23 PARK AVENUE, AVALON BEACH, NSW

ARBORICULTURAL IMPACT ASSESSMENT

Date 30 November 2022

Client Mrs Helen Owens

LGA Northern Beaches Council

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SELENA HANNAN LANDSCAPE DESIGN

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QUALIFICATIONS OF THE AUTHOR OF THIS REPORT

Selena Hannan, the author of this report, has Arboricultural AQF Level 5 qualification as required by Council:

Diploma Arboriculture (AQF5)
Associate Diploma Applied Science (Landscape)
Advanced Certificate Urban Horticulture

DISCLAIMER

This report is not a hazard or risk assessment report. No aerial or below-ground investigations have been undertaken. The inspection was limited to a visual examination without any dissection, probing, root investigation or other means of investigation. Trees are living structures, are inherently unpredictable and may fail from above-ground and/or below-ground parts. Structural weaknesses may exist within roots, stems and branches. Regular inspections and monitoring are necessary to make informed assessments of trees' condition and development of any problems over time. The recommendations in this report for tree protection aim to reduce risk. However, no responsibility is accepted for damage or injury caused by the trees, nor can responsibility be accepted if the recommendations in this report are not adopted.

1 SUMMARY

i. This report has been commissioned on behalf of the site owner Mrs Helen Owens to accompany a **Development Application to Northern Beaches Council** for proposed works, for alterations and additions to an existing house.

ii. The report is a combined **Preliminary Tree Assessment** and **Arboricultural Impact Assessment** and includes a **Tree Protection Plan and Specification.**

iii. This report is an assessment of seven (7) trees on site.

iv. The site is known as 23 Palm Avenue, Avalon Beach, being Lot 43 in DP 13325 in the Northern Beaches Council LGA. The land is controlled by *Pittwater Local Environmental Plan 2014* (PLEP2014). PLEP2014 and *Pittwater Development Control Plan* (P21DCP) have been referred to in the preparation of this report.

v. *Removing and pruning trees on private land (*Northern Beaches Council website) has been referred to.

vi. Development is proposed for the site, therefore prescribed trees in the vicinity of proposed works were assessed.

vii. The trees' retention values were determined using the STARS© methodology and discussed in this report; the potential impact of construction on trees was assessed; and recommendations have been made for appropriate management and construction methods to enable their viable retention.

viii. The process of assessment, planning and preparation of the report has been undertaken to provide information to other parties with regards tree retention or removal, to minimise impacts on retained trees.

1.1 Landscape Significance ratings (LS)

i. Two (2) trees are rated with High Landscape Significance.

ii. Five (5) trees/palms are rated with Low Landscape Significance.

1.2 Retention Value ratings (RV)

i. One (1) tree is rated with a High Retention Value, Tree 7. This tree is to be retained in the proposal. Tree-sensitive design and construction methods shall be adopted for works within the Tree Protection Zones.

ii. One (1) tree, Tree 6, which is rated with High Retention Value is also defined as Exempt because the tree is 'located within 2 metres of an existing approved building' trees (*Removing and pruning trees on private land (*Northern Beaches Council website). This tree can be removed without Council permission, or it can be retained if desired.

iii. Five (5) trees have Low Retention Value, Trees 1, 2, 3, 4 and 5. All are Exempt species under Council's DCP.

1.3 Trees to be retained and removed

i. **Seven (7) trees on site were assessed**.

ii. Seven (7) trees are to be retained in the proposal, Trees 1, 2, 3, 4, 5, 6, 7.

iii. **No (0) trees are proposed to be removed**.

iv. **Trees 1, 2, 3 and 4** are Bangalow Palms near the back decking and steps, the roots and canopies of which will not be impacted by the proposed works of minor alterations to the deck. These palms are Exempt species. No further discussion re these trees.

v. **Tree 5 is proposed to be retained.** Tree 5 may be potentially impacted by proposed development within its Tree Protection Zone**.** Potential impacts to the canopy and roots are described in **Section 6.3** and **Section 8: Tree Protection Plan and Specification.**

vi. **Tree 6 is proposed to be retained** with impact to the canopy of the tree by the proposed development. This tree should be protected during works by the erection of Tree Protection Fencing and other stem and ground protection methods. Potential impacts to the canopy and roots are described in **Section 6.4,** and protection is described in **Section 8: Tree Protection Plan and Specification.**

vii. **Tree 7 is proposed to be retained** with minor impact to the canopy of the tree by the proposed development. This tree should be protected during works by the erection of Tree Protection Fencing and other stem and ground protection methods. Potential impacts to the canopy and roots are described in **Section 6.5,** and protection is described in **Section 8: Tree Protection Plan and Specification.**

viii. All care must be taken during demolition of parts of the house and construction of the new additions to the house, to not damage canopy or roots of retained trees, to preserve the trees' vigour and condition, and to not cause or accelerate the trees' decline or cause the failure of the trees.

ix. No trenching for services or other excavation, piers, or footings, and/or additional structures above ground, shall be approved in the TPZ of any trees unless it can be proven than the impact on roots is negligible. This may necessitate below-ground root investigation prior to design or installation of services/structures to determine the potential impact on the tree/trees and may not be possible – the viability and stability of a retained tree will depend on the size, number and location of roots that may be required to be severed.

1.4 Tree protection and specification

i. All trees to be retained should be protected to exclude works in their Tree Protection Zones as much as practical. Tree Protection Fencing is required to be erected and kept in place for the duration of construction works.

ii. **Additional stem and ground protection will be required** since most building work and activity will be inside the Tree Protection Zones and exclusion fencing will not be able to sufficiently enclose the TPZs to exclude works from the TPZs. **Refer to Diagrams 1, 2 and 3 in Section 8 Tree Protection Plan and Specification.**

iii. Builders must be told not to dump waste materials in the garden, damage any trees, store materials in the TPZ of trees, cause soil compaction etc. **Refer to Section 8** and **Tree Protection Plans TPP-01 (Appendix E).**

1.5 Pruning

Trees 6 and 7 will require pruning to clear the proposed upper floor as described in Sections 6.4 and 6.5.

All pruning that is required shall be carried out as per *Standards Australia 2007*, *Pruning of Amenity Trees*, *AS 4373-2007.*

1.6 Monitoring

All retained site trees should be monitored regularly (annually) by an experienced, qualified arborist to note any change in their vigour and development of defects.

2 INTRODUCTION

2.1 Reason for the report

i. This report has been commissioned on behalf of the site owner Mrs Helen Owens to accompany a **Development Application to Northern Beaches Council** for proposed works for alterations and additions to an existing house.

ii. The report is a combined **Preliminary Tree Assessment** and **Arboricultural Impact Assessment** and includes a **Tree Protection Plan and Specification.**

2.2 Aims of the report

The aims of this report are to:

- Provide relevant information to the clients, architect and Northern Beaches Council regarding trees located in areas of the site and/or on properties adjacent to the site, in proximity to proposed development.
- Assess the dimensions, health, condition, and other characteristics of subject trees, including any obvious defective structures.
- From the collected data, determine retention values, useful life expectancies, and the contribution to the site in terms of significance and amenity, of subject trees.
- Provide planning and design options to prevent unnecessary removal of trees and to minimise impacts on retained trees.
- Comply with the requirements of *Australian Standard AS 4970 -2009 Protection of Trees on Development Sites.*
- Comply with the requirements of *Australian Standard AS 4373 – 2007 Pruning of Amenity Trees.*
- Describe the subject trees that are proposed to be retained and protected, and trees proposed to be removed, based on the plans for proposed development.
- Review development plans and the impact on trees to be retained. These are detailed in **Section 6** of the report**.**
- Describe the location of tree protection measures to be installed. These are described in **Section 8: Tree Protection Plan and Specification,** and **Tree Protecton Plan TPP 01 (Appendix E).**
- Make recommendations for tree sensitive construction methods to be undertaken when working within the Tree Protection Zones of trees to be retained. These are described in **Section 6: Proposed Development and Impacts on Trees.**

2.3 Proposed development – refer to Tree Protection Plan TPP-01 (Appendix E)

Proposed work includes alterations and addition to an existing house – upper floor added, and ground floor verandah partially enclosed.

2.4 The site, and relevant development controls

The site is known as 23 Palm Avenue, Avalon Beach, being Lot 43 in DP 13325 in the Northern Beaches Council LGA.

The land is controlled by Pittwater Local Environmental Plan 2014 (PLEP2014).

PLEP2014 and Pittwater Development Control Plan (P21DCP) have been referred to in the preparation of this report.

