment is identified, however, the disturbed area will be available for new root growth, post-construction, which places the permanent encroachment in the *low* range of approximately 4.7% and is acceptable from an arboricultural perspective.
- A proposed informal path through the TPZ is unlikely to involve any major disturbance or root loss in the TPZ area provided the existing levels are not altered by excavation and any fill is only a maximum of 150mm depth and of coarse material (i.e. not finer than the existing soil structure).

Pruning impacts:

- No pruning is anticipated to accommodate the proposed works.

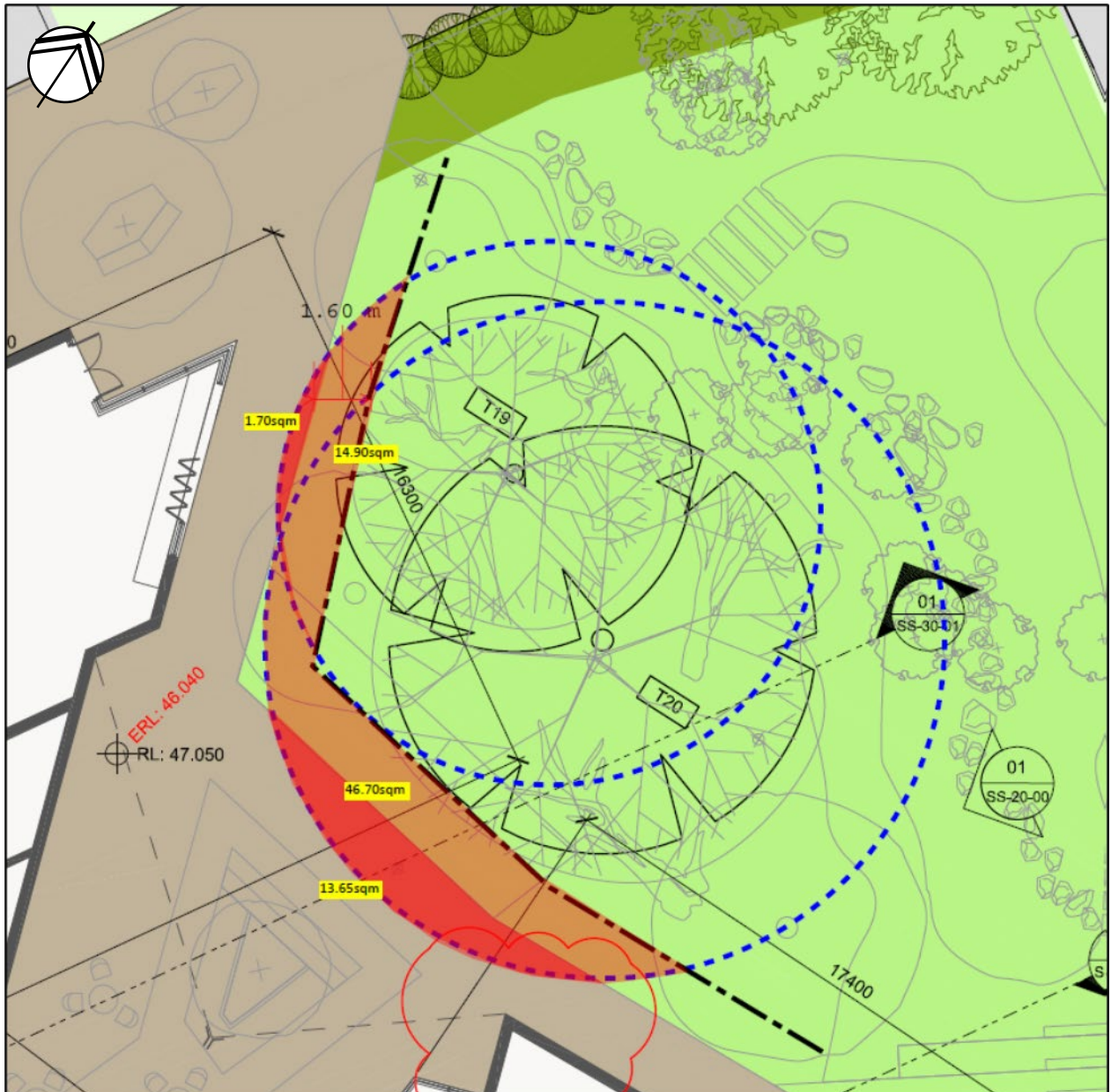


Figure 3

Illustrates the notional TPZ (dashed blue circles) for Trees 19 and 20. The darker red shaded areas depict the 'permanent' encroachment into the tree protection zone; the lighter red areas are the approximately 1.5m wide disturbance zones beyond the actual built footprint, which will become available for tree root occupation after works are completed. Not to scale. Excerpt of Proposed Ground Plan MP-SS-10-01 Rev 3, 04.02.22, marked up by C. Mackenzie.

