25 June 2024

smart arbor professional CONSULTING

19 Marlborough Avenue, Freshwater

Arbor Impact Assessment
Version 1.0
Client: Robert Glasson
c/- A Grade Landscaping

Prepared By

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AQF V Consulting Arborist (AHC50510)

Arboriculture Australia™

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Contents

1. DISCLAIMER

The information provided within this report from Smart Arbor Professional Consulting is independently gathered by the author as an unbiased party and represents only the opinions and summations of the consulting arborist; compiled using the data gathered from the site inspection/s and any relevant information provided to the author.

All recommendations and information provided in this report relates to the time and date of the initial, and any following, site assessment/s. In the absence of historical records or information provided to the author, assumptions and findings of the consulting arborist are made based off observations at the time of inspection.

Measurements and locations noted in this report are an approximation and may be based on information found in surveys and further documentation not necessarily completed by the author. Exact locations and measurements of landscape require the assessment of a qualified surveyor.

No guarantees are implied for any findings or recommendations made within this report. Deficiencies, defects, climatic impacts, environmental changes, vandalism, mechanical impacts, or any other variable that may change the current state of the tree/s assessed are not covered in this report and may change the relevance to the opinions and findings provided.

2. EXECUTIVE SUMMARY

This report has been commissioned by Robert Glasson, c/- A Grade Landscaping to provide a qualified assessment of multiple tree specimens on and adjacent to a proposed development site located at 19 Marlborough Avenue, Freshwater; a residential property located in the Northern Beaches Council LGA and subject to Local Government Tree Management policies.

The general vegetation on the site is noted to be a combination made up of mostly native tree specimens and multiple Bamboo plantings across the property, with a densely vegetated rear garden area where the development is proposed. The vegetation assessed were 10 x trees on the property and 1 x tree in a neighbouring property (No. 21 Marlborough Ave).

The proposed development that bears any impact to trees on site includes the construction of a new pool with associated coppicing and paved hardstand areas; a new balcony attached to the existing premises; new ground floor decking with complementing lawn area, and new feature landscape on the lower garden level with associated timber sleeper pathway, steps and areas with a granite or pebble layer. This will involve construction activities including demolition of existing landscape structures and regrading site levels by excavation, cut/fill processes and trenching.

A summary of the recommendations in reference to the vegetation assessed and information on the proposed development provided within this report is as follows:

- Tree No.'s 8, 9, 10 & 11 are suitable for retention as only a negligible impact is posed to the Tree Protection Zone (TPZ). Tree protection fencing must be implemented as prescribed below and in the **DISCUSSION** section of this report (page 12).
- Tree No.'s 1 & 7 have a moderate, yet sustainable impact encroachment posed to the Tree Protection Zone by the proposed development and are suitable for retention. Tree sensitive construction techniques must be utilised, and protection measures must be implemented as prescribed below and in the **DISCUSSION** section of this report (pages 13 & 14).
- Tree No.'s 2, 3, 4 & 5 are unsuitable for retention if the proposed development is to proceed due to an unsustainable encroachment being posed to TPZ and SRZ from the excavation associated with the pool area. These trees should be removed prior to site establishment.
- Tree 7 is unsuitable for retention if the proposed development is to proceed due to being located within the footprint of the proposed timber sleeper pathway. This tree should be removed prior to site establishment.
- Tree removal works should be completed by an experienced Arborist who holds Public Liability and Workers Compensation insurance.
- A Project Arborist with a minimum AQF V qualification must be engaged for the duration of the project to manage the implemented TPZs, supervise excavation works within a measured Tree Protection Zone of retained trees, monitor retained tree health with intermittent site visits over the course of the development, and certify Tree Protection Measures.

- A ground protection weight dispersal system such as geotextile fabric beneath a layer of mulch, or crushed aggregate below rumble boards should be implemented in high traffic areas within the measured Tree Protection Zone of Tree 1 (as indicated on the **TREE LOCATION & IMPACT PLAN,** page 18), and must be installed prior to any time this kind of access is proposed.
- Tree 7 should have protective battening installed on the lower trunk (as per **10.3 – OTHER TREE PROTECTION MEASURES**, page 20) that shall consist of internal cushioning and battens strapped together consistent with the Australian Standard for the Protection of Trees on Development Sites (AS 4970 - 2009), Section 4 and paragraph 4.5.2 and Figure 4. The battens shall consist of 2m lengths of 35 x 70mm (or similar to accommodate tree structure) structural timber secured side by side, spaced 50-100mm apart with galvanised steel banding for the full circumference of the trunk and fixed by straps without driving nails or screws into the trunk or branches. This should be installed prior to site establishment and removed after completion of the development.
- A fenced exclusion zone is to be implemented that runs parallel to the western boundary of the property in order to protect as much of the TPZ as feasible for Tree No.'s 8, 9, 10 & 11, while providing a reasonable offset from the proposed granite and pebble area footprints to allow clear access for construction activities (as indicated on the **TREE LOCATION & IMPACT PLAN**, page 18). This exclusion zone must be installed as per **10.2- TREE PROTECTION FENCING**, page 19 of this report.

Schedule of Tree Management Processes

Stage	Task	Responsible Parties	Process Timing
1	Engagement of Project Arborist to oversee tree health and management	Principal Contractor	Prior to site establishment
2	Undertake removal of Trees 2, 3, 4, 5 & 6	Principal Contractor	Prior to site establishment
3	Install ground protection within TPZ of Tree 1, Tree Protection battens on Tree 7 and Protective fencing around Trees 8, 9, 10 & 11	Principal Contractor	Prior to site establishment.
4	Certification of Tree Protection Measures	Project Arborist	Prior to site establishment.
5	Supervise all excavation works proposed within the TPZ and complete intermittent visits to assess retained tree health.	Principal Contractor Project Arborist	As required prior to the works proceeding adjacent to tree
6	Final Inspection and certification of retained tree health	Project Arborist	Following the removal of tree protection measures from Stage 3

3. PURPOSE

3.1 - PROPOSAL

This report has been commissioned by Robert Glasson, c/- A Grade Landscaping to provide a qualified assessment of multiple tree specimens on and adjacent to a proposed development site located at 19 Marlborough Avenue, Freshwater; a residential property located in the Northern Beaches Council LGA and subject to Local Government Tree Management policies.

The objective of this report is to complete a Visual Tree Assessment (Mattheck and Breloer 1994 standard)[c] and take data to assess and provide advice on the impacts posed to vegetation protected by Local Government policies and provide recommendations to assist and guide management of tree species with the view of retaining and protecting suitable specimens.