- Trees within the area of the site that are prescribed, within the vicinity of proposed works, have been assessed.
- The site is zoned C4 Environmental Living.
- The exempt tree species list was referred to.
- Site trees at the rear of the property are of Pittwater and Wagstaffe Spotted Gum Forest Endangered Ecological Community (EEC) as listed in Schedule 2 of the Biodiversity Conservation Act (2016).

2.5 Site location and description

The site shares side boundaries with residential properties. Existing structures include a single storey timber-clad residence, carport, and unpaved gravel driveway. The site supports mature *Angophora costata* trees in the front yard, mature exotic and native trees, scattered plantings of exotic palms and shrubs, and lawn in front and back yards.

The site is exposed to winds from North, East and South, and is somewhat protected from winds from the West.

The area is described on the **Tree Location Plan TLP 01 (Appendix D)** of this report, based on the site plan.

Figure 1: Aerial view of the site - approximate boundaries in yellow (Google Earth)

3 METHOD

3.1 Trees on development sites

This report refers to the Australian Standard *Protection of Trees on Development Sites AS4970-2009* for the principles for protecting trees on land subject to development.

3.2 Visual Tree Assessment (VTA)

Site inspection on 21 November 2022 was undertaken to assess trees from ground level only. No aerial inspections were made. A Stage 1 Visual Tree Assessment (VTA) of the biological and mechanical characteristics of the tree was undertaken (Mattheck, Bethge and Weber 2015). **The VTA results are included in Tree Assessment Schedule (Appendix A).**

Observations from ground level included, but were not limited to:

- Species identification and tree characteristics.
- Dimensions – height estimated by eye, canopy spread with tape measure,
- Diameter of the stem at breast height of 1.4 metres above ground level at the base of tree (DBH), and diameter of the stem at the base, above the root flare, (DAB) were determined by measuring the circumference with tape at these points, then by calculation.
- Canopy health and condition – foliage density, size and colour; location, size and quantity of dieback; deadwood; epicormic growth; and signs of stress.
- Branches – signs of structural defects, insect and animal activity, and disease. Previous pruning was noted.
- Stem – the base of the stem and root crown area was inspected for signs of cavities, wounds, decay, basal flare, degree of lean, soil upheaval, root damage, surface roots and structural defects.

3.3 Other site observations

- Proximity of trees to buildings and structures.
- Aspect and protection/exposure to prevailing winds.
- Species, dimensions and location of other trees and vegetation in the trees' proximity.
- Signs of erosion, recent excavation, construction works, and level changes.
- Site usage by people and vehicles.

3.4 Summary of assessment methodologies

Type of assessment	Description	Source	Appendix/Location
VTA	Visual Tree Assessment (VTA) of the biological and mechanical characteristics of trees was undertaken (Mattheck, Bethge and Weber)	Mattheck, Bethge and Weber (2015)	Appendix A
ULE	Useful Life Expectancy (ULE) categories (updated 01/04/01)	Barrell, Jeremy (2001)	Appendix B
Landscape Significance LS	IACA Significance of a Tree, Assessment Rating System (STARS) © based on tree condition and form; heritage, ecological and amenity values; was applied according to the assessment criteria.	IACA Significance of a Tree, Assessment Rating System (STARS)© Institute of Australian Consulting Arborists (IACA 2010)©	Appendix C
Retention Value RV	IACA Significance of a Tree, Assessment Rating System (STARS)© Table 1.0 Tree Retention Value – Priority Matrix combines the Landscape Significance rating with Estimated Life Expectancy (ULE), to determine Retention Value (RV).	IACA Significance of a Tree, Assessment Rating System (STARS)© Institute of Australian Consulting Arborists (IACA 2010)©	Appendix C
TPZ	Tree Protection Zones were calculated from the DBH of trees, where relevant	AS4970-2009	Appendix A
SRZ	Structural Root Zones were calculated from the DAB of trees where relevant.	AS4970-2009	Appendix A

3.5 Plans and diagrams

The following plans and drawings were relied upon for this arboricultural assessment.

Author	Title	Reference	Date	Drawing Number and Version
JJ Drafting	Plans, Elevations and Sections	923/21	30.9.2022	Rev. E

4 RESULTS AND OBSERVATIONS

4.1 Visual Tree Assessment (VTA)

Detailed VTA results are listed in **Tree Assessment Schedule (Appendix A).**

4.2 Tree Significance Schedule and Tree Retention Schedule

The following is a summary of assessed and determined values, as per the methodology outlined in 3.5.

Tree No.	Species Name	Common Name	ULE	Landscape Signific-ance (LS)	Retention Value (RV)	TPZ (m)	SRZ (m)	ACTION DUE TO PROPOSED WORKS
1	Archontophoenix cunninghamiana	Bangalow Palm	2A	M	L/E	3	-	**RETAIN** NO IMPACT
2	Archontophoenix cunninghamiana	Bangalow Palm	2A	M	L/E	3	-	**RETAIN** NO IMPACT
3	Archontophoenix cunninghamiana	Bangalow Palm	2A	M	L/E	3	-	**RETAIN** NO IMPACT
4	Archontophoenix cunninghamiana	Bangalow Palm	2A	M	L/E	3	-	**RETAIN** NO IMPACT
5	Liquidambar styraciflua	Liquidambar	3B	M	L/E	5.0	2.4	**RETAIN** MINOR IMPACT
6	Angophora costata	Sydney Red Gum	2B	H	H/E	4.2	2.6	**RETAIN**, PRUNING REQUIRED TO CLEAR PROPOSED ADDITION
7	Angophora costata	Sydney Red Gum	2B	H	H	7.2	2.9	**RETAIN,** MINOR MINOR PRUNING REQUIRED

KEY

***** Tree located on neighbouring property / property owned by others / Council tree on nature strip.

? Further investigation recommended, or difficult to inspect, therefore difficult to assign accurate value at this stage.

H High Retention Value **M** Medium Retention Value **L** Low Retention Value **R** Removal recommended **E** Exempt

TPZ Tree Protection Zone and **SRZ** Structural Root Zone, radial distances in metre from tree centre, included where relevant.

4.3 Local native tree species

Site trees at the rear of the property are of Pittwater and Wagstaffe Spotted Gum Forest Endangered Ecological Community (EEC) as listed in Schedule 2 of the Biodiversity Conservation Act (2016).

4.1 Exempt trees

Trees 1, 2, 3, 4 and 5 are Exempt due to the species' inclusion on the Exempt Tree Species List as per *Removing and pruning trees on private land (*Northern Beaches Council website).

Tree 6 is Exempt due to the tree being located within 2 metres of an 'existing approved dwelling' as per *Removing and pruning trees on private land (*Northern Beaches Council website).

5 Discussion – description of trees

5.1 Trees 1,2,3,4 *Archontophoenix cunninghamiana* (Bangalow Palm)

Figure 2: The four Bangalow Palms are to be retained. Minor changes to the deck are proposed but there is no alteration to the existing footprint of the deck in the vicinity of the palms.

5.1 Tree 5 *Liquidambar styraciflua* (Liquidambar)

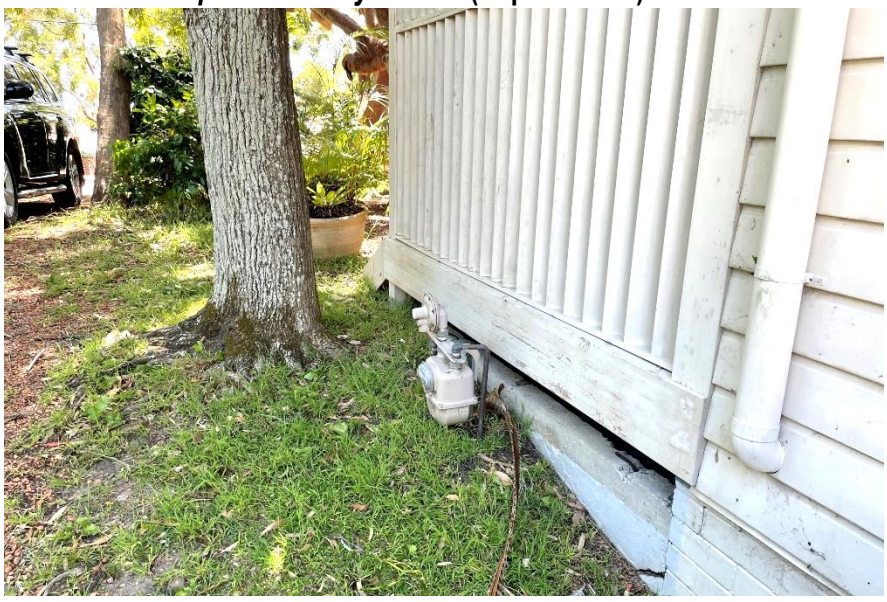


Figure 3: Tree 5, Liquidambar, is around 500mm from the existing house. The tree could be retained for the short to medium term if roots are not required to be cut, which may affect its stability and vigour (ie cutting roots may cause the tree to fail, or cause reduced overall vigour). However, the tree stem will probably conflict with the building when it increases in girth and its roots may cause movement to footings in time, therefore the tree would be required to be removed when it becomes a problem. The tree offers some amenity currently by protecting the house from Westerly winds and provides shade from the West. Surface roots, girdle roots noted around the base of the tree. Any excavation should first explore root location before decisions regarding excavation can be made to prevent excessive root cutting, if the tree is to be retained.