4 CONCLUSIONS

- A total of 15 trees are included in this Arboricultural Impact Assessment. Of these:
 - 6 trees are proposed to be removed—Trees 4, 5, 7, 14, 15 and 17. These trees are within the footprint of proposed structures and paved areas.
 - 9 trees are proposed to be retained—Trees 1, 2, 3, 6, 8, 9, 10, 19 and 20.
- No assessed tree on the site was identified as an endangered species, although Forest Red Gum is a component species of the Cumberland Plain Woodland endangered ecological community.
- Trees 1 and 2 would have nil to minor (<10%) estimated encroachments resulting from the proposed realignment of the car park turning head. These figures include a likely disturbance zone within the TPZ where construction access would be likely.
- Trees 3, 6 and 19 would have low to moderate (10 - 20%) estimated encroachments resulting from the proposed realignment of the car park turning head and the pavilion works. These figures include a likely disturbance zone within the TPZ where construction access would be likely however, following completion of works it would be expected the roots of trees could occupy those disturbed areas and reduce the overall TPZ encroachment level.
- Trees 8, 9 and 10, under the assumption the existing surfaces were removed to facilitate the new turning head, may result in SRZ encroachments and high TPZ encroachments which could substantially affect tree health and stability, however, should existing pavements remain undisturbed within the TPZ and SRZ of Trees 9 and 10 and, for the most part, Tree 8, those impacts would be dramatically reduced. Arboricultural advice and supervision of works is certainly warranted in this respect.
- A moderate to high (>20%) level of encroachment is identified for Tree 20, however this does include the 'disturbance' area in the calculations. The reality is the encroachment will be in the vicinity of 4.7% and acceptable.
- Provided the recommendations of this report are adopted, and a site arboriculturist provides appropriate supervision and management of the trees during development, adverse impacts on tree vigour and structural condition of trees to be retained will be managed as practically as possible, and it is unlikely any tree decline or tree removal will result from the proposed works.

5 RECOMMENDATIONS

5.1 Project Arboriculturist

- 5.1.1 A Project Arboriculturist (PA) shall be engaged prior to works commencing on the site, including demolition of structures, site clearing and the like.
- 5.1.2 The PA must hold an Australian Qualification Framework Level 5 (AQF5) in Arboriculture.
- 5.1.3 Duties of the PA shall include, but not be limited to:
- Liaising with the Project Manager/Head Contractor/Site Manager to confirm the tree protection fencing locations, construction access, ground and root protection and other specific tree protection requirements prior to site works commencing are fit for purpose and in accordance with the recommendations of this report and AS4970.
 - Inspection of Tree Protection Devices and supervision of works as recommended in this report or as specified in any Conditions of Consent associated with an approved development application.
 - Provision of Compliance Certification as and when required.

5.2 Tree removal

- 5.2.1 Removal of subject site trees are subject to authority review of this report, and approval is to be obtained (e.g. by Consent) before any tree is removed.
- 5.2.2 All tree removals are to be undertaken in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998) and the Guide to Managing Risks of Tree Trimming and Removal Work 2016 by Safe Work Australia.

5.3 General Tree Protection Recommendations

5.3.1 Tree and Root Pruning

- Any pruning required is to be assessed and approved by the PA, prior to undertaking any of this type of work
- Pruning shall not be undertaken by unqualified site personnel at any time.
- Pruning of branches must be undertaken by a minimum AQF Level 3 arborist in accordance with the Australian Standard AS4373-2007 *Pruning of amenity trees*,
- Unless otherwise approved by the Conditions of Development Consent, or by separate application and approval by the consent authority, pruning is to be limited to cutting of limbs less than 80mm diameters, and no more than 10% total live material removed.

5.3.2 Stockpiling and location of site sheds

- The project arboriculturist must be consulted prior to placing any items within a tree's TPZ.
- Where stockpiling must be located within the TPZ offset of trees to be retained, the existing/undisturbed natural ground must be covered with thick, coarse mulch to a minimum 75-100mm thickness.
- Large, or bulky materials (non-contaminating) can be stacked on wooden pallets or boards placed over the mulch.
- Tarpaulins (or similar) placed on boards or pallets on top of mulch shall be used to prevent loose or potentially contaminating materials from moving into the soil profile within the TPZ of trees.
- Where site sheds must be located within the TPZ offset of a tree/s, the shed must be fully elevated on all sides with a minimum 300mm between existing ground and the floor/floor bearers. Isolated pad footings must be carefully dug by hand and not damage or sever any roots greater than 20mm diameters.
- Any conflict between footing locations and larger roots (i.e. 20mm Ø plus) must be brought to the attention of the project arboriculturist who is to provide practical alternatives that do not include unnecessary tree root removal.

5.3.3 Fill Material

- Placement of fill material within the TPZ of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be a coarse, gap graded material such as 20 — 50mm crushed basalt or equivalent to provide some aeration to the root zone. Note that roadbase or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose.

