URBAN FORESTRY AUSTRALIA

TREE MANAGEMENT CONSULTING ARBORICULTURISTS

ARBORICULTURAL IMPACT ASSESSMENT

for

Ms Lin Yee
C/- Turnbull Planning International Pty Ltd
2301 / 4 Daydream Street
WARRIEWOOD NSW 2102

SITE ADDRESS

163 RIVERVIEW ROAD
AVALON

DECEMBER 2018

Prepared by
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1 INTRODUCTION

1.1 This Arboricultural Impact Assessment (AIA), prepared by Urban Forestry Australia (UFA), was commissioned by the Mrs Yin Lee and Mr Geoffrey Lee, owners of the subject site.

1.2 The 'site' is identified as Lot 1 in D.P. 19396, and known as 163 Riverview Road, Avalon Beach, New South Wales.

1.3 This AIA is to accompany a development application to Northern Beaches Council for proposed alterations and additions to the existing dwelling, a swimming pool and inclinator.

1.4 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.

1.5 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 development application.

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 In preparation for this report, ground level, *visual tree assessments*[1] of eighteen (18) trees, including street trees and those on adjoining properties, were undertaken by Catriona Mackenzie and Mark Jamieson for Urban Forestry Australia, on 4 May 2018. 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 Clause 5.9 of the Pittwater Local Environment Plan 2014, and prescribed and non-prescribed (exempt) trees as specified in Part B4.22—Preservation of Trees or Bushland Vegetation—Pittwater 21 Development Control Plan (PDCP).

2.3 Tree heights and canopy spreads were visually estimated or measured using a Nikon ForestryPro Laser measurer. Unless otherwise noted in Appendix E, 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 6 and/or Canon EOS SLR digital camera.

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, Ref. No. 3010, dated 19/06/2017, prepared by DP Surveying.
- Plans A101 – A113, dated 17/12/2018, prepared by Blue Sky Building Designs.
- Landscape Plan L-01, Rev H, dated 25/10/18, prepared by Space Landscape Designs.
- Pittwater 21 DCP
- AS4970-2009 *Protection of trees on development sites*, Standards Australia.
- Schedule 5 Environmental Heritage of the Pittwater Local Environment Plan.

2.7 No hydraulic service 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 Eighteen (18) trees (prescribed and non-prescribed) were assessed or identified and are included in this report. Details of these are included in the Schedule of Assessed Trees—Appendix E.

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. ■ = proposed removal.

Tree No.	*Genus & species* **Common Name**	On site?	RV	Tree No.	*Genus & species* **Common Name**	On site?	RV
1	*Corymbia maculata* **Spotted Gum**	✓	L	10	*Eucalyptus punctata* **Grey Gum**	X	M?
2	*Corymbia gummifera* **Red Bloodwood**	✓	L	11	*Elaeocarpus reticulatus* **Blueberry Ash**	✓	L
3	*Corymbia gummifera* **Red Bloodwood**	✓	M	12	*Eucalyptus punctata* **Grey Gum**	✓	H
4	*Corymbia maculata* **Spotted Gum**	✓	M	13	*Eucalyptus punctata* **Grey Gum**	✓	M
5	*Jacaranda mimosifolia* **Jacaranda**	✓	L	14	*Corymbia maculata* **Spotted Gum**	✓	H
6	*Ceratopetalum gummiferum* **NSW Christmas Bush**	✓	M	15	*Corymbia maculata* **Spotted Gum**	X	H
7	*Ceratopetalum gummiferum* **NSW Christmas Bush**	✓	M	16	*Angophora costata* **Smooth-barked Apple**	✓	M
8	*Corymbia maculata* **Spotted Gum**	✓	L	17	*Allocasuarina torulosa* **Forest Oak**	X	M
9	*Corymbia maculata* **Spotted Gum**	✓	H	18	*Eucalyptus paniculata* **Grey Ironbark**	X	H

3.1.3 Tree numbers—of the 18 assessed trees, the following is noted:

- One (1) tree is a street tree—Tree 18.
- One (1) site tree is an exempt tree species and not protected under the PDCP—Tree 5 (Jacaranda).
- Three (3) trees are located on adjoining properties—Trees 10, 15 and 17.
- Thirteen (13) prescribed trees are located within the subject site—Trees 1 – 4, 6 – 9, 11 – 14, and 16.

3.1.4 Species assemblage—of the 18 assessed trees, the following is noted:

- All seventeen (17) prescribed trees are locally indigenous species.
- One (1) tree is a non-prescribed site tree that may be removed without authority approval—Tree 5.

3.1.5 No species of assessed tree is subject to threatened conservation status under Australian and/or State Government legislation (i.e. NSW *Biodiversity Conservation Act* 2016, or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*).

3.1.6 The locally indigenous tree species present on the site are indicative of the endangered ecological community Pittwater Spotted Gum Forest.

3.1.7 The site falls within a C01 Wildlife Corridor area identifying it as likely to have habitat value due to good crown cover and/or understorey.

3.2 Proposed Removal of Prescribed Trees

3.2.1 Five (5) prescribed site trees are proposed to be removed:

- Tree 1—Spotted Gum of Low RV. This tree has structural issues that identify it as having a poor long-term retention prospect. An accessible ramp will be constructed allowing access to the jetty.
- Tree 7—NSW Christmas Bush of Medium RV. This small tree stands within the footprint of the proposed pool and would be removed. It can be readily replaced in the site with another of the same species.
- Tree 8—Spotted Gum of Low RV. This tree has a severe, bordering on critical, lean of around 40°. It clearly had the main stem removed some years ago to reduce the crown weight and relieve load on the stem. However, it has subsequently produced strong vertical secondary limbs which place further load on the leaning stem and the root system supporting it in the ground. The deck design would include excavation within the tree's Structural Root Zone, which would likely affect tree stability. My initial recommendation was to reduce the deck to avoid bulk excavation within 3.5m of the tree. However, given the lean and the tree's heavy reliance of the supporting roots it is my opinion that any disturbance of the ground in the tree's vicinity may affect its anchorage and above ground stem bias will be a tipping point for failure.

- Tree 11—Blueberry Ash of Low RV. This tree is of poor vigour and low amenity value. Removal is proposed to accommodate landscaping.
- Tree 16—Smooth-barked Apple of Medium RV. This tree is proposed to be removed to assist with site access. The location of the stairs is supported as it reduced the original proposal for stairs closer to the large Spotted Gums T14 and T15.

