32 GOLF AVENUE, MONA VALE, NSW

ARBORICULTURAL IMPACT ASSESSMENT

Date 23 February 2024, updated 25 June 2024,

updated 10 April 2025 for new DA

Client LAXDTX2 Pty Ltd

LGA Northern Beaches Council

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SELENA HANNAN LANDSCAPE DESIGN

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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.

Qualifications of consulting arborist, author of report

The author of this report has arboricultural AQF Level 5 qualification as required by Council.

1 SUMMARY

i. The report has been updated to include revised architectural plans on 10 April 2025.

ii. Addendum for new DA dated 10 April 2025. There will be no additional impact from the new development on any tree. The basement and ground floor footprints are essentially the same and will not affect trees any more than was previously described in this report.

iii. This report has been commissioned by LAXDTX2 Pty Ltd to accompany a **Development Application to Northern Beaches Council** for proposed new apartments.

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

v. The site is S.P. 57603, known as 32 Golf Avenue, Mona Vale, NSW, in the Northern Beaches Council LGA.

vi. 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.

vii. Site trees include species of Pittwater and Wagstaffe Spotted Gum Forest Endangered Ecological Community (EEC) as listed under the Threatened Species Conservation Act (1995).

viii. Development is proposed for the site, therefore prescribed trees in the vicinity of proposed works were assessed. This includes trees within neighbouring properties.

ix. 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.

x. 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 Proposed development

i. Demolition of existing townhouses and driveway.

ii. Construction of new apartments with basement parking.

1.2 Trees to be retained and removed

i. **Twenty three (23) trees or groups of trees,** on the site and in neighbouring properties were assessed.

ii. **Fifteen (15) trees or groups of trees are to be retained in the proposal, Trees 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 17, 18.**

iii. **Trees 1, 2, 3, 4, 5, 6 and 7** form a dense screen and are in the neighbours' yard on the west side. All these trees have High Retention Value. These trees will be able to be retained with negligible to marginal impact. Tree Protection Fencing shall be required within the site to protect their root systems (Tree Protection Zone) to prevent damage to roots and soil by potential compaction and contamination during construction works. Canopy pruning will be required prior to

construction commencing. Tree-sensitive construction methods are to be adopted during excavation. **Refer to Sections 5.3, 5.4** and **5.5, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

iv. **Tree 9** has High Retention Value. It will be able to be retained with minor impact due to work to replace an existing stormwater pit. **Refer to Section 5.6.**

v. **Tree 10** has High Retention Value. It will be able to be retained with negligible impact. **Refer to Section 5.7.**

vi. **Tree 12** has High Retention Value**.** It will be able to be retained with an 8.8% encroachment into the TPZ, which is a minor impact on the root system. The tree should tolerate this impact. Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of the proposed excavation and severing of roots by the project arborist. The canopy will be required to be pruned to clear the building at 4.0 metres away, up to a height of approximately 9 metres. **Refer to Section 5.8, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

vii. **Trees 13 and 14** have Medium Retention Value and can be retained in the proposal with marginal impact. **Refer to Section 5.9, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

viii. **Tree 15** has Medium Retention Value and can be retained in the proposal with marginal impact. **Refer to Section 5.10**, **Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

ix. **Trees 17 and 18** have Medium and High Retention Value and can be retained in the proposal. **Refer to Section 5.11.**

x. Refer **to Tree Protection Zones (TPZs)** for retained trees in **Section 4.2 Tree Significance and Retention Schedule.**

xi. **Eight (8) trees or groups of trees are to be removed in the proposal, Trees 11, 16, 19ab, 20, 21, 22, 23, 24.**

xii. **Tree 11** has Low Retention Value, is an Exempt species and is not desired to be retained in the proposal.

xiii. **Tree 16** has Low Retention Value, is an environmental weed and is not desired to be retained in the proposal.

xiv. **Trees 19a and 19b** have Low Retention Value and are to be removed in the proposal.

xv. **Trees 21 and 24** have Low Retention Value, are an environmental weed and are not desired to be retained in the proposal.

xvi. **Tree 22** has Low Retention Value and is to be removed in the proposal.

xvii. **Trees 20 and 23** have Medium Retention Value and cannot be retained in the proposal due to the proximity of proposed works. **Refer to further discussion in Sections 5.12 and 5.14**.

xviii. All care in demolition and excavation of the existing building and driveway must be taken to minimise loss of roots, or damage to roots of retained trees, to preserve their vigour and condition, to not accelerate the trees' decline or cause the failure of any retained trees by damage to roots or canopies.

xix. Existing soil levels in the Tree Protection Zones of all retained trees must be maintained as existing situation, so as not to fill over roots or cut roots. Where there are existing retaining walls in place, these must be retained or re-built in the same location without damaging roots. This may require pier and beam footings for new retaining walls.

xx. 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.

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

xxii. Roots present along the line of any excavation should be cut cleanly by the project arborist.

1.3 Tree protection and specification

i. Trees to be retained must be protected with Trunk Protection and Ground Protection to create exclusion zones in their TPZs as shown in **Diagrams 1, 2 and 3 in Section 7.8 of the Tree Protection Specification and described elsewhere.**

ii. Builders should be told not dump waste materials in the garden, damage any trees, store materials in the TPZ of trees, cause unnecessary soil compaction etc.

iii. Tree Protection Fencing is to be erected to exclude construction workers, storage of materials etc from the TPZ of all trees to be retained to a practical extent, if possible.

iv. Refer to **Tree Protection Plan TPP02 (Appendix E)** and the **Tree Protection Specification (Section 7)** for further direction.

1.4 Pruning

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

1.5 Monitoring

All retained site trees should be monitored regularly (annually or bi-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 by LAXDTX2 Pty Ltd to accompany a **Development Application to Northern Beaches Council** for proposed new apartments.

ii. The report has been updated to include revised architectural plans on 10 April 2025.

iii. Addendum for new DA dated 10 April 2025. There will be no additional impact from the new development on any tree. The basement and ground floor footprints are essentially the same and will not affect trees any more than was previously described in this report.

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

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 5** of the report**.**
- Describe the location of tree protection measures to be installed. These are described in **Section 7 Tree Protection Specification,** and **Tree Protection Plan -TPP02 (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 detailed in **Section 5 Discussion - Proposed Development and Impacts on Trees.**

2.3 Proposed development

i. Demolition of existing townhouses and driveway.

ii. Construction of new apartments with basement parking.

2.4 The site, and relevant development controls

The site is S.P. 57603, known as 32 Golf Avenue, Mona Vale, NSW, 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 vegetation is Pittwater and Wagstaffe Spotted Gum Forest Endangered Ecological Community (EEC) as listed under the Threatened Species Conservation Act (1995).

2.5 Site location and description

The site is a gentle slope falling from north to south. It shares boundaries with residential properties which are developed with apartments. Existing structures include townhouses and driveway.

Mature, planted trees and shrub plantings typify the residential-style gardens.

The site is reasonably exposed to winds from all directions.

