Arboricultural Impact Assessment

TREEISM
Arboricultural Services

Prepared For
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SITE ADDRESS
82 AVALON PARADE
AVALON BEACH NSW 2107

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Contents

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 Haley Rich of Element Environment on behalf of the owners of the subject site. The Site is known as 82 Avalon Parade, Avalon Beach, New South Wales. Removal of the existing entry path, amendments to sections of pathway into site, landscape wall, seating, signage, and construction of three (3) masonry walls and porphyry paving at the main entrance is proposed.

1.1.2 The purpose of this report is to identify the species of the subject trees, assess vigour, condition, landscape prominence and ascribe a Retention Value.

1.1.3 This report identifies the potential impacts the proposal will have on the retention or long-term viability of the subject trees 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 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 'Holocene silty to peaty quartz sand. Medium to fine marine sand with podzols'.

1.2.3 Details of vegetation as per Espade states - 'Extensively cleared, sclerophyll scrub and woodland. Remaining native tree species include *Melaleuca quinquenervia, Banksia integrifolia, Casuarina glauca* and *Eucalyptus robusta*. Remaining scrub and understorey species include *Leptospermum laevigatum, Eleocharis* spp., and *Gahnia sieberiana'*.

1.3 Methodology

1.3.1 In preparation for this report, ground level, visual tree assessment[1] or limited VTA (e.g. where access was limited), of the subject trees was completed by Chantalle Hughes of Treeism Arboricultural Services on 2nd May 2024. Inspection details of these trees are provided in Appendix 3 — Schedule of Assessed Trees.

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 spread was stepped out with field observations written down, and photographs of the site and tree were taken using an iPhone 13.

1.3.3 The Structural Root Zone (SRZ) and the Tree Protection Zone (TPZ) 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) was calculated utilising STARS – Significance of a Tree Assessment Rating System (IACA 2010) ©.

[1]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.

1.4 Plans and Documents Referenced

1.4.1 Landscape Plans, Project no. 2201, Drawing reference no. LC-01, Issue B, dated 16 February 2023 authored by Stone Rose Landscapes.

1.4.2 Landscape Architect Concept Plan, Drawing no. LC-02, Revision C, dated 8 July 2024, authored by Context Landscape Architecture.

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 Survey Plan, Drawing reference no. 19125_1A, dated 6 May 2024, authored by Sydney Surveyors.

1.4.1 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 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.

1.5.2 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.

1.5.3 No aerial inspections, root mapping or woody tissue testing were undertaken as part of this tree assessment.

1.5.4 Information contained in this report only reflects the condition of the tree at the time of inspection. Trees are dynamic, living things which can be subject to change without notice in certain circumstances.

1.5.5 This AIA is not intended as an assessment of any impacts on the tree by any proposed future development of the site.

2 Observations and Discussion

2.1 Threatened Species/Biodiversity Status

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).

2.1.2 The site is not identified on the Department of Planning and Environments Biodiversity Values Map (BV).

2.2 Assessed Trees

2.2.1 Six (6) trees were assessed or identified and included in this report. Details of the trees are included in the Schedule of Assessed Trees—Appendix 3.

2.2.2 **Tree location and relevance under the P21 DCP** — Of the six (6) assessed trees the following is noted:

- One (1) tree (non-prescribed species) is located on neighbouring property adjoining the subject site—Tree 4.
- Five (5) trees are located wholly within the subject site—Tree 1-3 and 5-6.
- One (1) subject site tree is a exempt/non-prescribed species under P21DCP—Tree 6.

2.2.3 **Species origin** — Of the six (6) assessed trees the following is noted:

- One (1) tree is an introduced, exotic species—Tree 1.
- Two (2) trees are introduced native species—Tree 4 and 6.
- Three (3) trees are locally native species—Tree 2, 3 and 5.

2.2.4 The six (6) assessed 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 and RV, where L = Low, M = Medium, H = High, **R = Proposed removal**

Tree No.	*Genus & species* **Common Name**	RV	Tree No.	*Genus & species* **Common Name**	RV
1	*Syagrus romanzoffiana* **Cocos Palm**	**L**	**4**	*Archontophoenix cunninghamiana* **Bangalow Palm**	**M**
2	*Eucalyptus robusta* **Swamp Mahogany**	**H**	**5**	*Eucalyptus robusta* **Swamp Mahogany**	**H**
3	*Angophora/Corymbia* sp.?	**M**	**6**	*Heptapleurum (formerly Schefflera) actinophylla* **Umbrella Tree**	**L**

3 Impact of the Proposed Development

3.1 Prescribed Tree Proposed for Removal

3.1.1 One (1) non- prescribed tree (Tree 1) is proposed for removal to accommodate the works.

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, 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.