5.3.4 Fencing and walls within the SRZ and TPZ of retained trees.

- Where fencing and/or masonry walls are to be constructed along site boundaries, they must provide for the presence of any living woody tree roots greater than 30mm Ø.
- Hand digging must occur within the SRZ of trees to be retained.
- For masonry walls/fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (e.g. steel or timber pickets, lattice etc) fixed to pillars.

5.3.5 Landscaping within tree root zones.

- The level of introduced planting media into any proposed landscaped areas within the TPZ is not to be greater than 75mm depth, and be of a coarse, sandy material to avoid development of soil layers that may impede water infiltration.
- Appropriate container size of proposed plants within the SRZ of trees should be determined prior to purchase of plants. Otherwise, any proposed landscaping within the SRZ must consist of tubestock only. This is required to ensure that damage to tree roots is avoided.
- Mattocks and similar digging instruments must not be used within the TPZ of the trees. Planting holes should be dug carefully by hand with a garden trowel, or similar small tool.
- Where possible, do not plant canopy trees beneath, or within 6 - 8m of overhead lines.

5.3.6 Other

- No washing or rinsing of tools or other equipment, preparation of any mortars, cement mixing, or brick cutting is to occur within 8m upslope of any trees to be retained.
- Regular monitoring of the trees during development works for unforeseen changes or decline will help maintain the trees in a healthy state.

Report prepared by Catriona Mackenzie

1 August 2022



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APPENDIX A

TERMS AND DEFINITIONS



TERMS AND DEFINITIONS

The following relates to terms or abbreviations that may have been used in this report and provides the reader with a detailed explanation of those terms.

Aerial inspection Where the subject tree is climbed by a professional tree worker or arborist specifically to inspect and assess the upper stem and crown of the tree for signs or symptoms of defects, disease, etc.

Age classes

Y	<i>Young</i> refers to a well-established but juvenile tree
SM	<i>Semi-mature</i> refers to a tree at growth stages between immaturity and full size
EM	<i>Early-mature</i> refers to a tree that is more or less full sized and vigourously growing.
M	<i>Mature</i> refers to a full sized tree with some capacity for further growth
LM	<i>Late Mature</i> refers to a full sized tree with little capacity for growth, not yet about to enter decline
OM	<i>Over-mature</i> refers to a tree about to enter decline or already declining.

Buttress A flange of adaptive wood occurring at a junction of a trunk and root or trunk and branch in response to loading.

Condition refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) and the state of the scaffold (i.e. trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition.

Crown All the parts of a tree arising above the trunk where it terminates by its division forming branches, e.g. the branches, leaves, flowers and fruit: or the total amount of foliage supported by branches.

Crown raise pruning Pruning technique where lower limbs are removed, thereby lifting the overall crown above the ground.

Deadwood refers to any whole limb that no longer contains living tissues (e.g. live leaves and/or bark). Some dead wood is common in a number of tree species.

Diameter at Breast Height (DBH) refers to the tree trunk diameter at breast height, i.e. measured at 1.4 m above ground level.

Dieback Death of growth tips/shoots and partial limbs, generally from tip to base. Dieback is often an indicator of stress and tree health.

Form refers to the crown shape of the tree as influenced by the availability or restriction of space and light, or other contributing factors within its environment. Crown form may be determined by tree shape, species and habit and described as Dominant, Codominant, Intermediate, Emergent, Forest and Suppressed, as well as Forest Form or Open Grown. May also be described qualitatively as Good Form or Poor Form.

Growth crack / split Longitudinal crack/split that may develop as a rupture in the bark from normal growth. Longitudinal crack/split that may develop in the trunk of some fast growing palms.

Habit The shape of a tree when its growth is unencumbered by constraints for space and light, e.g. idealized by an isolated field grown specimen with consideration of the species and the type of environment in which it evolved e.g. rainforest, open forest, etc.

Habitat A habitat is an ecological or environmental area that is inhabited by a particular species of animal, plant or other type of organism. It is the natural environment in which an organism lives, or the physical environment that

surrounds (influences and is utilised by) a species population. In restoration ecology of native plant communities or habitats, some invasive species create monotypic stands that replace and/or prevent other species, especially indigenous ones, from growing there.

Health (syn. vigour) refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

Inclusion - the pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet. This is normally a genetic fault and potentially a weak point of attachment as the bark obstructs healthy tissue from joining together to strengthen the joint.

Indigenous Native to an area, and not introduced.

Impact Level Rating (ILR) refers to the estimated percentage of the Tree Protection Zone (TPZ) affected by development impacts. Note: This is a general guide only. These figures are based on the notional SRZ and TPZ offsets of the trees as calculated under AS4970 and do not necessarily reflect the actual root zones of each tree. The assessing arboriculturist should consider that the actual SRZ or TPZ offsets may vary due to the site-specific conditions and constraints, e.g. past and existing at or below ground structures near the tree, site topography and soil hydrology will influence the presence, spread and direction of tree root growth. The age, vigour and condition of the tree, as well as the species tolerance to impacts, will also affect a tree's ability to respond to development disturbance.

