



Arboricultural Assessment

2 trees located at Currawong Beach Pittwater

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Introduction

This report was prepared for the Northern Beaches Council in relation to two (2) trees located at Currawong Beach, Pittwater. This report consists of the following two parts:

1. Impact assessment of a single Rough-barked Apple (*Angophora floribunda*) located within the area of proposed works for the upgrade of Cabin 1 -Kookaburra. The aim of this section of the report is to provide a detailed assessment of the tree and to outline a design option that would allow this tree to be retained.
2. Risk assessment of a single Rough-barked Apple (*Angophora floribunda*) located between Cabin 4 (Magpie) and Cabin 5 (Lorikeet). This tree was identified as being a potential risk by the site caretaker due to the extent of dead branches overhanging Cabin 5.

Methodology

Site Inspection

Site inspection and tree assessment was undertaken by Alexis Anderson on the 21st of October, 2019. The definitions and explanations of terms used in the assessment are outlined in the Tree Assessment Definitions page and Tree Risk Assessment Methodology which are included at Attachment A and B.

Plan Review

The Construction Tender Drawings (Kookaburra Cabin No. 1) were reviewed and marked up as part of this report (TK 01, Issue E).

Tree Protection Zones

A Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) has been calculated in accordance with the Australian Standard 4970-2009, *Protection of trees on development sites*. The terms TPZ and SRZ are used throughout this report. The following is a brief explanation of these terms:

Tree Protection Zone -TPZ: This is the area that should be isolated from construction disturbance so that the tree remains viable. Some disturbance within the TPZ may be possible following arboricultural assessment.

Structural Root Zone -SRZ: This is the area of undisturbed soil required to maintain tree stability. Excavation within the SRZ can lead to whole tree failure. Isolated piers can be used within the SRZ following test digging to ensure placement clear of roots.

Retention Values

Retention values are derived from a combination of Estimated Life Expectancy rating and Landscape and Environmental Significance ratings.

- **HIGH Retention Value:** These trees are worthy of retention and design consideration should be made where possible to allow their retention.
- **MEDIUM Retention Value:** These trees are worthy of retention and minor design consideration should be made to retain these trees wherever possible (e.g. placement of ancillary structures, garden retaining walls, driveway levels).
- **LOW Retention Value:** These trees should not be considered to be a constraint to design layout. Some of these trees should be removed irrespective of any proposed development.

The method of determining and defining retention values used in this report has been derived from the ©Retention Index developed by Tree Wise Men® Australia Pty Ltd.

Tree Risk Assessment (Tree 2)

The tree risk rating has been determined using the method outlined in the ISA Tree Risk Assessment manual. Alexis Anderson is a trained and qualified user of this method. A summary of this method is detailed in Attachment B.

Part 1 -Development Impact Assessment

Species	Rough-barked Apple, <i>Angophora floribunda</i>
Trunk Diameter (1.4m height)	630mm.
Trunk Diameter at Base (above root flare)	740mm
Height (estimated)	16 metres
Canopy Spread Radius	6 metres. Canopy skew to the south-east
Age-Class	Mature
Health/Vitality	Good.
Structural Condition	Fair. Lean to the south-east. Previous storm damage (branch loss). The structural root spread has formed around the positions of floating sandstone boulders.
Estimated Life Expectancy (remaining)	Long (30+ years)
Landscape and Environmental Significance	2. This tree is a locally native species that has self-sown as part of the surrounding bushland. The subject tree provides wildlife habitat amenity to the site.
Retention Value	High. This tree is worthy of retention and protection during construction.
Impact of the Proposed Works	This tree is located within the proposed building footprint. Whole tree removal would be required to accommodate the current building layout. The proposed bathroom would need to be relocated to the east by at least 2.0m if this tree were to be retained. Refer to Figures A and B and Photo A (following page) for detail.

