

# Arboricultural Impact Assessment



## Prepared For

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# 1 Introduction

## 1.1 Brief

- 1.1.1 This Arboricultural Impact Assessment (AIA) was prepared by Chantalle Hughes of Treeism Arboricultural Services. This report was commissioned by Sean Gartner of Gartner and Trovato Architects on behalf of the owner of the subject site. The Site is identified as Lots 10 and 11 of DP 12435 and is known as 25 and 27 Kevin Avenue, Avalon Beach, New South Wales. Demolition of existing structures and a new Seniors Living Development with basement is proposed.
- 1.1.2 The purpose of this report is to identify the species of each assessed tree, assess their vigour, condition, landscape prominence and ascribe a Retention Value to each tree.
- 1.1.3 This report identifies the potential impacts the proposal will have on the retention or long-term viability of each tree and aims to provide guidelines for tree protection and maintenance during development.

## 1.2 Context

- 1.2.1 Acknowledgement of the original inhabitants of the Northern Sydney area is complex. The Aboriginal Heritage Office (AHO) states...’ Clan names which can be found on most maps for the northern Sydney region of the AHO partner Councils are the following: Gayamaygal, Gamaragal, Garigal, Darramurragal and many more’.....exact clan name knowledge has been lost, or at the very least is hard to find, as traditional inhabitants of Australia were told to ‘give up their language, stop practicing ceremony and hide their Aboriginality’.
- 1.2.2 The Department of Planning, Industry and Environment ‘Espade’ states the site geology as ‘Terrigal Formation of the Narrabeen Group consisting of lithic and quartz sandstone and siltstone, minor sedimentary breccia, claystone and conglomerate (Herbert, 1983). Some sandstones are highly weathered and friable’.
- 1.2.3 Details of vegetation as per Espade states ‘Extensively cleared tall open-forest (wet sclerophyll forest) with open-heath in exposed coastal locations. Common species of the open-forest include *Eucalyptus (sic) maculata*, *E. paniculata* and *Allocasuarina torulosa*. Associations of *Syncarpia glomulifera* and *E. saligna* are also common. Heathlands occur on exposed coastal headlands. They contain *Banksia integrifolia*, *Allocasuarina littoralis*, *Westringia fruticosa* and *Acacia longifolia*. Heathland vegetation has been described by Siddiqui et al. (1972)’.

## 1.3 Methodology

- 1.3.1 In preparation for this report, ground level, visual tree assessments<sup>1</sup> or limited VTA (e.g. where access was limited), of sixty-three (63) trees was completed by Chantalle Hughes of Treeism Arboricultural Services on 1<sup>st</sup> August 2023. Inspection details of these trees are provided in Appendix 3 — Schedule of Assessed Trees.

<sup>1</sup>Visual Tree Assessment (VTA) is a procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.

- 1.3.2 The tree heights were visually estimated or measured using a Nikon ForestryPro, unless otherwise noted in Appendix 3, the trunk Diameter at Breast Height were measured at 1.4 metres above ground level (DBH) using a diameter tape unless indicated otherwise. Tree canopy spreads were stepped out with field observations written down, and photographs of the site and trees were taken using an iPhone 13.
- 1.3.3 The Structural Root Zone (SRZ) and the Tree Protection Zone (TPZ) of each tree is calculated using the formula provided within the Australian Standard 4970-2009 Protection of trees on development sites (AS4970).
- 1.3.4 Tree Retention Values (RV) were calculated utilising STARS – Significance of a Tree Assessment Rating System (IACA 2010) <sup>®</sup>.
- 1.3.5 Tree data and field observations were entered into a data dictionary on a Trimble TDC600. Data was managed through Terraflex Trimble Connect.

## 1.4 Plans and Documents Referenced

- 1.4.1 Architectural Plans, Project no. 2306, Drawing no's. A-01 to A-15, Revision A, dated 30 October 2023, by Gartner and Trovato Architects.
- 1.4.2 Survey Plan, Reference no. 21372, Revision no. 00, dated 31 June 2023, authored by Bee and Lethbridge Pty Ltd.
- 1.4.3 AS4970-2009 Protection of trees on development sites, Standards Australia.
- 1.4.4 AS4373-2007 Pruning of amenity trees, Standards Australia.
- 1.4.5 This AIA takes account Chapter 2 *Vegetation in Non-Rural Areas* of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 'The SEPP' and Section B4 Controls relating to the Natural Environment, Pittwater 21 Development Control Plan (P21DCP).

## 1.5 Limitations

- 1.5.1 No Hydraulic or Landscape Plans were viewed as part of this assessment.
- 1.5.2 Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible; however, I can neither guarantee nor be responsible for the accuracy of information provided by others.
- 1.5.3 This report is not intended to be a comprehensive tree risk assessment; however, the report may make recommendations, where appropriate, for further assessment, treatment or testing of trees where potential structural problems have been identified, or where below ground investigation may be required.
- 1.5.4 No aerial inspections, root mapping or woody tissue testing were undertaken as part of this tree assessment.
- 1.5.5 Information contained in this report only reflects the condition of the trees at the time of inspection. Trees are dynamic, living things which can be subject to change without notice in certain circumstances.
- 1.5.6 This AIA is not intended as an assessment of any impacts on the trees by any proposed future development of the site.

## 2 Observations and Discussion

### 2.1 Threatened Species

- 2.1.1 No species of assessed tree is subject to threatened conservation status under Australian and/or State Government legislation (i.e. NSW Threatened Species Conservation Act 1995 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999). However, a majority of assessed trees (Tree 1-3, 7-12, 14, 16-22, 25-29, 31-37 and 49-60) are species consistent with the mapped Pittwater and Wagstaffe Spotted Gum Forest.
- 2.1.2 The site is also identified on the Department of Planning and Environments Biodiversity Values Map (BV).

### 2.2 Assessed Trees

- 2.2.1 Sixty-three (63) trees were assessed or identified and are included in this report. Details of these are included in the Schedule of Assessed Trees—Appendix 3.
- 2.2.2 **Tree location and relevance under the P21 DCP** — Of the sixty-three (63) assessed trees, the following is noted:
- Eleven (11) trees are located on Council managed property—Tree 18-21, 24, 25, 26 (partially), 27-29 and 61.
  - Thirty-four (34) trees are located within the subject site—Tree 3, 5, 9, 11, 12, 16, 17, 22, 23, 26 (partially), 30, 36-39, 42, 44-48, 48A and 49-60. Of these, the following eleven (11) trees are exempt/non-prescribed from P21 DCP —Tree 5, 23, 38, 39, 42, 44-48 and 48A. All non-prescribed trees will be removed to allow development, apart from Tree 42, which is noted for retention.
  - Nineteen (19) trees are located on neighbouring property adjoining the subject site—Tree 1, 2, G4, 6-8, 10, G13, 14, 15, 31-35, 40, 41, 43 and G44A.
- 2.2.3 **Species origin** — Of the fifty-three (53) prescribed (except Tree 42) or Council/neighbouring trees, the following is noted:
- Three (3) trees are introduced native species— Tree 29, 41 and 44A.
  - Forty-seven (47) trees are locally native species—Tree 1-4, 6-12, 14-22, 24-37, 42, 43, G44A, 49-60.
  - Three (3) are introduced exotic species—Group 13, Tree 40 and 61.
- 2.2.4 The fifty-three (53) prescribed/Council/neighbouring trees and their respective **Retention Value (RV)** are identified in Table 1, below/next page. Note: Refer to Appendix 2 for the methodology used to assess the Retention Value of a tree.

**Table 1**—Tree Identification & RV - L = Low, M = Medium, H = High, R = Proposed Removal, Exempt 42.

Tree No.	Genus & species Common Name	RV	Tree No.	Genus & species Common Name	RV	Tree No.	Genus & species Common Name	RV
1	<i>Corymbia maculata</i> Spotted Gum	H	21	<i>Syncarpia glomulifera</i> Turpentine	H	58	<i>Syncarpia glomulifera</i> Turpentine	H
2	<i>Glochidion ferdinandi</i> Cheese Tree	M	22	<i>Corymbia maculata</i> Spotted Gum	H	59	<i>Syncarpia glomulifera</i> Turpentine	H
3	<i>Corymbia maculata</i> Spotted Gum	H	24	<i>Eucalyptus haemastoma</i> Scribbly Gum	H	43	<i>Acmena smithii</i> Lilly Pilly	M
4	<i>Syzygium australe</i> Bush Cherry x 15	L	25	<i>Glochidion ferdinandi</i> Cheese Tree	H	44A	<i>Waterhouisia floribunda</i> Weeping Lilly Pilly – group/hedge	L
6	<i>Ficus macrophylla</i> Moreton Bay Fig	H	26	<i>Corymbia gummifera</i> Red Bloodwood	M	49	<i>Corymbia maculata</i> Spotted Gum	H
7	<i>Corymbia maculata</i> Spotted Gum	M	27	<i>Glochidion ferdinandi</i> Cheese Tree	M	50	<i>Corymbia maculata</i> Spotted Gum	H
8	<i>Corymbia maculata</i> Spotted Gum	H	28	<i>Glochidion ferdinandi</i> Cheese Tree	M	51	<i>Angophora costata</i> Smooth-barked Apple Myrtle	M
9	<i>Corymbia maculata</i> Spotted Gum	H	29	<i>Callistemon viminalis</i> Weeping Bottlebrush	M	52	<i>Corymbia gummifera</i> Red Bloodwood	M
10	<i>Eucalyptus umbra</i> Broad-leaved White Mahogany	H	30	<i>Eucalyptus haemastoma</i> Scribbly Gum	H	53	<i>Corymbia gummifera</i> Red Bloodwood	M
11	<i>Pittosporum undulatum</i> Sweet Pittosporum	M	31	<i>Angophora costata</i> Smooth-barked Apple Myrtle	H	54	<i>Syncarpia glomulifera</i> Turpentine	H
12	<i>Glochidion ferdinandi</i> Cheese Tree	L	32	<i>Corymbia gummifera</i> Red Bloodwood	H	55	<i>Syncarpia glomulifera</i> Turpentine	H
13	<i>Syagrus romanzoffiana</i> Cocos Palm x3	L	33	<i>Corymbia gummifera</i> Red Bloodwood	H	56	<i>Syncarpia glomulifera</i> Turpentine	H
14	<i>Eucalyptus punctata</i> Grey Gum	H	34	<i>Pittosporum undulatum</i> Sweet Pittosporum	H	57	<i>Syncarpia glomulifera</i> Turpentine	H
15	<i>Cupaniopsis anacardioides</i> Tuckaroo	M	35	<i>Pittosporum undulatum</i> Sweet Pittosporum	H	58	<i>Syncarpia glomulifera</i> Turpentine	H
16	<i>Angophora costata</i> Smooth-barked Apple Myrtle	H	36	<i>Livistona australis</i> Cabbage Fan Palm	H	59	<i>Syncarpia glomulifera</i> Turpentine	H
17	<i>Angophora costata</i> Smooth-barked Apple Myrtle	H	37	<i>Livistona australis</i> Cabbage Fan Palm	H	60	<i>Glochidion ferdinandi</i> Cheese Tree	M

Tree No.	Genus & species Common Name	RV	Tree No.	Genus & species Common Name	RV	Tree No.	Genus & species Common Name	RV
18	<i>Syncarpia glomulifera</i> Turpentine	H	40	<i>Ulmus parvifolia</i> Chinese Elm	M	61	<i>Erythrina</i> sp. Coral Tree	L
19	<i>Syncarpia glomulifera</i> Turpentine	H	41	<i>Grevillea robusta</i> Silky Oak	M			
20	<i>Syncarpia glomulifera</i> Turpentine	H	42	<i>Acmena smithii</i> Lilly Pilly	M			

### 3 Impact of the Proposed Development

#### 3.1 Prescribed Trees Proposed for Removal

3.1.1 The following twelve (12) prescribed trees will be required for removal to accommodate the proposal.

- Tree 9 – Red Bloodwood: This tree is located within the footprint of the proposed development and could not be safely retained.
- Tree 12 Cheese Tree: This tree has previously lost a large diameter codominant stem, decay and termite damage were noted at the time of assessment. It has been ascribed a low retention value and is not suitable for long term retention.
- Tree 22 Spotted Gum: This tree is located within the footprint of the proposed entry path and will be heavily impacted from retaining walls, other entry pathways and stairs and could not be safely retained.
- Tree 51 Smooth-barked Apple: Whilst the encroachment calculated for this tree (See Appendix 3) refers only to the granite path, the stem is orientated low over the proposed building line and thus pruning could not be carried out in compliance AS4373. This tree could not be safely retained.
- Tree 52 & 53 – Red Bloodwood: These two (2) trees would not incur 'major' impact as per AS4970 in relation to below ground TPZ impacts. However excessive, unsupportable pruning on the tree canopies would be required to provide built form clearances, and as such, these trees could not be safely retained.
- Tree 54-59 – Turpentine: These trees are located within the building footprint and could not be safely retained.

## 3.2 Potential Impacts on Trees Proposed for Retention

3.2.1 Under the Australian Standard 4970-2009 Protection of trees on development sites (AS4970), encroachments less than 10% of the Tree Protection Zone (TPZ) are considered to be minor. No specifications are provided in AS4970 for potential impacts of 10% or greater. This 10% is interpreted as the threshold figure, if the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable.

3.2.2 When determining the potential impacts of encroachment into the TPZ, the project arborist should consider the following items listed under Clause 3.3.4 of AS4970-2009:

(a) Location and distribution of the roots to be determined through non-destructive investigation methods (pneumatic, hydraulic, hand digging or ground penetrating radar). Photographs should be taken, and a root zone map prepared.

(b) The potential loss of root mass resulting from the encroachment: number and size of roots.

(c) Tree species and tolerance to root disturbance.

(d) Age, vigour and size of the tree.

(e) Lean and stability of the tree. NOTE: Roots on the tension side are likely to be most important for supporting the tree and are likely to extend for a greater distance.

(f) Soil characteristics and volume, topography and drainage.

(g) The presence of existing or past structures or obstacles affecting root growth.

(h) Design factors.

3.2.3 Disturbance within the Structural Root Zone (SRZ), and extent of encroachments into the TPZ's of prescribed trees to be retained are summarised in Table 2 below and next page.

**Table 2:** Estimated encroachments of permanent structures into the SRZ and TPZ of trees proposed for retention. Note 1: These figures are based on the SRZ and TPZ's offsets of the trees as calculated under AS4970 and do not necessarily reflect the actual root zones of the trees. Existing at or below ground structures, site topography and soil hydrology will influence the presence, spread and direction of tree root growth.

