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Arboricultural Impact Assessment of Trees adjoining 29 Currong Circuit, Terrey Hills

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Contents

1. Introduction

1.1. Location of the site (See Figure 1)

Figure 1: Location of Subject Site (From SixMaps viewed 2021)

1.2 The subject site was inspected on 21/5/2021;

1.3 This report was prepared for Clarendon Homes.

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 calculate the required Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) for the trees;

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 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 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

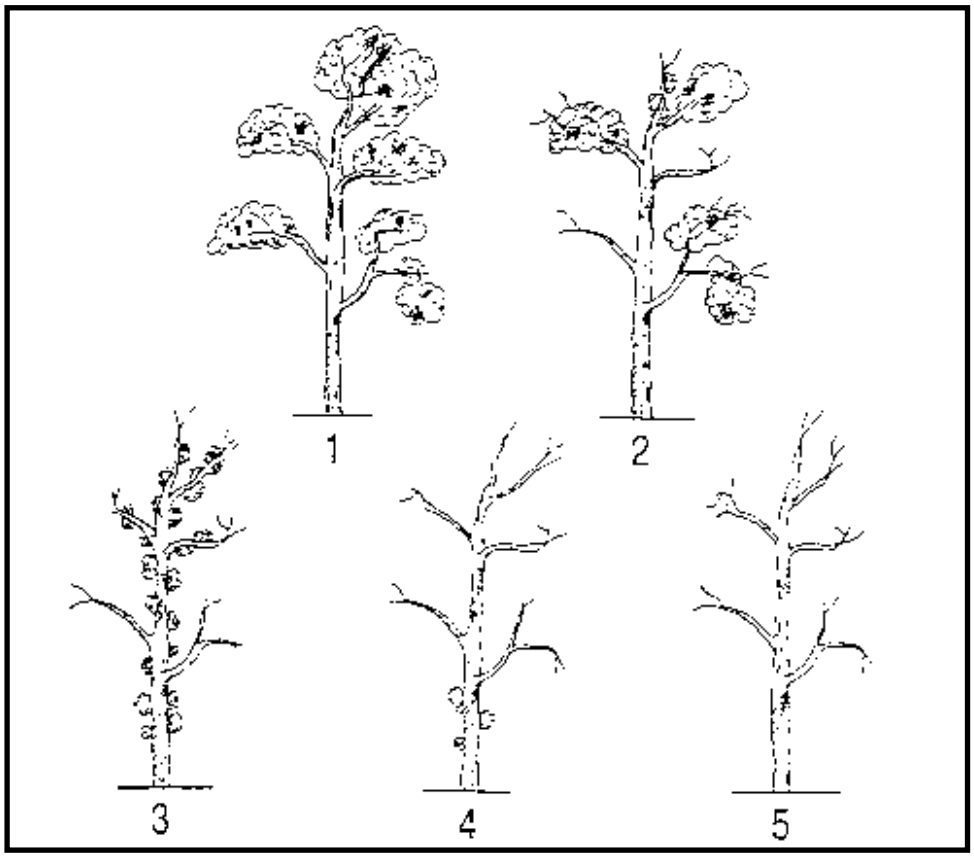

Figure 2: Crown Health Assessment

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	
1	*Liquidambar styraciflua*	Sweet Gum	50 plus years	0.86	**10.3**	1.06	**3.4**	**8.22**	**8.17**	**4.57**	**11.00**	16.00
2	*Liquidambar styraciflua*	Sweet Gum	50 plus years	0.43	**5.2**	0.53	**2.5**	**4.92**	**1.89**	**5.61**	**7.42**	16.00
3	*Liquidambar styraciflua*	Sweet Gum	50 plus years	0.65	**7.8**	0.77	**3.0**	**6.54**	**4.84**	**4.82**	**8.08**	16.00
4	*Araucaria heterophylla*	Norfolk Island Pine	50 plus years	0.57	**6.8**	0.67	**2.8**	**4.18**	**2.70**	**3.27**	**3.20**	12.00

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
1	*Liquidambar styraciflua*	Sweet Gum	Fair	Good	1	Fair	4C	Compression fork, crown lifted, within 2 metres of water main	Low
2	*Liquidambar styraciflua*	Sweet Gum	Fair	Fair	1	Fair	4A	Side stubbed and partially suppressed	Low
3	*Liquidambar styraciflua*	Sweet Gum	Poor	Fair	1	Poor	4C	Compression fork, epicormic development	Low
4	*Araucaria heterophylla*	Norfolk Island Pine	Good	Good	1	Good	1A	No isssues	High