3.3 Proposed Tree Retention

3.3.1 Eight (8) prescribed site trees are proposed to be retained—Trees 2, 3, 4, 6, 9, 12, 13 and 14.

3.3.2 All adjoining and street trees (Trees 10, 15, 17 and 18) are to be retained and protected.

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.

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

3.4.3 The estimated extent and/or impact of root zone encroachments upon protected trees to be retained is summarised in Table 2.

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. Note 2: In assessing site features that could influence tree root growth and the minor nature of some proposed works (e.g. paving at/above existing grade) a more realistic Impact Level Rating (ILR) is given in parentheses after the estimated notional encroachment.

Tree No.	Tree	Tree located on site	SRZ affected	TPZ area (m^2)	TPZ encroachment (approx. m^2)	TPZ encroachment (approx. %)	ILR
2	Red Bloodwood	✓	×	72.0	0	0	0
3	Red Bloodwood	✓	possible	35.0	0	0	L
4	Spotted Gum	✓	×	64.0	0	0	0
6	NSW Christmas Bush	✓	×	10.0	0	0	0
9	Spotted Gum	✓	✓	182.0	-	-	L-M
10	Grey Gum	×	possible	92.0	0	<10	L
12	Grey Gum	✓	✓	137.0	36 (20)	26 (14.5)	L-M
13	Grey Gum	✓	possible	41.0	4 (2)	11.4 (0.5)	L
14	Spotted Gum	✓	possible	327.0	35	10.7	L-M
15	Spotted Gum	×	×	222.0	5	<10	L
17	Forest Oak	×	×	18.0	0	0	0
18	Grey Ironbark	×	×	191.0	10	<10	L

3.4.4 No changes to existing conditions are proposed within the Structural Root Zone (SRZ) or TPZ of site Trees 2, 4 and 6, and adjoining Tree 17.

3.4.5 **Tree 2**—Red Bloodwood

Structural Root Zone impacts:

- This proposed inclinator rail passes through the notional 2.4m radius SRZ offset. However, I am advised the rail will be fully elevated in this location. Rail supports and footings will need to be located outside the SRZ radius to avoid any potential for severing structural roots.

Tree Protection Zone impacts:

- A negligible encroachment will occur from the proposed inclinator rail as I am advised it will be elevated above existing levels where it traverses the TPZ offset.

Pruning impacts:

- Pruning of the tree is not required.

3.4.6 **Tree 9**—Spotted Gum

Structural Root Zone impacts:

- The timber screening and inclinator rail would likely require isolated footing holes within the trees SRZ.

Tree Protection Zone impacts:

- Most of the decking to the west appears to be above existing ground levels as the existing ground falls away to the west. Therefore, the TPZ encroachment is likely to be in the low to moderate range provided the deck bearers do not require excavation into existing ground.

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the dwelling and proposed pool areas.

3.4.7 **Tree 10**—Grey Gum

Structural Root Zone impacts:

- Proposed aluminum garden edging is proposed within the tree's SRZ. Based on the landscape specifications, this would require compacting the location of the edging and hammering of spikes into ground, which could damage structural roots if care is not taken.

Tree Protection Zone impacts:

- Provided no structural roots are damaged (the edging must accommodate roots without damage and relocated to suit), the loss of non-woody root mass will be minimal and anticipated to be less than 10% at worst.
- No proposed structures are within the TPZ (i.e. the existing retaining wall to the west is to be added to, not re-built).

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the dwelling and proposed garage areas.

3.4.8 **Tree 12**—Grey Gum

Structural Root Zone impacts:

- The base of the proposed garage lift floor (FL33.30) will be around 33.10 (likely less than this if accounting for base preparation for the slab). It would be located approximately 2.5m from the centre of the tree and will be a relatively shallow excavation but does occur just inside the tree's notional 2.8m SRZ radius.
- Proposed aluminum garden edging is proposed within the tree's SRZ. Based on the landscape specifications, this would require compacting the location of the edging and hammering of spikes into ground, which could damage structural roots if care is not taken.

Tree Protection Zone impacts:

- The existing dwelling, garage and smaller structures such as paving and the like are already well inside the tree's TPZ.
- The northwest section of the existing retaining wall would be demolished and a proposed curved wall would involve a very small encroachment of around $4m^2$.
- The proposed lift and retaining wall to the northeast would account for approximately $16m^2$ encroachment.
- Most of the proposed paving and steps will be at or above existing ground levels; these encroachments could be considered as temporary (approximately $16m^2$).

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the dwelling and garage.

3.4.9 **Tree 13**—Grey Gum

Structural Root Zone impacts:

- Proposed aluminum garden edging is proposed within the tree's SRZ. Based on the landscape specifications, this would require compacting the location of the edging and hammering of spikes into ground, which could damage structural roots if care is not taken.

Tree Protection Zone impacts:

- The are only small encroachment areas at the edge of the tree's 3.3m radius TPZ.

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the dwelling and garage.

3.4.10 **Tree 14**—Spotted Gum

Structural Root Zone impacts:

- The proposed inclinator walkway and landing will be outside the notional 3.3m radius SRZ offset. However, as there is an existing wall to the north precluding root extension in that direction, it is quite possible the actual SRZ extends further that its notional radius in other directions.
- All proposed post footings for inclinator landings, elevated stairs and the like will need to be located away from any structural roots encountered by initial hand excavations.
- There are a number of 250mm container plants proposed to be planted in the SRZ. Given the potential for structural root damage during digging, these container sizes will need to be reduced to tubestock.

Tree Protection Zone impacts:

- The notional TPZ encompasses most of the front garden area (and areas well outside the site, including the public road and adjoining property frontage).
- In essence, most of the works in the TPZ will consist of paving at or slightly above existing grade and elevated stairs.
- The proposed bin store slab and retaining wall from the lift to path are the main structural encroachment components, comprising an estimated encroachment of around 35m^2 or 10.7% which acceptable. However, this low-moderate impact rating is heavily reliant upon assumed close arboricultural supervision and advice during works in the front garden.

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the dwelling and garden areas.

3.4.11 **Tree 15**—Spotted Gum

Structural Root Zone impacts:

- No structural works are proposed within the tree's notional SRZ radius.
- There are a number of 250mm container plants proposed to be planted in the SRZ. Given the potential for structural root damage during digging, these container sizes will need to be reduced to tubestock.

Tree Protection Zone impacts:

- The notional TPZ encompasses most of the front garden area (and areas well outside the site, including the public road and adjoining property frontage).
- The situation is very similar to that of Tree 14, however the proposed bin store is outside the TPZ and the estimated encroachments are much less.