Tree Protection Zones

Tree Protection Offsets based on <i>AS4970-2009-Protection of Trees on Development Sites</i>	
Tree Protection Zone (radius –measured from centre of trunk)	Structural Root Zone (radius –measured from centre of trunk)
7.6 metres	2.9 metres

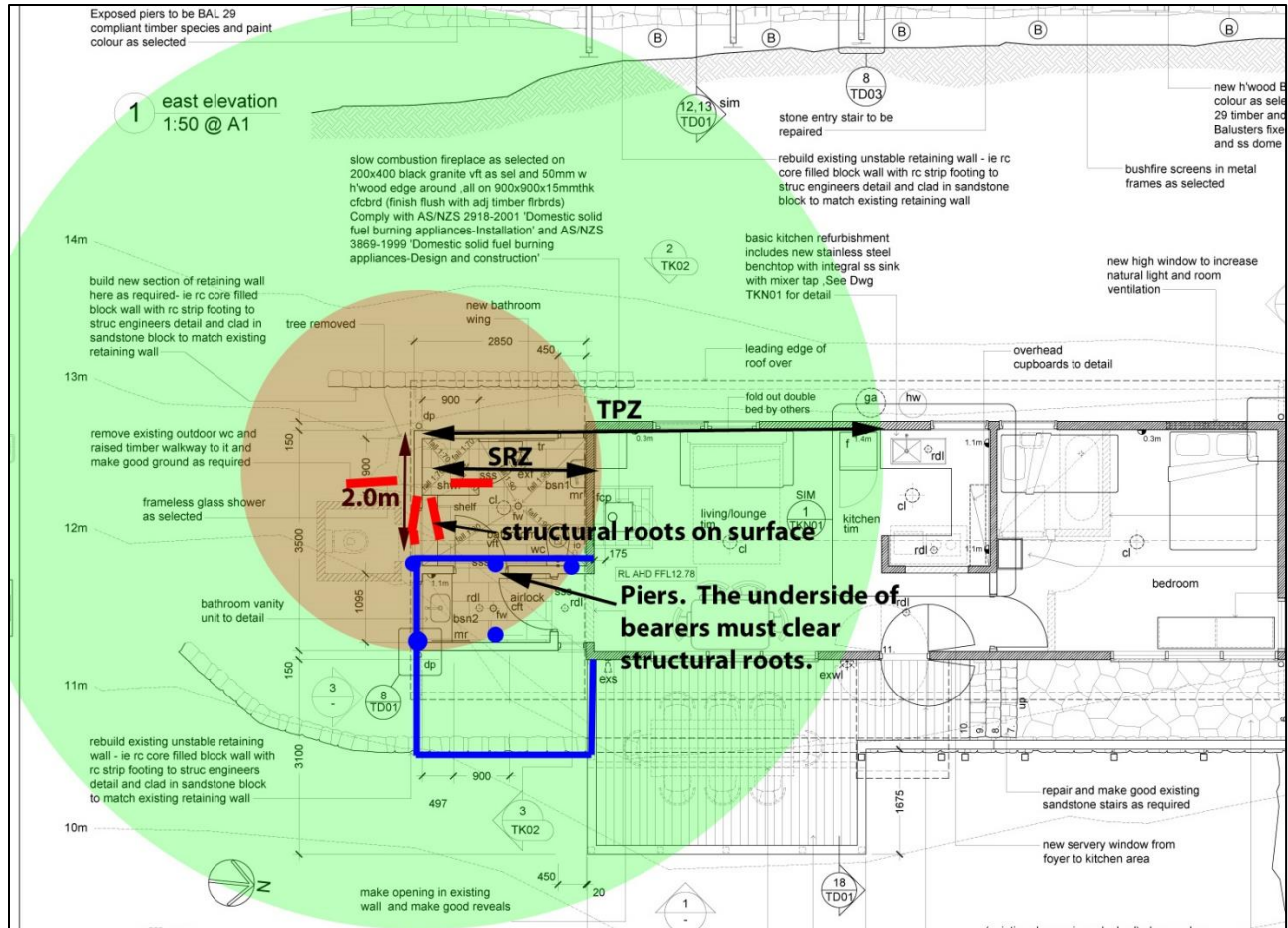


Figure A: Excerpt from the Floor Plan showing the Tree Protection Zone, Structural Root Zone and position of the bathroom that would allow tree retention.