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

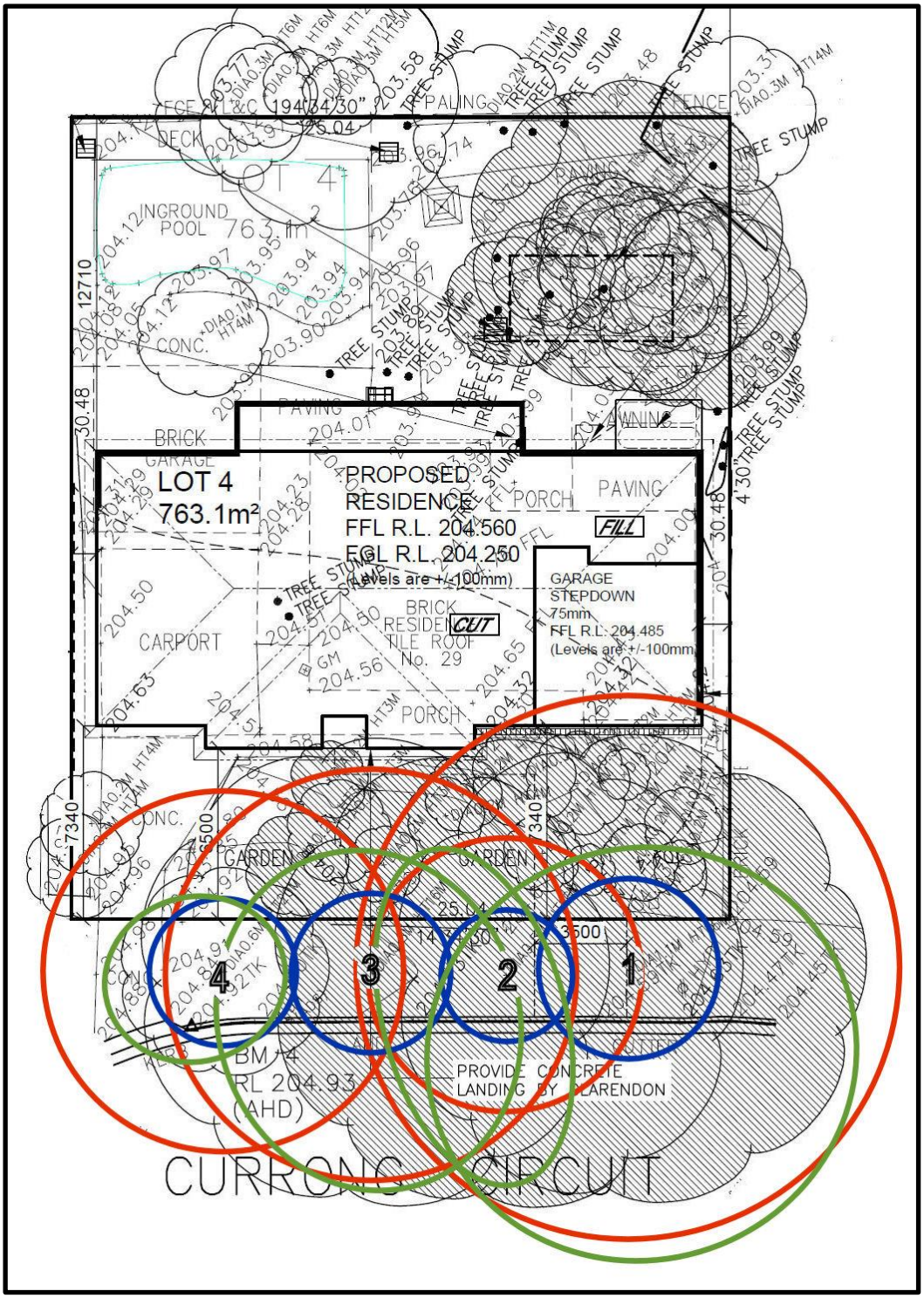

Figure 3: Position of the trees with calculated Tree Protection Zones outlined in red, the calculated Structural Root Zones outlined in blue and the crown limits in green. Scale 1:250. From Site Plan of 29 Currong Circuit, Terrey Hills, by Clarendon Homes. Dated 29/3/2021

