



## **Arborists Impact Assessment Report: 23 and 25-33 Robertson Road, Scotland Island.**

February 16, 2018

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# Introduction

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## Background

H2O Ecology was commissioned by SDG to provide an Arborists Report of trees at 23 and 25-33 Robertson Rd, Scotland Island (Subject Site) NSW to support a development application. The subject site is located along the northern shore of Scotland Island and falls within the Local Government Area of Northern Beaches Council.

Northern Beaches Council require that an Arborist Impact Assessment Report to accompany Development Applications (DA) with potential to impact on trees.

## Tree Management Requirements

Under the Tree Preservation Order for the Northern Beaches, consent is required for the removal of the following:

- ❖ Any tree or native vegetation which is a threatened species, threatened species habitat or is part of an Endangered Ecological Community as defined under the *Biodiversity Conservation Act 2016*
- ❖ Any tree which is a heritage item or that is within a heritage conservation area as defined by searching the Planning Rules for your address
- ❖ Any tree specifically identified to be retained as a condition of development consent for building or works or subdivisions (this does not include Development Applications for Tree Removal or Tree Pruning)

## Site Description

The subject site is currently used for residential use and is zoned E3 – Environmental management and is identified as ‘Biodiversity’. The area is also mapped as Pittwater Spotted Gum Forest, which is listed as an Endangered Ecological Community (ECC) in the locality (Figure 1). Thus, consent from Northern Beaches Council would be required for the removal of any trees.

The subject site is along the waterfront on the northern shore of Scotland Island (Figure 1).



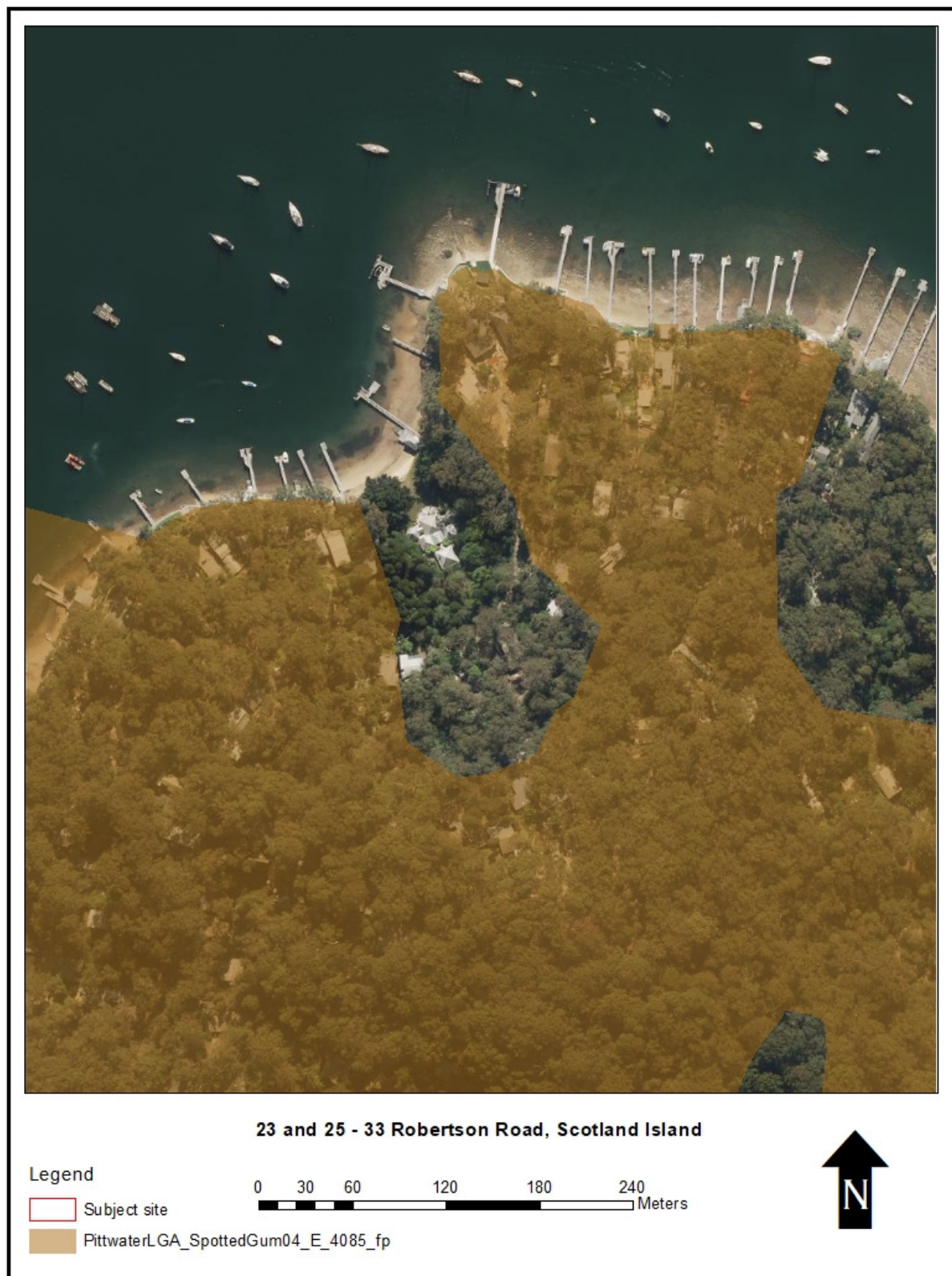


Figure 1: Location of the subject site.