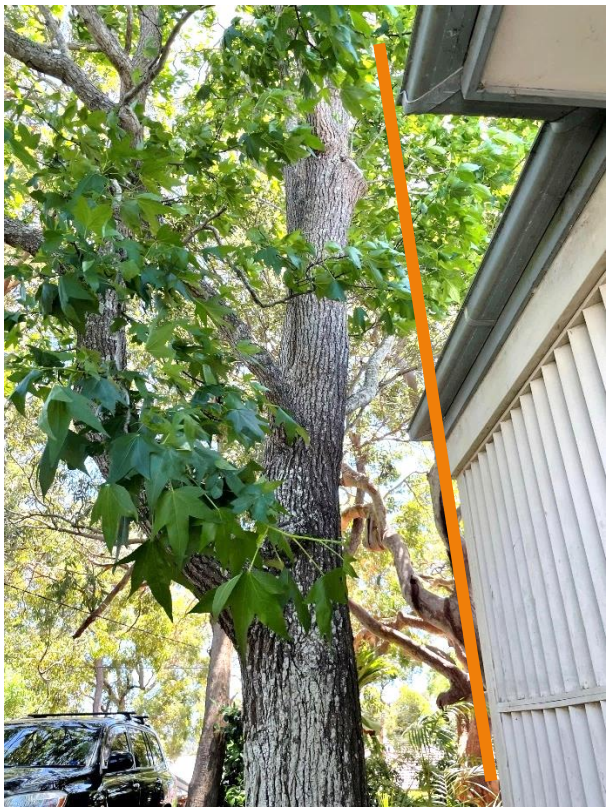


Figure 4: The Liquidambar is currently required to be frequently pruned to clear the existing house. When the additional floor that is proposed is built, this pruning will continue to be required (orange line indicates pruning line).

5.2 Tree 6 *Angophora costata* (Sydney Red Gum)

Figure 5: Tree 6 showing proximity to house and carport. The tree is Exempt due to being 'located within 2 metres of an approved building'. Approximately 30% of the canopy of the tree is growing over the roof of the house. Refer to Section 6 for pruning points.

5.3 Tree 7 *Angophora costata* (Sydney Red Gum)

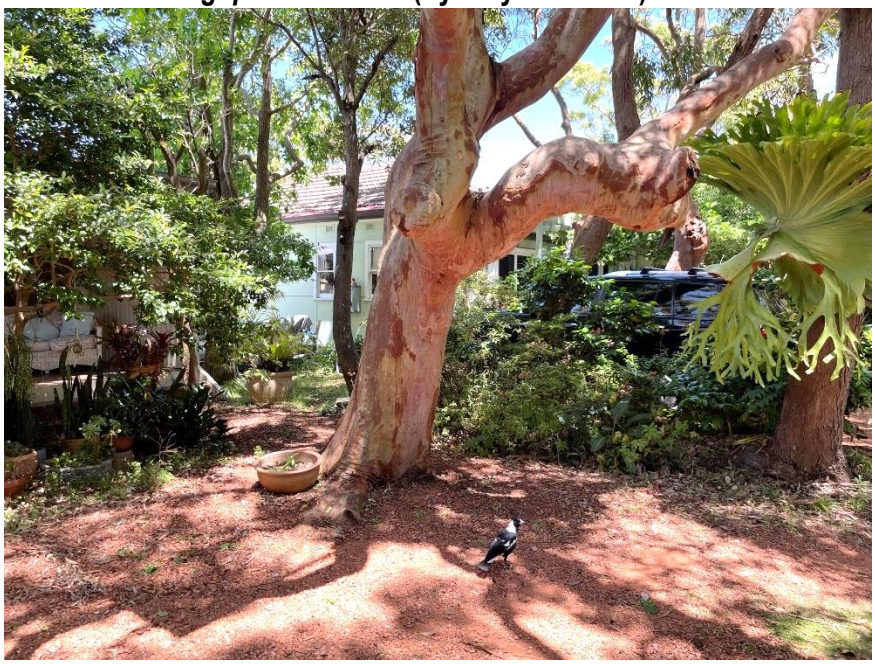


Figure 6: Tree 7 is adjacent to the existing permeable gravel driveway. Refer to Section 6 for proposed pruning.

5.4 Landscape Significance ratings (LS)

i. Two (2) trees are rated with High Landscape Significance.

ii. Five (5) trees/palms are rated with Low Landscape Significance.

5.5 Retention Value ratings (RV)

i. Two (2) trees have a High Retention Value, Trees 6 and 7. These trees are to be retained in the proposal. Tree-sensitive design and construction methods shall be adopted for works within the Tree Protection Zones. Tree 6 is also defined as Exempt under *Removing and pruning trees on private land (*Northern Beaches Council website).

ii. Five (5) trees have Low Retention Value, Trees 1, 2, 3, 4 and 5. All are Exempt species under Council's DCP.

iii. Trees assigned High Retention Value are recommended to be retained as a priority. This may require design, placement of buildings and infrastructure to minimise any adverse impact with respect to the Tree Protection Zones. The extent of the canopy with regards to proposed development building height must be considered in site and building design and placement, and significant pruning of canopy or roots of these trees is not generally acceptable.

iv. Trees with Medium Retention Value may be retained and protected, however are less critical for retention. Their retention should remain a priority, however, and removal considered only if all planning and design options for building and other structures have been considered.

v. Trees with Low Retention Value are not considered to be important for retention, and do not require special planning considerations to be implemented to enable their retention.

5.6 Tree Protection Zone (TPZ) and Structural Root Zone (SRZ)

- **Table 4.2 Tree Significance Schedule** lists the calculated TPZ and SRZ for all trees.
- **Tree Location Plan TLP 01 (Appendix D)** shows the location and numbering of all assessed trees.

- **Tree Protection Plan TPP-01 (Appendix E)** show the TPZs of trees to be retained in the proposal.
- Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) are areas described by a radial distance measured from the centre of the trees, based on calculations determined from Australian Standard *Protection of trees on development sites 4970-2009.*
- The TPZ is defined as 'a specified area above and below ground, and at a given distance from the trunk, set aside for the protection of a tree's roots and crown, to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development'.
- The TPZ is an area within which construction of buildings and other structures, trenching, soil level changes, use of machinery, storage of site materials, at minimum, should be excluded. The TPZ is the theoretical minimum area which is required for maintaining a viable tree.
- The SRZ is defined as 'the area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area'.
- The SRZ is an area within which no excavation or construction should encroach. The SRZ is the area in which roots required for stability are typically found. If an encroachment is considered into the SRZ then this must be proven to be of no impact to the structural roots, by preliminary root mapping.

5.7 Estimating impacts of development on trees – TPZ encroachment

- Some encroachment into the TPZ may be possible depending on site conditions and tree location, species, age, vigour, condition, and canopy spread, presence of existing structures (or other trees) that may be limiting or affecting root growth.
- A 10% encroachment into the TPZ may be allowable, provided there is compensatory area contiguous to the TPZ – this may be advised on a site- and tree-specific basis.
- Encroachments over 10% into the TPZ, if contemplated, may require preliminary root mapping to determine the potential impact on the tree and may not be possible – the viability and stability of a retained tree will depend on the size, number and location of roots that may be required to be severed in the proposal.
- A major encroachment is between 15 – 35% of the TPZ (root zone) impacted. Tree sensitive design must be adopted if a major encroachment into a TPZ is contemplated.
- A marginal encroachment of between 10-15% without undertaking root mapping may be acceptable, but this will depend upon a tree's vigour and tolerance to root disturbance.