The area is described on **Tree Location Plan - TLP01 (Appendix D)** of this report, based on the site survey.

Figure 1: Aerial view of the site, yellow area (image from Six Maps). The site sits on the north side of Golf Avenue.

3 METHOD

3.1 Trees on development sites

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

3.2 Visual Tree Assessment (VTA)

Site inspection on 15 January 2024 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 the 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.
- Photographs were taken.

3.3 Other site observations

- Proximity of trees to buildings and structures.
- Aspect and protection/exposure to prevailing winds.
- Overland flow path of water.
- 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.
- Soil profile investigation and testing were not undertaken.

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	IACA Significance of a Tree, Assessment Rating System (STARS)© Institute of Australian Consulting Arborists (IACA 2010)©	Appendix C

	combines the Landscape Significance rating with Estimated Life Expectancy (ULE), to determine Retention Value (RV).		
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.	AS4970-2009	Appendix A

3.5 Plans and documents

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

Author	Title	Reference	Date	Drawing Number and Version
Bee & Lethbridge	Survey Plan	23104	9.01.2024	01
Walsh Architects	Architectural documentation for DA		23 February 2024	A
Walsh Architects	Architectural documentation for DA		9 April 2025	A

4 Results and Observations

4.1 Visual Tree Assessment (VTA)

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

Assessed trees are shown and numbered on **Tree Location Plan TLP01 (Appendix D)**

4.2 Tree Significance and Retention Schedule

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

Tree No.	Botanical Name	Common Name	ULE	Landscape Significance (LS)	Retention Value (RV)	TPZ (m)	SRZ (m)	ACTION DUE TO PROPOSED WORKS
***1**	Ravanea rivularis	Majestic Palm	2A	M	H	3.0	-	**RETAIN**
***2**	Syzygium australe	Lillypilly	2A	M	H	4.2	2.1	**RETAIN**
***3**	Cupaniopsis anarcardioides	Tuckeroo	2A	M	H	4.8	2.5	**RETAIN**
***4**	Syzygium australe	Lillypilly	2A	M	H	2.4	1.7	**RETAIN**
***5**	Cupaniopsis anarcardioides	Tuckeroo	2A	M	H	4.6	2.1	**RETAIN**
***6**	Cupaniopsis anarcardioides	Tuckeroo	2A	M	H	5.0	2.3	**RETAIN**
***7**	Cupaniopsis anarcardioides	Tuckeroo	2A	M	H	2.8	2.0	**RETAIN**
***9**	Syzygium australe	Lillypilly	2A	M	H	2.8	1.0	**RETAIN**
***10**	Cupaniopsis anarcardioides	Tuckeroo	2A	H	H	6.6	2.7	**RETAIN**

11	Phoenix canariensis	Canary Island Date Palm	2B	L	L, E	3.0	-	**REMOVE**
***12**	Eucalyptus botryoides	Bangalay	2B	H	H	5.6	2.5	**RETAIN**
13	Elaeocarpus reticulatus	Blueberry Ash	2A	M	M	2.0	1.5	**RETAIN**
14	Elaeocarpus reticulatus	Blueberry Ash	2A	M	M	2.0	1.5	**RETAIN**
15	Banksia integrifolia	Coastal Banksia	2A	M	M	2.4	1.9	**RETAIN**
16	Strelitzia nicholii	Giant Bird of Paradise	4E	M	L, R	-	-	**REMOVE**
17	Phoenix canariensis	Canary Island Date Palm	2B	M	M	4.0	-	**RETAIN**
***18**	Phoenix canariensis	Canary Island Date Palm	2B	M	H	4.0	-	**RETAIN**
19a and 19b	Leptospermum petersonii	Lemon-scented Tea Tree	3	M	L	2.2	1.9	**REMOVE**
20	Banksia integrifolia	Coastal Banksia	2A	M	M	3.1	1.9	**REMOVE**
21	Schinus terebinthifolius	Brazilian Pepper Tree	4E	L	L, R	4.8	2.5	**REMOVE**
22	Grevillea cv	Greville cultivar	4	L	L	2.0	1.5	**REMOVE**
23	Banksia integrifolia	Coastal Banksia	2A	M	M	4.6	2.7	**REMOVE**
24	Schinus terebinthifolius	Brazilian Pepper Tree	4E	L	L, R	4.3	2.4	**REMOVE**

KEY TO TREE SIGNIFICANCE SCHEDULE

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.
***** Located in neighbouring properties. All trees outside the site boundaries are assigned High Retention Value even if they are Exempt.

4.3 Local native tree species

- Several site trees are typical of Pittwater and Wagstaffe Spotted Gum Forest Endangered Ecological Community (EEC) as listed under the Threatened Species Conservation Act (1995).

5 PROPOSED DEVELOPMENT AND IMPACTS ON TREES

5.1 Proposed development – refer to Tree Protection Plan TPP02 (Appendix E)

i. Demolition of existing townhouses and driveway.

ii. Construction of new apartments with basement parking.

5.2 Trees to be retained and removed

i. **Twenty three (23) trees or groups of trees,** on the site and in neighbouring properties were assessed.

ii. **Fifteen (15) trees or groups of trees are to be retained in the proposal, Trees 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 17, 18.**

iii. **Trees 1, 2, 3, 4, 5, 6 and 7** form a dense screen and are in the neighbours' yard on the west side. All these trees have High Retention Value. These trees will be able to be retained with negligible to marginal impact. Tree Protection Fencing shall be required within the site to protect their root systems (Tree Protection Zone) to prevent damage to roots and soil by potential compaction and contamination during construction works. Canopy pruning will be required prior to construction commencing. Tree-sensitive construction methods are to be adopted during excavation. **Refer to Sections 5.3, 5.4** and **5.5, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

iv. **Tree 9** has High Retention Value. It will be able to be retained with minor impact due to work to replace an existing stormwater pit. **Refer to Section 5.6.**

v. **Tree 10** has High Retention Value. It will be able to be retained with negligible impact. **Refer to Section 5.7.**

vi. **Tree 12** has High Retention Value**.** It will be able to be retained with an 8.8% encroachment into the TPZ, which is a minor impact on the root system. The tree should tolerate this impact. Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of the proposed excavation and severing of roots by the project arborist. The canopy will be required to be pruned to clear the building at 4.0 metres away up to a height of approximately 9 metres. **Refer to Section 5.8, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

vii. **Trees 13 and 14** have Medium Retention Value and can be retained in the proposal with marginal impact. **Refer to Section 5.9, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

viii. **Tree 15** has Medium Retention Value and can be retained in the proposal with marginal impact. **Refer to Section 5.10**, **Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

ix. **Trees 17 and 18** have Medium and High Retention Value and can be retained in the proposal. **Refer to Section 5.11.**

x. Refer **to Tree Protection Zones (TPZs)** for retained trees in **Section 4.2 Tree Significance and Retention Schedule.**

xi. **Eight (8) trees or groups of trees are to be removed in the proposal, Trees 11, 16, 19ab, 20, 21, 22, 23, 24.**

xii. **Tree 11** has Low Retention Value, is an Exempt species and is not desired to be retained in the proposal.

xiii. **Tree 16** has Low Retention Value, is an environmental weed and is not desired to be retained in the proposal.

xiv. **Trees 19a and 19b** have Low Retention Value and are to be removed in the proposal.

xv. **Trees 21 and 24** have Low Retention Value, are an environmental weed and are not desired to be retained in the proposal.

xvi. **Tree 22** has Low Retention Value and is to be removed in the proposal.

xvii. **Trees 20 and 23** have Medium Retention Value and cannot be retained in the proposal due to the proximity of proposed works. **Refer to further discussion in Sections 5.12 and 5.14**.

