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Arboricultural Impact Assessment for Trees located on 6A Lovering Place, Newport

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1 Introduction

1.1. Location of the site (See Figure 1)

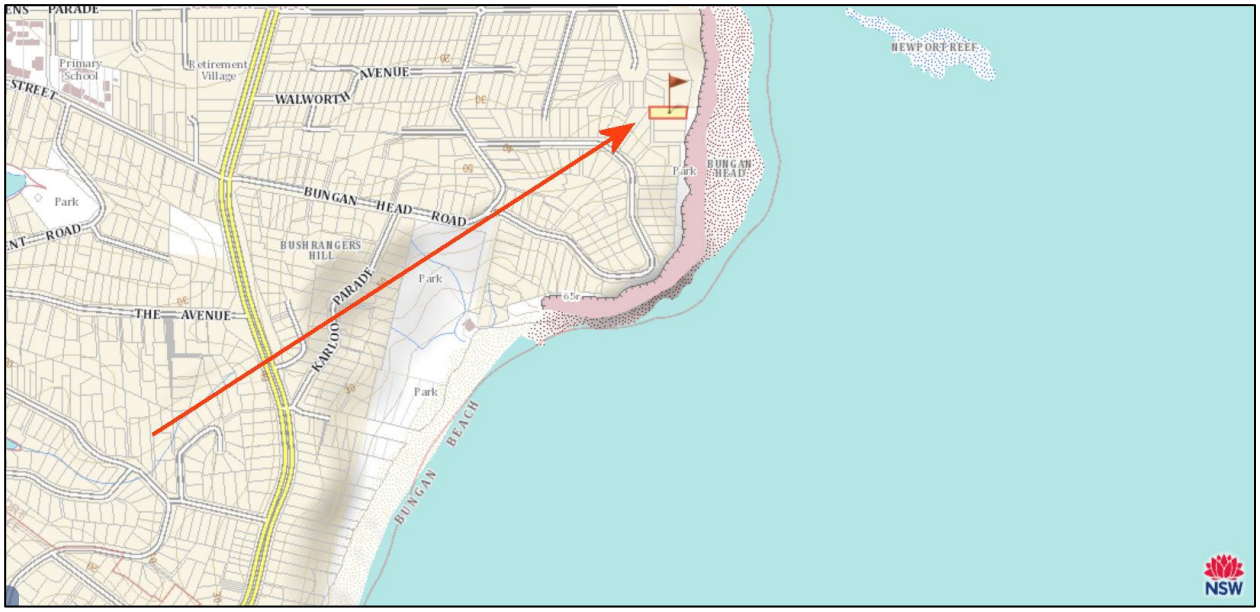

Figure 1: Location of Subject Site (From SixMaps viewed 2024)

1.2 The subject site was inspected 14/10/2024;

1.3 This report was prepared for Bill and Lyn Ryder;

1.4 © This document is property of Malcolm Bruce and can only be used by the nominated client in Point 1.3 or the client's agent;

2 Aims

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

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

2.3 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 trees, 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:-

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

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 1 metre (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 was assessed 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.

