



REPORT: **Arboricultural Impact Assessment**

REPORT COMMISSIONED FOR:

Jovan Sarai

DA2022/1710

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Freshwater NSW 2096

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17th of January, 2023

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Document Tracking

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1. EXECUTIVE SUMMARY

1.1 The client commissioned an Arboricultural Impact Assessment to evaluate the potential impacts on trees by a proposed development and, if viable, to make recommendations that reduce the impacts on trees at 24 Oliver Street, Freshwater NSW 2096.

1.2 The proposed development (**DA2022/1710**) involves the demolition of existing structures and the construction of two (2) detached two storey dwellings.

1.3 The assessment was conducted on the 22nd of December, 2022 by Jim McArdle B.Ed. Sci (ACU), Dip. Arb AQF L5 (Ryde), Tree Risk Assessment Qualified (TRA), Quantified Tree Risk Assessment (QTRA) & Tree Contractors Association of Australia (TCAA) Vice President.

1.4 Eight (8) trees/tree groups on site on the street curtilage/nature strip and in the adjacent surrounding area were assessed and are summarised as follows:

Table 1: Retention Values.

Retention Values				
High (0 trees)	Moderate (1 tree)	Low-Moderate (3 trees)	Low (4 trees/tree groups)	Very Low (0 trees)
-	1.	3, 4, 6.	2, 5, 7, 8.	-

Table 2: Tree Works.

Tree Works	
Retain (5 trees/tree groups)	Remove (3 trees/tree groups)
1, 3, 4, 7, 8.	2, 5, 6.

Table 3: Tree Management Plan.

Tree Management Measures	Tree No.
Mulch Ground Cover Protection	1, 3, 4, 7.
Tree Protection Fencing	3, 4, 7, 8.
Tree Trunk Protection	1.
Tree-Sensitive Construction Measures	1, 7, 8.
Root Mapping Investigations	1, 7, 8.

1.5 **Retain** five (5) trees/tree groups numbered 1, 3, 4, 7 and 8.

1.6 **Remove** three (3) trees/tree groups numbered 2, 5 and 6.

1.7 **Tree-sensitive construction measures** are required to minimise major anticipated impacts to three (3) trees/tree groups numbered 1, 7 and 8.

1.8 **Root mapping investigations** are to be conducted by an AQF Level 5 arborist prior to the proposed works to locate roots of three (3) trees/tree groups numbered 1, 7 and 8 that may be situated within the footprint of the proposed development.

2. INTRODUCTION

2.1 AIMS

The aim of the report is to:

2.1.1 To assess the trees' health and retention value and to evaluate the potential impacts on trees by the proposed development.

2.1.2 To provide options, if viable, to reduce potential impacts on trees and make recommendations for tree management and protection during development.

2.2 SCOPE

2.2.1 Jovan Sarai commissioned an Arboricultural Impact Assessment for the site at 24 Oliver Street, Freshwater NSW 2096.

2.2.2 The assessment was conducted on the 22nd of December, 2022 by Jim McArdle B.Ed. Sci (ACU), Dip. Arb AQF L5 (Ryde), Tree Risk Assessment Qualified (TRA), Quantified Tree Risk Assessment (QTRA) & Tree Contractors Association of Australia (TCAA) Vice President.

2.2.3 Tree management measures are regulated by Warringah Development Control Plan (DCP) 2011 and Warringah Local Environmental Plan (LEP) 2011.

2.2.4 Eight (8) trees/tree groups on site and in the adjacent surrounding area were assessed.

2.2.5 The inspection does not include below ground root excavation, and no expert laboratory analyses – including internal diagnostics, inaccessible trunk and aerial inspections – were conducted. No pathology tests or soil analyses were conducted. Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale.

2.2.6 The owner or manager of this site has not provided other documentation relating to the trees. Apart from post-site research and comparisons of similar sites, our observations are the only details analysed.

2.3 METHODOLOGY

2.3.1 The inspection was primarily conducted using ground-based collection of data to identify visible signs of tree health, structure and potential hazards. Collection data methods may include the use of a mallet for sound testing, the use of a trowel to test for soil compaction, and the use of a screwdriver to probe cavities for pathogens, pests and disease. The assessments do not involve laboratory analysis. Methods may include the following:

Visual Tree Assessment (VTA) (Mattheck and Breloer 1994), a method for assessing biological and lower-level mechanical functions and signs of decay, damage or defects (Appendix A).

Tree AZ Categories (Barrell 2010) classifies the importance of trees on development sites (Appendix B).

- **Category A** – suitable for retention.
- **Category Z** – not worthy of constraint.

Tree Useful Life Expectancy (TULE) (Barrell 2014) determines the time a tree can be expected to be usefully retained in normal circumstances (Appendix C).

- **Long** > 40 years.
- **Medium** 15 – 40 years.
- **Short** 5 – 15 years.
- **No retention potential** 0 – 5 years.

Landscape Significance Rating (Morton 1996), (Appendix D).

- **Significant** – based on heritage or ecological value.
- **Very High** – based on adjacent area surrounding the site.
- **High** – neighbourhood status but may have some conditions or health issues.
- **Moderate** – good and worthy of preservation, may have minor health issues.
- **Low** – worthy of preservation, may have major conditions or health issues.
- **Very Low** – retain if possible.
- **Insignificant** – exempt from retention.

Retention Value Rating (Morton 2011), determined by considering both TULE and the Landscape Significance (Appendix E).

- **High** retention value trees are a priority for retention.
- **Medium** retention value trees are retained where possible.
- **Low** retention value trees are generally not a constraint to development.
- **Very Low** retention value trees may have potential hazards.

Planting Specifications from NATSPEC (Clark 2003) and Australian Standard® AS 2303-2018 – Tree Stock for Landscape Use (Appendix F).

