



**EARTHSCAPE HORTICULTURAL SERVICES**  
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# **ARBORICULTURAL IMPACT ASSESSMENT REPORT**

## **PROPOSED ALTERATIONS AND ADDITIONS**

### **40 PARADISE AVENUE, AVALON BEACH**

**June 2025**

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## 1 INTRODUCTION

- 1.1.1 This report was commissioned by TKD Architects on behalf of Michael Price and Kyra Bennett to assess the health and condition of twenty-eight (28) trees located within or immediately adjacent to 40 Paradise Avenue, Avalon Beach. The report has been prepared to aid in the assessment of a Development Application (DA) for the alterations and additions to the existing dwelling and construction of a new studio within the property, together with associated landscape works. The report has been limited to the trees within five (5) metres of the proposed works in accordance with Council's requirements.
- 1.1.2 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures (Tree Protection Plan and Specification) to ensure the long-term preservation of the trees to be retained where appropriate.
- 1.1.3 This report has been prepared in accordance with the Northern Beaches Council's *Guidelines for Arborists Reports* as outlined on Council's website, Section 2.4.1 & 2.4.2 of Appendix 9 and Appendix 19 of the *Pittwater 21 Development Control Plan 2015* (PDCP) and Sections 2.3.2 - 2.3.5 of the *Australian Standard for Protection of Trees on Development Sites* (AS 4970:2009).

## 2 THE SITE

- 2.1.1 The subject property is a residential allotment known as Lot 132 in DP 1010865, being 40 Paradise Avenue, Avalon Beach. For the purposes of this report, the subject allotment will be referred to as 'the site'. The total area of the site is approximately 1,076 m<sup>2</sup>. The site is zoned Environmental Living [C4] under the *Pittwater Local Environmental Plan 2014* (PLEP).
- 2.1.2 The site contains an existing dwelling located in the centrally within the lot, together with detached shed near the south-eastern corner. The site adjoins the foreshores of Pittwater on the western boundary. The site has a steep westerly gradient with established gardens, traversed by a series of garden terraces supported by low stone retaining walls and pathways. The site is heavily treed, with a number of mature and semi-mature trees. These include a variety of locally-indigenous, non-local native and exotic (introduced) species.
- 2.1.3 Soils of this area are typical of the Watagan Soil Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of "shallow to deep (300 – 2000 mm) *Lithosols/Siliceous Sands* and *Yellow Podzolic soils* on sandstone and moderately deep (1000 - 2000 mm) *Brown Podzolic soils*, *Red Podzolic soils* and *Gleyed Podzolic soils* on shales". Soil materials are derived from Narrabeen Group sediments with occasional rock outcrop. The landscape is typically rolling to very steep hills and steep colluvial side slopes with occasional sandstone boulders and benches<sup>1</sup>
- 2.1.4 The original vegetation of this area consisted of open forest and woodland typical of the Narrabeen formation<sup>2</sup> 'Shale Slopes'. The dominant locally-indigenous tree species occurring in this area include *Angophora costata* (Sydney Red Gum), *Corymbia maculata* (Spotted Gum) and *Syncarpia glomulifera* (Turpentine). Other species found in this vegetation community may include *Eucalyptus paniculata* (Grey Ironbark), *Allocasuarina torulosa* (Forest Oak), *Glochidion ferdinandi* (Cheese Tree), *Allocasuarina littoralis* (Black She Oak), *Ficus rubiginosa* (Port Jackson Fig), *Eucalyptus punctata* (Grey Gum), *Eucalyptus umbra* (Bastard Mahogany), *Angophora floribunda* (Rough barked Apple) and *Eucalyptus botryoides* (Bangalay).

### 3 SUBJECT TREES

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 15<sup>th</sup> May 2024. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey prepared by CMS Surveyors Pty Ltd, Dwg. Ref No. 21152Adetail [1] dated 17/05/2024. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No.s T4, T6, T9, T13 & T19 were not shown on the original survey and have been plotted on the drawing in their approximate positions by taking offsets from existing features.

### 4 HEALTH AND CONDITION ASSESSMENT

#### 4.1 Methodology

- 4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.<sup>3</sup> All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

- 4.1.2 The following information was collected for each tree:-

- **Tree Species** (Botanical & Common Name);
- **Approximate height**;
- **Canopy spread** (measured using laser distance measurer in four directions and an average taken);
- **Trunk diameter** (measured with a diameter tape at 1.4 metres from ground level);
- **Live Crown Size** (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres);
- **Maturity Class** - the Maturity Class for each tree has been divided into the following categories:-
  - **OM** Over-mature – greater than 80% of the life expectancy for the species;
  - **M** Mature – 50-80% of the life expectancy for the species;
  - **SM** Semi-mature – 20-50% of the life expectancy for the species;
  - **I** Immature – less than 20% of the life expectancy for the species.
- **Health & vigour** (using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators),
- **Condition** (using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators); and
- **Suitability** of the tree to the site and its existing location (in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues).

- 4.1.3 This information is presented in a tabulated form in **Appendix 3**.

#### 4.2 Safe Useful Life Expectancy (SULE)

- 4.2.1 The remaining Safe Useful Life Expectancy<sup>4</sup> of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 3**.

- 4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)

- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

4.2.1 SULE ratings are intended to provide a general overview of the long-term sustainability of the trees within the site in consideration of these factors. The allocated ranges are not intended to be absolute. This information is useful in guiding future planning by highlighting the probable lifespan of individual trees, for which a clear pattern may emerge. This information may be helpful in forecasting likely tree senescence and planning for replacement planting to ensure continuity in tree canopy across the site. It should be noted that SULEs *may* be extended or reduced depending on the way trees are managed. Intervention and remedial works may extend the SULE of some trees.

## 5 LANDSCAPE SIGNIFICANCE

### 5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure a consistent approach, the assessment criteria shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

### 5.2 Environmental Significance

#### 5.2.1 Tree Management Controls

Prescribed Trees within the Northern Beaches (former Pittwater) Local Government Area (LGA) are protected under the provisions under Volume 2, Section B4.22 (Preservation of Trees and Bushland Vegetation) of the *Pittwater 21 Development Control Plan 2014* (PDCP) (as amended 25/11/2015), made pursuant to Part 3, Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (Vegetation SEPP) superseded by Chapter 2, Part 2.3 of the *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity SEPP). The PDCP generally protects all trees with a height of five (5) metres or greater and all Bushland Vegetation. Some exemptions apply. The following trees are exempt (not protected) under the provisions of the PDCP 2014:-

Tree No.	Species	Exemption
T6	<i>Plumeria acutifolia</i> (Frangipani)	Less than the Prescribed Dimensions

The remainder of the trees are protected under Council's Tree Management Controls.

### 5.2.2 *Wildlife Habitat*

*Angophora costata* (Sydney Red Gum) [T28], *Angophora floribunda* (Rough-barked Apple) [T3], *Corymbia maculata* (Spotted Gum) [T2, T7, T10, T15, T16, T17, T21, T23, T24, T26 & T27], *Eucalyptus punctata* (Grey Gum) [T11], *Eucalyptus resinifera* (Red Mahogany) [T18, T19, T20], *Glochidion ferdinandi* (Cheese Tree) [T22] and *Livistona australis* (Cabbage Tree Palm) [T1], are all locally-indigenous species, representative of the original vegetation of the area and would be of benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds. Several trees exhibited evidence of climbing (claw marks) by Brushtail or Ringtail Possums (including T15 & T16). There were no other visible signs of wildlife habitation.

### 5.2.3 *Noxious Plants & Environmental Weeds*

None of the subject trees are scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW under the provisions of the *Biosecurity Act 2015*.

### 5.2.4 *Threatened Species & Ecological Communities*

Vegetation mapping on the *Sharing and Enabling Environmental Data in NSW* (SEED) website [<https://geo.seed.nsw.gov.au/>] indicates that the locally-indigenous vegetation within the site is classified as Hunter Coast Lowland Spotted Gum Moist Forest (HCLSGMF) (PCTID 3234).

Northern Beaches Council classifies the vegetation community in this area as Pittwater and Wagstaff Spotted Gum Forest (PWSGF).

PWSGF is listed as an Endangered Ecological Community (EEC) under Schedule 2, Part 2 of the *Biodiversity Conservation Act 2016* (NSW). PWSGF is *not* listed under the *Environment Protection and Biodiversity Conservation Act 1999*.

*Angophora costata* (Sydney Red Gum) [T28], *Angophora floribunda* (Rough-barked Apple) [T3], *Corymbia maculata* (Spotted Gum) [T2, T7, T10, T15, T16, T17, T21, T23, T24, T26 & T27], *Eucalyptus punctata* (Grey Gum) [T11], *Glochidion ferdinandi* (Cheese Tree) [T22] and *Livistona australis* (Cabbage Tree Palm) [T1], are all characteristic species of the original vegetation community and are therefore considered to be constituents of this EEC.

None of the other trees are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities (EECs) under the provisions of the *Biodiversity Conservation Act 2016* (NSW) or the *Environment Protection and Biodiversity Conservation Act 1999*.

### 5.2.5 *Biodiversity, Bushfire & Riparian Lands*

The whole of the site contains areas of 'Biodiversity' as indicated on the *Pittwater Biodiversity Map* forming part of the PLEP 2014.

The NSW Office of Environment and Heritage (OEH) *Biodiversity Values Map and Threshold Tool* (refer <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>), indicates that the vegetation along the western half of the site (excluding the area occupied by the existing dwelling) is subject to the Biodiversity Offset Scheme (BOS).

The site has a stormwater easement alongside the southern boundary.

The site does *not* contain any Bushfire Prone Land as indicated on Council's Bush Fire Prone Land Map (2020).

The site is *not* within a 'Designated Bush Fire Prone Area' as defined by the NSW Rural Fire Service (RFS). The site is *not* within a 'Designated 10/50 Vegetation Clearing Entitlement Area' as defined by the NSW RFS.

### 5.3 Heritage Significance

#### 5.3.1 Heritage Items

The subject property is *not* listed as a Heritage Item under Schedule 5, Part 1 of the *Pittwater Local Environmental Plan 2014* (PLEP).