5.8 Clause 3.3.4 of AS4970

Clause 3.3.4 from the *Australian Standard for Protection of trees on development sites AS4970 2009* includes considerations for assessing encroachments into the TPZ:

- Species' tolerance to root disturbance,
- Age and vigour of tree,
- The presence of existing or past structures or obstacles which may affect root growth,

- Adoption of tree-sensitive construction methods such as pier and beam, suspended slabs, discontinuous footings that would minimise impact on root systems.

6 PROPOSED DEVELOPMENT, AND IMPACTS ON TREES

6.1 Proposed development – refer to Tree Protection Plan TPP-01 (Appendix E)

Proposed work includes:

- Alterations and addition to an existing house – upper floor added, and ground floor verandah partially enclosed.

6.2 Trees to be retained and removed

i. **Seven (7) trees on site were assessed**.

ii. Seven (7) trees are to be retained in the proposal, Trees 1, 2, 3, 4, 5, 6, 7.

iii. **No (0) trees are proposed to be removed**.

iv. **Trees 1, 2, 3 and 4** are Bangalow Palms near the back decking and steps, the roots and canopies of which will not be impacted by the proposed works of minor alterations to the deck. These palms are Exempt species. No further discussion re these trees.

v. Tree 5 is proposed to be retained. Tree 5 may be potentially impacted by proposed development within its Tree Protection Zone**.** Potential impacts to the canopy and roots are described in **Section 6.3** and **Section 8: Tree Protection Plan and Specification.**

vi. Tree 6 is proposed to be retained with impact to the canopy of the tree by the proposed development. This tree should be protected during works by the erection of Tree Protection Fencing and other stem and ground protection methods. Potential impacts to the canopy and roots are described in **Section 6.4,** and protection is described in **Section 8: Tree Protection Plan and Specification.**

vii. Tree 7 is proposed to be retained with minor impact to the canopy of the tree by the proposed development. This tree should be protected during works by the erection of Tree Protection Fencing and other stem and ground protection methods. Potential impacts to the canopy and roots are described in **Section 6.5,** and protection is described in **Section 8: Tree Protection Plan and Specification.**

viii. All care must be taken during demolition of parts of the house and construction of the new additions to the house, to not damage canopy or roots of retained trees, to preserve the trees' vigour and condition, and to not cause or accelerate the trees' decline or cause the failure of the trees.

ix. No trenching for services or other excavation, piers, or footings, and/or additional structures above ground, shall be approved in the TPZ of any trees unless it can be proven than the impact on roots is negligible. This may necessitate below-ground root investigation prior to design or installation of services/structures to determine the potential impact on the tree/trees and may not be possible – the viability and stability of a retained tree will depend on the size, number and location of roots that may be required to be severed.

6.3 Impacts of proposed work near Tree 5 *Liquidambar styraciflua* (Liquidambar)

i. The TPZ of Tree 5 is a circular area described by a 5.0 metre radius measured from the centre of the tree.

ii. The SRZ of Tree 5 is a circular area described by a 2.4 metre radius measured from the centre of the tree.

iii. Theoretical potential impact is 25 sqm of the TPZ area of 79 sqm (32% encroachment) for construction of the new addition of an upper floor and new steps to access the upper floor.

iv. The proposed new steps are within the SRZ.

v. The proposed works are a theoretical major impact, therefore excavation for posts for the new steps shall be managed carefully to not damage roots, which may destabilise the tree or cause it to lose vigour.

vi. Preliminary investigative hand-excavation will be needed to decide on the final location of posts, to prevent excessive root cutting or damage.

vii. Construction of the upper floor will require pruning of the tree canopy on the east side to clear the structure. This is not expected to have a significant additional impact, because the pruning will be where it has previously been undertaken and is mainly of small diameter regrowth branches.

viii. Note that the tree stem will probably conflict with the building when it increases in girth and its roots may cause movement to footings in time, therefore the tree would be required to be removed when it becomes a problem.

ix. The tree is an Exempt species and may be removed without requiring Council permission under current DCP.

6.4 Impacts of proposed work near Tree 6 *Angophora costata* (Sydney Red Gum)

i. The TPZ of Tree 6 is a circular area described by a 4.2 metre radius measured from the centre of the tree.

ii. The SRZ of Tree 6 is a circular area described by a 2.6 metre radius measured from the centre of the tree.

iii. Theoretical potential impact is 8 sqm of the TPZ area of 55 sqm (15% encroachment) for construction of the new addition of an upper floor. The proposed works impact the canopy of the tree. The roots should not be impacted as there are no proposed alterations to the building footprint on the ground level.

iv. Construction of the upper floor will require approximately 30% of the tree canopy to be removed. **Refer to Figures 7 and 8 for proposed pruning points.**

v. The tree shall be required to be well irrigated after the pruning to encourage compartmentalisation and callousing to avoid decay in the wounds. Creating large wounds may potentially shorten the useful life of the tree.

vi. Note that the tree is less than 2 metres (1600 mm) from the existing house, an approved building, which defines the tree as Exempt under *Removing and pruning trees on private land (*Northern Beaches Council website).

vii. Do not apply wound paint to the tree wounds. The pruning work shall be done by experienced, qualified climbing arborists with minimum AQF3, to *Australian Standard AS4373-2007 Pruning of Amenity Trees.*

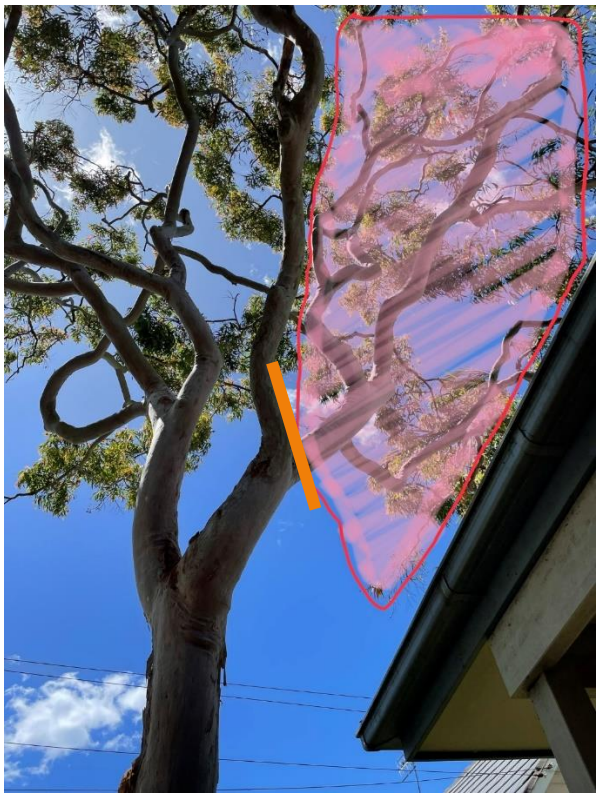


Figure 7: The canopy of Tree 6 to be removed (pink shading) is to be cut back to the branch collar as shown (orange line). The branch to be removed is 230mm diameter branch at the branch collar. The branch is 6 metres above ground level and heads South, from the South side of the tree. The tree shall be required to be pruned to the branch collar as stipulated in Crown Modification: 7.3.2 Reduction Pruning in Australian Standard AS4373-2007 Pruning of Amenity Trees.

Figure 8: Different view of the branch to be removed (as shown in Figure 7) from Tree 6, plus an additional smaller branch to also be removed for clearance. The canopy to be removed (pink shading) is to be cut back to the branch collars as shown (orange lines). The larger branch to be removed is 230mm diameter at the branch collar. The smaller branch in the lower part of the Figure is approx. 80mm diameter, a minor impact. The tree shall be required to be pruned to the branch collars as stipulated in Crown Modification: 7.3.2 Reduction Pruning in Australian Standard AS4373-2007 Pruning of Amenity Trees.

6.5 Impacts of proposed work near Tree 7 *Angophora costata* (Sydney Red Gum)

i. The TPZ of Tree 7 is a circular area described by a 7.2 metre radius measured from the centre of the tree.

ii. The SRZ of Tree 7 is a circular area described by a 2.9 metre radius measured from the centre of the tree.

iii. Theoretical potential impact is 16 sqm of the TPZ area of 163 sqm (10% encroachment) for construction of the new addition of an upper floor. The proposed works to remove small branches that will conflict with the building works are a minor impact to the canopy of the tree. The roots should not be impacted as there are no proposed alterations to the building footprint on the ground level.

iv. Construction of the upper floor will require approximately <5% of the tree canopy to be removed. **Refer to Figure 9 proposed pruning points.**

v. The tree shall be required to be well irrigated after the pruning to encourage compartmentalisation and callousing to avoid decay in the wounds. Creating large wounds may potentially shorten the useful life of the tree.

vi. Do not apply wound paint to the tree wounds. The pruning work shall be done by experienced, qualified climbing arborists with minimum AQF3, to *Australian Standard AS4373-2007 Pruning of Amenity Trees.*

Figure 9: Showing minor removal of canopy of Tree 7 to clear building (pink shaded area).