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the dwelling and garden areas.

3.4.12 **Tree 18**—Grey Ironbark

Structural Root Zone impacts:

- No structural works are proposed within the tree's notional SRZ radius.

Tree Protection Zone impacts:

- The notional TPZ encompasses extends beyond the existing concrete driveway apron/crossover. It is proposed to extend this crossover slightly to the north to create a trafficable access to the site stairs. This involves minor encroachment at the perimeter of the tree's 7.8m radius TPZ.

Pruning impacts:

- Pruning of the tree is unlikely as the tree's crown is held well above the garage, garden and roadway.

4 CONCLUSIONS

- A total of eighteen (18) trees are included in this Arboricultural Impact Assessment. Of these:
  - Four (4) are 'off-site' trees and will be retained—Trees 10, 15, 17 and 18.
  - One (1) tree within the subject site has been identified as exempt from protection under the PDCP—Tree 5.
  - Five (5) prescribed site trees are proposed for removal—Trees 1, 7, 8, 11 and 16.
  - Eight (8) prescribed trees are proposed to be retained—Trees 2, 3, 4, 6, 9, 12, 13 and 14

- The 8 prescribed site trees to be retained are:
  - Tree 2 (Red Bloodwood) of Low RV
  - Tree 3 (red Bloodwood) of Medium RV
  - Tree 4 (Spotted Gum) of Medium RV
  - Tree 6 (NSW Christmas Bush) of Medium RV
  - Tree 9 (Spotted Gum) of High RV
  - Tree 12 (Grey Gum) of High RV
  - Tree 13 (Grey Gum) of Medium RV
  - Tree 14 (Spotted Gum) of High RV

- The 6 prescribed site trees to be removed are:
  - Tree 1 (Spotted Gum) of Low RV
  - Tree 7 (NSW Christmas Bush) of Medium RV
  - Tree 8 (Spotted Gum) of Low RV
  - Tree 11 (Blueberry Ash) of Low RV
  - Tree 16 (Smooth-barked Apple) of Medium RV.

- No assessed tree on the site or on adjoining properties was identified as an endangered species.
- No assessed tree on the site or on adjoining properties was identified as, or associated with, a heritage item.

- TPZ encroachments are estimated as follows:
  - Nil or Low (minor) TPZ encroachments are identified for Trees 2, 3, 4, 6, 10, 13, 15, 17 and 18.
  - Low to Moderate TPZ encroachment are identified for Trees 9, 12 and 14.

- 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 Minimising Impacts on Trees to be Retained

5.1.1 A project arborist with a minimum AQF level 5 qualification in arboriculture, who is a registered consulting member of a nationally recognised arboricultural organisation or association, and who does not undertake any tree pruning or removal works in the Northern Beaches local government area, shall be engaged before work commences for the duration of site preparation, demolition, construction and landscaping.

5.1.2 The project arboriculturist will need to liaise with the builders and landscapers to ensure the trees are given high priority for due care and tree sensitive construction methodologies.

5.1.3 All decking, including allowances for bearers, joists and decking timbers must be elevated at least 200mm above existing ground within 6m of Tree 9.

5.1.4 Unless otherwise directed by Council Conditions of Consent, the following recommendations shall be adopted to protect trees to be retained:

Demolition

- Tree protection devices are to be placed as advised by the PA or Council's Tree Management Officer, prior to any site works commencing.
- The existing wall adjacent to adjoining **Trees 4 and 5** should be retained within a 2.5m radius of each tree to avoid potential destabilising of the trees.
- Heavy equipment and machinery is not to be used within 10m of any retained tree unless otherwise approved by Council or the PA.
- Direct supervision by the PA of the removal of any pavements or structures within the TPZ of any retained adjoining or street tree shall be undertaken. The PA is to provide written certification of compliance with this requirement.

Pre-construction

- Following demolition of structures and pavements within the TPZ of trees to be retained, the newly exposed ground is to be watered and mulched with coarse mulch to a depth of 100mm.

Construction

- The Project Arboriculturist is to be present to supervise all works within:
  - 3 metres of Tree 3.
  - 5 metres from Trees 10, 12 and 13
  - 6 metres from Tree 9.
  - 8 metres from Trees 14 and 15.

- Landscaping other than proposed new paths is to retain the existing ground levels within the 10 metres radius of Trees 14 and 15 (Spotted Gums), unless otherwise approved by Council or the PA.
- Proposed Link garden edging must only be installed under the supervision of the PA.
- All plant stock proposed within the SRZ of trees to be retained shall be tubestock size unless approved by the PA.
- The PA must advise on all aspects of tree protection prior to and during construction. Fencing may be removed for soft landscaping. No skid-steer loaders (e.g. Bobcats) or similar landscaping machinery or equipment are to be used within the TPZ during landscaping.
- Refer to sections 5.2 and 5.3 and Appendices D and E for additional recommendations that may require adoption during development.
- Irrigation—The PA should determine whether irrigation should be carried out during extended periods of drought.
- Pest management—Monitoring is required as trees under stress are more prone to insect attack.

Post-construction

- Mulching – removal of mulch after construction to remove any contaminants. Replacement with a good quality mulch and addition of 10% organic matter will improve beneficial soil micro-organisms, retain moisture and improve aeration and water infiltration.

5.2 Tree Protection

5.2.1 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 D – Tree Protection Devices).
- The TPD cannot be removed, altered, or relocated without the project arborists' prior assessment and approval.

5.3 Arboricultural advice

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 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 300m 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.
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- 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.

5.3.4 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.

5.3.5 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.

5.3.6 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.