(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.

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 (Common name)	Tree located on site	SRZ affected	TPZ area (m^2)	TPZ encroachment (approx. m^2)	TPZ encroachment (approx. %)
2	Swamp Mahogany	✓	✓	304	76.5	25
3	R'bd Apple/Bloodwood	✓	✓	28	2.7	10
4	Bangalow Palm	**x**	**N/A**	51	11.3	22
5	Swamp Mahogany	✓	✓	180	64.6	36
6	Umbrella	✓	✓	36	2	6

3.2.4 NOTE: See Appendix 7 - Encroachment Calculation Overview, for visual reference to tree encroachments.

3.2.5 **Tree 2 Swamp Mahogany** – located on subject site.

Structural Root Zone impacts:

- The proposed porphyry paving within the roadway falls within the calculated SRZ of this specimen. See further discussion below.

Tree Protection Zone impacts:

- An encroachment of 25% has been estimated for the proposed lifting of existing bitumen and placing porphyry paving within the roadway. This level of encroachment (and within the SRZ) places it within *major* encroachment under AS4970 (see Appendix 7). This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary considerations most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (g) *The presence of existing or past structures or obstacles affecting root growth* and (h) *Design factors.*
- In relation to (g), the proposed paving is a 'remove and replace', however in relation to (h) the method in which works are carried out will directly correlate to the level of impacts on this tree. The provided Landscape Plans note levels similar than existing for finished works, this means ground preparation has the potential to impact any roots in the area.
- Whilst no raising or cracking of the bitumen was noted within the roadway, consideration to potential root damage and appropriate management under direct Project Arborist supervision will be required to ensure protection and retention of this tree. Additionally, care will be required during mass planting to not impact existing woody roots.

Pruning impacts:

- No pruning will be required to accommodate the proposed works.

3.2.6 **Tree 3 Rough-barked Apple/Bloodwood** – located on subject site.

Structural Root Zone impacts:

- The proposed porphyry paving within the roadway falls within the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 10% has been estimated for the proposed porphyry paving within the roadway. This level of encroachment (and within the SRZ) places it within *major* encroachment under AS4970 (see Appendix 7). This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary considerations most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (g) *The presence of existing or past structures or obstacles affecting root growth* and (h) *Design factors.*
- As previously discussed, in relation to (g), the proposed paving is a 'remove and replace', however in relation to (h) the method in which works are carried out will directly correlate to the level of impacts on this tree. The provided Landscape Plans note levels similar than existing for finished works, this means ground preparation has the potential to impact any roots in the area.

- Consideration to potential root damage and appropriate management under direct Project Arborist supervision will be required to ensure protection and retention of this tree. Again, care will be required during mass planting to not impact existing woody roots.

Pruning impacts:

- No pruning will be required to accommodate the proposed works.

3.2.7 **Tree 4 Bangalow** – located on neighbouring property.

Structural Root Zone impacts:

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

Tree Protection Zone impacts:

- According to AS4970, the TPZ of palms (and other monocots, cycads, and tree ferns) should not be less than 1m outside the crown projection. Given the 3m radial TPZ, an encroachment of 22% has been estimated in relation to the proposed lifting of existing pebblecrete/concrete path and replacement with 1200mm wide paved pathway.
- This is, in my experience, a 4-metre radial TPZ distance is an excessive TPZ calculation for a palm species, given the dense, compact fibrous root ball.
- However, 22% places it within *major* encroachment under AS4970 and 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*.
- In relation to both (b) and (c), given the proposed works are in excess of 1.5m from the base of the stem, likelihood of impacts on tree health and condition are considered minimal.

Pruning impacts:

- No pruning on this palm will be required to accommodate the proposed works.

3.2.8 **Tree 5 Swamp Mahogany** – located on subject site.

Structural Root Zone impacts:

- The proposed lifting of existing pebblecrete/concrete path and replacement with 1200mm wide paved pathway falls within the SRZ of this specimen.