6.6 Additional comments for works in the vicinity of all retained trees

i. Protect roots under the driveway within the TPZ of retained trees during construction.

ii. Arborist supervision during excavation for piers within TPZs, discontinuous footings and/or pier and bridge footings if required, are to be adopted for works within the Tree Protection Zones.

iii. Roots shall not be torn or removed with an excavator or other machinery, or otherwise damaged within the TPZs.

iv. No excavation, scraping of the surface, or compaction of the driveway will be allowed.

v. Refer to **Section 8: Tree Protection** recommendations.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Landscape Significance ratings (LS)

i. Two (2) trees are rated with High Landscape Significance.

ii. Five (5) trees/palms are rated with Low Landscape Significance.

7.2 Retention Value ratings (RV)

i. One (1) tree is rated with a High Retention Value, Tree 7. This tree is to be retained in the proposal. Tree-sensitive design and construction methods shall be adopted for works within the Tree Protection Zones.

ii. One (1) tree, Tree 6, which is rated with High Retention Value is also defined as Exempt because the tree is 'located within 2 metres of an existing approved building' trees (*Removing and pruning trees on private land (*Northern Beaches Council website).

iii. Five (5) trees have Low Retention Value, Trees 1, 2, 3, 4 and 5. All are Exempt species under Council's DCP.

7.3 Trees to be retained and removed

i. **Seven (7) trees on site were assessed**.

ii. Seven (7) trees are to be retained in the proposal, Trees 1, 2, 3, 4, 5, 6, 7.

iii. **No (0) trees are proposed to be removed**.

iv. **Trees 1, 2, 3 and 4** are Bangalow Palms near the back decking and steps, the roots and canopies of which will not be impacted by the proposed works of minor alterations to the deck. These palms are Exempt species. No further discussion re these trees.

v. Tree 5 is proposed to be retained. Tree 5 may be potentially impacted by proposed development within its Tree Protection Zone**.** Potential impacts to the canopy and roots are described in **Section 6.3** and **Section 8: Tree Protection Plan and Specification.**

vi. Tree 6 is proposed to be retained with impact to the canopy of the tree by the proposed development. This tree should be protected during works by the erection of Tree Protection Fencing and other stem and ground protection methods. Potential impacts to the canopy and roots are described in **Section 6.4,** and protection is described in **Section 8: Tree Protection Plan and Specification.**

vii. Tree 7 is proposed to be retained with minor impact to the canopy of the tree by the proposed development. This tree should be protected during works by the erection of Tree Protection Fencing and other stem and ground protection

methods. Potential impacts to the canopy and roots are described in **Section 6.5,** and protection is described in **Section 8: Tree Protection Plan and Specification.**

viii. All care must be taken during demolition of parts of the house and construction of the new additions to the house, to not damage canopy or roots of retained trees, to preserve the trees' vigour and condition, and to not cause or accelerate the trees' decline or cause the failure of the trees.

ix. No trenching for services or other excavation, piers, or footings, and/or additional structures above ground, shall be approved in the TPZ of any trees unless it can be proven than the impact on roots is negligible. This may necessitate below-ground root investigation prior to design or installation of services/structures to determine the potential impact on the tree/trees and may not be possible – the viability and stability of a retained tree will depend on the size, number and location of roots that may be required to be severed.

7.4 Tree protection and specification

i. All trees to be retained should be protected to exclude works in their Tree Protection Zones as much as practical. Tree Protection Fencing is required to be erected and kept in place for the duration of construction works.

ii. **Additional stem and ground protection will be required** since most building work and activity will be inside the Tree Protection Zones and exclusion fencing will not be able to sufficiently enclose the TPZs to exclude works from the TPZs. **Refer to Diagrams 1, 2 and 3 in Section 8 Tree Protection Plan and Specification.**

iii. Builders must be told not to dump waste materials in the garden, damage any trees, store materials in the TPZ of trees, cause soil compaction etc. **Refer to Section 8** and **Tree Protection Plans TPP-01 (Appendix E).**

7.5 Pruning

All pruning that is required shall be carried out as per *Standards Australia 2007*, *Pruning of Amenity Trees*, *AS 4373-2007.*

7.6 Monitoring

All retained site trees should be monitored regularly (annually) by an experienced, qualified arborist to note any change in their vigour and development of defects.

8 TREE PROTECTION PLAN AND SPECIFICATION

8.1 Introduction

This section provides general **Tree Protection Plan and Specification** measures for tree protection works to be implemented at the proposed development, as described in the **Arboricultural Impact Assessment**.

Previous sections of the **Arboricultural Impact Assessment** examined the impact on trees to be retained and removed and provided recommendations as to how the site may be managed to minimise negative impacts by construction on trees to be retained.

All works are to comply with the requirements of *Australian Standard Protection of Trees on Development Sites AS 4970-2009.*

8.2 Aims

The aims of this Tree Protection Plan and Specification are to:

- identify the responsibilities of the project arborist for site developers and managers, and to
- specify general tree protection works that are required to protect trees retained on the proposed development site.

8.3 The role of the project arborist

An AQF5-qualified consulting arborist (hereafter referred to as 'the project arborist') may be required by certifying authorities to:

- inspect and assess and supervise works within the TPZ of trees,
- specify and supervise any pruning works,
- specify and monitor compliance of tree protection measures,
- specify and certify remediation works, and to
- provide written statement of compliance at specific milestones in accordance with AS4970- 2009.

8.4 Scope of works for the project arborist

PRE-CONSTRUCTION

The project arborist is to:

- Mark trees for pruning, retention, removal, or transplanting, with reference to approved plans and documentation.
- Specify all pruning works.
- Certify all pruning, removal and transplanting on completion of these works.
- Tree Protection: The Project arborist shall certify that all tree protection measures have been installed in compliance with the Tree Protection Plan and Specification.

THROUGHOUT THE CONSTRUCTION PROCESS.

The project arborist may be required to provide reports and/or certification to Council at the following specific hold-points/milestones:

- Completion of site establishment.
- Installation of services.
- Installation of footings or slabs.
- Erection of scaffolding, if required, near trees.
- Works within Tree Protection Zones.

POST- CONSTRUCTION CERTIFICATION

At completion of the defect liability period, the project arborist may be required to certify that all tree protection measures throughout the construction and landscaping works have complied with all plans, specifications, and reports prepared by the project arborist and with the Conditions as specified in Development Application approval/Notification of Determination Conditions of Consent.

8.5 Tree Protection Plans and Details

- Erection of Tree Protection Fencing to enclose a practical TPZ exclusion area for trees prior to any works on the site.
- Work in the vicinity of the retained trees will require additional care and supervision by project arborist so as not to damage the roots within the TPZ during demolition and excavation.

- Sediment control devices may be required to be installed within the on the line of the Tree Protection Fencing, to prevent runoff of construction pollutants or other sediment onto site vegetation.

8.6 Refer to Tree Location Plan TLP-01 (Appendix D) for:

- location of assessed trees, tree numbers, spot levels at the base of trees, assessed canopy sizes and shape.

8.7 Refer to Tree Protection Plan TPP-01 (Appendix E) for:

- location of trees to be retained and protected,
- location and levels of proposed works,
- SRZ and TPZ of retained trees.

8.8 Pre-construction scope of works

- Prior to any construction works, the project arborist is to:
- Mark trees for pruning, retention, removal, or transplanting, with reference to approved plans and documentation.
- Specify (and supervise, if required) pruning works.
- Certify all pruning and tree removal on completion of these works.
- Supervise installation of tree protection measures and certify that all tree protection measures have been installed in compliance with the Tree Protection Plan and Specification.

PRUNING AND TREE REMOVAL

- Approved tree removal and pruning works are to be carried out before the installation of TPF and other protection measures such as may be required when scaffolding is to be installed within the TPZ.
- The project arborist shall mark trees for pruning, retention, removal, or transplanting, with reference to approved plans and documentation.
- The project arborist shall supervise any pruning required and tree removal works.
- Pruning works are to be carried out as per AS4373-2007.
- Tree removal work shall not damage trees to be retained.
- Vehicles used for tree removal works may require limited movement within TPZs. The arborist is to supervise.
- Stumps to be removed within a TPZ must be removed to not damage or disturb roots of trees to be retained. The arborist is to supervise.