5.3.7 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

December, 2018

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APPENDIX A

TERMS AND DEFINITIONS

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

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)©

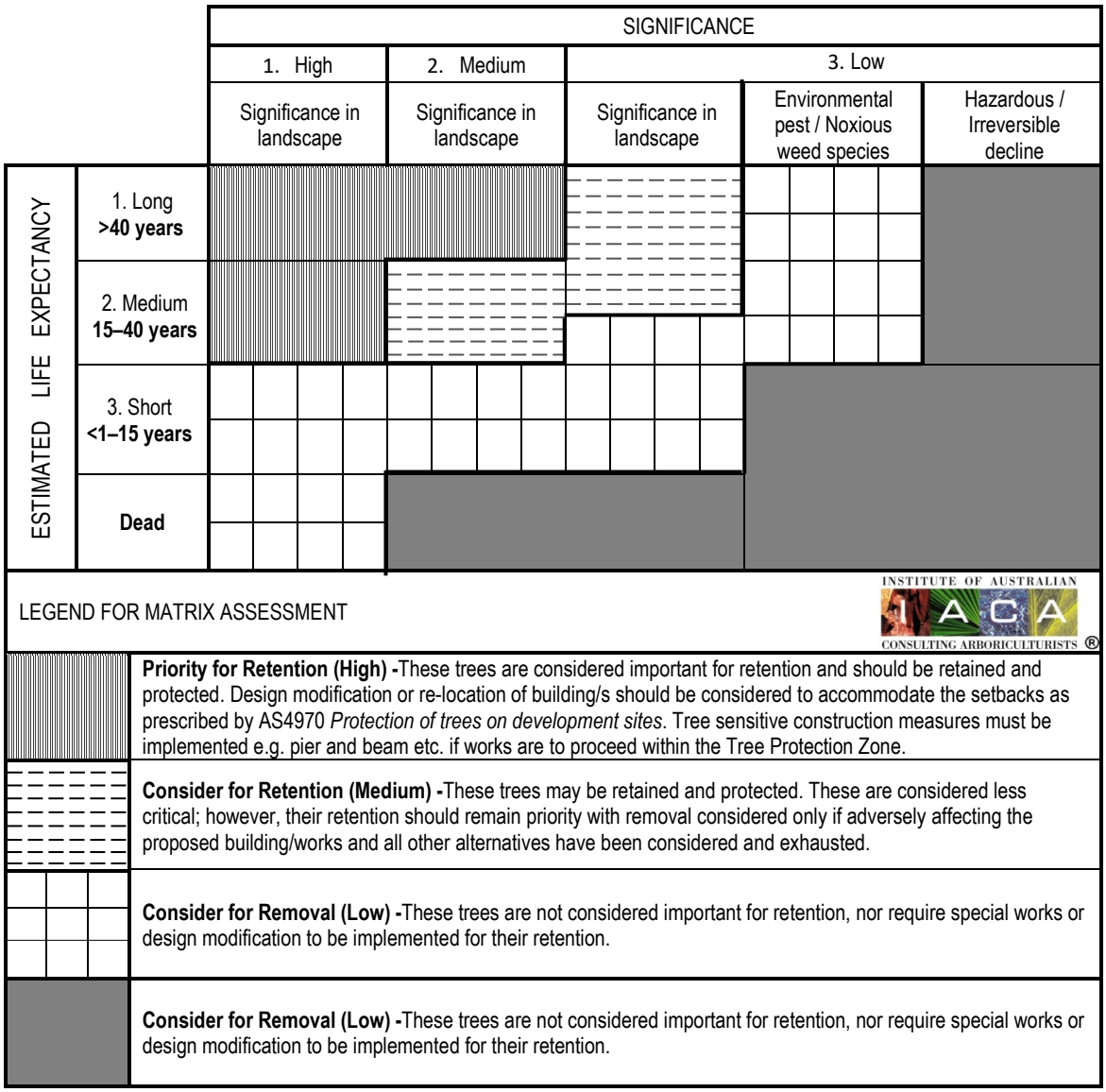
The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary 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 *in situ* - tree is appropriate to the site conditions
2. MEDIUM SIGNIFICANCE IN LANDSCAPE
The tree is in fair-good condition and good or low vigour
The tree has 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 *in situ*.
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 *in situ* - tree is inappropriate to the site conditions
The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
The tree has a wound or defect that has potential to become structurally unsound.
Environmental Pest / Noxious Weed Species
–The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties
–The tree is a declared noxious weed by legislation
Hazardous/Irreversible Decline
–The tree is structurally unsound and/or unstable and is considered potentially dangerous
–The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term

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



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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

PHOTOGRAPHS

Plate 1 (left)
Tree 1—Spotted Gum to be removed

Plate 2 (below)
Tree 1—Spotted Gum to be removed
Trees 2 and 3—Red Bloodwoods to be retained

Plate 3
Tree 4—Spotted Gum to be retained

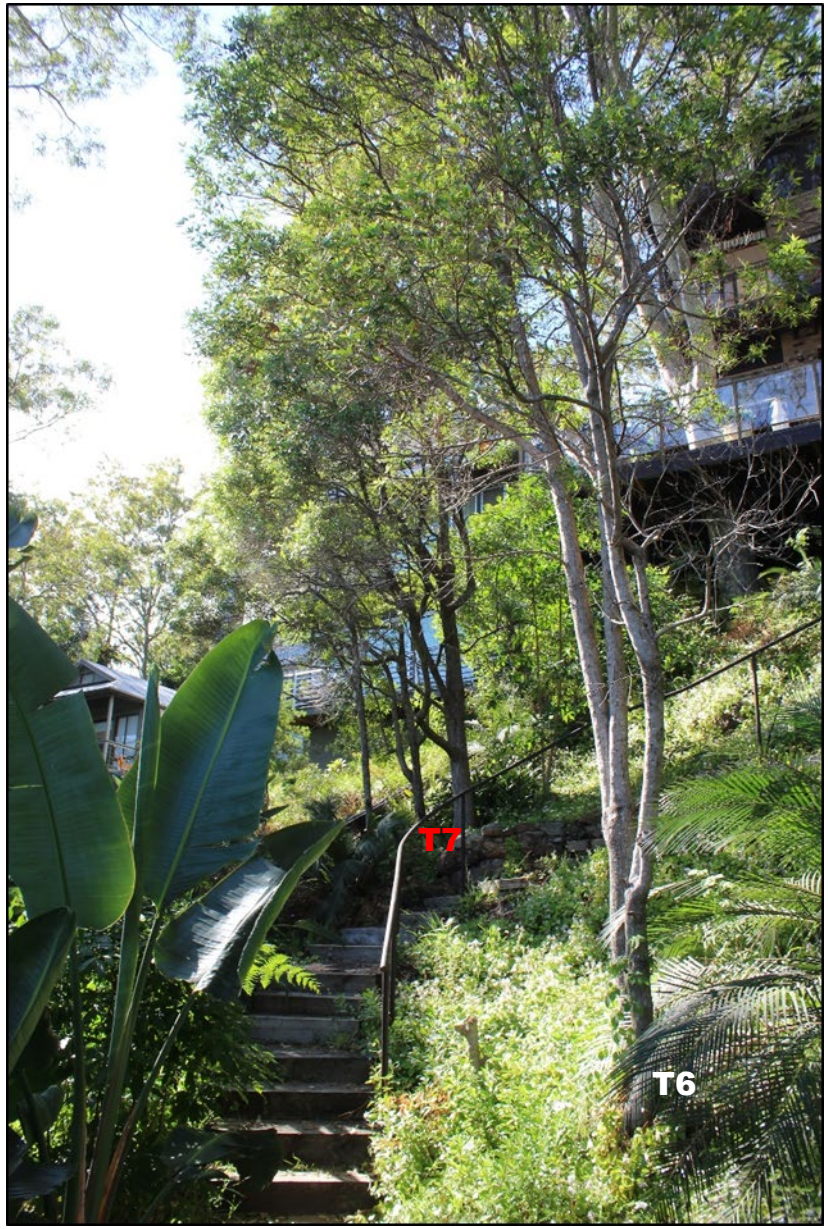


Plate 4
Tree 6—NSW Christmas Bush to be retained
Tree 7—NSW Christmas Bush to be removed