2.3.2 **Tree Contractors** must have a minimum AQF Level 3 Certificate in Arboriculture and work in accordance with Australian Standard® AS 4373-2007 – Pruning of Amenity Trees, the Work Health & Safety (WHS) Act 2011 and the WHS Regulations 2017, the SafeWork NSW – Guide to Managing Risks of Tree Trimming and Removal Work 2016, and the Code of Practice for The Amenity Tree Industry 1998. Work near powerlines should be carried out in accordance with the Code of Practice for Work Near Overhead Power Lines.

3. RESULTS

3.1 THE SITE

3.1.1 The site is 24 Oliver Street, Freshwater NSW 2096.

3.1.2 This landscape slopes gently to the south-east, and the soils¹ are classified generally as fine sandy loam.



Figure 1: Aerial site map of 24 Oliver Street, Freshwater NSW 2096 (Nearmap 2023). The site perimeter is outlined in yellow.

¹ [Espade.environment.nsw.gov.au](https://www.environment.nsw.gov.au)

3.2 LEGISLATION AND SIGNIFICANCE IN THE ENVIRONMENT

Trees are subject to the following commonwealth and State Legislation:

3.2.1 NSW and Commonwealth Legislation regulates the **Biosecurity Act 2015** (diseases and pests) and the **Environmental Protection & Biodiversity Conservation Act 1999 (EPBC Act)**, which manages nationally endangered ecological communities (EEC) and national heritage items. The EPBC Act delegates to the **NSW Biodiversity Conservation Act 2016 (BC Act)**² and allows state and local authorities to manage ecological and heritage matters of significance. The BC Act repealed (but still has some transitional arrangements) the NSW Threatened Species Conservation Act 1995. The BC Act may require a Species Impact Statement and Biodiversity Banking and Offset Scheme agreements determined by the Biodiversity Assessment Method (BAM).

3.2.2 NSW State Legislation³ is regulated under the **NSW Environmental Planning and Assessment Act 1979 (EP&A Act)**, which manages significant development and infrastructure in NSW. The EP&A Act utilises **Environmental Planning Instruments (EPI)**³. These instruments include **State Environment Planning Policies (SEPP)** that deal with matters of state or regional environmental planning significance and **Local Environmental Plans (LEP)** that provide local councils a framework for land usage. **SEPP (Vegetation in Non-Rural Areas) 2017** applies to this local government area (LGA) and prohibits clearing vegetation without council consent.

3.2.3 **NSW Rural Fire Act 1997**⁴ regulates a **10/50 Vegetation Clearing Code**, which may allow a designated area to clear trees within 10 metres of a home and clear underlying vegetation such as shrubs (but not trees), within 50 metres of a home to reduce risk from bushfires. The 10/50 Vegetation Clearing Code does not apply to this site.

3.2.4 An analysis of state and local legislation, development controls and planning instruments concludes the following:

- **Tree management measures**⁵ are regulated by Warringah DCP 2011 and Warringah LEP 2011.
- **Landslide Risk Land:** Area A – Slope < 5.
- **Land Zoning:** R2: Low Density Residential.
- **Local Aboriginal Land Council:** Metropolitan.

² <https://www.environment.nsw.gov.au>

³ <https://www.planningportal.nsw.gov.au/>

⁴ <https://www.rfs.nsw.gov.au/>

⁵ <https://www.northernbeaches.nsw.gov.au/>

3.3 LOCAL PLANNING AND ZONING CONTROLS

Site Address: 24 Oliver Street, Freshwater NSW 2096.

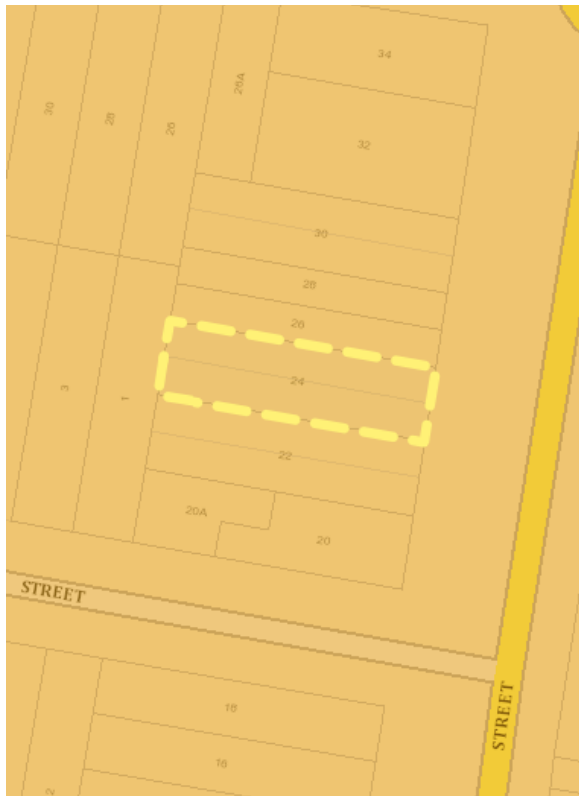


Figure 2: Landslide Risk Land.
Area A – Slope < 5 (brown).