INSTALLATION OF TREE PROTECTION FENCING

- Refer to Diagrams 1 to 3 for types of fencing, and additional ground protection measures if required.
- The TPZ is a restricted area and TPF is to be installed prior to site establishment.
- The TPF is to be retained intact until works are completed.
- Permission for works within the TPZ must be sought and approved by Ku-ring-gai Council.
- These works are to be supervised by the project arborist, and any additional works that may arise during the progress of site works must be reviewed by the project arborist and be acceptable to Council before the works are carried out. Failure to do this proactively may result in the arborist being unable to certify the works.

ACTIVITIES THAT ARE RESTRICTED FROM WITHIN THE TPZ (AS PER AS4970-2009)

- Machine excavation including trenching
- Excavation for silt fencing
- Cultivation

- Storage
- Preparation of chemicals, including preparation of cement products
- Parking of vehicles and plant
- Re-fueling
- Dumping of waste
- Wash-down and cleaning of equipment
- Lighting of fires
- Soil level changes
- Temporary or permanent installation of utilities and signs, and
- Physical damage to the tree.

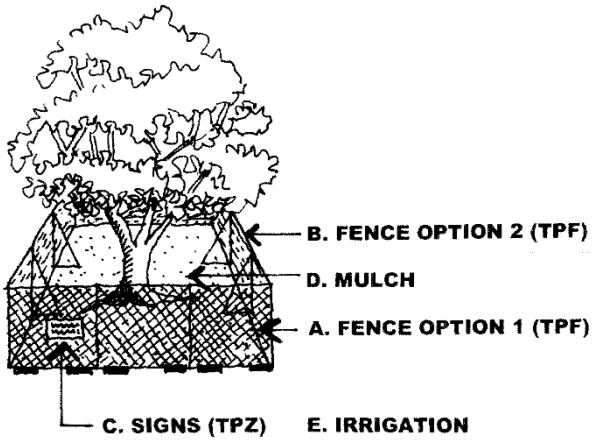


Diagram 1 TREE PROTECTIVE FENCING (TPF)

A. Fence Option 1 (TPF)
1.8 metre high chain wire mesh panels with shade cloth attached if required, to be held in place with concrete blocks.
B. Fence Option 2 (TPF)
1.8 metre high plywood or wooden panel/paling fence (prevents soil or building contaminants from coming under fence when panels are laid flush to ground).
C. Signs (TPZ)
Tree Protection Zone Signs
D. Mulch
50mm to 100mm thick layer of organic mulch, or aggregate, installed across surface area of TPZ.
E. Irrigation
Irrigation to arborist's advice.

TREE PROTECTION MEASURES TO BE INSTALLED WHEN TPF REQUIRED TEMPORARY REMOVAL, OR WHEN FENCING MUST BE LOCATED WITHIN THE TPZ – TRUNK AND BRANCH PROTECTION

The materials and positioning of protection as shown in Diagrams 2 and 3 are to be specified by the project arborist on site. A minimum of 2 metres in height is recommended. Temporary powerlines, guys and stays are not to be attached to the tree. Nails are not to be driven into the trunks or branches.

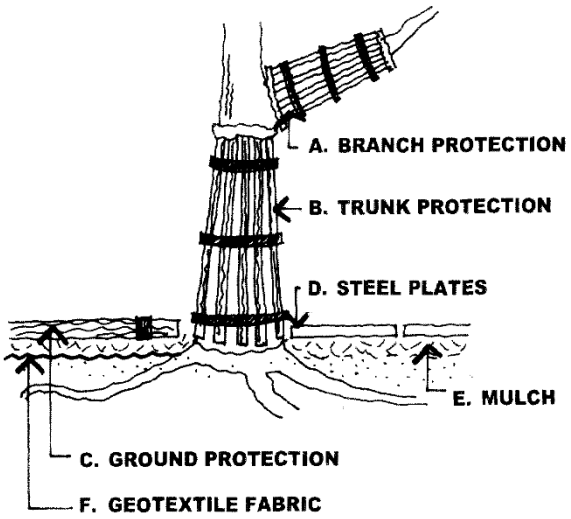


Diagram 2 TYPES OF BRANCH, TRUNK AND GROUND PROTECTION

3. **Branch Protection**
Prevent bark damage by use of timber boards and padding strapped to branch. (Do not use nails or screws).

B. Trunk Protection
Prevent bark damage by use of timber boards and padding for at least 2 metres above ground level. (Do not use nails or screws). Also refer to Detail Diagram 3.

C. Ground Protection
Install a suitable device eg timber rumble boards strapped together, above mulch or aggregate. The device shall be thick enough to prevent soil compaction and also to prevent compression or damage to roots.

D. Steel Plates
Steel plates (or similar, as approved by arborist) may be laid with, or without, mulch or aggregate under.

E. Mulch
Minimum 50mm thick, maximum 100mm thick, organic mulch or aggregate.

F. Geotextile fabric
Geotextile fabric laid under mulch or aggregate layer.

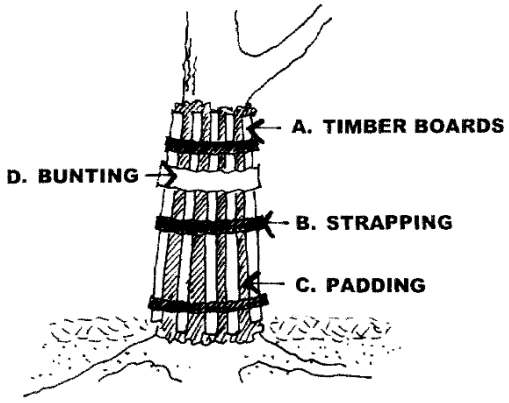


Diagram 3 DETAIL TRUNK PROTECTION

3. **TIMBER BOARDS**
Pine timber 3 metres x 50mm x 50mm at 150mm centres.

B. STRAPPING
Secure timber at no less than 3 locations with galvanised hoop strapping (or similar).
Do not use nails or screws.

C. PADDING
Insert expansion joint padding at minimum of three points to prevent timber from touching trunk.

D. BUNTING
Secure high visibility bunting at around 2 metres above ground level for visual reinforcement.

8.9 Scope of works for tree protection during construction

GENERAL

During construction the following situations will require the arborist's input and on-site supervision. (These may be in addition to the predetermined number of site inspections that shall be agreed upon).

- Demolition, bulk earthworks, installation of sediment control works, and drainage works near the TPZ.
- Installation of services, footings, and slabs near the TPZ.
- Temporary construction work required within TPZs – ground protection, scaffolding (erection and moving).
- Hand excavation of roots at perimeter of TPZs.
- Changes arising from building works that are different to approved plans.

- Landscaping, including installation of landscape structures such as paths, walls, soil topdressing and cultivation, planting, lighting, and irrigation.

GROUND PROTECTION

If temporary access for machinery is required into the TPZ, additional ground protection measures will be required (ie. in addition to mulching). Refer to Diagram 2. This is to prevent root damage and soil compaction within the TPZ.

HAND EXCAVATION AND ROOT PROTECTION DURING EXCAVATION

Proposed works where inside Tree Protection Zones, must have minimal impact on root systems. Without prior investigation it is unknown if any large diameter roots are present.

Wounds shall not be treated with dressings or with paints.

Temporary protection of exposed roots may be required, to prevent drying out, by use of jute mesh or hessian sheeting laid in multiple layers over the exposed roots and soil profile, to the full depth of the root zone. This is to be pegged in place and kept moist for the duration of root zone exposure.

INSTALLING UNDERGROUND SERVICES WITHIN THE TPZ

Proposed works have been designed to reduce impacts on root systems. However, without prior investigation it is unknown if any large diameter roots are present at the perimeter of, or extend past the TPZ of trees nominated for retention.

Should any large roots be found in locations where proposed services are to be laid then the work methods outlined above are to be adopted. The project arborist must be consulted.

8.10 Maintaining the TPZ

MULCHING

The area within the TPZ shall be mulched. The mulch shall be maintained to a depth of 50-100mm using material that complies with AS4454. However, the arborist may determine if mulch is required in areas where there is existing turf, gardens or mulch, and additional mulching may not be required.

WATERING

Temporary irrigation will be required in the TPZ of all site trees. This is be maintained for the duration of construction works until final certification. The project arborist shall monitor soil water and adjust if necessary.

WEED REMOVAL

All weeds within the TPZ shall be removed by hand without soil disturbance or shall be removed by use of species-appropriate herbicides by qualified operators.

8.11 Scope of works post-construction

REMOVAL OF TREE PROTECTION FENCING

TPF shall not be removed until all construction and landscaping works have been completed at Practical Completion.

