

Arboricultural Impact Assessment



Prepared For
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AVALON BEACH NSW 2107

SITE ADDRESS
9 NORTH AVALON ROAD
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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 Richard Smith of Richard Smith Architect, on behalf of the owners of the subject site. The site is Lot 24 in DP 8394 and is known as 9 North Avalon Road, Avalon Beach, New South Wales. Alterations and additions to the childcare facility including new onsite parking, pedestrian pathways, outdoor play area and a revised ramp are 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 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 The Department of Planning, Industry and Environment 'Espade' states site vegetation as '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* or limited VTA (e.g. where access was limited), of twenty-one (21) trees/tree groups were completed by Treeism on 22nd October 2024. Inspection details of these trees are provided in Appendix 3 —Schedule of Assessed Trees.

* 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 16 Pro Max.
- 1.3.3 Tree data and field observations were entered into a data dictionary on a Trimble TDC600. Data was managed through Terraflex Trimble Connect.
- 1.3.4 The Structural Root Zone (SRZ) and the Notional Root Zone (NRZ) of each tree is established using the formula provided within the Australian Standard 4970-2025 Protection of trees on development sites (AS4970).
- 1.3.5 Tree Retention Values (RV) were calculated utilising STARS – Significance of a Tree Assessment Rating System (IACA 2010) ©.

1.4 Plans and documents referenced

- 1.4.1 AS4970-2025 Protection of trees on development sites, Standards Australia.
- 1.4.2 AS4373 – 2007 Pruning of amenity trees, Standards Australia.
- 1.4.3 Survey Plan, drawing no. 19347detail, dated 8/5/2020, Issue 2, authored by C.M.S. Surveyors Pty Ltd.
- 1.4.4 Hydraulic Engineering Plans, job no. 2407010, Issue A, drawing no. DA01-DA04, DA10, DA11, dated 17/4/2025.
- 1.4.5 Architectural Plans, drawing no's. SK 01- SK 06, dated 03/10/2024, and (updated) drawing no. DA03 dated 28/5/2025 authored by Richard Smith Architect.
- 1.4.6 This AIA takes account of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 'Bio SEPP' and Pittwater 21, Section B4 – Controls relating to the Natural Environment, Northern Beaches/Pittwater Council 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 trees at the time of inspection. Trees are dynamic, living things which can be subject to change without notice in certain circumstances.
- 1.5.5 No Landscape Plans were viewed as part of this assessment.

2 Observations and Discussion

2.1 Threatened Species

- 2.1.1 No assessed tree was found to be of a species subject to endangered or threatened conservation status under either Federal and State Government legislation i.e. NSW Biodiversity Conservation Act 2016 and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
- 2.1.2 The site is not identified on the NSW Government Biodiversity Values Map and Threshold Tool.

2.2 Assessed Trees

- 2.2.1 Twenty-one (21) trees/tree groups 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 numbers**—of the twenty-one (21) assessed trees, the following is noted:
- Two (2) trees are located within neighbouring property adjoining the subject site—Tree 11 and 21.
 - Nineteen (19) trees are located within the subject site—Tree 1-10 and 12-20.
 - Of these subject site trees, four (4) trees are non-prescribed—Tree 5, 11, 18 and Group 20.
- 2.2.3 **Tree origin**—of the seventeen (17) prescribed/neighbouring trees, the following is noted:
- Twelve (12) trees are locally native species—Tree 1-4, 7-10, 14-16, Group 19.
 - One (1) tree is an introduced native species—Tree 13.
 - Four (4) trees are introduced exotic species—Tree 6, 12, 17 and 21.
- 2.2.4 **Retention Value (RV)** — Seventeen (17) prescribed/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 and Retention Value, where **L** = Low, **M** = Medium, **H** = High, **R** = Removal Proposed.

Tree No.	Common Name	RV	Tree No.	Common Name	RV
1	Swamp She-oak	H	12	Hibiscus	L
2	Swamp She-oak	H	13	Lilly Pilly	M
3	Swamp She-oak	M	14	Swamp She-oak	H
4	Swamp She-oak	H	15	Swamp She-oak	M
6	Radiata Pine	H	16	Swamp She-oak	H
7	Swamp She-oak	H	17	Dwarf Bull Bay Magnolia	M
8	Swamp She-oak	H	G19	Brush Cherry	M
9	Swamp She-oak	H	21	Chinese Tallow Tree	L
10	Swamp She-oak	M			

3 Impact of the Proposed Development

3.1 Prescribed Trees Proposed for Removal

3.1.1 Nine (9) prescribed subject site trees are proposed for removal to accommodate the proposal;

- **Tree 2-4 Swamp She-oak** - These three (3) locally native trees are located within the footprint of the onsite car parking area and could not be retained.
- **Tree 6 Radiata Pine** - This introduced exotic tree is also located within the footprint of the onsite car parking area and could not be retained.
- **Tree 14-16 Swamp She-oak** - These three (3) locally native trees are located within the footprint of the onsite car parking area and could not be retained.
- **Tree 17 Dwarf Bull Bay Magnolia** - This introduced exotic tree is located just within the footprint of the onsite car parking area and could not be retained.
- **Group 19 Brush Cherry** - The alterations/extension of the existing decking/verandah area will impact the majority of these specimens.