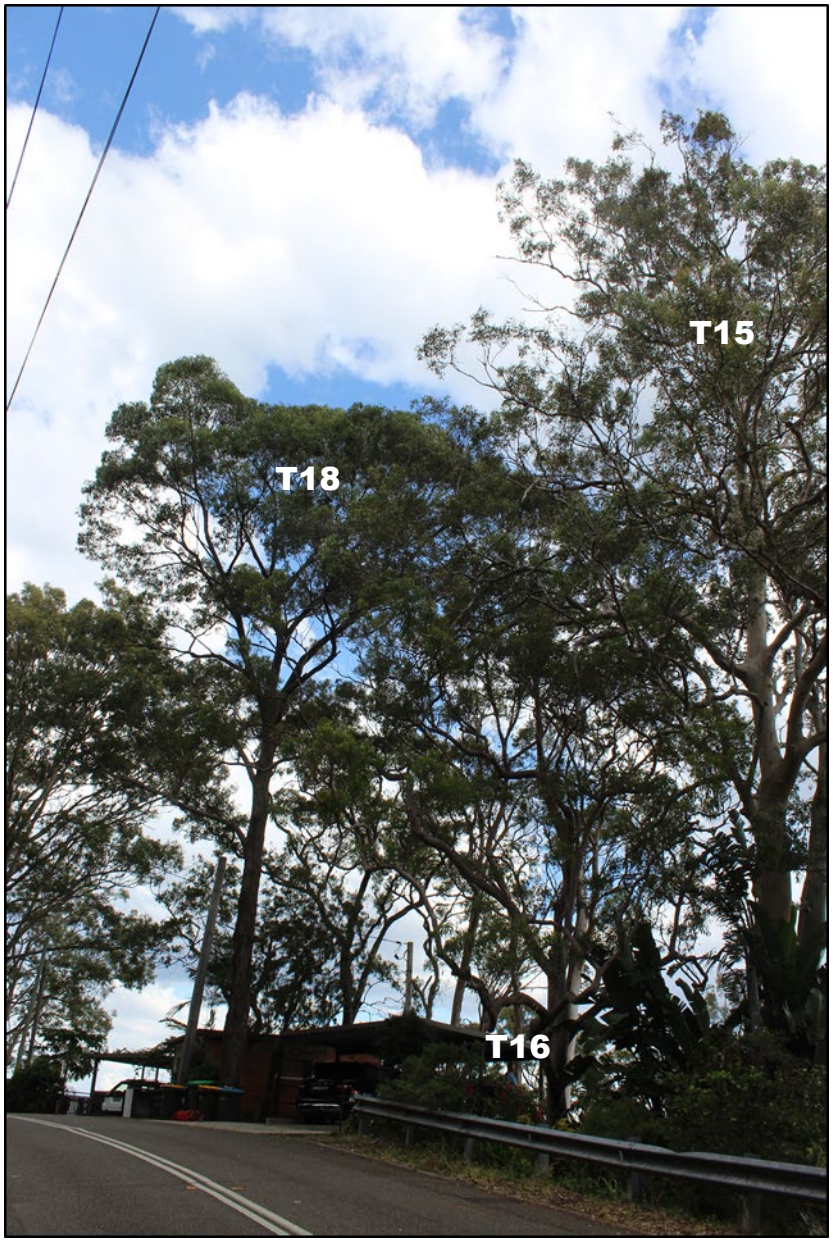
Plates 5 and **6**
Tree 8—Spotted Gum to be removed
Composite image at left illustrating the severe lean of Tree 8 over the steep slope.
Image below of Tree 8 indicating severe lean.
Note minor lean of tree behind, and vertical orientation of tree beyond.

Plate 7 (left)
Tree 9—Spotted Gum to be retained

Plate 8
Tree 10—Grey Gum on adjoining property to be retained

Plate 9 (left)
Tree 11—Blueberry Ash to be removed
Tree 12—Grey Gum to be retained
Tree 13—Grey Gum (obscured) to be retained

Plate 10
Tree 14—Spotted Gum to be retained
Tree 15—Spotted Gum on adjoining property to be retained
Tree 16—Smooth-barked Apple to be removed



Plates 11 and **12**
Tree 17—Forest oak on adjoining property to be retained
Tree 18—Grey Ironbark street tree to be retained

APPENDIX D

TREE PROTECTION DEVICES

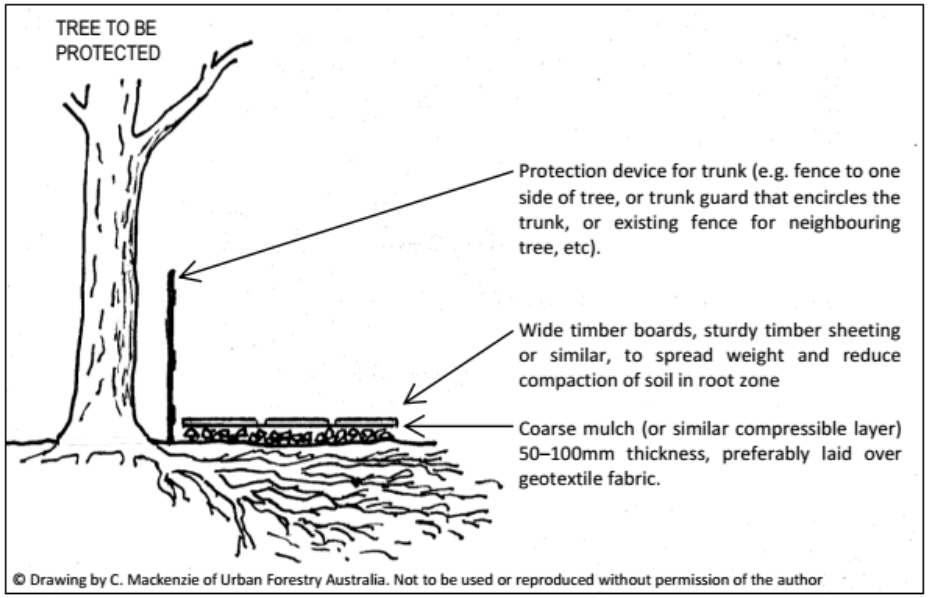


Figure 1
A method of reducing risk of root damage and soil compaction within the tree's Structural Root Zone.