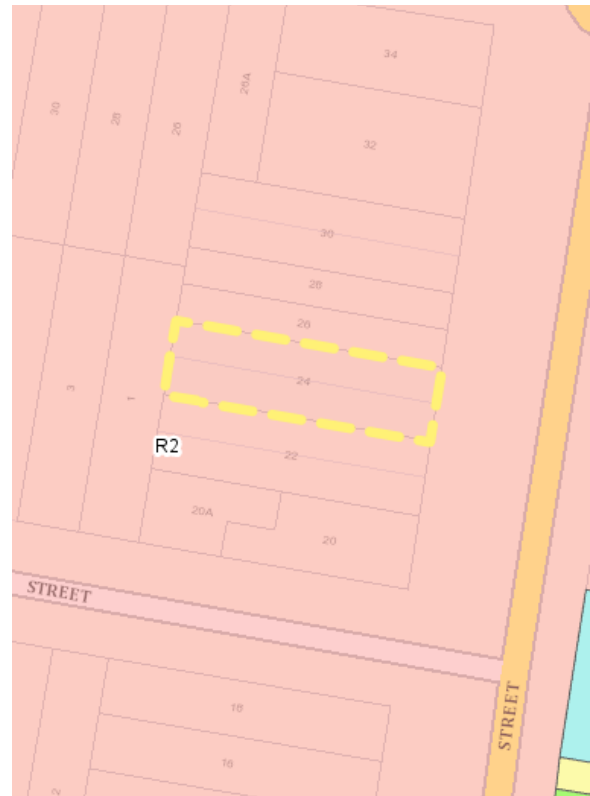


Figure 3: Land Zoning.
R2: Low Density Residential (red).

3.4 TREE SCHEDULE

Table 4: Tree Schedule – Health and Structural Condition of Trees.

(*DBH – Diameter Breast Height, *DRC – Diameter Root Collar, *TPZ – Tree Protection Zone, *SRZ – Structural Root Zone, *TULE – Tree Useful Life Expectancy).

Tree No.	Location	Botanical Name Common Name	Crown (m)	Height (m)	DBH* DRC* (cm)	TPZ* SRZ* (m)	Tree Health & Condition	TULE* A-Z	Retention Value	Control Measures
1	Street tree.	<i>Syagrus romanzoffiana</i> Cocos Palm	8	12	38 42	5.0# 2.3	Semi-mature, good condition but poor development.	2a A1	Moderate	Retain and protect.
2 (x 5)	Street tree.	<i>Murraya spp.</i> Murraya (hedge)	3-5	3-5	15/15 22	2.5 1.8	Immature, good condition.	2a Z10	Low	Remove and replenish.
3	Street tree.	<i>Pittosporum spp.</i> Pittosporum	4	6	14 16	2.0 1.5	Immature, good condition but poor development, previously pruned, with a suppressed canopy, and a kinked stem.	2d A2	Low-Moderate	Retain and protect.
4	Street tree.	<i>Pittosporum spp.</i> Pittosporum	4	6	10/12 20	2.0 1.7	Immature, good condition but poor development, with twin stems.	2d A1	Low-Moderate	Retain and protect.
5	East of dwelling.	<i>Cryptomeria japonica</i> Sugi	2	3	10/10 15	2.0 1.5	Immature, good condition, heavily pruned.	1a Z1	Low	Remove (Exempt, under 5m height).
6	East of dwelling.	<i>Grevillea buxifolia</i> Spider Grevillea	6	5	15 20	2.0 1.7	Immature, good condition but poor development, previously pruned, with decay and a cavity.	3a Z10	Low-Moderate	Remove and replenish.
7 (x 7)	22 Oliver Street.	<i>Murraya spp.</i> Murraya	3	5	10 15	2.0 1.5	Immature, good condition, heavily pruned hedge.	2a A1	Low	Retain and protect.
8	26 Oliver Street.	<i>Schefflera actinophylla</i> Australia Umbrella Tree	3	3	5/5 10	2.0 1.5	Immature, good condition.	1a A1	Low	Retain and protect.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 metre outside the crown projection.

3.5 OBSERVATIONS



Plate 1: Tree 1, *Syagrus romanzoffiana* (Cocos Palm).

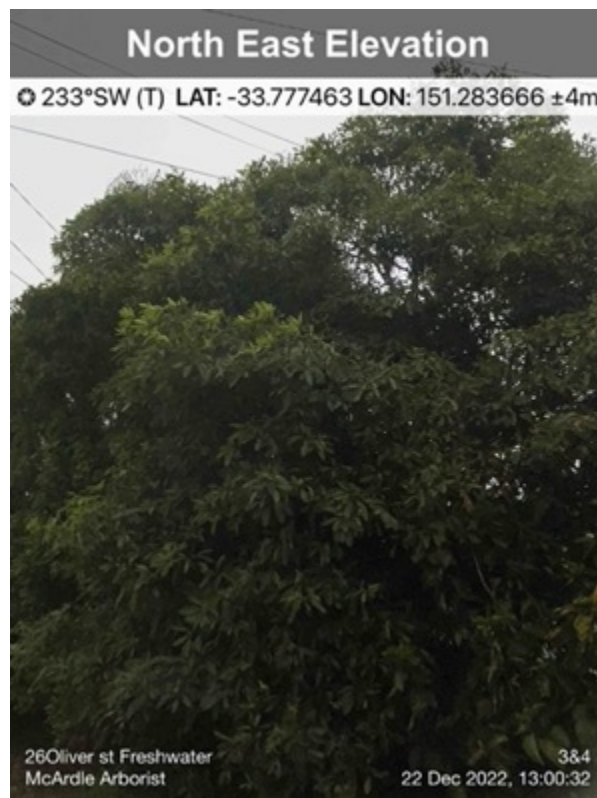


Plate 2: Trees 3 and 4, two (2) *Pittosporum* spp. (*Pittosporum*).