5.3 Tree 1, *Ravanea rivularis* Majestic Palm

Figure 2: Tree 1, Majestic Palm located within neighbouring property. The proposed excavation for the basement is 3.6 metres away, outside the TPZ, and will have no impact on the palm.

5.4 Trees 2 and 4 *Syzygium australe* (Lillypilly)

Figure 3: Trees 2 and 4 canopies overhang the site. The proposed excavation for the basement is 3.5 metres from Tree 2 which is a 5% impact in the TPZ, and 3 metres from Tree 4, which is outside the TPZ of 2.4 metres. This is theoretically a negligible impact from the proposed works on the root systems of these two trees.

The canopies may be required to be pruned to clear the building and scaffolding during construction. The species is well able to tolerate pruning and it is recommended that the pruning be not excessive, that is, to remove no more than 10% of the canopy of the trees. The existing building is 4 metres from the boundary and the proposed building is generally 3.5 metres from the boundary.

5.5 Trees 3, 5, 6 and 7 *Cupaniopsis anarcardioides* (Tuckeroo)

Figure 4: Trees 5, 6 and 7 canopies overhang the site. (Tree 3 is set well back from the boundary and will be not impacted at all). The proposed excavation for the basement is 3.5 metres from Trees 5 and 6 which is a 13% and 11% encroachment into the TPZs, which is a theoretical marginal impact on the root systems of these two trees. These trees should tolerate this impact. The excavation is 2.8 metres from Tree 7 which is outside the TPZ therefore of negligible impact.

The canopies of 5,6 and 7 will be required to be pruned to clear the building and scaffolding during construction. The species can tolerate pruning and it is recommended that the pruning be not excessive, to remove no more than 15% of the canopy of the trees. The existing building is 4 metres from the boundary and the proposed building is generally 3.5 metres from the boundary. The red line shows required pruning cut line at 2.5 metres from the boundary which would provide clearance for scaffolding.

Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of the proposed excavation and severing of roots by the project arborist. Tearing of roots will not be tolerated by the tree.

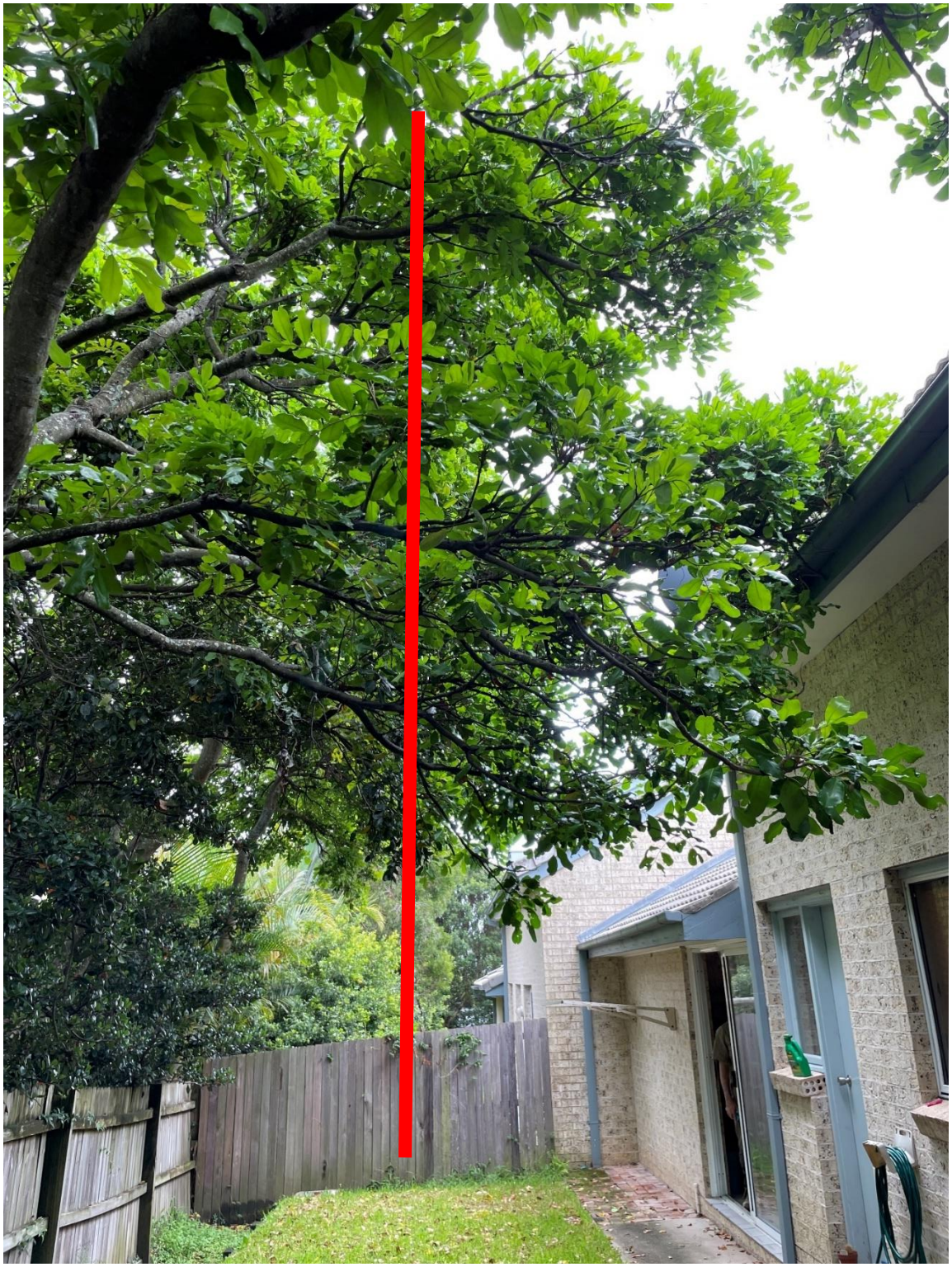


Figure 5: close-up of proposed pruning cut line of Trees 5, 6 and 7 at approximately 2.5 metres from the boundary. All pruning shall be carried out as per Standards Australia 2007, Pruning of Amenity Trees, AS 4373-2007. Branches shall be cut back to the nearest branch collar.