#### 5.3.2 Heritage Conservation Area

The site is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the PLEP 2014.

#### 5.3.3 Significant Tree Register

Pittwater Council does *not* currently maintain a Register of Significant Trees.

#### 5.3.4 General

Based on analysis of Historical Imagery of the site (NSW Spatial Services), the 1955 aerial image indicates the present dwelling and driveway were extant at this time, surrounded by mature trees. The vegetation on the site appears to have remained more or less unchanged to the present day. All of the larger Spotted Gums are likely to be remnant of the original forest of this area and the smaller locally indigenous trees are likely to be progeny of the original vegetation community. Several Eucalypts appear to have been planted within the site, including T5 & T12 [both *Eucalyptus microcorys* (Tallowwood)]. These trees were probably planted c.1980-1990 and have no ecological significance in the context of this site.

### 5.4 Amenity Value

- 5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

## 6 TREE RETENTION VALUES

- 6.1.1 The Retention Values shown in **Appendix 3** and **Appendix 5** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table 1**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

**TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY**

	Landscape Significance Rating						
Estimated Life Expectancy	1	2	3	4	5	6	7
Long - Greater than 40 Years	High Retention Value						
Medium- 15 to 40 Years			Moderate Retention Value				
Short - 5 to 15 years				Low Ret. Value			
Transient - Less than 5 Years				Very Low Retention Value			
Dead or Potentially Hazardous							

6.1.2 The following table describes the implications of the retention values on site layout and design.

**TABLE 2 – TREE RETENTION PRIORITIES.**

RETENTION VALUE	RECOMMENDED ACTION
<b>“High”</b>	These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. Proposed site design and placement of buildings and infrastructure should consider the recommended setbacks as discussed in the following section to avoid any adverse impact on these trees (refer also <b>Appendix 2</b> for examples of acceptable encroachments) In addition to Tree Protection Zones, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to multi-storey developments. Significant canopy pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
<b>“Moderate”</b>	The retention of these trees is desirable, but not essential. These trees should be retained as part of any proposed development if possible. However, these trees are considered less critical for retention. If these trees must be removed, replacement planting should be considered in accordance with Council’s Tree Replenishment Policy to compensate for loss of amenity (refer also <b>Section 11</b> ).
<b>“Low”</b>	These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. These trees should not be considered as a constraint to the future development of the site.
<b>“Very Low”</b>	These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. The removal of these trees is therefore recommended regardless of the implications of any proposed development.

## 7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).<sup>5</sup>

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

### 7.2 Structural Root Zone (SRZ)

7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 4**. The SRZ has been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).

7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.



### **7.3 Acceptable Encroachments to the Tree Protection Zone.**

- 7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 2**. Greater incursions to the TPZ may result in an adverse impact on the tree.
- 7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable

### **7.4 Acceptable Encroachments to the Canopy**

- 7.4.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as “lopping” and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.
- 7.4.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

### **7.5 Legal Protection**

- 7.5.1 Notwithstanding the above recommendations, Council may require a greater setback from certain types of structures to ensure the on-going legal protection of the tree (i.e. its legal status under Council’s Tree Management Controls). In the Northern Beaches LGA, a tree located within two (2) metres of the wall of an existing approved building is not protected under the PDGP. This exemption excludes decks, pergolas, sheds, patios or similar ancillary structures, even if they are attached to the building). The measurement is taken from the base of the trunk of the tree at ground level to the external wall of the building. As such, if a tree is considered worthy of preservation, Council is unlikely to approve the construction of a dwelling within two (2) metres of the tree (regardless of whether this can be undertaken without having an adverse impact on its health or longevity). It should be noted that this does not necessarily apply to other types of structures.

## **8 PROPOSED DEVELOPMENT**

- 8.1.1 The proposed development includes the alterations and additions to the existing dwelling and construction of a new studio within the property, together with associated landscape works.

## **9 IMPACT ASSESSMENT**

- 9.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	Author	Dwg No. [Rev.]	Date
<i>Civil Services – Stormwater Management Plan</i>	ACOR Consultants	NA241586 C08-0001 [E]	06/2025
<i>Landscape Concept</i>	Nelson Thomas	[v2.3]	12/11/2024
<i>Proposed Lower Ground Floor</i>	TKD Architects	240037 AR DA 2000	06/2025
<i>Proposed Ground Floor</i>	TKD Architects	240037 AR DA 2001	06/2025
<i>Proposed Roof Plan &amp; Waste Management</i>	TKD Architects	240037 AR DA 2002	06/2025
<i>Proposed North &amp; South Elevation</i>	TKD Architects	240037 AR DA 3100	06/2025
<i>Proposed East &amp; West Elevation</i>	TKD Architects	240037 AR DA 3101	06/2025
<i>Proposed Sections</i>	TKD Architects	240037 AR DA 3400	06/2025

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 4**. The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (R.L.);
- Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);
- Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
- Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
- Incursions to the tree canopy from the building envelope and temporary structures; and
- Assessment of the likely impact of the works on existing trees.

9.1.3 The proposed development will necessitate the removal of three (3) trees of low retention value. These include Tree No.s T6 (Frangipani), T9 (Black Tea-tree), and T13 (Water Gum). None of these trees are considered significant or worthy of special measures to ensure their preservation. The removal of these trees to accommodate the proposed development is therefore considered warranted in this instance. It should be noted that T6 is exempt from Council's Tree Management Controls. Note that whilst T13 (Water Gum) is located within an area of the site indicated as subject to the Biodiversity Offset Scheme due to the presence of PWSGF (refer to **Sections 5.2.4 & 5.2.5**), this species [*Tristanopsis laurina* (Water Gum) does *not* form part of the species assemblage for this EEC (as scheduled in the Final Determination by the NSW Scientific Committee, 2013). Therefore, the removal of this tree should *not* trigger the requirement for a Biodiversity Development Assessment Report (BDAR) in this instance.

9.1.4 Additions to the existing dwelling (comprised primary of elevated decks, verandahs and associated stairs) are located within the TPZs of Trees T10, T17, T21 & T22 (Spotted Gum) and T18 (Red Mahogany). Given that the foundations of the additions will be limited to isolated pier/pad footings, the proposed works will result in very limited incursions to the root zone of these trees. The proposed additions will not result in any adverse impact, provided that all excavation for the pier/pad footings within the TPZs of these trees is undertaken in accordance with **Section 10.9**.

9.1.5 The existing shed is proposed to be demolished and replaced with a new studio building in a similar position within the TPZs of trees T2 (Spotted Gum), T3 (Rough-barked Apple), T4 (Sweet Viburnum) & T5 (Tallowwood). In all instances, the proposed new works are located beyond existing retaining walls that would form a barrier to the root growth of these trees. As such, the proposed works will not result in any actual incursion to the root zones and therefore will not

result in any adverse impact on these trees. In order to avoid any adverse impact, demolition of the existing building, pavements and any other structures within the TPZs of these trees should be undertaken in accordance with **Section 10.8** and all excavation for the foundations of the new building and any associated retaining walls within the TPZs should be undertaken in accordance with **Section 10.9**.

- 9.1.6 A proposed new elevated walkway and associated stairs is located within the TPZs of trees T5 (Tallowwood), T7, T10, T15, T16 & T17 (Spotted Gum), T8 (Black Tea tree), T11 (Grey Gum) & T12 (Tallowwood). The upper section of the walkway, incorporating several sets of stairs, will be constructed as a completely elevated structure supported by post footings with void beneath. As such, the proposed works will result in very limited incursions to the root zone of these trees. The lower section of the walkway will follow the alignment of the existing stone flag path. Parts of this will be repaired and restored and parts will be replaced with raised timber decking, supported by post footings where required. Given the minimum incursion to root zones and position within the footprint of the existing path, this work will not result in any adverse impact on these trees. In order to avoid any adverse impact on these trees, all excavation for the post footings within the TPZs should be undertaken in accordance with **Section 10.9**.
- 9.1.7 The existing concrete driveway is proposed to be demolished and replaced with a new driveway at a lower level to provide access to the new garage within the TPZs of Trees T23, T24, T26 & T27 (Spotted Gum), T25 (Dragon Tree) and T28 (Sydney Red Gum). The existing driveway is partly supported by fill / excavated ground (east side to about the centreline) and partly suspended and supported by piers (west side, from about the centreline). The new driveway will be approximately 0.7 to 1.0 metres above existing ground level on the western side. The new driveway will be constructed using a reinforced concrete slab over engineered fill, supported by a retaining wall on the west side. In the case on trees T24 & T27, the extent of encroachment to the rootzone is less than 10% of the TPZ. As such, the proposed works will not result in any adverse impact on these trees. In the case of trees T23, T25, T26 & T28, the encroachment to the TPZ will be 19%, 29%, 16% and 12% respectively, which exceeds acceptable limits under AS4970:2009. This level of encroachment has the potential to result in any adverse impact on these trees. In order to minimise any adverse impact, all excavations for the retaining wall foundations on the western side of the driveway should be undertaken in accordance with **Section 10.9**. Where necessary, to avoid severance and damage to woody roots of the trees, alternative construction methods should be adopted in accordance with **Section 10.10**.
- 9.1.8 Proposed new stormwater pipelines are located within the TPZs of trees T10 & T17 (Spotted Gum) & T18 (Red Mahogany). In the case of T18, the extent of encroachment to the rootzone is less than 10% of the TPZ and will not result in any adverse impact on this tree. In the case of T17, the proposed pipeline has been aligned close to any existing retaining wall and associated terrace and beyond an existing retaining wall, therefore the proposed works will not result in any increase in encroachment from the present situation. The proposed works will not result in any adverse impact on this tree, provided that all open trenching for the pipeline within the TPZ is undertaken in accordance with **Section 10.11**. In the case of T10, the extent of the encroachment to the TPZ is approximately 21%, which exceeds acceptable limits under AS4970:2009. The pipeline has been located as best as possible to minimise encroachment to the TPZ of T10, but must discharge to the existing pit located immediately south-east of the tree. In order to avoid any adverse impact on T10, all open trenching for the pipeline within the TPZ should be undertaken in accordance with **Section 10.11**. Where large woody roots are encountered during trenching, these should be retained intact by tunnelling beneath wherever possible as specified in **Section 10.11**.
- 9.1.9 No other trees will be adversely affected by the proposed development.