Determinations and conclusions are drawn in this report by identifying key factors such as:

- Significant tree specimens
- Trees protected under the Warringah Development Control Plan 2011[h] and the Warringah Local Environmental Plan 2011[i]
- Trees protected under the NSW Biodiversity Conservation Act 2016 and the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.
- Trees suitable/unsuitable for retention
- The impacts by proposed structures to currently existing tree specimens

The data collected can be read in summarized table form in **TREE DATA COLLECTION FORM** (page 11).

3.2 - LOCAL GOVERNMENT TREE PROTECTION

The site is located within the Northern Beaches Council LGA and is thus governed by their relevant adopted Development Control Plans and Local Environment Plans from former Councils and Tree Management Policy. The Warringah Development Control Plan[h] requires a Vegetation Clearing Permit for:

a. Removal or cutting down of any tree over five (5) metres in height;
b. Pruning of more than ten percent (10%) of a tree canopy.
c. The removal or cutting down of vegetation in "Bushland".

The policy applies to all trees addressed in this report.

4. METHOD

4.1 – METHODOLOGY

A visual assessment of the trees (VTA[8] - Mattheck and Breloer 1994 standard)[(c)] was performed on 4th June, 2024. VTA[8] is an industry recognised and standard assessment of an individual tree from ground level to identify tree health and structural symptoms. VTA[8] is limited to view at ground level, and does not observe symptoms below ground level, or up in the canopy not viewable from ground.

In order to view tree conditions below ground level, excavation around the root base would be required. For viewing areas of the canopy not viewable from ground, an aerial inspection would be required. Neither of these methods were completed at the time of assessment.

4.2 - INSPECTION DATA

- Genus and species
- Height (Estimation),
- Canopy Spread (Estimation)
- DBH (Diameter at Breast Height) and DRB (Diameter at Root Base) with Diameter Tape
- Age
  (**J**uvenile, **S**emi-**M**ature, **M**ature, **L**ate-**M**aturity, **S**enescent)
- Vigor
  (**G**ood, **AV**erage, **F**air, **P**oor, **D**ead, **DO**rmant)
- Growth Habit
  (**U**pright, **S**preading, **L**eaning, **O**ver-**E**xtended, **D**ominant, **C**o-**D**ominant leaders, **M**ulti-**S**temmed)
- Crown[1] Form
  (**S**ymmetrical, **AS**ymmetrical, **DE**nse, **SP**arse)
- IACA STARS© Significance value
  (**H**igh, **M**edium, **L**ow)
- Defects
- General Comments

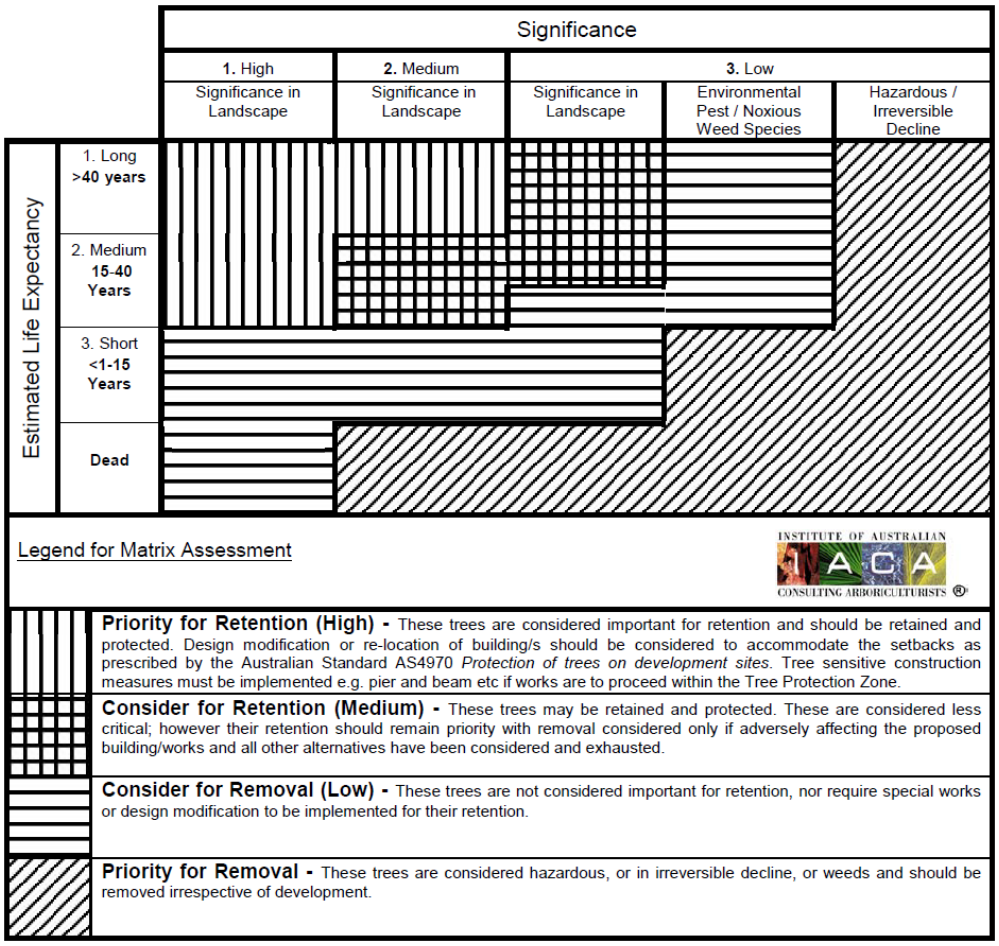
Data collected is then subject to the SULE (© Jeremey Barrell 2001)[(d)] methodology of assessment, which influences any conclusions drawn and recommendations made.

