



TREE MANAGEMENT CONSULTING ARBORICULTURISTS

ARBORICULTURAL IMPACT ASSESSMENT

for

Gartner Trovato Architects
Suite 13 / 10 Park Street
MONA VALE NSW 2103

SITE ADDRESS

1742 PITTWATER ROAD
BAYVIEW NSW 2104

AUGUST 2019

Prepared by
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INSTITUTE OF AUSTRALIAN
CONSULTING ARBORICULTURISTS



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1 INTRODUCTION

- 1.1 This Arboricultural Impact Assessment (AIA) prepared by Catriona Mackenzie of Urban Forestry Australia (UFA), was commissioned by Sean Gartner of Gartner Trovato Architects, on behalf of the owners of the subject site. 'The site' is identified as Lot E in DP404485 and Lot 4 in DP 455969 and known as 1742 Pittwater Road, Bayview, New South Wales.
- 1.2 This AIA is to accompany a development application to Northern Beaches Council for a proposed swimming pool and boatshed.
- 1.3 The purpose of this report is to assess the *vigour* and *condition* of the surveyed trees, and identify the potential impacts the proposed development may have on those trees to be retained in proximity to the works.
- 1.4 This report gives recommendations for tree retention or removal and provides guidelines for tree protection and maintenance.
- 1.5 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.
- 1.6 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 development application.
- 1.7 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 In preparation for this report, ground level, *visual tree assessments*¹ of seven (7) trees were undertaken by Catriona Mackenzie on 23 April 2019. Inspection details of these trees are provided in Appendix E—*Schedule of Assessed Trees*.
- 2.2 This AIA takes account of prescribed trees pursuant to Pittwater 21 Development Control Plan DCP 2014 – Section B4.22 Preservation of Trees or Bushland Vegetation.
- 2.3 Tree heights and canopy spreads were visually estimated or measured using a Nikon ForestryPro Laser measurer. Unless otherwise noted in Appendix D, all trunk diameters were measured at approximately 1.4 metres above ground level (“the DBH”), using a Yamiyo diameter tape.
- 2.4 Field observations were written down, and photographs of the site and trees were taken using an iPhone 8.
- 2.5 No *aerial inspections*, *root mapping* or woody tissue testing were undertaken as part of this tree assessment. 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.
- 2.6 Plans and documents referenced for the preparation of this report include:
- Survey Plan, Job Ref. 7552, Plan no. A1, Issue A, dated 25 January 2018, prepared by SDG Land Development Solutions;
 - Architectural Plans A-01 – 06, dated 15 August 2019, prepared by Gartner Trovato Architects.
 - AS4970-2009 *Protection of trees on development sites*, Standards Australia.
 - Section B4.22 Preservation of Trees or Bushland Vegetation of Pittwater 21 Development Control Plan 2014.
- 2.7 No hydraulic service or landscape plans have been reviewed in preparation of this report.
- 2.8 The subject trees are shown on a marked-up excerpt of the survey plan. This marked-up plan is attached as Appendix F—Tree Location Plan.

¹ Visual Tree Assessment (VTA) is a procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.

3 OBSERVATIONS AND DISCUSSION

3.1 Assessed Trees

3.1.1 Seven (7) prescribed trees were assessed and are included in this report. Details of these are included in the Schedule of Assessed Trees—Appendix E.

3.1.2 The prescribed 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. **R** = proposed removal.

Tree No.	Genus & species Common Name	RV	Tree No.	Genus & species Common Name	RV
1	<i>Corymbia maculata</i> Spotted Gum	H	5	<i>Corymbia maculata</i> Spotted Gum	H
2	<i>Corymbia maculata</i> Spotted Gum	L	6	<i>Corymbia maculata</i> Spotted Gum	H
3	<i>Corymbia maculata</i> Spotted Gum	H	7	<i>Corymbia maculata</i> Spotted Gum	H?
4	<i>Corymbia maculata</i> Spotted Gum	H			

3.1.3 Tree numbers—of the 7 assessed trees, the following is noted:

- Six (6) trees are located on the site—Trees 1 – 6.
- One (1) prescribed tree group is predominantly located within the adjoining land—Tree 7.

3.1.4 *Corymbia maculata* (Spotted Gum) is a key component of the species assemblage typical of the Pittwater Spotted Gum Forest Endangered Ecological Community, however, there are no other canopy or understorey trees on the land that are part of this vegetation community.

3.1.5 *Corymbia maculata* is not listed as a threatened species under Australian and/or State Government legislation (i.e. NSW *Biodiversity Conservation Act* 2016, and the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999).

3.2 Proposed Removal of Prescribed Trees for Site Development

3.2.1 One (1) prescribed tree is proposed to be removed.

- Tree 2—Spotted Gum of low RV. This large tree is located on the edge of a retained bank above the existing pool. The bank and retaining devices are collapsing and require repair and stabilisation.
- The tree exhibits symptoms of *Armillaria luteobubalina* (Honey Fungus) a disease that affects the roots of the host tree, causing rotting of roots and wood decay and eventual destabilisation. Lower trunk bulging is consistent with the tree responding to a deterioration of internal strength. Exudates and wounding are consistent with the external symptoms. This disease is common in Pittwater and particularly in Spotted Gums.
- There are currently no effective means of controlling the disease in large, mature trees as the methods of control usually rely on trenching and root barriers or exposing the root system to attempt to retard the disease spread. Exposing the root system is not practical as this tree already has a compromised anchorage system due to its highly eccentric arrangement on this bank.
- This tree has a poor prognosis as a safe amenity tree.

3.3 Proposed Tree Retention

3.3.1 The remaining five (5) site and one (1) neighbouring high RV trees are proposed to be retained (Trees 1, 3 – 7). Potential impacts on these trees are discussed in the following paragraphs.

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 *Tree Protection Zone* (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 The potential extent of root zone 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	
O	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

3.4.3 In determining the most appropriate locations for a proposed pool and ancillary items (such as landscape, decking, pool pump, etc) the architect and I discussed a number of options whilst on site that would potentially be agreeable to the client and would had the best outcome in terms of reducing impacts o existing trees on the site.

3.4.4 To this end, three (3) options were considered. These are:

Option A

- Entire pool is within the TPZ of T1 and will require excavation and therefore impact to T1.
- T1 is considered the most significant of all Spotted Gum trees in the rear yard, of the 7 trees.
- Pool is behind the Foreshore Building line, but close to neighbour’s house and therefore potential impacts on neighbours.
- No impact on any other trees.