## 10 RECOMMENDED TREE PROTECTION MEASURES

## 10.1 Tree Protection Plan

- 10.1.1 The following Tree Protection Measures should be read in accordance with the Tree Protection Plan (**Appendix 6**). The Tree Protection Plan (TPP) indicates the position of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained as part of the proposed development.

## 10.2 Prohibited Activities

- 10.2.1 The following activities should be avoided within specified Tree Protection Zones (refer **Appendix 4 & 6** for extent of the TPZ for each tree):-
- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
  - Soil disturbance, surface grading, compaction, tining, ripping or cultivation of soil;
  - Mechanical removal of vegetation, including extraction of tree stumps;
  - Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works)
  - Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas);
  - Erection of site sheds (except where approved by the site arborist);
  - Affixing of signage, barricades or hoardings to trees;
  - Storage of building materials, waste and waste receptacles;
  - Stockpiling of spoil or fill;
  - Stockpiling of bulk materials, such as soil, sand, gravel, roadbase or the like;
  - Stockpiling of demolition waste;
  - Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
  - Other physical damage to the trunk or root system; and
  - Any other activity likely to cause damage to the tree.

## 10.3 Tree Damage

- 10.3.1 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.
- 10.3.2 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist [Australian Qualification Framework Level 5] shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

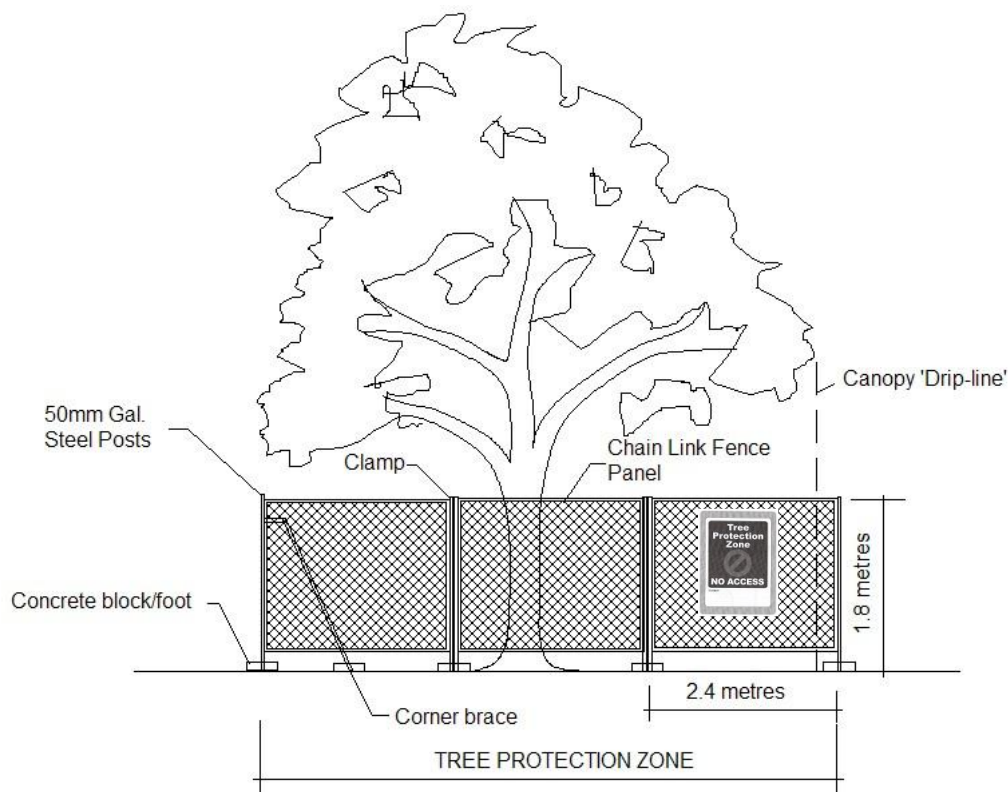
## 10.4 Tree Removal

- 10.4.1 The removal of Trees [**T6, T9 & T13**] shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.
- 10.4.2 Stumps located within the TPZs of trees to be retained shall be grubbed-out where required using a mechanical stump grinder (or by hand where less than 150mm in diameter) without damage to the root system of other trees. Where trees to be removed are within the SRZ of any trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the

root crown intact. Stumps within the Tree Protection Zone of other trees to be retained shall **not** be pulled out using excavation equipment or similar.

## 10.5 Tree Protection Fencing

- 10.5.1 Trees [T2-T4, T5-T8, T10-T12, T17-T28] shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence in the positions as indicated on the Tree Protection Plan (**Appendix 6**). As a minimum, the fence shall consist of temporary chain wire panels of 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement using corner braces where required. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate. Existing site boundary fences may form part of the enclosure.



**Figure 1 – Detail of Tree Protection Fence**

## 10.6 Tree Protection Signs

- 10.6.1 Signs shall be installed on the Tree Protection Fence to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone. The signs shall be securely attached to the fence using cable ties or equivalent. Signs shall be placed at minimum 10 metre intervals. The wording and layout of the sign shall comply with AS 4970-2009 as shown in **Figure 2**.



**Figure 2 – Detail of Tree Protection Sign**

## 10.7 Ground Protection

- 10.7.1 Construction haul routes shall be confined to existing paved areas wherever possible. Where this is not feasible and construction haul routes or access for plant and equipment must traverse soft

landscape areas within TPZs of [**any tree nominated for retention**], 20mm thick marine ply sheets or truck mats (such as Envirex Versadeck® access mats) (refer **Figure 4** shall be placed over the top of the ground surface to minimise compaction and disturbance of the underlying soil profile and root zone.



**Figure 4** – Showing typical detail for truck mats.

- 10.7.2 Ground protection shall be installed prior to any site works and maintained in good condition for the duration of the construction period. On completion of the works, ground protection shall be removed without damage or disturbance to the underlying soil profile.

## **10.8 Demolition Works within Tree Protection Zones**

### *10.8.1 Existing Turfgrass*

No mechanical soil cultivation (using ripping tynes, rotary hoes or the like) is permitted within Tree Protection Zones (TPZs). Where existing turfgrass or low ground cover vegetation is proposed to be removed (demolished) within the TPZs of Trees [**any tree nominated for retention**], the turfgrass shall be first treated with a non-selective herbicide with the active constituent Glyphosate (Round-up ® or equivalent) at the manufacturers recommended rate and allowed to dehisce. Once the turfgrass in the effected area is completely dead, any high grass may be slashed/mown close to ground level.

Any residual vegetation (dead grass etc) may then be carefully scraped-off the surface using a small rubber tracked excavator with a broad sand bucket (i.e. without tynes/teeth), taking care to remove the minimum topsoil necessary (no more than 20mm deep) (refer to **Figure 5**). An observer shall be used to ensure that no woody surface roots of any trees are damaged during this process.





**Figure 5** – Showing method for removal of residual surface vegetation from Tree Protection Zones following herbicide treatment and slashing.

#### 10.8.2 *Paved Areas*

Demolition of paved areas within the Tree Protection Zones (TPZs) of trees [**T2, T3, T5, T10, T11, T12, T16, T17, T18, T23, T24, T25, T26 & T28**] shall be undertaken under the supervision of a qualified Arborist [Australian Qualification Framework (AQF) Level 5].

Concrete pavements shall be demolished by breaking the slab into manageable sections (using a rock hammer or similar) and asphalt pavements shall be removed by breaking the topcoat into manageable pieces. The broken sections shall be carefully lifted and folded over the remaining paved surface to minimise disturbance and compaction of the underlying soil profile (refer to **Figure 6**). Special care shall be taken where underlying woody roots have lifted or displaced the pavement. Any plant or equipment used in demolition work shall operate within the footprint of existing paved areas and avoid traversing soft landscape areas. Where this is unavoidable, suitable ground protection shall first be installed in accordance with **Section 10.7**.



**Figure 6** – Showing method for removal of concrete pavement, by carefully lifting sections and folding over the remaining paved surface.

The pavement sub-base within the TPZ shall be gradually removed (where required) in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid excessive disturbance and compaction of the underlying soil profile and damage to underlying roots and minimise. The machine shall work within the footprint of the existing path footprint to avoid compaction of the underlying soil. The final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and avoid damage to any underlying woody roots.

### *10.8.3 Structures & Retaining Walls*

Demolition of existing walls, kerbs and other structures within the TPZ of trees [T2, T3, T5, T10, T11, T12, T16, T17, T18, T23, T24, T25, T26 & T28] shall be undertaken under the supervision of a qualified Arborist [AQF level 5]. The structures shall be demolished using equipment on stationed outside the TPZ where possible or within the footprint of existing hardstand areas.

Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the structures during demolition works, with special attention required during demolition of the footings and other sub-surface members to avoid damage to woody roots. An observer (‘spotter’) shall be employed to assist the plant operator in order to detect and avoid damage to underlying woody roots during demolition. Trunk and/or branch protection shall be installed where there is a potential risk of damage to trees in proximity or overhead of the work.

## **10.9 Excavations within Tree Protection Zones**

- 10.9.1 Prior to any mechanical excavations for building foundations or pavement sub-grade within the TPZs of Trees [T2, T3, T5, T10, T11, T12, T16, T17, T18, T23, T24, T25, T26 & T28] exploratory excavation using non-destructive techniques shall be taken along the perimeter of the structure or pavement within the TPZ. Non-destructive excavation techniques may include the use of hand-held implements, air pressure (using an Air-spade® device) or water pressure (hydro-excavation in combination with a vacuum extraction unit). The exploratory excavation shall be undertaken along the perimeter of the foundation or pavement (within the TPZ) to the depth of the foundation or to a maximum of 800mm from surface levels, to locate and expose any woody roots



prior to any mechanical excavation. All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation.