3.2 Potential Impacts on Trees to be Retained

3.2.1 Under the Australian Standard 4970-2025 Protection of trees on development sites (AS4970), encroachments equal to or less than 10% of the Notional Root Zone (NRZ) are considered to be *minor*. Encroachments greater than 10% and less than or equal to 20% are considered *moderate*. Encroachment is considered *major* if it is greater than 20% of the area of the NRZ or inside the SRZ.

3.2.2 To avoid a net loss of soil area and volume, an area equivalent to the encroachment shall be incorporated into the TPZ regardless of level of encroachment, unless the Project Arborist (PA) otherwise demonstrates that the tree will remain viable.

3.2.3 In relation to *minor* encroachment, it is unlikely that there will be a significant impact to tree health, longevity or structure.

3.2.4 For *moderate* encroachment, the project arborist shall be engaged to review the proposed impact and undertake any other necessary investigation to address the factors listed in Clause 3.3.2 to demonstrate tree viability. This may be through the implementation of suitable design measures and construction controls to mitigate impacts during the development process as part of a TPS and TPP.

3.2.5 For *major* encroachment the PA shall be engaged to review the proposed impact and undertake any other necessary investigation to address the factors listed in Clause 3.3.2 to demonstrate tree viability. The PA shall be engaged to explore alternative designs with the design team and/or demonstrate that the tree will remain viable.

3.2.6 When determining the potential impacts of encroachment into the NRZ, (i.e determining the Tree Protection Zone {TPZ}) the project arborist should consider the following items listed under Clause 3.3.2 of AS4970-2025:

- (a) Location and distribution of the roots.

- (b) The potential loss of root mass resulting from the encroachment (number of roots and diameter of roots).
- (c) Tree species and tolerance to root disturbance.
- (d) If the works will result in a temporary (e.g. service trench) or permanent (e.g. basement carpark) loss of available soil volume.
- (e) Age, health, current size and projected size of the tree.
- (f) Presence of other trees with overlapping NRZ or grafted roots.
- (g) Proposed staging and timing of excavation or root-cutting
- (h) Proposed tree maintenance and tree care activities.
- (i) Lean and stability of the tree.
- (j) Soil characteristics and volume, topography and drainage.
- (k) Presence of existing or past structures, obstacles affecting root growth or recent encroachments.
- (l) Proposed construction measures that reduce the impact the impact on trees. (Note 1 states – Construction measures such as pier and beam, suspended slabs, cantilevered building sections and screw piles can reduce the impact of encroachment.)
- (m) Whether a root investigation is required. The location and distribution of the roots should be determined through minimally destructive investigation methods (pneumatic, hydraulic, hand digging or ground penetrating radar). Photographs should be taken, and, where needed to address geospatial issues, a root zone map prepared. (Note 2 states – Root damage should be minimized during this process. The roots should only be exposed for as long as required to meet the purposes of the investigation.)

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

Table 2: Estimated encroachments of permanent structures into the SRZ and NRZ of trees proposed for retention. Note 1: These figures are based on the SRZ and NRZ'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	NRZ area (m ²)	NRZ encroachment (approx. m ²)	NRZ encroachment (approx. %)
1	Swamp She-oak	✓	x	55	18.04	32.8
7	Swamp She-oak	✓	✓	96	27.41	28.6
8	Swamp She-oak	✓	✓	84	18.9	22.5
9	Swamp She-oak	✓	✓	96	20.04	20.9
10	Swamp She-oak	✓	✓	15	1.74	11.6
12	Hibiscus	x	x	13	0	0
13	Lilly Pilly	✓	✓	13	1.77	13.6
21	Chinese Tallow Tree	x	✓	13	4.32	33.2

NOTE: Visual encroachment mark ups are detailed in Appendix 6 - NRZ Encroachment Calculations - Visual.

3.2.2 **Tree 1 Swamp She-oak** – located on subject site.

Structural Root Zone impacts:

- All works fall outside the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- The proposed staff carparking area, grated drain and stormwater piping encroaches an estimated 18.04m² or 32.8% of the calculated NRZ of this specimen (see orange shading Appendix 6 NRZ Encroachment Calculations - Visual). This places the proposed works within *major* encroachment under AS4970 and consideration to the items listed under Clause 3.3.4 of AS4970 is required.