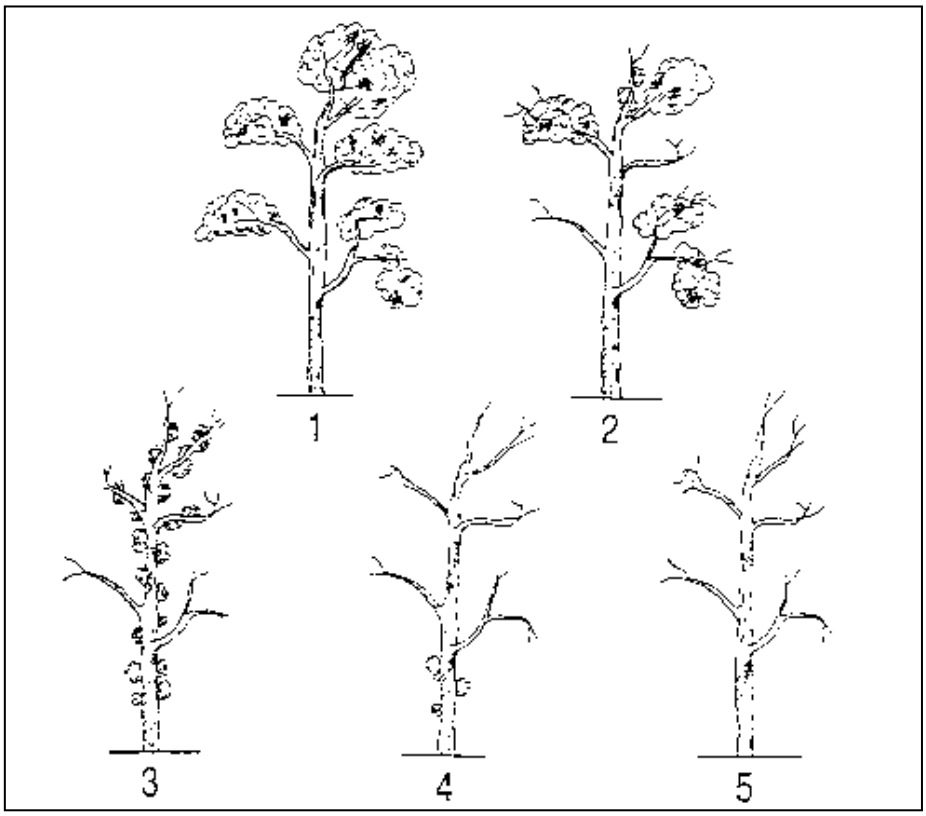

Figure 2: Crown Health Assessment

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	
1	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	0.58	**7.0**	0.69	**2.8**	**6.36**	**4.88**	**4.22**	**3.23**	**15.30**
2	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	0.24 0.36	**4.4**	0.5	**2.5**	**5.48**	**3.80**	**4.07**	**5.11**	**12.92**
3	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	0.65	**7.8**	0.78	**3.0**	**4.16**	**3.85**	**5.14**	**4.29**	**14.73**
4	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	0.33 0.45	**6.4**	0.75	**2.9**	**5.06**	**4.12**	**6.31**	**5.14**	**13.33**
5	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	0.39	**4.7**	0.46	**2.4**	**5.63**	**5.33**	**6.61**	**4.92**	**8.37**
6	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	1.06	**12.7**	1.06	**3.4**	**Not Measured**				
7	*Melaleuca quinquinervia*	Broad-leafed Paperbark	40 plus years	0.07 0.25 0.63	**6.4**	0.7	**2.8**	**Not Measured**				

Table 4: Tree health and structural description

No	Scientific Name	Common Name	Trunk and Branch Health	Crown Health	Crown health Assessment Code	Overall Health	SULE Rating	Observed Issues.	Retention Value	Recom-mendation
1	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Poor	Good	1	Poor	4C	Compression fork, within 5 metres of dwelling	Low	Remove
2	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Poor	Good	1	Poor	4C	Compression fork, within 5 metres of dwelling	Low	Remove
3	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Poor	Good	1	Poor	4C	Compression fork, within 5 metres of dwelling	Low	Remove
4	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Fair	Good	1	Good	1B	Fair condition	Medium	Retain
5	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Good	Good	1	Good	1B	Fair condition	Medium	Retain
6	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Fair	Fair	1	Fair	1B	Some branch damage and crown topped, open grown co-dominant form	High	Retain
7	*Melaleuca quinquinervia*	Broad-leafed Paperbark	Good	Fair	1	Good	1B	Some branch damage and crown topped, open grown co-dominant form	Medium	Retain