## Description of the Proposed Development

### 23 Robertson Road, Scotland Island

- ❖ Boatsheds to be raised in its entirety and structure to remain in its current form.
  - Proposed boatshed finished floor level - rl1.77 AHD
  - Proposed boatshed ridge level - rl5.73 AHD
  - Proposed jetty finished decking level - rl1.55 AHD
- ❖ Ramp to be renewed to meet jetty
- ❖ Additional step riser to be installed

### 25 - 33 Robertson Road, Scotland Island

- ❖ Boatsheds to be raised in its entirety and structure to remain in its current form.
  - Proposed boatshed finished floor level - rl1.70 AHD
  - Proposed boatshed ridge level - rl5.85 AHD
  - Proposed jetty finished decking level – rl1.55 AHD
- ❖ Stone flagging to be renewed to meet rl1.70 AHD.

The works are proposed along the subject sites waterfront within the footprint of the existing boat sheds and expected to require minimal soil disturbance (Figure 2 and 3).

## Objectives

The objectives of this Arborists Impact Assessment Report are to:

- ❖ assess impact of the proposal on the site and neighboring trees,
- ❖ determine the Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) distances of those trees,
- ❖ provide advice on the suitability for retention of those trees, and
- ❖ develop a system of recommendations and a plan to show the tree protection measures required for the site.





Figure 3: Plans of the proposed improvement works at No: 25-33.

## Methodology

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The site survey was undertaken on the 28<sup>th</sup> October 2017 by David Cummings (AQF 5 Arborist). Trees surveyed included all trees within 5 m of the proposal footprint with a height of 2.5 m. Each tree was allocated a reference number and identified to species based on guidance from regionally identification guides (Robinson 2003), and descriptions and records provided by the online tool provided by the Royal Botanic Gardens (Plantnet 2016).

### Visual Tree Assessment

A visual tree assessment to evaluate the health and condition of these trees in relation to the impacts of the proposed development was undertaken from ground level following the methodology described by Matheck and Breloer (1994). Tree height was estimated following the guidance outlined in the Private Native Forestry Code of Practice (DECC 2007). The DBH (Diameter at Breast Height) was determine using a DBH tape.

### SULE

The SULE method (Safe Useful Life Expectancy) estimates the suitability of the tree in the urban landscape based on the species and age of the subject tree (Barrell 1996, Appendix 1). 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)
- ❖ Dead, dying, suppressed, defective or damaged (Remove)
- ❖ Less than 5m in height or 15years of age (Young or small tree)

### Tree Retention Value

To determine tree retention value a Landscape Significance Rating (LSR) was assigned to each tree. The SRZ value provides consideration of the trees amenity, environmental and heritage values (See Appendix 2). Trees are then assigned one of the following categories:

- ❖ Significant (1)
- ❖ Very High (2)
- ❖ High (3)
- ❖ Moderate (4)
- ❖ Low (5)
- ❖ Very Low (6)
- ❖ Insignificant (7).

Once the landscape significance value has been determined the following assessment matrix that utilizes estimated life expectancy and landscape significance (Table 1) was applied to each tree.

Table 1: Assessment matrix adopted from Morton (2006).

	Landscape significance rating						
Estimated Life Expectancy	1	2	3	4	5	6	7
Long	High						
Medium			Moderate				
Short					Low		
Transient					Very low		
Defective/dead/unstable							

## Calculations

For each tree the SRZ and TPZ was calculated in accordance with AS 4970 – 2009 (Appendix 3). The following formulas were applied for SRZ and TPZ.

$$SRZ = (DBH \times 50)^{0.24} \times 0.64$$

$$TPZ = DBH \times 12$$

To calculate an estimate of canopy spread, the spread in four directions (N, E, S and W) was recorded and the following formula applied.

$$Canopy\ Spread = \frac{\left[ \pi \left( \frac{(N + S)}{2} \right)^2 + \pi \left( \frac{(E + W)}{2} \right)^2 \right]}{2}$$

## Mapping

Mapping works where done using mapping software and aerial imagery from the online tool Six Maps (NSW L&PI 2016).

## Limitations

This report utilizes a rapid assessment of tree health and condition to inform retention value. Should a detailed assessment of tree structural health and condition be required a tree risk assessment report should be commissioned.

This assessment of tree health and condition is based on non-destructive visual observations from ground level. Thus, it is not possible to identify all structural faults at high levels in the tree, internal structural faults or within the root system. Should a detailed assessment for structural faults be required a tree risk assessment report should be commissioned.

Weather conditions such as extreme wind, storm activity, lightning as well as other events or disturbances independent of the proposed activities are unpredictable. Unforeseeable damage to trees may occur as a result of unpredictable or unplanned weather events or disturbances.