Tree Protection Zone impacts:

- An encroachment of 36% has been estimated for the proposed lifting of the existing pebblecrete/concrete path and replacement with 1200mm wide paved pathway. This level of encroachment (and within the SRZ) places it within *major* encroachment under AS4970 (see Appendix 7). This triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary considerations most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (g) *The presence of existing or past structures or obstacles affecting root growth* and (h) *Design factors.*

- In relation to (g), the proposed paving is a 'remove and replace', however in relation to (h) the method in which works are carried out will directly correlate to the level of impacts on this tree. The provided Landscape Plans note levels similar than existing for finished works, this means ground preparation has the potential to impact any roots in the area.
- Whilst it is understood that the purpose of the path upgrade in this location is to correct the uneven path surface and make it safe for users, this will be hard to obtain without impacts on existing tree roots.
- Given the multiple mature trees along this walkway (outside the scope of this report), consideration to replacement of the path above the existing grade and/or use of products such as Tripstop™ will ensure less ongoing maintenance and tree long-term viability.
- Consideration to potential root damage during path demolition and construction with appropriate management under direct Project Arborist supervision will be required to ensure protection and retention of this tree. Additionally, care will be required during mass planting to not impact existing woody roots.

Pruning impacts:

- No pruning will be required to accommodate the proposed works.

3.2.9 **Tree 6 Umbrella** – located on subject site (non-prescribed species).

Structural Root Zone impacts:

- The proposed lifting of existing pebblecrete/concrete path and replacement with 1200mm wide paved pathway falls just within the calculated SRZ of this non-prescribed specimen.

Tree Protection Zone impacts:

- An encroachment of 6% has been estimated for the proposed removal of the pebblecrete/concrete path and replacement with 1200mm wide paved pathway. However, encroachment within the SRZ places it within *major* encroachment under AS4970 and triggers Clause 3.3.4 - TPZ encroachment considerations under AS4970 - 2009.
- The primary considerations most relevant for this tree under Clause 3.3.4 of AS4970-2009 is (c) *Tree species and tolerance to root disturbance* and (g) *The presence of existing or past structures or obstacles affecting root growth*.
- In relation to (c), this species is highly tolerant to root disturbance and (g) a path is already in this location. Care will be required during mass planting to not impact existing woody roots.
- Impacts to tree health/condition are considered unlikely for this specimen provided recommendations within this report are followed.

Pruning impacts:

- No pruning will be required to accommodate the proposed works.

4 Conclusions

4.1.1 A total of six (6) 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. The site is not identified on the Department of Planning and Environments Biodiversity Values Map (BV).

4.1.3 One (1) non-prescribed tree under the Pittwater 21 Development Control Plan (P21DCP) and will be removed to facilitate the proposal – Tree 1.

4.1.4 Five (5) assessed trees (Tree 2-6) will incur 'major' encroachment as the works fall within the SRZ or over the 10% TPZ threshold. The provided Landscape Plans also discuss 'making good' sections of path currently lifted by tree roots along the length of the path (outside the scope of this report). Treeism has concerns on how this will be achieved without damaging roots in this area. Consideration to replacement of the path above the existing grade and/or use of products such as Tripstop™ will ensure less ongoing maintenance and tree long-term viability for existing mature trees.

4.1.5 Should the provided the recommendations of this report are followed, long term tree protection and retention would be considered viable.

5 Recommendations

5.1 Project Arboriculturist

5.1.1 A Project Arboriculturist (PA) shall be engaged prior to works commencing on the site.

5.1.2 A 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.

5.1.3 The PA must have a minimum Australian Qualification Framework Level 5 (AQF5) or above in Arboriculture.

5.1.4 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.

5.2 Minimising Impacts on Trees to be Retained

5.2.1 Tree 2 & 3 – Swamp Mahogany & Rough-barked Apple/Bloodwood

- Stem protection as per Appendix 4, Figure 3 shall be installed prior to works commencing.
- Any excavation/fill/compaction within the calculated TPZ for removal of existing road and seating porphyry pavers is to be carried out under direct Project Arborist supervision. No root pruning is permittable within the SRZ. Within the TPZ (aside the radial SRZ calculation) any roots less than 40mm in diametre shall be cut by the PA only, using a sharp and clean fit for purpose tool (saw/axe). Roots in excess of 40mm diametre needing severance

require PA consideration and likely Council liaison/design alteration prior to works continuing.

- See 5.3 for further tree protection measures.

5.2.2 Tree 4 – Bangalow Palm

- Existing boundary fencing is considered adequate protection. Under no circumstances is storage of materials/equipment to occur within the calculated TPZ of this tree outside existing pathways.
- See 5.3 for further tree protection measures.