The most relevant items are (c) *Tree species and tolerance to root disturbance*, (d) *If the works will result in a temporary or permanent loss of available soil volume*, and (e) *Age, vigour and size of the tree*.

- This species is very tolerant of root disturbance, given it grows in wet/anaerobic areas naturally, this species has an elevated ability to cope with higher levels of root disturbance, compacted soils and sealed surfaces.
- The Hydraulic service trench is a temporary encroachment, once excavation occurs and pipes laid roots can grow back in this area. Care could be taken to allow roots to bridge the trench and piping feed above or below roots should fall requirements allow. Additionally the paved parking area is to be grass paving, so long term impact should be negligible.
- This specimen is mature but vigorous, with years of active growth ahead, this will provide ample time to acclimatise to the proposed carparking area.
- Minor short-term impact on tree health or condition is foreseen.

Pruning impacts:

- No pruning would be required to accommodate the proposal, the canopy is held high currently.

3.2.3 **Tree 7-10 Swamp She-oak** – located on subject site.

Structural Root Zone impacts:

- The pedestrian pathway falls within the SRZ of Tree 7-10, however as decking is proposed, minimal impact on tree health is expected, see further discussion below.

Tree Protection Zone impacts:

- The proposed pedestrian pathway encroaches an estimated 28.6% for Tree 7, 22.5% for Tree 8, 20.9% for Tree 9 and 11.6% for Tree 10 of the calculated NRZ (see orange shading Appendix 6 NRZ Encroachment Calculations - Visual). This places the proposed works for all trees within *major* encroachment under AS4970 (given the SRZ encroachment for Tree 10) and consideration to the items listed under Clause 3.3.4 of AS4970 is required.

- The most relevant items are (b) *The potential loss of root mass resulting from the encroachment: number and size of roots*, (c) *Tree species and tolerance to root disturbance*, (e) *Age, vigour and size of the tree* and (i) *Proposed construction measures that reduce the impact on trees*.
- In relation to items (b) and (i), only pier footings will be required for a large portion of the path within the NRZ as decking is proposed for much of the estimated encroachment. Hand digging could be carried out and pier locations flexible to avoid woody roots in this area.
- In relation to items (c) and (e) this species is very tolerant of root disturbance and all trees are mature but vigorous, with many more years of active growth still to go. This will provide ample time to acclimatise to the proposed works/changes.
- Assuming piers are hand excavated and avoid large woody roots, nil to minor impact on tree health or condition is foreseen.

Pruning impacts:

- Minor pruning (if any) would be required to ensure pedestrian pathway clearances.

3.2.4 **Tree 12 Hibiscus** – located within neighbouring property.

Structural Root Zone impacts:

- All works fall outside the calculated SRZ of this specimen.

Tree Protection Zone impacts:

- All works fall outside the calculated NRZ of this tree. No impact to tree health and condition are foreseen.

Pruning impacts:

- Pruning will be required to provide pathway clearance, this species is very tolerant to pruning and negative impact on tree health or condition is not foreseen.

3.2.5 **Tree 13 Lilly Pilly** – located within subject site.

Structural Root Zone impacts:

- The proposed raised timber boardwalk is inside the SRZ of this tree. See discussion below.

Tree Protection Zone impacts:

- The proposed pedestrian path encroaches an estimated 1.77m² or 13.6% of the calculated NRZ of this specimen (see orange shading Appendix 6 NRZ Encroachment Calculations - Visual).
- Given the decking also falls within the SRZ, this places the proposed works within *major* encroachment under AS4970 and consideration to the items listed under Clause 3.3.4 of AS4970 are required.
- The most relevant item is (i) *Proposed construction measures that reduce the impact on trees*, as discussed previously, only pier footings will be required for a large portion of the path within the NRZ as decking is proposed for much of the estimated encroachment. Hand digging could be carried out and pier locations flexible to avoid woody roots in this area.
- Assuming piers are hand excavated and avoid large woody roots, nil to minor impact on tree health or condition is foreseen.

Pruning impacts:

- Pruning may be required to provide pathway clearance, this species is very tolerant to pruning and negative impact on tree health or condition is not foreseen.

3.2.6 **Tree 21 Chinese Tallow Tree** – located on adjacent, neighbouring property.

Structural Root Zone impacts:

- The proposed sound barrier fencing falls inside the calculated SRZ of this specimen. See discussion below.