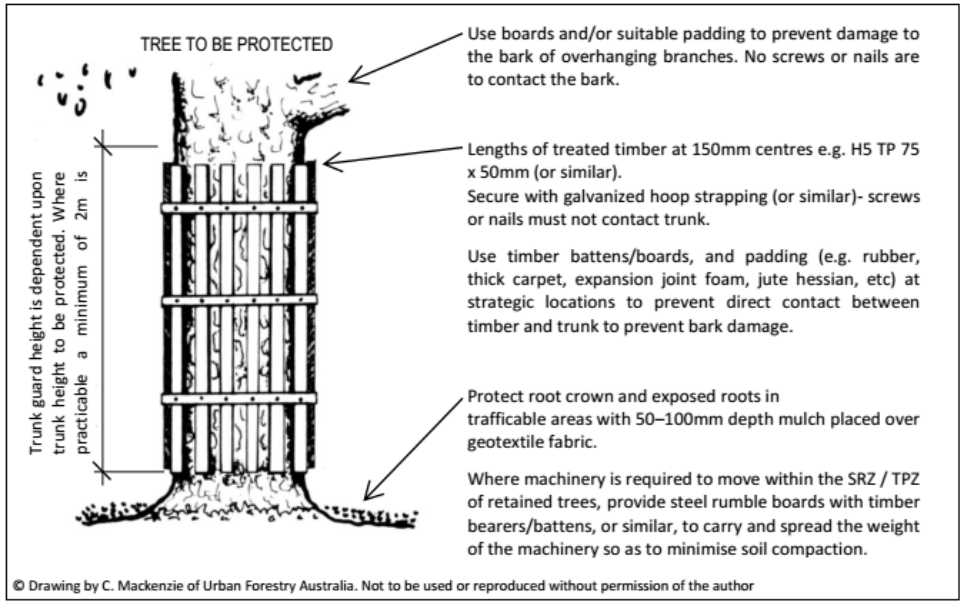


Figure 2
Example of tree trunk and tree branch protection.

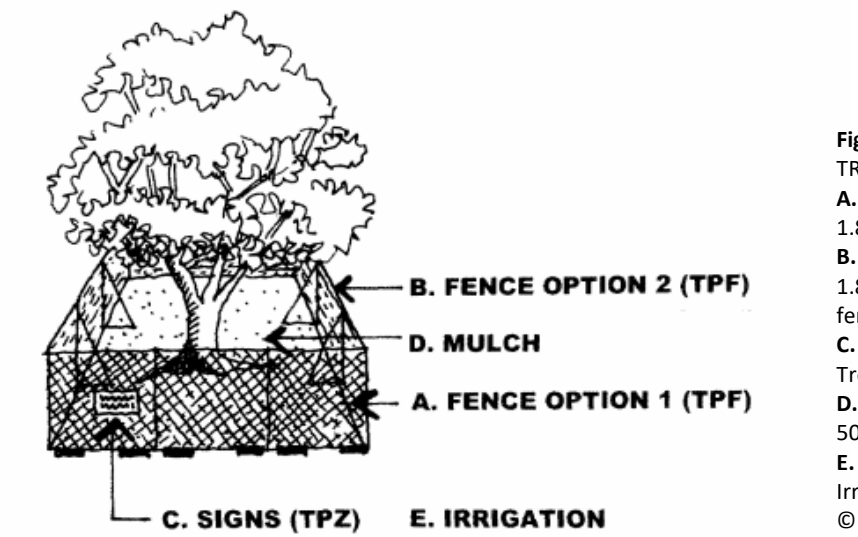
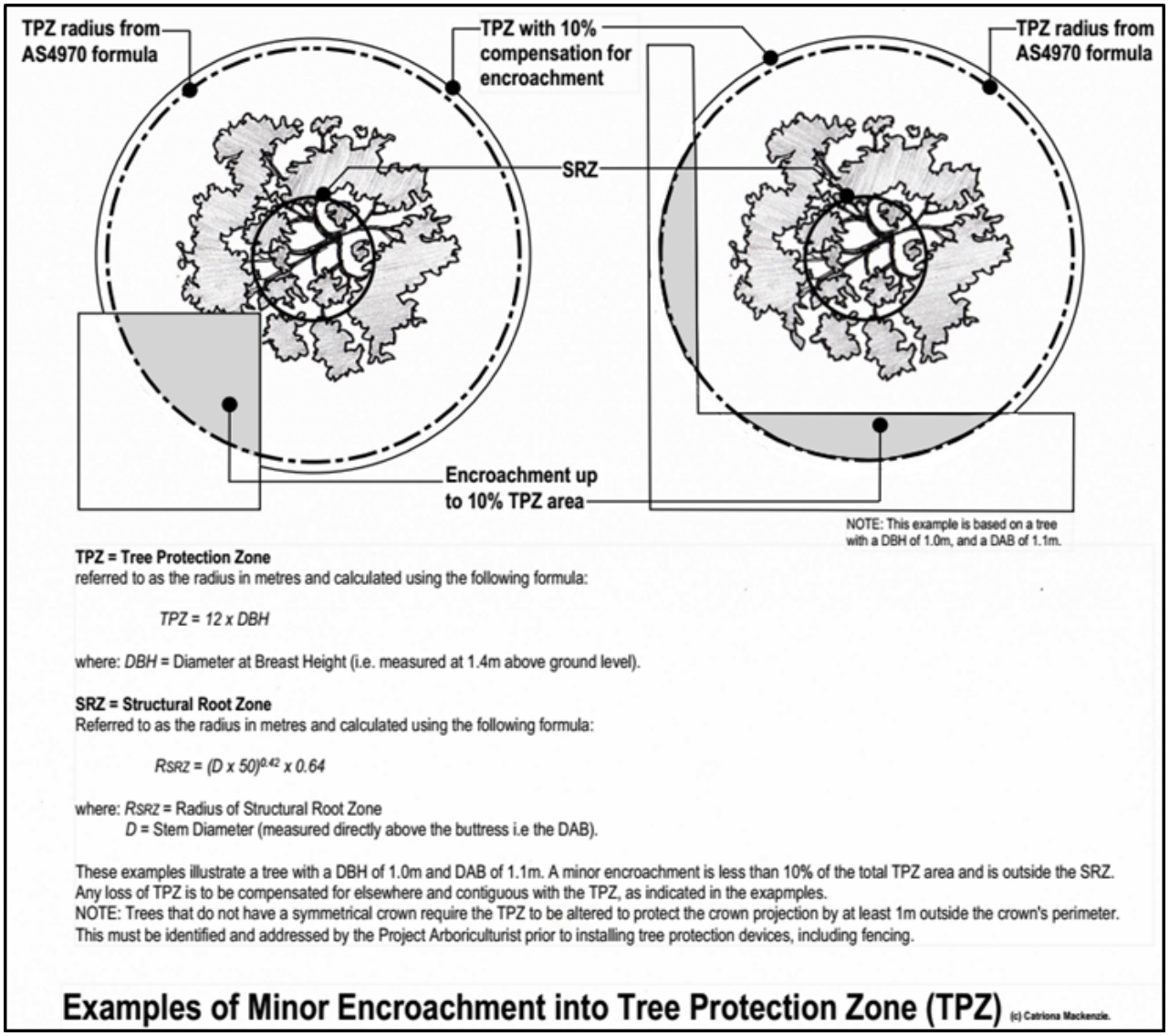


