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Arboricultural Impact Assessment of a Tree located on 47 Arthur Street, Forestville

Malcolm Bruce

Contents

1. Introduction

1.1. Location of the site (See Figure 1)

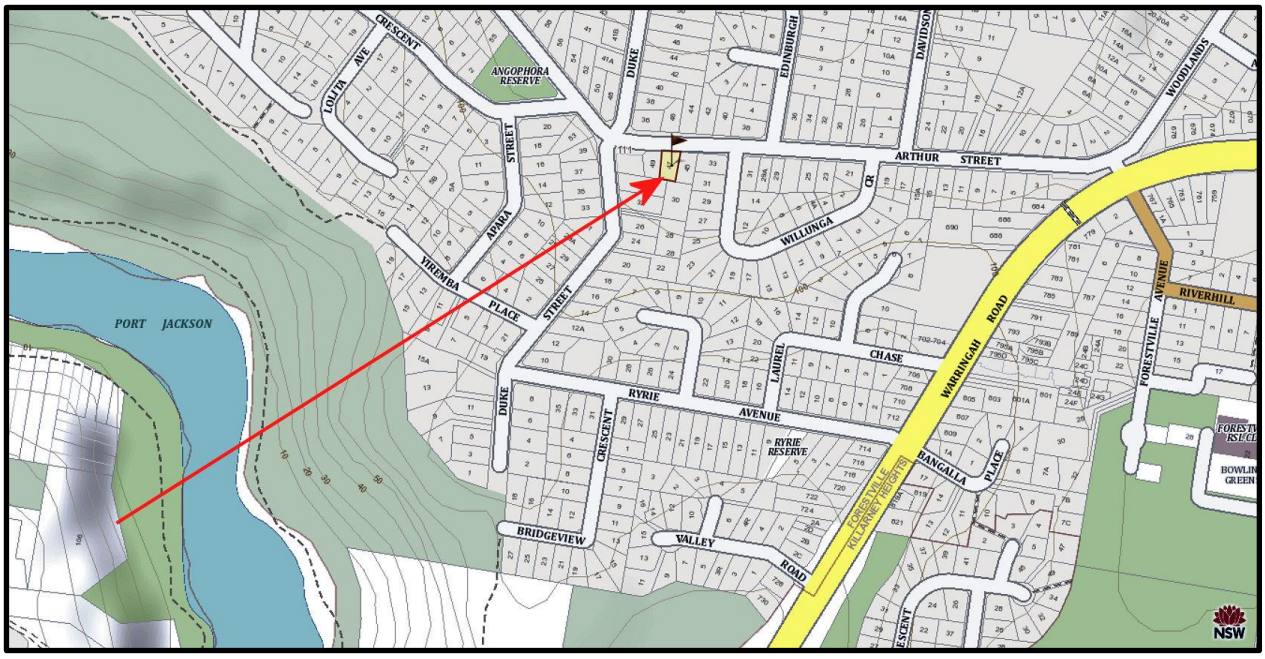

Figure 1: Location of Subject Site (From SixMaps viewed 2022)

1.2 The subject site was inspected on 6/5/2022;

1.3 This report was prepared for Jolene and John Farrant.

2 Aims

2.1 To examine the nominated tree and assess the tree's health, structure and environmental conditions;

2.2 To identify and describe any health, structural or environmental issues relating to the subject tree;

2.3 To calculate the required Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) for the tree;

2.4 To provide and recommend workable solutions to ameliorate and health, structural or environmental issue detected during the assessment process and to recommend suitable actions for the tree, if necessary.

3 Methods

3.1 The Crown Width was measured, by a laser distance measuring instrument, from the centre of the tree out to the edge of the crown along the four points of the compass, North, South, East and West;

3.2 The diameter of the trunk is measured at 1.4 metres above the soil by measuring the diameter using a diameter tape. This is the Diameter at Breast Height (DBH). (AS 4970-2009). Additionally, the diameter of the trunk at above the start of the root buttress is measured using a diameter tape. This Root Buttress Diameter (RBD) is for the calculation of the Structural Root Zone or Root Plate;

3.3 The height was calculated by multiplying the percentage angle, measured by a Suunto Inclinometer, by a distance from the tree, measured by a laser distance measuring instrument;

3.4 The lean of the tree was measured using a Suunto clinometer;

3.5 Tree Protection Zone (TPZ) is the principal means for protecting trees on development sites. It is an area isolated from the construction disturbance so that the tree remains viable.