5.6 Tree 9 *Syzygium australe* (Lillypilly)

Figure 6: Tree 9 at rear of neighbouring property to the north. The existing pit is to be replaced. New lines are to be installed outside the Tree Protection Zone, minimizing impact to the TPZ.

Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of any proposed excavation for new stormwater lines and pit, and severing of roots must be done cleanly and by the project arborist. Tearing of roots will not be tolerated by the tree.

5.7 Tree 10 *Cupaniopsis anarcardioides* (Tuckeroo)

Figure 7: Tree 10 at rear of neighbouring property to the east. The proposed excavation for the basement is 5.5 metres from the tree, a 2% encroachment into the TPZ, which is a negligible impact on the root system. The tree should tolerate this impact.

The canopy will not be required to be pruned to clear the building.

Note that Tree 11, a young Canary Island Date Palm, can be partially seen to the right of the photo. This palm is to be removed and is an exempt species.

5.8 Tree 12 *Eucalyptus botryoides* (Bangalay)

Figure 8: Tree 12 in neighbouring property to the east. The proposed excavation for the basement is 4.5 metres from the tree, and the ground floor is 4 metres away from the tree. This is an 8.8% encroachment into the TPZ, which is a theoretically minor impact on the root system. The tree should tolerate this impact. Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of the proposed excavation and severing of roots by the project arborist. Tearing of roots will not be tolerated by the tree.

The property to the east has constructed a retaining wall along the boundary (as can be seen in the photograph) and it is not known if roots were damaged when this wall was built. The tree appears to be in good vigour currently.

The canopy will be required to be pruned to clear the building at 4.0 metres away up to a height of approximately 9 metres. The canopy has been previously pruned on the eastern side to 2 metres from the stem. Numerous previous pruning cuts are noted, to uplift the crown.

Two branches will be required to be removed from within the site to clear the proposed building:

1. *Branch heading south, 6 metres above ground level, 5 metres long.*
2. *Branch heading west, 7 metres above ground level, 6 metres long.*

All pruning shall be carried out as per Standards Australia 2007, Pruning of Amenity Trees, AS 4373-2007. Branches shall be cut back to the nearest branch collar.

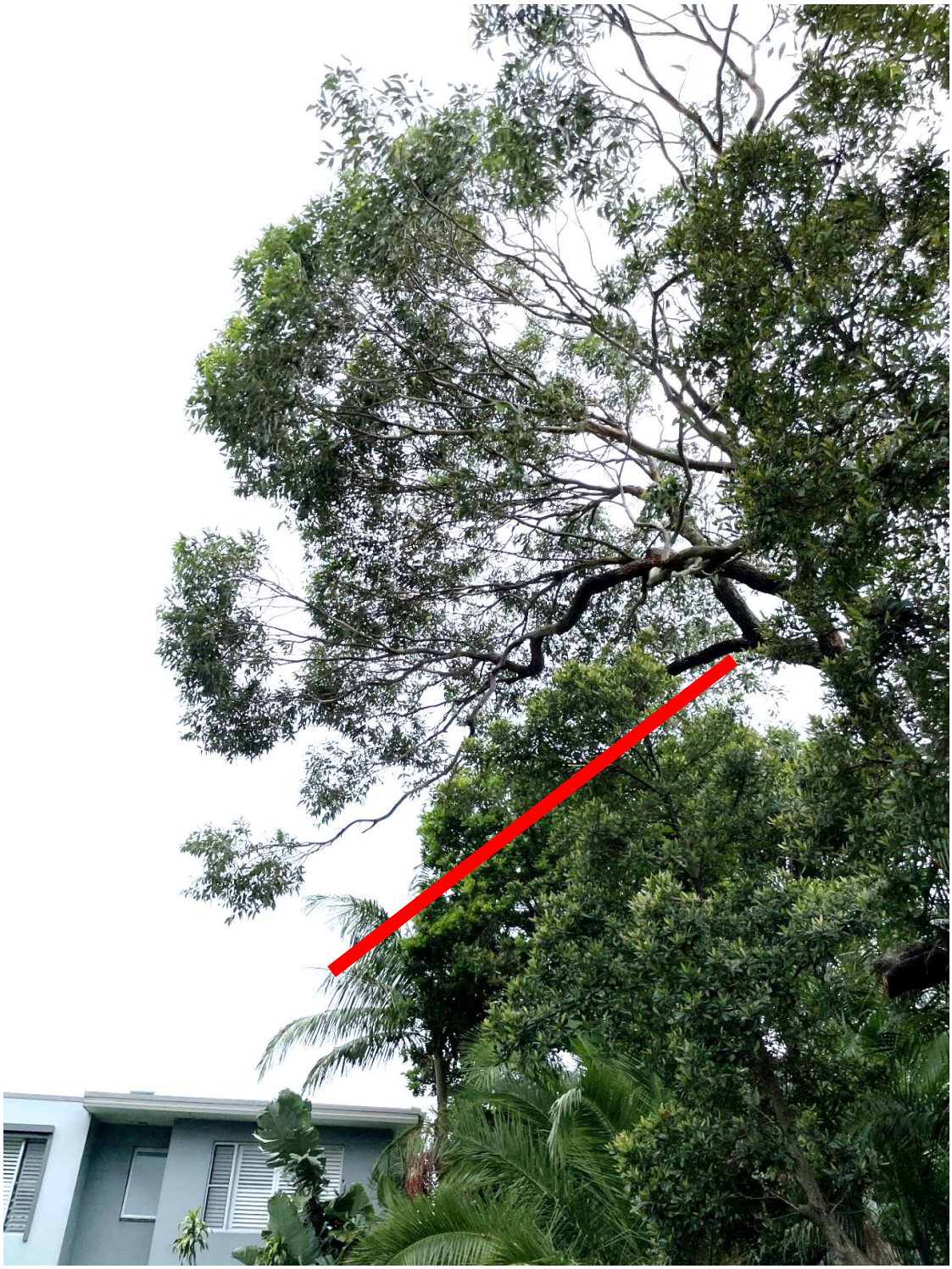


Figure 9: Tree 12 branch heading west to be pruned back to clear the proposed building. All pruning shall be carried out as per Standards Australia 2007, Pruning of Amenity Trees, AS 4373-2007. Branches shall be cut back to the nearest branch collar.

Branches higher than the roof line of the building (approximately 9 metres) can in theory be retained unless the possible use of cranes requires that they be removed.

Figure 10: Tree 12 branch heading south to be pruned back to clear the proposed building. All pruning shall be carried out as per Standards Australia 2007, Pruning of Amenity Trees, AS 4373-2007. Branches shall be cut back to the nearest branch collar.

5.9 Trees 13 and 14 *Elaeocarpus reticulatus* (Blueberry Ash)

Figure 11: Trees 13 and 14 are young Blueberry Ash to be retained. The proposed excavation for the basement is 1.5 metres from the trees, a 15% encroachment into the TPZ, which is a marginal impact on the

root systems. The young trees should tolerate this impact and have a naturally upright, narrow form which is suitable for retention within the proposed 3.5 metre side setback.