Figure 3
TREE PROTECTIVE FENCING (TPF)
A. Fence Option 1 (TPF)
1.8 metre high chain wire mesh panels with shade cloth attached if required, to be held in place with concrete blocks.
B. Fence Option 2 (TPF)
1.8 metre high plywood or wooden panel/paling fence (prevents soil or building contaminants from 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

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



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

APPENDIX E

SCHEDULE OF ASSESSED TREES

Schedule of Assessed Trees—163 Riverview Rd., Avalon. May, 2018

Tree No.	*Genus* and *species* Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Observations/Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)	ILR
1	*Corymbia maculata* **Spotted Gum**	10	5	2 x *200 (300)	EM	F	P	Locally indigenous species. Growing on steep part of bank. **Crown** bias to W. **Co-dominant** stems @ 1m AGL. **Included**, with SW stem **decayed** at base. Some tip **dieback**.	3D	M	L	2.2	3.6	41.0	**NA**
2	*Corymbia gummifera* **Red Bloodwood**	8	7	2 x 275 (400)	EM	F	F	Locally indigenous species. N stem **lopped** @ 1.2m AGL. Tree stem confined within block wall built to both sides. Crown bias to NW with some **lean**. Some tip dieback. **Deadwood** >30mm Ø, up to 80mm Ø.	3D	M	L	2.4	4.8	72.0	**0**
3	*Corymbia gummifera* **Red Bloodwood**	9	10	275	SM	F	F	Locally indigenous species. Crown bias to NW. Some tip dieback. Deadwood to 60mm Ø.	2D	M	M	2.1	3.3	35	**L**
4	*Corymbia maculata* **Spotted Gum**	8	12	375	SM	F	F	Locally indigenous species. Crown heavily biased to WNW. Tip dieback and minor Ø deadwood.	2D	M	M	2.4	4.5	64	**0**
5	*Jacaranda mimosifolia* **Jacaranda**	-	-	-	-	-	-	Introduced exotic species. heavily lopped in the past. Exempt from protection under Council's tree management guidelines.	2B	L	L	-	-	-	**NA**
6	*Ceratopetalum gummiferum* **NSW Christmas Bush**	7	4	75 + 150 (150)	EM	G	G	Locally indigenous species. Minor tip dieback and lower crown deadwood.	2D	L	M	1.6	2.0	10.0	**0**
7	*Ceratopetalum gummiferum* **NSW Christmas Bush**	8	4	200	EM	G	G	Locally indigenous species. Small Ø deadwood. Two smaller trees nearby within 1m or so N. Small Native Frangipani (*Hymenosporum flavum)* to S.	2A	L	M	1.8	2.4	18	**NA**
8	*Corymbia maculata* **Spotted Gum**	22 – 24	20	*1000	LM	G	F?	Locally indigenous species. Very large structural/**scaffold** branch (<400mm Ø) WNW side removed in the past. **Cambium** dieback noted around base of pruning wound. Deadwood to 100mm+Ø. Crown and stem bias to W/NW. Severe, tending to critical lean of around 40° (possibly past failure, combined with **phototropic** bias). Minor dieback. Large **hanger** over existing path. Limited basal inspection due to steep slope& dense vegetation over root crown.	2D	H	L	3.5	12.0	452	**NA**
9	*Corymbia maculata* **Spotted Gum**	22	18	625	M	G	G	Locally indigenous species. Growing through existing deck. Deck joist and deck tiles in contact with stem. At this stage minor damage to tree and deck components.	2A	H	H	2.9	7.6	182	**L-M**
10	*Eucalyptus punctata* **Grey Gum**	22 – 24	16	*450	EM	G	F?	Locally indigenous species. On adjoining property. Co-dominant stems @ 7m AGL. Some 'ears' evident (**compression fracture**). **Bracket fungus** emerging at junction of stems – extent of decay unknown.	3A?	H	M?	2.5	5.4	92	**L**