Tree No.	Tree	Tree located on site	SRZ affected	TPZ area (m <sup>2</sup> )	TPZ encroachment (approx. m <sup>2</sup> )	TPZ encroachment (approx. %)
1	Spotted Gum	x	x	255	0	0
2	Cheese Tree	x	x	46	0	0
3	Spotted Gum	✓	x	34	3.32	9.8
G4	Bush Cherry x 15	x	x	13	0	0
6	Moreton Bay Fig	x	x	113	0	0
7	Spotted Gum	x	x	31	0	0
8	Red Bloodwood	x	x	55	1.43	2.6
10	Broad-leaved Mahogany	x	x	290	12.93	4.5
11	Sweet Pittosporum	✓	x	13	0	0
13	Cocos Palm x 3	x	N/A	49	*11.9	*24.3
14	Grey Gum	x	x	28	0.93	3.3
15	Tuckeroo	x	x	15	0	0
16	Smooth-barked Apple	✓	x	100	3.8	3.8



Tree No.	Tree	Tree located on site	SRZ affected	TPZ area (m <sup>2</sup> )	TPZ encroachment (approx. m <sup>2</sup> )	TPZ encroachment (approx. %)
17	Smooth-barked Apple	✓	x	147	*29.53	*20.1
18	Turpentine	x	x	52	0	0
19	Turpentine	x	x	36	0	0
20	Turpentine	x	x	48	0	0
21	Turpentine	x	x	104	*5.37	*5.2
24	Scribbly Gum	x	x	24	0	0
25	Cheese Tree	x	x	139	2.61	1.9
26	Red Bloodwood	✓x	x	31	1.96	6.3
27	Cheese Tree	x	x	18	0	0
28	Cheese Tree	x	x	40	0	0
29	Weeping Bottlebrush	x	x	13	0	0
30	Scribbly Gum	✓	x	182	*51.45	*28.3
31	Smooth-barked Apple	x	x	41	0	0
32	Red Bloodwood	x	x	15	0	0
33	Red Bloodwood	x	x	36	0	0
34	Sweet Pittosporum	x	x	32	0	0
35	Sweet Pittosporum	x	x	13	0	0
36	Cabbage Fan Palm	✓	N/A	49	14.2	29
37	Cabbage Fan Palm	✓	N/A	49	16.92	34.5
40	Chinese Elm	x	x	81	0	0
41	Silky Oak	x	x	137	0	0
42	Lilly Pilly	✓	✓	13	0.57	4.4
43	Lilly Pilly	x	x	16	0.1	0.6
G44A	Weeping Lilly Pilly	✓	x	13	0	0
49	Spotted Gum	✓	*✓	235	*88.59	*37.7
50	Spotted Gum	✓	x	375	*130.86	*34.9
60	Cheese Tree	✓	*✓	46	*5.37	*11.7
61	Coral Tree	x	x	18	0	0

\* This symbol denotes that existing structures or construction methods will reduce encroachments detailed within Table 2 and is discussed further in relevant points below.

### 3.2.4 Tree 1, 2, Group 4, Tree 6 & Tree 7 – located on neighbouring property.

#### Structural Root Zone impacts:

- All works are outside the SRZ of these trees.

#### Tree Protection Zone impacts:

- All works are outside the TPZ of these specimens.

#### Pruning impacts:

- No pruning of these trees will be required to accommodate the proposal.

3.2.5 **Tree 3** Spotted Gum – located within the subject site.

Structural Root Zone impacts:

- All works are outside the SRZ of this tree.

Tree Protection Zone impacts:

- An encroachment of 9.8% has been estimated (see Figure 1 below) for the proposed rear retaining wall. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health in the medium to long term.

Pruning impacts:

- No pruning will be required to accommodate works.

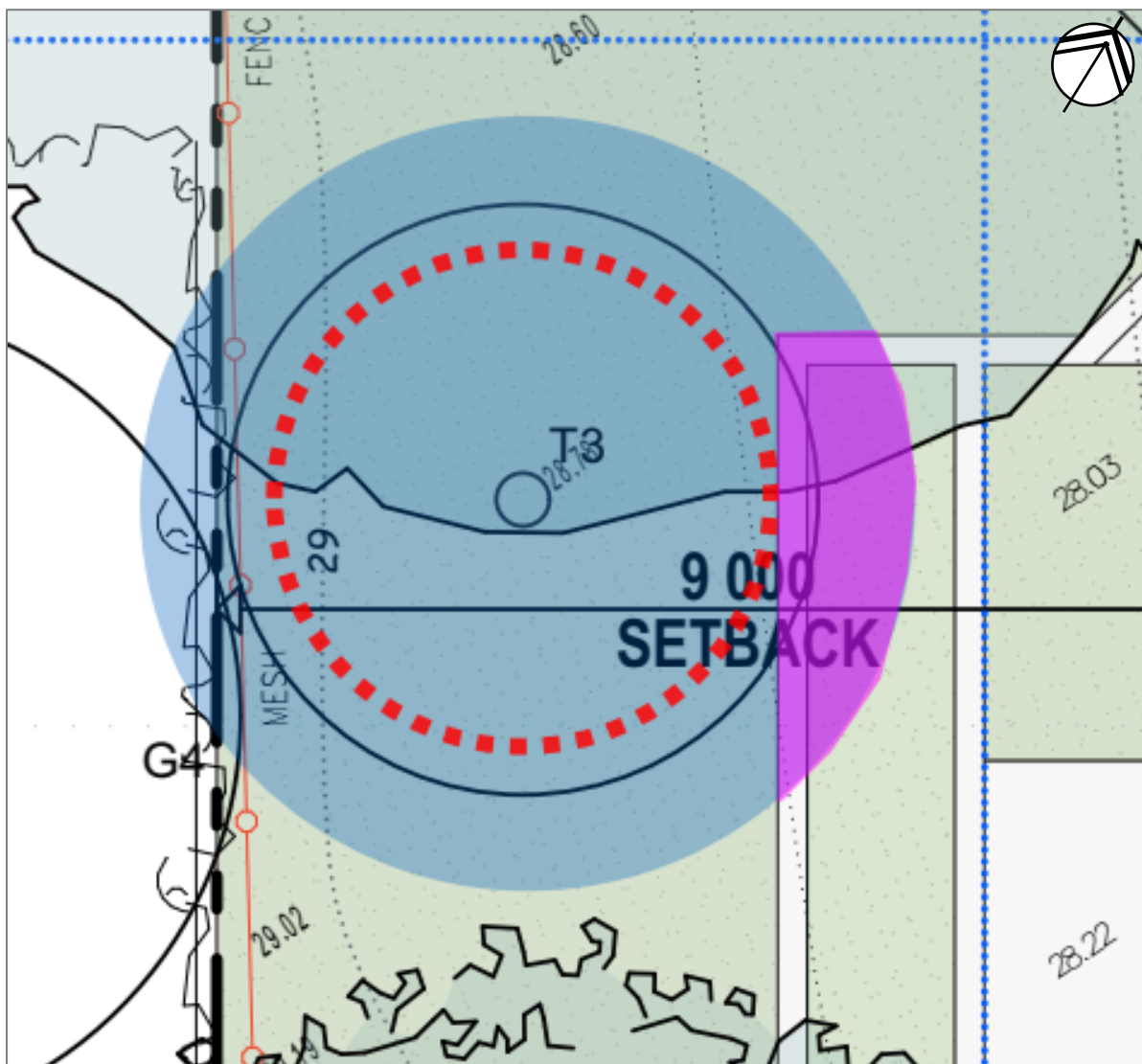


Figure 1 – Tree 3 encroachment calculation – Excerpt of Site Plan, Project 2306, dwg no. A.03, 30/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates encroachment. NOT TO SCALE. Marked up by C Hughes.

3.2.6 **Tree 8** Spotted Gum – located on neighbouring property.

Structural Root Zone impacts:

- All works are outside the SRZ of this tree.

Tree Protection Zone impacts:

- An encroachment of 2.6% has been estimated (see Figure 2 below) for the proposed pit and one (1) pier for Level 1 Floor of the build. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health or condition.

Pruning impacts:

- No pruning of this tree will be required as the canopy is held high over the subject site.

3.2.7 **Tree 10** Broad-leaved White Mahogany – located on neighbouring property.

Structural Root Zone impacts:

- All works are outside the calculated SRZ of this tree.

Tree Protection Zone impacts:

- An encroachment of 4.5% has been estimated (see Figure 2 below) for the proposed piers for Level 1 Floor of the build and basement. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health/condition in relation to root disturbance. However, consideration into irrigation to offset the inevitable rain shadow is recommended.

Pruning impacts:

- Moderate pruning (two (2) 100-200mm in diameter low east branches) will be required. This pruning work could be carried out in compliance with AS4373.

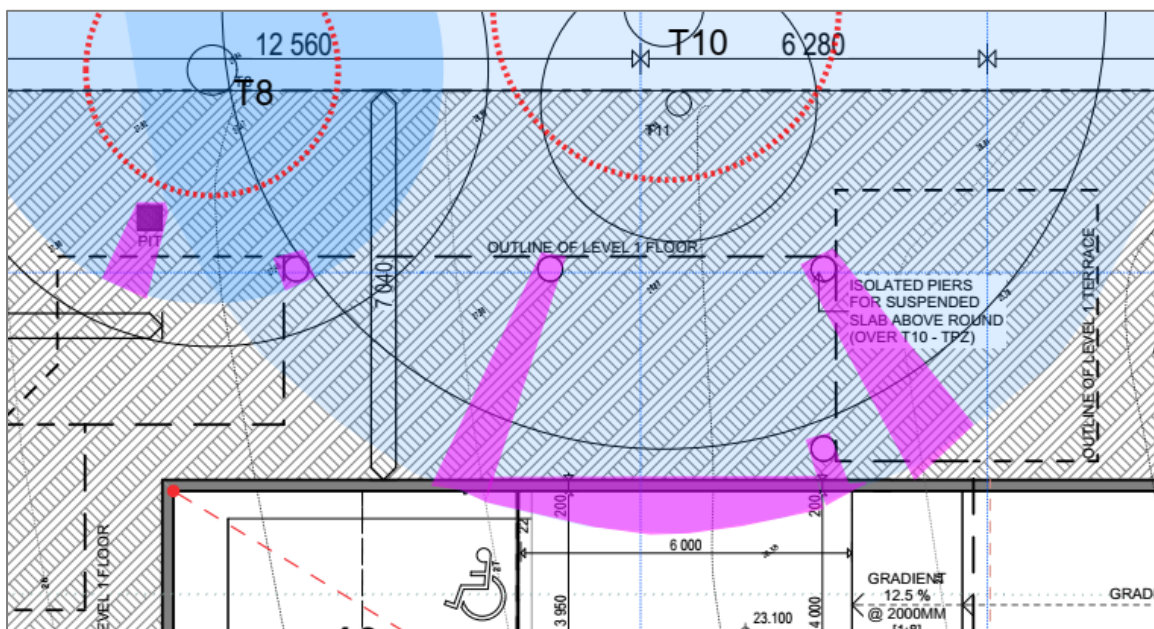


Figure 2 – Tree 8 & 10 encroachment calculation – Excerpt of Basement Plan, Project 2306, dwg no. A.04, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates encroachment. NOT TO SCALE. Marked up by C Hughes.

**Tree 11** Sweet Pittosporum – located within the subject site.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

Pruning impacts:

- Moderate pruning may be required to accommodate the proposal.

3.2.8 **Tree 13** Cocos Palm x 3 – located on neighbouring property.

Structural Root Zone impacts:

- Under AS4970, the formula for calculating the SRZ of a tree does not apply to palms, other monocots, cycads, and tree ferns.

Tree Protection Zone impacts:

- An encroachment of 24.3% has been estimated for the proposed footpath and pit (see Figure 3 below/page 12). This places it within *major* encroachment under AS4970. This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots*, (c) *Tree species and tolerance to root disturbance* and (h) *Design factors*.
- The proposed pathway is to be on-grade thus minimal excavation will be required. Palms have dense, fibrous root systems, rarely in excess of 1m radial distance from the stem. The pathway is located approximately 1.25m from these palm stems.
- The likelihood of root damage is minimal and impacts on tree health/condition are considered highly unlikely.

Pruning impacts:

- No pruning of these palms will be required.

3.2.9 **Tree 14** Grey Gum – located on neighbouring property.

Structural Root Zone impacts:

- All works are located outside the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 3.3% has been estimated (see Figure 3 below/next page) for the proposed retaining wall beside entry stairs. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health or condition.

Pruning impacts:

- No pruning of this tree will be required as the canopy is barely over the subject site and held high.

3.2.10 **Tree 15** Tuckeroo – located on neighbouring property.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

Pruning impacts:

- No pruning will be required to accommodate the proposal as the canopy does not extend over the subject site.

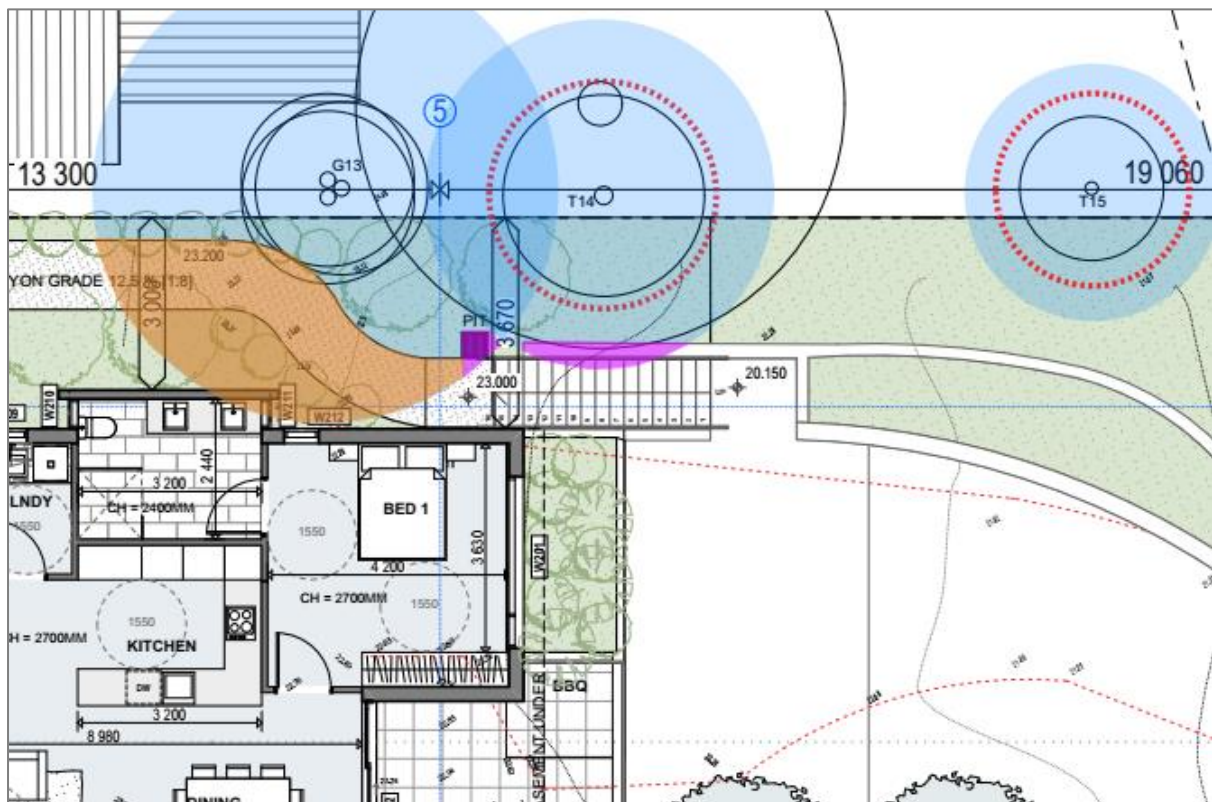


Figure 3 – Group 13, Tree 14 & 15 encroachment calculation – Excerpt of Ground Floor Plan, Project 2306, dwg no. A.05, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates permanent encroachment, orange shading ‘temporary’ encroachment. NOT TO SCALE. Marked up by C Hughes.