The findings of this report is reliant on the accuracy and completeness of the plans drafted on 10.10.17 and provided by SDG.



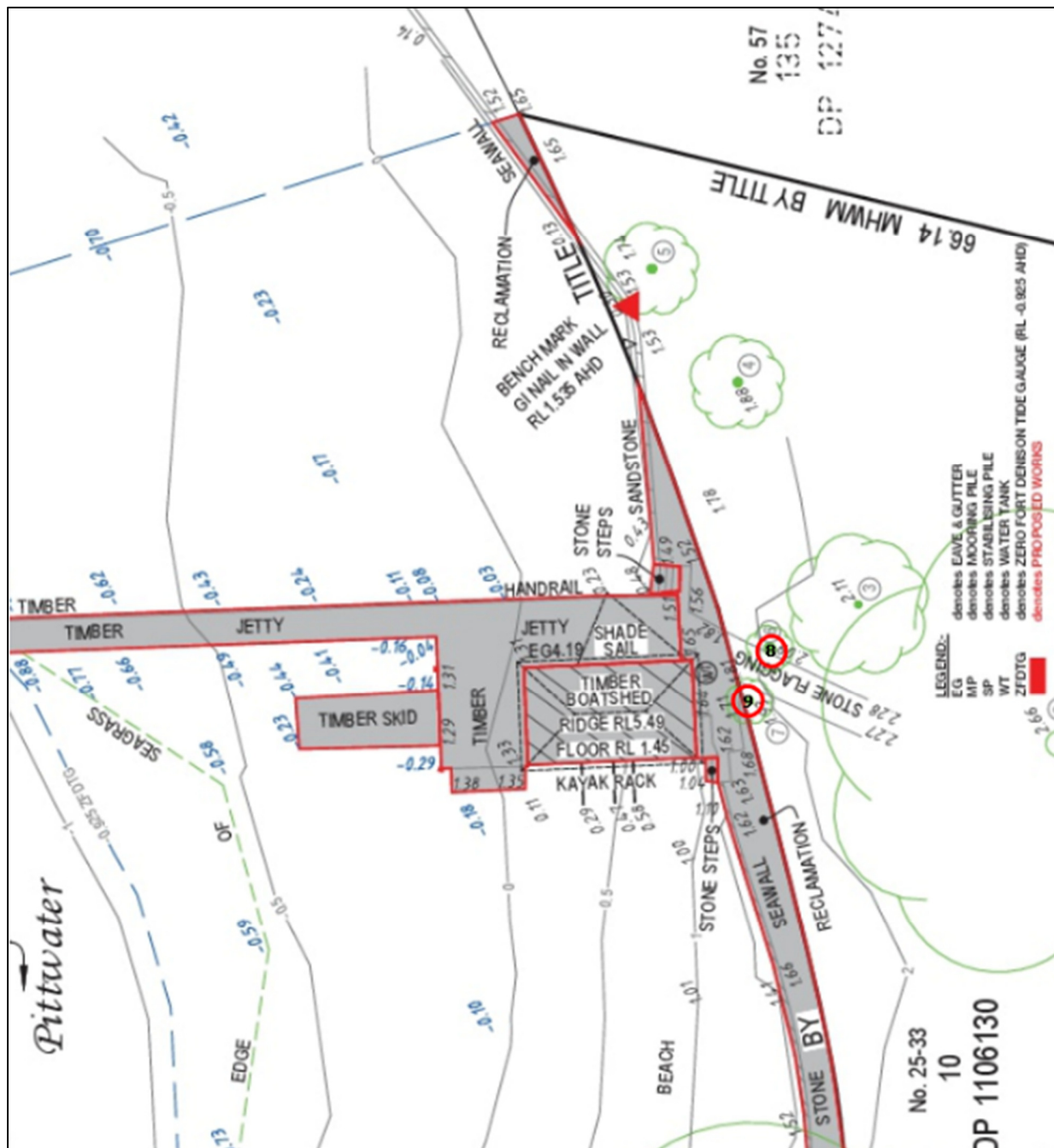


Figure 5: Original site survey (10.10.17) on No: 25-33 showing trees assessed further during the Arborist survey (red circles).

## Tree Assessment

Trees were found near the high-water mark of the subject site. This included *Allocasuarina littoralis* near No: 23 and *Cupressocyparis leylandii* plantings near No: 25-33. Many of the *A. littoralis* trees were growing in the bank itself that was eroding. Further details and site survey records recorded during the assessment of these trees are provided in Table 2.

Table 2: Tree details recorded during the assessment.