- 10.9.2 Any roots encountered of less than 40mm in diameter may be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise moisture stress on the tree.
- 10.9.3 Where large woody roots (greater than 40mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary (to avoid severance of large woody roots), alternative construction methods should be adopted in accordance with **Section 10.10**.

#### **10.10 Alternative Construction Methods**

- 10.10.1 Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor supported on piers, cantilevered slab, up-turned edge beam etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the SRZ. Pier footings intersecting large woody roots should be slightly offset where necessary to avoid root severance.
- 10.10.2 For masonry walls or 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. For retaining walls, consideration should be given to eliminating continuous strip footings and substituting with pier and beam footings, pier footings (using a post and caisson type wall) or mass wall such as gabions or mass stone that can be placed without a structural footing.
- 10.10.3 For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation where large woody roots are found within the sub-base.

#### **10.11 Underground Services**

- 10.11.1 Trenching for underground services and stormwater pipes within the TPZs of Trees [**T10, T17 & T18**], shall be undertaken using non-destructive excavation in accordance with **Section 10.9**. Where large woody roots are encountered during excavation or trenching (root diameter greater than 40mm), these shall be retained intact wherever possible (e.g. by tunnelling beneath roots and inserting the pipeline or conduit beneath or re-routing the service etc). Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by a qualified arborist [AQF 5] to evaluate the potential impact on the health and stability of the subject tree.
- 10.11.2 Installation of underground services and stormwater pipes within the SRZs of Trees [**any tree nominated for retention**], shall only be undertaken by Horizontal Directional Drilling (HDD) (also referred to as sub-surface boring or Micro-tunnelling for large diameter pipes). The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. At this site a minimum depth of 1 metre to the invert level of the pipe is specified.

#### **10.12 Root Pruning**

- 10.12.1 Where root pruning of [**any tree nominated for retention**] is required to facilitate construction, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall

be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

- 10.12.2 Any required root pruning shall be carried out in accordance with Australian Standard 4373-2007 – *Pruning of Amenity Trees* by a qualified and experienced arborist or tree surgeon [Australian Qualification Framework Level 3] in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). No roots of greater than 40mm in diameter should be removed or pruned without further advice from a Consulting Arborist [Australian Qualification Framework Level 5].

## 11 REPLACEMENT PLANTING

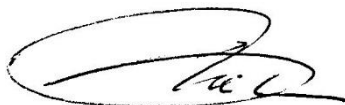
- 11.1.1 In order to compensate for loss of amenity resulting from the removal of any trees to accommodate the proposed development, an equivalent number of new trees capable of attaining a height of at least twelve (12) metres at maturity should be planted within the allotment.
- 11.1.2 Under the requirements of Section B4.7 of the PDCP, replacement trees to be planted on a site classified as Pittwater Spotted Gum Forest must include 80% locally indigenous species.
- 11.1.3 The following tree species are appropriate to the site conditions and could be considered for replacement planting:-

Suitable locally-indigenous species:-

- *Ficus rubiginosa* (Port Jackson Fig)
- *Syzygium paniculatum* (Magenta Cherry)
- *Glochidion ferdinandi* (Cheese Tree)
- *Syncarpia glomulifera* (Turpentine)
- *Eucalyptus umbra* (Bastard Mahogany),
- *Angophora floribunda* (Rough barked Apple)
- *Angophora costata* (Sydney Red Gum),
- *Corymbia maculata* (Spotted Gum)
- *Allocasuarina torulosa* (Forest Oak).

Suitable non-local native species:-

- *Backhousia citriodora* (Lemon-scented Myrtle)
- *Scolopia braunii* (Flintwood)
- *Stenocarpus sinuatus* (Qld Firewheel Tree)
- *Syzygium oleosum* (Blue Cherry)
- *Syzygium leuhmannii* (Small Leaf Lillypilly)
- *Waterhousea floribunda* (Weeping Lilly Pilly)
- *Lophostemon confertus* (Brushbox).
- *Ceratopetalum apetalum* (Coachwood)



**Andrew Morton**

EARTHSCAPE HORTICULTURAL SERVICES

24<sup>th</sup> June 2025

## REFERENCES

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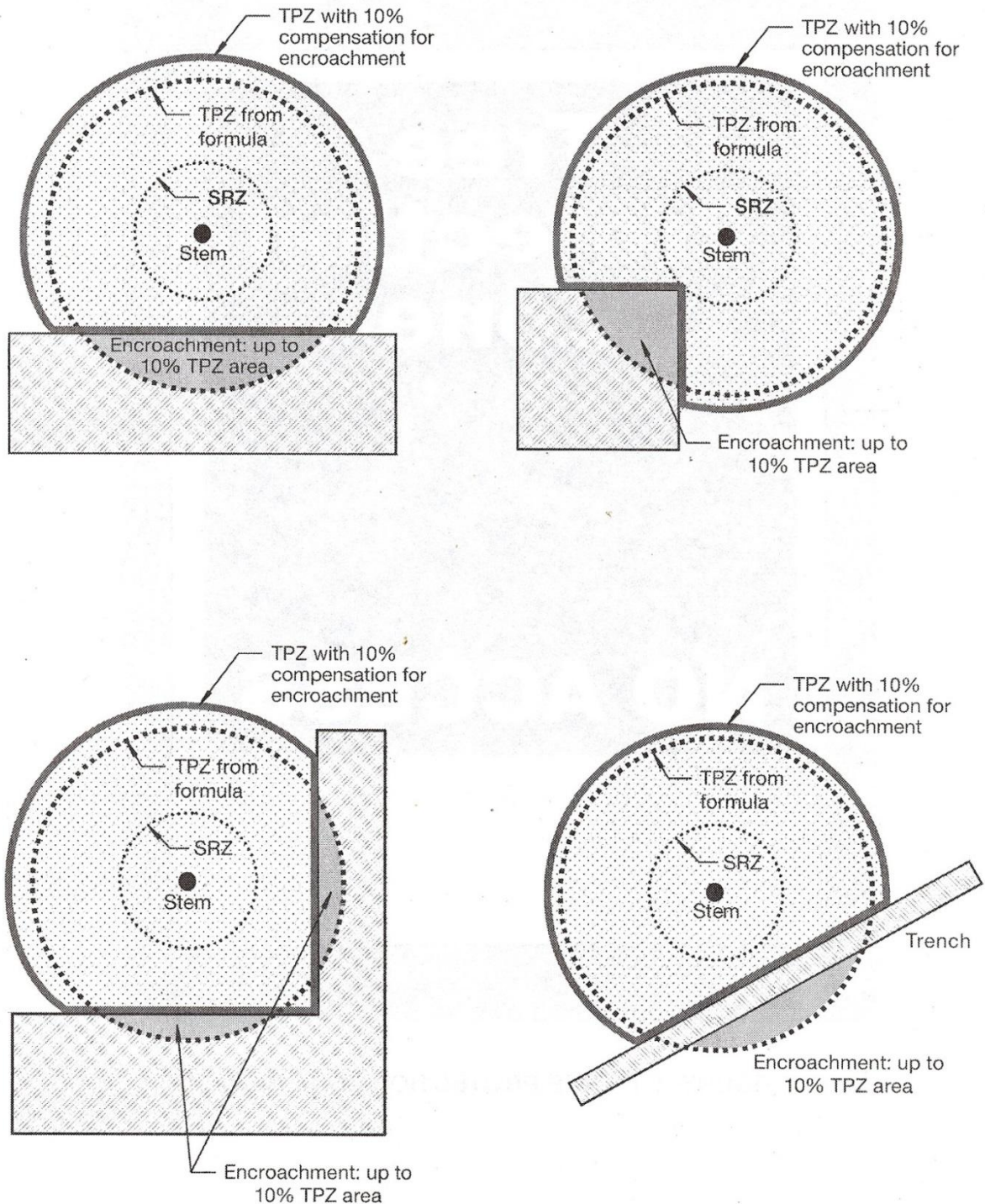
- <sup>1</sup> Chapman, G.A. & Murphy, C. L. (1989)  
**Soil Landscapes of the Sydney 1:100,000 Sheet**  
Soil Conservation Service of NSW. Sydney
- <sup>2</sup> Benson, Doug & Howell, Jocelyn (1990)  
**Taken for Granted: the Bushland of Sydney and its Suburbs.**  
Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW
- <sup>3</sup> Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)  
**The Body Language of Trees – A Handbook for Failure Analysis**  
The Stationery Office, London, England
- <sup>4</sup> Barrell, Jeremy (1996)  
**Pre-development Tree Assessment**  
Proceedings of the International Conference on Trees and Building Sites (Chicago)  
International Society of arboriculture, Illinois, USA
- <sup>5</sup> Council of Standards Australia (August 2009)  
**AS 4970 – 2009 – Protection of Trees on Development Sites**  
Standards Australia, Sydney

## APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
<b>1. SIGNIFICANT</b>	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened or Vulnerable Species as defined under the provisions of the <i>Biodiversity Conservation Act 2016</i> (NSW) or the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .	The subject tree has a very large live crown size exceeding 300m <sup>2</sup> with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
<b>2. VERY HIGH</b>	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m <sup>2</sup> ; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
<b>3. HIGH</b>	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m <sup>2</sup> ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
<b>4. MODERATE</b>	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of the local or state planning controls (Development Control Plan etc).	The subject tree has a medium live crown size exceeding 40m <sup>2</sup> ; the tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
<b>5. LOW</b>	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of the local or state planning controls (DCP etc) due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m <sup>2</sup> and can be replaced within the short term (5-10 years) with new tree planting
<b>6. VERY LOW</b>	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
<b>7. INSIGNIFICANT</b>	The tree is completely dead and has no known heritage value (or any habitat value)	The tree is scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW or within the relevant Local Government Area under the provisions of the <i>Biosecurity Act 2015</i>	The tree is completely dead and represents a potential hazard.