3.2.11 **Tree 16** Smooth-barked Apple – located on subject site.

Structural Root Zone impacts:

- All works are located outside the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 3.8% has been estimated (see Figure 4 below/next page) for the proposed retaining wall beside the driveway and within the front landscaping area. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health or condition.

Pruning impacts:

- No pruning of this tree will be required as the canopy is held high, there is an existing driveway within this area and the tree has been pruned previously to clear it.

3.2.1 **Tree 17** Smooth-barked Apple – located on subject site.

Structural Root Zone impacts:

- All the proposed works are located outside the SRZ of this tree.

Tree Protection Zone impacts:

- An encroachment of 20.1% has been estimated (see Figure 4 below/next page), for the proposed driveway, retaining wall, storm filter pit and driveway crossover placing it within *major* encroachment under AS4970.
- This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009. The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots* and (g) *The presence of existing or past structures or obstacles affecting root growth*.
- Within the subject site an existing bitumen driveway is located closer to the tree than the proposed, whilst bitumen does not generally effectively deflect root growth, continued compaction from vehicular access may. Outside the boundary however, a concrete cross-over is currently insitu. This cross-over would be deflecting root ingress into this area.
- Removing the proposed encroachment calculation of the cross-over (see Figure 4 - orange shaded area) reduces the estimated encroachment to 13.3%. Given the existing driveway location, in my opinion tree retention remains viable for this tree and impacts to tree health in the long term are unlikely.
- It should be noted however, that root growth is opportunistic, and the existence, extent, size, quantity, and quality of roots between the tree and the proposed cut for the driveway and retaining wall are an unknown factor.

Pruning impacts:

- No pruning of this tree will be required as the canopy is held high and has been cleared for the existing driveway.

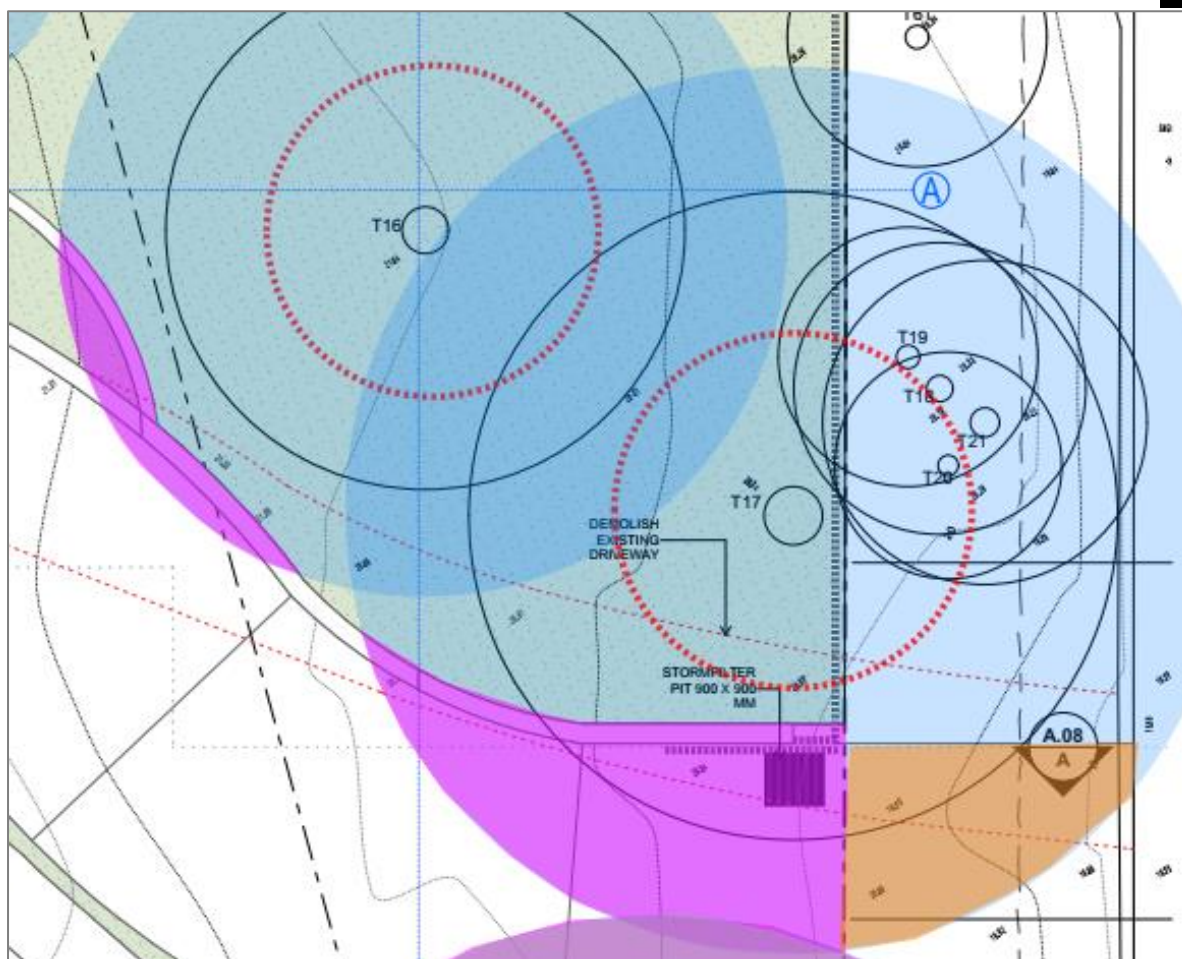


Figure 4 –Tree 16 & 17 encroachment calculation – Excerpt of Ground Floor Plan, Project 2306, dwg no. A.05, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates permanent encroachment, orange shading indicates existing concrete encroachment. NOT TO SCALE. Marked up by C Hughes.

### 3.2.2 **Tree 18, 19 & 20** Turpentine – located on Council managed land.

#### Structural Root Zone impacts:

- All works are outside the SRZ of these trees.

#### Tree Protection Zone impacts:

- All works are outside the TPZ of these specimens.

#### Pruning impacts:

- No pruning will be required on any of these specimens to accommodate the proposal.

### 3.2.3 **Tree 21** Turpentine – located on Council managed land.

#### Structural Root Zone impacts:

- The proposed works are located outside the SRZ of this tree.

Tree Protection Zone impacts:

- An encroachment of 5.2% has been estimated (see Figure 5 below) for the proposed retaining wall beside the driveway and driveway cross-over. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health or condition. Additionally existing cross-over encroachment sits closer to the tree stem.

Pruning impacts:

- No pruning of this tree will be required as the driveway is being located further from this tree than the existing.

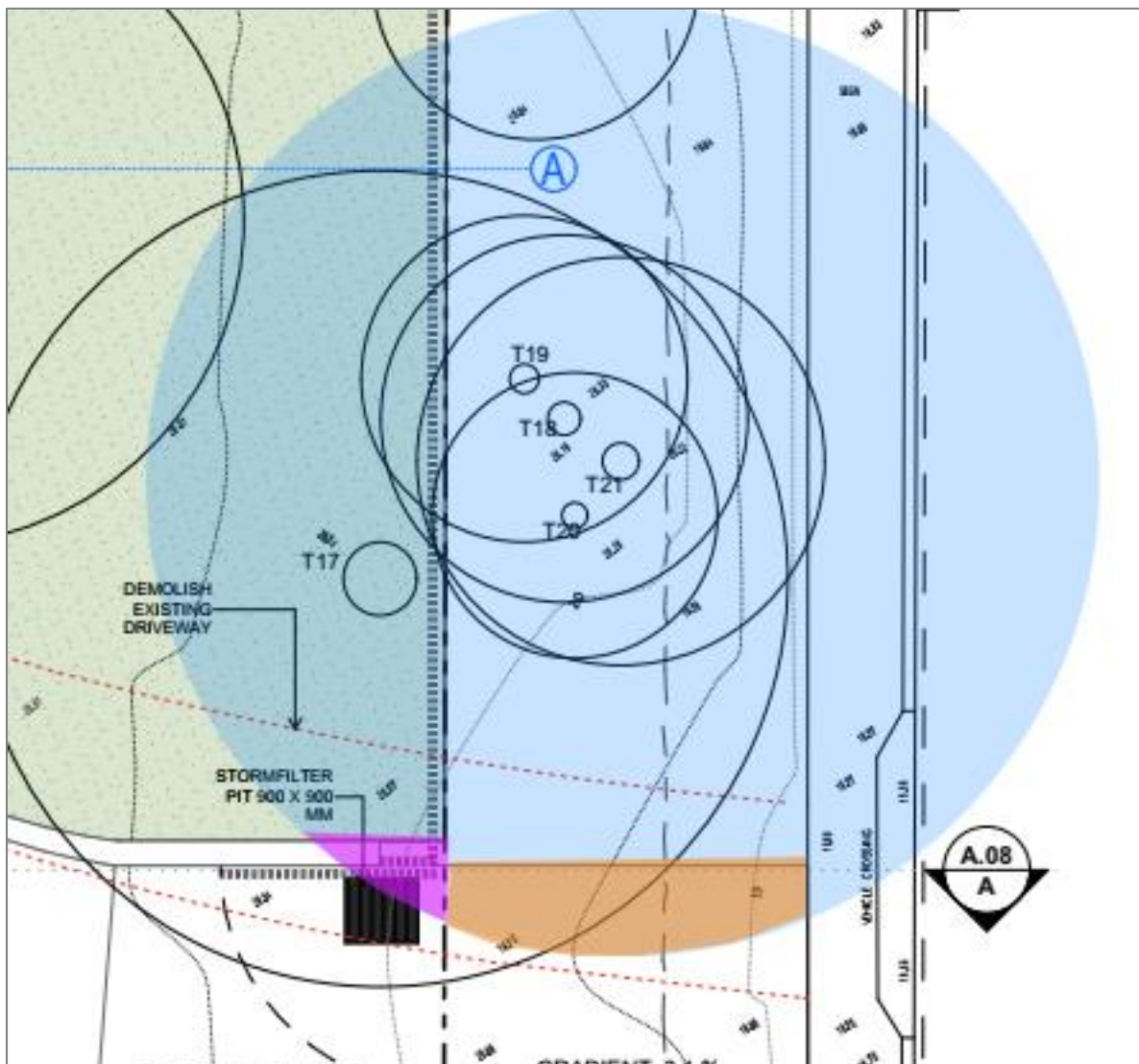


Figure 5 –Tree 21 encroachment calculation – Excerpt of Basement Plan, Project 2306, dwg no. A.04, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates permanent encroachment, orange shading indicates existing concrete encroachment. NOT TO SCALE. Marked up by C Hughes.



3.2.4 **Tree 24** Scribbly Gum – located on Council managed land.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

Pruning impacts:

- No pruning will be required to accommodate the proposal however the canopy is low over the roadway.

3.2.5 **Tree 25** Cheese Tree – located on Council managed land.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 1.9% has been estimated (see Figure 6 below/next page) for the proposed bioswale. This places it within *minor* encroachment under AS4970.
- This level of impact is not foreseen to impact tree health or condition.

Pruning impacts:

- No pruning of this tree will be required.

3.2.6 **Tree 26** Red Bloodwood – located on boundary of subject site and Council managed land.

Structural Root Zone impacts:

- The proposed bioswale is located just outside the SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 6.3% has been estimated (see Figure 6 below/next page) for the proposed bioswale. This places it within *minor* encroachment under AS4970.
- This level of impact is unlikely to negatively impact tree health/condition.

Pruning impacts:

- No pruning of this tree will be required.

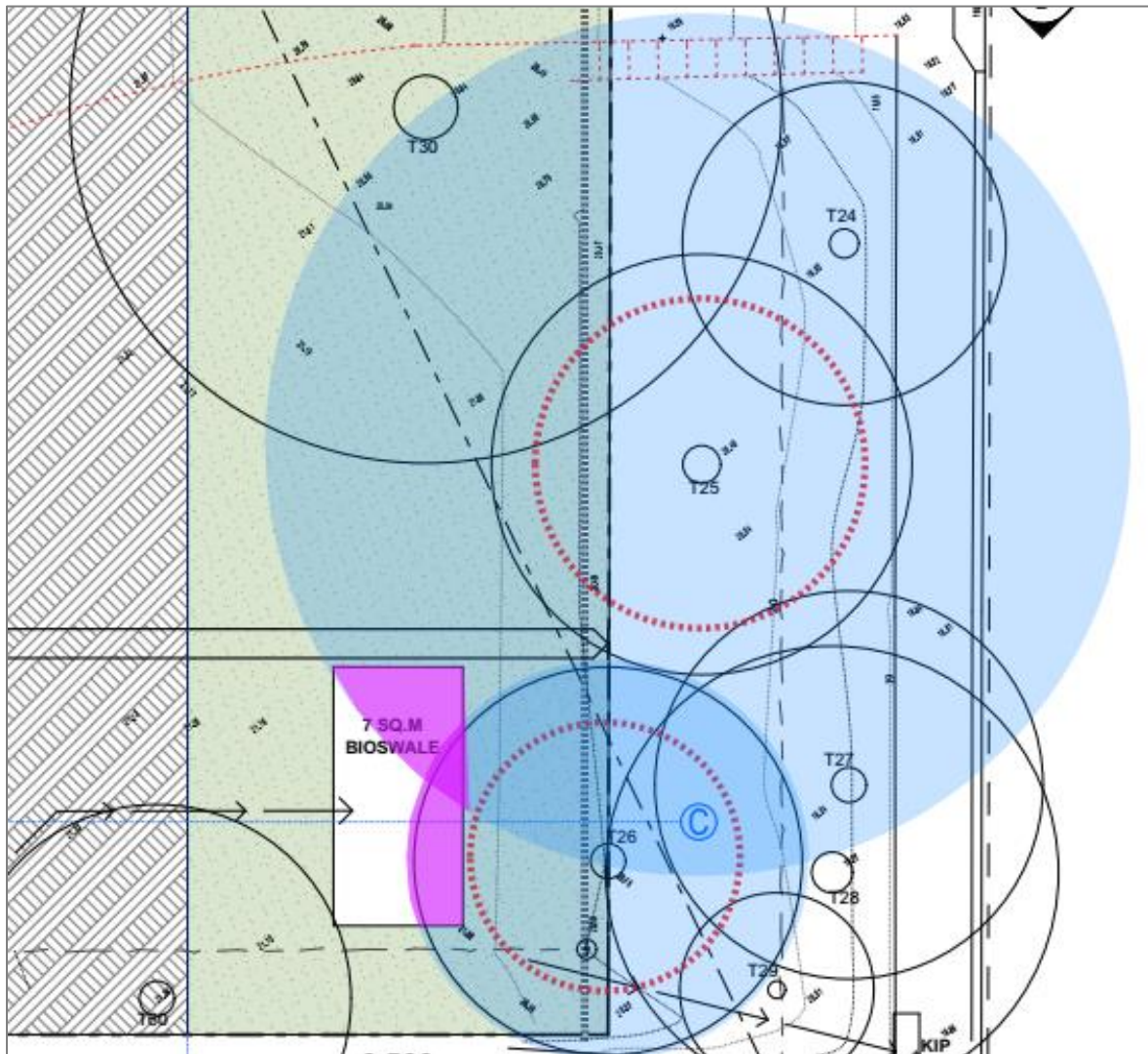


Figure 6 –Tree 25 & 26 encroachment calculation – Excerpt of Basement Plan, Project 2306, dwg no. A.04, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates encroachment. NOT TO SCALE. Marked up by C Hughes.