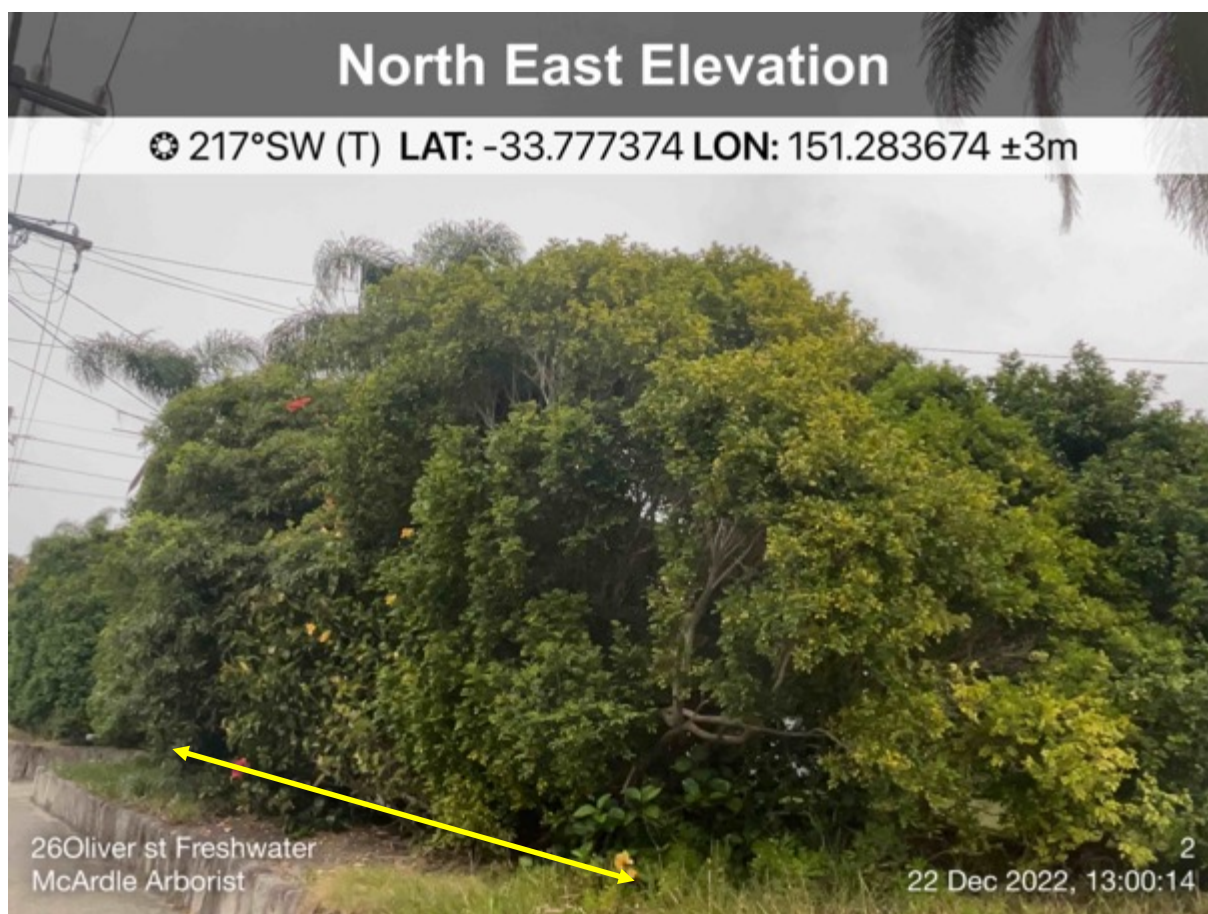


Plate 3: Tree Group 2, a *Murraya* spp. (*Murraya*) hedge.

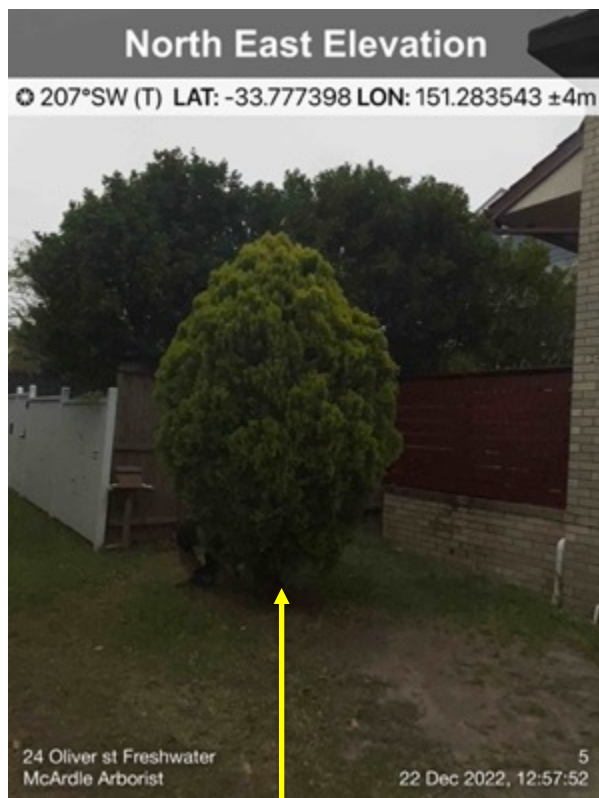


Plate 4: Tree 5, *Cryptomeria japonica* (Sugi).