IMPACT LEVEL RATING

0	0 – 0.9% of root zone impacted – no impact of significance
L	1 to 10% of root zone impacted – low (minor) level of impact
L - M	>10 to 15% of root zone impacted – low (minor) to moderate level of impact
M	>15 to 20% of root zone impacted – moderate level of impact
M – H	>20 to 25% of root zone impacted – moderate to high level of impact
H	>25 to 35% of root zone impacted – high level of impact
S	>35% of root zone impacted – significant level of impact

Note: This is a general guide only. These figures may vary due to the specific conditions and constraints on a particular site, tree species tolerance to impacts, age, vigour, condition of the tree, etc.

Lopping Cutting between branch unions (not to branch collars), or at internodes on a tree, with the final cut leaving a stub. Lopping may result in dieback of the stub and can create infection courts for disease or pest attack.

Root Mapping The exploratory process of recording the location of roots usually in reference to a datum point where depth, root diameter, root orientation and distance from trunk to existing or proposed structures are measured. It may be slightly invasive (disturbs or displaces soil to locate but not damage roots, e.g. hand excavation, or use of air or water knife), or non-invasive (does not disturb soil, e.g. ground penetrating radar).

Scaffold branch/root A primary structural branch of the crown or primary structural root of the tree.

Structural Root Zone (SRZ) Refers to the radial distance in metres, measured from the centre of the tree stem, which defines the critical area required to maintain stability of the tree. Only thorough investigation into the location of structural roots within this area can identify whether any minor incursions into this protection zone are feasible. Note: The SRZ is calculated on the diameter measured immediately above the root/stem buttress (DAB). Where this measurement is not taken in the field, it is calculated by adding 12.5% to the stem diameter at breast height (DBH). Note: The SRZ may not be symmetrical in shape/area where there is existing obstruction or confinement to lateral root growth, e.g. structures such as walls, rocky outcrops, etc).

Snub-nosed rib Adaptive wood formed over a crack, included bark or enclosed bark and may be a round edged (snub-nosed) rib where a broad convex swelling is formed over the crack by the addition of new growth increments, and the

cracking is slowed or prevented from developing further (Or, may be a sharp-edged rib as an elongated protuberance where a crack continues to develop).

Suppressed In crown class, trees which have been overtopped, whose crown development is restricted from above.

Sweep A curve in the trunk, generally near the ground. This usually occurs when a tree is partially wind thrown when young, but then stabilises itself and straightens due to reaction wood. Stem sweep can also be a naturally developed feature of some tree species. e.g. *Araucaria columnaris* (Cook Pine), that has no relationship to a defect or partial windthrow.

Tree Protection Zone (TPZ). Refers to the radial distance in metres, measured from the centre of the tree stem which defines the *tree protection zone* for a tree to be retained. This is generally the minimum distance from the center of the tree trunk where protective fencing or barriers are to be installed to create an exclusion zone. The **TPZ** surrounding a tree aids the tree's ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death and the possibly damage to structural stability of the tree from root damage. To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the TPZ. Note: In many circumstances the tree root zone does not occupy a symmetrically radial area from the trunk, but may be an irregular area due to the presence of obstructions to root spread or inhospitable growing conditions.

Tree Risk Assessment is the systematic process to identify, analyze, and evaluate tree risk. A tree risk rating of Low, Moderate, High or Extreme is derived by categorising or quantifying both the *likelihood* (probability) of tree or tree part(s) failure and impact on a target(s) and the severity of consequences of the impact on the target(s).

USEFUL LIFE EXPECTANCY (ULE) In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. ULE i.e. a system designed to classify trees into a number of categories so that information regarding tree retention can be concisely communicated in a non-technical manner. ULE categories are easily verifiable by experienced personnel without great disparity. A tree's ULE category is the life expectancy of the tree modified first by its age, health, condition, safety and location (to give the life expectancy); then by economics (i.e. cost of maintenance - retaining trees at an excessive management cost is not normally acceptable); and finally, effects on better trees, and sustained amenity (i.e. establishing a range of age classes in a local population). ULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with a short ULE may at present be making a contribution to the landscape, but their value to the local amenity will decrease rapidly towards the end of this period, prior to them being removed for safety or aesthetic reasons. For details of ULE categories see Appendix B, modified from Barrell 2001.

Vigour (syn. health) refers to the tree's health as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

Woody roots usually used in reference to the first order roots i.e. structural (anchor) roots and woody lateral roots within the Structural Root Zone. Damage, disturbance to, or severing of these roots can compromise the stability of the tree.