3.2.7 **Tree 27, 28 & 29** – located on Council managed land.

Structural Root Zone impacts:

- All works are outside the SRZ of these trees.

Tree Protection Zone impacts:

- All works are outside the TPZ of these specimens.

Pruning impacts:

- No pruning of these trees will be required to accommodate the proposal.

3.2.8 **Tree 30** Scribbly Gum – located on subject site.

Structural Root Zone impacts:

- An existing driveway is located within the SRZ of this specimen, the proposed new driveway is located outside the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- Whilst an encroachment of 28.4% (see Figure 7 next page) has been estimated for the proposed entry path and driveway (placing it within *major* encroachment under AS4970), the existing concrete driveway, cross-over and timber entry stairs have been calculated as encroaching approximately 47% of the TPZ.
- The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots* and (g) *The presence of existing or past structures or obstacles affecting root growth*.
- There is currently an incursion from the existing concrete driveway, cross-over and timber entry stairs, it is likely that the driveway has either deflected surface roots or that surface roots have already been severed in this location.
- Considering the good vigour of the specimen and the existing incursion (driveway/cross-over), it is assumed that there will be minimal root loss in this area. As such, the impact of the proposed works in this area are likely to be minimal and the long-term viability of the tree would be considered high.
- It should be noted however, that root growth is opportunistic, and the existence, extent, size, quantity, and quality of roots between the tree and the proposed cut (approximately 1.44m) for entry path/retaining wall and driveway are an unknown factor.

Pruning impacts:

- No pruning of this tree will be required as the canopy is held high over the proposed entry area.

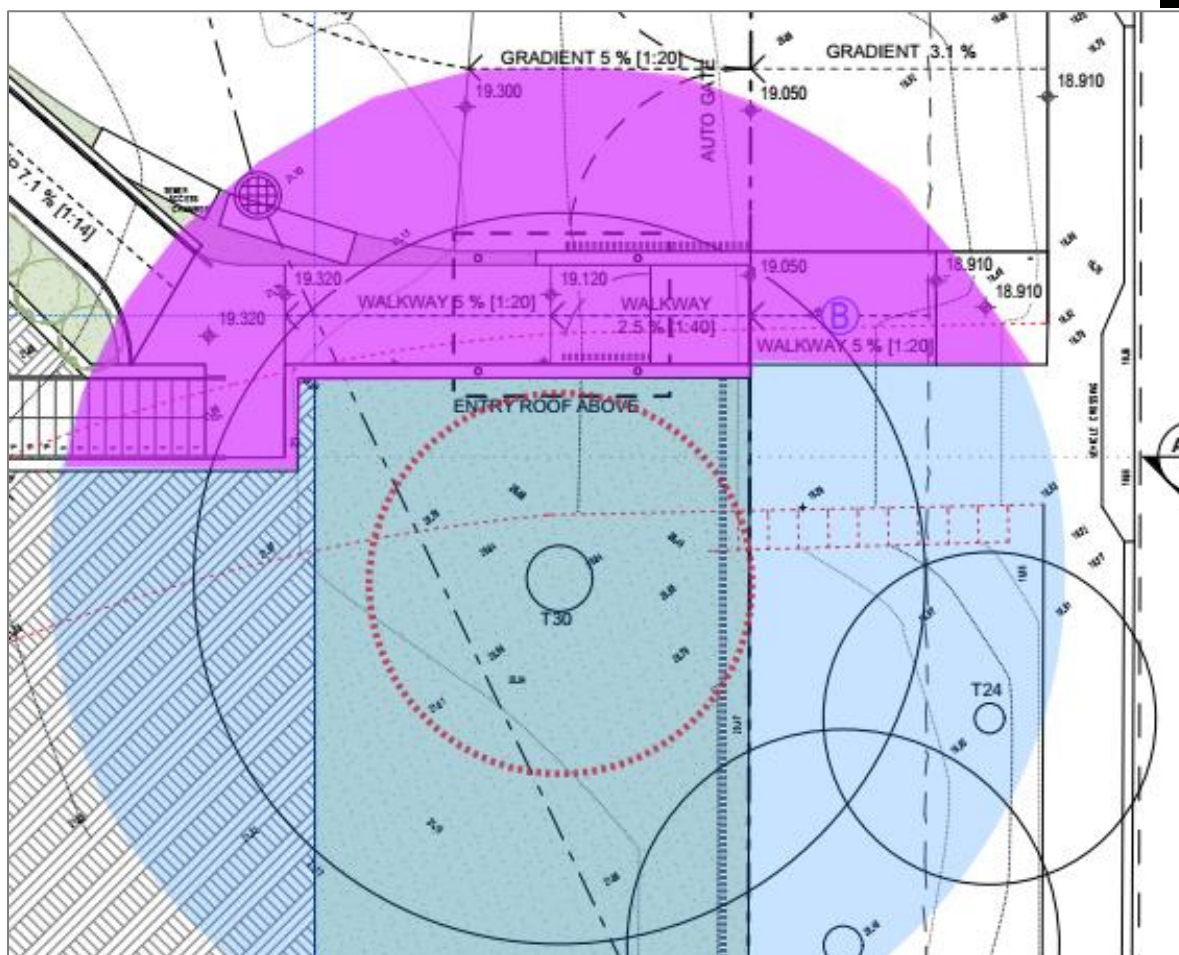


Figure 7 –Tree 30 encroachment calculation – Excerpt of Basement Plan, Project 2306, dwg no. A.04, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates encroachment. NOT TO SCALE. Marked up by C Hughes.

### 3.2.9 Tree 31-35 – located on neighbouring property.

#### Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

#### Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

#### Pruning impacts:

- No pruning will be required to accommodate the proposal.

### 3.2.10 Tree 36 & 37 Cabbage Tree Palm – located within the subject site.

#### Structural Root Zone impacts:

- Under AS4970, the formula for calculating the SRZ of a tree does not apply to palms, other monocots, cycads, and tree ferns.

Tree Protection Zone impacts:

- An encroachment of 29% for Tree 36 and 34.5% for Tree 37 has been estimated for the proposed basement and building, placing them within *major* encroachment under AS4970. This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots* and (c) *Tree species and tolerance to root disturbance*.
- Palms have dense, fibrous root systems, rarely in excess of 1m radial distance from the stem. The excavation will be approximately 1.4m from Tree 36 and 1.1m from Tree 37.
- The likelihood of root damage is minimal and impacts on tree health/condition for either specimen is considered unlikely.

Pruning impacts:

- Some minor frond clearance pruning may be required.



Figure 8 –Tree 36 & 37 encroachment calculation – Excerpt of Level 01 Plan, Project 2306, dwg no. A.06, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates encroachment. NOT TO SCALE. Marked up by C Hughes.

3.2.11 **Tree 40 & 41** – located on neighbouring property.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

Pruning impacts:

- No pruning will be required to accommodate the proposal.

3.2.12 **Tree 42** Lilly Pilly – located within the subject site.

Structural Root Zone impacts:

- A pit is located within the SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 4.4% has been estimated for a pit, given this also falls within the SRZ, this places it within *major* encroachment under AS4970. However, potentially the pit location could be flexible if woody roots were found in this area. If so, this would reduce impact on tree health or condition.

Pruning impacts:

- No pruning will be required as the building will be further away than the current dwelling.

3.2.13 **Tree 43** Lilly Pilly – located within neighbouring property.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 0.6% has been estimated for the proposed pit. *Minor* encroachment under AS4970. This level of impact is not foreseen to impact tree health or condition.

Pruning impacts:

- No pruning will be required to accommodate the proposal.

3.2.14 **Group 44A** Lilly Pilly – located within neighbouring property.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

Pruning impacts:

- No pruning will be required to accommodate the proposal.

3.2.15 **Tree 49** Spotted Gum – located on the subject site.

Structural Root Zone impacts:

- The proposed OSD piping runs just through the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 38.6% has been estimated for the proposed basement, building footprint and OSD pipe (see Figure 9 below), placing it within *major* encroachment under AS4970. This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots* and (h) *Design factors*. The OSD piping can be hand dug and root severance avoided by potentially weaving piping above or below any existing roots thus leaving roots bridging the trench. Level 1 of the built form (and floors above) are cantilevered, thus not impacting the root zone of this tree.
- Should roots be able to be retained by bridging the OSD piping trench, and given the cantilevering of Level 1, the residual encroachment only equates to 0.6%, minor encroachment under AS4970, (basement/OSD tank).

Pruning impacts:

- No pruning of this tree will be required.

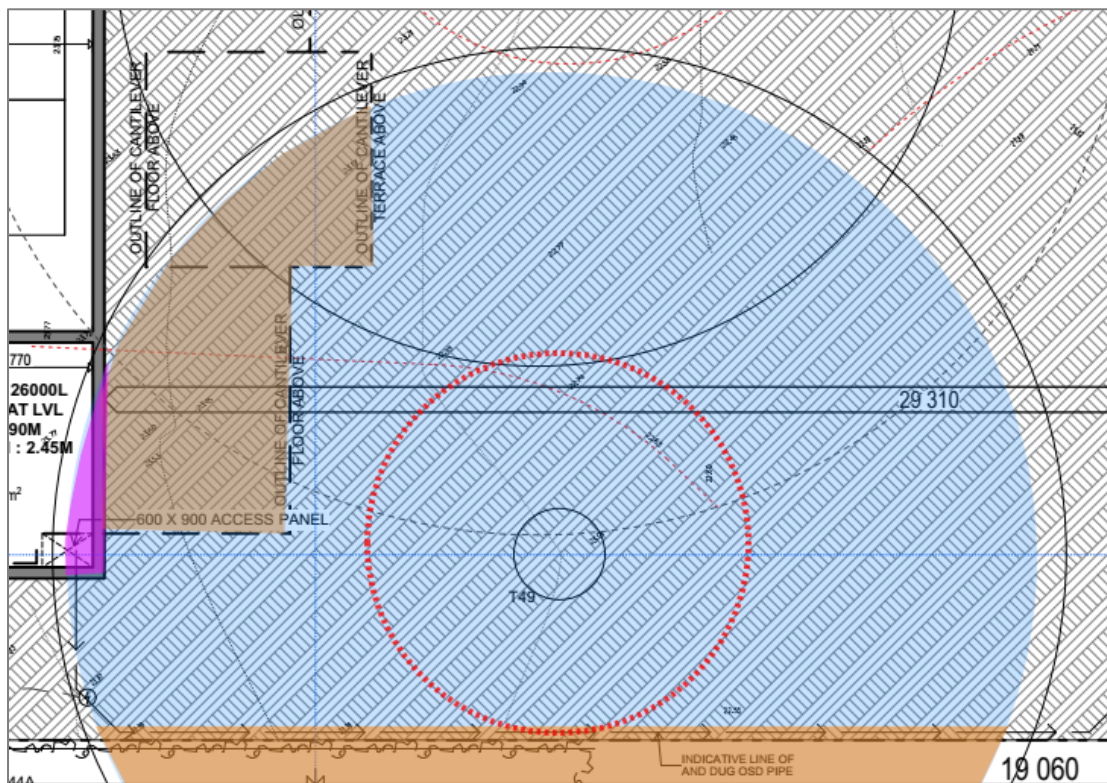


Figure 9 –Tree 49 encroachment calculation – Excerpt of Basement Plan, dwg no. A.04, 30/10/23 Gartner Trovato Architects. Red hashed circle SRZ, blue shaded circle TPZ. Pink shading indicates ‘permanent’ encroachment & orange ‘temporary’ encroachment. NOT TO SCALE. Marked up by C Hughes.

3.2.16 **Tree 50** Spotted Gum – located on the subject site.

Structural Root Zone impacts:

- All proposed works are located outside the SRZ of this tree.

Tree Protection Zone impacts:

- An encroachment of 34.9% has been estimated for the proposed basement, building footprint and entry path, placing it within *major* encroachment under AS4970 (see Figure 10 next page). This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots* and (h) *Design factors*.
- In relation to both (b) and (h), the proposed pathway is on-grade and crushed granite has been selected (see orange shading Figure 10 next page). Whilst this will cause compaction, it is only in an isolated area and root growth is unlikely to be disturbed. This pathway equates to 21.07m<sup>2</sup> of the encroachment calculation (from the total 130.9m<sup>2</sup>).
- Level 1 Floor (see orange shaded area in Figure 10 next page) has been cantilevered over the TPZ of this specimen, this equates to 45.83m<sup>2</sup> of the total encroachment calculation.
- The remaining encroachment calculation is due to the proposed basement and stairs (see pink shading in Figure 10 next page). This residual encroachment of 17.1% is still considered *major* encroachment under AS4970.
- Whilst the tree condition was considered good at time of inspection, the tree is mature but not moving into over-mature and should have ample stores to combat surrounding changes. However, root growth is opportunistic, the existence, extent, size, quantity, and quality of roots between the tree and the proposed cut for the basement are an unknown factor. Impact of tree long-term viability will be determined by the extent of root damage by the basement cut.
- Mitigation measures must be increased given the high level of encroachment within the TPZ, to ensure this tree is to remain viable. Intensive Project Arborist on-site management will be required to allow long term viability for this tree.
- Significant effort has gone into the design process to ensure retention of this tree, it is assumed this level of intensity will follow into the building process to ensure safe retention of this tree.

Pruning impacts:

- No pruning of this tree will be required for building clearances as the canopy is held high over the proposed built form.