Option B

- Pool is outside the TPZ of all major trees except T2.
- T2 is affected by borers and possibly a root rotting disease, and a potentially unstable bank that requires stabilising or re-building will disturb the tree’s Structural Root Zone.
- This pool location will free up the foreshore area for landscape – lawn at the waterfront edge and pool is disguised into the slope.

- Low to low-moderate impacts are on the other trees are supportable from an arboricultural perspective.
- No impact on neighbour's

Option C

- Existing pool must be relocated to allow for the boatshed as approved by Crown Land and Fisheries.
- Pool is within the SRZ of T6 and within the TPZ of T5, 6, 7 and will require excavation and therefore impact to T5, 6, 7, with likely removal of T6.
- No impact on neighbour's.
- Reduces the foreshore area to provide landscaped setting.

3.4.5 From analysis of the 3 options for the location of the pool, it is considered option B will have the least impact on the group of Spotted Gums. Although it will require the removal of T2, this tree has the least chance of long-term survival on the embankment. It is considered that T1, and the group T5, 6, 7 are more important to retain. Option B also provides the best result in terms of a landscaped foreshore and minimal impacts upon neighbour's and is therefore the most environmentally sensitive location.

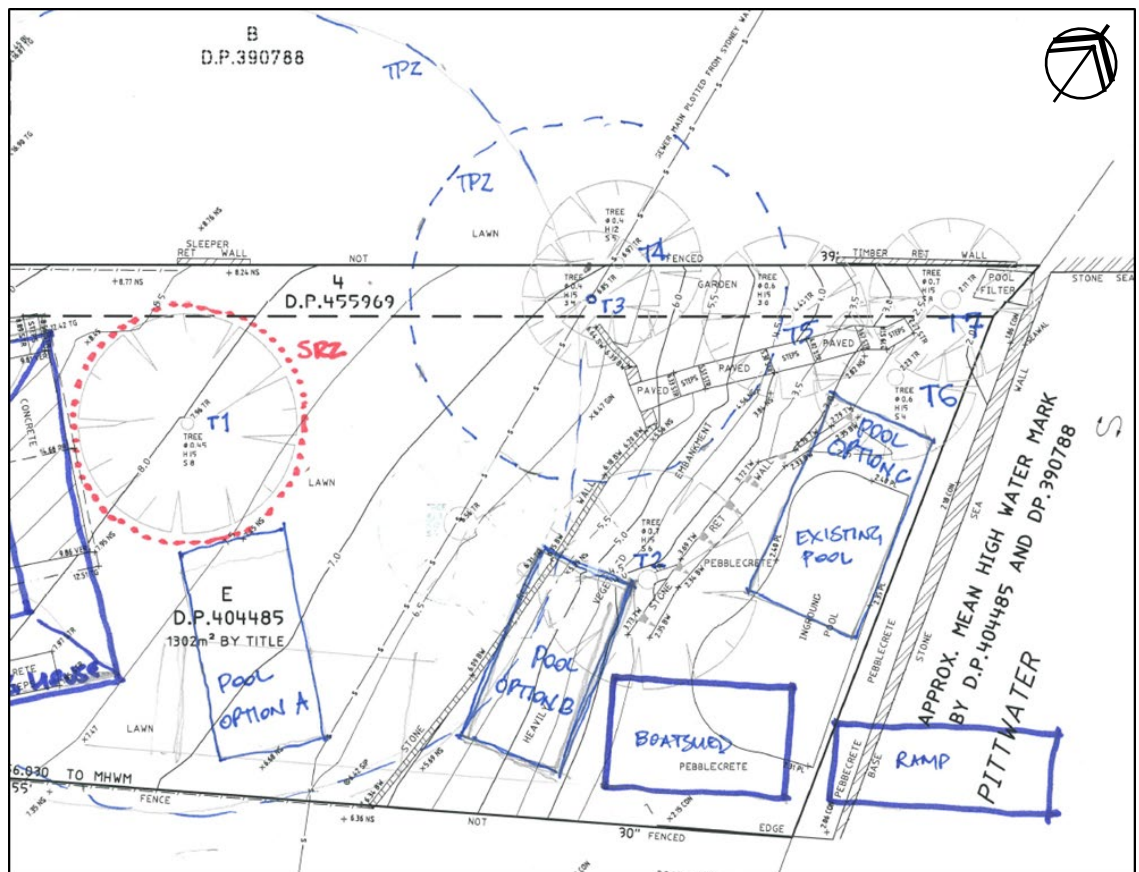


Figure 1

Illustrates the 3 options considered for the proposed pool, taking into consideration the locations and extent of Tree Protection Zones, function and practicality of pool location, client acceptance, and approved boatshed and ramp locations. Not to scale. Marked up by S. Gartner..

3.4.6 Disturbance within the *Structural Root Zone* (SRZ), and extent of encroachments into the TPZ's of prescribed trees to be retained are summarised in Table 4, below.

Table 3: Estimated encroachments into the SRZ and TPZ of trees proposed for retention.

Note 1: These figures are based on the *notional* SRZ and TPZ's offsets of the trees as calculated under AS4970 and do not necessarily reflect the actual root zones of the trees. Existing at or below ground structures, site topography and soil hydrology will influence the presence, spread and direction of tree root growth.

Tree No.	Tree	Tree located on site	works within SRZ	TPZ area (m ²)	TPZ encroachment (approx. m ²)	TPZ encroachment (approx. %)	ILR
1	Spotted Gum	✓	✗	707.0	*95	*13.4	L-M
3	Spotted Gum	✓	✓	137	*16	*11.6	L
4	Spotted Gum	✗	✓	163	*12	*7.36	L
5	Spotted Gum	✓	✓	222	*37	*16.6	L-M
6	Spotted Gum	✓	✓	163	*21	*12.8	L-M
7	Spotted Gum	✓	✓	290	*17.5	*6	L

* The actual encroachment figure will be less than above as part of this estimated encroachment includes 'temporary' encroachment areas that are available to tree root occupation following works.

3.4.7 **Tree 1**—Spotted Gum (Figure 2)

Structural Root Zone impacts:

- There are no proposed works within or near the SRZ of this tree.

Tree Protection Zone impacts:

- The proposed low retaining wall (stone blocks on ground), decking, steps, and a very small section of excavation would be located within the tree's notional 15m TPZ radius (see Figure 1). This represents an encroachment of approximately 75m² or 10.6%
- An area of fill between 0 – 300mm depth is proposed between the existing lawn and low retaining wall to minimise level changes between the two (see Figure 1). This is approximately 20m² in area and much of the fill will be less than 200mm depth. The overall area represents approximately 2.8% of the tree's TPZ. Further, this area will be accessible to new non-woody roots generating from the tree.