4.2 Location of Trees, Tree Protection and Structural Root Zones and Crown Limits

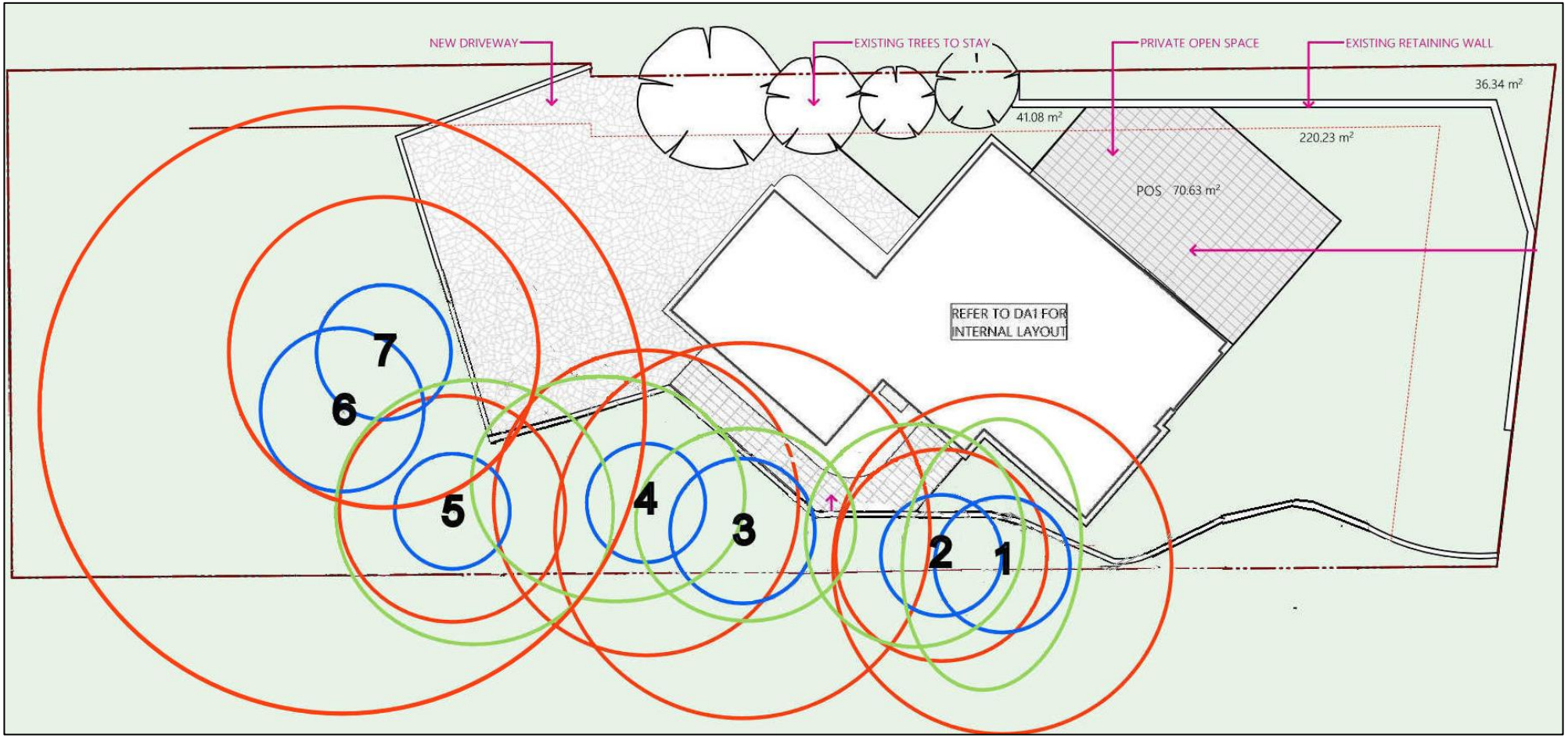

Figure 3: Position of the Trees with calculated Tree Protection Zones outlined in red, the calculated Structural Root Zones outlined in blue and the Crown Limits in green. Scale 1:250. From the Site Plans by SDA, dated 4/12/2024 of 6a Lovering Place, Newport

4.3 Geology and Soils

The soil, surrounding the subject trees, is Watagan Soil Landscape (See Figure 4). Chapman and Murphy (1989), P.51, describe the Watagan Soil Landscape as being "*rolling to very steep hills on fine-grained Narrabeen Group sediments. Local relief 60-120 m, slopes >25%. Narrow, convex crests and ridges, steep colluvial sideslopes, occasional sandstone boulders and benches. Tall eucalypt open-forest with closed-forest (rainforest) in sheltered positions.*"