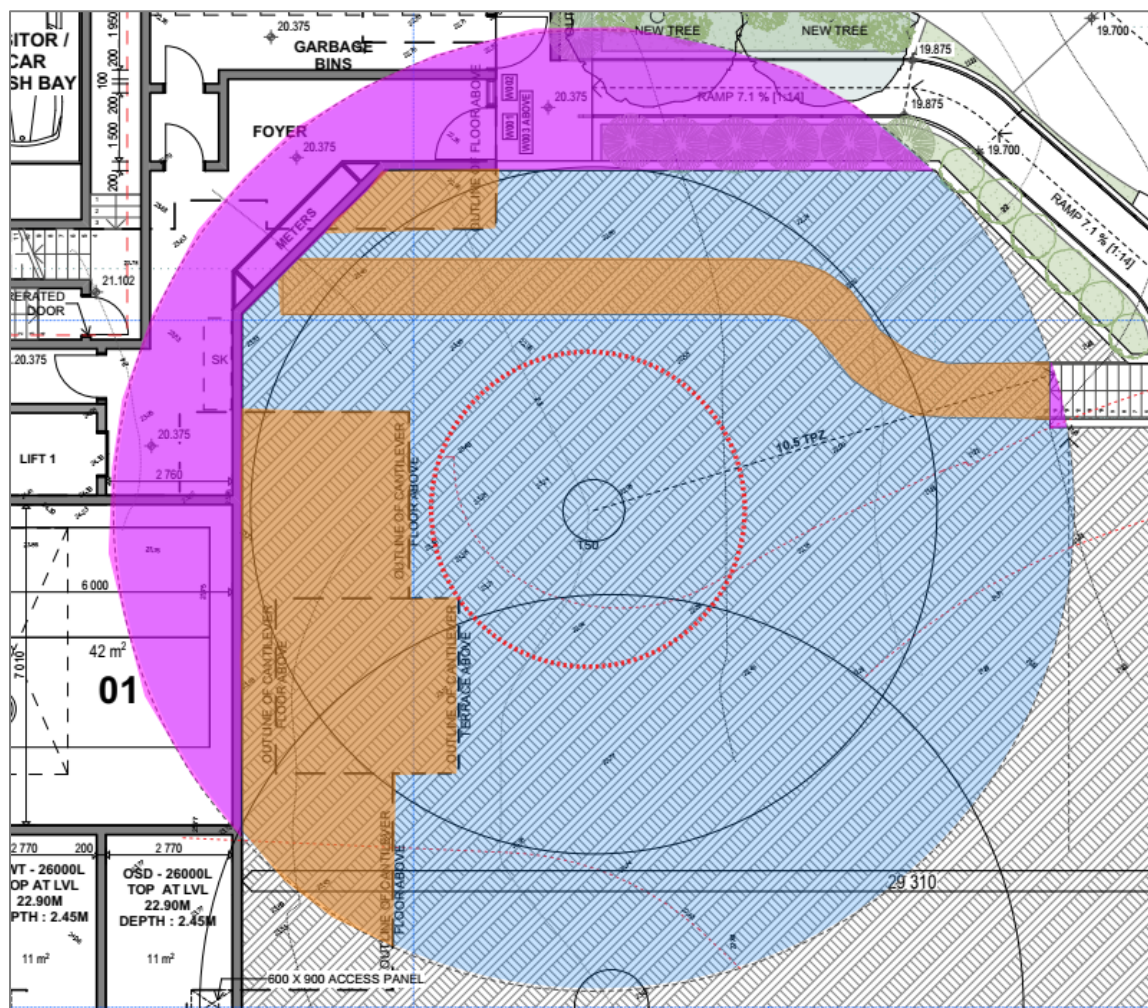


Figure 10 –Tree 50 encroachment calculation – Excerpt of Basement Plan, Project 2306, dwg no. A.04, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates ‘permanent’ encroachment, orange ‘temporary’ encroachment. NOT TO SCALE. Marked up by C Hughes.

### 3.2.17 Tree 60 Cheese Tree – located on the subject site.

#### Structural Root Zone impacts:

- All works are located outside the SRZ of this specimen.

#### Tree Protection Zone impacts:

- An encroachment of 11.7% has been estimated for the proposed Bioswale and OSD piping, placing it within *major* encroachment under AS4970. This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary consideration most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (b) *The potential loss of root mass resulting from the encroachment: number and size of roots* and (h) *Design Factors*.
- The OSD piping could be hand dug and root severance avoided, by weaving piping above or below any existing roots and leaving roots bridging the trench.

- Should roots be able to be retained and bridging the trench, the Bioswale encroachment only equates to 1.8%, minor encroachment under AS4970.

Pruning impacts:

- No pruning of this tree will be required as all works are below ground.

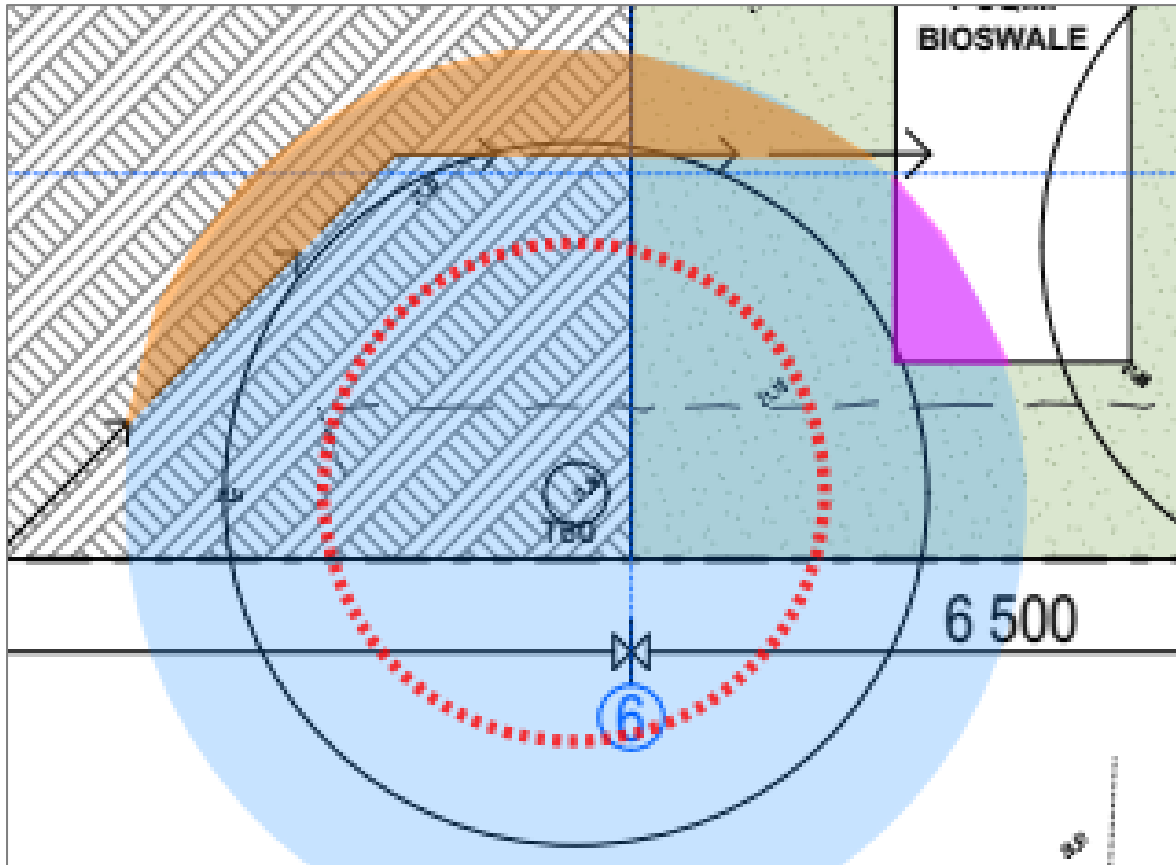


Figure 10 –Tree 60 encroachment calculation – Excerpt of Basement Plan, Project 2306, dwg no. A.04, 23/10/23 authored by Gartner Trovato Architects. Red hashed circle indicates SRZ, blue shaded circle denotes the TPZ. Pink shading indicates ‘permanent’ encroachment and orange ‘temporary’ encroachment. NOT TO SCALE. Marked up by C Hughes.

3.2.18 **Tree 61** Coral Tree – located on Council managed land.

Structural Root Zone impacts:

- All works are outside the SRZ of this specimen.

Tree Protection Zone impacts:

- All works are outside the TPZ of this tree.

Pruning impacts:

- No pruning will be required to accommodate the proposal.

## 4 Conclusions

- 4.1.1 A total of sixty three (63) trees are included in this Arboricultural Impact Assessment.
- 4.1.2 No assessed tree has been identified as endangered or threatened under State or Federal Government legislation.
- 4.1.3 Twenty-three (23) assessed trees will incur no/nil encroachment into the calculated TPZ, negative impacts to tree health and condition are unlikely – Tree 1, 2, 4, 6, 7, 11, 15, 18-20, 24, 27, 28, 29, 31-35, 40, 41, G44A, and 61.
- 4.1.4 Ten (10) assessed trees will incur ‘minor’ encroachment into the calculated TPZ, negative impacts to tree health and condition not foreseen – Tree 3, 8, 10, 14, 16, 21, 25, 26, 42 and 43.
- 4.1.5 Eight (8) assessed trees (Tree 13, 17, 30, 36, 37, 49, 50 and 60) will incur ‘major’ encroachment as the works fall over the 10% TPZ threshold. Existing site factors have been considered, design methods have been altered to be sensitive to root disturbance and tree species have been considered. As such in relation to Tree 13, 17, 30, 36, 37, 49 and 60 long term tree viability is considered high provided tree protection measures are adhered to. Tree 50 will require mitigation measures and careful Project Arborist management to ensure ongoing tree viability.

## 5 Recommendations

### 5.1 Trees Proposed for removal

- 5.1.1 Tree pruning/removal is to be undertaken in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998) and Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016. Tree pruning shall be in accordance with the Work Health and Safety Act 2011, the Work Health and Safety (WHS) Regulations 2017 and AS4373 Pruning of Amenity Trees.
- 5.1.2 Tree pruning/removal is subject to permit approval from the relevant consent authority.

### 5.2 Project Arboriculturist

- 5.2.1 A Project Arboriculturist (PA) shall be engaged prior to works commencing on the site.
- 5.2.2 A **tree specific Tree Protection Plan**, once Councils Conditions of Consent are issued, shall be established to ensure compliance with the relevant Notice of Determination and in line with Construction Plans/Drawings prior to the issue of the Construction Certificate.
- 5.2.3 The PA must have a minimum Australian Qualification Framework Level 5 (AQF5) or above in Arboriculture.
- 5.2.4 Duties of the PA shall include, but not be limited to:
- Liaising with the Project Manager/Head Contractor/Site Manager to confirm the tree protection and other specific tree protection requirements prior to site works commencing.
  - Inspection of Tree Protection Devices and supervision of works as recommended in this report or as specified in any Conditions of Consent associated with an approved development application.

- Provision of Compliance/Occupation Certification if, and when required.

### 5.3 Minimising Impacts on Trees to be Retained

- Given the high level of impacts for several trees and significant nature of site trees, a specific Tree Protection Plan, once Councils Conditions of Consent are issued, shall be established to ensure compliance with the relevant Notice of Determination.
- This Tree Protection Plan most importantly, requires referral to Construction Plans/Drawings to ensure areas of proposed hand digging, cantilevered and pier built form is captured and reiterated to Site Project Manager/Builder prior to the Construction Certificate.
- This Tree Protection Plan needs to be established prior to demolition works.
- Mitigation measures must be increased relative to the level of encroachment within the TPZ to ensure trees to be retained remain viable.

### 5.4 General Tree Protection Measures

- 5.4.1 Works within TPZs of trees to be retained shall be done under direct supervision of an AQF Level 5 Consulting Arborist and shall comply with the Tree Protection Plan.
- 5.4.2 Non-destructive excavation is to be used when working within the TPZ of trees to be retained and must be supervised by an AQF level 5 consulting arborist.
- 5.4.3 Encroachment within the TPZ must be offset with a range of mitigation measures to ensure that impacts to trees to be retained are reduced or restricted wherever possible. Mitigation must be increased relative to the level of encroachment within the TPZ to ensure trees to be retained remain viable. This can mean (but is not limited to) specific watering over warmer months, carbohydrate/mycorrhizal treatments and regular monitoring of tree condition.
- 5.4.4 Activities such as replacing or installing footpaths/driveways/retaining walls shall be done with minimal ground and root disturbance within the TPZs of trees that are proposed to be retained.
- 5.4.5 Any pruning required (including clearances for vehicle movements or other construction impacts) will need to be assessed and supervised by an AQF level 5 consulting arborist and is subject to consent authority approval. This shall be specified in the Tree Protection Plan.
- 5.4.6 If temporary access for machinery is required within the TPZ of trees to be retained, ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Ground protection may include a permeable membrane such as geotextile fabric beneath a layer of mulch (minimum 75-100mm thickness), crushed rock or rumble boards. This is to be directed within the Tree Protection Plan.
- 5.4.7 Any additional construction activities within the TPZ of trees to be retained must be assessed and written in the Tree Protection Plan. All activities require approval by the Project Arborist and must comply with AS 4970-2009 - Protection of trees on development sites.

## 5.5 General Arboricultural advice

### 5.5.1 Tree and Root Pruning

- Any pruning required is to be assessed and approved by the Council/PA, prior to undertaking any of this type of work.
- Pruning shall not be undertaken by unqualified site personnel at any time.
- Pruning of branches must be undertaken by a minimum AQF Level 3 arborist in accordance with the Australian Standard AS4373-2007 *Pruning of amenity trees*,
- Unless otherwise approved by the Conditions of Development Consent, or by separate application and approval by the consent authority, pruning is to be limited to cutting of limbs less than 80mm diameters, and no more than 10% total live material removed.

### 5.5.2 Stockpiling and location of site sheds

- The project arboriculturist must be consulted prior to placing any items within a tree's TPZ.
- Where stockpiling must be located within the TPZ offset of trees to be retained, the existing/undisturbed natural ground must be covered with thick, coarse mulch to a minimum 75-100mm thickness.
- Large, or bulky materials (non-contaminating) can be stacked on wooden pallets or boards placed over the mulch.
- Tarpaulins (or similar) placed on boards or pallets on top of mulch shall be used to prevent loose or potentially contaminating materials from moving into the soil profile within the TPZ of trees or within 10m upslope of trees.
- Where site sheds must be located within the TPZ offset of a tree/s, the shed must be fully elevated on all sides with a minimum 300mm between existing ground and the floor/floor bearers. Isolated pad footings must be carefully dug by hand and not damage or sever any roots greater than 20mm diameters.
- Any conflict between footing locations and larger roots (i.e. 20mm Ø plus) must be brought to the attention of the project arboriculturist who is to provide practical alternatives that do not include unnecessary tree root removal.

### 5.5.3 Fill Material

- Placement of fill material within the TPZ of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be in accordance with specification set out within Appendix 6.
- The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil.
- Permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material shall be placed in direct contact with the trunk.

### 5.5.4 Pavements

- Pavements should be avoided within the TPZ of trees to be retained where possible.

- Proposed paved areas within the TPZ of trees to be retained is to be placed above grade to minimise excavations within the root zone, avoiding root severance and damage.

#### 5.5.5 Fencing and walls within the SRZ and TPZ of retained trees.

- Where fencing and/or masonry walls are to be constructed along site boundaries, they must provide for the presence of any living woody tree roots greater than 50mm diameter.
- Hand digging must occur within the SRZ of trees to be retained.
- For masonry walls/fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (e.g. steel or timber pickets, lattice etc) fixed to pillars.

#### 5.5.6 Landscaping within tree root zones.

- The level of introduced planting media into any proposed landscaped areas within the TPZ is not to be greater than 75mm depth, and be of a coarse, sandy material to avoid development of soil layers that may impede water infiltration.
- Appropriate container size of proposed plants within the SRZ of trees should be determined prior to purchase of plants. Otherwise, any proposed landscaping within the SRZ must consist of tubestock only. This is required to ensure that damage to tree roots is avoided.
- Mattocks and similar digging instruments must not be used within the TPZ of the trees. Planting holes should be dug carefully by hand with a garden trowel, or similar small tool.
- Where possible, do not plant canopy trees beneath, or within 6 - 8m of overhead lines.

#### 5.5.7 Other

- No washing or rinsing of tools or other equipment, preparation of any mortars, cement mixing, or brick cutting is to occur within 8m upslope of any palms or trees to be retained.
- Regular monitoring of the trees during development works for unforeseen changes or decline will help maintain the trees in a healthy state.

## 6 References

6.1.1 Barrell, J (1995) Pre-development Tree Assessment from Trees and Building Sites, Eds. Watson & Neely, International Society of Arboriculture, Illinois.