Pruning impacts:

- Nil. The tree will not require pruning for construction works.

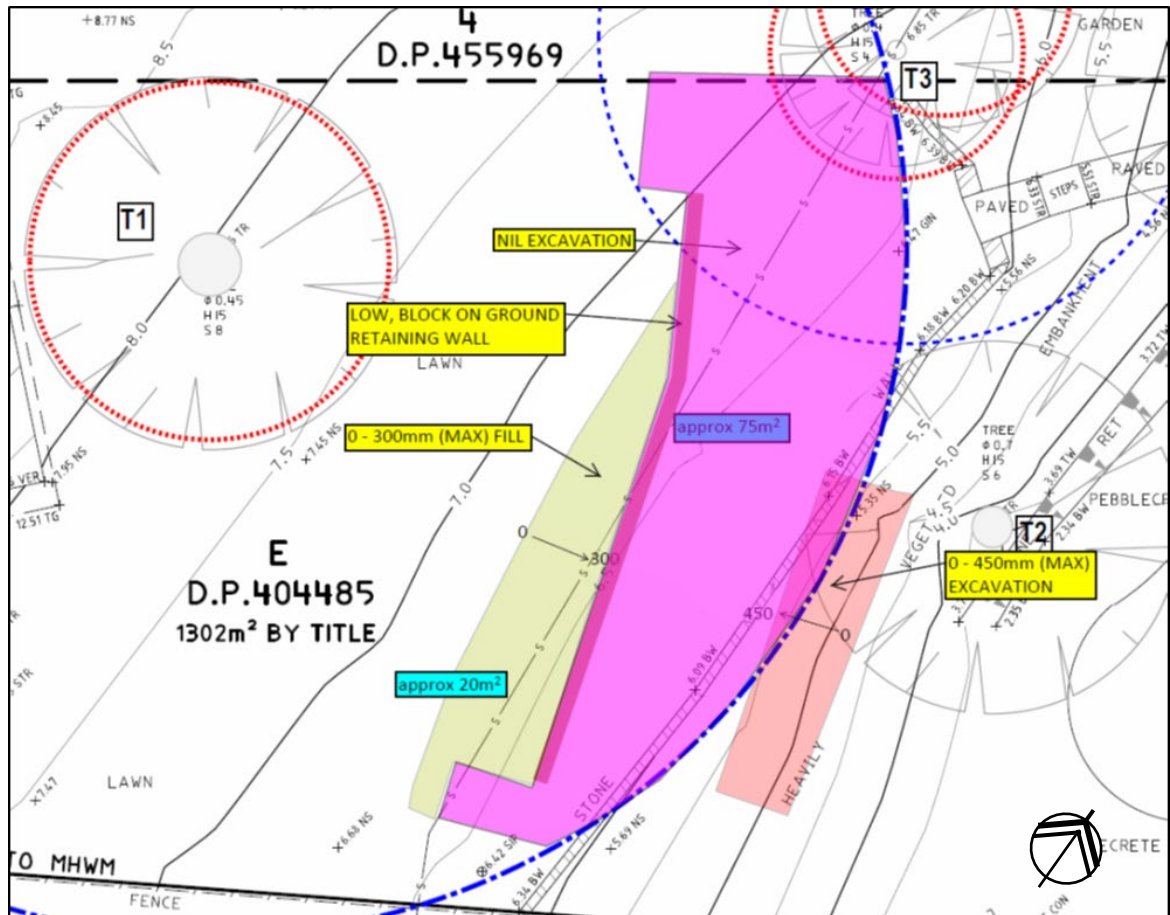


Figure 2

Illustrates the part of Tree 1's TPZ (blue dashed) where the proposal would encroach. The pink shaded area depicts the TPZ encroachments from the proposed low block wall and decking footprint

Not to scale. Survey marked up by C. Mackenzie.

3.4.8 Tree 3—Spotted Gum (Figure 3)

Structural Root Zone impacts:

- Pool fencing will span across the SRZ of this tree. The typical 2.4m fencing lengths may have to be adjusted to allow for posts to be located to avoid damage or disturbance to structural roots.

Tree Protection Zone impacts:

- A small section of the proposed low retaining wall (stone blocks on ground), decking and minor landscape works would be located within the tree's notional 6.6m TPZ radius. These represent an encroachment of approximately 16m² or 11.6%. Further, these minor structures will generally not impede new non-woody roots from growing into the disturbed areas following construction.

Pruning impacts:

- Nil. The tree will not require pruning for construction works.

3.4.9 **Tree 4**—Spotted Gum (Figure 3)

Structural Root Zone impacts:

- Pool fencing will span across the SRZ of this tree. The typical 2.4m fencing lengths may have to be adjusted to allow for posts to be located to avoid damage or disturbance to structural roots.

Tree Protection Zone impacts:

- A small section of the proposed low retaining wall (stone blocks on ground), decking and minor landscape works would be located within the tree's notional 7.2m TPZ radius. These represent an encroachment of approximately 12m² or 7.36%. Further, these minor structures will generally not impede new non-woody roots from growing into the disturbed areas following construction.

Pruning impacts:

- Nil. The tree will not require pruning for construction works.