5.10 Tree 15 *Banksia integrifolia* (Coastal Banksia)

Figure 12: Tree 15 Coastal Banksia is to be retained. The proposed excavation for the basement is 1.7 metres from the tree, an 8% encroachment into the TPZ, and on the line of the SRZ. This is a marginal impact on the TPZ and is a one-sided impact in the theoretical SRZ. However, the tree is reasonably young and vigorous and should tolerate this impact.

Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of the proposed excavation and severing of roots by the project arborist. Tearing of roots will not be tolerated by the tree.

5.11 Tree 17 and Tree 18 *Phoenix canariensis* (Canary Island Date Palm)

Figure 13: Trees 17 and 18 are two Canary Island Date Palms which appear to be arising from a shared root crown in the boundary fence line. Tree 17 is in a raised bed. The stems are clear to 8 metres therefore the canopies should be clear of the roof line and the proposed building without pruning.

5.12 Tree 20 *Banksia integrifolia* (Coastal Banksia)

Figure 14: Canopy of Tree 20 (arrowed) which is skewed to the west, would conflict with the building. The red line shows the line of the proposed building, which is 2 metres from the tree. The tree is to be removed in the proposal as it would not tolerate the excavation nor probably the extent of canopy pruning.

5.13 Tree 21 and 24 *Schinus terebinthifolius* (Brazilian Pepper Tree)

Figure 15: Trees 21 and 24, Brazilian Pepper Trees are undesirable, toxic, allergenic, environmental weed species and are to be removed. The two trees are suckering, heavily previously pruned specimens.

5.14 Tree 23 *Banksia integrifolia* (Coastal Banksia)

Figure 16: Tree 23, Coastal Banksia is not likely to survive the proposed TPZ impacts of over 20% from excavation and built structures (bin area). The tree has a structural defect identified at the base, with very a vertical, co-dominant stem junction, which reduces its Useful Life Expectancy.

5.15 Methodology for excavation works within the Tree Protection Zones of retained trees

i. Tree-sensitive construction methods must be adopted for the works within the Tree Protection Zones of the following trees to be retained: Trees 5, 6, 9, 10, 12, and 15 due to the proximity of proposed excavation.

ii. The works must be supervised by an experienced, qualified arborist.

iii. No excavation shall be done by machinery until AFTER non-root-destructive hand excavation has been undertaken, which has been supervised by the project arborist, and exposed roots have been cut cleanly.

iv. No trench footings will be allowed in the TPZ.

v. The site arborist shall be present when any excavation is required within the TPZ to determine if any roots may be cut, and if so, the number, dimension, and location. Footings will have to be isolated and piered over roots, and roots over 30mm in diameter can be cut only by the site arborist.

vi. Roots are to be cleanly cut by the project arborist. No tearing of the oots of any trees that are to be retained by excavators.

5.16 Retention Values (RV) of trees

i. Trees assigned High Retention Value are generally 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.

ii. 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.

iii. 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.

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

- **Table 4.2 Tree Significance and Retention Schedule** lists the calculated TPZ and SRZ for all trees.
- **Tree Location Plan TLP01 (Appendix D)** shows the location and numbering of all assessed trees.
- **Tree Protection Plan TPP02 (Appendix E)** shows the TPZs and SRZs of trees to be retained in the proposal, if relevant.
- 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.

5.18 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.

5.19 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 CONCLUSIONS AND RECOMMENDATIONS

6.1 Trees to be retained and removed

i. **Twenty three (23) trees or groups of trees,** on the site and in neighbouring properties were assessed.

ii. **Fifteen (15) trees or groups of trees are to be retained in the proposal, Trees 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 17, 18.**

iii. **Trees 1, 2, 3, 4, 5, 6 and 7** form a dense screen and are in the neighbours' yard on the west side. All of these trees have High Retention Value. These trees will be able to be retained with negligible to marginal impact. Tree Protection Fencing shall be required within the site to protect their root systems (Tree Protection Zone) to prevent damage to roots and soil by potential compaction and contamination during construction works. Canopy pruning will be required prior to

construction commencing. Tree-sensitive construction methods are to be adopted during excavation. **Refer to Sections 5.3, 5.4** and **5.5, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

iv. **Tree 9** has High Retention Value. It will be able to be retained with minor impact due to work to replace an existing stormwater pit. **Refer to Section 5.6.**

v. **Tree 10** has High Retention Value. It will be able to be retained with negligible impact. **Refer to Section 5.7.**

vi. **Tree 12** has High Retention Value**.** It will be able to be retained with an 11.7% encroachment into the TPZ, which is a marginal impact on the root system. The tree should tolerate this impact. Excavation works within the TPZ should be undertaken by tree-sensitive methods such as preliminary non-root-destructive hand excavation along the line of the proposed excavation and severing of roots by the project arborist. The canopy will be required to be pruned to clear the building at 3.5 metres away up to a height of approximately 9 metres. **Refer to Section 5.8, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

vii. **Trees 13 and 14** have Medium Retention Value and can be retained in the proposal with marginal impact. **Refer to Section 5.9, Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

viii. **Tree 15** has Medium Retention Value and can be retained in the proposal with marginal impact. **Refer to Section 5.10**, **Section 7 Tree Protection Specification,** and **Tree Protection Plan TPP02 (Appendix E).**

ix. **Trees 17 and 18** have Medium and High Retention Value and can be retained in the proposal. **Refer to Section 5.11.**

x. Refer **to Tree Protection Zones (TPZs)** for retained trees in **Section 4.2 Tree Significance and Retention Schedule.**

xi. **Eight (8) trees or groups of trees are to be removed in the proposal, Trees 11, 16, 19ab, 20, 21, 22, 23, 24.**

xii. **Tree 11** has Low Retention Value, is an Exempt species and is not desired to be retained in the proposal.

xiii. **Tree 16** has Low Retention Value, is an environmental weed and is not desired to be retained in the proposal.

xiv. **Trees 19a and 19b** have Low Retention Value and are to be removed in the proposal.

xv. **Trees 21 and 24** have Low Retention Value, are an environmental weed and are not desired to be retained in the proposal.

xvi. **Tree 22** has Low Retention Value and is to be removed in the proposal.

xvii. **Trees 20 and 23** have Medium Retention Value and cannot be retained in the proposal due to the proximity of proposed works. **Refer to further discussion in Sections 5.12 and 5.14**.

xviii. All care in demolition and excavation of the existing building and driveway must be taken to minimise loss of roots, or damage to roots of retained trees, to preserve their vigour and condition, to not accelerate the trees' decline or cause the failure of any retained trees by damage to roots or canopies.

xix. Existing soil levels in the Tree Protection Zones of all retained trees must be maintained as existing situation, so as not to fill over roots or cut roots. Where there are existing retaining walls in place, these must be retained or re-built in the same location without damaging roots. This may require pier and beam footings for new retaining walls.

xx. 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.