5.2.3 Tree 5 – Swamp Mahogany

- Stem protection as per Appendix 4, Figure 3 shall be installed prior to works commencing.
- Any excavation/fill/compaction within the calculated TPZ for removal of existing pathway and seating/construction pavers/path is to be carried out under direct Project Arborist supervision. No root pruning is permittable within the SRZ. Within the TPZ (aside the radial SRZ calculation) any roots less than 40mm in diametre shall be cut by the PA only, using a sharp and clean fit for purpose tool (saw/axe). Roots in excess of 40mm diametre needing severance require PA consideration and likely Council liaison/design alteration prior to works continuing.
- See 5.3 for further tree protection measures.

5.2.4 Tree 6 – Umbrella

- Stem protection as per Appendix 4, Figure 3 shall be installed prior to works commencing.
- Any excavation/fill/compaction within the calculated TPZ for removal of existing pathway and construction of path is to be carried out under direct Project Arborist supervision. No root pruning is permittable within the SRZ. Within the TPZ (aside the radial SRZ calculation) any roots less than 40mm in diametre shall be cut by the PA only, using a sharp and clean fit for purpose tool (saw/axe). Roots in excess of 40mm diametre needing severance require PA consideration and likely Council liaison/design alteration prior to works continuing.
- See 5.3 for further tree protection measures.

5.3 General Arboricultural advice

5.3.1 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.

5.3.2 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 300m 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.

5.3.3 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.

5.3.4 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.

5.3.5 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.

5.3.6 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.

5.3.7 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

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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.

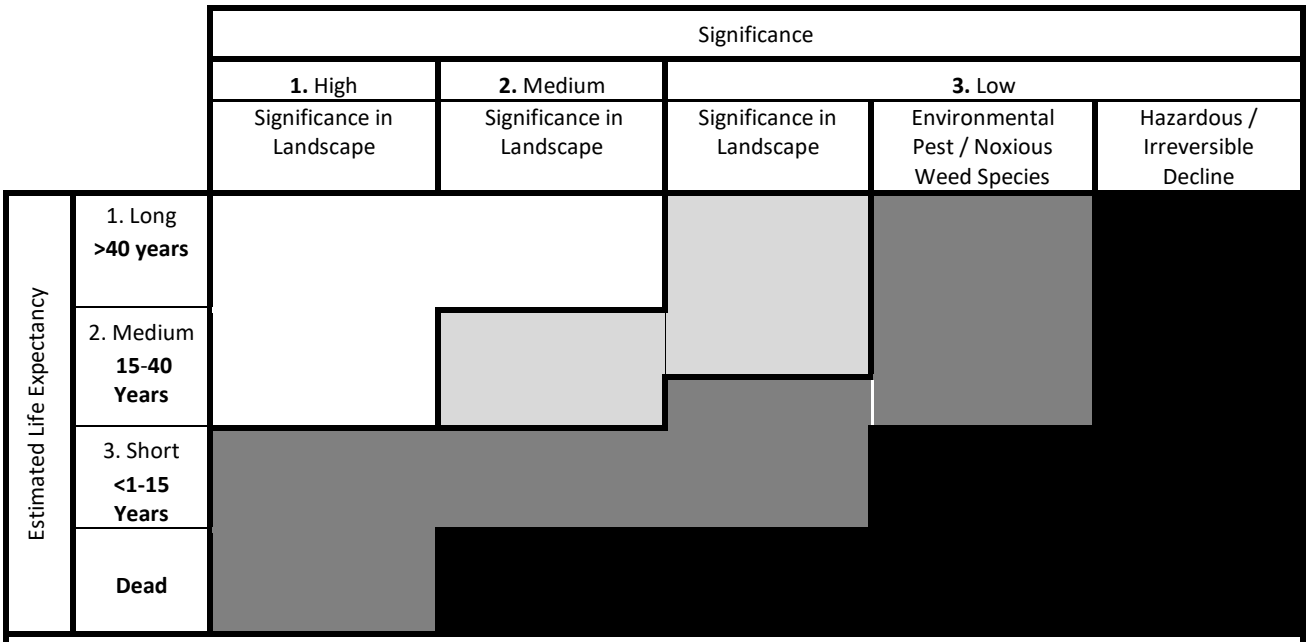
Hazardous/Irreversible Decline:

- 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.