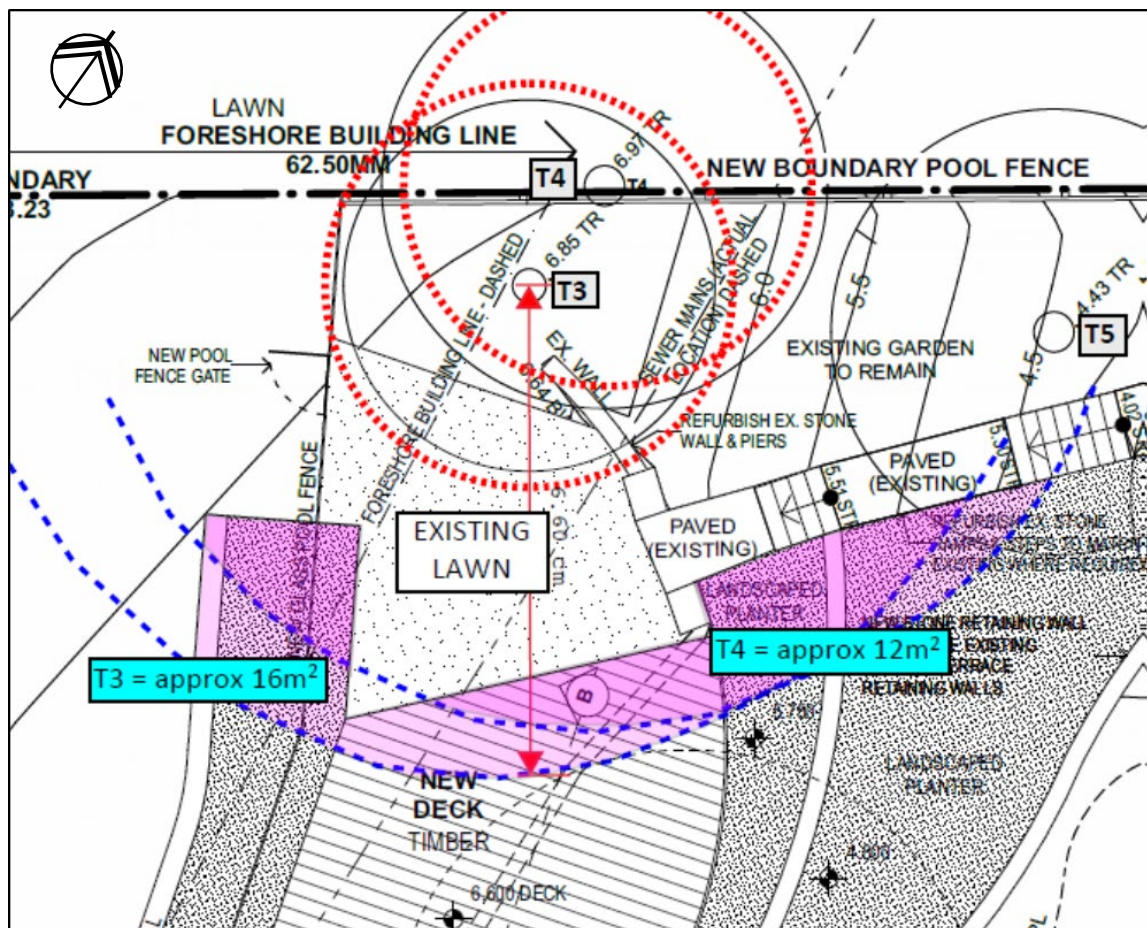


Figure 3

Illustrates the part of Trees 3 and 4 TPZ (blue dashed) where the proposal would encroach. The pink shaded areas depict the TPZ encroachments from the proposed low block wall, decking and landscaping.

Not to scale. Plan DA-03, marked up by C. Mackenzie.

3.4.10 **Tree 5**—Spotted Gum (Figure 4)

Structural Root Zone impacts:

- Pool fencing will span across the SRZ of this tree. The typical 2.4m fencing lengths may have to be adjusted to allow for posts to be located to avoid damage or disturbance to structural roots.

Tree Protection Zone impacts:

- New, low retaining walls consisting of stone blocks or stone 'logs' will be seated on natural ground and replace the existing low retaining walls that are deteriorating. Provided the new blocks can be seated without being placed directly on top of structural roots or require cutting of structural

Pruning impacts:

- Nil. The tree will not require pruning for construction works.

3.4.11 **Tree 6**—Spotted Gum (Figure 4)

Structural Root Zone impacts:

- Pool fencing will span across the SRZ of this tree. The typical 2.4m fencing lengths may have to be adjusted to allow for posts to be located to avoid damage or disturbance to structural roots.
- Provided the proposed new sandstone blocks or logs can be seated without being placed directly on top of structural roots or require cutting of structural roots the impact on the SRZ is likely to be negligible. I note the new wall will taper down toward Tree 6 and be at or very close to the existing level adjacent to this tree.

Tree Protection Zone impacts:

- New, low retaining walls consisting of stone blocks or stone 'logs' will be seated on natural ground and replace the existing low retaining walls that are deteriorating.
- There is no proposal to change levels to create level areas. A small level of coarse soil for landscape planting will be introduced over the area but will not exceed 100 – 150mm depth.

Pruning impacts:

- Nil. The tree will not require pruning for construction works.

3.4.12 Tree 7—Spotted Gum (Figure 4)

Structural Root Zone impacts:

- Pool fencing will span across the SRZ of this tree. The typical 2.4m fencing lengths may have to be adjusted to allow for posts to be located to avoid damage or disturbance to structural roots.

Tree Protection Zone impacts:

- New, low retaining walls consisting of stone blocks or stone 'logs' will be seated on natural ground and replace the existing low retaining walls that are deteriorating.
- There is no proposal to change levels to create level areas. Some coarse soil for landscape planting will be introduced over the area but will not exceed 100 – 150mm depth.

Pruning impacts:

- Nil. The tree will not require pruning for construction works.