Tree No:	Species	Common Name	DBH (cm)	Height (m)	Structure	Health	Comments
1	<i>Allocasuarina littoralis</i>	Black sheoak	24	13	Good form and vigor	Good but vines	Some undermining at high tide. On beach
2	<i>Allocasuarina littoralis</i>	Black sheoak	45	13	Codominant, lean & unbalanced	Good but vines	Some undermining at high tide. On beach
3	<i>Allocasuarina littoralis</i>	Black sheoak	32	11	Codominant, lean (northern codominant) & unbalanced	Good but vines	Some undermining at high tide. On beach
4	<i>Allocasuarina littoralis</i>	Black sheoak	25	11	Codominant, lean & unbalanced	Good	Growing below bank, behind shed. Western codominant on lean and may need removal. Very undermined with buttress roots exposed.
5	<i>Allocasuarina littoralis</i>	Black sheoak	35	11	Good	Good	Growing below bank, behind shed. Some small lower branches may need removal if height of the boat shed is raised. Very undermined with buttress roots exposed.
6	<i>Allocasuarina littoralis</i>	Black sheoak	11	9	Lean	Good -young tree	Growing on top of bank near edge and at risk of failure from bank erosion.
7	<i>Allocasuarina littoralis</i>	Black sheoak	21	11	Codominant (western on lean)	Good	Growing in a large rock on the shoreline. Western codominant on lean and very close to top of shed roof, may require removal if height of the boat shed is raised.
8	<i>Cupressocyparis leylandii</i>	Leyland Cypress	61	19	Good	Good but some dieback in lower canopy on shaded side	Part of shoreline planting extending north. Very tall, and prominent from the water.
9	<i>Cupressocyparis leylandii</i>	Leyland Cypress	31	11	Good	Good but some dieback in lower	Part of shoreline planting extending north. Tall with top in view from the water.

						canopy on shaded side	
<b>15</b>	<i>Allocasuarina littoralis</i>	Black sheoak	4	8	Good	Good. Young	Young tree, positioned back from HWM important to retain.
<b>16</b>	<i>Allocasuarina littoralis</i>	Black sheoak	17	11	Good but codominant	Good. Young	Young tree, positioned back from HWM important to retain.

## Retention values, associated values, and calculations

The SULE method was applied to provide guidance on safe useful life expectancy of the eleven trees that may potentially be impacted by the proposal. The majority of trees assessed were found to have a short-medium SULE, with the exception of three young trees (Table 3).

Based on the Estimate Life Expectancy (ELE) and the Landscape Significance Rating (LSR), the majority of trees were found to have a high retention value. This is due the alignment of *A. littoralis* with the Pittwater Spotted Gum Forest ECC and the prominent nature within the landscape of tree 8, a large *C. leylandii* (Table 3). Additional calculations of canopy spread, SRZ and TPZ are also provided in Table 2.

Table 3: Tree values and calculations.

Tree No:	SULE	ELE	LSR	Retention value	Canopy Spread (m <sup>2</sup> )	SRZ	TPZ	Distance from proposal *
1	Short	Short	Significant	High	19.6	1.8	2.9	5
2	Short	Short	Significant	High	33.2	2.4	5.4	4.5
3	Short	Short	Significant	High	15.9	2.1	3.8	2.5
4	Short	Short	Significant	High	15.9	1.8	3.0	0.5
5	Short	Short	Significant	High	0.6	2.1	4.2	0.3
6	Young	Short	Significant	High	12.6	1.3	2	0.5
7	Medium	Medium	Significant	High	3.1	1.7	2.5	0.5
8	Medium	Medium	High	Moderate	3.1	2.7	7.3	3.5
9	Medium	Medium	Significant	High	1.8	2.0	3.7	2.5
15	Young	Medium	Significant	High	1.8	0.9	2	2
16	Young	Medium	Young	High	19.6	1.6	2.0	5



# Tree Impact Assessment

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## Trees to be Impacted

Any digging or soil disturbance at the back of the boat shed at 23 Robertson Road, Scotland Island will occur within the SRZ, and consequently has potential to impact on the roots of *A. littoralis* trees 4, 5, 6 and 7 (Table 3, Figure 6). Of these trees, tree 4 and 7 that are on lean over the boat shed may require removal, while tree 5 may require trimming of some lower branches, if works are required to raise the boat shed roof by greater than 100 mm, or any works to the roof of the boat shed require clearer access. It should also be noted, that these trees are likely to fail if continued shoreline erosion occurs at the site, irrespective of this proposal. Trees, 1 – 3, 5, 6, 15 and 16 can be retained where recommendations given in this report are implemented, as the works will be typically confined to the existing footprint.

The works at 25 - 33 Robertson Road, Scotland Island may impinge on the TPZ of trees 2 and 3, however given the works are minimal and proposed to be contained to the existing footprint these trees can also be retained. At No 25-33, it is also likely that the two *C. leylandii* trees can also be retained where recommendations given in this report are implemented (Table 3, Figure 6).

## Potential Impacts

Potential impacts on these trees from this proposal include the following:

- ❖ Potential requirement to remove and/or trim *A. littoralis* trees (4 and 7) to allow for the raising of the roof of the boatshed at 23 Robertson Road, Scotland Island.
- ❖ Compaction of roots and soils within the TPZs from use of equipment.
- ❖ Damage to low branches by construction equipment operating in close proximity to these trees.