Hadlington, P. & Johnston, J. (1988) Australian Trees: Their Care & Repair. University of NSW Press, Kensington.

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Standards Australia AS4970-2009 Protection of trees on development sites, Standards Australia, Sydney.

[geo.seed.nsw.gov.au/Public\\_Viewer/index.html?viewer=Public\\_Viewer&locale=en-AU](http://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU) - SEED Portal accessed 4/8/2023

<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap> – Biodiversity Values Mapping Portal accessed 4/8/2023.

[www.treetec.net.au/tpz\\_srz\\_dbh\\_calculator](http://www.treetec.net.au/tpz_srz_dbh_calculator) - accessed 4/8/2023.

Report prepared by Chantalle Hughes – August-October 2023.



### **Chantalle Brackenridge Hughes**

#### **Consulting arboriculturist and horticulturist**

Tree Surgery Certificate

Advanced Certificate Urban Horticulture

Diploma of Horticulture (Arboriculture) *Credit*

ISA Tree Risk Assessment Qualification (TRAQ) 2022

Accredited Member of Institute of Australian Consulting Arboriculturists (IACA)

Affiliate Member of the Local Government Tree Resources of Australia (LGTRA)

Member of the International Society of Arboriculture (ISA)

## 7 Appendices

### Appendix 1 – Terms and Definitions

#### Age classes

- Y** Young refers to an established but juvenile tree.
- SM** Semi-mature refers to a tree at growth stages between immaturity and full size.
- EM** Early-mature refers to a tree close to full sized still actively growing.
- M** Mature refers to a full sized tree with some capacity for further growth.
- LM** Late-Mature refers to a full sized tree with little capacity for growth that is not yet about to enter decline.
- OM** Over-Mature refers to a full sized tree with little capacity for growth that is entering or has entered decline.

**Co-dominant:** refers to stems or branches equal in size and relative importance.

**Condition/Structure:** refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) and the state of the scaffold (i.e. trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition/structure.

**Deadwood:** refers to any whole limb that no longer contains living tissues (e.g. live leaves and/or bark). Some dead wood is common in a number of tree species.

**Diameter at Breast Height (DBH):** Refers to the tree trunk diameter at breast height (1.4 metres above ground level).

**Epicormic growth:** adventitious branches that are considered to be a weak attachment in the short term due to minimal wood formation. There are generally formed following storm-related branch breakage or poor pruning practices. Should sufficient holding wood form in the long-term this growth is less of an issue.

**Hazard:** refers to anything with the potential to harm health, life or property.

**Health:** Refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

**Secondary Stem:** refers to stems or branches with one of unequal size and relative importance.

**SRZ:** refers to the Structural Root Zone of the tree, this is the area required for tree stability.

**TPZ:** refers to the Tree Protection Zone of the tree, this is the primary method of protecting trees, it is a combination of the root area and the canopy and the SRZ is located within it.

**Visual Tree Assessment (VTA):** a procedure of defect analysis developed by Mattheck and Breloer (1994) that uses the growth response and form of trees to detect defects.



## Appendix 2 – STARS – Significance of a Tree Assessment Rating System (IACA 2010)©

### Estimated Life Expectancy

STARS refers to an estimated life expectancy of a tree, Treeism utilises the ULE categories to clarify how this was obtained/decided.

ULE categories (after Barrell 1996, Updated 01/04/01)

The five categories and their sub-groups are as follows:

1. Long ULE - tree appeared retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance:
  - a) Structurally sound trees located in positions that can accommodate future growth
  - b) Trees which could be made suitable for long term retention by remedial care
  - c) Trees of special significance which would warrant extraordinary efforts to secure their long term retention
  
2. Medium ULE - tree appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance:
  - a) Trees which may only live from 15 to 40 years
  - b) Trees which may live for more than 40 years but would be removed for safety or nuisance reasons
  - c) 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
  - d) Trees which could be made suitable for retention in the medium term by remedial care
  
3. Short ULE - tree appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance:
  - a) Trees which may only live from 5 to 15 years
  - b) Trees which may live for more than 15 years but would be removed for safety or nuisance reasons
  - c) 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
  - d) Trees which require substantial remediation and are only suitable for retention in the short term.
  
4. Removal - trees which should be removed within the next 5 years:
  - a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions
  - b) dangerous trees through instability or recent loss of adjacent trees
  - c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form
  - d) Damaged trees that are clearly not safe to retain
  - e) Trees which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
  - f) Trees which are damaging or may cause damage to existing structures within the next 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
  
5. Small, young or regularly pruned - Trees that can be reliably moved or replaced:
  - a) small trees less than 5m in height
  - b) young trees less than 15 years old but over 5m in height
  - c) formal hedges and trees intended for regular pruning to artificially control growth

## Landscape Significance

The landscape significance of a tree is an essential criterion for establishing the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance and estimated life expectancy (*utilising Useful Life Expectancy*) of an individual tree has been defined, the retention value can be determined.

### Tree Significance - Assessment Criteria

#### 1. High Significance in landscape.

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

#### 2. Medium Significance in landscape.

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area;
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street;
- The tree provides a fair contribution to the visual character and amenity of the local area;
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

#### 3. Low Significance in landscape.

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings;
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area;
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen;
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions;

- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms;
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species:

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties;
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline:

- The tree is structurally unsound and/or unstable and is considered potentially dangerous;
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are designed for individual trees only but can be applied to a monocultural stand in its entirety e.g. hedge.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd and Andrew Morton in June 2001.


		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long <b>&gt;40 years</b>					
	2. Medium <b>15-40 Years</b>					
	3. Short <b>&lt;1-15 Years</b>					
	<b>Dead</b>					
<p><u>Legend for Matrix Assessment</u></p> 						
		<p><b>Priority for Retention (High)</b> -These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i>. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.</p>				
		<p><b>Consider for Retention (Medium)</b> -These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.</p>				
		<p><b>Consider for Removal (Low)</b> -These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.</p>				
		<p><b>Priority for Removal</b> -These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>				

Table 1 - Tree Retention Value - Priority Matrix.

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, [www.iaca.org.au](http://www.iaca.org.au)

Appendix 3 – Schedule of Assessed Trees – Site inspection 1/8/2023, 25-27 Kevin Avenue, Avalon Beach.

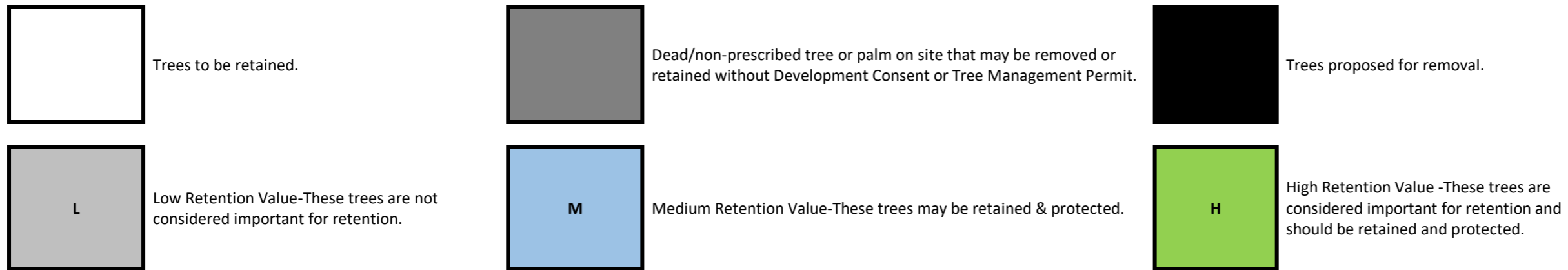
Tree No	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	AB (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)	TPZ encroachment (area %)
1	<i>Corymbia maculata</i> <b>Spotted Gum</b>	26	14	750	800	M	G	G	Located on neighbouring property, limited assessment. Locally native species. Heavily crown raised, potential hollow in old pruning site/stub.	1A	M	H	3.0	9.0	255	0
2	<i>Glochidion ferdinandi</i> <b>Cheese Tree</b>	16	10	250/ 200 (320)	300	M	G-F	F	Located on neighbouring property, limited assessment. Locally native species, Defoliated currently, suspect aphid attack ( <i>Aphis eugeniae</i> ).	2A	M	M	2.0	3.8	46	0
3	<i>Corymbia maculata</i> <b>Spotted Gum</b>	24	10	275	340	M	G-F	G-F	Located on subject site, locally native species. Cracks in lower and mid stem, oozing kino.	1A	M	H	2.1	3.3	34	9.8
4	<i>Syzygium australe</i> <b>Bush Cherry x 15</b>	6	4	100	125	M	G	G	Located on neighbouring property, limited assessment. Locally native species planted hedge of approximately 15 specimens.	5B	M	L	1.5	2.0	13	0
5	Dead tree	-	-	-	-	-	-	-	Dead tree.	4A	L	L	-	-	-	-
6	<i>Ficus macrophylla</i> <b>Moreton Bay Fig</b>	26	12	500	600	M	G	G	Located on neighbouring property, limited assessment. Native species. Very straight specimen.	1A	M	H	2.7	6.0	113	0
7	<i>Corymbia maculata</i> <b>Spotted Gum</b>	25	16	260	300	M	G	G-F	Located on neighbouring property, limited assessment. Locally native species. Lost codominant stem at 8m AGL. Located directly under Fig.	2A	M	M	2.0	3.1	31	0
8	<i>Corymbia maculata</i> <b>Spotted Gum</b>	28	20	350	400	M	G	G	Located on neighbouring property, limited assessment. Locally native species. Deadwood to 30mm in diameter. Canopy over site but held high.	1A	M	H	2.3	4.2	55	2.6
9	<i>Corymbia gummifera</i> <b>Red Bloodwood</b>	14	10	220	280	M	G	G-F	Located on subject site. Locally native species. Suppressed under neighbours tree, canopy all to east. High percentage of twiggy deadwood noted.	1A	M	H	1.9	2.6	22	100
10	<i>Eucalyptus umbra</i> <b>Broad-leaved White Mahogany</b>	32	24	800	900	M	G	G	Located on neighbouring property, limited assessment. Locally native species. Excellent specimen, codominant at 6m AGL. Canopy overhangs site.	1A	M	H	3.2	9.6	290	4.5
11	<i>Pittosporum undulatum</i> <b>Sweet Pittosporum</b>	8	7	140	180	M	G-F	G-F	Located on subject site. Locally native species.	2A	M	M	1.6	2.0	13	0
12	<i>Glochidion ferdinandi</i> <b>Cheese Tree</b>	18	18	390/ 380 (545)	600	M	G	F	Located on subject site, locally native species. Lost north-east facing stem few years ago from deep inclusion. Evidence of termite damage and decay into base of stem. AB estimated as hard against fence.	2D	M	L	2.7	6.5	134	N/A
13	<i>Syagrus romanzoffiana</i> <b>Cocos Palm x3</b>	16	6	250	-	M	G	G	Located on neighbouring property, limited assessment. Introduced exotic species. Group of three palms.	2B	L	L	N/A	4.0	49	#24.3
14	<i>Eucalyptus punctata</i> <b>Grey Gum</b>	24	7	210	300	EM	G	G	Located on neighbouring property, limited assessment. Think it is a locally native species but unsure of identification.	1A	M	H	2.0	3.0	28	3.3
15	<i>Cupaniopsis anacardioides</i> <b>Tuckaroo</b>	8	5	180	200	EM	G	G	Located on neighbouring property, limited assessment. Locally native species. Not on Survey	2A	M	M	1.7	2.2	15	0

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	AB (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)	TPZ encroachment (area %)
16	<i>Angophora costata</i> Smooth-barked Apple Myrtle	24	16	470	550	M	G	G	Located on subject site, locally native species. Canopy orientated to north-west. Decay pockets with kino exudation noted.	1A	M	H	2.6	5.6	100	3.8
17	<i>Angophora costata</i> Smooth-barked Apple Myrtle	28	20	570	670	M	G	G	Located on subject site, locally native species. Canopy held high, orientated to north, north-west. Deadwood to 50mm.	1A	M	H	2.8	6.8	147	#20.1
18	<i>Syncarpia glomulifera</i> Turpentine	18	9	340	380	M	G	F	Located on Council managed land, locally native species. Lopped under lines. Shares root crown with Tree 19. Heavily impacted by Turpentine Gall Wasp at time of assessment.	1B	H	H	2.2	4.1	52	0
19	<i>Syncarpia glomulifera</i> Turpentine	18	8	280	320	M	G	F	Located on Council managed land, locally native species. Lopped under lines, heavily impacted by Turpentine Gall Wasp at time of assessment. Shares root crown with Tree 18.	1B	H	H	2.1	3.4	36	0
20	<i>Syncarpia glomulifera</i> Turpentine	8	7	180/ 270/ (324)	200/ 300 (361)	M	G	F	Located on Council managed land, locally native species. Lopped under lines, heavily impacted by Turpentine Gall Wasp at time of assessment. Shares root crown with Tree 21.	1B	H	H	2.2	3.9	48	0
21	<i>Syncarpia glomulifera</i> Turpentine	14	10	480	520	M	G	F	Located on Council managed land, locally native species. Lopped under lines, most of canopy over roadway. Heavily impacted by Turpentine Gall Wasp at time of assessment. Shares root crown with Tree 20.	1B	H	H	2.5	5.8	104	#5.2
22	<i>Corymbia maculata</i> Spotted Gum	18	16	300	370	M	G	G-F	Located on subject site. Sooty mould affected at time of assessment. Deadwood to 60mm in diameter, high percentage of epicormic growth noted.	1A	M	H	2.2	3.6	41	100
23	<i>Liquidambar styraciflua</i> Liquidamber	14	10	400	500	M	G	G	Located on subject site. Introduced, exotic species. Exempt species under P21.	2A	M	M	2.5	4.8	72	-
24	<i>Eucalyptus haemastoma</i> Scribbly Gum	12	10	230	340	M	G	G-F	Located on Council managed land, locally native species. Leans to north.	1B	H	H	2.1	2.8	24	0
25	<i>Glochidion ferdinandi</i> Cheese Tree	14	13	500/ 240 (555)	560	M	G	G-F	Located on Council managed land, locally native species. Lopped around power lines (bundled now).	1B	H	H	2.6	6.7	139	1.9
26	<i>Corymbia gummifera</i> Red Bloodwood	18	12	260	340	M	G-F	F	Located on boundary of subject site and Council managed land, locally native species. Lopped limbs over private property. Mainly epicormic growth and high percentage of deadwood noted.	1B	M	M	2.1	3.1	31	6.3
27	<i>Glochidion ferdinandi</i> Cheese Tree	7	12	120/ 160 (200)	280	M	G-F	G-F	Located on Council managed land, locally native species. High percentage of twiggy deadwood.	1B	M	M	1.9	2.4	18	0
28	<i>Glochidion ferdinandi</i> Cheese Tree	8	14	200/ 220 (297)	320	M	G	G-F	Located on Council managed land, locally native species. Lopped under powerlines.	2A	M	M	2.1	3.6	40	0
29	<i>Callistemon viminalis</i> Weeping Bottlebrush	5	6	60	100	M	G	G	Located on Council managed land, introduced native species. Not on survey.	2A	M	M	1.5	2.0	13	0