Tree Protection Zone impacts:

- The proposed sound barrier fencing encroaches an estimated 33.2% of the calculated NRZ, *major* encroachment under AS4970 (see orange shading Appendix 6 NRZ Encroachment Calculations – Visual), and consideration to the items listed under Clause 3.3.4 of AS4970 are required.
- The most relevant items are (b) *The potential loss of root mass resulting from the encroachment: number and size of roots*, (c) *Tree species and tolerance to root disturbance*, (e) *Age, vigour and size of the tree* and (i) *Proposed construction measures that reduce the impact on trees*.
- Whilst this species is very tolerant to root disturbances care during construction to ensure woody roots are not impacted during construction will be required.

Pruning impacts:

- The canopy does not extend over the boundary into the subject site (see Plate 12), no pruning is foreseen to facilitate works.

4 Conclusions

- 4.1.1 A total of twenty-one (21) trees/tree groups 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 nor is the site identified on the Department of Planning and Environments Biodiversity Values Map (BV).
- 4.1.3 Four (4) trees are non-prescribed under the Pittwater 21 Development Control Plan (P21DCP) and thus impacts not discussed – Tree 5, 11, 18 and G20.
- 4.1.4 Nine (9) trees are proposed for removal to facilitate works – Tree 2, 3, 4, 6, 14, 15, 16, 17 and 18. Offset planting under a Landscape Plan could replenish canopy loss.
- 4.1.5 One (1) assessed trees located on adjoining property to the subject site (Tree 12) will incur minor encroachment as per AS4970 and negative impact on tree health is considered unlikely.
- 4.1.6 Six (6) assessed trees (Tree 1, 7-10 and 21) will incur ‘major’ encroachment under AS4970. Tree species tolerance, age and vigour have been assessed, tree protection and retention are considered viable.
- 4.1.7 In relation to Tree 7-9 and 21, construction methods will significantly reduce impacts, provided works are carried out sympathetically to woody root retention.

5 Recommendations

5.1 Trees proposed for removal/pruning

- 5.1.1 Any tree removal and pruning 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 removal and pruning 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 Specification (TPS) and Plan (TPP)**, 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

- A specific Tree Protection Specification and Plan, once Councils Conditions of Consent are issued, shall be established to ensure compliance with the relevant Notice of Determination.
- This TPS and TPP require referral to Construction Plans/Drawings.
- This TPS and TPP need to be established prior to demolition works.

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 TPS and TPP.
- 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.
- The fill material should be consolidated by hand 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 Mattheck, C. & Breloer, H. (1994) *The Body Language of Trees: A handbook for failure analysis*. Research for Amenity Trees No. 4, The Stationery Office, London.
- 6.1.2 Standards Australia AS4970-2025 *Protection of trees on development sites*, Standards Australia, Sydney.
- 6.1.3 Standards Australia AS4373-2007 *Pruning of amenity trees*, Standards Australia, Sydney.
- 6.1.4 Council Arboriculture Victoria (CAV) AS 4970-2009 Calculator, accessed 29/10/2024
<https://as4970calculator.web.app/>
- 6.1.5 Espade Information – accessed 29/10/2024
<https://www.environment.nsw.gov.au/Salis5app/resources/spade/reports/9130ha.pdf>
- 6.1.6 Biodiversity Values Map – accessed 29/10/2024
<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>

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October 2024, Updated (Revision 1) June 2025



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Tree Surgery Certificate

Advanced Certificate Urban Horticulture

Diploma of Horticulture (Arboriculture) *Credit*

ISA Tree Risk Assessment Qualification (TRAQ) 2016, updated 2022

Quantified Tree Risk Assessment Registered User (QTRA) 2024

Accredited Member of Institute of Australian Consulting Arboriculturists (IACA)

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 Standard Height (DSH): 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.

NRZ: refers to the Notional Root Zone of the tree, this is the area required to maintain tree health/vigour and at times stability.

TPZ: refers to the Tree Protection Zone of the tree of which the NRZ is the starting point. This is a given offset from the trunk, set aside, and is the primary method of protecting trees on development sites. It is a combination of the root area, the canopy, 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 estimated life expectancy of a tree, Treeism utilises ULE categories (after Barrell 1996, Updated 01/04/01) to clarify how this was obtained/decided.

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 15 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 *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.

STARS – Significance of a Tree Assessment Rating System (IACA 2010)© continued

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 >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
<p><u>Legend for Matrix Assessment</u></p> 						
		<p>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 <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>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.</p>				
		<p>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.</p>				
		<p>Priority for Removal -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

Appendix 3 – Schedule of Assessed Trees – Site inspection 22/10/2024, 9 North Avalon Road, Avalon Beach.