4.3 - TREE DATA DEFINITIONS

- **Age:** The definitions for tree age refer to the stage of life and maturity the tree is currently in that is relevant to tree species. Juvenile (**J**) is where the tree is in a small or sapling form and has not yet reached a stage where it is producing fruit. This category can often refer to a tree specimen that is under Local Government minimum requirements for classification of a tree but is not necessarily defined by this parameter. A juvenile specimen can grow at an accelerated rate in comparison to the other categories depending on competing species. Semi-Mature (**SM**) is an age of the tree where it may have reached fruiting ability, however the size and habit does not reflect what would be classified as a fully mature example of its species. This category is governed by tree species and their growth habits. Mature (**M**) is the category where the tree has reached fruiting ability and the size and habit reflect what is expected from a fully mature specimen. A mature tree will continue to have steady annual growth. Late Maturity (**LM**) is a mature tree that has considerably slowed its growth rate and has neared its useful life expectancy. Senescent (**S**) is a stage where the tree is still alive, but no longer capable of putting on new growth. This is the final live stage of a tree.
- **Vigor:** The definitions for vigor correlate with how well the tree is performing in its environment and inclusive of canopy growth, branch growth and habit, and expression of general shape from the species in question. Good (**G**) is signs of new growth both in leaf/canopy and branches. 'Flushing'[4] is a general good indicator. Average (**AV**) is little to no signs of 'Flushing'[4], however growth is stabilizing and there is no significant loss of canopy growth, nor is there excessive presence of deadwood. Fair (**F**) has an increased presence of deadwood, or moderate signs of decline and dieback to branch extremities. The tree's significance value is usually decreased when in this state, however it is generally reversible with appropriate management. Poor (**P**) is when the tree shows heavier signs of decline, usually with excessive amounts of deadwood or epicormic[3] growth, along with less canopy leaf presence and little to no progress in branch and trunk growth. Dead (**D**) means no signs of growth, and the tree is irreversible of its condition. Dormant (**DO**) describes the canopy as being non-existent, i.e. no leaves, however this is not necessarily a sign of death or poor vigor as the tree may be deciduous and in its dormancy stage.
- **Growth Habit:** The definitions for growth habit apply to condition and habit of the tree and the form features that impact its shape and other factors. Upright (**U**) means the tree is generally growing straight up and reaching skyward with little deviation of direction from the point of the root base. Leaning (**L**) means the tree has deviated from the point of the root base and is favoring a direction that is leaning away. Over-extended (**OE**) means the tree has an excessive lean that could over-balance the tree, and extreme weather conditions may pose a threat of uprooting the tree. Co-Dominant (**CD**) means the main leader of the tree has split into two or more main leaders that have started growing their own primary and secondary laterals. Multi-Stemmed (**MS**) means the tree has begun growth of multiple leaders from the root base that have started their own scaffold of primary and secondary branches.
- **Crown Form:** The definitions for crown form describe the shape and habit of the canopy, or crown, and touch upon the vigor or leaf growth habit of the crown also. Symmetrical (**S**) describes the canopy as being generally even and balanced in all directions, without favoring a direction. Asymmetrical (**AS**) could refer to a lean or unbalanced canopy,

generally seen in species inhibited by other species or unevenly pruned. Dense (**DE**) describes the canopy as generally full for its species, with decent or 'Flushing'[4] growth. Sparse (**SP**) describes the canopy as having less decent growth, or open gaps in the canopy.

- **Significance Value:** The definitions for significance value are determined using the IACA Significance of a Tree, Assessment Rating System (STARS)©[(e)]. This rating system assists with tree management in the planning processes for a proposed development that impacts trees protected under Local Government Tree Management Policies. The system defines three categories of significance as **H**igh, **M**edium and **L**ow within the landscape. Once assessment criteria define the significance of the tree in the landscape, a retention value can then be determined utilising the below Priority Matrix:



Other variations on values defined and attributed to the significance value of a tree is at the discretion of the author utilizing experience and professional opinion. All such results are discussed in a report's recommendations.

5. SITE OBSERVATIONS

5.1 - SITE DESCRIPTION

The trees are located on a residential block with a north-westerly aspect that composes of a three-storey split level residence with attached carport and associated concrete driveway, paved paths footways and steps, and landscaped tiered gardens supporting the steep slope at the rear of the block, which is heavily vegetated with both native and exotic tree and shrub species. The approximate location of each tree specimen can be identified on the **TREE LOCATION & IMPACT PLAN** (page 18).

The proposed development that bears any impact to trees on site includes the construction of a new pool with associated coppicing and paved hardstand areas; a new balcony attached to the existing premises; new ground floor decking with complementing lawn area, and new feature landscape on the lower garden level with associated timber sleeper pathway, steps and areas with a granite or pebble layer. This will involve construction activities including demolition of existing landscape structures and regrading site levels by excavation, cut/fill processes and trenching.

5.2 - VEGETATION COMMUNITY

The nearest mapped vegetation community for this site is located approximately 450m to the south-west where a corridor of the Coastal Floodplain Wetlands[g]. is situated along Manly Creek. This community is dominated by *Angophora floribunda* (Rough-barked Apple), *Angophora subvelutina* (Broad-leaved Apple), *Eucalyptus amplifolia* (Cabbage Gum), *Eucalyptus grandis* (Flooded Gum), *Eucalyptus robusta* (Swamp Mahogany), *Eucalyptus saligna* (Sydney Blue Gum) or *Eucalyptus* tereticornis (Forest Red Gum) on levees and elevated terrace[g]. *Casuarina glauca* (Swamp She-Oak) is also a dominant species along banks and heavily flooded zones.

Shrub and lower growing canopy trees species include *Glochidion ferdinandi* (Cheese Tree), *Melaleuca ericifolia* (Swamp Paperbark) and *Myoporum acuminatum* (Waterbush)[g].

Other relevant representative communities for the area also include Sydney Coastal Dry Sclerophyll Forests and Sydney Coastal Heaths; however, there are no species representative of any of these communities addressed in this report.

5.3 - REFERENCE MATERIAL

- Site & Landscape Plan by **A Grade Pools & Landscapes**; supplied 22/05/24
- NSW Government; **The SEED Initiative**; 2018 data[g]