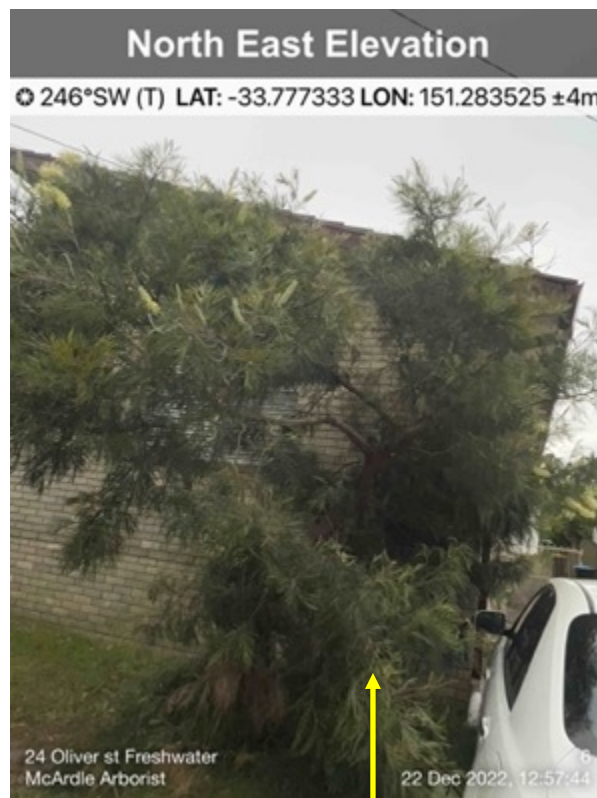


Plate 5: Tree 6, *Grevillea buxifolia* (Spider Grevillea).



Plate 6: Tree Group 7, a *Murraya spp.* (Murraya) hedge.



Plate 7: Tree 8, *Schefflera actinophylla* (Australia Umbrella Tree).

4. DISCUSSION

4.0.1 Eight (8) trees/tree groups on site and in the adjacent surrounding were assessed by an AQF level 5 arboist. The streetscape trees or trees in the curtilage/nature strip is requested to be assessed by the council. Five (5) trees/tree groups numbered 1, 3, 4, 7 and 8 are proposed for **retention**; and three (3) trees /tree groups numbered 2, 5 and 6 are proposed for **removal** as a result of this assessment.

4.1 SIGNIFICANCE IN THE LANDSCAPE AND USEFUL LIFE EXPECTANCY

4.1.1 Tree 1 has a **medium** useful life expectancy rating (2a) and an estimated life duration of 15 to 40 years. As the tree is an exotic plant species and has a medium live crown size exceeding 40m², the tree is considered to have **moderate** value in the landscape.

4.1.2 Trees 5 and 8 have **long** useful life expectancy ratings (1a) and estimated life durations of over 40 years. As the trees have small live crown sizes less than 40m², the trees are considered to have **low** value in the landscape.

4.1.3 Trees 2, 3, 4 and 7 have **medium** useful life expectancy ratings (xx) and estimated life durations of 15 to 40 years. As the trees have small live crown sizes less than 40m², the trees are considered to have **low** value in the landscape.

4.1.4 Tree 6 has a **short** useful life expectancy rating (3a) and an estimated life duration of 5 to 15 years. As the tree is a native plant species and has a small live crown size less than 40m², the tree is considered to have **moderate** value in the landscape.

4.2 RETENTION VALUES

4.2.1 Retention values are determined by considering both TULE and Significance in The Landscape (Appendix E). The retention values of the assessed trees are as follows:

Table 5: Retention Values.

Retention Values				
High (0 trees)	Moderate (1 tree)	Low-Moderate (3 trees)	Low (4 trees)	Very Low (0 trees)
-	1.	3, 4, 6.	2, 5, 7, 8.	-

4.2.2 Tree 1 has **moderate** retention value. This tree is desirable for retention and should be retained if possible.

4.2.3 The trees of **low-moderate** retention value are numbered 3, 4 and 6. These trees require substantial remediation and are only suitable for retention in the short term.

4.2.4 The trees of **low** retention value are numbered 2, 5, 7 and 8. These trees do not have special ecological or amenity value and are not considered to be worthy of preservation.

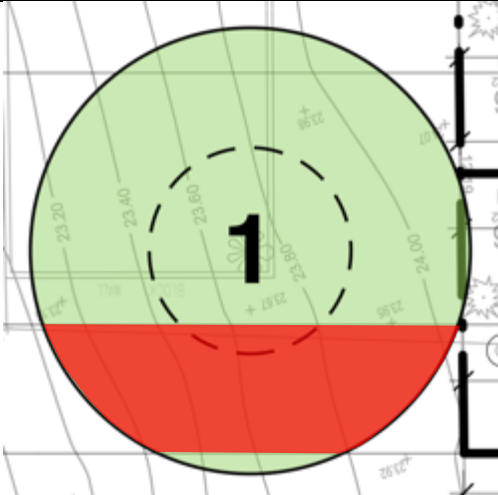
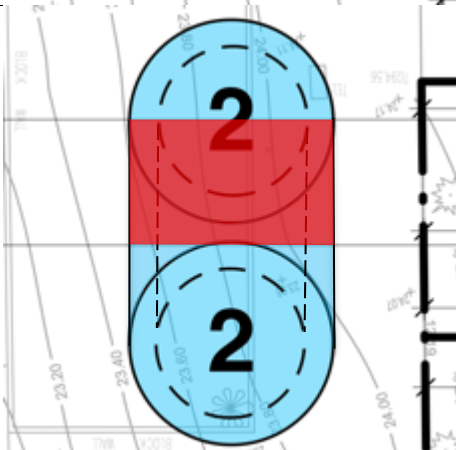

4.3 IMPACT ASSESSMENT

4.3.1 The assessment evaluates how the proposed development will impact the Tree Protection Zones (TPZ) and canopies of the assessed trees. The impacts are classified as minor or major TPZ encroachments.

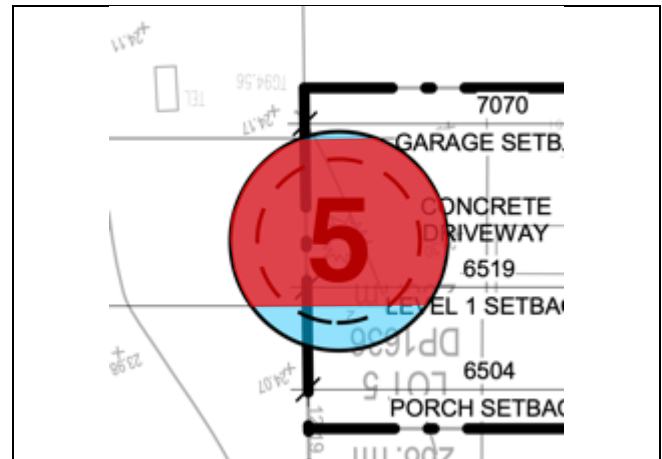
Table 6: TPZ Encroachments.