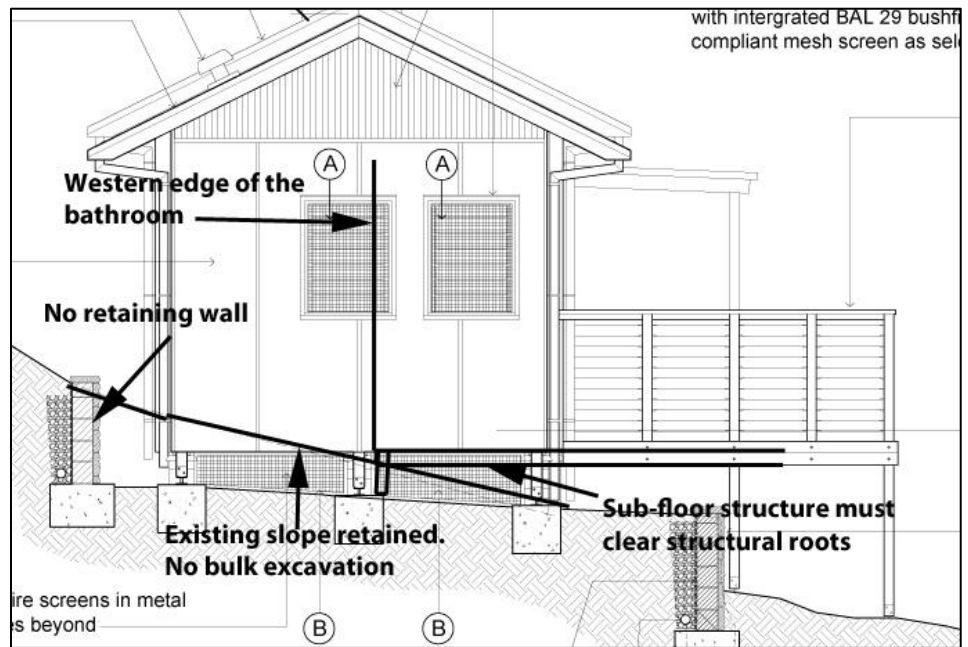


Figure B: Marked up south elevation showing changes required to allow tree retention.



Photo A: Structural roots on the eastern side and recommended western edge of bathroom.

Part 2 -Tree Risk Assessment

Species	Rough-barked Apple, <i>Angophora floribunda</i>
Trunk Diameter (1.4m height)	760mm.
Height (estimated)	25 metres
Canopy Spread Radius	7 metres.
Age-Class	Late-Mature
Health/Vitality	Poor. The northern stem is entirely dead (Photo B). This accounts for 60% of the canopy. The remaining southern section of the canopy is in an advanced state of decline with no prospect of recovery.
Structural Condition	Poor. There is a column of decay extending from the roots up the trunk to 7m height (Photo C). The structural integrity of the structural roots and trunk may have been compromised.
Estimated Life Expectancy (remaining)	Short -Less than 2 years.
Landscape and Environmental Significance	2. This tree is a locally native species that has self-sown as part of the surrounding bushland. The subject tree provides wildlife habitat and amenity to the site.
Retention Value	Low.
Tree Risk Assessment	
Targets	-Cabin 5 (Lorikeet). -Pedestrians using space around the cabin. -People within the cabin.
Likelihood of Failure	-Imminent (Dead branches) -Possible (Complete failure of the northern trunk)
Likelihood of Impact	-High (Cabin) -Low (Pedestrians) -Low (People within the cabin)
Consequence of Impact	-Significant (Damage to roof structure of the cabin) -Severe (Injury to pedestrians) -Severe (Injury to cabin occupants)
Risk Rating	-High (Damage to cabin) -Low (Injury to pedestrians or cabin occupants)
Recommended Action	Tree removal is recommended. There were no viable management options that would allow tree retention. It is recommended that the trunk be retained at 8m height to provide habitat and slope retention.



Photo B: Dead canopy



Photo C: Trunk decay



Photo D: The trunk is recommended to be retained at 8m height (red lines).

Statement of Impartiality

- This report prepared by Bluegum Tree Care & Consultancy (BTCC) reflects the impartial and expert opinion of Alexis Anderson.
- BTCC is acting independently of and not as the advocate for the owners of the subject trees.
- BTCC does not undertake tree pruning and removal works and will not have any involvement with pruning or removing trees which are the subject of this report.