APPENDIX B

TREE RETENTION VALUE ASSESSMENT



APPENDIX B—TREE RETENTION VALUE ASSESSMENT

Part 1 of 3—Useful Life Expectancy (ULE)

In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. ULE i.e. a system designed to classify trees into a number of categories so that information regarding tree retention can be concisely communicated in a non-technical manner. ULE categories are easily verifiable by experienced personnel without great disparity. A tree's ULE category is the life expectancy of the tree modified first by its age, health, condition, safety and location (to give the life expectancy); then by economics (i.e. cost of maintenance - retaining trees at an excessive management cost is not normally acceptable); and finally, effects on better trees, and sustained amenity (i.e. establishing a range of age classes in a local population).

ULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with a short ULE may at present be making a contribution to the landscape, but their value to the local amenity will decrease rapidly towards the end of this period, prior to them being removed for safety or aesthetic reasons.

ULE categories (modified from Barrell 2001) The five categories and their sub-groups are as follows:

- 1. Long ULE** - tree appeared retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance:
 - A. structurally sound trees located in positions that can accommodate future growth
 - B. trees which could be made suitable for long term retention by remedial care
 - C. trees of special significance which would warrant extraordinary efforts to secure their long term retention
- 2. Medium ULE** - tree appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance:
 - A. trees which may only live from 15 to 40 years
 - B. trees which may live for more than 40 years but would be removed for safety or nuisance reasons
 - C. trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
 - D. trees which could be made suitable for retention in the medium term by remedial care
- 3. Short ULE** - tree appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance:
 - A. trees which may only live from 5 to 15 years
 - B. trees which may live for more than 15 years but would be removed for safety or nuisance reasons
 - C. trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
 - D. trees which require substantial remediation and are only suitable for retention in the short term
- 4. Removal** - trees which should be removed within the next 5 years.
 - A. dead, dying, suppressed or declining trees because of disease or inhospitable conditions.
 - B. dangerous trees through instability or recent loss of adjacent trees
 - C. dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
 - D. damaged trees that are clearly not safe to retain.
 - E. trees which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.
 - F. trees which are damaging or may cause damage to existing structures within the next 5 years.
 - G. trees that will become dangerous after removal of other trees for the reasons given in (a) to (f).
 - H. trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
- 5. Small, young or regularly pruned** - Trees that can be reliably moved or replaced.
 - A. small trees less than 5m in height.
 - B. young trees less than 15 years old but over 5m in height.
 - C. formal hedges and trees intended for regular pruning to artificially control growth

Part 2 of 3—IACA Significance of a Tree, Assessment Rating System (STARS)©

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have 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 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.



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 <i>in situ</i> - 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 a form typical or atypical for the species
The tree is a planted locally indigenous or a common species with its taxa commonly planted in the 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 and/or below ground influences, reducing its ability to reach dimensions typical for the taxa <i>in situ</i> .
3. LOW SIGNIFICANCE IN LANDSCAPE
The tree is in fair-poor condition and good or low vigour
The tree has a form atypical for 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 <i>in situ</i> - 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.

The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge. In the development of this document IACA acknowledges the contribution and original concept of the Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd and Andrew Morton in June 2001.

Part 3 of 3—Tree Retention Value Priority Matrix

		SIGNIFICANCE															
		1. High				2. Medium				3. Low							
		Significance in landscape				Significance in landscape				Significance in landscape				Environmental pest / Noxious weed species		Hazardous / Irreversible decline	
ESTIMATED LIFE EXPECTANCY	1. Long >40 years																
	2. Medium 15–40 years																
	3. Short <1–15 years																
	Dead																

LEGEND FOR MATRIX ASSESSMENT



	Priority for Retention (High) -These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc. if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) -These trees may be retained and protected. These are considered less critical; however, their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) -These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Consider for Removal (Low) -These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.

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

REFERENCES

Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

APPENDIX C

TREE PROTECTION DEVICES



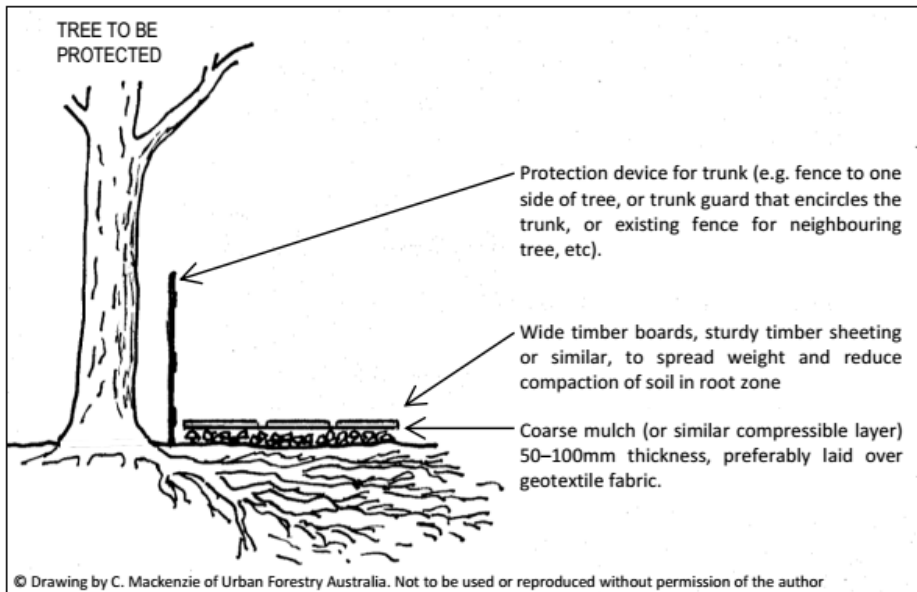


Figure 1
A method of reducing risk of root damage and soil compaction within the tree's Structural Root Zone.