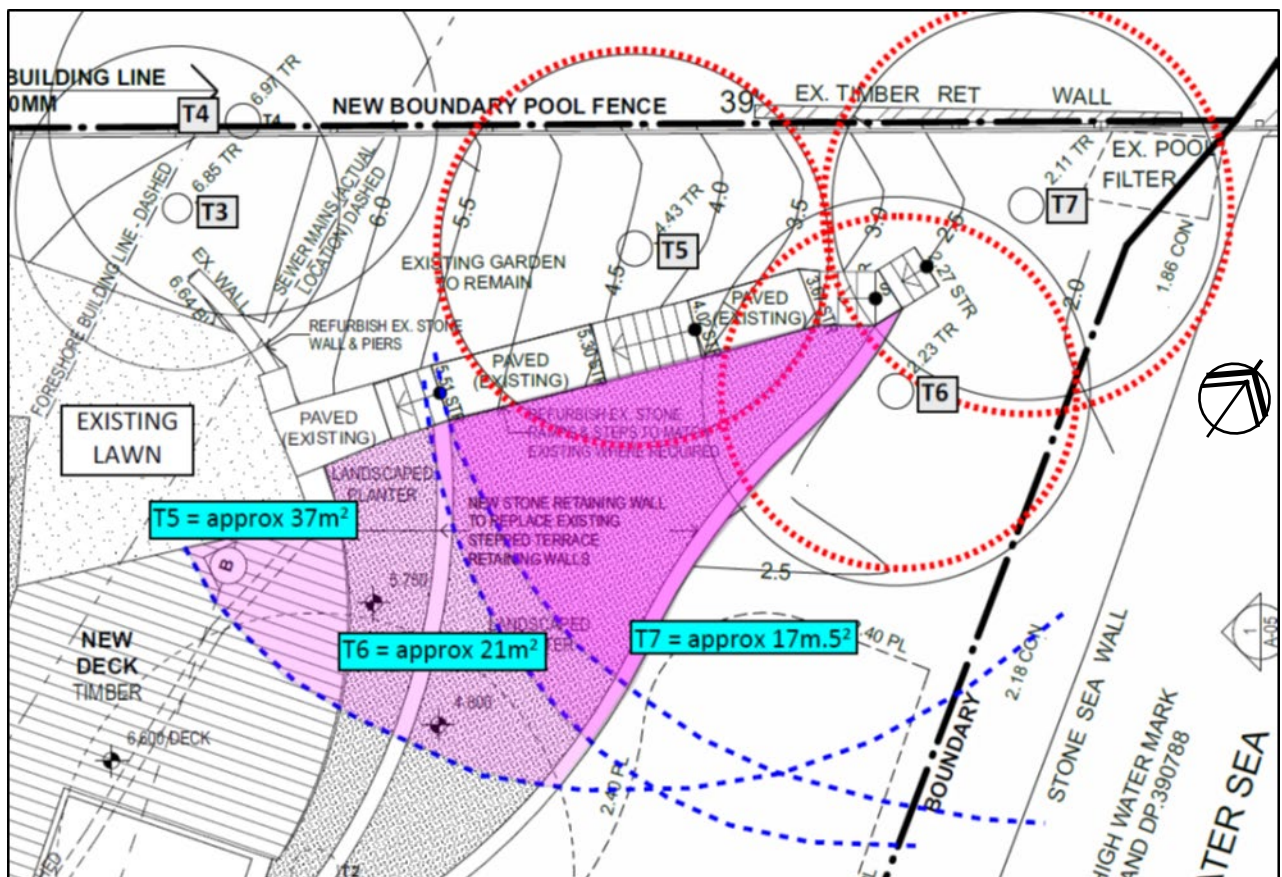


Figure 4

Illustrates the part of Trees 3 and 4 TPZ (blue dashed) where the proposal would encroach. The pink shaded areas depict the TPZ encroachments from the proposed low block walls, decking and landscaping.

Not to scale. Plan DA-03, marked up by C. Mackenzie.

3.2.1 Additional comments for Trees 3 – 7

- Removal of the existing pool and filling with material and turfing is unlikely to impact on the trees, particularly Tree 6, which is the closest. Roots would not have penetrated the pool shell so the potential impact on trees roots in this area would be negligible.
- The removal of the existing pebblecrete within the TPZ of Trees 6 and 7 has potential to impact on the trees if the existing ground beneath the slab slopes naturally away.
- It may not be possible to have a lawn level consistent with the existing pebblecrete platform level.
- Minor fill up to 150mm coarse material over existing grade is supportable. This area near Trees 6 and 7 (and north of the existing pool footprint), may need to incorporate landscaping following original contours rather than introducing excessive fill to create a level lawn.
- As the conditions of the ground beneath the slab will only be known following demolition of the slab, we will be recommending arboricultural supervision during works and subsequent advice on the most appropriate way to manage landscaping in this area without affecting tree health and stability.

4 CONCLUSIONS

- A total of seven (7) trees are included in this Arboricultural Impact Assessment. Of these:
 - Six (6) Spotted Gums are within the subject site—Trees 1, 2, 3, 5, 6 and 7.
 - One (1) Spotted Gum is located primarily on the adjoining property to the north (Tree 4).
- No assessed tree on the site or on adjoining properties was identified as an endangered species.
- Six Spotted Gums are considered to be of High Retention Value—Trees 1, 3, 4, 5, 6 and 7 and will be retained.
- One (1) prescribed Spotted Gum of low to moderate Retention Value is proposed to be removed.
- There are impacts into the theoretical SRZ for Trees 3, 4, 5, 6 and 7, however, provided pool posts and fencing are sympathetically located to avoid tree roots and introduced fill is of a minimal depth, the trees are not expected to be adversely affected by the proposed works.
- 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 additional tree removal will result.

5 RECOMMENDATIONS

5.1 Tree Removal

- 5.1.1 Removal of one Spotted Gum (Tree 2) is subject to authority review of this report, and approval is to be obtained (e.g. by Consent) before the tree is removed.
- 5.1.2 Tree removals are to be undertaken in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).

5.2 Project Arboriculturist

- 5.2.1 A Project Arboriculturist (PA) shall be engaged prior to works commencing on the site, including demolition of structures, site clearing and the like. The PA must have a minimum Australian Qualification Framework Level 5 (AQF5) or above in Arboriculture.
- 5.2.2 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, and other specific tree protection requirements prior to site works commencing.
 - 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.

5.3 Minimising Impacts on Trees to be Retained

- Any ground level changes, demolition or excavation within the calculated TPZ are to be directly supervised by the Project Arboriculturist. Determination of tree stability and suitability to retention is to be made at this time.
- Any pruning works shall be as described under Clause 7.3.2 of Australian Standards 4373-2007 (AS4373) and by a minimally qualified AQF Level 3 Tree Worker. Pruning works are not to exceed 10% total live canopy without Council or Project Arborist approval. Pruning is to be carried out prior to works commencing and only with tree owner permission.

5.4 Tree Protection

5.4.1 The Tree Protection is to be in accordance with the following:

- Tree Protection Devices (TPD) may include mulching, tree guards and other devices other than fencing.
- The TPD must be in place prior to any site works commencing, including clearing, demolition or grading.
- The most appropriate fencing for tree protection is 1.8m chainlink with 50mm metal pole supports. During installation, care must be taken to avoid damage to significant roots. The practicality of providing this fencing on this site must be addressed by the arboriculturist.
- Locate large primary roots by careful removal of soil within the fencing area. **Do not drive any posts or pickets into tree roots.** Replace soil back over tree roots.
- It is recommended that the arboriculturist provide written certification that the TPD is/are installed and will satisfy tree protection requirements.
- Nothing should occur inside the tree protection fenced areas, so therefore all access to personnel and machinery, storage of fuel, chemicals, cement or site sheds is prohibited.
- Signage should explain exclusion from the area defined by TPD and carry a contact name for access or advice (see Appendix E – Tree Protection Devices).
- The TPD cannot be removed, altered, or relocated without the project arborists' prior assessment and approval.

5.5 Arboricultural advice

5.5.1 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.

5.5.2 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 or within 10m upslope 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.
- Preference is to be given to the stockpiling location shown on the Tree Protection Plan—Appendix E.

5.5.3 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.
- The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil.
- Permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material shall be placed in direct contact with the trunk.