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	AB (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)	TPZ encroachment (area %)
30	<i>Eucalyptus haemastoma</i> <b>Scribbly Gum</b>	28	22	635	750	M	G	G	Located on subject site. Locally native species. Canopy orientated to north. Deadwood to 60mm in diameter.	1A	H	H	2.9	7.6	182	#28.4
31	<i>Angophora costata</i> <b>Smooth-barked Apple Myrtle</b>	28	20	300	340	M	G	G	Located on neighbouring property, very limited assessment, particularly as obscured by thick, 12m high Bamboo. Locally native species.	1A	M	H	2.1	3.6	41	0
32	<i>Corymbia gummifera</i> <b>Red Bloodwood</b>	20	-	180	200	M	G-F?	G-F?	Located on neighbouring property, very limited assessment, particularly as obscured by thick, 12m high Bamboo. Locally native species.	1A	M	H	1.7	2.2	15	0
33	<i>Corymbia gummifera</i> <b>Red Bloodwood</b>	14	-	280	300	M	G-F?	G-F?	Located on neighbouring property, very limited assessment, particularly as obscured by thick, 12m high Bamboo. Locally native species.	1A	M	H	2	3.4	36	0
34	<i>Pittosporum undulatum</i> <b>Sweet Pittosporum</b>	14	-	180/ 180 (267)	280	M	G-F?	G-F?	Located on neighbouring property, very limited assessment, particularly as obscured by thick, 12m high Bamboo. Locally native species.	1A	M	H	1.9	3.2	32	0
35	<i>Pittosporum undulatum</i> <b>Sweet Pittosporum</b>	14	-	100	140	M	G-F?	G-F?	Located on neighbouring property, very limited assessment, particularly as obscured by thick, 12m high Bamboo. Locally native species.	1A	M	H	1.5	2.0	13	0
36	<i>Livistona australis</i> <b>Cabbage Fan Palm</b>	9	6	490	N/A	M	G	G	Located on subject site, locally native species.	1A	M	H	N/A	4.0	49	29
37	<i>Livistona australis</i> <b>Cabbage Fan Palm</b>	12	6	440	N/A	M	G	G	Located on subject site, locally native species.	1A	M	H	N/A	4.0	49	34.5
38	<i>Jacaranda mimosifolia</i> <b>Jacaranda</b>	18	24	300/ 360 (469)	460	M	G	G	Located on subject site, introduced exotic species. Exempt species under P21.	2A	L	L	-	-	-	-
39	<i>Trachycarpus fortunei</i> <b>Chinese Windmill Palm</b>	7	4	140	N/A	M	G	G	Introduced exotic species. Exempt species under P21.	2A	L	L	N/A	3.0	28	-
40	<i>Ulmus parvifolia</i> <b>Chinese Elm</b>	14	14	300/ 300 (424)	500	M	G	G	Located on neighbouring property, very limited assessment as obscured by Bamboo. Introduced exotic species. Could not see lower part of stem.	2A	M	M	2.5	5.1	81	0
41	<i>Grevillea robusta</i> <b>Silky Oak</b>	30	18	550	650	M	G?	G?	Located on neighbouring property, very limited assessment as obscured by Bamboo. Introduced native species. Could not see lower part of stem.	2A	M	M	2.8	6.6	137	0
42	<i>Acmena smithii</i> <b>Lilly Pilly</b>	16	6	150	250	M	G	G	Located within the subject site. Locally native species, technically would be exempt from P21 as within 1.3m of existing dwelling but site Biomapped.	2A	M	M	1.8	2.0	13	0
43	<i>Acmena smithii</i> <b>Lilly Pilly</b>	14	14	100/ 160 (189)	250	M	G	G	Located on neighbouring property, limited assessment. Locally native species.	2A	M	M	1.8	2.3	16	0
44	<i>Archontophoenix cunninghamiana</i> <b>Bangalow Palm</b>	-	-	-	-	-	-	-	Located on subject site, introduced native species. Exempt species under P21.	2B	M	M	-	-	-	-
G44A	<i>Waterhousia floribunda</i> <b>Weeping Lilly Pilly – group/hedge</b>	4	2	100	125	Y	G	G	Located on neighbouring property, limited assessment. Introduced native species.	5B	M	L	1.5	2.0	13	-

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DBH (mm)	AB (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	TPZ (m)	TPZ (area)	TPZ encroachment (area %)
45	<i>Archontophoenix cunninghamiana</i> Bangalow Palm	-	-	-	-	-	-	-	Located on subject site, introduced native species. Exempt species under P21.	2B	M	M	-	-	-	-
46	<i>Archontophoenix cunninghamiana</i> Bangalow Palm	-	-	-	-	-	-	-	Located on subject site, introduced native species. Exempt species under P21.	2B	M	M	-	-	-	-
47	<i>Archontophoenix cunninghamiana</i> Bangalow Palm	-	-	-	-	-	-	-	Located on subject site, introduced native species. Exempt species under P21.	2B	M	M	-	-	-	-
48	<i>Archontophoenix cunninghamiana</i> Bangalow Palm	-	-	-	-	-	-	-	Located on subject site, introduced native species. Exempt species under P21.	2B	M	M	-	-	-	-
48A	<i>Phoenix roebelenii</i> Dwarf Date Palm	-	-	-	-	-	-	-	Located on subject site, introduced exotic species. Exempt species under P21.	2B	M	M	-	-	-	-
49	<i>Corymbia maculata</i> Spotted Gum	28	20	720	860	M	G	G	Located on subject site, locally native species. Minor deadwood to 40mm in diameter noted.	1A	H	H	3.1	8.6	235	#37.7
50	<i>Corymbia maculata</i> Spotted Gum	34	30	910	1090	M	G	G	Located on subject site, locally native species. Minor deadwood to 100mm in diameter noted.	1A	H	H	3.4	10.9	375	#34.9
51	<i>Angophora costata</i> Smooth-barked Apple Myrtle	12	8	280	310	M	G	G-F	Located on subject site, locally native species. Canopy all to north, poor form.	1A	M	M	2.0	3.4	36	47 ECE
52	<i>Corymbia gummifera</i> Red Bloodwood	16	10	260	320	M	G-F	G-F	Located on subject site, locally native species. Canopy all to north, suppressed. Shared root crown with Tree 53	1A	M	M	2.1	3.1	31	1.4 ECE
53	<i>Corymbia gummifera</i> Red Bloodwood	12	10	200	250	M	G-F	G-F	Located on subject site, locally native species. Shared root crown with Tree 52, wound at base of stem to north.	1A	M	M	1.8	2.4	18	5.4 ECE
54	<i>Syncarpia glomulifera</i> Turpentine	16	20	470/ 180 (503)	620	M	G	G	Located on subject site, locally native species. Group will share their root crowns.	1A	M	H	2.7	6.0	115	100
55	<i>Syncarpia glomulifera</i> Turpentine	14	10	340	400	M	G	G	Located on subject site, locally native species. Group (Tree 54-59) will share their root crowns.	1A	M	H	2.3	4.1	52	100
56	<i>Syncarpia glomulifera</i> Turpentine	20	10	350	400	M	G	G	Located on subject site, locally native species. Group will share their root crowns.	1A	M	H	2.3	4.2	55	100
57	<i>Syncarpia glomulifera</i> Turpentine	13	6	190	225	M	G	G	Located on subject site, locally native species. Group will share their root crowns.	1A	M	H	1.8	2.3	16	100
58	<i>Syncarpia glomulifera</i> Turpentine	18	12	350	440	M	G	G	Located on subject site, locally native species. Group will share their root crowns.	1A	M	H	2.3	4.2	55	100
59	<i>Syncarpia glomulifera</i> Turpentine	15	9	320	420	M	G	G	Located on subject site, locally native species. Group will share their root crowns, canopy orientated to the east.	1A	M	H	2.3	3.8	46	100
60	<i>Glochidion ferdinandi</i> Cheese Tree	14	12	240/ 210/ (319)	390	M	F	F	Located on subject site, locally native species Very thin canopy, codominant stem at 0.3m AGL.	2A	M	M	2.2	3.8	46	#11.7
61	<i>Erythrina</i> sp. Coral Tree	12	8	200	225	M	F	F	Located on Council managed land, introduced weed species.	2B	L	L	1.8	2.4	18	0

**KEY**



\* DBH is visually estimated (usually adjoining trees or those that are hard to access). AB – above *buttress roots*. AGL - above ground level. ECE – Excessive canopy encroachment into proposed built form (could not be pruned to AS4373).

# See further explanation in Section 3.2 providing justification on how tree retention is feasible given this level of encroachment.

Figures in brackets indicates the determined DBH and TPZ for a multi-stemmed tree based on the formula shown in Appendix A of AS4970-2009.

**NOTE:** According to AS4970, the TPZ of palms, other monocots, cycads, and tree ferns should not be less than 1m outside the crown projection. The AS4970 formula for calculating the SRZ of a tree does not apply to palms, other monocots, cycads, and tree ferns.

**H** refers to the approximate height of a tree in metres, from base of stem to top of tree crown.

**Sp** refers to the approximate and average spread in metres of branches/canopy (the 'crown') of a tree.

**DBH** refers to the approximate diameter of tree stem at breast height i.e. 1.4 metres above ground (unless otherwise noted) and expressed in millimetres. Figures in brackets indicate the minimum TPZ allowable as per Section 3.2 Determining the TPZ with AS4970-2009.

**Age** refer to Appendix 1 -Terms and Definitions for more detail.

**V** refers to the tree's vigour (health) Refer to Appendix 1 -Terms and Definitions for more detail.

**C** refers to the tree's structural condition. Refer to Appendix 1 -Terms and Definitions for more detail.

**ULE** refers to the estimated *Useful Life Expectancy* of a tree. Refer to Appendix 2 for details.

**TSR** The *Tree Significance Rating* considers the importance of the tree because of its prominence in the landscape and its amenity value, from the point of view of public benefit. Refer to Appendix 2 – Significance of a Tree Assessment Rating for more detail.

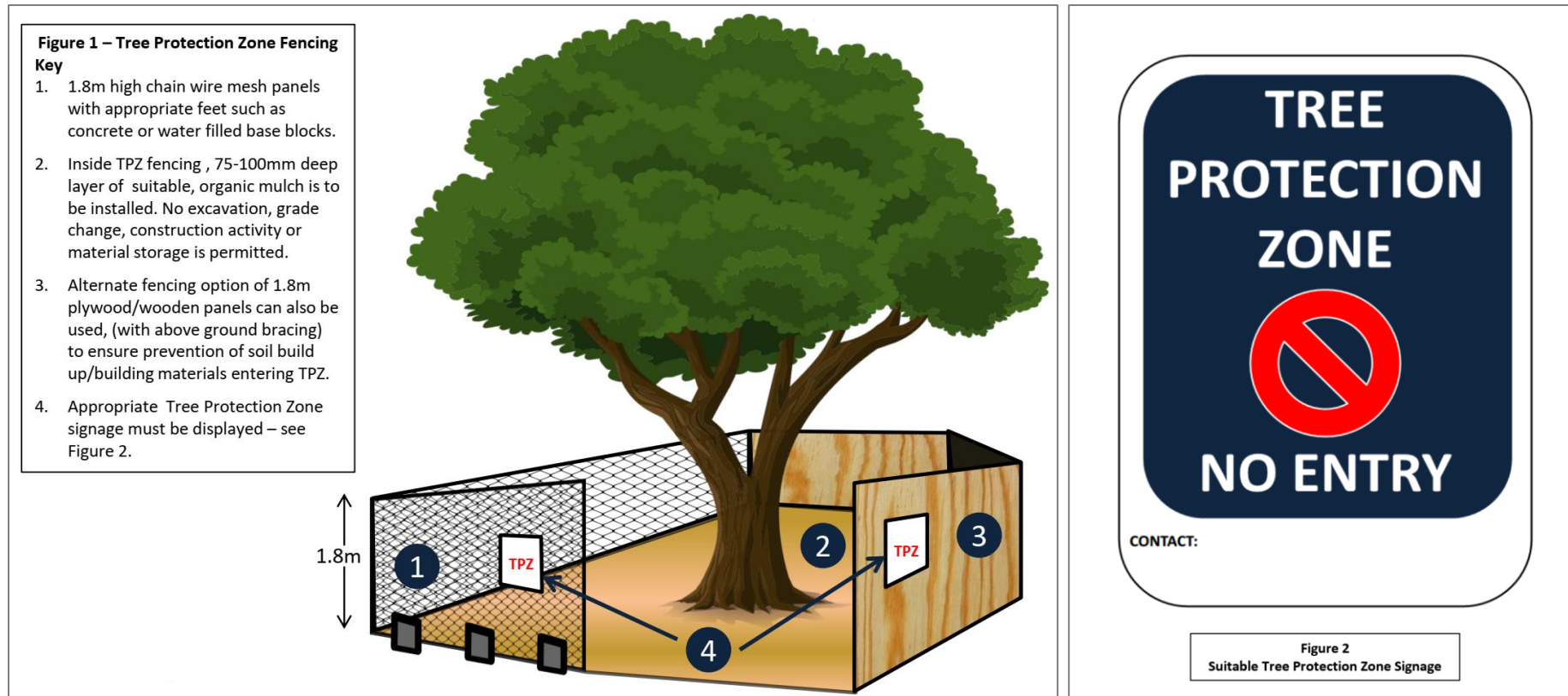
**RV** Refers to the retention value of a tree, based on the tree's ULE *and* Tree Significance. Refer to Appendix 2 – Significance of a Tree Assessment Rating for more detail.

**SRZ** Structural Root Zone (SRZ) refers to the critical area required to maintain stability of the tree. Refer to Appendix 1 -Terms and Definitions for more detail. This is not calculated/does not apply for palms, cycads, tree ferns or monocot species.

**TPZ** Tree Protection Zone (TPZ) refers to the *tree protection zones* for trees to be retained. Refer to Appendix 1 -Terms and Definitions for more detail. For palms, cycads, tree ferns or monocot species it is calculated to be no less than 1m outside the crown projection.



## Appendix 4 - Tree Protection Devices



Figures 1 & 2 – Tree Protection Fencing and appropriate signage.