The TPZ is calculated using the formula: -

TPZ = DBH (diameter at breast height) *x* 12

Where multiple trunks the DBH is calculated as:-

$DBH = \sqrt{(DBH_1)^2 + (DBH_2)^2 + \text{+++} \quad \text{++++} (DBH_x)^2}$

The TPZ is the above formula expressed in terms of a radius from the trunk of the tree. For palms the TPZ is Crown Width plus 2 metres (From AS 4970-2009);

3.6 The Structural Root Zone (SRZ) is the area required for tree stability.

Structural Root Zone (SRZ) is calculated using the formula: -

SRA Radius = $(RBD \times 50)^{0.42} \times 0.64$

The SRA expressed in terms of a radius from the trunk of the tree. (From AS 4970-2009);

3.7 Health of the trunk and branches was assessed by examination for insect and pathogen invasion, scarring, bark splitting and excess shedding, death of major branches and known structural weakness indicators, using the Visual Tree Assessment Method (VTA) to Stage

1, which includes use of a sounding (acoustic) hammer. (Mattheck & Breloer 1994, pp. 12–13, 145). No internal examination of any trees was conducted;

3.8 Crown Health was assessed by examination for excessive leaf drop, sparse crowing, small and medium branch death, yellow or discolouration of the leaves and insect and pathogen invasion of the leaves. Additionally, Crown Health was assigned a number based on comparison with illustrations in Figure 2: Crown Health Assessment. Within this comparison system the lower the number the better the health of the tree's crown. The assessed number has can be found in Table 4;

3.9 Soil compaction was arbitrarily assessed by pushing a 200mm flat bladed screwdriver into the soil;

3.10 The tree assessment has been conducted using the SULE method (Barrel 2001) (See Table 1) and Significant Retention Value (See Table 2);

3.11 Size of the impact has been calculated using the devise located in http://www.proofsafe.com.au/tpz_incursion_calculator.html

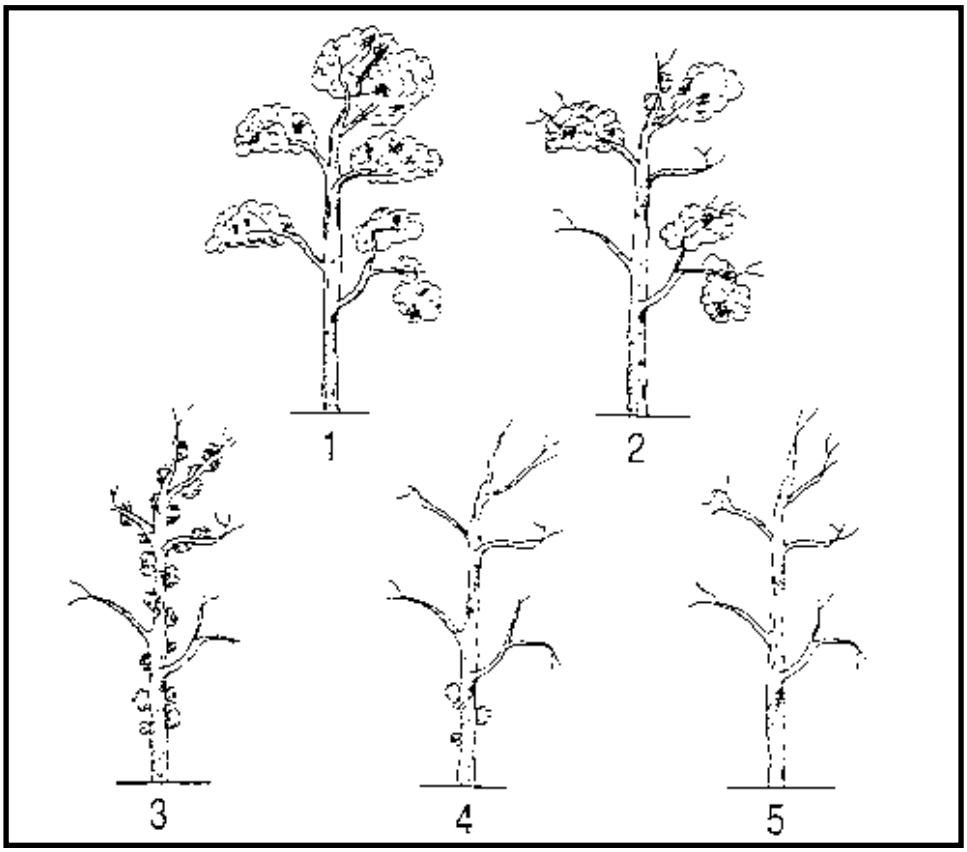

Figure 2: Crown Health Assessment

Table 1: SULE Table (After Barrel 2001)