Tree No.	<u>Botanical Name</u> (Common Name)	TPZ Encroachment	Category
1	<u>Syagrus romanzoffiana</u> (Cocos Palm)	34.52%	Major (more than 10%)
2	<u>Muraya spp.</u> (Murraya)	Up to 50%	Major (more than 10%)
3	<u>Pittosporum spp.</u> (Pittosporum)	5.20%	Minor (less than 10%)
4	<u>Pittosporum spp.</u> (Pittosporum)	5.20%	Minor (less than 10%)
5	<u>Cryptomeria japonica</u> (Sugi)	72.90%	Major (more than 10%)
6	<u>Grevillea buxifolia</u> (Spider Grevillea)	31.19%	Major (more than 10%)
7	<u>Muraya spp.</u> (Murraya)	Up to 28.18%	Major (more than 10%)
8	<u>Schefflera actinophylla</u> (Australia Umbrella Tree)	19.55%	Major (more than 10%)

Table 7: Major TPZ Encroachments. Encroachments are highlighted in red.

Major TPZ Encroachments	
<p>Tree 1, <u>Syagrus romanzoffiana</u> (Cocos Palm)</p> <p>Retention Value: Moderate</p> <p>TPZ Encroachment: 34.52%</p> <p>Likely Impacts:</p> <ul style="list-style-type: none"> • Driveway within SRZ and TPZ. <p>Recommendations: Retain and protect with mulch and tree trunk protection. Root mapping is required prior to the commencement of development. Construct the driveway on grade using reinforced concrete or permeable paving over geotextile fabric. Minimal excavations to a depth of 100mm are permitted to remove topsoil and debris. Excavations are to be completed by hand under AQF Level 5 arborist supervision using non-destructive digging (NDD) methods.</p>	
<p>Tree 2, <u>Muraya spp.</u> (Murraya)</p> <p>Retention Value: Low</p> <p>TPZ Encroachment: Up to 50%</p> <p>Likely Impacts:</p> <ul style="list-style-type: none"> • Driveway within SRZ and TPZ. <p>Recommendations: Remove due to major anticipated impacts from encroachments of greater than 10% within the trees' SRZs/TPZs. This tree group has low retention value and is not worthy of preservation. The removal of this tree is necessary to accommodate the proposed works.</p>	
<p>Tree 5, <u>Cryptomeria japonica</u> (Sugi)</p> <p>Retention Value: Low</p> <p>TPZ Encroachment: 72.90%</p> <p>Likely Impacts:</p> <ul style="list-style-type: none"> • Driveway within SRZ and TPZ. 	

Recommendations: Remove due to major anticipated impacts from encroachments of greater than 10% within the trees' SRZs/TPZs. This tree is not worthy of preservation. The removal of this tree is necessary to accommodate the proposed works.



Major TPZ Encroachments

Tree 6, *Grevillea buxifolia* (Spider Grevillea)

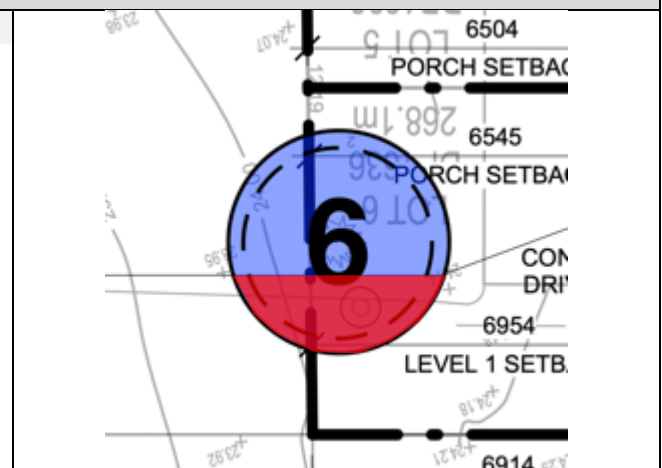
Retention Value: Low-Moderate

TPZ Encroachment: 31.19%

Likely Impacts:

- Driveway within SRZ and TPZ.

Recommendations: Remove due to major anticipated impacts from encroachments of greater than 10% within the trees' SRZs/TPZs. This tree is not worthy of preservation. The removal of this tree is necessary to accommodate the proposed works.



Tree 7, *Murraya spp.* (Murraya)

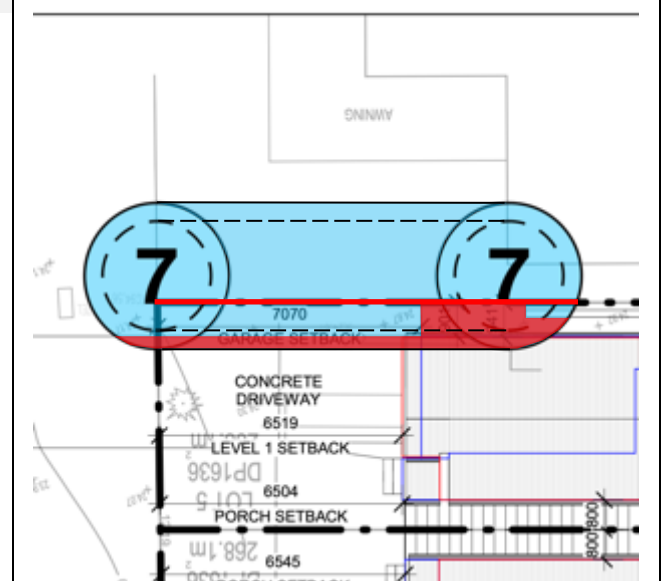
Retention Value: Low

TPZ Encroachment: Up to 28.18%

Likely Impacts:

- Boundary fence within SRZ and TPZ.
- Cut/fill within SRZ and TPZ.
- Driveway within SRZ and TPZ.
- Dwelling within TPZ.
- Side path within SRZ and TPZ.