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

xxii. Roots present along the line of any excavation should be cut cleanly by the project arborist.

6.2 Tree protection and specification

i. Trees to be retained must be protected with Trunk Protection and Ground Protection to create exclusion zones in their TPZs as shown in **Diagrams 1, 2 and 3 in Section 7.8 of the Tree Protection Specification, and described elsewhere.**

ii. Builders should be told not dump waste materials in the garden, damage any trees, store materials in the TPZ of trees, cause unnecessary soil compaction etc.

iii. Tree Protection Fencing is to be erected to exclude construction workers, storage of materials etc from the TPZ of all trees to be retained to a practical extent, if possible.

iv. Refer to **Tree Protection Plan TPP02 (Appendix E)** and the **Tree Protection Specification (Section 7)** for further direction.

6.3 Pruning

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

6.4 Monitoring

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

7 TREE PROTECTION SPECIFICATION

7.1 Introduction

This section provides general **Tree Protection Specification** measures for tree protection works to be implemented at the proposed development site. Previous sections examined the impact on trees to be retained and removed and provided recommendations as to how the site should 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.*

7.2 Aims

The aims of this Tree Protection 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.

7.3 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.

7.4 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.

7.5 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.

7.6 Refer to Tree Location Plan TLP01 (Appendix D) for:

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

7.7 Refer to Tree Protection Plan TPP02 (Appendix E) for:

- location of trees to be retained and protected,
- location of proposed works,
- SRZ and TPZ of retained trees,
- Location of Tree Protection Fencing to be erected.

7.8 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 Northern Beaches 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.

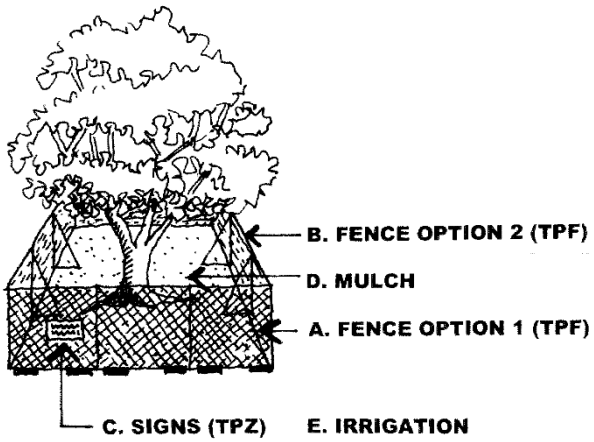


Diagram 1 TREE PROTECTIVE FENCING (TPF)

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.

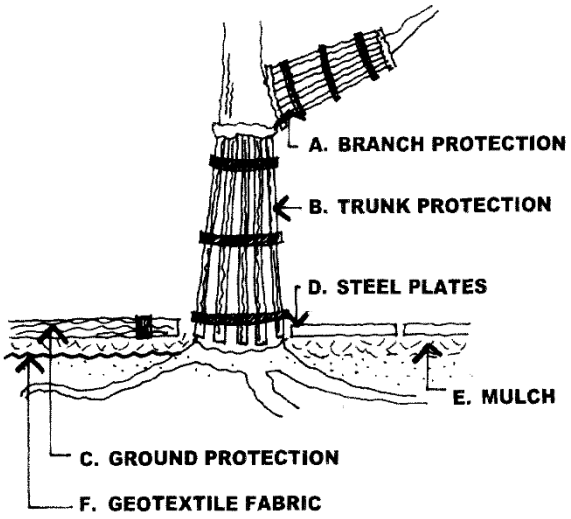


Diagram 2 TYPES OF BRANCH, TRUNK AND GROUND PROTECTION

A. 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 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.

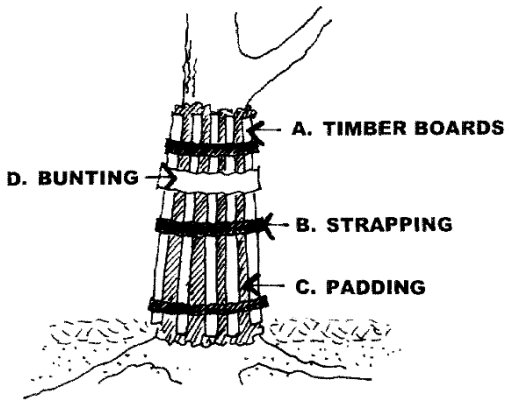


Diagram 3 DETAIL TRUNK PROTECTION

A. 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.

7.9 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.

7.10 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.

7.11 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.

8 References

8.1 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.

8.2 WEBSITES

https://maps.six.nsw.gov.au/

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

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 – TLP01**
Appendix E	**Tree Protection Plan – TPP02**

APPENDIX A TREE ASSESSMENT SCHEDULE

Site address: 32 Golf Avenue, Mona Vale, NSW Date of assessment: 15 January 2024 Assessed by: Selena Hannan

'Exempt' from protection under Northern Beaches DCP due to species or dimension (under 5 metres) or proximity to approved dwelling (within 2 metres).

***** Trees located on land owned by others (neighbours, Council road reserve etc). Note that trees growing on land owned by others, even if they are 'Exempt', are considered High Retention Value irrespective of ULE and LSR.

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	*Ravanea rivularis* Majestic Palm	5 stem, plus head	4 total	300	-	M	G	G	Exotic palm. Typical form for species. 'Exempt' under Northern Beaches TPO.	2A	M	H	3.0	-
*2	*Syzygium australe* Lillypilly	8	6 total	250, 250	350	M	G	G	Native, not local species. Canopy overhangs site by 2.5 metres.	2A	M	H	4.2	2.1
*3	*Cupaniopsis anarcardioides* Tuckeroo	9	9 total	400	500	M	G	G	Native, not local species. Canopy, high, overhangs site by 2 metres.	2A	M	H	4.8	2.5
*4	*Syzygium australe* Lillypilly	7	4 total	130, 150	200	M	F	F	Native, not local species. Canopy, high, overhangs site by 3 metres.	2A	M	H	2.4	1.7
*5	*Cupaniopsis anarcardioides* Tuckeroo	8	9 total	200,230, 230	350	M	G	G	Native, not local species. Co-dominant stems at 1.5 metres AGL. Canopy, high, overhangs site by 4.6 metres. One low branch at 2.5 metres AGL, 100mm diameter, will be required to be removed. Smaller, high branches will require pruning and will tolerate pruning to be clear of new building and to allow for scaffolding.	2A	M	H	4.6	2.1
*6	*Cupaniopsis anarcardioides* Tuckeroo	8	9 total	300, 300	400	M	G	G	Native, not local species. Canopy, high, only branches 5 metres AGL may require pruning to reduce length.	2A	M	H	5.0	2.3