ADDRESS: 19 Marlborough Avenue, Freshwater INSPECTION: 04/06/24

NO#	Genus	Species	Common Name	Age	Vigor	Growth Habit	Crown Form	Height (m)	Canopy Spread (m)	Avg DBH (mm)	DRB (mm)	SRZ (mm)	TPZ (mm)	STARS© Rating	Defects & Attributes	General Comments	Encroachment
1	*Glochidion*	*ferdinandi*	Cheese Tree	M	Av-G	CD, L	S, Dom	8	9	600	700	2849	7200	M	Slight lean to NE. Minor foraging occurring on branch extremities.	Located in neighbouring property to S (#21). DBH and DRB estimated due to access.	Located 2.1m from proposed new pool area posing a 14% cut encroachment within the TPZ and SRZ
2	*Syzigium*	*sp.*	Brush Cherry	M	G	U, Hedge	As	6	2.5	150	180	1611	1800	L	Part of row hedge	Tree not on survey	Located 0.4m from proposed new pool area posing a 23% cut encroachment within the TPZ and SRZ
3	*Syzigium*	*sp.*	Brush Cherry	M	G	U, Hedge	As	6	3	170	200	1683	2040	L	Part of row hedge	Tree not on survey	Located 0.4m from proposed new pool area posing a 34% cut encroachment within the TPZ and SRZ
4	*Syzigium*	*sp.*	Brush Cherry	M	G	U, Hedge	As	6	2.5	160	200	1683	1920	L	Part of row hedge	Tree not on survey	Located 0.4m from proposed new pool area posing a 34% cut encroachment within the TPZ and SRZ
5	*Syzigium*	*sp.*	Brush Cherry	M	G	U, Hedge	As	6	3	198	250	1849	2376	L	Part of row hedge	Tree not on survey	Located 0.35m from proposed new pool area posing a 19% cut encroachment within the TPZ and SRZ
6	*Cyathea*	*cooperi*	Lacy Tree Fern	M	G	Pole, Skew	S	6	4	130	N/A	N/A	1560	L-M	Slight lean to S		Located within proposed timber sleeper footprint
7	*Cyathea*	*cooperi*	Lacy Tree Fern	M	G	Pole, Skew	S	6	3.5	190	N/A	N/A	2280	L-M	Upper crown skew to N from 3m.		Located 1m from proposed timber sleepers posing a negligible encroachment., and surrounded by proposed new granite layer posing a moderate fill impact to root zone.
8	*Archontophoenix*	*cunninghamiana*	Bangalow Palm	M	G	Pole	S, CD	11	5	170	N/A	N/A	2040	L	Codominant crown with T9		Located 1.5m from proposed new granite layer posing a negligble fill encroachment to TPZ
9	*Archontophoenix*	*cunninghamiana*	Bangalow Palm	M	Av	Pole	S, CD	11	5	190	N/A	N/A	2280	L	Codominant crown with T8		Located 1.3m from proposed new granite layer posing a negligble fill encroachment to TPZ
10	*Archontophoenix*	*cunninghamiana*	Bangalow Palm	M	G	Pole	S, CD	10	5	170	N/A	N/A	2040	L	Codominant crown with T11		Located 1.8m from proposed new pebble layer posing a negligble fill encroachment to TPZ
11	*Archontophoenix*	*cunninghamiana*	Bangalow Palm	M	G	Pole	S, CD	10	5	200	N/A	N/A	2400	L	Codominant crown with T10		Located 1.8m from proposed new pebble layer posing a negligble fill encroachment to TPZ

7. DISCUSSION

Four out of the twelve tree species assessed on this site were not surveyed on the original plans supplied and were noted as matching prescribed tree criteria as per the Warringah Development Control Plan. These trees (4 x Brush Cherries) form a hedge row along the southern property boundary directly adjacent to the proposed pool footprint.

The extent of impacts to trees on development sites can be broadly rated using the following scale of impact to the tree's health and structure (as utilised by Guy Paroissien – Landscape Matrix Pty Ltd):

0% of encroachment into the Tree Protection Zone –	No Impact
0 to 10% of encroachment into the Tree Protection Zone –	Low Impact
10 to 15% of encroachment into the Tree Protection Zone –	Low to Moderate Impact
15 to 20% of encroachment into the Tree Protection Zone –	Moderate Impact
20 to 25% of encroachment into the Tree Protection Zone –	Moderate to High impact
25 to 35% of encroachment into the Tree Protection Zone –	High Impact
>35% of encroachment into the Tree Protection Zone –	Significant Impact

7.1 – Trees with a Low Impact (<10%)

- Tree No.'s 8, 9, 10 & 11 are Bangalow Palms (*Archontophoenix cunninghamiana*) located at the rear of the property along the western boundary fenceline and are 1.3-1.8m from the areas proposed for the installation of a granite and pebble layer, providing a negligible encroachment within the Tree Protection Zone. These trees are species listed on the Northern Beaches exempt tree species list, are considered as having a Low STARS© Significance rating and should not be viewed as a constraint on development.

  While the construction of the new dwelling occurs within the measured TPZ of these trees, the TPZ of Palms and monocotyledon tree vegetation are calculated differently to dicotyledons. All four trees' TPZ is based on providing an offset from the overhead crown, to ensure no damage is posed to the live fronds of the tree; and there is no official calculation for its Structural Root Zone. A Palm's root system generally has small, shallow, fibrous roots that are an extension of the rhizomic trunk, and the tree only requires a small root zone for trunk stability. As the proposed new granite/pebble areas and associated construction activities will occur below and well clear of the overhead crown, the impact within the TPZ is most likely sustainable.

  A fenced exclusion zone should be implemented in order to protect the trunks and critical root base of these trees, while providing a reasonable offset from the proposed granite and pebble area footprints to allow clear access for construction activities (as indicated in the **TREE LOCATION & IMPACT PLAN**, page 18).

7.2 - Moderately Impacted Trees (>10%; <20%)

- Tree 1 is a Cheese Tree (*Glochidion ferdinandi*) located in the rear yard of the neighbouring property to the south (No. 21 Marlborough Avenue) and is 2.1m from the proposed new pool area, providing a 14% cut encroachment within the Tree Protection Zone. This tree is considered as having a Medium STARS© Significance rating and must be retained and protected as a neighbouring tree asset.

  The excavation required for construction of the new pool with associated coppice and hardstand poses a moderate impact to the tree's root zone with a continuous cut encroachment. However, this may be deemed as sustainable if exploratory root mapping is completed by first digging a narrow trench along the nearest line of cut to the tree to the depth of the proposed hard stand area using appropriate hand-controlled tools under the supervision of a Project Arborist with a minimum AQF5 level qualification. If roots greater than 30mm diameter are identified, the Project Arborist at their discretion should advise whether the root must be retained or should be clean cut with a pruning saw or chainsaw under their direction.

  A ground protection weight dispersal system such as geotextile fabric beneath a layer of mulch, or crushed aggregate below rumble boards should be implemented in high traffic areas for work staff and equipment within the measured Tree Protection Zone area (as indicated on the **TREE LOCATION & IMPACT PLAN**, page 18), and must be installed prior to any time this kind of access is proposed.

- Tree 7 is a Lacy Tree Fern (*Cyathea cooperi*) located in the rear yard of the property in the lower garden area, and is 1m from the proposed timber sleeper pathway, providing a negligible cut encroachment within the Tree Protection Zone; and has a proposed granite layer spread around the base of the tree as part of the new landscaping on the lower garden level. This tree is considered as having a Low-Medium STARS© Significance rating and is suitable for retention and protection.