Legend for Matrix Assessment

	Priority for Retention (High) -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 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) -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.
	Consider for Removal (Low) -These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal -These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

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

Appendix 3 – Schedule of Assessed Trees – Site inspection 2/5/2024, 82 Avalon Parade, 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	*Syagrus romanzoffiana* **Cocos Palm**	7	6	-	-	-	-	-	Located on the subject site. Introduced exotic species. Exempt under P21DCP and proposed for removal.	2A	L	**L**	-	-	-	100
2	*Eucalyptus robusta* **Swamp Mahogany**	19	14	820	925	M	G	G	Located on the subject site. Locally native species.	1A	H	**H**	3.2	9.8	304	25
3	*Angophora/Corymbia* sp.? (not comprehensively assessed at time of inspection)	6	6	*250	*350	M	G	F	Located on the subject site. Locally native species. Lopped/poorly pruned under power lines. Not fully assessed at time of inspection. TPZ protected within Tree 2 TPZ.	2A	M	**M**	2.1	3.0	28	10
4	*Archontophoenix cunninghamiana* **Bangalow Palm**	8	6	*325	N/A	M	G	G	Located on neighbouring property. Introduced native species.	2A	M	**M**	N/A	4.0	51	22
5	*Eucalyptus robusta* **Swamp Mahogany**	20	14	630	730	M	G	G	Located on the subject site. Locally native species.	1A	H	**H**	2.9	7.6	180	36
6	*Heptapleurum (formerly Schefflera) actinophylla* **Umbrella Tree**	7	7	280	340	M	G	G	Located on the subject site. Introduced exotic species. Exempt under P21DCP but proposed for retention.	2A	L	**L**	2.1	3.4	36	6

KEY

Trees to be retained.

Dead/non-prescribed tree or palm on site that may be removed or retained without Development Consent or Tree Management Permit.

Trees proposed for removal.

L Low Retention Value-These trees are not considered important for retention.

M Medium Retention Value-These trees may be retained & protected.

H High Retention Value -These trees are considered important for retention and should be retained and protected.

* DBH is visually estimated (usually adjoining trees or those that are hard to access). AB – above *buttress roots*. AGL - above ground level.

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

Figure 1 – Tree Protection Zone Fencing
Key

1. 1.8m high chain wire mesh panels with appropriate feet such as concrete or water filled base blocks.
2. Inside TPZ fencing , 75-100mm deep layer of suitable, organic mulch is to be installed. No excavation, grade change, construction activity or material storage is permitted.
3. Alternate fencing option of 1.8m plywood/wooden panels can also be used, (with above ground bracing) to ensure prevention of soil build up/building materials entering TPZ.
4. Appropriate Tree Protection Zone signage must be displayed – see Figure 2.