Ref:- Morton, A (2006) **Determining the Retention Value of Trees on Development Sites**TreeNet - Proceedings of the 7<sup>th</sup> National Street Tree Symposium 2006 Government of South Australia Department for Transport, Energy and Infrastructure

## APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

REF:- Council of Standards Australia (August 2009)  
**AS 4970 – 2009 – Protection of Trees on Development Sites**  
 Standards Australia, Sydney

		APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE												
Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm) at 1.4 metres	Live Crown Size (m²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	<i>Livistona australis</i> (Cabbage Tree Palm)	7	4.5	280	13.5	SM	Appears stable with sound branching structure.	No evidence	Good	No Evidence	Long - more than 40 years	2	High	Nature strip
2	<i>Corymbia maculata</i> (Spotted Gum)	20	11	446	88	M	Appears stable with sound branching structure. Exhibits a slight lean to the north. 5% deadwood.	No evidence	Good	No Evidence	Long - more than 40 years	2	High	On-site
3	<i>Angophora floribunda</i> (Rough-barked Apple)	8	3.5	153	10.5	I	Appears stable with sound branching structure. Exhibits a prominent lean to the north-west.	No evidence	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	2	High	On-site
4	<i>Viburnum odoratissimum</i> (Sweet Viburnum)	6	5	130 + 160	22.5	SM	Appears stable with fair branching structure. Exhibits a high bark inclusion at junction of co-dominant PLs at GL.	Crown lifted to 2 metres.	Good	High foliar insect infestation (Spider Mite)	Long - more than 40 years	5	Moderate	On-site
5	<i>Eucalyptus microcorys</i> (Tallowwood)	20	12	494	156	SM	Appears stable with fair branching structure. Exhibits a high bark inclusion at junction of PL at 7 & 8 metres. Prominent lean to the north (self-corrected).	No evidence	Very Good	No Evidence	Medium 15-40 Years	3	High	On-site
6	<i>Plumeria acutifolia</i> (Frangipani)	4	5	120 + 70	20	SM	Appears stable with fair branching structure. Exhibits a very prominent lean to the north.	No evidence	Good	No Evidence	Medium 15-40 Years	6	Low	On-site
7	<i>Corymbia maculata</i> (Spotted Gum)	12	6	140	36	I	Appears stable with sound branching structure.	No evidence	Good	No Evidence	Long - more than 40 years	2	High	On-site
8	<i>Melaleuca bracteata</i> (Black Tea-tree)	11	7	213	42	M	Appears stable with fair branching structure. Exhibits a high bark inclusion at junction of co-dominant PLs at GL. Crown suppressed on east side due to overshadowing.	Crown lifted to 3 metres.	Good	No Evidence	Medium 15-40 Years	4	Moderate	On-site
9	<i>Melaleuca bracteata</i> (Black Tea-tree)	7	4	166	20	SM	Appears stable with fair branching structure. Exhibits a prominent lean to the south-east (self corrected).	Selectively pruned.	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	5	Low	On-site



### APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm) at 1.4 metres	Live Crown Size (m <sup>2</sup> )	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
10	<i>Corymbia maculata</i> (Spotted Gum)	27	14	742	210	M	Appears stable with sound branching structure. Exhibits a prominent lean to the south-west	No evidence	Good	No Evidence	Medium 15-40 Years	1	High	On-site
11	<i>Eucalyptus punctata</i> (Grey Gum)	18	13	500	169	M	Appears stable with sound branching structure. Exhibits a prominent lean to the west. Some dieback with 10% deadwood.	No evidence	Fair with slightly thinning crown	No Evidence	Long - more than 40 years	2	High	On-site
12	<i>Eucalyptus microcorys</i> (Tallowwood)	11	7	271	49	SM	Appears stable with fair branching structure. Exhibits multiple basal epicormic sprouts.	No evidence	Good	No Evidence	Medium 15-40 Years	4	Moderate	On-site
13	<i>Tristaniopsis laurina</i> (Water Gum)	5	4	70x3 + 90	20	I	Appears stable with poor branching structure. Exhibits multiple high bark inclusions at junctions of co-dominant PLs (x3) at GL. Crown suppressed east side due to overshadowing.	No evidence	.Fair	No Evidence	Short 5-15 Years	5	Low	On-site
14	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	5	10	140x4 + 200x2	50	SM	Appears stable with fair branching structure. Exhibits multiple contorted laterally inclined PLs. Crown suppressed and upper crown distorted east side due to overshadowing.	No evidence	Good	No Evidence	Medium 15-40 Years	4	Moderate	On-site
15	<i>Corymbia maculata</i> (Spotted Gum)	12	5	182	25	SM	Appears stable with fair branching structure. Crown suppressed on the north-east side due to overshadowing. Prominent lean to the south-west. Possum claw marks on trunk.	No evidence	Good	No Evidence	Long - more than 40 years	2	High	On-site
16	<i>Corymbia maculata</i> (Spotted Gum)	27	14	780	308	M	Appears stable with sound branching structure. Crown suppressed on east side due to crowding. Co-dominant trunks at 4 metres. Possum claw marks on trunk.	No evidence	Very Good	No Evidence	Long - more than 40 years	1	High	On-site
17	<i>Corymbia maculata</i> (Spotted Gum)	22	7	525	70	M	Appears stable with sound branching structure. Crown suppressed on the east side due to previous pruning.	Selectively pruned east side to clear existing dwelling.	Good	No Evidence	Long - more than 40 years	1	High	On-site
18	<i>Eucalyptus resinifera</i> (Red Mahogany)	13	8	280x2	64	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at junction of co-dominant PLs at 1.5 metres. 10% deadwood.	No evidence	Fair with slightly thinning crown	No Evidence	Long - more than 40 years	3	High	On-site

### APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm) at 1.4 metres	Live Crown Size (m <sup>2</sup> )	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
19	<i>Eucalyptus resinifera</i> (Red Mahogany)	9	5	223	25	SM	Appears stable with poor branching structure. Exhibits multiple moderate wounds to trunk at 0.3 metres due to previous pruning. Crown suppressed on the east side due to crowding. Exhibits a prominent lean to the west.	Previously cut to GL (crown restored)	.Fair	No Evidence	Short 5-15 Years	4	Low	On-site
20	<i>Eucalyptus resinifera</i> (Red Mahogany)	9	5	160 + 170	35	SM	Appears stable with poor branching structure. Crown suppressed on the east side due to overshadowing. 10% epicormic growth and 5% deadwood.	Previously cut to GL (crown restored)	Good	No Evidence	Short 5-15 Years	4	Low	On-site
21	<i>Corymbia maculata</i> (Spotted Gum)	20	13	600	130	M	Appears stable with fair branching structure. Exhibits multiple broken and suspended branches due to previous storm damage.	No evidence	.Fair	No Evidence	Long - more than 40 years	1	High	On-site
22	<i>Glochidion ferdinandi</i> (Cheese Tree)	5	5	150	25	I	Appears stable with sound branching structure.	No evidence	.Fair	Moderate foliar insect infestation (Kurrajong Leaf Tier)	Medium 15-40 Years	5	Low	On-site
23	<i>Corymbia maculata</i> (Spotted Gum)	27	15	750	255	M	Appears stable with fair branching structure. Crown suppressed on the east side due to crowding. Exhibits a prominent lean to the west. Multiple moderate wounds & broken branch stubs due to previous storm damage.	No evidence	Good	No Evidence	Medium 15-40 Years	1	High	On-site
24	<i>Corymbia maculata</i> (Spotted Gum)	15	11	573	143	M	Appears stable with sound branching structure. Crown suppressed on the east side due to overshadowing. Growing on steep bank.	No evidence	Very Good	No Evidence	Long - more than 40 years	1	High	On-site
25	<i>Dracaena marginata</i> (Dragon Tree)	6	4.5	140x3	22.5	M	Appears stable with sound branching structure.	No evidence	Good	No Evidence	Medium 15-40 Years	5	Low	On-site
26	<i>Corymbia maculata</i> (Spotted Gum)	18	12	600	120	M	Appears stable with fair branching structure. Contorted branching habit. Some dieback at epicormic growth at extremities of crown.	No evidence	Good	Suspected termite infestation	Medium 15-40 Years	1	High	On-site



### APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm) at 1.4 metres	Live Crown Size (m <sup>2</sup> )	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
27	<i>Corymbia maculata</i> (Spotted Gum)	18	12	600	120	M	Appears stable with fair branching structure. Exhibits multiple moderate wounds & broken branch stubs due to previous storm damage. Prominent lean to the north-west.	No evidence	Good	Suspected termite infestation	Medium 15-40 Years	1	High	On-site
28	<i>Angophora costata</i> (Sydney Red Gum)	9	7	200x2	49	SM	Appears stable with fair branching structure. Exhibits a low bark inclusion at junction of co-dominant PLs at 1.3 metres.	No evidence	Good	No Evidence	Long - more than 40 years	2	High	On-site