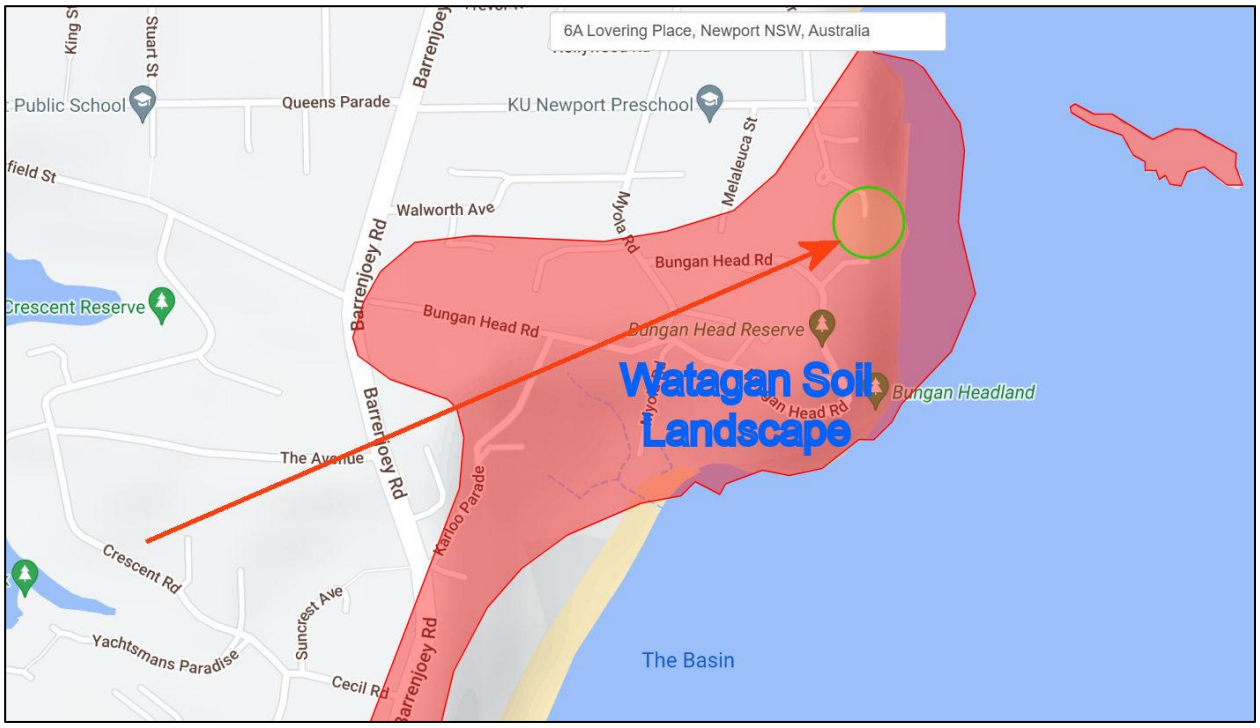

Figure 4: Subject site, showing Watagan soil landscapes (From DPE (eSpade V2) 2024)

5 Observations and Discussion of the Tree and Environment

5.1 Tree 1 is a mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 5) The proposed new retaining wall will encroach on Tree 1's theoretical Tree Protection Zone (TPZ) by 17%, which is a major encroachment under point 3.3.3 of Australian Standard 4970 of 2009. (See Figure 3) The proposed wall will encroach into Tree 1's Structural Root Zone (SRZ). However, due to the position of the existing retaining wall, the encroachment may be less, as Tree 1's root expansion will have been restricted by the wall and cutting. Tree 1's root system will have been damaged by construction and landscaping activities on the adjoining allotment, 75 Bungan Head Road. The additional encroachment into Tree 1's SRZ may have detrimental impacts on the structure and health of the tree. Tree 1 has a large compression fork with included bark between the two first order leader branches. (See Figure 6) Although this defect is stable at the present time, failure can occur during weather extremes or changes to the usual wind direction. This is notes by Lonsdale (2000) P. 20, who states "*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*.". If the new retaining wall is to proceed, then Tree 1 should be removed;

Figure 5: Tree 1

Figure 6: Inclusion on Tree 1

5.2 Tree 2 is a mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 7) The proposed new retaining wall will encroach on Tree 2's theoretical Tree Protection Zone (TPZ) by 20%, which is a major encroachment under point 3.3.3 of Australian Standard 4970 of 2009. The proposed wall will encroach, substantially into Tree 2's Structural Root Zone (SRZ). (See Figure 3) As with Tree 1, Tree 2's root system will have been damaged by construction and landscaping activities on the adjoining allotment, 75 Bungan Head Road. The proposed new construction activities and retaining wall will significantly impact on Tree 2's root system and when the incursion combined with root damage sustained in 75 Bungan Head Road, then the accumulated damage may cause significant impacts. The encroachment into the SRZ will cause stability issues for this tree. Tree 2 has a large compression fork with included bark between the two first order leader branches, near the base of the trunk. (See Figure 8) Reaction wood ears are developing around the compression fork. Mattheck (2007) P.131, describes this defect as a "low-level" compression fork. "Low-level" compression forks have a high chance of failure. Additionally, Tree 2 has a compression fork with included bark on one of the co-dominant trunks at the union of the two first order branches. (See Figure 9) The included compression fork has been described by Mattheck as potentially dangerous (Mattheck and Breloer, 1994, P.60 and Mattheck, 2007, P.21). Lonsdale (2000) P. 20. If the new retaining wall is to proceed, then Tree 2 should be removed;