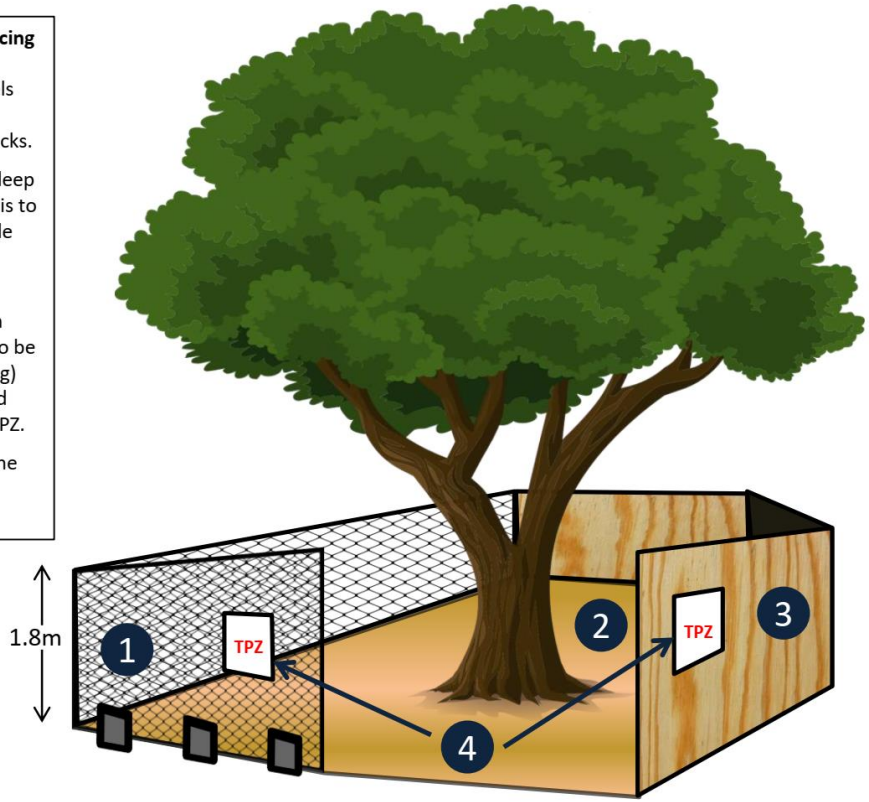


Figure 2
Suitable Tree Protection Zone Signage

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

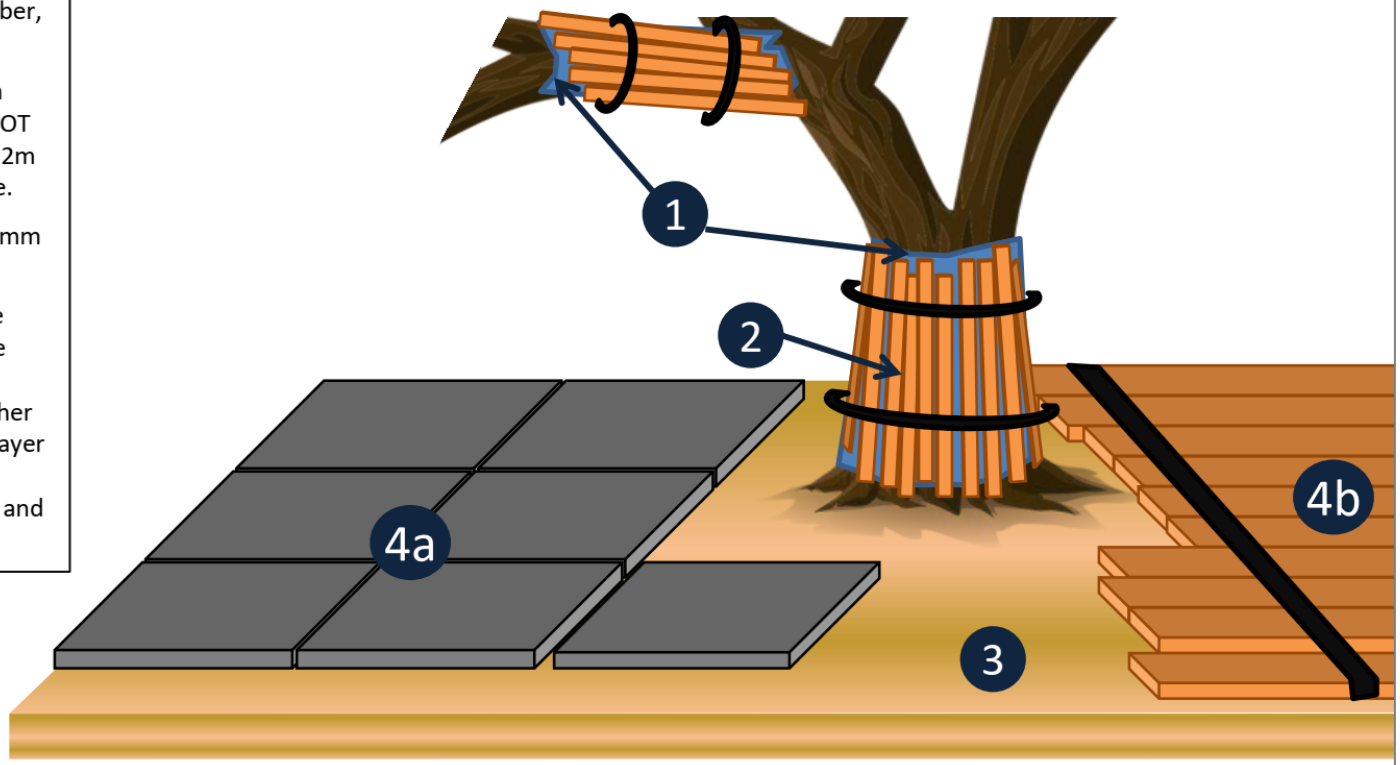


Figure 3 – Stem and ground protection measures.

Appendix 5 – Photographs

Plate 1 – Tree 5noted with arrow – Tree located on subject site.

Plate 2 – Tree 5 noted with arrow, Tree 6 numbered.