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
*7	*Cupaniopsis anarcardioides* Tuckeroo	7	3,3,0,0	230	300	M	G	F	Native, not local species. Canopy weighted to North, suppressed by Tree 6. Canopy leans and overhangs site by 2.5 metres, tree will tolerate some pruning if required.	2A	M	H	2.8	2.0
8	*Melaleuca quinquenervia* Broad-leaf Paperbark	10	5 total	400	500	M	G	G	Native, local species. Growing 1.6 metres from existing building, hence is Exempt and may be removed if required. Tree has been heavily pruned in the past at 3 metres AGL to clear the existing building.	2A	M	H, E	4.8	2.5
*9	*Syzygium australe* Lillypilly	6	5 total	180, 150	250?	M	G	G	Native, not local species. Note existing drainage inspection pit within 1 metre of tree. This tree is in neighbouring property to North, behind fence, cannot measure DAB.	2A	M	H	2.8	1.9
*10	*Cupaniopsis anarcardioides* Tuckeroo	10	9 total	250, 250, 300, 300	600?	M	G	G?	Native, not local species. Cannot measure base of tree to get accurate DAB. Canopy very high, unlikely to require any pruning to clear proposed building. Tree is growing at the top of a retaining wall behind a fence.	2A	H	H	6.6	2.7
11	*Phoenix canariensis* Canary Island Date Palm	2 stem, plus head	4 total	500	500	M	G	G	Exotic palm. Exempt, may be removed. Recommend removal due to nuisance and danger from spines. Pruned by neighbours.	2B	H	H, E	3.0	-
*12	*Eucalyptus botryoides* Bangalay	13	6,2,6,6	350, 300	500?	M	G	G	Native, local species. Estimated diameter at base, tree is in neighbouring property to East. For development to East a blockwork retaining wall has been built approx 500 high along boundary, adjacent to tree, and probably filled soil around base of tree. Many pruning wounds noted in lower canopy, to uplift the crown. Possible branches that may require pruning or removal are: Branch heading to South, 6 metres high AGL, 5 metres long overhanging site. Branch heading West, 6 metres long, about 7 metres high, reduce length, not remove whole branch.	2B	H	H	5.6	2.5

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
13	***Elaeocarpus reticulatus*** **Blueberry Ash**	6	2.5 total	100	150	EM	G	G	Native, local species. Branching above 3 metres AGL, canopy has been pruned to raise and clear driveway. Located in garden bed 200mm higher than driveway.	2A	M	M	2.0	1.5
14	***Elaeocarpus reticulatus*** **Blueberry Ash**	6	3 total	130	150	EM	F	F	Native, local species. Branching above 3 metres AGL, canopy has been pruned to raise and clear driveway. Located in garden bed 200mm higher than driveway.	2A	M	M	2.0	1.5
15	***Banksia integrifolia*** **Coastal Banksia**	6	3 total	200	250	M	G	G	Native, local species. Located in garden bed 300mm higher than driveway.	2A	M	M	2.4	1.9
16	***Streltizia nicholii*** **Giant Bird of Paradise**	6	3,1,3,2	multi	multi	M	G	G	Exotic, monocot, weed species. Growing in raised garden bed 300mm high above driveway. Should be removed in any event due to nuisance (difficult to control large size), weed of bushland.	4E	M	L, R	-	-
17	***Phoenix canariensis*** **Canary Island Date Palm**	8 stem plus head	6 total	700	900	M	G	G	Exotic species. Exempt. Growing in raised garden bed 500mm high above driveway. Fence stops both sides of palm. Double-stem palm, the other stem is in the development to the East. Further inspection required to determine if this stem could possibly be removed without destabilising the other stem.	2B	M	M	4.0	-
***18**	***Phoenix canariensis*** **Canary Island Date Palm**	6	6 total	500	600?	M	G	G?	Exotic species. Exempt. Growing in neighbouring property to East. Fence stops both sides of palm. Double-trunked palm, the other palm is in the subject site.	2B	M	H	4.0	-
19a 19b	***Leptospermum petersonii*** **Lemon-scented Tea Tree**	5	3 total	180	280	M	F	F	Native, not local species. Growing in raised garden bed 400mm higher than driveway.	3	M	L	2.2	1.9
20	***Banksia integrifolia*** **Coastal Banksia**	7	1,1,4,3	260	280	EM	G	G	Native, local species. Pruned by neighbouring property. Growing in raised garden bed.	2A	M	M	3.1	1.9
21	***Schinus terebinthifolius*** **Brazilian Pepper Tree**	7	5,2,4,2	400	500	M	F	F	Exotic. Toxic, allergenic, weed species. Suckering, pruned heavily in past. Would remove in any event due to nuisance, undesirable species. Epicormics.	4E	L	L, R	4.8	2.5

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
22	***Grevillea cv.*** **Grevillea**	5	1 total	80, 100	180	OM	P	P	Native, not local species. Poor specimen, overmature and in decline.	4	L	L	2.0	1.5
23	***Banksia integrifolia*** **Coastal Banksia**	6	6 total	200, 200, 260	600	M	F	F-G	Native, local species. One stem is codominant, with included junction from ground level to 500mm AGL. Sparse canopy, probably due to plastic weed suppressant matting on ground causing reduction in vigour.	2A	M	M	4.6	2.7
24	***Schinus terebinthifolius*** **Brazilian Pepper Tree**	5	6 total	180, 200, 200, 100, 100	470	M	F	F	Exotic. Toxic, allergenic, weed species. Suckering, pruned heavily in the past. Would remove in any event due to nuisance, undesirable species.	4E	L	L, R	4.3	2.4

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.

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) ©

E 'Exempt' species under Council's tree management order or policies.

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.