Figure 7: Tree 2

Figure 8: Tree 2 "low-level" compression fork

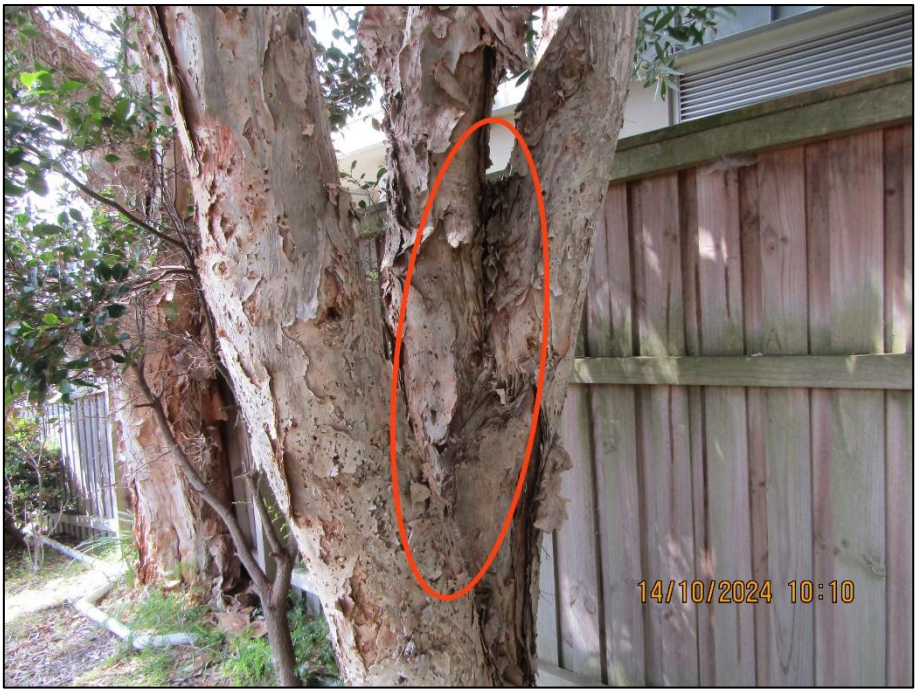

Figure 9: Compression fork in crown of Tree 2

5.3 Tree 3 is a mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 10) The proposed new retaining wall will encroach on Tree 3's theoretical Tree Protection Zone (TPZ) by 22%, which is a major encroachment under point 3.3.3 of Australian Standard 4970 of 2009. (See Figure 3) The proposed wall will encroach, substantially into Tree 2's Structural Root Zone (SRZ). (See Figure 3) As with Trees 1 and 2, Tree 3's root system will have been damaged by construction and landscaping activities on the adjoining allotment, 75 Bungan Head Road. This level of encroachment would destabilise Tree 3, as described by Moore (2014) P 58 who states "*Structural roots are important to tree stability, and it is one of the aims of tree protection regulation for development sites to protect them as part of the critical root zone (Matheny and Clark 1998: Anonymous 2009). However, fine roots, because of their large numbers and surface area, still contribute substantially to tree anchorage, as they bind closely to the soil and consolidate the root plate, increasing its mass.*". Tree 3 has numerous compression forks with included bark within many of the crowded branches in the crown. (See Figure 11) If the new retaining wall is to proceed, then Tree 3 should be removed due to the potential damage to the structural roots;