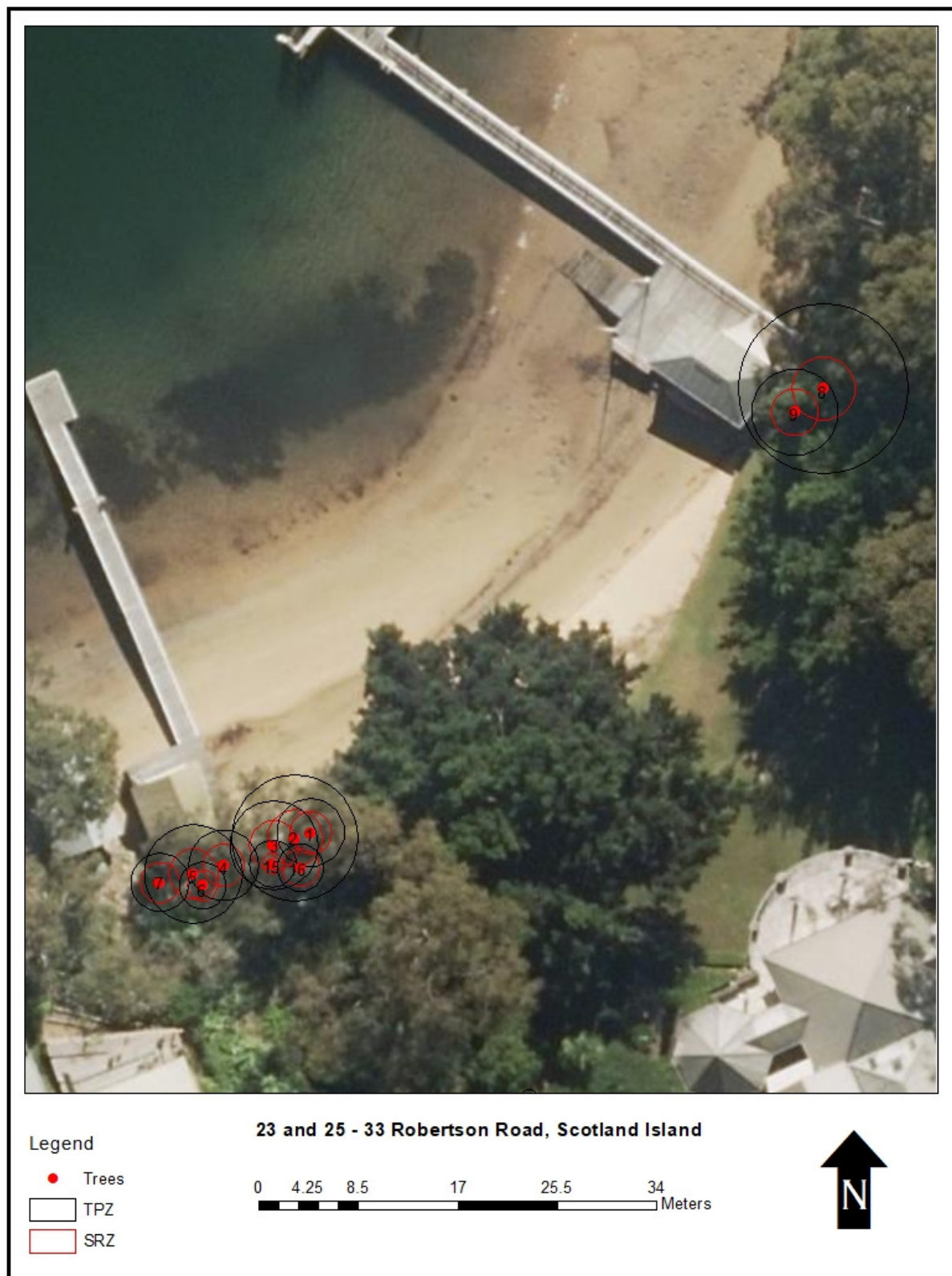


Figure 6: Tree management plan showing SRZs and TPZs.

# Recommendations

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## Tree retention and removal

The *A. littoralis* trees have a high retention value, but many are at risk of eventual failure and loss from continued undermining from shoreline erosion. The following actions are recommended regarding tree retention and removal:

- ❖ It is recommended that trees 4 and 7 be removed to allow for the raising of the boat shed roof at 23 Robertson Road, Scotland Island.
- ❖ Given that the works are expected to require minimal ground disturbance and are confined to the existing footprint of the boatsheds it is recommended that the remaining trees be retained.

## Further recommendations

Further to the above the following recommendations should be considered.

- ❖ Tree protection fencing/barriers should be put in place for all trees to be retained.
- ❖ No stock piling of soils above tree buttress or changes to natural gradients in the TPZs of any trees should occur.
- ❖ The use of overhead construction equipment (excavators and cranes) should be avoided within the TPZs of all trees.
- ❖ Encroachment into the TPZ should be avoided and not be greater than 10%. Where it is less than 10% compensation for encroachment should be added to the remaining TPZ zone. Should more than 10% of encroachment be required further assessment of the impact on those specific trees should occur before development starts.
- ❖ To compensate for loss of amenity resulting from the removal of trees, consideration should be given to replacement planting of trees. This should occur within appropriate areas of the site and with species that align with the Pittwater Spotted Gum Forest.
- ❖ All tree work should be carried out by a qualified tree worker in accordance with AS4373 –2007 and the Code of Practice *Amenity Tree Industry August 2007*.
- ❖ The following activities should be avoided within the TPZ:
  - Excavation of soil,
  - Operation of heavy equipment resulting in compaction,
  - Change of soil level, and
  - Covering with concrete, impermeable, or compacted surfaces.
- ❖ Any digging or works that require soil disturbance within the TPZ of the trees to be retained should be done using hand tools.