Limitations

- The findings of this report are based upon and limited to visual examination of two trees from ground level without any climbing, internal testing or exploratory excavation.
- This report reflects the health and structure of tree at the time of inspection. Bluegum cannot guarantee that a tree will be healthy and safe under all circumstances or for a specified period of time. There is no guarantee that problems or defects with assessed trees, will not arise in the future. Liability will not be accepted for damage to person or property as a result of failure of assessed trees.
- This report must be read in its entirety. No part of this report may be referred to, verbally or in writing, unless taken in full context of the whole report.

Attachment A: TREE ASSESSMENT DEFINITIONS

Height. Tree height is estimated from ground level. This assessment is made independently of data plotted on survey plan. These measurements have not been confirmed with clinometer or other surveying instrument.

Diameter at Breast Height (DBH). Trunk diameter is measured at 1.4 metres above ground level. A diameter tape is used which calculates the diameter from a measurement of the circumference. DBH is primarily used for the calculation of the TPZ. The trunk diameter above the root buttress is measured to calculate the Structural Root Zone. If a tree has more than 4 trunks, the diameter of the four largest trunks is recorded. For irregular trunk formations the DBH is calculated as outlined in Appendix A of AS4970-2009 - *Protection of Trees on Development Sites*.

Canopy Spread Radius. Average canopy spread radius is estimated from the centre of trunk to the outer edge of canopy. Refer to Comments column for detail of heavily skewed canopy spread.

Age Class - This is an estimation of the tree's current age class based on size, growth habit, local environmental conditions and comparison with surrounding trees.

- **Immature (IM):** This is a juvenile specimen that is likely to have germinated within the previous 5 years.
- **Early Mature (EM):** This is a tree that is established within its growing environment, though has not reached an age of reproductive maturity or the natural growth habit of a mature individual.
- **Mature (M):** This is a tree has reached both reproductive maturity and a physical form and shape typical for the species. Trees can have a Mature Age Class for the majority of their life span.
- **Late-Mature (LM):** These trees show early signs of senescence with symptoms such as reduced canopy density and an accumulation of dead branches.
- **Over-mature (OM):** These trees show symptoms of irreversible decline such as canopy dieback with dead branches concentrated in the upper canopy.

Health/Vitality - Good (G), Fair (F) or Poor (P). This is primarily based on the extent of vigorous new foliage growth at branch tips and the colour, size and density of foliage generally. The percentage of live branches to dead branches is considered. The location of any dead branches is also considered. The presence of any pest or disease is considered as part of this assessment. Health can vary with climatic conditions.

Structural Condition - Good (G), Fair (F) or Poor (P). This is an assessment of tree structure and stability. Root anchorage, trunk lean, structural defects, canopy skew and any hazardous features are considered. Dead branches can be considered as part of Structural Condition if they are of a size and location that could cause injury or property damage.

Tree Protection Zone (TPZ). This is a radial distance of (12X) the DBH measured from centre of trunk. TPZ is rounded to the nearest 0.1 metre. A TPZ should not be less than 2m or greater than 15m. The TPZ for palms and other monocots should not be less than 1m outside of the crown projection. Existing constraints to root spread can vary the TPZ. For a tree to remain viable, construction activity should be excluded or undertaken with care within the TPZ. Disturbance within up to 10% of the TPZ area is considered to be a minor encroachment. Disturbance to more than 10% of the TPZ area is considered a major encroachment. Major encroachment into the TPZ is possible depending on the type of disturbance, and species tolerance to disturbance. Exploratory excavation may be required to quantify the presence of roots at the alignment of proposed ground disturbance.

This is based upon the Australian Standard AS 4970, 2009, *Protection of trees on development sites* and the Matheny & Clarke "Guidelines for adequate tree preservation zones for healthy, structurally stable trees".

Structural Root Zone (SRZ). This is a radial distance based on the following formula- $SRZ = (D \times 50)^{0.42} \times 0.64$ (for trees less than 150mm Diameter, a minimum SRZ of 1.5 metres). The **D** in the formula is the trunk diameter measured above the root buttress. This was recorded in the field notes. SRZ measurements are rounded to the nearest 0.1m. The Structural Root Zone is the area of soil and roots required to maintain tree stability. Excavation within the SRZ can result in whole tree failure. Fully elevated construction is possible within SRZ with specific rootzone assessment. Existing constraints to root spread can vary the SRZ. This method of determining SRZ is outlined at Section 3.3.5 of Australian Standard AS 4970, 2009, *Protection of trees on development sites*.