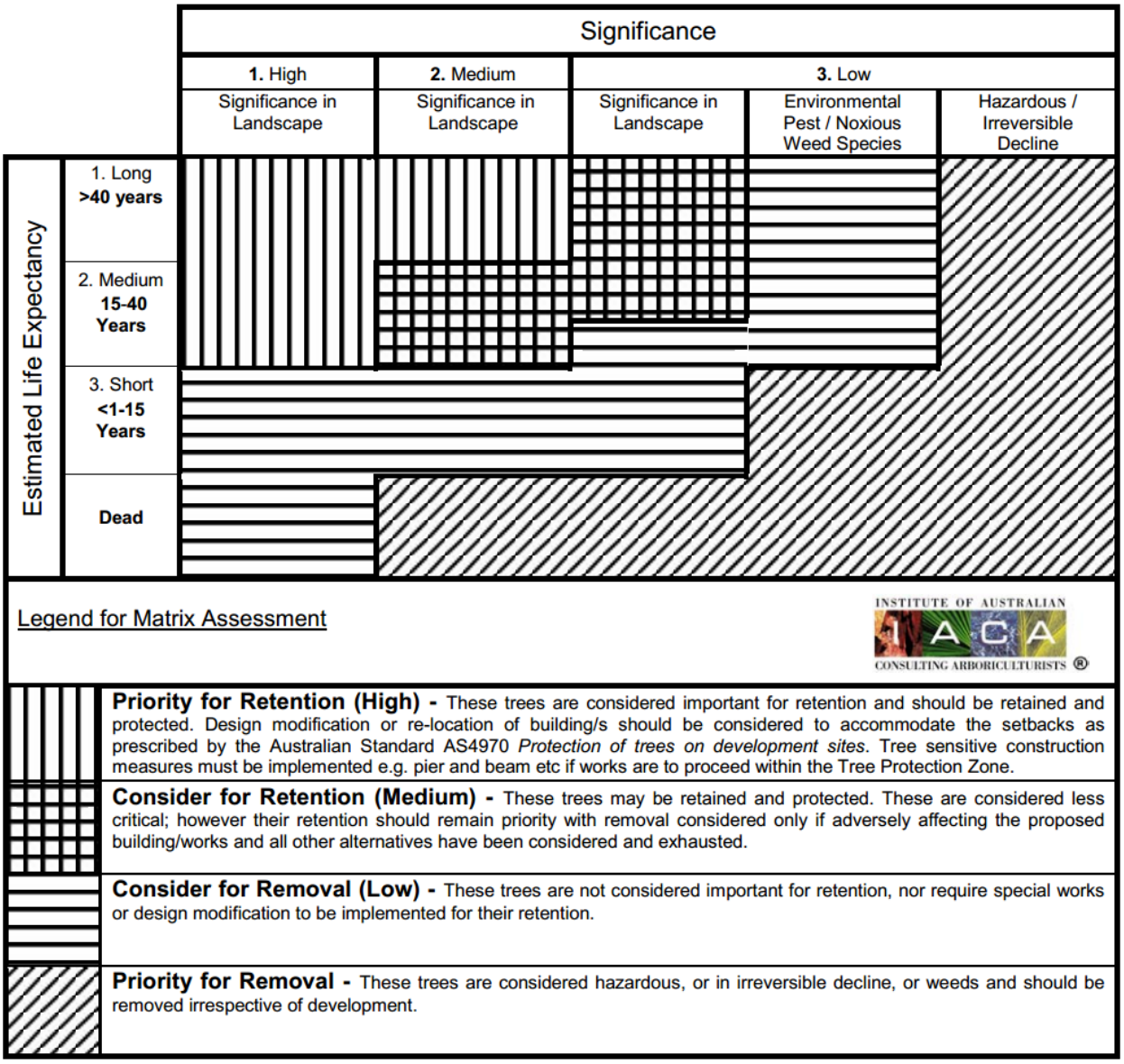
<u>Environmental Pest / Noxious Weed Species</u>

- 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

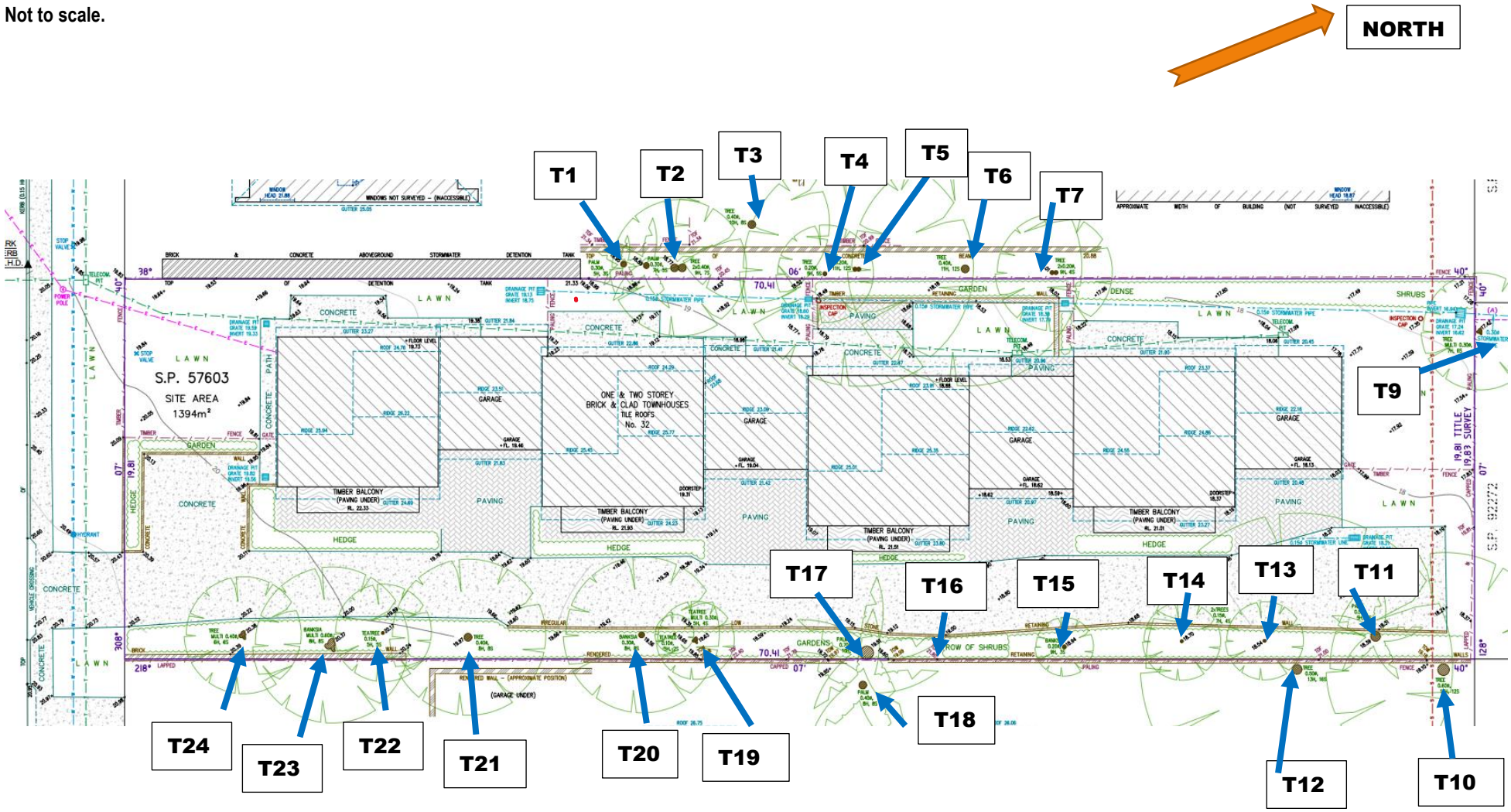
Australia ICOMOS Inc. 1999, The Burra Charter - The Australian ICOMOS Charter for Places of Cultural Significance, International Council of Monuments and Sites, www.icomos.org/australia

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 -TLP01

Not to scale.



APPENDIX E TREE PROTECTION PLAN -TPP02

NORTH

Tree Protection Fencing (TPF) to be installed to protect TPZs of retained trees as per Diagram 1 in Tree Protection Specification.

TPF may be able to be moved under arborist supervision. If fencing cannot be installed to enclose the whole TPZ, then ground protection in the TPZs will be required as per Diagrams 2 and 3 in Tree Protection Specification.