DEFECTS LIABILITY PERIOD

Should any works be required during the defects liability period, such works shall not injure trees.

9 REFERENCES

9.1 BOOKS AND JOURNALS

Mattheck, C, Bethge, K & Weber, K 2015, *The Body Language of Trees*, Karlsruhe Institute of Technology, Karlsruhe, Germany.

Standards Australia 2009, *Protection of Trees on Development Sites*, AS 4970-2009, Standards Australia, Sydney.

Standards Australia 2007, *Pruning of Amenity Trees*, AS 4373-2007, Standards Australia, Sydney.

9.2 WEBSITES

https://earth.google.com

https://www.northernbeaches.nsw.gov.au

https://www.northernbeaches.nsw.gov.au/planning-development/tree-management/private-land

APPENDICES

Appendix A	**Tree Assessment Schedule**
Appendix B	**Useful Life Expectancy (ULE) Categories**
Appendix C	**Methodology for Determining Tree Retention Values (STARS©)**
Appendix D	**Tree Location Plan TLP-01**
Appendix E	**Tree Protection Plan TPP-01**

APPENDIX A TREE ASSESSMENT SCHEDULE

Site address: 23 Park Avenue, Avalon Beach, NSW Date of assessment: 21 November 2022 Assessed by: Selena Hannan

Tree No.	*Botanical Name* Common Name	Height (m)	Canopy spread N, E,S,W (m)	DBH or multi (mm)	DAB mm	Age	Health/ Vigour	Cond-ition	Comments	ULE	LSR	RV	TPZ (m) radius	SRZ (m) radius
1	***Archontophoenix cunninghamiana*** **Bangalow Palm**	9	4 total	190	-	M	G	G	Native palm species. Typical of species. Exempt under Council DCP.	2A	M	L/E	3	-
2	***Archontophoenix cunninghamiana*** **Bangalow Palm**	9	4 total	220	-	M	G	G	Native palm species. Typical of species. Exempt under Council DCP.	2A	M	L/E	3	-
3	***Archontophoenix cunninghamiana*** **Bangalow Palm**	9	4 total	210	-	M	G	G	Native palm species. Typical of species. Exempt under Council DCP.	2A	M	L/E	3	-
4	***Archontophoenix cunninghamiana*** **Bangalow Palm**	8	4 total	270	-	M	G	G	Native palm species. Typical of species. Exempt under Council DCP.	2A	M	L/E	3	-
5	***Liquidambar styraciflua*** **Liquidambar**	10	4,2,4,5	420	470	M	G	F-G	Deciduous, exotic species. Exempt under Council DCP. Tree growing near gas meter, 500mm from house, has been frequently pruned to clear existing house and roof to East side. **Recommendation** If tree is desired to be retained for a period, it must be taken into consideration that this species can grow considerably larger and may be required to be removed before it damages footings or other structures.	3B	M	L/E	5.0	2.4
6	***Angophora costata*** ***Sydney Red Gum***	12	6,4,5,6	350	550	EM	G	G	Local native species. Arguably defined as 'Exempt' under Council DCP due to location at less than 2 metres to an existing approved dwelling. Located in driveway carport area (permeable gravel driveway and under carport)	2B	H	H	4.2	2.6

									with parking within Tree Protection Zone currently. Parking in TPZ has occurred for many years, causing soil compaction, and the tree has possibly grown feeder roots in other areas to compensate. Stem may need protection during building works to prevent accidental damage by builders, and ground protection is also recommended. Co-dominant stems at 5 metres AGL. Relatively light in foliage volume, minor twig dieback (5%). Canopy currently located over roof of house, approximately 30% of canopy would need to be removed to clear the proposed addition to the house.					
7	***Angophora costata*** ***Sydney Red Gum***	12	10,8,8,5	600	700	M	G	G	Local native species. Located in driveway area (permeable gravel driveway) with parking within Tree Protection Zone currently. Parking in TPZ has occurred for many years, causing soil compaction, and the tree has possibly grown feeder roots in other areas to compensate. Stem may need protection during building works to prevent accidental damage by builders, and ground protection is also recommended.	2B	H	H	7.2	2.9

Key and explanation of table categories, and common abbreviations

Height is the approximate height of the tree in metres, from base of stem to top of crown (Note: Height of palms is measured to top of stem and shaft, not including leaves.

Canopy Spread is the approximate length in metres of the branches/canopy of the tree, either measured as a total, or from the stem/trunk to North, South, East, and West.

DBH (in millimetres) is the approximate Diameter of tree stem/s (trunk) measured at Breast Height ie. at 1.4 metres above ground level, unless noted otherwise.

DAB (in millimetres) is the approximate Diameter at the Base of the tree, measured just above the root buttress.

Age classes: I is immature, EM is Early Mature, M is Mature, LM is Late Mature, OM is Over Mature, D is Dead. **E** 'Exempt' species under Council's tree management order or policies.

Health is classed as P Poor, F Fair, G Good. Tree vigour is an indication of health. Assessment includes crown density, leaf colour, pest and disease presence/resilience, dieback amount and type.

Condition is classed as P Poor, F Fair, G Good. A tree may be in good health but have poor condition due to structural defects such as weak branch/stem junctions, cavities, cracks, signs of root plate failure etc. The tree's environment (proximity to other trees, soil types and profiles, water supply, aspect, and topography) may modify its form and growth habit, and its condition.

ULE Useful Life Expectancy – Barrell. Refer to Appendix B for detail of categories.

LSR Landscape Significance Rating, of High, Medium, and Low, based on IACA SIGNIFICANCE OF A TREE - ASSESSMENT RATING SYSTEM (STARS)© (IACA2010) ©. This rating system utilises structured qualitative criteria to assist in determining the retention value for a tree.

RV Retention Value, of High, Medium, Low, or Removal, is based on Useful Life Expectancy and Landscape Significance, as derived from the matrix of IACA SIGNIFICANCE OF A TREE - ASSESSMENT RATING SYSTEM (STARS)© (IACA2010) ©.

TPZ Tree Protection Zone, expressed as a radial distance in metres, measured from the centre of the tree. It is defined in the Australian Standard *Protection of Trees on Development Sites*, AS 4970-2009 as 'a specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development'.

SRZ Structural Root Zone, expressed as a radial distance in metres, measured from the centre of the tree. It is defined in the Australian Standard *Protection of Trees on Development Sites*, AS 4970-2009 as 'the area around the base of a tree required for a tree's stability in the ground. The woody growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area".

AGL Above Ground Level (distance)

LGA Local Government Area

N (North), **S** (South), **E** (East), **W** (West)

APPENDIX B ULE

USEFUL LIFE EXPECTANCY (ULE) CATEGORIES (after Barrell, updated 01/04/01)

1 Long ULE: Trees that appeared to be retainable at the time of assessment for **more than 40 years** with an acceptable level of risk, assuming reasonable maintenance:

- **A** Structurally sound trees located in positions that can accommodate future growth.
- **B** Trees that could be made suitable for retention in the long term by remedial tree care.
- **C** Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.

2 Medium ULE: Trees that appeared to be retainable at the time of assessment for **15–40 years** with an acceptable level of risk, assuming reasonable maintenance:

- **A** Trees that may only live between 15 and 40 more years.
- **B** Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.
- **C** Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
- **D** Trees that could be made suitable for retention in the medium term by remedial tree care.

3 Short ULE: Trees that appeared to be retainable at the time of assessment for **5–15 years** with an acceptable level of risk, assuming reasonable maintenance:

- **A** Trees that may only live between 5 and 15 more years.
- **B** Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
- **C** Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
- **D** Trees that require substantial remedial tree care and are only suitable for retention in the short term.

4 Remove: Trees that should be removed **within the next 5 years**.

- **A** Dead, dying, suppressed or declining trees because of disease or inhospitable conditions.
- **B** Dangerous trees because of 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 that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
- **F** Trees that are damaging or may cause damage to existing structures within 5 years.
- **G** Trees that will become dangerous after removal of other trees for the reasons given in A to F.
- **H** Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.

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.

APPENDIX C METHODOLOGY FOR DETERMINING TREE RETENTION VALUES

IACA SIGNIFICANCE OF A TREE - ASSESSMENT RATING SYSTEM (STARS) © (IACA2010) ©

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 in June 2001.

The landscape significance of a tree is an essential criterion to establish 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. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

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 of an individual tree has been defined, the retention value can be determined.

TREE SIGNIFICANCE - ASSESSMENT CRITERIA

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 for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

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.