4.3 Geology and Soils

The soil surrounding the subject trees has been described as Somersby Soil Landscape (See Figure 4). Chapman and Murphy (1989), P.40, describe the Somersby Soil Landscape as "*gently undulating to rolling rises in deeply weathered Hawkesbury Sandstone plateau. Local relief to 40 m, slopes <15%. Rock outcrop is absent. Crests are broad and convex, valleys are narrow and concave. Extensively cleared, low eucalypt open-woodland and scrubland."*

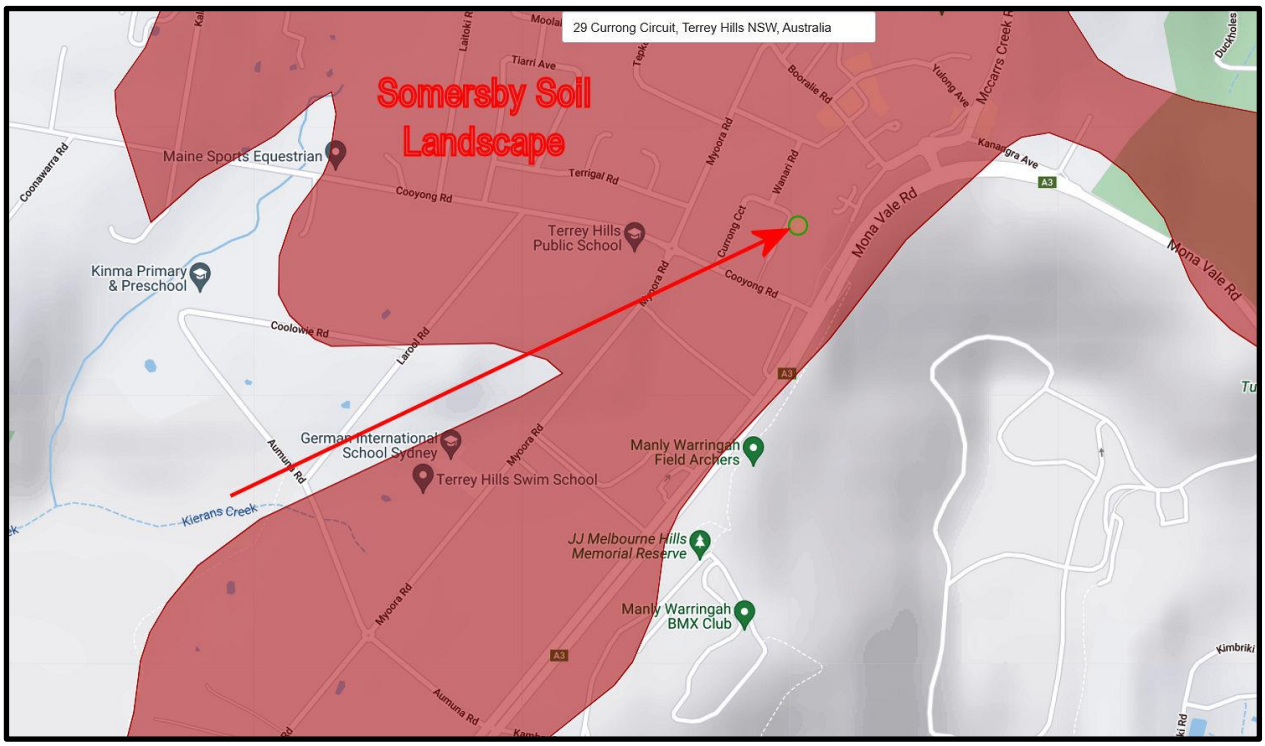

Figure 4: Subject site, showing Somersby Soil Landscape (From eSpade V2 2021)

5 Observations and Discussion of the Tree and Environment

5.1 Tree 1 is a mature *Liquidambar styraciflua* (Sweet Gum). (See Figure 5) Tree 1 is growing on the road verge of Currong Circuit. Tree 1 has been crown lifted of several years by removing the majority of the lower and mid-trunk first order branches. (See Figure 6) This has resulted in a tree typified by Mattheck (2007) P. 67, where he describes a tree "*which will put on less and less radial increment from the top down*". Mattheck, also, implies that the loss of the lower first order branches will reduce root growth, resulting in a smaller root plate. The mid trunk's reduced growth is such that the lower trunk has developed an expanded form, similar to "Bottle Butt". (See Figure 5) Gilman and Eisner (2007) suggest that trees that have been heavily trunk pruned can developed decay, from the excessive pruning, and can be at risk of failing, resulting from too much weight at the top of the tree. This tree does appear to have decay in the poorly sealed over branch stubs. (See Figure 6 and Figure 7) However, Tree 1 has developed a buttressed root system and does appear