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DRH (mm)	AB (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	NRZ (m)	NRZ (area)	NRZ encroachment (%)
1	<i>Casuarina glauca</i> Swamp She-oak	17	9	350	450	M	G	G-F	Located on subject site. Locally native species. Decay pockets from old pruning wounds noted. Occluding well.	2A	H	H	2.4	4.2	55	32.8
2	<i>Casuarina glauca</i> Swamp She-oak	15	6	210	285	M	G	G-F	Located on subject site. Locally native species. Superficial crack down stem driveway/east side. Shares root crown with tree 3.	2A	H	H	2.0	2.5	20	100
3	<i>Casuarina glauca</i> Swamp She-oak	12	5	220	260	M	G	G	Located on subject site. Locally native species. Shares root crown T2. Large mature Oleander below it. Obscured by trees surrounding it.	2A	M	M	1.9	2.6	22	100
4	<i>Casuarina glauca</i> Swamp She-oak	17	12	440	510	M	G	G	Located on subject site. Locally native species.	2A	H	H	2.5	5.3	88	100
5	<i>Nerium oleander</i> Oleander	6	-	-	-	-	-	-	Located on subject site. Exempt species under P21DCP.	4E	L	L	-	-	-	N/A
6	<i>Pinus pinea/radiata</i> Stone/Radiata Pine	24	11	540	800	M	G	G	Located on subject site. Introduced exotic species. Deadwood to 100mm dia. Roots along existing driveway.	2A	H	H	3.0	6.5	132	100
7	<i>Casuarina glauca</i> Swamp She-oak	17	10	460	610	M	G	G	Located on subject site. Locally native species. Canopy mainly to west due to T8 and 9.	2A	H	H	2.7	5.5	96	#28.6
8	<i>Casuarina glauca</i> Swamp She-oak	17	10	430	530	M	G	G	Located on subject site. Locally native species. Canopy mainly to north, shares root crown with T7.	2A	H	H	2.5	5.2	84	#22.5
9	<i>Casuarina glauca</i> Swamp She-oak	18	12	460	610	M	G	G	Located on subject site. Locally native species. Base measurement incorporates secondary stem from ground level.	2A	H	H	2.7	5.5	96	#20.9
10	<i>Casuarina glauca</i> Swamp She-oak	13	8	180	240	M	G	G	Located on subject site. Locally native species. Hidden behind other trees. Canopy all to east.	2A	M	M	1.8	2.2	15	#11.6
11	<i>Lagunaria patersonii</i> Norfolk Island Hibiscus	15	-	-	*680	-	-	-	Located on subject site. Exempt under P21DCP. Introduced exotic species.	4E	L	L	2.8	-	-	N/A
12	<i>Hibiscus</i> sp. Hibiscus	4.5	10	*20/40/20 (49)	*120	M	G	F	Located on neighbouring property. Introduced exotic species. Sprawling specimen.	5A	L	L	1.5	2.0	13	0
13	<i>Syzygium</i> sp. Lilly Pilly	6	4	60/10 (61)	90	SM	G-F	G-F	Located on subject site. Introduced native species.	5B	M	M	1.5	2.0	13	#13.6
14	<i>Casuarina glauca</i> Swamp She-oak	21	8	480	590	M	G	G-F	Located on subject site. Locally native species. Heavily crown raised with decay pockets at wound sites.	2A	H	H	2.7	5.8	104	100
15	<i>Casuarina glauca</i> Swamp She-oak	15	10	350	460	M	G	G	Located on subject site. Locally native species. Canopy suppressed and all to west.	2A	M	M	2.4	4.2	55	100
16	<i>Casuarina glauca</i> Swamp She-oak	19	16	480	630	M	G	G	Located on subject site. Locally native species.	2A	H	H	2.7	5.8	104	100
17	<i>Magnolia grandiflora</i> 'Little Gem' Dwarf Bull Bay	9	11	310	410	M	G	G	Located on subject site. Introduced exotic species.	2A	M	M	2.3	3.7	44	100

Tree No.	Genus & species Common Name	Ht (m)	Sp (m)	DRH (mm)	AB (mm)	Age	V	C	Comments	ULE	TSR	RV	SRZ (m)	NRZ (m)	NRZ (area)	NRZ encroachment (%)
18	Removed, stump only	-	-	-	-	-	-	-	Removed.	-	L	L	-	-	-	N/A
G19	<i>Syzygium australe</i> Brush Cherry x 13	8	5	90-100	100-120	SM	G-F	G-F	Located on subject site. Locally native species. Thirteen (13) trees planted in rows. Not on Survey Plan.	2A	M	M	1.5	2.0	13	100
G20	<i>Murraya paniculata</i> Mock Orange	3.5	4	*20/10 (22)	*80	M	G	G	Located on subject site. Exempt under P21DCP. Introduced exotic species.	5A	M	L	1.5	2.0	13	N/A
21	<i>Sapium sebiferum</i> Chinese Tallow Tree	5	7	*100	*150	M	G	F-P	Located on neighbouring property. Introduced exotic species. Heavily lopped, 100% epicormic growth.	2C	L	L	1.5	2.0	13	#33.2

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.
	Low Retention Value-These trees are not considered important for retention.		Medium Retention Value-These trees may be retained & protected.		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. # Construction measures or existing features will significantly reduce this calculation.