Recommendations: Retain and protect with mulch and tree protection fencing. Root mapping is required prior to the commencement of development. Construct the driveway and side path on grade using reinforced concrete or permeable paving over geotextile fabric. Minimal excavations to a depth of 100mm are permitted to remove topsoil and debris for the driveway. Excavations for the driveway and side path and the pier holes for the boundary fence are to be completed by hand under AQF Level 5 arborist supervision using non-destructive digging (NDD) methods.



Tree 8, *Schefflera actinophylla* (Australia Umbrella Tree)

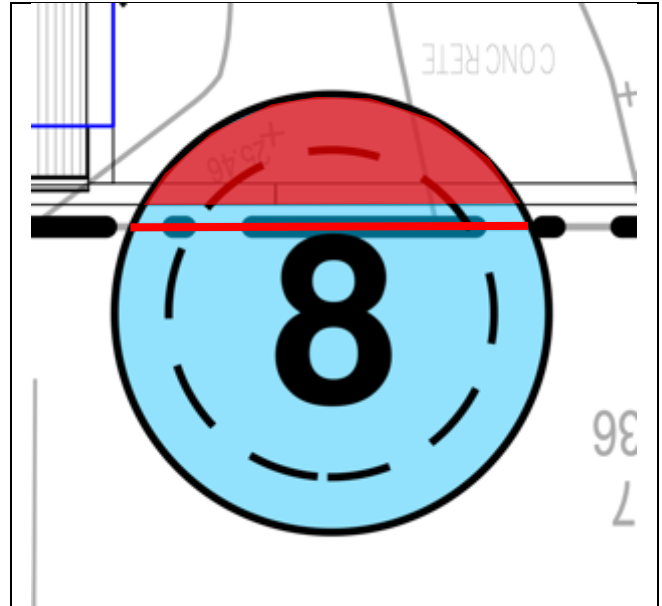
Retention Value: Low

TPZ Encroachment: 19.55%

Likely Impacts:

- Boundary fence within SRZ and TPZ.
- Cut/fill within SRZ and TPZ.
- Retaining wall within SRZ and TPZ.

Recommendations: Retain and protect with mulch and tree protection fencing. Root mapping is required prior to the commencement of development. Excavations for the cut and pier holes for the retaining wall and boundary fence are to be completed by hand under AQF Level 5 arborist supervision using non-destructive digging (NDD) methods.



5. RECOMMENDATIONS

5.1 TREE WORKS

Table 8: Tree Works.

Tree Works	
Retain (5 trees/tree groups)	Remove (3 trees/tree groups)
1, 3, 4, 7, 8.	2, 5, 6.

5.1.1 **Retain** five (5) trees/tree groups numbered 1, 3, 4, 7 and 8.

5.1.2 **Remove** three (3) trees/tree groups numbered 2, 5 and 6.

5.1.3 **Suitably Qualified Arborist:** Most councils require written consent prior to tree pruning or removal. Tree contractors must have a minimum AQF Level 3 Certificate in Arboriculture and work in accordance with Australian Standard® AS 4373-2007 – Pruning of Amenity Trees, the Work Health & Safety (WHS) Act 2011 and the WHS Regulations 2017, the SafeWork NSW – Guide to Managing Risks of Tree Trimming and Removal Work 2016, and the Code of Practice for The Amenity Tree Industry 1998. Work near powerlines should be carried out in accordance with the Code of Practice for Work Near Overhead Power Lines. Tree contractors shall be members of Tree Contractors Association Australia (TCAA) or Arborists Australia (AA) and hold Workers Compensation and Public Liability Insurance. Tree contractors must liaise with the consulting arborist to ensure that tree pruning and removal works are completed in accordance with specification.

5.1.4 **Canopy Cover Loss:** Replenish tree removals with new tree plants within the site to compensate for loss of amenity in accordance with council requirements. To compensate for the reduced canopy cover, planting of indigenous trees which are appropriate to the local environment and provide koala habitat should be considered using the canopy cover formula $((\frac{1}{2} \times \text{canopy diameter})^2 \times \pi)$ as follows:

Table 9: Canopy Loss. Exempt trees are highlighted in red and do not require replenishment.

Tree No.	Canopy Diameter (m)	Canopy Loss (m ²)	Total Canopy Loss	New Planting
2	5 (x 5 trees)	98.17	129.58m ²	Plant two (2) trees with a canopy diameter at maturity of 9-10 metres.
5	2	3.14		
6	6	28.27		

5.1.5 **Replenishment Planting:** Two (2) trees of 45L potted volumes are required. In accordance with Council requirements, new tree plantings should be a native species or from a vegetation community present on site to compensate for loss of amenity. Replenishment is to be completed in accordance with planting specifications from NATSPEC (Clark 2003) and Australian Standard® AS 2303-2018 – Tree Stock for Landscape Use (Appendix F).

5.1.6 **Mulch:** Maintain aged *Eucalyptus spp.* mulch around all the retained and replenished trees in accordance with Australian Standard® AS 4454-2003 – Compost, Soil Conditioners and Mulches.