Tree No.	*Genus* and *species* Common Name	Ht (m)	Sp (m)	DBH (mm)	Age	V	C	Observations/Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)	ILR
11	*Elaeocarpus reticulatus* **Blueberry Ash**	8	5	125	EM	F	F	Locally indigenous species. Dead **leader** (snap-out). Dieback and small Ø deadwood.	3C	L	L	1.6	2.0	8	**NA**
12	*Eucalyptus punctata* **Grey Gum**	26	12	550	M	G	G	Locally indigenous species. **Suppressed** by another tree. **Crown raised** by pruning.	2A	H	H	2.8	6.6	137	**L-M**
13	*Eucalyptus punctata* **Grey Gum**	23	11	300	M	G	F	Locally indigenous species. **Kinked** upper stem. Crown raised by pruning. Very suppressed, with some **epicormic** growth and dieback noted.	2D	H	M	2.2	3.6	41	**L**
14	*Corymbia maculata* **Spotted Gum**	22	14	850	LM	G	F – G	Locally indigenous species. Some crown asymmetry – biased to W (shares crown with T15. Restricted root zone to N (retaining wall approximately 1.4m N from Centre of Tree [CoT]). Low volume dieback. Co-dominant stems @ 7m, with **snub-nosed ribs** (arrested compression fracture). Limited visual access to stem union.	2D	H	H	3.3	10.2	327	**L-M**
15	*Corymbia maculata* **Spotted Gum**	26	20	*700	LM	G	G	Locally indigenous species. Predominantly on adjoining property (straddles boundary). Growing on bank. Shares crown with T14, with crown bias to E. Low volume dieback. Root zone partially restricted by retaining wall to W.	2D	H	H	3.1	8.4	222	**L**
16	*Angophora costata* **Smooth-barked Apple**	11	18	425	EM	F	F – P	Locally indigenous species. Overtopped w/ sprawling, wide habit. Central leader decayed, with **cavity** at 7m AGL.	2B	H	M	2.5	5.1	82	**NA**
17	*Allocasuarina torulosa* **Forest Oak**	9	6	200	EM	G	F	Locally indigenous species. Growing in confined space between neighbour's garage and site carport. Slight stem sweep away from T18.	2D	L	M	1.8	2.4	18	**0**
18	*Eucalyptus paniculata* **Grey Ironbark**	21 - 22	17	650	M	G	G	Locally indigenous species. On adjoining property. Street tree. Driveway less than 1.m N from CoT. Typical small to medium Ø deadwood.	2A	H	H	2.9	7.8	191	**L**

KEY

	Prescribed trees to be retained
	Prescribed trees proposed to be removed.
	Non-prescribed trees exempt from preservation controls under the DCP.
L	LOW Retention Value-These trees are not considered important for retention.
M	MEDIUM Retention Value-These trees may be retained and protected.
H	HIGH Retention Value -These trees are considered important for retention and should be retained and protected.

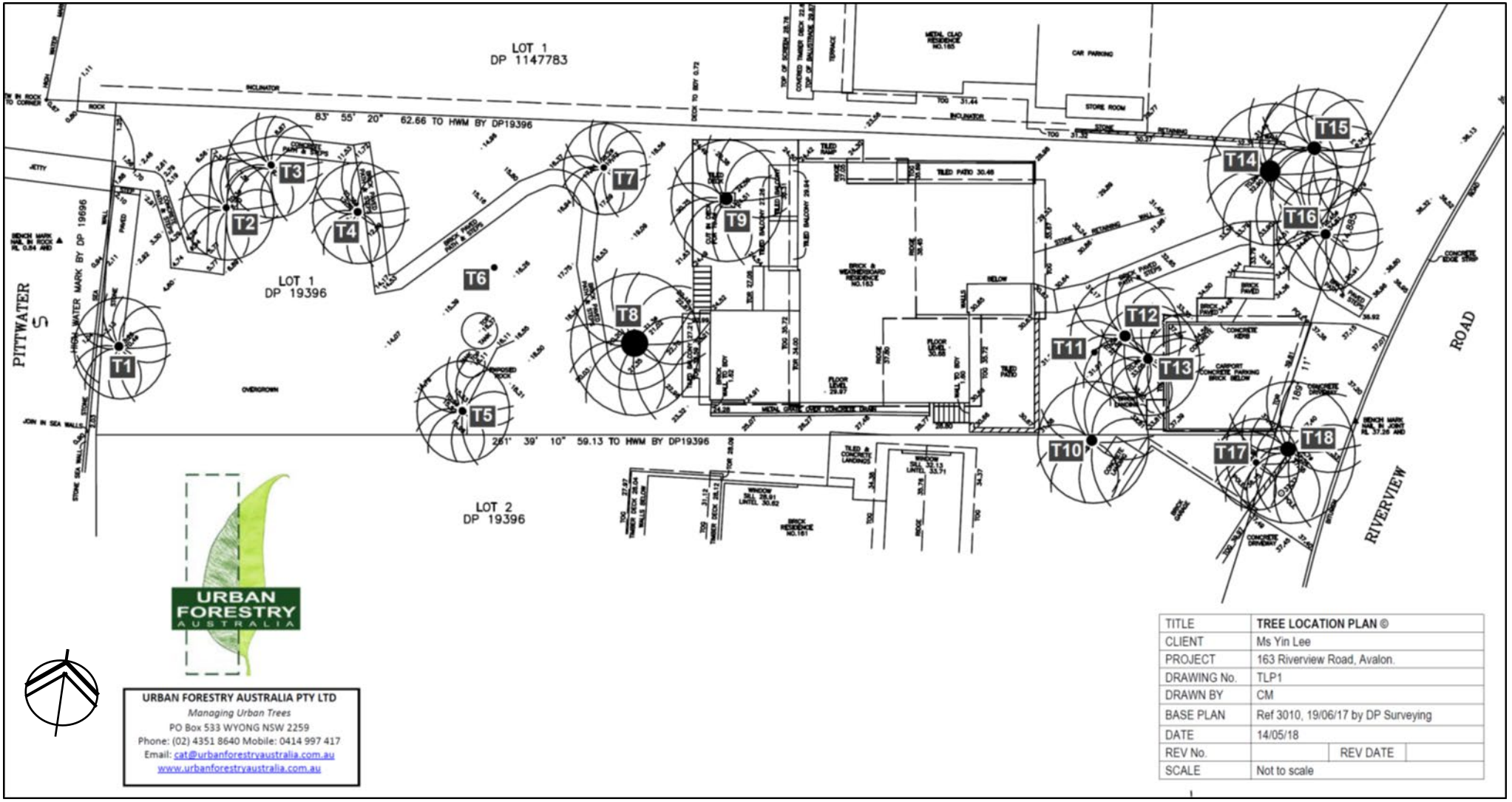
DETAILS FOR HEADINGS AND SYMBOLS USED IN TREE SCHEDULE

***** 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).
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 TPZ offsets.
DAB—The trunk/stem diameter measured *above the buttress*/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*.
? —a tentative result due to inspection limitations, e.g. limited visual access to an adjoining tree, very dense vegetation obscuring tree parts or preventing visual access, a tree that requires more detailed assessment, such as an aerial inspection, decay diagnostic tests, pathology tests, etc.

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 average 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 C – 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



TREE LOCATION PLAN Not to Scale (Excerpt of site survey by DP Surveying, marked up by C. Mackenzie)