Figure 10: Trees 3 and 4

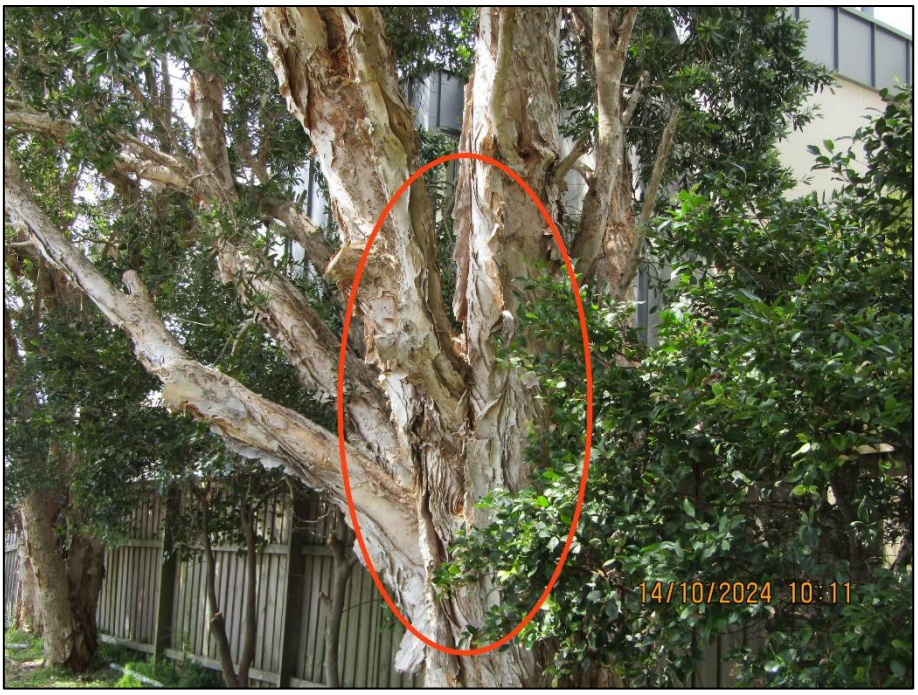

Figure 11: Showing crowded crown with bark inclusions

5.4 Tree 4 is a mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 10) The proposed new retaining wall will encroach on Tree 4's theoretical Tree Protection Zone (TPZ) by 4.8%, which is a minor encroachment under point 3.3.2 of Australian Standard 4970 of 2009. (See Figure 3) This is an acceptable encroachment and Tree 4 should be retainable;

5.5 Tree 5 is a mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 12) Tree 5 has a poorly formed area branch of the branch union. (See Figure 13) The proposed new retaining wall will encroach on Tree 3's theoretical Tree Protection Zone (TPZ) by 4%, which is a minor encroachment under point 3.3.2 of Australian Standard 4970 of 2009. (See Figure 3) This is an acceptable encroachment and Tree 5 should be retainable but may require some formative pruning to rectify the poor branch union formation;

Figure 12: Tree 5

Figure 13: Are that should be formatively pruned on Tree 5

5.6 Tree 6 is a very mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 14) Tree 6 is a significant tree for the locality. The proposed new retaining wall will encroach on Tree 3's theoretical Tree Protection Zone (TPZ) by 16%, which is a major encroachment under point 3.3.3 of Australian Standard 4970 of 2009. (See Figure 3) The level of encroachment may result in Tree 6 declining, as suggested by Roberts et al (2006) P. 255 who state that "*It is commonly observed that resilience to root severance declines as tree become more mature*" and 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*.". Although Tree 6 has been heavily topped, resulting some decline of the top of the crown, this is a significant tree that should be retained. (See Figure 15 and Figure 16) Burges (2005) states "*Cuts made along a limb between lateral branches create stubs with wounds that the tree may not be able to close. Normally a tree will "wall off," or compartmentalise the decaying tissues, but few trees can handle the multiple severe wounds caused by topping. The exposed wood tissues begin to decay and the decay can spread into the trunk.*". The position of the proposed retaining wall should be moved by 1 metres, towards the dwelling. If the wall's position is readjusted, then the encroachment will be within acceptable limits;

Figure 14: Trees 6 and 7

Figure 15: Topped crowns of Trees 6 and 7

Figure 16: Part of topped crown dying on Tree 6

5.7 Tree 7 is a mature *Melaleuca quinquinervia* (Broad-leafed Paperbark). (See Figure 14) Tree 7 is growing closely to Tree 6, forming a co-dominant relationship. The proposed new retaining wall will encroach on Tree 3's theoretical Tree Protection Zone (TPZ) by 13%, which is a major encroachment under point 3.3.3 of Australian Standard 4970 of 2009. (See Figure 3) However, if the position of the proposed retaining wall is moved by 1 metres, towards the dwelling, then the encroachment will be within acceptable limits.

6 Recommendations

6.1 Trees 1 to 3 should be removed to permit the construction of the retaining wall;

6.2 Tree 5 should be subjected to formative pruning to improve the area of the branch unions;

6.3 The retaining wall, adjoining Trees 6 and 7, should be moved by 1 metres away from Trees 6 and 7;

6.4 Trees 1 to 3 must be replaced each, by at least two specimens. The replacement species can be the same as the removed trees of a local species such as *Banksia integrifolia*;

6.4.1 The replacement trees that should be as specified in AS 2303 of 2018 *Tree stock for landscape use* (Standards Australia, 2018), in 10 litre containers and between 4 and 5 metres in height.

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