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

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/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.

DSH refers to the approximate diameter of tree stem at standard 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 NRZ 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. G- Good, F-Fair, P-Poor.

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 Appendices 1 and 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.

NRZ 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 – Photographs



Plate 1 – Tree 1. Arrow notes subject tree proposed for retention.



Plate 2 – Tree 2, note crack in stem, requires removal to facilitate car parking onsite.



Plate 3– Tree 2-5. All require removal to facilitate car parking onsite.



Plate 4– Tree 6 noted with arrow, requires removal to facilitate car parking onsite.



Plate 5– Tree 7-10 (Tree 10 hidden directly behind Tree 9). Proposed for retention and located on subject site.



Plate 6– Tree numbers as marked. Tree 6 and 14 proposed for removal, Tree 7-10 to be retained and protected.



Plate 7– Tree 11, non-prescribed species under P21 DCP.



Plate 8– Tree 14-17, require removal to facilitate onsite parking.



Plate 9– Tree 18 is a stump only, tree removed since survey taken.

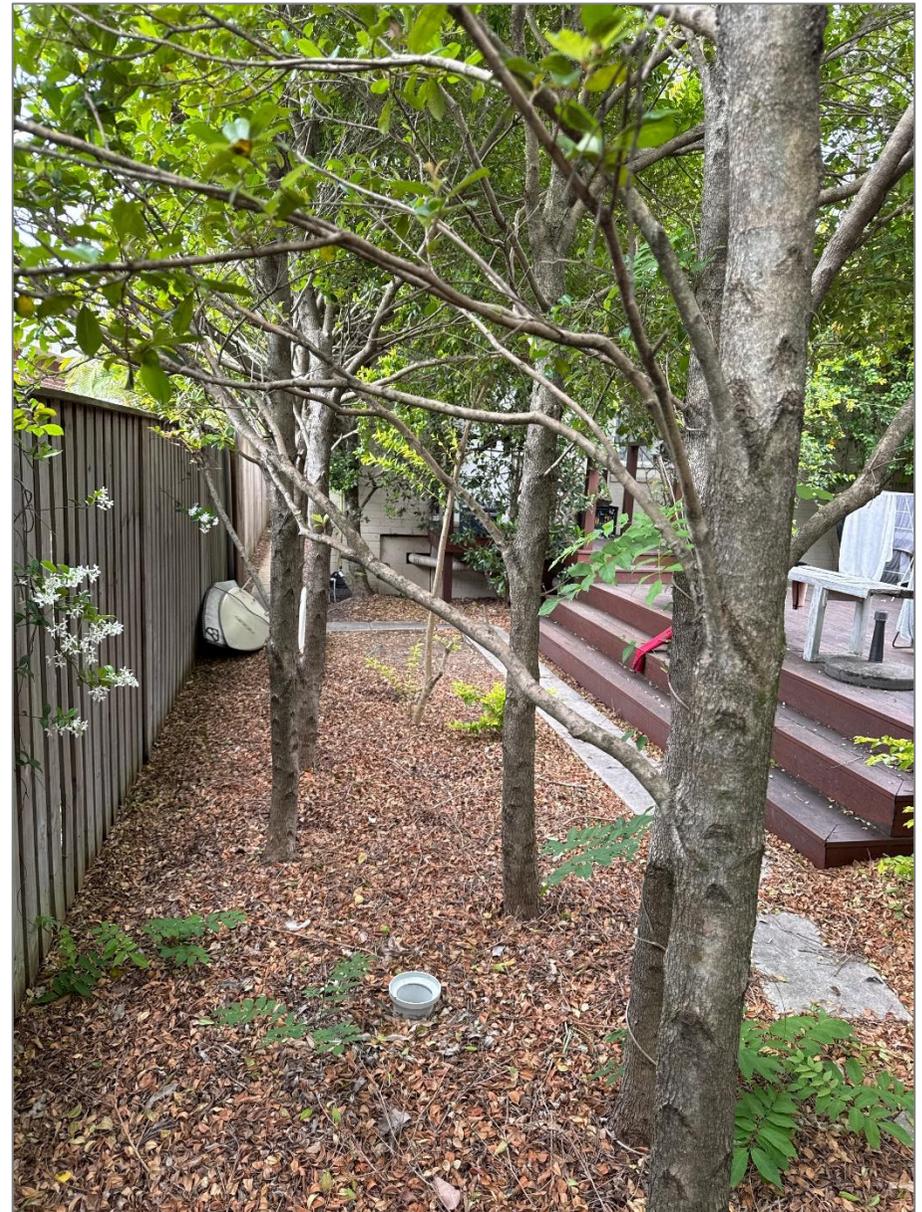


Plate 10– Group 19, thirteen (13) Brush Cherry, originally planted as hedge but have formed into small trees.