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	<i>Livistona australis</i> (Cabbage Tree Palm)	G	3.4	N/A	2.3	35.4	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
2	<i>Corymbia maculata</i> (Spotted Gum)	P	6.0	2.5	4.1	113.0	Existing shed/outbuilding offset 4.7 metres north-west to be demolished within TPZ. Proposed Studio offset 5.8 metres north-west at RL13.60 (200mm above grade, beyond existing retaining wall). Encroachment to TPZ = 1%. No actual encroachment to the root zone due to the barrier created by the existing retaining wall.	Extent of encroachment to the TPZ is within acceptable limits under AS 4970:2009. No adverse impact.	To be retained - no special tree protection measures required.
3	<i>Angophora floribunda</i> (Rough-barked Apple)	P	2.5	1.6	1.7	19.6	Existing shed/outbuilding offset 2.4 metres north-west to be demolished within TPZ. Proposed Studio offset 3.6 metres north-west at RL13.60 (200mm above grade, beyond existing retaining wall). No encroachment to TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
4	<i>Viburnum odoratissimum</i> (Sweet Viburnum)	M	3.0	1.8	2.0	28.3	Existing shed/outbuilding & associated porch offset 1.6 metres north-west to be demolished within TPZ. Proposed Studio offset 2.6 metres north-west at RL13.60 (200mm above grade). Excavation for building foundations within TPZ. Encroachment to TPZ = 3%.	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing building within TPZ in accordance with Section 10.8. Undertake all excavation for new building foundations within TPZ in accordance with Section 10.9.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
5	<i>Eucalyptus microcorys</i> (Tallowwood)	P	5.9	2.6	4.0	110.2	Existing shed/outbuilding & associated porch offset 2.3 metres north-east to be demolished within TPZ. Proposed Studio offset 2.5 metres north-east at RL13.60 (100-200mm above grade, beyond existing retaining wall - to be maintained intact). Excavation for building foundations within TPZ. Encroachment to TPZ = 10% (decrease from present situation). Proposed raised timber stair and landing offset 4.6 metres north-west at RL11.62 (0.8 metres above grade). Excavation for post/pad footings within TPZ. Encroachment to TPZ = 2%.	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing building within TPZ in accordance with Section 10.8. Undertake all excavation for new building foundations within TPZ in accordance with Section 10.9.
6	<i>Plumeria acutifolia</i> (Frangipani)	M	3.0	1.5	2.0	28.3	Proposed Studio offset 0.2 metres north at RL13.60 (1 metre above grade). Substantial canopy pruning will be required to clear building envelope, resulting in 40% crown loss.	Extent of crown loss exceeds acceptable limits under AS4373:2007. Proposed works are likely to result in a significant impact, necessitating removal.	Remove tree.
7	<i>Corymbia maculata</i> (Spotted Gum)	P	4.0	1.5	2.7	50.2	Proposed raised timber stair and landing offset 3.5 metres north at RL11.42 (0.9 metres above grade). Excavation for post/pad footings within TPZ. Encroachment to TPZ = 4%. Minor incursion to root zone.	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
8	<i>Melaleuca bracteata</i> (Black Tea-tree)	M	4.0	2.0	2.7	50.2	Proposed raised timber stair and landing offset 1.2 metres NE at RL11.62 (0.8 metres above grade) and 1 metre north at RL11.42 - 10.03 (1 metres above grade). Excavation for post/pad footings within TPZ/SRZ. Encroachment to TPZ = 23%. Minor incursion to root zone.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavation for new stair and deck post footings within TPZ in accordance with Section 10.9. Adopt alternative construction methodology as required in accordance with Section 10.10.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
9	<i>Melaleuca bracteata</i> (Black Tea-tree)	M	2.5	1.6	1.7	19.6	Proposed raised timber stair and landing offset 0.7 metres north at RL11.42 to RL10.03 (1 metre above grade). Excavation for post/pad footings within TPZ/SRZ. Encroachment to TPZ = 18%. Minor incursion to root zone. Proposed 150mmØ stormwater pipelines and associated pit offset 1.1 metres west at IL7.37 (1.5 below grade). Open trenching for pipelines within TPZ/SRZ. Cumulative encroachment to TPZ = 36%.	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Open trenching for stormwater pipelines within SRZ is likely to result in severance and damage to woody roots, leading to a significant adverse impact, necessitating removal.	Remove tree.
10	<i>Corymbia maculata</i> (Spotted Gum)	P	8.9	3.1	6.1	249.0	Proposed raised timber stair and landing offset 2.8 metres north at RL9.49 (450mm above grade) to RL7.00 (meets existing landing at grade). Excavation for post/pad footings within TPZ/SRZ. Encroachment to TPZ = 18%. Minor incursion to root zone. Proposed 150mmØ stormwater pipelines and associated pit offset 4.2 metres east at IL7.37 (1.5 below grade) and 5.0 metres north-east at IL? (assumed 400-800mm below grade). Open trenching for pipelines within TPZ. Encroachment to TPZ = 21%.	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. No adverse impact, provided that all proposed works are undertaken as recommended. Note that the pipeline has been located as best as possible to minimise encroachment to the TPZ, but must discharge to the existing pit located immediately south-east of the tree.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavation for new stair and deck post footings within TPZ in accordance with Section 10.9. Adopt alternative construction methodology as required in accordance with Section 10.10. Install stormwater pipelines within the TPZ in accordance with Section 10.11.
11	<i>Eucalyptus punctata</i> (Grey Gum)	P	7.0	2.5	4.8	153.9	Existing stone flag pathway offset 3.3 metres north-east to be maintained intact (repaired and restored as required). No encroachment to TPZ. Proposed random stone steps offset 4.5 metres west and north. Minor excavation for stone bedding within TPZ.	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavation for new random stone steps within TPZ in accordance with Section 10.9. Adopt alternative construction methodology where required in accordance with Section 10.10.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
12	<i>Eucalyptus microcorys</i> (Tallowwood)	P	4.0	2.0	2.7	50.2	Proposed random stone steps offset 1.8 metres west. Minor excavation for stone bedding within TPZ.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavation for new random stone steps within TPZ in accordance with Section 10.9. Adopt alternative construction methodology where required in accordance with Section 10.10.
13	<i>Tristaniopsis laurina</i> (Water Gum)	M	2.5	1.7	1.7	19.6	Proposed random stone steps offset 0.4 metres east. Minor excavation for stone bedding within TPZ/SRZ.	Excavations for stone steps may result in severance and damage to woody roots, leading to a significant adverse impact.	Remove tree.
14	<i>Melaleuca quinquenervia</i> (Broad-leaved Paperbark)	M	5.0	2.3	3.4	78.5	Proposed random stone steps offset 2.5 metres east. Minor excavation for stone bedding within TPZ.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavation for new random stone steps within TPZ in accordance with Section 10.9. Adopt alternative construction methodology where required in accordance with Section 10.10.
15	<i>Corymbia maculata</i> (Spotted Gum)	P	4.0	1.7	2.7	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
16	<i>Corymbia maculata</i> (Spotted Gum)	P	9.4	3.0	6.4	275.3	Existing stone flag pathway offset 0.9 metres east to be maintained intact (repaired and restored as required). No encroachment to TPZ. Proposed addition (deck) offset 7.4 metres north-east at RL11.6 (3.5 metres above grade - elevated & supported by post footings). Minor encroachment to root zone.	No adverse impact.	To be retained - no special tree protection measures required.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
17	<i>Corymbia maculata</i> (Spotted Gum)	P	6.3	2.6	4.3	124.9	Proposed new path and stairs offset 1.8 metres east at RL? (suspended above grade and supported by post footings). Minor incursion to root zone. Proposed 150mmØ stormwater pipeline offset 2.4 metres east at IL? (assumed 400-600mm below grade). Open trenching for pipelines within TPZ (close to alignment of existing wall to be demolished & beyond existing retaining walls to be maintained). Encroachment to TPZ = 26% (no increase from present situation).	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. However given that there will be no increase in encroachment from the present situation, the proposed works will not result in any adverse impact, provided all works are carried out as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing walls and pathways within TPZ (where required) in accordance with Section 10.8. Undertake all excavation for new stair and deck post footings within TPZ in accordance with Section 10.9. Adopt alternative construction methodology as required in accordance with Section 10.10. Install stormwater pipelines within the TPZ in accordance with Section 10.11. Adopt alternative installation measures such as suspending the pipelines beneath the floor of the deck / stairs (where necessary) to avoid root severance and damage
18	<i>Eucalyptus resinifera</i> (Red Mahogany)	P	4.8	2.4	3.3	72.3	Proposed new path and stairs offset 2.7 metres east at RL? (suspended above grade and supported by post footings). Proposed deck offset 1.6 metres north-east at RL? (suspended above grade and supported by post footings). Minor incursion to root zone. Proposed 150mmØ stormwater pipeline offset 3.3 metres east at IL? (assumed 400-600mm below grade). Open trenching for pipelines within TPZ (close to alignment of existing wall to be demolished & beyond existing retaining walls to be maintained). Encroachment to TPZ = 10% (no increase from present situation).	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Demolish existing walls and pathways within TPZ (where required) in accordance with Section 10.8. Undertake all excavation for new stair and deck post footings within TPZ in accordance with Section 10.9. Adopt alternative construction methodology as required in accordance with Section 10.10. Install stormwater pipelines within the TPZ in accordance with Section 10.11. Adopt alternative installation measures such as suspending the pipelines beneath the floor of the deck / stairs (where necessary) to avoid root severance and damage

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE									
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
19	<i>Eucalyptus resinifera</i> (Red Mahogany)	P	3.5	2.4	2.4	38.5	Existing stone flag pathway offset 1.9 metres west to be maintained intact (repaired and restored as required). No encroachment to TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
20	<i>Eucalyptus resinifera</i> (Red Mahogany)	P	4.0	2.0	2.7	50.2	Existing stone flag pathway offset 1.0 metres west to be maintained intact (repaired and restored as required). No encroachment to TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
21	<i>Corymbia maculata</i> (Spotted Gum)	P	7.2	2.8	4.9	162.8	Existing stone flag pathway offset 2.7 metres west to be maintained intact (repaired and restored as required). No encroachment to TPZ. Proposed addition (suspended deck/verandah) offset 4.7 metres east at RL11.60 (3.5 metres above grade) (LGF level) and 4.1 metres east (GF level) at RL14.02 (6 metres above grade). Excavations for post footings within TPZ - minor incursion to root zone. Roofline extending to RL18.96 (10 metres above grade). No incursion to canopy.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavation for new post footings within TPZ in accordance with Section 10.9. Adopt alternative construction methodology where required in accordance with Section 10.10.
22	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	2.7	1.6	1.8	22.9	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
23	<i>Corymbia maculata</i> (Spotted Gum)	P	9.0	3.0	6.1	254.3	Existing driveway offset 4.6 metres east (suspended slab) to be demolished within TPZ. Proposed garage offset 5.8 metres south-east at RL11.01 (1 metre below grade, within footprint of existing driveway). Encroachment to TPZ = 4%. Proposed addition (suspended deck/verandah) offset 3.9 metres south-east at RL11.60 (3.5 metres above grade) (LGF level) and 4.6 metres south-east (GF level) at RL14.02 (6 metres above grade). Excavations for post footings within TPZ - minor incursion to root zone. Roofline extending to RL18.96 (10 metres above grade). No incursion to canopy. Proposed driveway & associated retaining wall offset 4.5 metres east at RL11.00 to RL12.57 (0.7 to 1.0 metres above GL below edge of existing suspended driveway). Excavations for wall foundations and engineering fill for pavement sub-grade within TPZ. Cumulative encroachment to TPZ = 19% (within footprint of existing driveway, partly suspended, partly on fill).	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Proposed works have the potential to result in some adverse impact. Any adverse impact can be minimised by undertaking the excavations for the wall foundations using non-destructive methods and adopting alternative construction measures (where required).	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavation for new stair & deck post footings and building foundations within TPZ in accordance with Section 10.9. Undertake all excavations for driveway slab and associated retaining wall foundations within the TPZ in accordance with Section 10.9. Adopt alternative construction methodology (such as partially elevated slab supported by isolated piers with void beneath) as required in accordance with Section 10.10.



# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

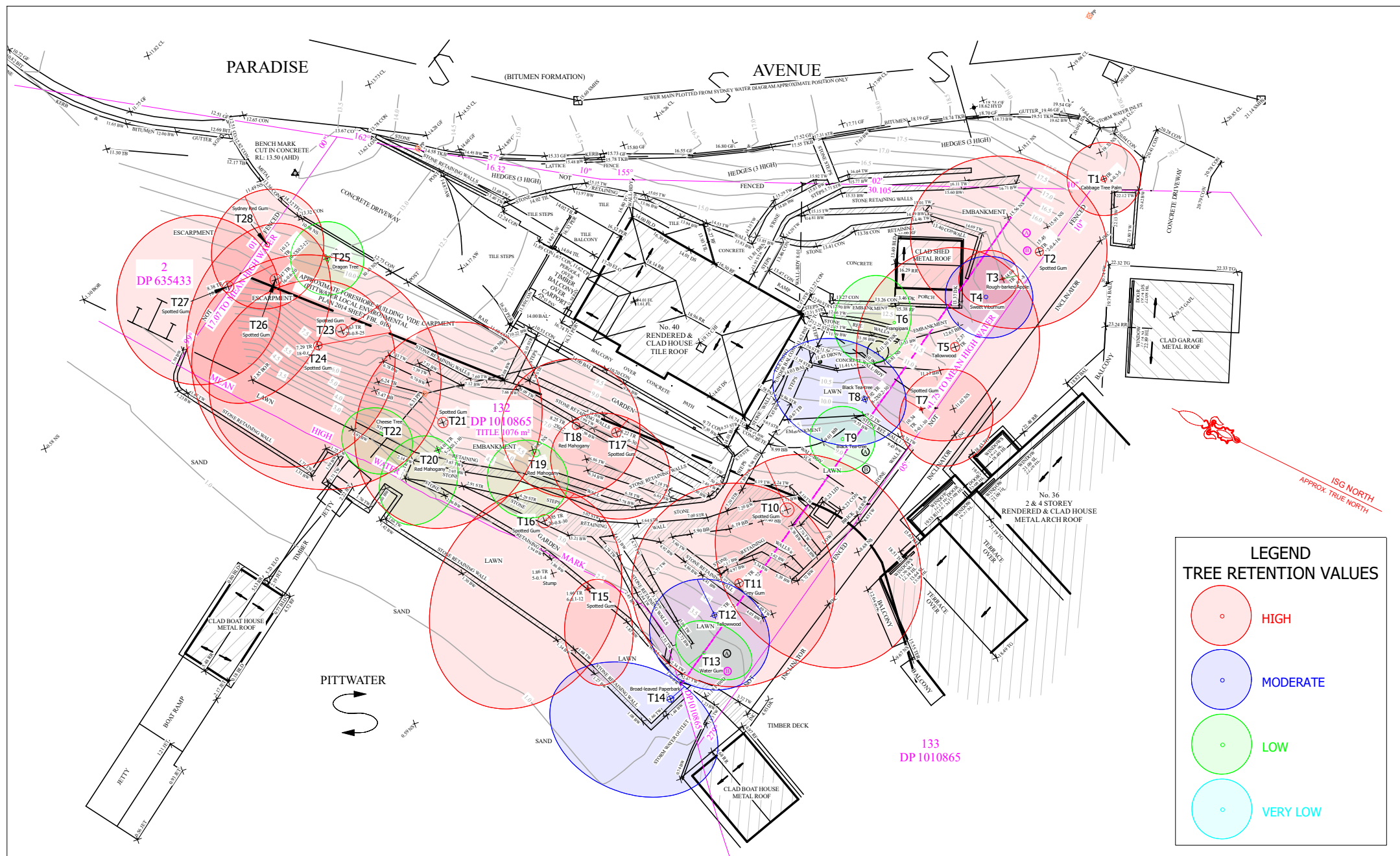
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
24	<i>Corymbia maculata</i> (Spotted Gum)	P	6.9	2.5	4.7	148.6	Existing driveway offset 6.0 metres east (suspended slab) to be demolished within TPZ. Proposed addition (suspended deck/verandah) offset 3.9 metres south-east at RL11.60 (3.5 metres above grade) (LGF level). Excavations for post footings within TPZ - minor incursion to root zone. Roofline extending to RL18.96 (10 metres above grade). No incursion to canopy. Proposed driveway & associated retaining wall offset 6 metres east at RL11.00 to RL12.57 (0.7 to 1.0 metres above GL below edge of existing suspended driveway). Excavations for wall foundations and engineering fill for pavement sub-grade within TPZ. Cumulative encroachment to TPZ = 3% (within footprint of existing suspended driveway slab)	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.
25	<i>Dracaena marginata</i> (Dragon Tree)	M	3.4	2.0	2.3	35.4	Existing driveway offset 1.3 metres east (suspended slab) to be demolished within TPZ. Proposed driveway & associated retaining wall offset 1.1 metres east at RL11.00 to RL12.57 (0.7 to 1.0 metres above GL below edge of existing suspended driveway). Excavations for wall foundations and engineering fill for pavement sub-grade within TPZ. Cumulative encroachment to TPZ = 29% (within footprint of existing driveway, partly suspended, partly on fill).	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Proposed works have the potential to result in some adverse impact. Any adverse impact can be minimised by undertaking the excavations for the wall foundations using non-destructive methods and adopting alternative construction measures (where required).	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for driveway slab and associated retaining wall foundations within the TPZ in accordance with Section 10.9. Adopt alternative construction methodology (such as partially elevated slab supported by isolated piers with void beneath) as required in accordance with Section 10.10.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
26	<i>Corymbia maculata</i> (Spotted Gum)	P	7.2	2.8	4.9	162.8	Existing driveway offset 4.1 metres east (suspended slab) to be demolished within TPZ. Proposed driveway & associated retaining wall offset 3.9 metres east at RL11.00 to RL12.57 (0.7 to 1.0 metres above GL below edge of existing suspended driveway). Excavations for wall foundations and engineering fill for pavement sub-grade within TPZ. Cumulative encroachment to TPZ = 16% (within footprint of existing driveway, partly suspended, partly on fill).	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Proposed works have the potential to result in some adverse impact. Any adverse impact can be minimised by undertaking the excavations for the wall foundations using non-destructive methods and adopting alternative construction measures (where required).	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for driveway slab and associated retaining wall foundations within the TPZ in accordance with Section 10.9. Adopt alternative construction methodology (such as partially elevated slab supported by isolated piers with void beneath) as required in accordance with Section 10.10.
27	<i>Corymbia maculata</i> (Spotted Gum)	P	7.2	2.8	4.9	162.8	Existing driveway offset 6.0 metres east (suspended slab) to be demolished within TPZ. Proposed driveway & associated retaining wall offset 5.9 metres east at RL11.00 to RL12.57 (0.7 to 1.0 metres above GL below edge of existing suspended driveway). Excavations for wall foundations and engineering fill for pavement sub-grade within TPZ. Cumulative encroachment to TPZ = 4% (within footprint of existing driveway, partly suspended, partly on fill).	Extent of encroachment to the root zone is less than 10% of the TPZ, which is within acceptable limits under AS4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5.

# APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
28	<i>Angophora costata</i> (Sydney Red Gum)	P	4.0	1.9	2.7	50.2	Existing driveway offset 2.5 metres east (suspended slab) to be demolished within TPZ. Proposed driveway & associated retaining wall offset 2.3 metres east at RL11.00 to RL12.57 (0.7 to 1.0 metres above GL below edge of existing suspended driveway). Excavations for wall foundations and engineering fill for pavement sub-grade within TPZ. Cumulative encroachment to TPZ = 12% (within footprint of existing driveway, partly suspended, partly on fill)..	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Proposed works have the potential to result in some adverse impact. Any adverse impact can be minimised by undertaking the excavations for the wall foundations using non-destructive methods and adopting alternative construction measures (where required).	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.5. Undertake all excavations for driveway slab and associated retaining wall foundations within the TPZ in accordance with Section 10.9. Adopt alternative construction methodology (such as partially elevated slab supported by isolated piers with void beneath) as required in accordance with Section 10.10.