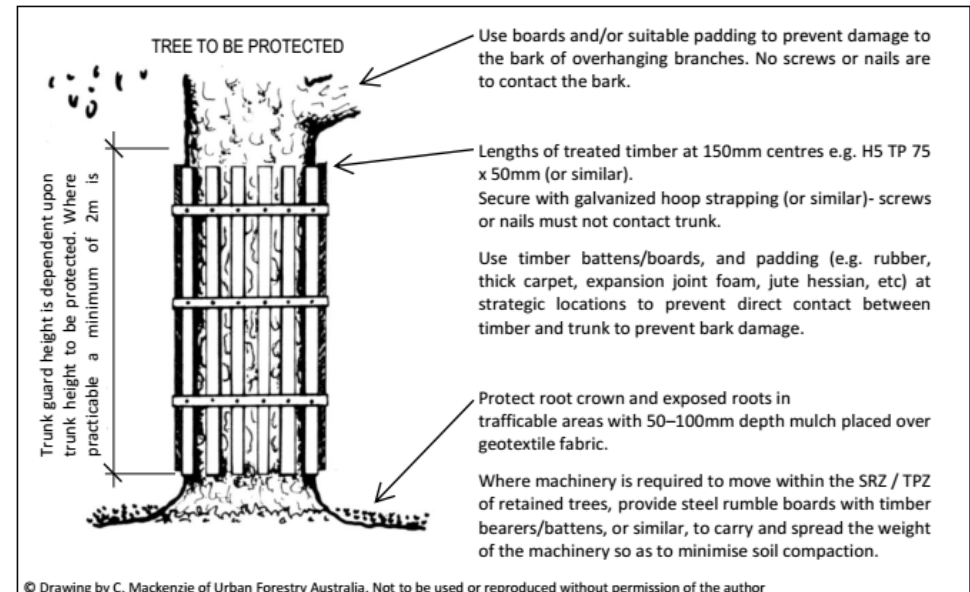


Figure 2
Example of tree trunk and tree branch protection.

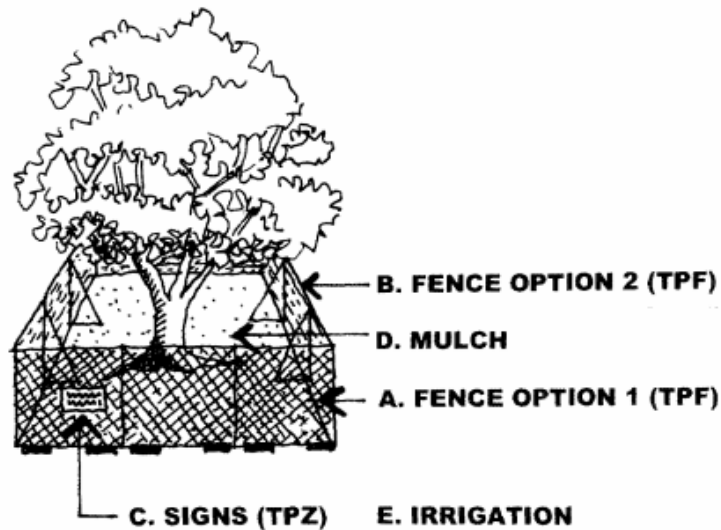


Figure 3
TREE PROTECTIVE FENCING (TPF)

A. Fence Option 1 (TPF)

1.8 metre high chain wire mesh panels with shade cloth attached if required, to be held in place with concrete blocks.

B. Fence Option 2 (TPF)

1.8 metre high plywood or wooden panel/paling fence (prevents soil or building contaminants from coming under fence when panels are laid flush to ground).