## References

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- Robinson, L. (2003). *Field Guide to the Native Plants of Sydney*. 3rd Edition. Simon Shuster, Sydney, New South Wales



## Photos

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Plate 1: Trees 1 to 3 adjacent to No: 23.





Plate 2: Trees 4 to 7 behind No: 23 boatshed.





Plate 3: Trees 4 to 7 behind No: 23 boatshed (a) showing undermining and shoreline erosion, and (b) growing close and over the boatshed.





Plate 4: Trees 15 and 16 near the No: 23 boatshed, with trees 1-3 in the background.





Plate 5: Trees 8 and 9 near the No: 25-33 boatshed.





Plate 6: Trees 8 and 9 close to the back of No: 25-33 boatshed.

# Appendix 1: SULE

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## **Long SULE: Trees that appear to be retainable with an acceptable level of risk for more than 40 years.**

- (a) Structurally sound trees located in positions that can accommodate future growth.
- (b) Storm damaged or defective trees that could be made suitable for retention in the long term by remedial tree surgery.
- (c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.

## **Medium SULE: Trees that appear to be retainable with an acceptable level of risk for 15 to 40 years.**

- (a) Trees that may only live between 15 and 40 more years.
- (b) Trees that may live for more than 40 years but would be removed to allow the safe development of more suitable individuals.
- (c) Trees that may live for more than 40 years but would be removed during the course of normal management for safety or nuisance reasons.
- (d) Storm damaged or defective trees that can be made suitable for retention in the medium term by remedial work.

## **Short SULE: Trees that appear to be retainable with an acceptable level of risk for 5–15 years.**

- (a) Trees that may only live between 5 and 15 more years.
- (b) Trees that may live for more than 15 years but would be removed to allow the safe development of more suitable individuals.
- (c) Trees that may live for more than 15 years but would be removed during the course of normal management for safety or nuisance reasons.
- (d) Storm damaged or defective trees that require substantial remedial work to make safe, and are only suitable for retention in the short term.

## **Remove: Trees with a high level of risk that would need removing within the next 5 years.**

- (a) Dead trees.
- (b) Dying or suppressed and declining trees through disease or inhospitable conditions.
- (c) Dangerous trees through instability or recent loss of adjacent trees.
- (d) Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.
- (e) Damaged trees that are considered unsafe to retain.
- (f) Trees that will become dangerous after removal of other trees for the reasons given in (a) to (e).

## **Young or Small Trees:**

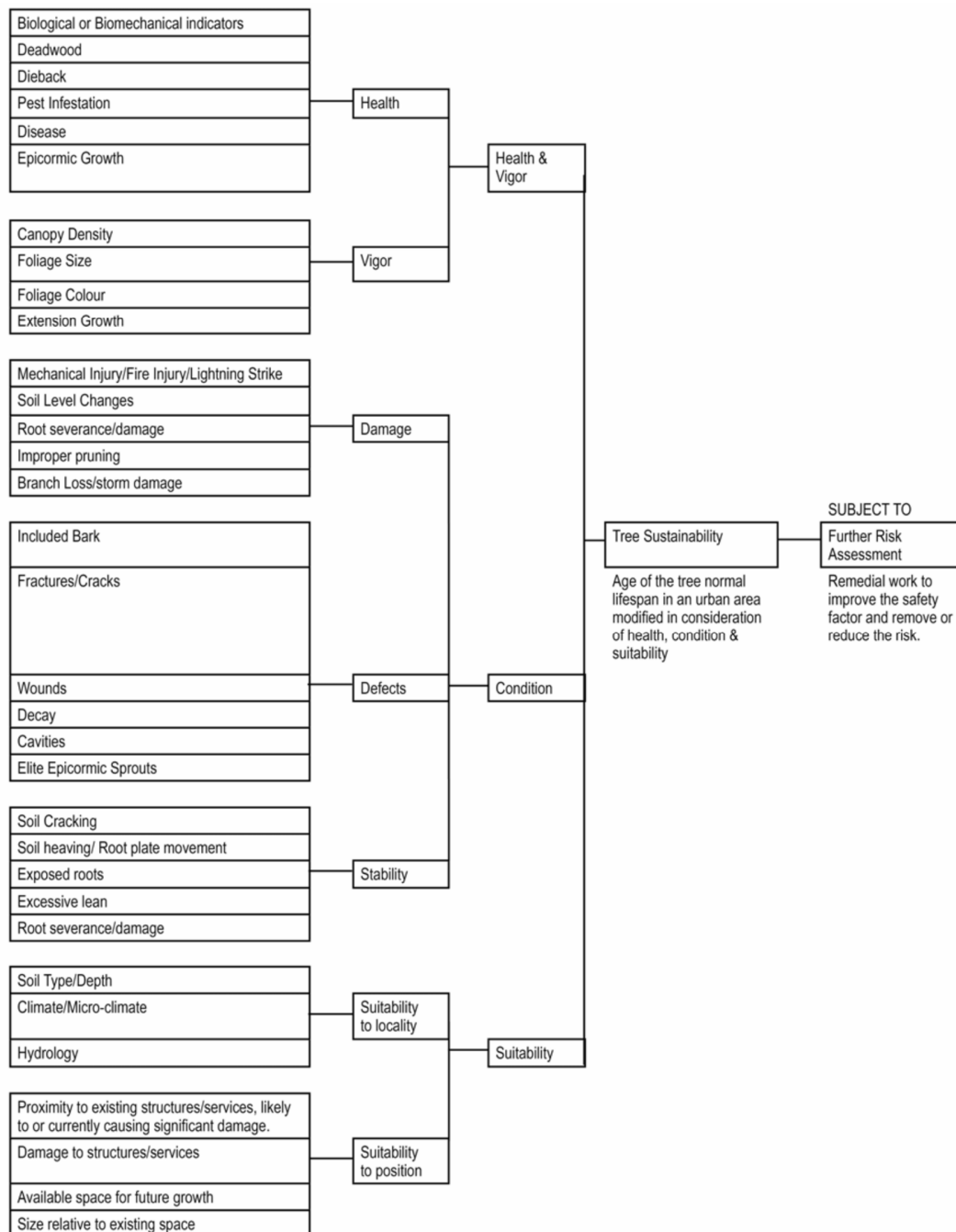
- (a) Trees which are less than 5 metres (m) in height.
- (b) Trees which are over 5m in height but less than 15 years old.