	1	2	3	4	5
	Long:	**Medium:**	**Short:**	**Remove**	**Small, Young or Regularly Pruned**
	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk	**Trees that appeared to be retainable at the time of assessment for 15–40 years with an acceptable level of risk**	**Trees that appeared to be retainable at the time of assessment for 5–15 years with an acceptable level of risk**	**Trees which should be removed in the next 5 years**	**Tree that can be reliably removed moved or replaced**
A	Structurally sound trees in positions that can accommodate future growth	Trees which may only live between 15 and 40 years.	Trees which may only live between 5 and 15 years.	Dead, dying, suppressed or declining trees because of disease or inhospitable conditions	Small trees less than 5m in height
B	Trees which could be made suitable for long-term retention by remedial care	Tree which may live for more than 40 years but would be removed for safety or nuisance reasons	Trees which may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees because of instability or recent loss of adjacent trees	Young trees less than 15 years old but over 5m in height
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention	Trees which may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting	Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting	Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form	Formal hedges and trees intended for regular pruning to artificially control growth
D		Trees which could be made suitable for retention in the medium term by remedial care	Trees which require substantial remedial tree care and are only suitable for retention in the short term	Damaged trees that are clearly not safe to retain	Damaged trees that are clearly not safe to retain
E				Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting	Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting
F					Trees that are damaging or may cause damage to existing structures within 5 years
G					Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f)
H					Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review

Table 2: Significant Retention Value

Retention Value	Significance Description
High	A mature tree that contributes positively to a site due to its botanical, historical or local significance in combination with good physiological characteristics such as health, form, structure and future development. Significant efforts should be made to retain this tree and it should be considered for retention within a proposed development
Medium	A semi-mature to mature tree which exhibits fair or good characteristics of health, structure or form and/or may provide some amenity value to the surrounding area or habitat value. Should be considered for retention, if possible, within a development design proposal and may be modified to allow for construction (e.g.: canopy pruning, root pruning etc).
Low	A tree that provides minimal contribution to the surrounding landscape and/or may be in poor or declining health. This tree may have a poor structure, poor form, be a noxious/poisonous or listed weed species or a combination of these characteristics. It may be in an inappropriate location. This tree is not worthy of being a constraint to a development design proposal.
Nil	A tree with no landscape significance and its retention is inappropriate. The removal of this tree would be of benefit to the landscape.

4 Observations

4.1 Tree Data

Table 3: Tree Data and TPZ Calculations

No	Scientific Name	Common Name	Estimate Age(years)	Trunk Diameter (metres)	Calculated TPZ radius	Root Buttress Diameter	Calculated SRA radius	Crown Width (Metres				Height
								N	S	E	W	
				0.11								
				0.12								
				0.12								
				0.22								
				0.25								
				0.14								
	Tristaniopsis		40 plus	0.16								
T5/6	*laurina*	Water Gum	years	0.15	**5.6**	0.75	**2.9**	**4.55**	**6.40**	**3.50**	**4.89**	**9.92**

Table 4: Tree Health Assessment

No	Scientific Name	Common Name	Trunk and Branch Health	Crown Health	Crown health Assessment Code	Overall Health	SULE Rating	Observed Issues	Retention Value
T5/6	*Tristaniopsis laurina*	Water Gum	Poor	Fair	1	Poor	4C	Compression forks, bark inclusions coppicing	Low