Plate 11– Group 20. Located on subject site, Murraya hedge of three (3) plantings, non-prescribed under P21 DCP.



Plate 12– Tree 21. Located on neighbouring property, note lopped form.

Appendix 5 – Tree Location Plan

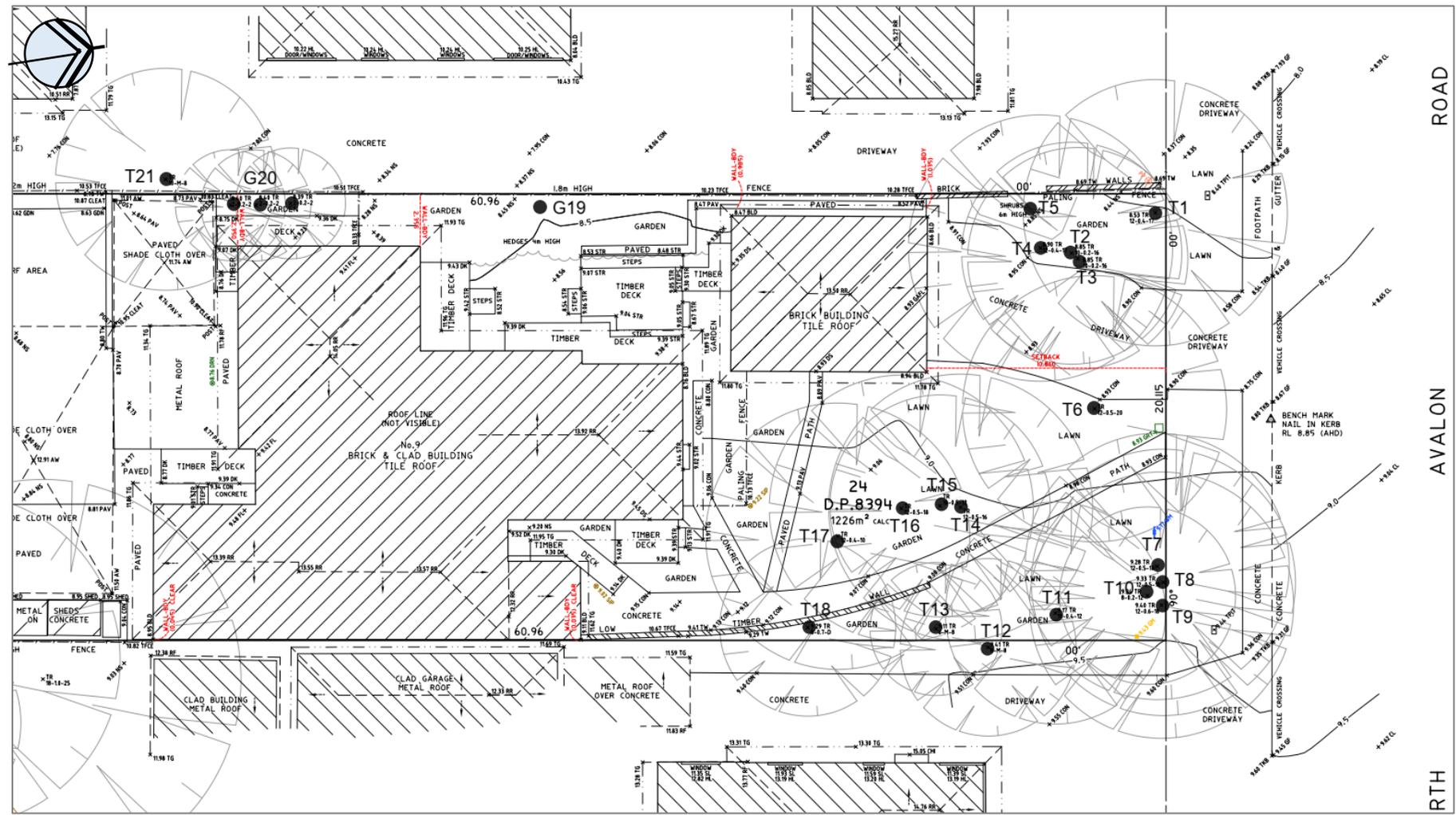


Figure 1 - Marked Up Survey Plan - Dwg no. 19347detail, dated 8/5/2020, Issue 2, authored by C.M.S. Surveyors Pty Ltd. NOT TO SCALE.