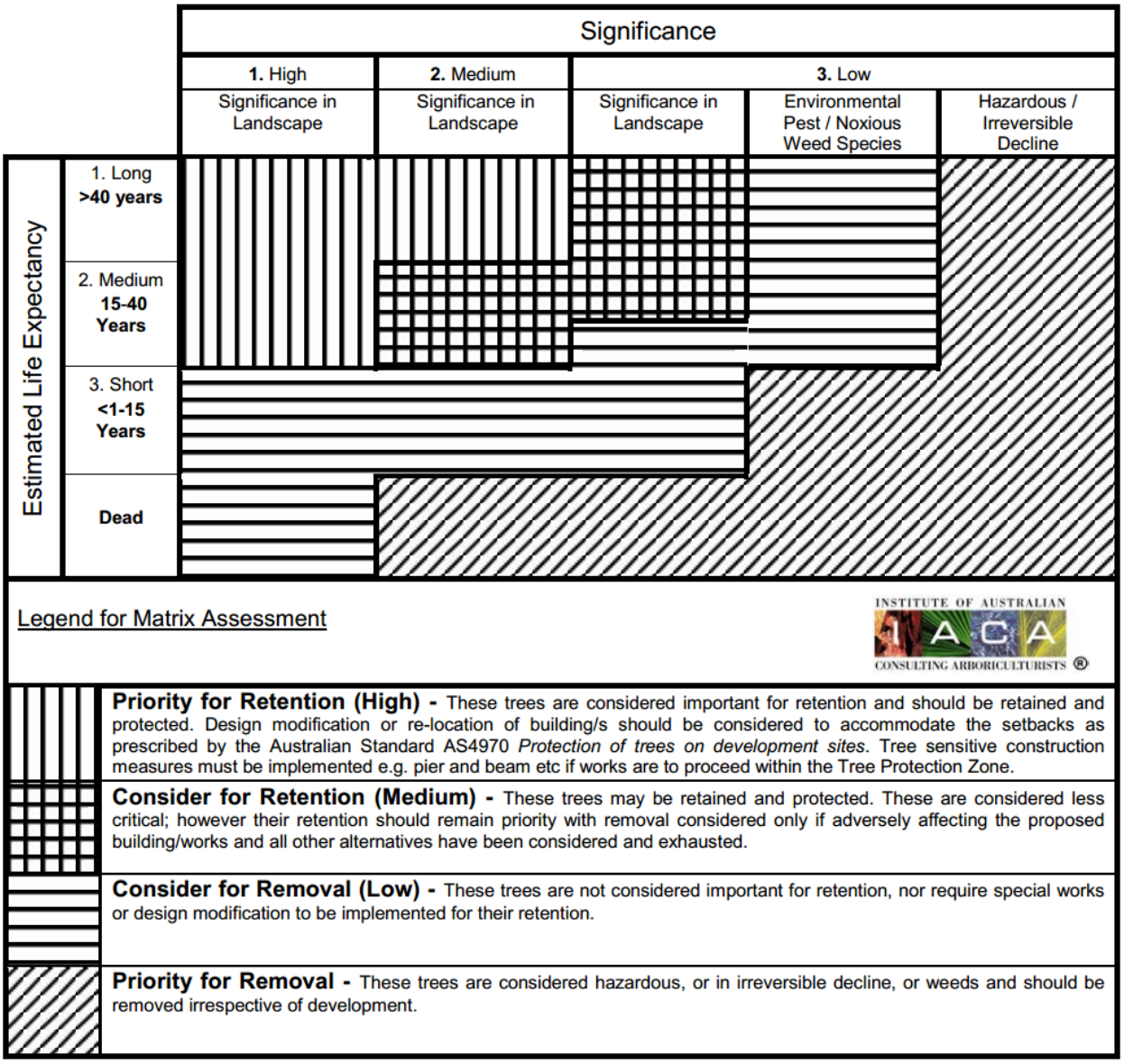
<u>Environmental Pest / Noxious Weed Species</u>

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

<u>Hazardous/Irreversible Decline</u>

- 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.

TABLE 1.0 TREE RETENTION VALUE - PRIORITY MATRIX



USE OF THIS DOCUMENT AND REFERENCING

The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES

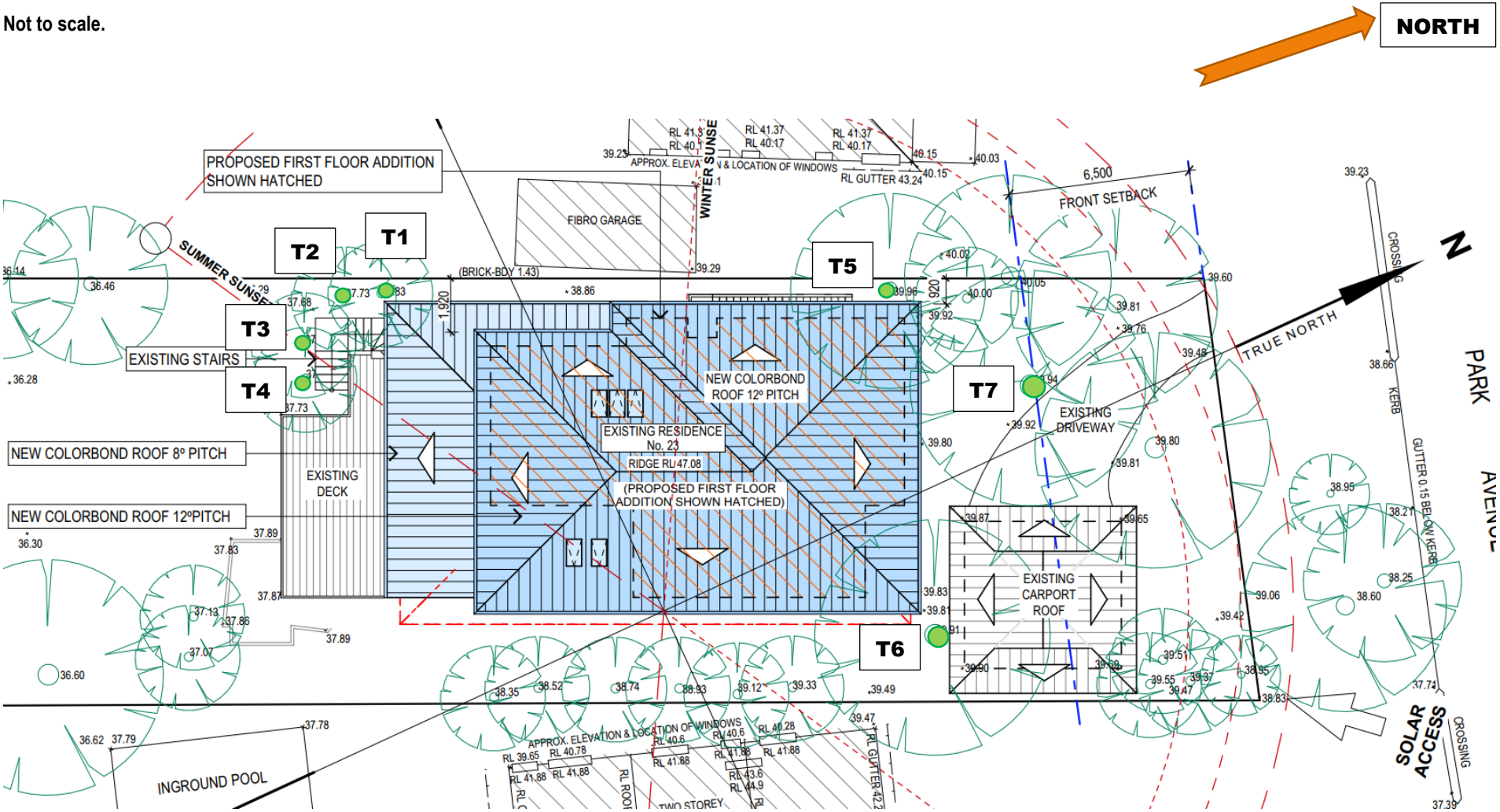
Australia ICOMOS Inc. 1999, The Burra Charter - The Australian ICOMOS Charter for Places of Cultural Significance, International Council of Monuments and Sites, www.icomos.org/australia

Draper BD and Richards PA 2009, Dictionary for Managing Trees in Urban Environments, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, Footprint Green Tree Significance & Retention Value Matrix, Avalon, NSW Australia,www.footprintgreen.com.au

APPENDIX D TREE LOCATION PLAN TLP-01

Not to scale.



APPENDIX E TREE PROTECTION PLAN TPP-01

TREE PROTECTION FENCING