**APPENDIX 5**  
**TREE LOCATION PLAN SHOWING**  
**TREE RETENTION VALUES**  
40 Paradise Avenue, AVALON BEACH, NSW

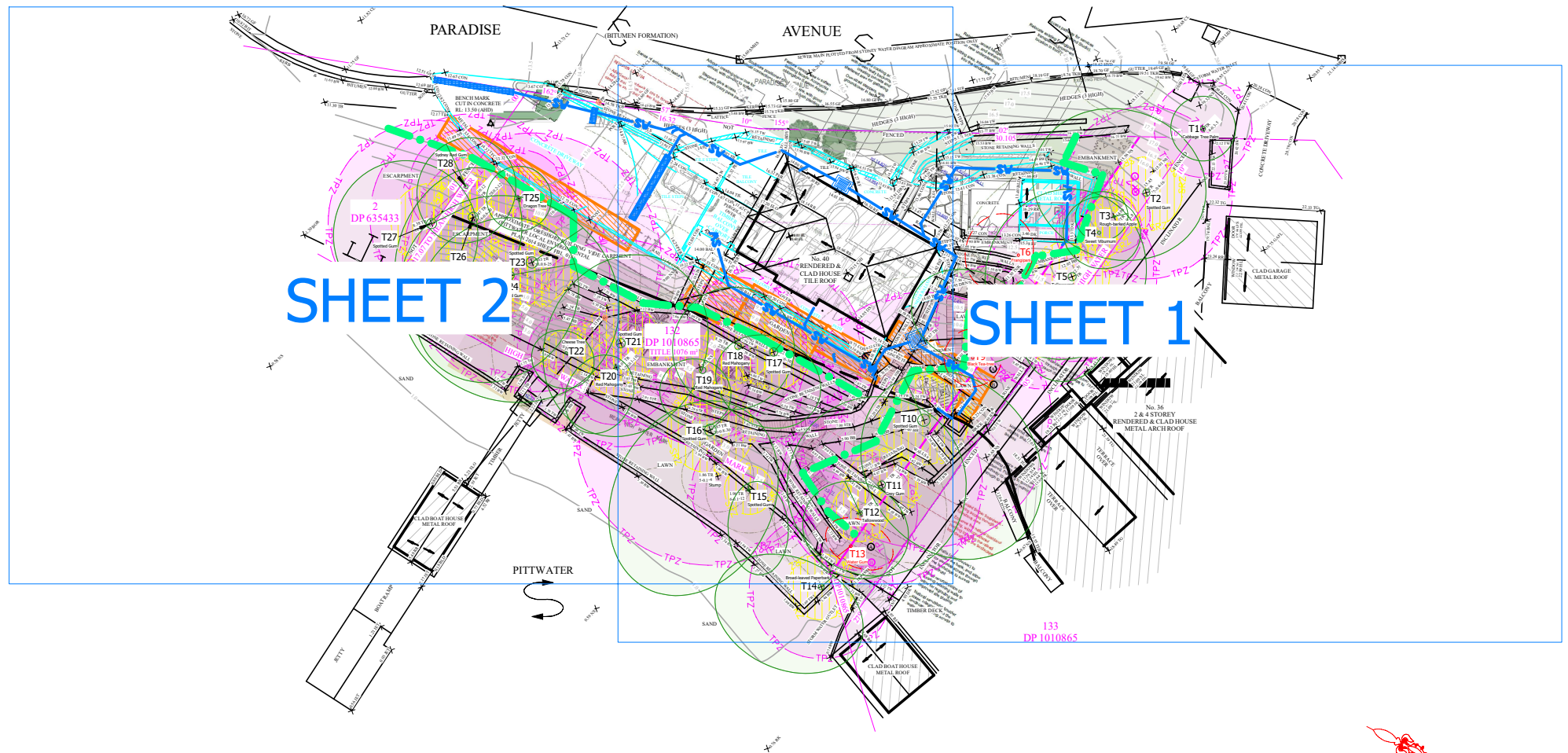


**Earthscape Horticultural Services**  
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Based on the Survey Drawing  
prepared by CMS Surveyors Pty Ltd  
Dwg Ref No. 21152Adetail [1]  
Dated 17/05/2024

DWG No. T24-0531/01 [A]

DATE: 31/05/2024



## APPENDIX 6

### TREE PROTECTION PLAN

40 Paradise Avenue, AVALON BEACH, NSW



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DWG No. T24-0531/02 [D]

KEY PLAN

DATE: 27/11/2024





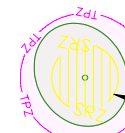
## LEGEND



Tree to be retained and protected in accordance with Tree Protection Measures (Section 10)



Tree to be removed in accordance with Section 10.4



Tree Protection Zone (TPZ) [refer Section 7]  
Canopy "Drip-line"  
Structural Root Zone (SRZ)



Existing buildings & structures to be demolished. Demolition works within TPZ's to be undertaken in accordance with Section 10.8



New development. All excavations for building foundations within TPZ's to be undertaken in accordance with Section 10.9



Excavations in these areas for footings and services to be undertaken in accordance with Section 10.9



Proposed stormwater infrastructure to be installed in accordance with Section 10.11



Tree Protection Fence to be erected in accordance with Section 10.5



Install Ground Protection in Accordance with Section 10.7

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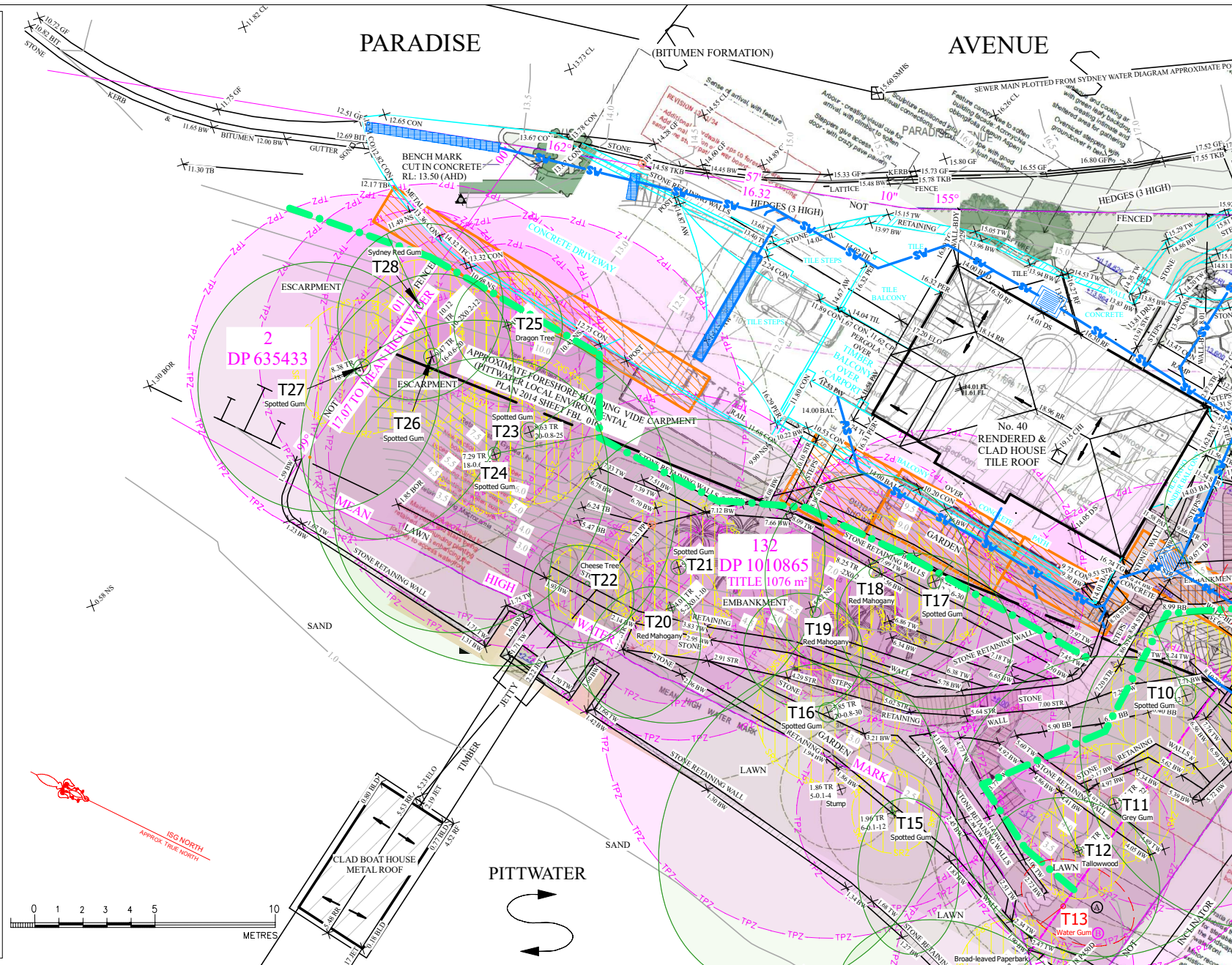
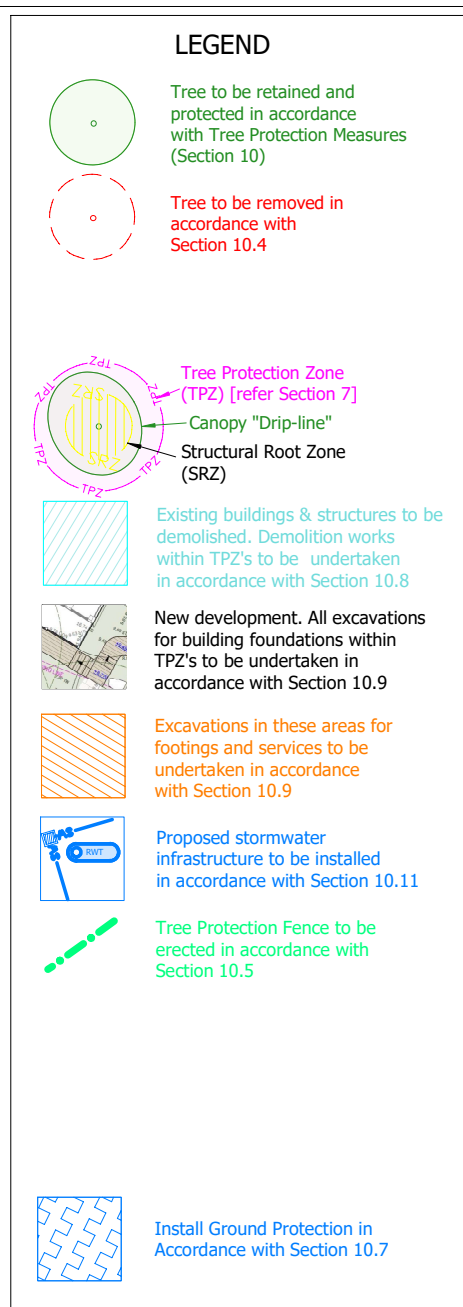
Dated 17/05/2024

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SHEET 1

DATE: 27/11/2024





## APPENDIX 6

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SHEET 2

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