5.5.4 Pavements

- Pavements should be avoided within the TPZ of trees to be retained where possible.
- Proposed paved areas within the TPZ of trees to be retained is to be placed above grade to minimise excavations within the root zone, avoiding root severance and damage.

5.5.5 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 50mm diameter.
- 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.

5.5.6 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.

5.5.7 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 palms or 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

August, 2019



Catriona Mackenzie

Consulting arboriculturist, horticulturist and landscape designer.

Tree Risk Assessment Qualified 2014 (TRAQ)

Certificate of Horticulture *Honours*

Diploma of Horticulture (Arboriculture) *Distinction*

Associate Diploma of Applied Science (Landscape) *Distinction*

Member of the International Society of Arboriculture (ISA)

Founding Member of the Institute of Australian Consulting Arboriculturists (IACA) ACM0052003

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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.

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 vigorously 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.

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.

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.

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).

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

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.

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

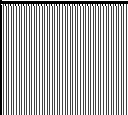
The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

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.

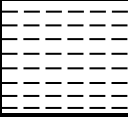
Part 3 of 3—Tree Retention Value Priority Matrix

		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																

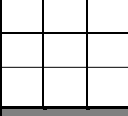
LEGEND FOR MATRIX ASSESSMENT




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 *Protection of trees on development sites*. 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.

INSTITUTE OF AUSTRALIAN
IACA
CONSULTING ARBORICULTURISTS

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



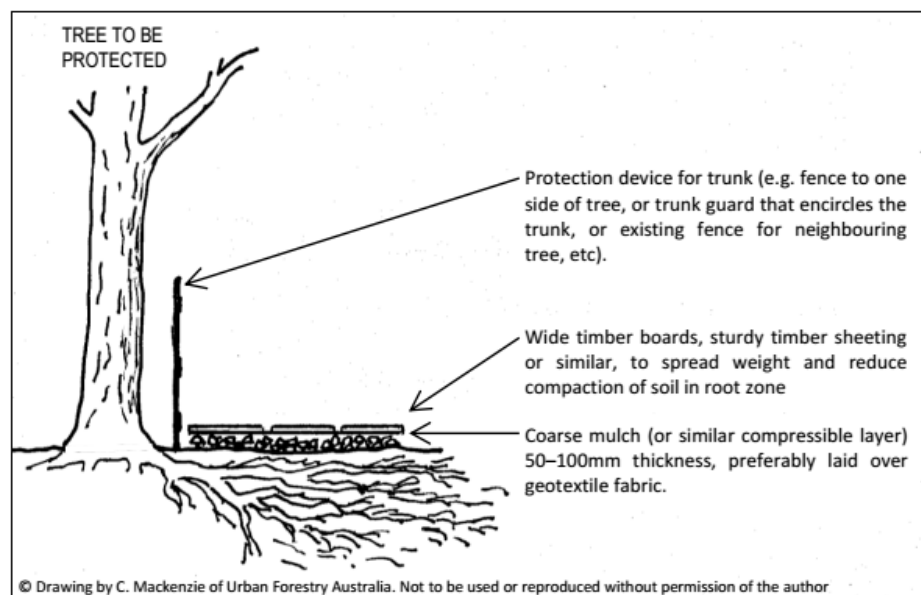


Figure 1
A method of reducing risk of root damage and soil compaction within the tree's Structural Root Zone.

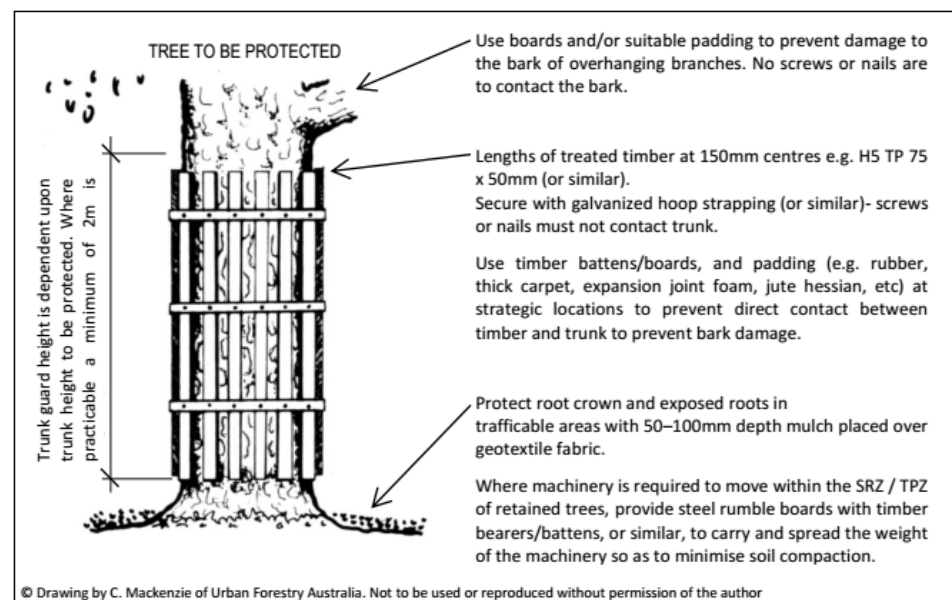


Figure 2
Example of tree trunk and tree branch protection.

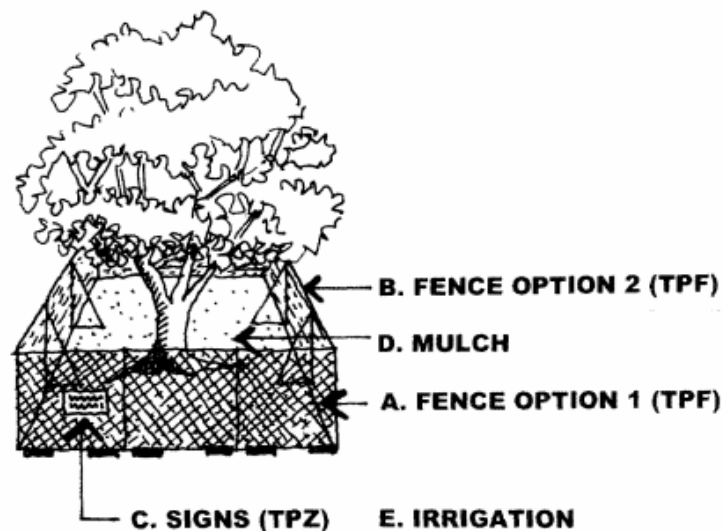


Figure 3

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.