## Appendix 2: Tree Retention Value

### Step 1 – Assess tree sustainability

- Greater than 40 years
- From 15 to 40 years
- From 5 to 15 years
- Less than 5 years
- Dead, defective or hazardous

### Step 2 – Determine landscape significance rating





The level of landscape significance has been determined using the following key criteria as a guide:

### **1. SIGNIFICANT**

- 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
- The subject tree forms part of the curtilage of a Heritage Item (building /structure/artifact as defined under the LEP) and has a known or documented association with that item; or
- The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event; or
- The subject tree is scheduled as a Threatened Species or is a key indicator species of an Endangered Ecological Community as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999; or
- 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; or
- The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
- 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 in the landscape, exhibits very good form and habit typical of the species and 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; or
- The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.

### **2. VERY HIGH**

- The tree has a strong historical association with a heritage item (building/structure/artifact/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; or
- The subject tree is listed on Council's Significant Tree Register; or
- 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 very large live crown size exceeding 200m<sup>2</sup>; a crown density exceeding 70% Crown Cover (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.

### **3. HIGH**

- The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area; or
- The subject tree has a large live crown size exceeding 100m<sup>2</sup>; and
- 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% Crown Cover (normal); and

- 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.

#### 4. MODERATE

- The subject tree has a medium live crown size exceeding 40m<sup>2</sup>; and
- 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% Crown Cover (thinning to normal); and
- The tree makes a fair contribution to the visual character and amenity of the area; 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 has no known or suspected historical association

#### 5. LOW

- The subject tree has a small live crown size of less than 40m<sup>2</sup> and can be replaced within the short term with new tree planting; or
- 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%
- Crown Cover (sparse); and
- 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.

#### 6. VERY LOW

- The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or a nuisance species.
- The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

#### 7. INSIGNIFICANT

- The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993

### Step 3 – Determine the Retention Value

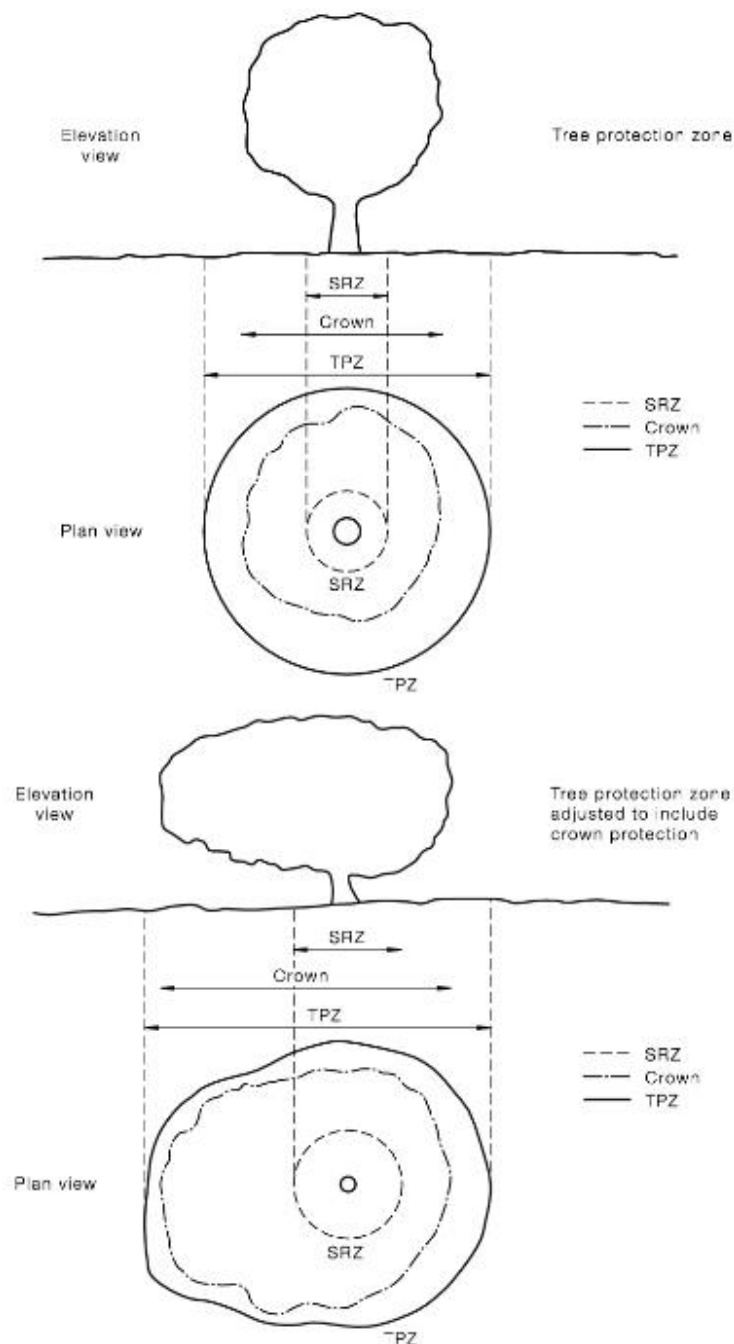
Determine the retention value by applying Tree Sustainability and Landscape Significance Rating using the following matrix.