  While the construction of the new timber sleeper pathway occurs within the measured TPZ of this tree, the TPZ of Tree Ferns is calculated the same as Palm trees (Tree No.'s 8, 9, 10 & 11). Tree 7's TPZ is also based on providing an offset from the overhead crown, to ensure no damage is posed to the live fronds of the tree; and there is no official calculation for its Structural Root Zone. A Tree Fern's root system generally has small, shallow, fibrous roots that are an extension of the rhizomic trunk, and the tree only requires a small root zone for trunk stability. However, the roots of Tree Ferns are also generally more fragile than Palm roots and are more sensitive to anerobic soil conditions caused by compaction, or the installation of fill over natural ground levels where the roots are located.

  If the tree is to be retained, consideration should be given to retaining natural ground levels and undisturbed soil within a 1m radius of the base of the tree to assist with tree retention. This undisturbed area should be implemented as a garden bed, with only a thin layer of leaf mulch being installed over existing soil to provide organic matter and moisture retention to the soil.

Establishment of an exclusion zone around the tree with temporary fencing as a protective measure would not be suitable for this specimen due to its proximity to the proposed works. As an alternative measure, the tree should have protective battening installed on the lower trunk (as per **10.3 – OTHER TREE PROTECTION MEASURES**, page 20) that shall consist of internal cushioning and battens strapped together consistent with the Australian Standard for the Protection of Trees on Development Sites (AS 4970 - 2009), Section 4 and paragraph 4.5.2 and Figure 4. The battens shall consist of 2m lengths of 35 x 70mm (or similar to accommodate tree structure) structural timber secured side by side, spaced 50-100mm apart with galvanised steel banding for the full circumference of the trunk and fixed by straps without driving nails or screws into the trunk or branches. This should be installed prior to site establishment and removed after completion of the development.

7.3 - Highly Impacted Trees (>20%; <35%)

- Tree No.'s 2, 3, 4 & 5 are a row of Brush Cherries (*Syzigium* sp.) located along the southern boundary of the property on the upper garden level and are approximately 0.4m from the proposed pool area, providing a 19-35% cut encroachment within the Tree Protection Zone that also encroaches within the Structural Root Zone (SRZ). These trees are considered as having a Low STARS© Significance rating and should not be viewed as a constraint on development.

  The excavation associated with the construction of the pool area poses a significant and unsustainable impact to tree stability due to the continuous cut encroachment across the measured SRZ of each tree, and they cannot be retained if the development is approved in its current form.

7.4 - Trees within the development footprint

- Tree 6 is a Lacy Tree Fern (*Cyathea cooperi*) located in the rear yard of the property in the lower garden area and is within the footprint of the proposed new timber sleeper pathway. This tree is considered as having a Low-Medium STARS© Significance rating and should not be viewed as a constraint on the development.

  Revision of the proposed design to accommodate retention of this tree would require the proposed stairs to be redirected away from its current set down, which may also necessitate the removal of a stand of Bamboo the client wishes to retain as a natural screen for the pool area. This tree cannot be retained if the development is approved in its current form.

7.5 - Other Trees Assessed and General Notes

- Other canopies included on the Site & Landscape Plan by A Grade Pools & Landscapes at the front of the property indicate trees that are unaffected by the proposed development and were

not assessed as part of this report. However, care should be taken when transporting equipment from the front of the property to the construction zone so as to avoid potential damage to tree trunks or crowns, and to avoid unnecessary compaction to soil adjacent to these trees.

- Shrubs located in the rear yard of the property did not match minimum prescribed tree criteria as per the Warringah Development Control Plan and are not included in this report. However, care should be taken when transporting materials and equipment in and around this vegetation to avoid unnecessary damage to retained shrub crowns or compaction to soil adjacent to these shrubs.

8. RECOMMENDATIONS

8.1 - TREES SUITABLE FOR RETENTION

- Tree No.'s 8, 9, 10 & 11 are suitable for retention as only a negligible impact is posed to the Tree Protection Zone (TPZ). Tree protection fencing must be implemented as prescribed below and in the **DISCUSSION** section of this report (page 12).

- Tree No.'s 1 & 7 have a moderate, yet sustainable impact encroachment posed to the Tree Protection Zone by the proposed development and are suitable for retention. Tree sensitive construction techniques must be utilised, and protection measures must be implemented as prescribed below and in the **DISCUSSION** section of this report (pages 13 & 14).

8.2 - TREES UNSUITABLE FOR RETENTION

- Tree No.'s 2, 3, 4 & 5 are unsuitable for retention if the proposed development is to proceed due to an unsustainable encroachment being posed to TPZ and SRZ from the excavation associated with the pool area. These trees should be removed prior to site establishment.

- Tree 7 is unsuitable for retention if the proposed development is to proceed due to being located within the footprint of the proposed timber sleeper pathway. This tree should be removed prior to site establishment.

- Tree removal works should be completed by an experienced Arborist who holds Public Liability and Workers Compensation insurance.