4.2 Location of Tree and calculated TPZ and SRZ and Crown Limits

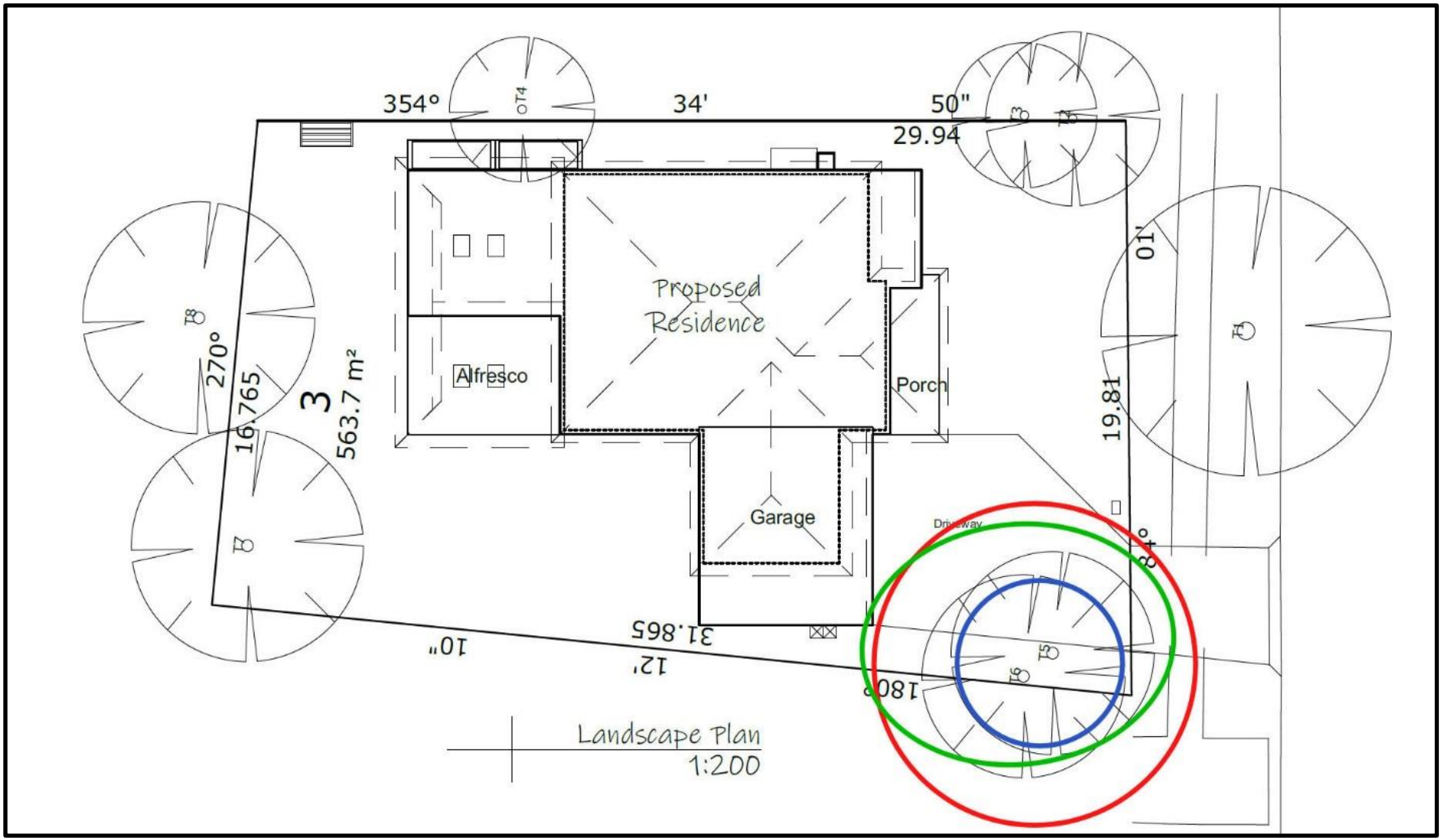

Figure 3: Position of the trees with calculated Tree Protection Zones outlined in red, the calculated Structural Root Zones outlined in blue and the Crown Limits in green. Scale 1:200. From Landscape Plan of 47 Arthur Street, Forestville by Accurate Design and Drafting, dated 3/5//2022

4.3 Geology and Soils

The soil surrounding the subject trees is described as Gymea Soil Landscape (See Figure 4). Chapman and Murphy (1989) P.71 describe the Gymea Soil Landscape as being "*Undulating to rolling rises and low hills on Hawkesbury Sandstone. Broad convex crests, moderately inclined sideslopes with wide benches, localised rock outcrop on low broken scarps. Extensively cleared open-forest (dry sclerophyll forest) and eucalypt woodland*." and on P.76, describe the Lambert Soil Landscape as "*undulating to rolling rises and low hills on Hawkesbury Sandstone. Local relief 20-120m, slopes 20%. Rock outcrop >50%. Broad ridges, gently to moderately inclined slopes, wide rock benches with low broken scarps, small hanging valleys and areas of poor drainage. Open and closed heathland, scrub and occasional low eucalypt open-woodland*." ;