C. Signs (TPZ)

Tree Protection Zone Signs

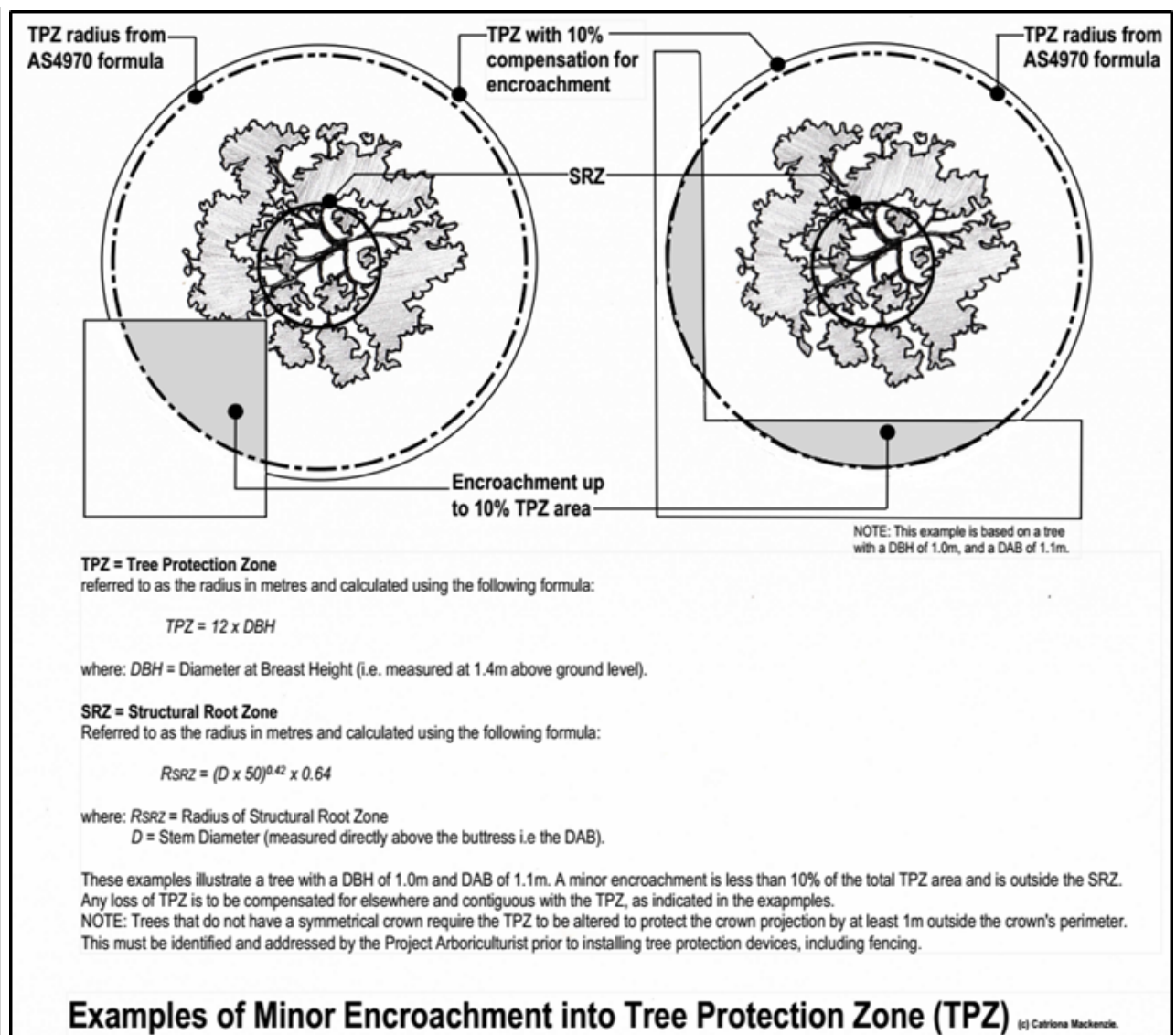
D. Mulch

50mm to 100mm thick layer of organic mulch, or aggregate, installed across surface area of TPZ.

E. Irrigation

Irrigation to arborist's advice.

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Include the Project Arboriculturist's details in the 'Contact' panel.

APPENDIX D

SCHEDULE OF ASSESSED TREES



SCHEDULE OF ASSESSED TREES – MODIFICATION OF DEVELOPMENT APPROVAL – ROUSE HILL ANGLICAN COLLEGE.

Note: Last tree assessment 2017 – Tree health and condition status not assessed or updated in 2022. Tree DBH's amended 2022.