8.3 – SITE SPECIFIC TREE PROTECTION MEASURES

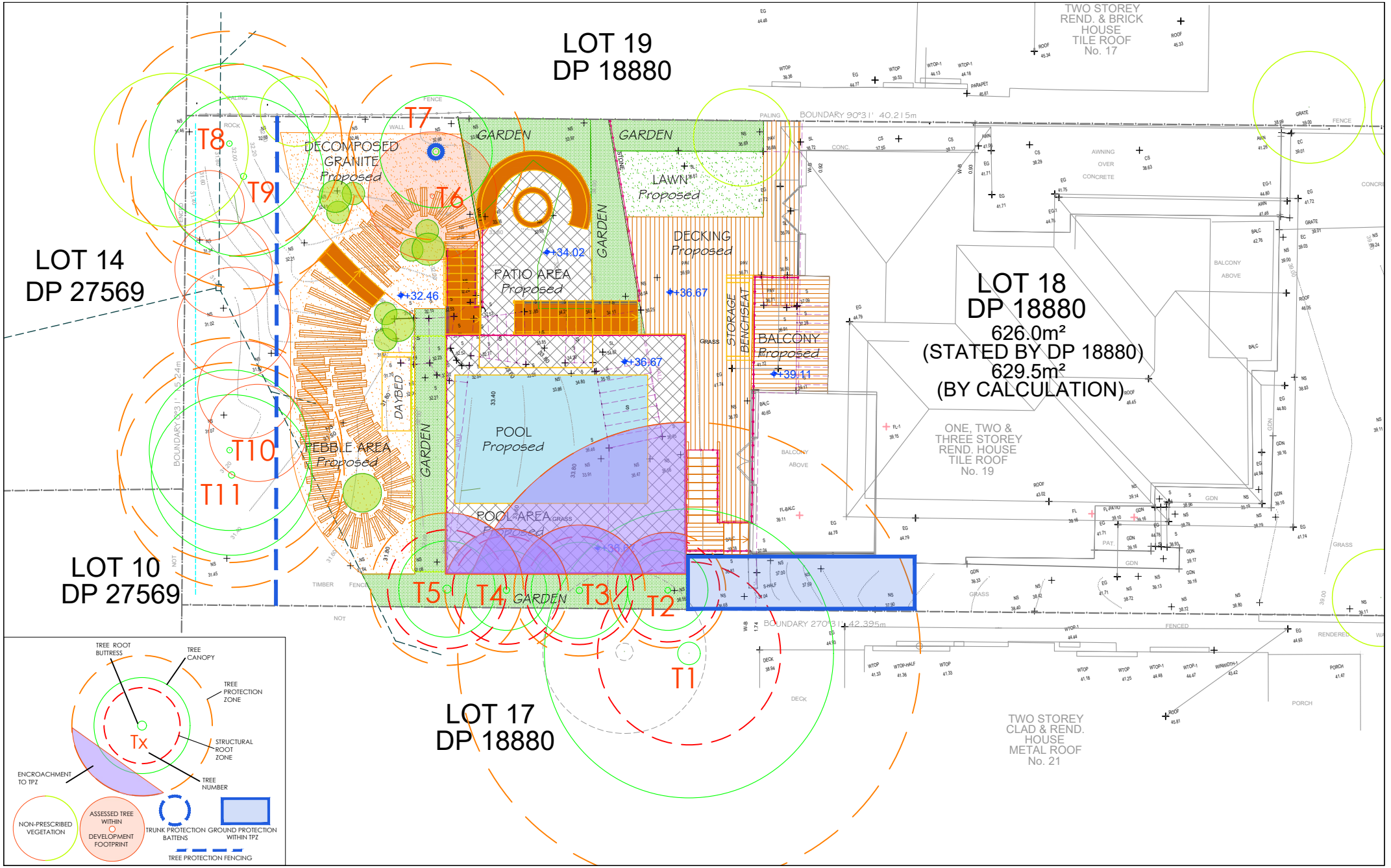
- A Project Arborist with a minimum AQF V qualification must be engaged for the duration of the project to manage the implemented TPZs, supervise excavation works within a measured Tree Protection Zone of retained trees, monitor retained tree health with intermittent site visits over the course of the development, and certify Tree Protection Measures.

- A ground protection weight dispersal system such as geotextile fabric beneath a layer of mulch, or crushed aggregate below rumble boards should be implemented in high traffic areas within the measured Tree Protection Zone of Tree 1 (as indicated on the **TREE LOCATION & IMPACT PLAN,** page 18), and must be installed prior to any time this kind of access is proposed.

- Tree 7 should have protective battening installed on the lower trunk (as per **10.3 – OTHER TREE PROTECTION MEASURES**, page 20) that shall consist of internal cushioning and battens strapped together consistent with the Australian Standard for the Protection of Trees on Development Sites (AS 4970 - 2009), Section 4 and paragraph 4.5.2 and Figure 4. The battens shall consist of 2m lengths of 35 x 70mm (or similar to accommodate tree structure) structural

timber secured side by side, spaced 50-100mm apart with galvanised steel banding for the full circumference of the trunk and fixed by straps without driving nails or screws into the trunk or branches. This should be installed prior to site establishment and removed after completion of the development.

- A fenced exclusion zone is to be implemented that runs parallel to the western boundary of the property in order to protect as much of the TPZ as feasible for Tree No.'s 8, 9, 10 & 11, while providing a reasonable offset from the proposed granite and pebble area footprints to allow clear access for construction activities (as indicated on the **TREE LOCATION & IMPACT PLAN**, page 18). This exclusion zone must be installed as per **10.2- TREE PROTECTION FENCING**, page 19 of this report.



REV.	TITLE	BY	DATE
A	TREE LOCATION & IMPACT PLAN	LS	24.06.24

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CLIENT
ROBERT GLASSON

PROJECT	NEW POOL & LANDSCAPING		
DRAWING	TREE LOCATION & IMPACT PLAN		
SCALE	NTS @ A4	REPORT ISSUE V1.0	DRAWN BY LS
SHEET NUMBER	TLP-S1	DATE 24.06.24	REVISION A

NORTH

10. TREE PROTECTION PLANNING

10.1 – Engagement of A Project Arborist

The engagement of a Project Arborist is required to oversee and certify tree protection measures implemented prior to any site establishment works and maintained for the duration of the construction process. The Project Arborist is to perform additional site inspections as required at each stage of the development that may impact tree health including supervision of construction works with a tree's measure TPZ, pruning of trees away from construction activities, etc. The Project Arborist should also be notified in the event the protected trees are damaged or are showing signs of decline which may require further management recommendations.

10.2 - Tree Protection Fencing

When required as part of an approved Development Application, tree protection fencing shall be installed prior to site establishment to establish the TPZ for trees to be retained. Tree protection fencing shall be maintained for the duration of the development schedule. The Tree Protection Fencing should enclose as much of the TPZ as can reasonably be fenced off, allowing for pedestrian access and a reasonable offset around the construction footprint and scaffolding. The fencing should be made up of steel with a chain mesh or fence palings with plywood panels that is lockable and a minimum 1.8m in height. All Tree Protection Fencing should be sign posted with a 'no access' instruction and contact details for the Project Manager and Project Arborist. This should all be certified by the Project Arborist.

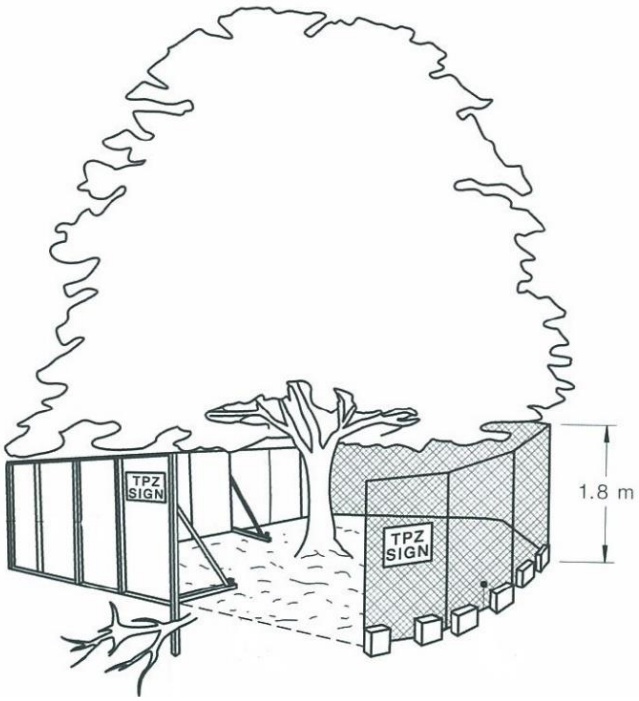


Image from AS 4970 'Protection of Trees on Development Sites'; Standards Australia, 2009

10.3 - Other Tree Protection Measures

Other measures that can assist with the protection of the canopy, trunk, branches, or roots from the risk of damage can include:

- A 100mm layer of approved mulch to be installed to the TPZ.
- A temporary drip irrigation system to be installed to the TPZ.
- Ground protection matting for staff, equipment and machinery access over tree roots.
- Trunk and branch battens and/or wrapping.