Estimated Remaining Life Expectancy: This gives a length of time that the Arborist believes a particular tree can be retained from the time of assessment with an acceptable level of risk based on the information available at the time of the inspection. This system of rating does not take into consideration the likely impacts of any proposed development. Ratings are **Long** (retainable for 30 years or more with an acceptable level of risk), **Medium** (retainable for 10-30 years), **Short** (retainable for 0-10 years) and **Removal** (tree requiring removal due to risk/hazard or absolute unsuitability).

Landscape & Environmental Significance*. This is an assessment of the impact of the tree on the surrounding landscape amenity and natural environment. Rarity, habitat value, physical prominence, historical and cultural significance of the tree are considered in this rating system. The Landscape & Environmental Value ratings used in this report are:

- 1. Very High Value:** This is an outstanding specimen that holds irreplaceable environmental, landscape or cultural value.
- 2. High Value:** An excellent specimen that holds environmental, landscape or cultural value that is present in other site trees or that could be replaced.
- 3. Moderate Value:** Can be a good to fair specimen with environmental, landscape or cultural value that is common within other trees in the locality.
- 4. Low Value:** Removal would not result in any loss of site amenity or environmental value. Can include undesirable or weed species or trees growing in unsuitable locations.
- 5. Very Low Value:** Dead or hazardous with no other environmental or cultural value. Could also include weed species. These trees should be removed or pruned in a way to make safe irrespective of any development.

***Note:** The concept of using a five (5) point scale to assess tree significance was derived from the Tree Wise Men® Australia Pty Ltd ©Significance Rating Scale.

Retention Value*. Retention values are derived from a combination of Estimated Life Expectancy rating and Landscape and Environmental Significance ratings.

		Estimated Life Expectancy			
		Long	Medium	Short	Removal
Significance Environmental Landscape &	Very High (1)	HIGH		MEDIUM	
	High (2)				
	Medium (3)	MEDIUM		LOW	
	Low (4)				
	Very Low (5)				

HIGH Retention Value: These trees are worthy of retention and major design consideration should be made where feasible to allow this.

MEDIUM Retention Value: These trees are worthy of retention and minor design consideration should be made to retain these trees wherever possible (e.g. placement of ancillary structures, garden retaining walls, driveway levels).

LOW Retention Value: These trees should not be considered to be a constraint to design layout. Some of these trees should be removed irrespective of any proposed development.

***Note:** The method of determining and defining retention values used in this report has been derived from the ©Retention Index developed by Tree Wise Men® Australia Pty Ltd.

Attachment B – Risk Assessment Methodology

The tree risk rating has been determined using the method outlined in the ISA Tree Risk Assessment manual. Alexis Anderson is a trained and qualified user of this method. A summary of this method is detailed below.

Part A- Likelihood of Failure and Impact

Likelihood of branch/tree failure within the inspection period (24 months)

This part of the assessment is related to the part of the tree most likely to fail. The part of the tree most likely to fail is allocated one of the following categories; *Imminent, Probable, Possible, Improbable*.

Likelihood of a tree failure impacting a target

This is an assessment of the likelihood of a falling part of tree connecting with a person or property. The occupancy rate of the area within the potential fall-zone is considered here as well as factors that may protect a target such as a shelter. The likelihood of a tree failure impacting a target is categorized as; *Very Low, Low, Medium, High*.

Likelihood of Failure	Likelihood of Impact			
	Very Low	Low	Medium	High
Imminent	Unlikely	Somewhat likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Part B- Rating the Risk

Consequence of Tree Failure and Impact

This part of the assessment categorises the likely extent of injury or property damage once impact has occurred. This takes into consideration the size and height of the defective tree part. The consequence of tree failure and impact is categorised as *Negligible, Minor, Significant* and *Severe*.

Using the Risk Rating Matrix to categorise the risk

Part A and the Consequence of Tree Failure and Impact are combined in the following matrix to give a risk rating.

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low