to be relatively stable. Although the root plate may be stable Tree 1 does appear to have a partially sealed over shear crack on the lower trunk, which may be related to the less formed trunk from the crown lifting. (See Figure 7) Mattheck (2007) P. 19 states that shear cracks *often start at bark inclusions* and *do not lead to total failure, but they do reduce the safety reserves with bending loads.* Further, Tree 1 is growing 1.63 metes from a hydrant. (See Figure 8) Considering the expansive and fast growing root system attributed to *Liquidambar styraciflua*, the tree is to close to the hydrant and water main. Council should consider removing Tree 1, due to the crown lifting, the shear crack and the proximity to the water main and hydrant. Further, the current proposal, including the driveway would require that Tree 1 is removed, as the driveway passes through the location for Tree 1;

Figure 5: Tree 1 showing the developing bottle butt

Figure 6: Showing the crown lifted trunk on Tree 1 with partially decaying branch stubs

Figure 7: Shear crack on Tree 1 with decaying stubs above

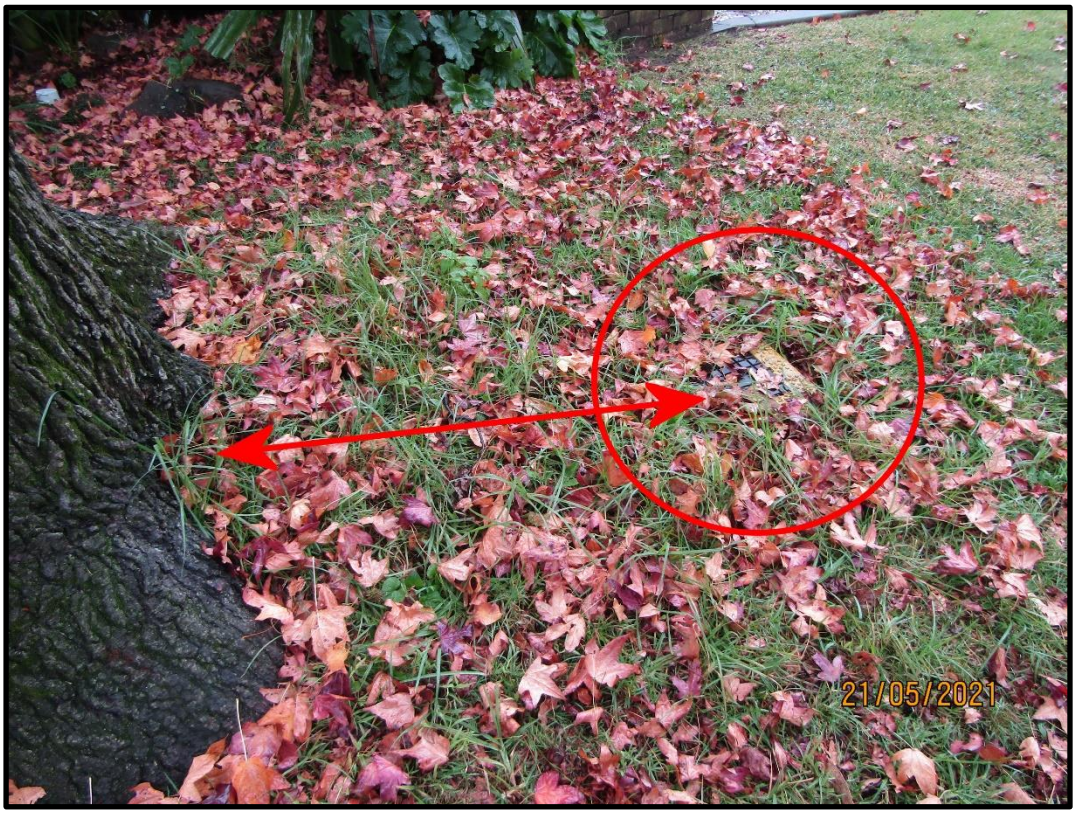

Figure 8: Showing Tree 1's position in relation to the hydrant

5.2 Tree 2 is a partially suppressed *Liquidambar styraciflua* (Sweet Gum). This tree is also growing on the road verge, in front of 29 Currong. Tree 2's growth has been supressed by Trees 1 and 3 with a much compressed crown and narrower trunk. (See Figure 3 and Figure 9) Tree 2's lower and mid trunk has been subjected to side stubbing which has been described by Lee R., F. and Wolowicz R., S. in Kuser edt (2013) as undesirable. (See Figure 10) The proposed driveway will impact on 28.7% of Tree 2's Tree Protection Zone (TPZ). (See Figure 3) This is major encroachment under Part 3.3.3 of the Australian Standard 4970 of 2007. Council should consider removing Tree 2;

Figure 9: Showing Tree 2 surrounded by Tree 1 and 3 with reduced trunk size.