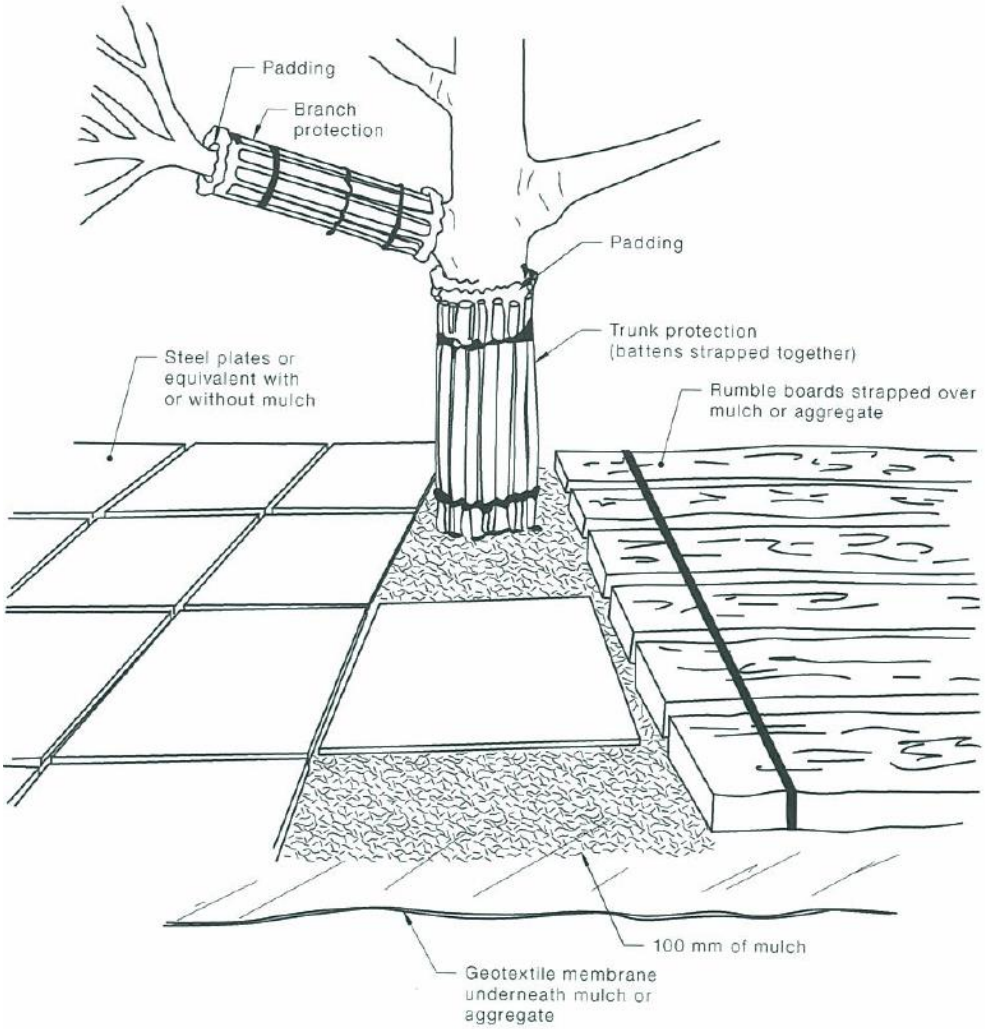


Image from AS 4970 'Protection of Trees on Development Sites'; Standards Australia; 2009

10.4 - Excavation within the TPZ

Excavation within the TPZ should be avoided, however this is not always realistically the case during a development. All efforts to preserve tree root systems should be taken including:

- Supervision from the Project Arborist during excavation.
- Excavation to be completed by hand when reasonable to avoid damage to roots.
- Root mapping may be required prior to excavation and should be completed with the use of either ground penetrating radar, air spade, water laser or by hand excavation; and should be certified by the Project Arborist.
- Where roots >50mm diameter are encountered, alternative construction methods should be considered to ensure roots are not damaged. Allowance should also be made for future root growth.
- Under-boring for services proposed below the root ball of the tree should be considered and certified by the Project Arborist.

10.5 - Fill

All fill material to be placed within the TPZ should be approved prior by the Project Arborist and be interfaced with a large diameter gravel or pebble to provide aeration and percolation to the root zone.

10.6 - Paving

Proposed paved areas within the TPZ That are to be installed on or above grade should ensure to minimise excavation and avoid surface root severance and/or damage. If proposed pavement materials are not permeable or porous, consideration should be given to forms of irrigation to the soil area below where tree roots have been retained.

10.7 - Pruning

All recommended pruning works (including root pruning) should be in accordance with Australian Standard for Pruning of amenity trees (AS4373 - 2007)[a]. If required, roots should be severed with clean sharp implement flush with the face of the excavation and maintained in a moist condition. Root pruning shall be performed under the supervision of the Project Arborist.

10.8 - Tree Removal

Tree removal work shall be carried out by an experienced Arborist in accordance with the NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and holds Public Liability and Workers Compensation insurance. Care shall be taken to avoid damage to trees during the felling operation. Stumps shall be grinded using a mechanical stump grinder to a minimum depth of 300mm without damage to other retained root systems.

10.9 - Tree Damage

In the event of damage to a tree or the TPZ of a tree to be retained, the Project Arborist should be advised in order to provide advice on remedial action. This should be implemented as soon as practicable and certified by the Project Arborist.

10.10 - Post Construction Tree Management

Tree protection fencing with additional trunk and root protection shall be removed following completion of the development schedule. Any mulch layer installed for root protection should be reduced to a 75mm layer and retained on site. In the event of any tree deteriorating in health after the development schedule is complete, the Project Arborist should be engaged to provide advice on any remedial action.