Plate 3 – Tree 4 – Tree in foreground not on survey, non-prescribed and is located on the subject site, Tree 4 is located on adjoining neighbouring property.

Plate 4 – Tree 1 noted with arrow. Exempt species under P21DCP. Tree 2 noted behind.

Plate 5 – Tree 1, 3 and 4 – Tree 1 is exempt and proposed for removal, Tree 2 and 3 are to be retained.

Plate 6 – Tree 2 – Existing roadway next to Tree 2 well within SRZ.

Plate 7 – Overview, looking east to west across the front of the site.

Plate 8 – Overview looking north-east to south-west.

Appendix 6 – Tree Location Plan

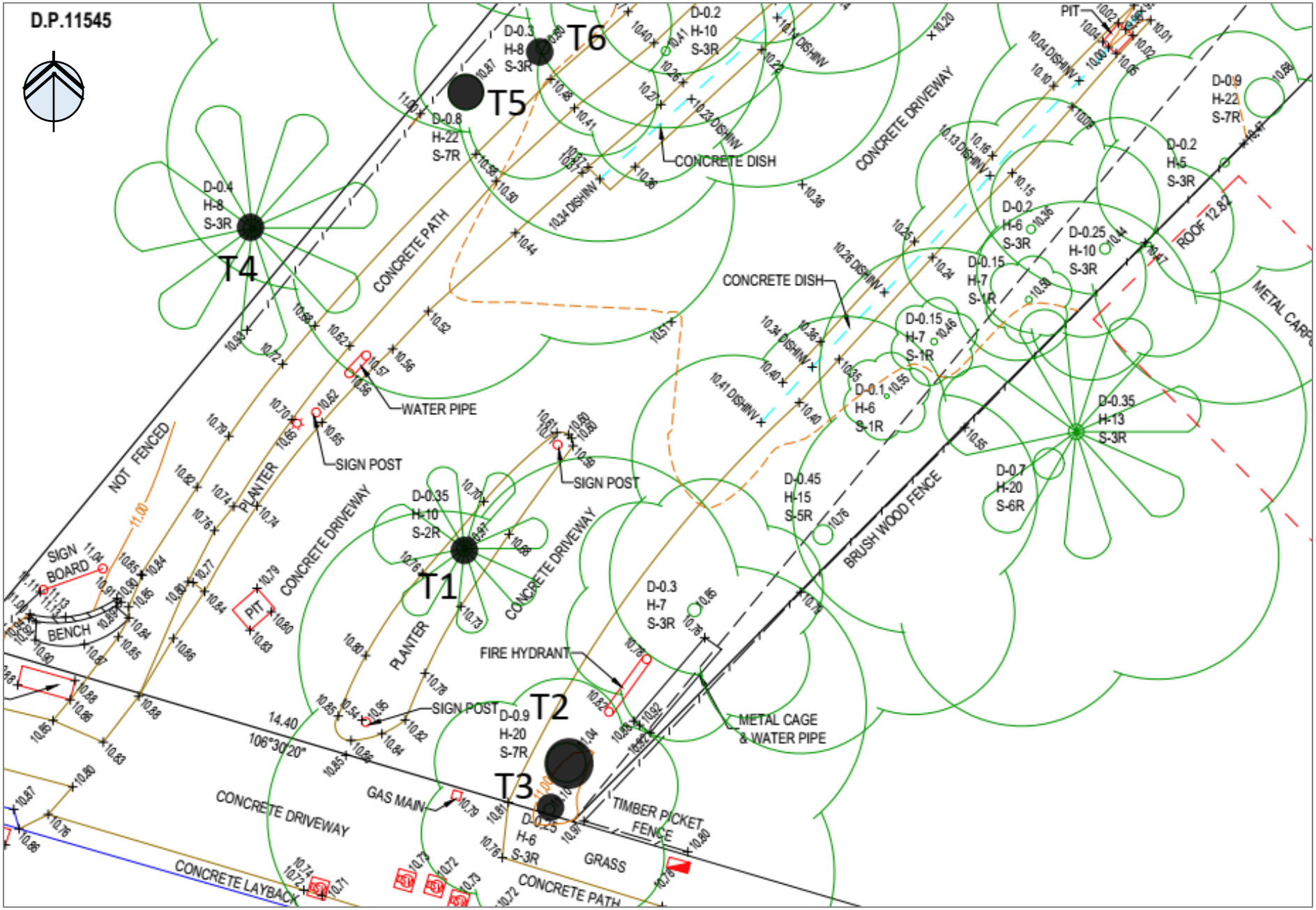


Figure 4 –Excerpt of Dwg ref no. 19125_1A, dated 6 May 2024, authored by Sydney Surveyors. Marked up by C Hughes. (NOT TO SCALE).