Tree No.	Genus and species Common Name	Ht (m)	DBH (mm)	Age	V	C	Comments and Recommendations	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (m²)
1	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	700	M	N	?	Acutely angled and included stems @ 3m. Bracket fungus at wound at junction of NE stem (appears to be <i>Phellinus</i> sp.). Further investigation of decay recommended.	?	H	H	3.1	8.4	222.0
2	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	400	EM	F	F	Large Ø deadwood, and hangers. Dieback to W. Removal deadwood > 50mm Ø recommended.	2A	H	H	2.4	4.8	72.0
3	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	450	EM	N	F	Stem decay W side 7m. Scattered deadwood to 50mm Ø. Removal deadwood > 50mm Ø recommended.	2A	H	H	2.5	5.4	92.0
4	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	500	M	N	F	Co-dominant stems @ 7m. Stem wound E side.	2A	H	H	2.6	6.0	113.0
5	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	500	M	F	F	Dieback of N epicormic stem to NE. High volume large Ø deadwood to 120mm Ø	2A	H	H	2.6	6.0	113.0
6	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	500	M	N	G	Deadwood to 100mm Ø.	1A	H	H	2.6	6.0	113.0
7	<i>Eucalyptus tereticornis</i> Forest Red Gum	21	600	M	F	F	Epicormic crown. Rubbing sub-stem. Stem wound 1m to S.	2A	H	H	2.8	7.2	163.0
8	<i>Eucalyptus tereticornis</i> Forest Red Gum	23	750	M	N	F	Included sub-stem 4m. Low volume deadwood to 80mm Ø. Removal deadwood > 50mm Ø recommended.	1A	H	H	3.1	9.0	255.0
9	<i>Eucalyptus tereticornis</i> Forest Red Gum	10	400	EM	N	F	Possible lightning strike damage. Major interior dieback of stems - mallet tested ok. Dieback of significant branch w/spiral scar. Removal deadwood > 50mm Ø recommended.	2D	M	H	2.4	4.8	72.0
10	<i>Eucalyptus tereticornis</i> Forest Red Gum	10	550	M	F	F	Significant dieback. High volume deadwood to 80mm Ø. Removal deadwood > 50mm Ø recommended.	2D	M	H	2.8	6.6	137.0
14	<i>Eucalyptus tereticornis</i> Forest Red Gum	15	500	M	N	F	Entire root zone covered with pavement. Raised planter and seating around tree. Co-dominant stems @ 7m. Low volume deadwood.	3B	M	M	2.6	6.0	113.0
15	<i>Eucalyptus tereticornis</i> Forest Red Gum	15	275 + 375 (525)	M	N	F	Root zone covered with pavement. Raised planter and seating around tree. Included stems. Deadwood stub to W. Several rubbing/crossing branches.	3B	M	L	2.5	5.1	84

Tree No.	Genus and species Common Name	Ht (m)	DBH (mm)	Age	V	C	Comments and Recommendations	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (m ²)
17	<i>Eucalyptus tereticornis</i> Forest Red Gum	11	350	SM	N	P	Entire root zone covered with pavement. Raised planter and seating around tree. Loss of leading stem. Base dead w/stem decay – mallet tested w/poor result.	3B	M	L	2.3	4.2	55.4
19	<i>Eucalyptus tereticornis</i> Forest Red Gum	18	550	M	L	F	Significant crown decline. Included stems @ 2.5m. Removal deadwood > 50mm Ø recommended.	3D	H	M	2.8	6.6	137.0
20	<i>Eucalyptus tereticornis</i> Forest Red Gum	24	800	LM	F-G	G	Large deadwood 100mm Ø+ E side @ 14.5m. Removal deadwood > 50mm Ø recommended.	2A	H	H	3.2	9.6	290.0

KEY



Trees to be retained.



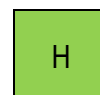
Prescribed trees proposed to be removed.



LOW Retention Value-These trees are not considered important for retention.



MEDIUM Retention Value-These trees may be retained and protected.



HIGH Retention Value -These trees are considered important for retention and should be retained and protected.

DETAILS FOR HEADINGS AND SYMBOLS USED IN TREE SCHEDULE

Ht refers to the approximate height of a tree in metres, from base of stem to top of tree crown.

DBH refers to the 'Diameter at Breast Height', being the diameter of the tree stem measured at 1.4 metres above ground (unless otherwise noted) and is expressed in millimetres. The numerical figure in parentheses (**) is the calculated DBH for a multiple stemmed tree, using the AS4970 formula

Age refer to Appendix A -Terms and Definitions for more detail.

V refers to the tree's vigour (health) Refer to Appendix A -Terms and Definitions for more detail.

C refers to the tree's structural condition. Refer to Appendix A -Terms and Definitions for more detail.

ULE refers to the estimated *Useful Life Expectancy* of a tree. Refer to Appendices A and B for details.

TSR The *Tree Significance Rating* considers the importance of the tree as a result of its prominence in the landscape and its amenity value, from the point of public benefit. Refer to Appendix B – Significance of a Tree Assessment Rating for more detail.

RV Refers to the retention value of a tree, based on the tree's ULE and Tree Significance. Refer to Appendix B – Significance of a Tree Assessment Rating for more detail.

SRZ (m^r) Structural Root Zone refers to the radial distance in metres of the critical area required to maintain stability of the tree. Refer to Appendix A -Terms and Definitions for more detail.

TPZ (m^r) Tree Protection Zone refers to the radial distance in metres, measured from the centre of the tree stem which defines the tree protection zone for a tree to be retained.

The TPZ of an individual tree is estimated at 12 times the stem diameter or may be the outer extent of the canopy dripline (whichever measurement is the greater). Refer to Appendix A -Terms and Definitions for more detail.

TPZ(m²) The calculated area within the TPZ radius.

APPENDIX E

TREE LOCATION PLAN



Arboricultural Impact Assessment for Rouse Hill Anglican College. 1st August 2022 © Urban Forestry Australia