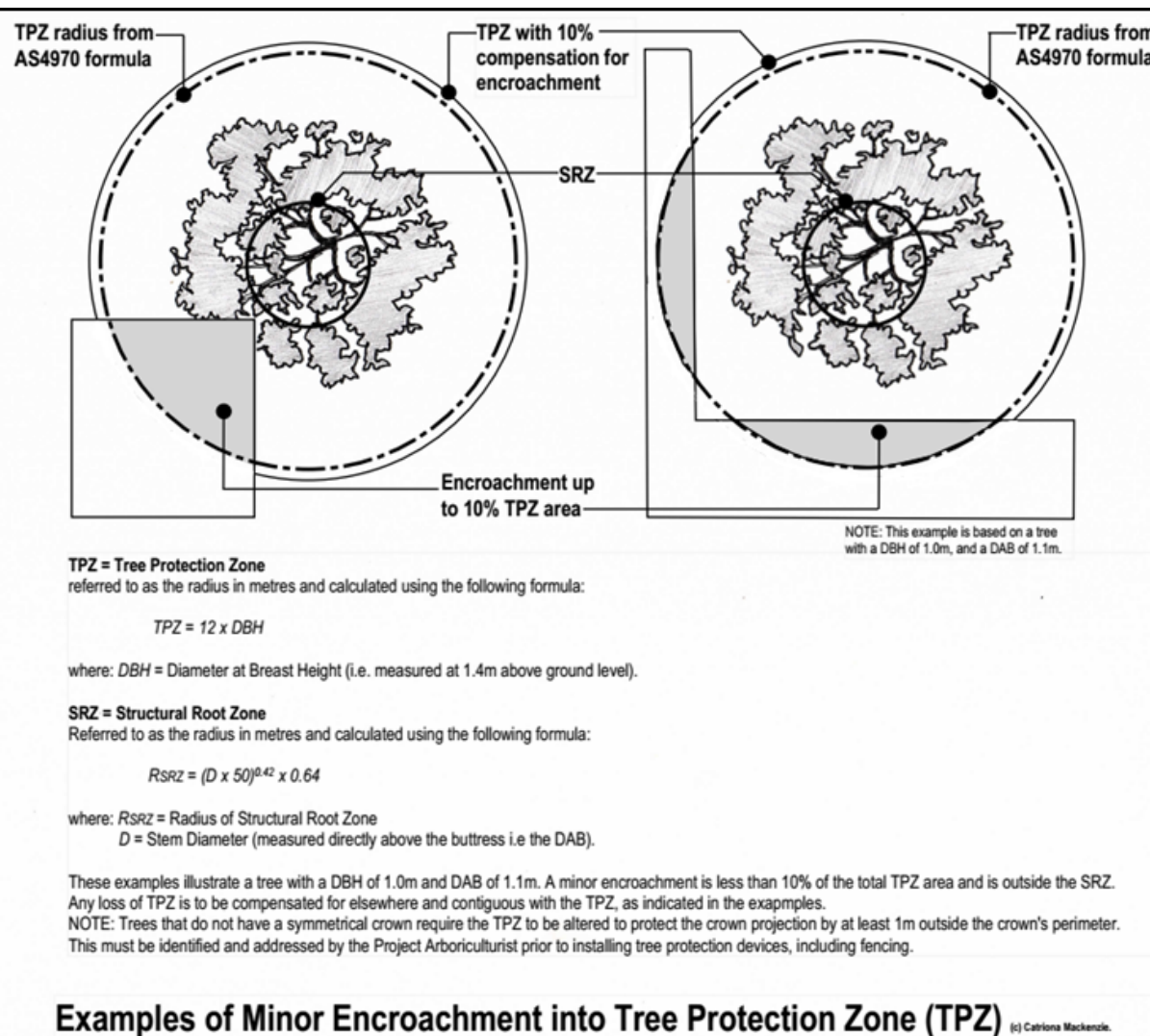
© Drawing by Selena Hannan. Used with permission.

TREE PROTECTION ZONE SIGNAGE



Contact:

Size: Approximate dimensions 225 x 300mm.
Material: Polypropylene or colourbond steel.



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

APPENDIX D

PHOTOGRAPHS





Plate 1

Illustrates the location of Trees 1 – 7. Drone image provided by client.



Plate 2

Illustrates the location of Trees 1 – 7. Drone image provided by client.

APPENDIX E

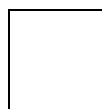
SCHEDULE OF ASSESSED TREES



Schedule of Assessed Trees—1742 Pittwater Road, Bayview. 23 April, 2019.

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Observations/Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)
1	<i>Corymbia maculata</i> Spotted Gum	23-24	18	1250	EM	G	G	Locally native species. Large, basal root mass. Minor volume, small Ø deadwood. Past crown raise pruning with some dead stubs. Some damage occurring to root bark from grass trimmers.	2A	H	H	3.9	15.0	707.0
2	<i>Corymbia maculata</i> Spotted Gum	27	15	800	M	G	F-P	Locally native species. Growing at edge of bank with no root support to N – highly asymmetric root plate. Notable bulging around base, with heavy kino exudate Canker and wound shape suggests likely <i>Armillaria</i> . Excessively crown raised. Existing bank and wall displacement-repair and stabilisation of retaining wall required. Phoenix pam seedling immediately at tree base is exacerbating conditions.	3B	H	L	3.2	9.6	290.0
3	<i>Corymbia maculata</i> Spotted Gum	26	10	550	SM	G	G	Locally native species. Parrot damage. Minor volume small to medium Ø deadwood.	2A	H	H	2.8	6.6	137.0
4	<i>Corymbia maculata</i> Spotted Gum	17	18	600	M	G	F	Locally native species. Some deadwood related to past pruning. Crown bias to NW, slightly suppressed by T3. Tree base appears to be predominantly on adjoining land.	2D	H	H	2.8	7.2	163.0
5	<i>Corymbia maculata</i> Spotted Gum	25	12	700	M	G	F	Locally native species. Heavily crown raised. Possible early stage of <i>Armillaria</i> (inverted 'v' lesions, no exudates). Longicorn borer exit holes. Dieback in prop root to NE at base of wall. Monitor condition.	2D	H	H	3.1	8.4	222.0
6	<i>Corymbia maculata</i> Spotted Gum	25	6	600	SM	G	F	Locally native species. Small cavity SSW side approximately 300mm depth by 250mm high at approximately 1.1m AGL. Heavily suppressed crown to S/SW. Good response growth. Resonance test around cavity and around did not indicate large cavity and loss of wood strength. Habitat tree. Monitor condition.	2D	H	H	2.8	7.2	163.0
7	<i>Corymbia maculata</i> Spotted Gum	24	10	800 @ 1m AGL	M	G	F-G?	Locally native species. Base of tree obscured as below existing slab level.	2D?	H	H?	3.2	9.6	290.0

KEY



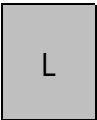

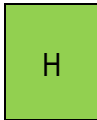
Prescribed trees to be retained



Prescribed trees proposed to be removed.