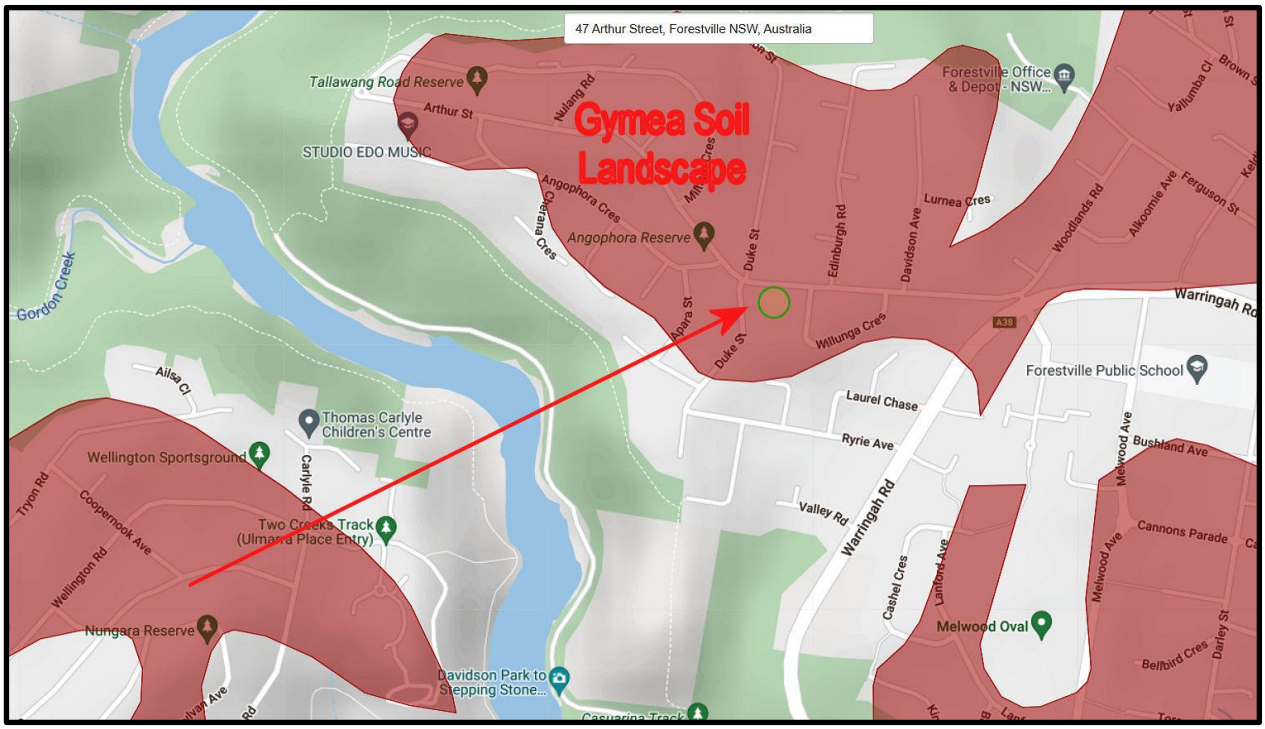

Figure 4: Subject site, showing Gymea soil landscapes (From eSpade V2.2 2022)

5 Observations and Discussion of the Tree and Environment

The subject tree is labelled as Trees 5 and 6 in the Landscape Plan (See Figure 3). Trees 5 and 6 are actually a single highly coppiced *Tristaniopsis laurina* (Water Gum). (See Figure 5) The tree has formed as a multi-trunked form as a result of removal of the original stem or damage to the base of the original stem. (See Figure 6) There is some indication of damage to the base of the original stem, resulting in the coppicing as well as signs of decay in the lower trunk. The close growth of the trunks has resulted in the formation of several bark inclusions, which Mattheck (2007) P.131, describes as a "low-level compression fork. (See Figure 7) This formation has a high chance of failure. Several bark inclusions have formed in the crown. Several of these have formed as longitudinal cracks. (See Figure 8 to Figure 10) Formations with bark inclusions and longitudinal cracks have been described by Mattheck as potentially dangerous (Mattheck and