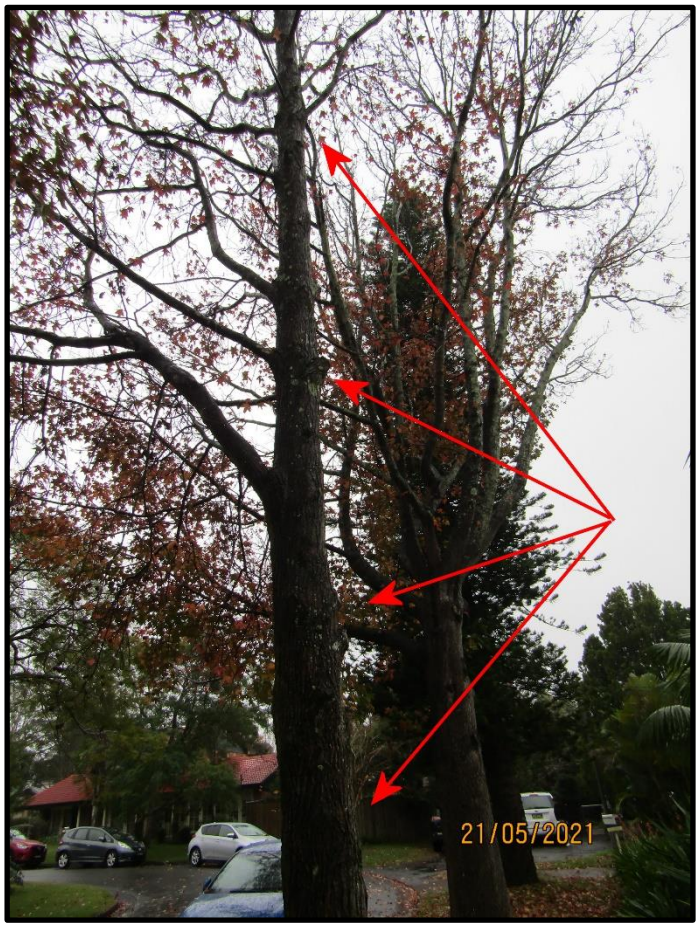

Figure 10: Showing side stubbing on Tree 2

5.3 Tree 3 is a mature *Liquidambar styraciflua* (Sweet Gum). (See Figure 11) Tree 3 has had a damaged crown, resulting in the development of s multi-branched crown, derived from epicormic shoots. (See Figure 11 and Figure 12) Regarding epicormic shoots, Burges (2005) states: - "*They are usually crowded and not strongly attached to the tree. Unlike normal branches that develop in a "socket" of overlapping wood tissues, these new shoots are anchored only in the outermost layers of the parent branches. Consequently, they are likely to break as they mature*." Further, Gillman (2012) states "*When sprouts with adjacent points of origin enlarge, they physically push against each other, sometimes resulting in bark inclusions and failure.*". There are several bark inclusions in the branch junction. Mattheck (2007) P.21 regards compression forks, particularly those with longitudinal cracks, as dangerous. 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* ". Tree 3 should be removed;

Figure 11: Tree 3 showing compression fork among epicormic derived branches

Figure 12: Tree 3 showing more compression fork among epicormic derived branches

5.4 Tree 4 is an *Araucaria heterophylla* (Norfolk Island Pine). (See Figure 9) Tree 4 is in good condition and should be retained;

5.5 There are numerous exotic palm species on the allotment, in both in front and behind the existing dwelling. These can be removed without the need for consent. There are a number of small trees that are all less than 5 metres in height.

6 Recommendation

6.1 Trees 1 to 3 should be removed as these trees all have structural issues. Trees 1 and 2 are in conflict with the proposed driveway and tree 1 is going in too close proximity to the water main and hydrant;

6.2 Tree 4 should be retained.

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