Non-prescribed trees exempt from tree preservation controls under PDCP.

	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.
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DETAILS FOR HEADINGS AND SYMBOLS USED IN TREE SCHEDULE

* Denotes those situations where the tree's Diameter at Breast Height (DBH) has been *visually* estimated (usually adjoining trees or those that are hard to access and/or physically measure).
 ? used to highlight a tentative condition assessment and subsequent ULE and RV rating where the tree cannot be visually assessed 'in-the-round' (usually adjoining trees or those that are hard to access).

() The numerical figure in parentheses is the calculated DBH for a multiple stemmed tree, using the AS4970 formula, *or*, is the calculated DBH where the measurement cannot be made at the standard 1.4m above ground level, e.g. where the diameter of the stem is measured at ground level (DGL) or above the buttress (DAB). All calculated figures are rounded up to the nearest 25mm to determine the tree's TPZ offsets.

NOTE: According to AS4970, the TPZ of palms, other monocots, cycads and tree ferns should not be less than 1m outside the crown projection. The AS4970 formula for calculating the SRZ of a tree does not apply to palms, other monocots, cycads and tree ferns.

DAB—The trunk/stem diameter measured *above the buttress* (i.e. root and trunk confluence), using a diameter tape

DGL—The trunk/stem diameter measured *at ground level*, using a diameter tape.

AGL—*above* ground level.

GL—*at* ground level.

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

Sp refers to the approximate and/or average diameter spread in metres of branches/canopy (the 'crown') of a tree.

DBH refers to the approximate diameter of tree stem at breast height i.e. 1.4 metres above ground (unless otherwise noted) and expressed in millimetres.

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 Structural Root Zone (SRZ) refers to the critical area required to maintain stability of the tree. Refer to Appendix A -Terms and Definitions for more detail.

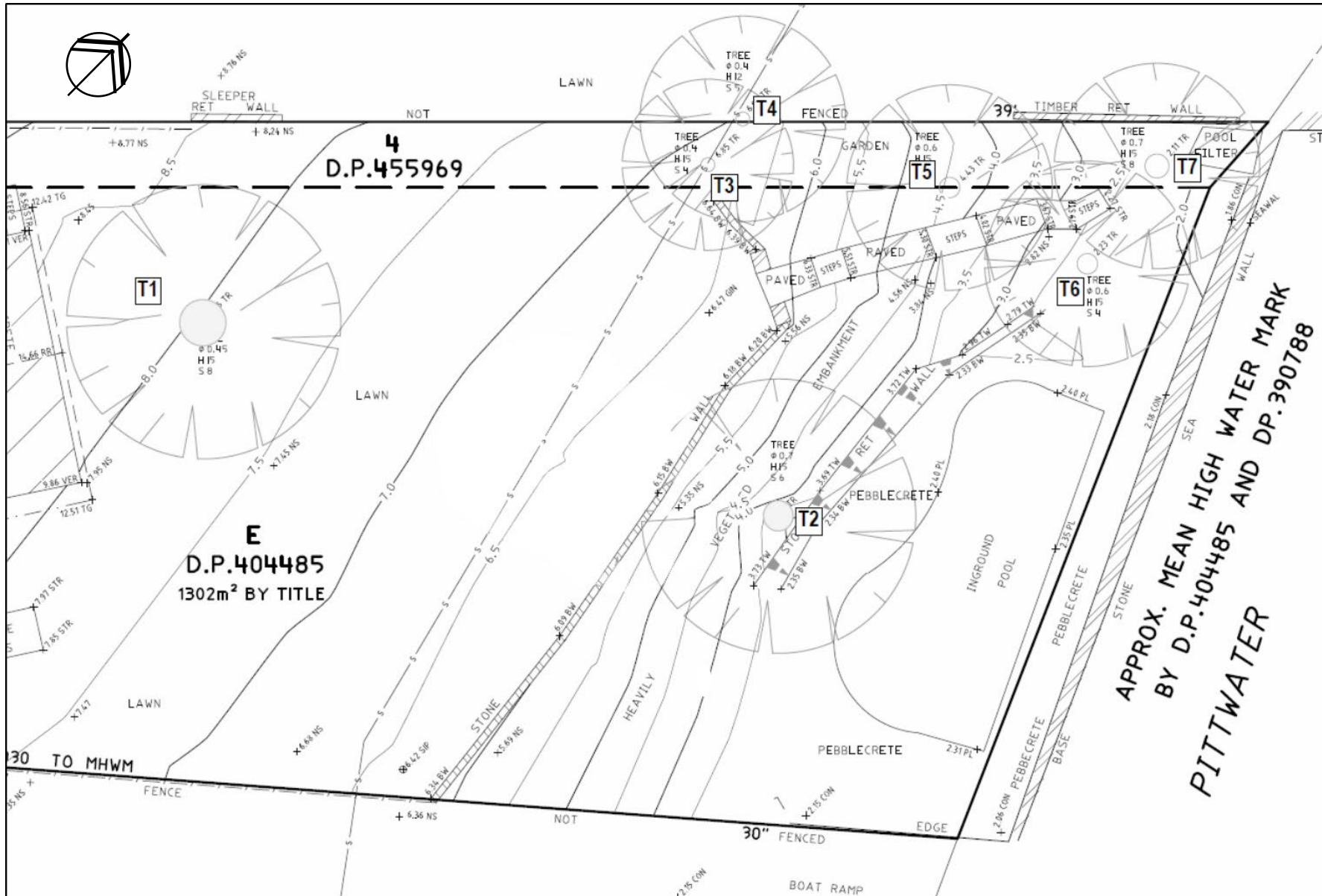
TPZ Tree Protection Zone (TPZ) refers to the *tree protection zones* for trees to be retained. Refer to Appendix A -Terms and Definitions for more detail.

ILR Impact Level rating. Refer to Appendix A -Terms and Definitions for more detail.

APPENDIX F

TREE LOCATION PLAN





Not to scale (Excerpt of site detail and level survey by CMS Surveyors, marked up by C. Mackenzie)