Appendix 6 – TPZ Encroachment Calculations – Visual

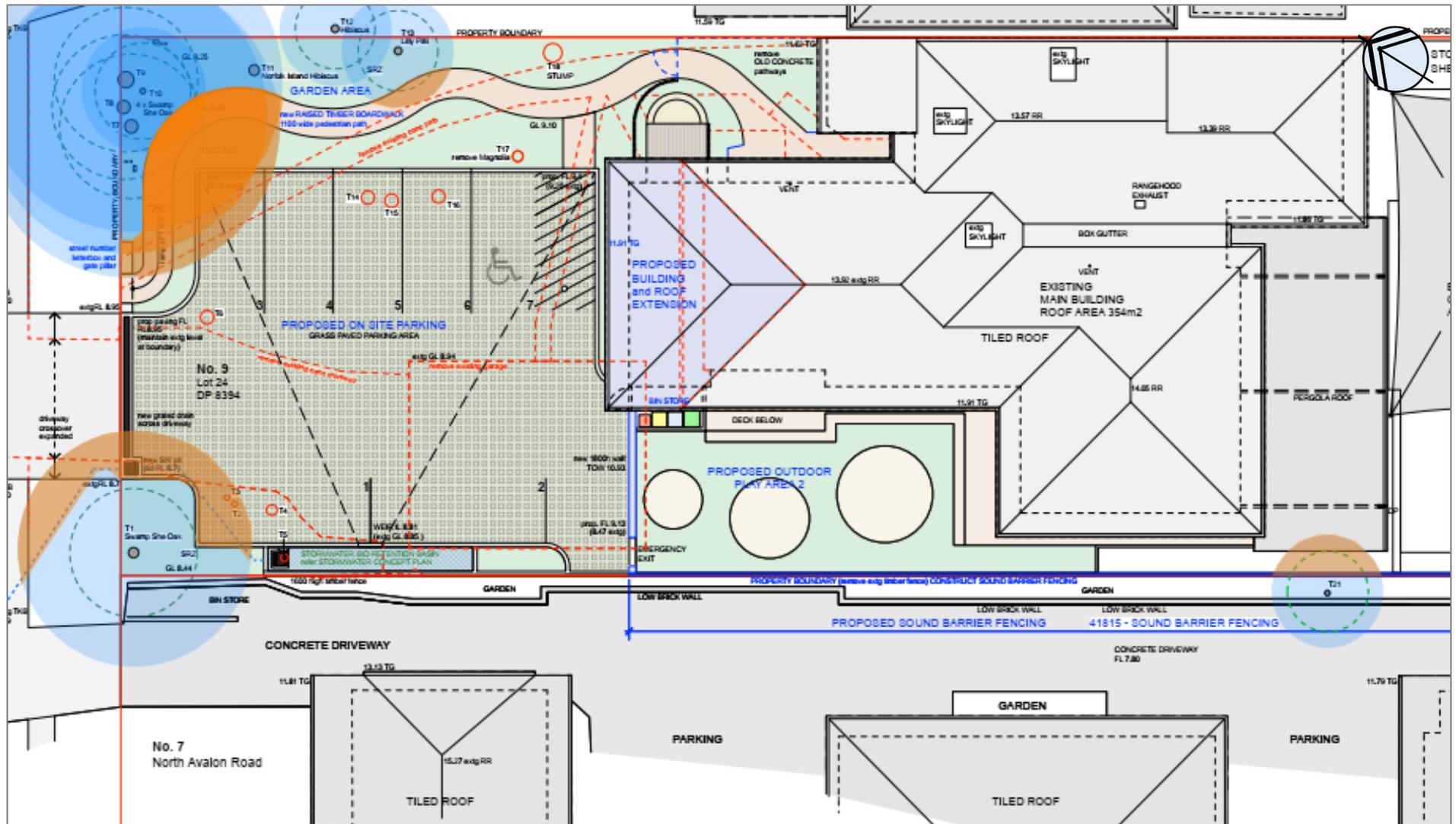


Figure 2 - Excerpt of Site Plan, dwg no. DA 03, 28/5/25 by Richard Smith Architect. SRZ noted with green hashed circle, NRZ blue shaded circle. Orange shading notes encroachment. Blue hashed lines near Tree 1 denote Hydraulic piping proposed. Marked up by C Hughes. NOT TO SCALE.