	Landscape Significance Rating						
Tree Sustainability	1	2	3	4	5	6	7
40+ years	High						
15 – 40 years			Moderate				
5 – 15 years					Low		
< 5 years					Very low		
Dead or hazardous							

## Appendix 3: Calculating SRZ and TPZ

AS 4970—2009

14



NOTE: Refer to Clause 3.2 for calculation of TPZ.

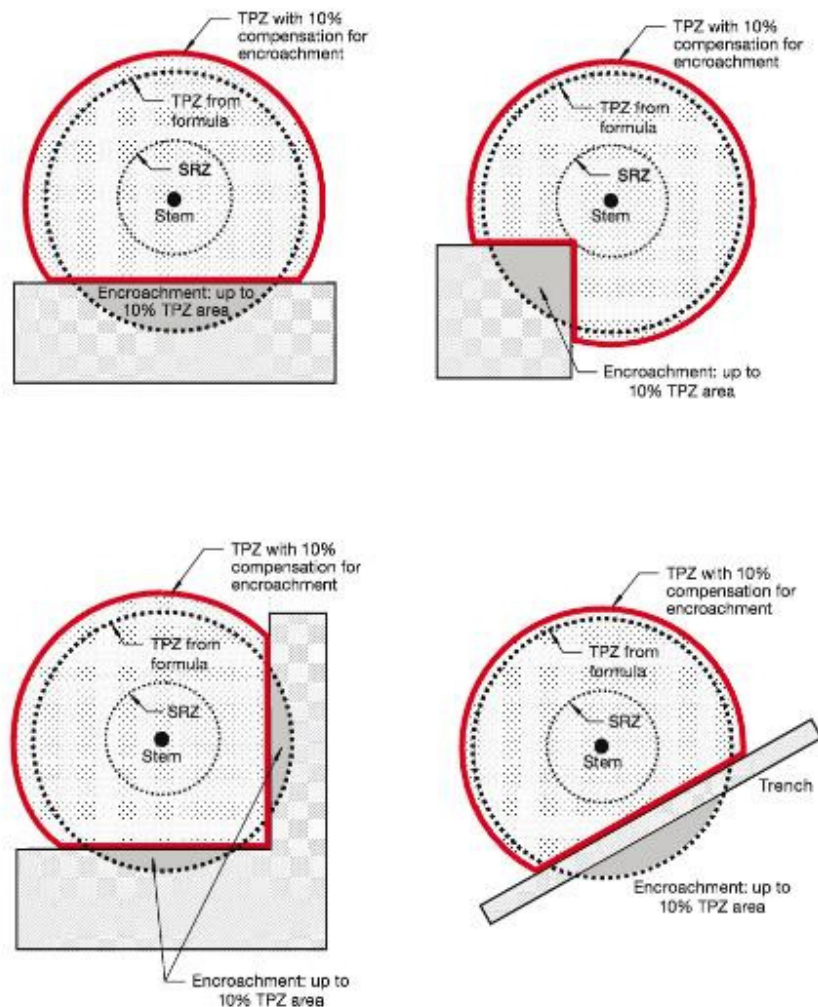
FIGURE 2 INDICATIVE TREE PROTECTION ZONE

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APPENDIX D  
ENCROACHMENT INTO TREE PROTECTION ZONE  
(Informative)

Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D1 provides examples of TPZ encroachment by area, to assist in reducing the impact of such incursions.



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

FIGURE D1 EXAMPLES OF MINOR ENCROACHMENT INTO TPZ