Appendix 7 – Encroachment Calculation Overview

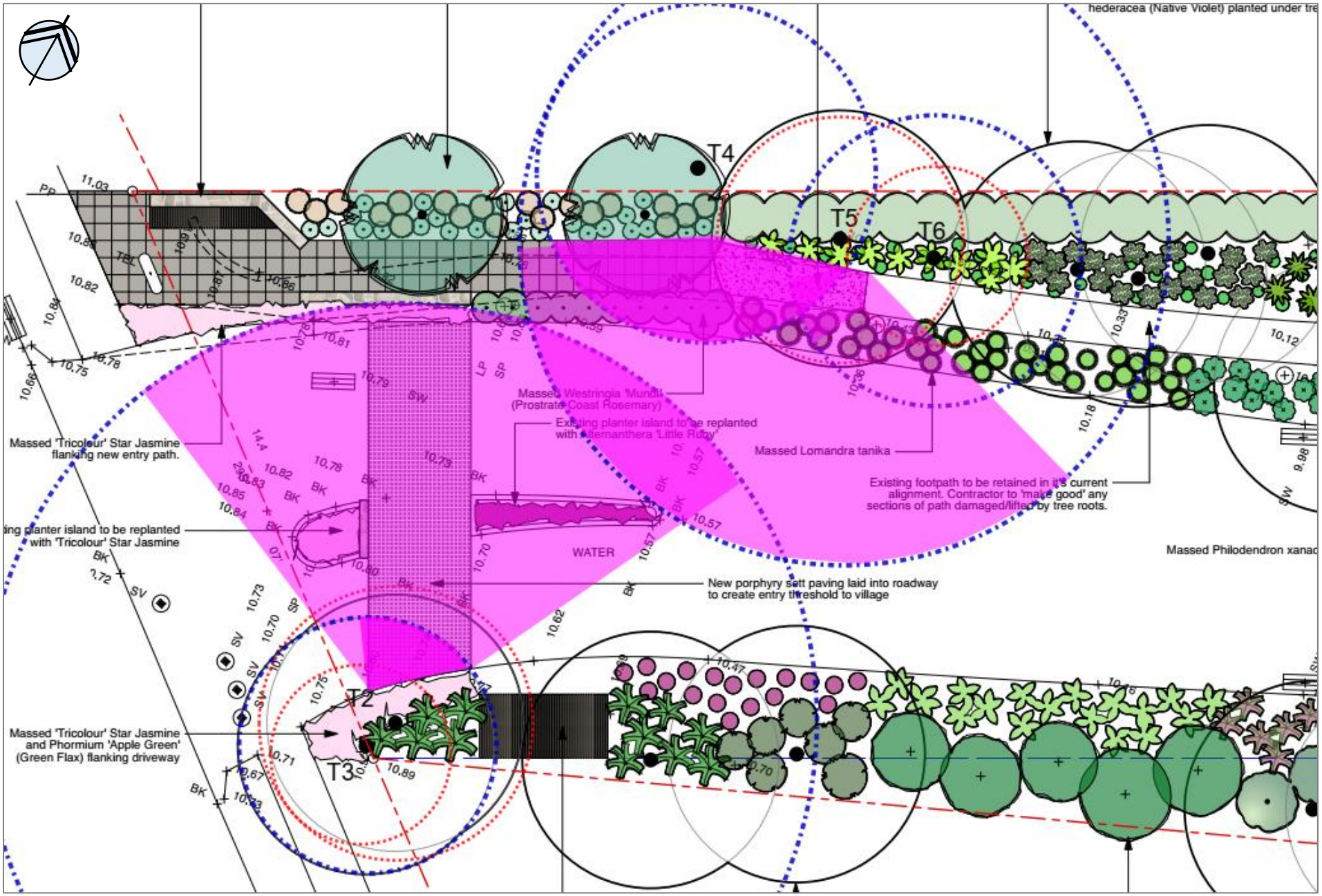


Figure 5 –Excerpt of Landscape Plan, Dwg no. LC-01, Issue B, dated 16/2/2023 authored by Stone Rose Landscapes. Marked up by C Hughes. (NOT TO SCALE).