11. GLOSSARY OF INDUSTRY TERMS

1. Crown: The canopy of the tree from the starting point of the tree's first primary lateral.

2. Deadwood: Leaves and branches that have died back and are of an irreversible condition.

3. Epicormic: The growth that occurs at the point of the epicormic bud that become active shoots when reacting to damage or stress in the tree.

4. Flushing: Fast green leaf growth occurring in reaction to ideal or high nutrient conditions for the tree.

5. Tree Protection Zone (TPZ): The area calculated (DBH x 12) as a protective buffer to isolate a tree from construction and excavation disturbance so the tree may remain viable.

6. Structural Root Zone (SRZ): The area calculated ($(DRB \times 50)^{0.42} \times 0.64$) that estimates root growth requiring to be retained for stability of the tree.

7. Encroachment: An activity or disturbance that takes place within proximity to the tree and inside the Tree Protection Zone that has potential for impact to tree health and structure.

8. Visual Tree Assessment (VTA): a non-invasive biomechanically based system of Tree Assessment developed by Claus Mattheck and Helge Breloer, examining the health and structural condition of individual trees.

9. Canker: A symptom of an infectious fungal pathogen that has entered between the bark cambium and heartwood that can display as a discolouration, a depression in the bark, or a wound that continues to attempt to heal but is continuously expanding.

10. Stem taper: The rate of decrease in stem diameter with increasing height from ground level to the highest point of a singular stem canopy point. Symptoms of good stem taper is an obvious, but not disproportionate decrease in stem diameter from root buttress to a height of 1.4m that continues evenly up the stem. Symptoms outside these proportions can be considered as poor taper.

12. REFERENCES

a) Standards Australia; **AS 4373 Pruning of amenity trees;** 2007

b) Standards Australia; **AS 4970 Protection of trees on development sites;** 2009

c) Claus Mattheck; Helge Breloer; **The body language of trees: a handbook for failure analysis;** 1994

d) Jeremy Barrell; **SULE: Its use and status into the New Millennium;** modified paper, 2001

e) Institute of Australian Consulting Arboriculturalists; **IACA Significance of a Tree, Assessment Rating System (STARS)©;** 2010

f) Richard W. Harris; James R. Clark; Nelda P. Matheny; **Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines**; 4th Edition 2004

g) NSW Government; **The SEED Initiative;** 2024

h) Warringah Council (adopted by Northern Beaches Council); **Warringah Development Control Plan**; 2011

i) Warringah Council (adopted by Northern Beaches Council); **Warringah Local Environmental Plan**; 2011

13. PHOTO REFERENCE

Tree 1

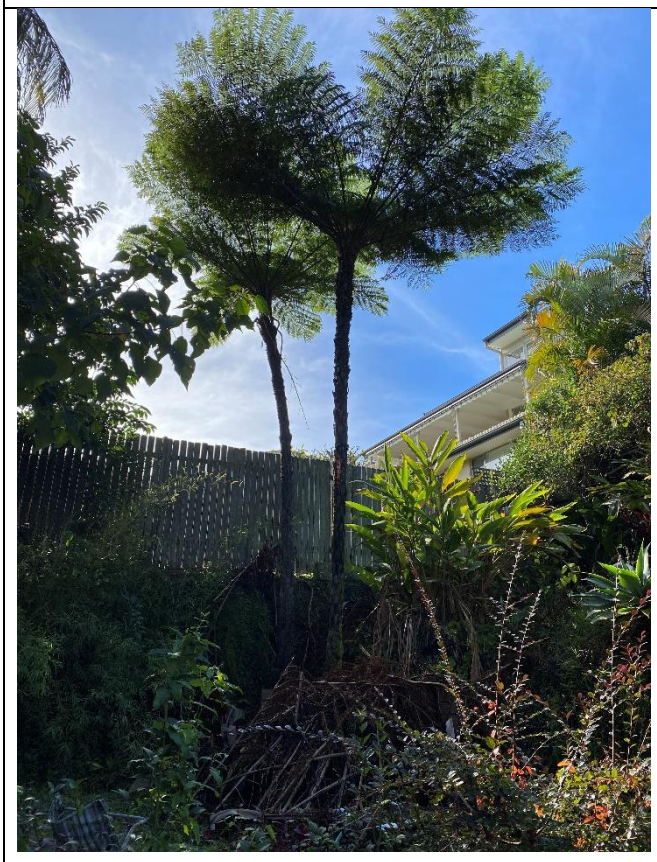
Base of Tree 1

Trees 2, 3, 4 & 5 (Brush Cherry Row)

Lower garden level

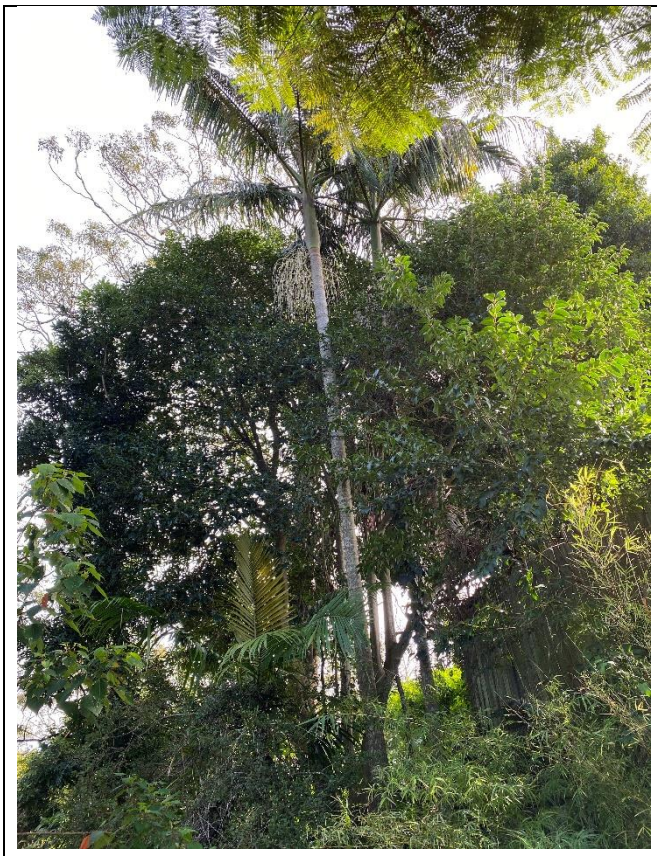
Row of Bamboo client wishes to retain

Trees 6 & 7 (from existing stairs)



Trees 6 & 7 (from lower garden level)

Base of Trees 6 & 7



Trees 8 & 9

Trees 10 & 11