Breloer, 1994, P.60 and Mattheck, 2007, P.21). Lonsdale (2000) P. 20, supports Mattheck stating "*unions with included bark are most likely to fail in trees on exposed sites (especially if exposure has increased, as when surrounding trees are removed), or in dominant trees whose height makes them rather exposed. Gusts blowing between the forks are most likely to cause failure* ". There is a poorly welded crossover and poorly pruned branch stub, protruding from one of the co-dominant trunks. (See Figure 11 and Figure 12) The Water Gum is in very poor structural condition. Further, the proposed driveway upgrade will encroach on 43% of the tree's Tree Protection Zone (TPZ) with a substantial incursion into the Structural Root Zone (SRZ). (See Figure 3) This is a major encroachment under Point 3.3.3 of Australian Standard 4970 of 2009. This will result in substantial root loss where the loss of structural roots and the subsequent loss of tree stability is emphasised by Mattheck (2007). Ps 34 to 41 and Coder (2000) states "*Reduced rooting volume mechanically destabilizes the whole tree*." Additionally, Roberts et al (2006) P. 257 state '*If energy reserves have been depleted, a tree faced with stress from disease, drought, or perhaps damage to its roots, may be unable to recover*." The tree is so poor structurally, that it should be removed.

Figure 5: Tree 5/6

Figure 6: Coppiced base

Figure 7: Low-level compression fork with included bark

Figure 8: Longitudinal crack with included bark

Figure 9: Reverse view of longitudinal crack in Figure 8

Figure 10: Further bark inclusion in the crown of the tree

Figure 11: Poorly welded crossover with abrasion wound

Figure 12: Protruding branch stub

6 Recommendation

6.1 Trees 5/6 should be removed;

6.2 Removed trees must be replaced. The replacement trees should be locally endemic species from the Gymea soil landscape, such as, *Angophora costata* and *Banksia serratifolia*, and grown as specified in AS 2303 of 2015 *Tree stock for landscape use* (Standards Australia, 2015), in 20 litre containers and between 1 and 2 metres in height.

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7 References

Barrell. J, 1995, *Pre-development tree assessment*; Proceedings of an International Conference on Trees on Building Sites in Chicago, 1995 pages 143–155.

Barrell, J., 2001, *SULE: Its use and status into the new millennium*, Paper presented to the NAAA Conference in Sydney in April 2001

Chapman G.A. and Murphy C.L., 1989, *Soil Landscapes of the Sydney 1:100,000 Sheet Report*, Department of Conservation and Land Management, Sydney P.71 to 75

Coder, K. D., 2000 *Soil Compaction Impacts on Tree Roots,* University of Georgia, Warnell School of Forest Resources Extension Publication FOR00-8

Harris, R., W., Clark, J., R., and Matheny, N., P., 2004, *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines (*4th Edt), Prentice Hall, New Jersey.

Kuser, J., E., 2020, *Handbook of Urban and Community Forestry in the North East*, Springer Science and Business Media, New York.

Lonsdale, D., 2000, *A Practical Guide to Hazardous Trees, A General Guide*, Forestry Commission, Edinburgh

Mattheck, C., and Breloer, H., 1998, *The Body Language of Trees*, The Stationery Office. London, England.

Mattheck, C., 2007, *Update Field Guide for Visual Tree Assessment 1st edition*, Forschungszentrum Karlsruhe GmbH, Karlsruhe

Northern Beaches Council (NBC), 2022, *Removing or Pruning Trees on Private Land*. https://www.northernbeaches.nsw.gov.au/planning-development/tree-management/private-land

Office of Environment and Heritage (OEH), 2022, NSW Soils and Landscape information (eSPADE V2) http://www.environment.nsw.gov.au/eSpade2WebApp/

Six Maps, 2022, viewed 10th May 2022

Standards Australia, 2009, Australian Standard AS4970-2009, *Protection of trees on development sites*

Standards Australia, 2018, Australian Standard AS2303 – 2018 *Tree Stock for Landscape Use*

Walker, J. and Hopkins M. S., (1990) *Australian Vegetation, Soil and Land Survey Handbook,* 2nd Ed. Inkata Press

Williams, V., 2015, *How Do You Decide When to Remove a Tree?*, University of Maryland Extension, Home and Garden Section

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