**Figure 3 - Stem, Branch & Ground protection measures**

**Key**

1. Padding (such as geotextile membrane, natural hessian, rubber, or carpet to protect bark).
2. Battens/boards for branch/stem protection, strapped together NOT nailed into bark/tree. Minimum 2m in height on stem where feasible.
3. Ground protection base 75-100mm of fit for purpose mulch.
4. If machinery is required to move within the TPZ then steel rumble boards (4a) or wide, timber sheeting/boards thrashed together (4b) is to be placed over mulch layer (preferably with geotextile base layer), this to spread the weight and minimise soil compaction

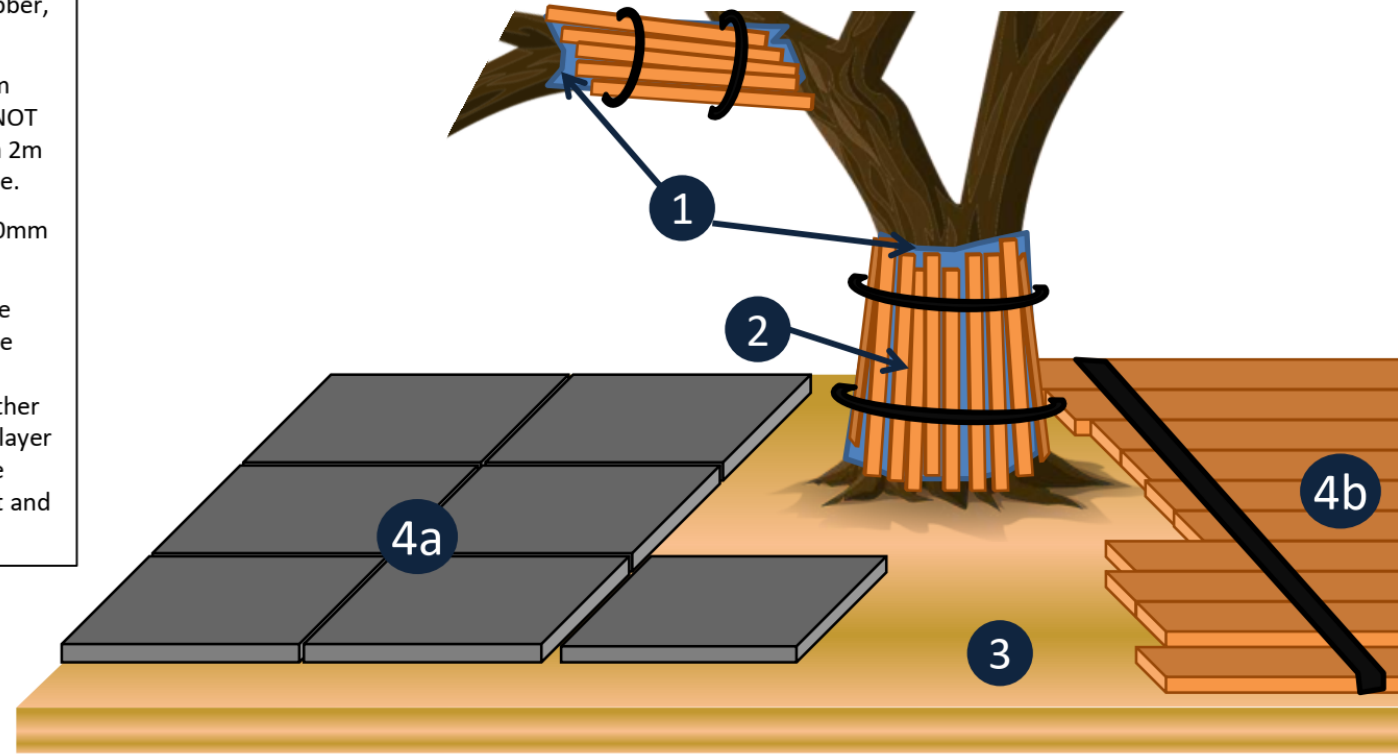


Figure 3 – Stem and ground protection measures.

Appendix 5 – Photographs



Plate 1 – Tree 10 noted with arrow – Tree is located within neighbouring property. Branches overhang the site and will require pruning prior to works commencing. Tree 9 and 12 are proposed for removal.



Plate 2 – Tree 16-21 – Arrow notes trees on Council managed land Tree 18-21, Tree 16 and 17 on subject site labelled. All trees are proposed for retention.



Plate 3 – Tree 30 – Arrow notes existing driveway and timber stairs/garden. This tree is proposed for retention.



Plate 4 – Tree 51 – This tree will require removal, canopy over proposed build and encroachment into TPZ excessive.



Plate 5 – Tree 50 – Arrow (and INSET) note Tree 50. Extraordinary effort has gone into the site design and is required during build to protect and retain this tree.

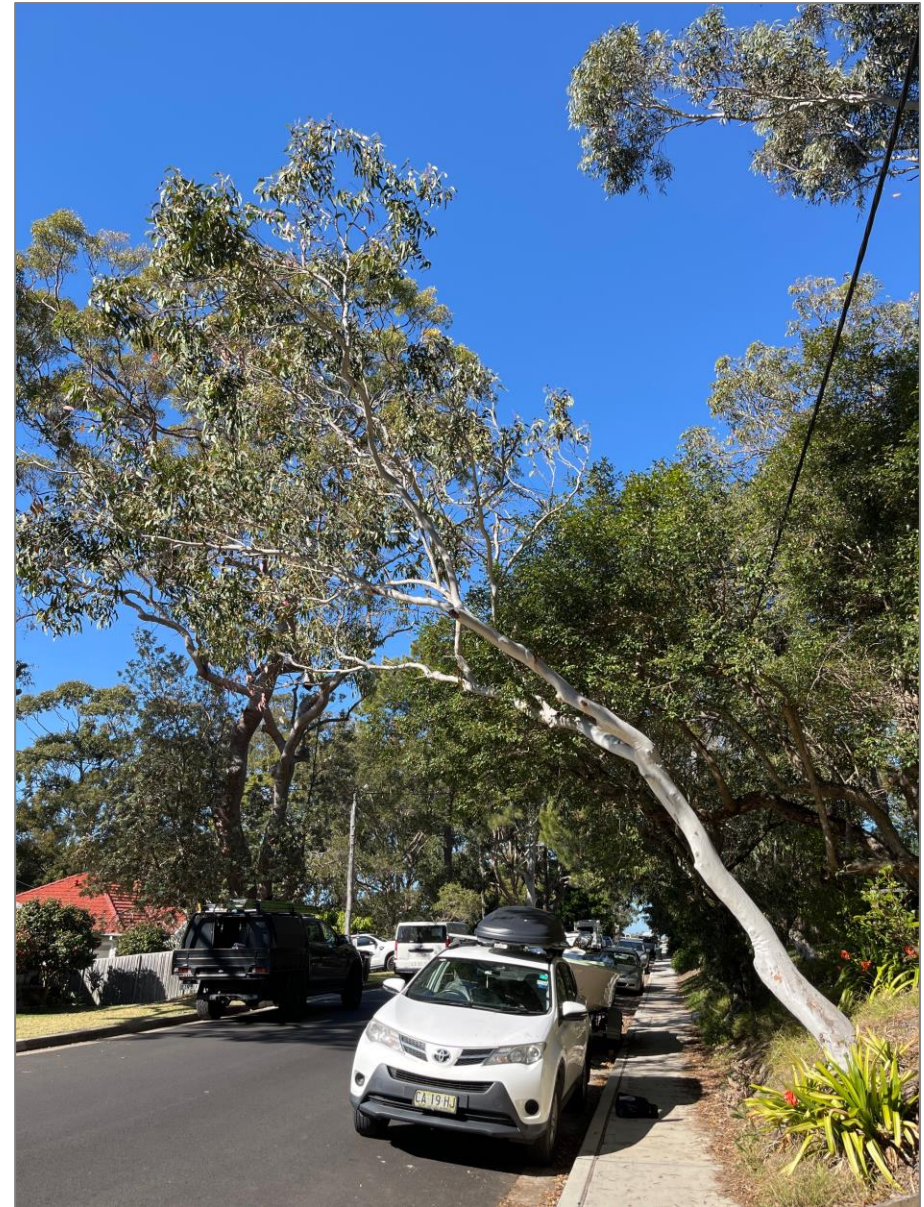
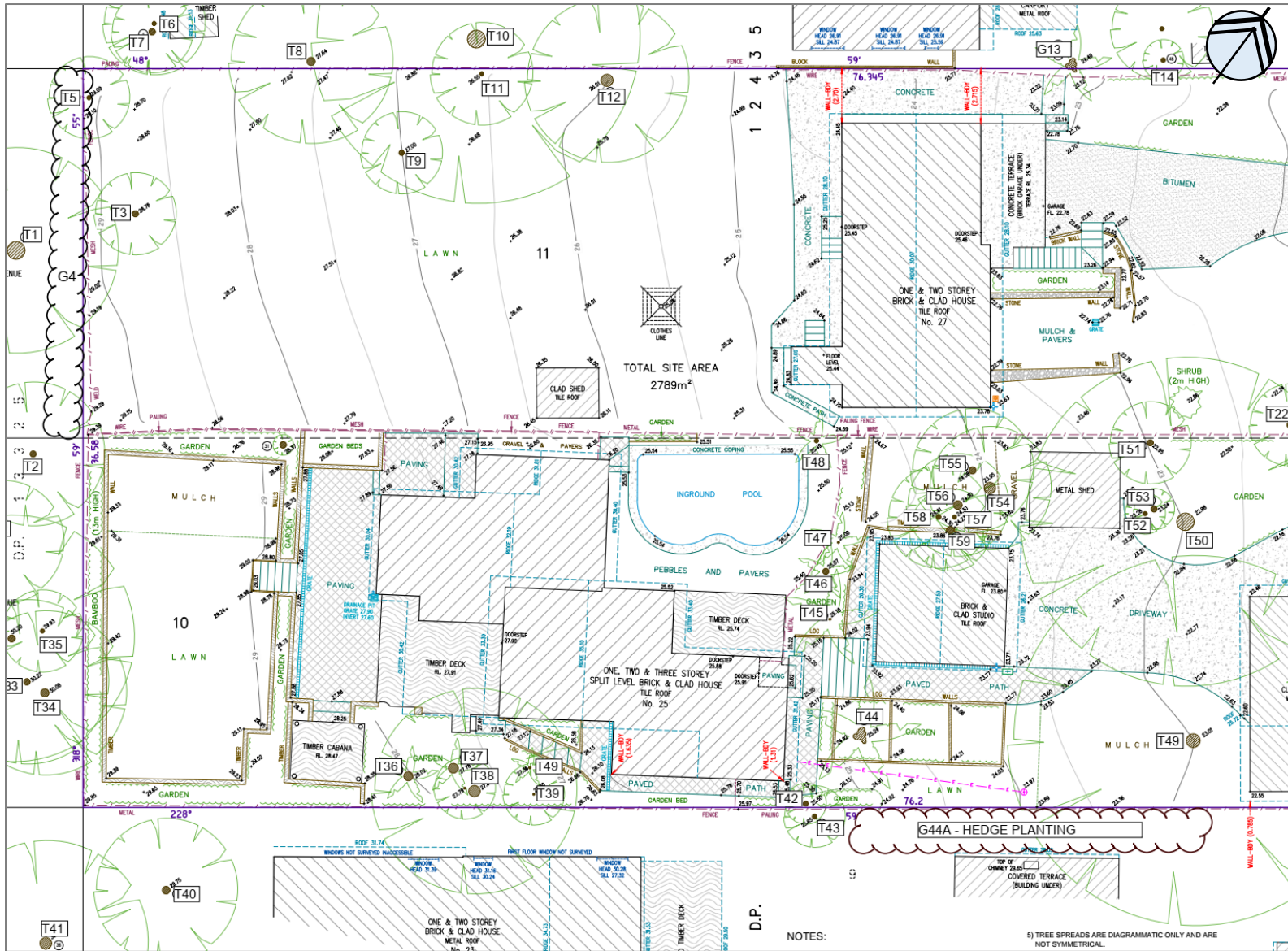


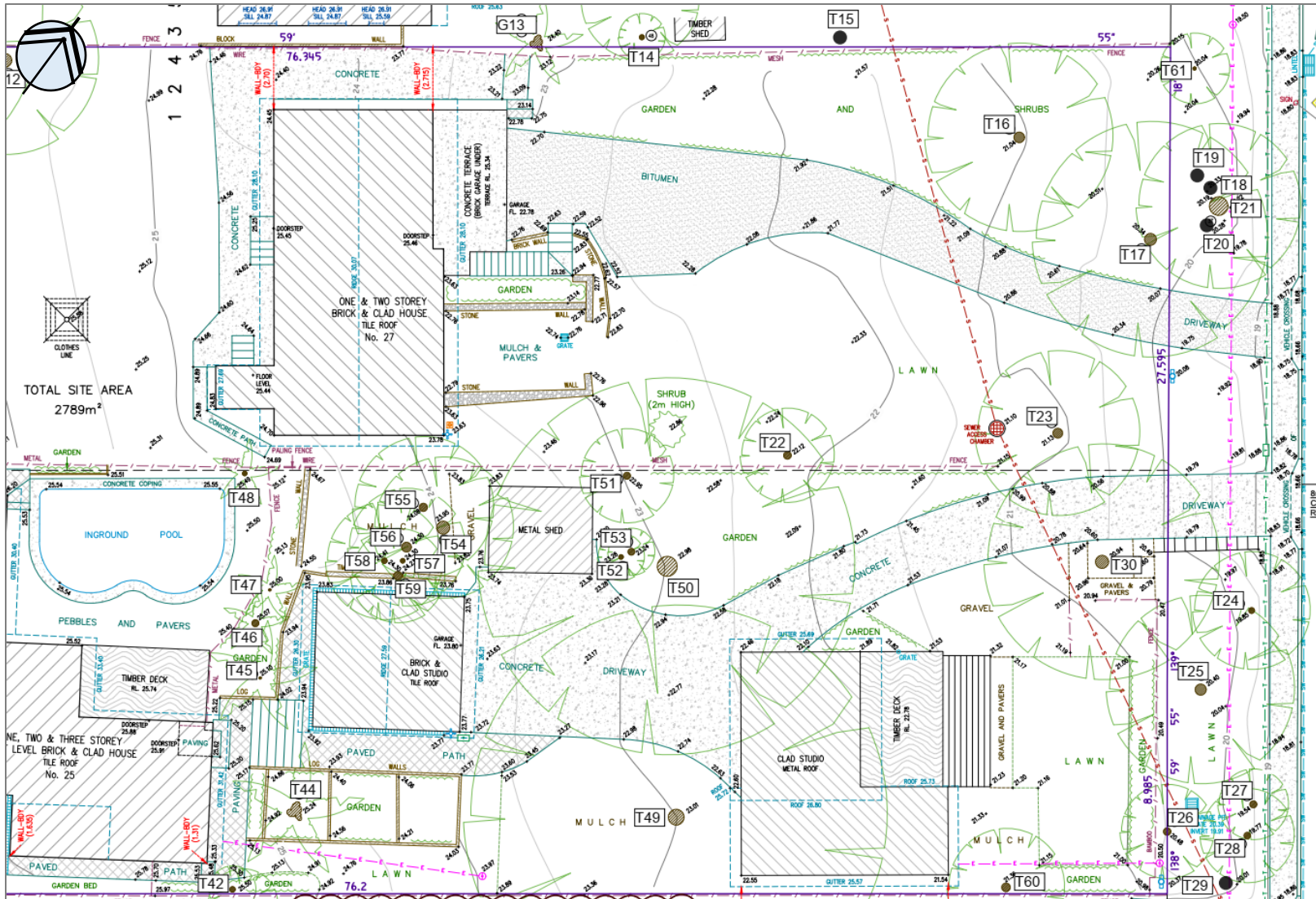
Plate 6 – Tree 24 – Tree located on Council managed land. Leans over roadway and may impact truck movement.

Appendix 6 – Tree Location Plan

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**Figure 4** –Excerpt of Survey Plan, Reference no. 21372B, dated 14 August 2023, authored by Bee & Lethbridge Pty Ltd. Marked up by C Hughes Part 1/2 (NOT TO SCALE).



**Figure 5**—Excerpt of Survey Plan, Reference no. 21372B, dated 14 August 2023, authored by Bee & Lethbridge Pty Ltd. Marked up by C Hughes Part 2/2 (NOT TO SCALE).