5.1.7 **Watering Schedule:** Maintain a watering schedule for replenished trees. A 45L potted volume requires approximately 35L of water daily (Trees Impact: 2021).

5.2 TREE PROTECTION MEASURES

Table 10: Tree Management Plan.

Tree Management Measures	Tree No.
Mulch Ground Cover Protection	1, 3, 4, 7.
Tree Protection Fencing	3, 4, 7, 8.
Tree Trunk Protection	1.
Tree-Sensitive Construction Measures	1, 7, 8.
Root Mapping Investigations	1, 7, 8.

5.2.1 Minor TPZ encroachments must be compensated for elsewhere and be contiguous with the TPZs of the assessed trees. All measures must be certified by an AQF Level 5 arborist in accordance with Council requirements and Australian Standard® AS 4970-2009 – Protection of Trees on Development Sites.

5.2.2 **Mulch ground cover protection** is required over the TPZs (where viable) of four (4) trees/tree groups numbered 1, 3, 4 and 7 to minimise soil compaction and root damage. This is to consist of 75mm depth layers of clean and certified *Eucalyptus spp.* mulch.

5.2.3 **Tree protection fencing** is required around the TPZs (where viable) of four (4) trees/tree groups numbered 3, 4, 7 and 8 to preserve their root zones. This is to consist of 1.8-metre-high steel mesh fencing anchored with concrete blocks, or, red high-visibility plastic mesh fencing attached to star pickets. Tree protection fencing may be relocated with the project arborist's permission to access the work site. TPZ signage with the project arborist's contact details is to be attached to the tree protection fencing and read 'Tree Protection Zone: Do Not Enter' written in large font with waterproof ink, in accordance with Australian Standard® AS 1319-1994 – Safety Signage.

5.2.4 **Tree trunk protection** is required around the stems of one (1) tree numbered 1, as tree protection fencing would be unpractical and block access to the work site. This is to consist of hessian, padding or geotextile fabric wrapped around the trees' trunk, with 1.8 metre lengths of timber spaced at small intervals and strapped over the top of the padding, not nailed or screwed into the trees.

5.3 TREE-SENSITIVE CONSTRUCTION MEASURES

5.3.1 **Tree-sensitive construction measures** are required to minimise major anticipated impacts to three (3) trees/tree groups numbered 1, 7 and 8 as follows:

- **Boundary Fence and Retaining Walls:** Pier and beam footings are required for the boundary fence and the retaining walls within the SRZs and TPZs of two (2) trees/tree groups numbered 7 and 8. Pier holes are to be excavated outside the trees' SRZs under AQF Level 5 arborist supervision using non-destructive digging (NDD) methods (e.g. shovel and pickaxe, hydro vacuum, air spade).
- **Cut:** Excavations for the areas where the grade is to be cut within the TPZs of two (2) trees/tree groups numbered 7 and 8 are to be completed by hand under AQF Level 5 arborist supervision using NDD methods.
- **Driveway and Side Access Path:** The driveway and side access path within the SRZs and/or TPZs of two (2) trees/tree groups numbered 1 and 7 are to be constructed on grade using reinforced concrete or permeable paving over geotextile fabric. Minimal excavation to a depth of 100mm is permitted to remove topsoil and debris.

5.4 FURTHER INVESTIGATION

5.4.1 **Root mapping investigations** are to be conducted by an AQF Level 5 arborist prior to construction to locate roots of three (3) trees/tree groups numbered 1, 7 and 8 that may be situated within the footprint of the proposed development.

5.5 SITE MONITORING

5.5.1 An AQF Level 5 arborist must monitor trees throughout the construction process. The site manager should notify the project arborist prior to works within the TPZs of the retained trees.

Table 11: Project Arborist Inspections.

SITE INSPECTIONS DURING CONSTRUCTION			
Stage	General Schedule of Work	Person Responsible	Certification by Project Arborist
Pre-Construction	Root mapping investigations to locate roots of trees 1,7&8 within footprint of development.	Project Arborist	Root Mapping Report
	Prior to demolition, earthworks or site clearing, clearly mark trees 2,5&6 for removal (spray paint on trunks).	Competent Person	n/a
	Tree Protection Systems (for retained trees) must be installed prior to demolition, include mulching in TPZ.	Competent Person	Pre-Construction Tree Protection Certificate
Construction	Scheduled inspection of trees during construction-usually monthly.	Project Arborist	Inspection and Certification
	Supervise and protect any excavations within the TPZ of retained trees.	Project Arborist	Supervision and Certification
Post-Construction	Final inspection after construction and prior to the removal of protection measures.	Project Arborist	Final Tree Protection Certificate

6. HOLDING POINTS

6.1 Tree protection measures are to be installed around the retained trees and certified by the project arborist prior to any demolition, development, or soil stripping. The protected area is an exclusion zone. Protection measures should not be removed or altered unless agreed by the supervising arborist. Ground protection should support all anticipated loading and prevent compaction in the TPZ.

6.2 All works carried out within the TPZs of the retained trees must be supervised by an AQF Level 5 arborist. Activities prohibited in TPZs are listed in [8. Tree Management Specifications](#).

6.3 Root mapping investigations are to be conducted by an AQF Level 5 arborist prior to construction to locate roots of three (3) trees/tree groups numbered 1, 7 and 8 that may be situated within the footprint of the proposed development.

6.4 Tree pruning and removal works are to be completed by qualified AQF Level 3 arborists in accordance with Australian Standard® AS 4373-2007 – Pruning of Amenity Trees and SafeWork NSW – Guide to Managing Risks of Tree Trimming and Removal Works. Tree contractors shall be members of Tree Contractors Association Australia (TCAA) or Arborists Australia (AA) and hold Workers Compensation and Public Liability Insurance. Tree contractors must liaise with the consulting arborist to ensure that pruning and removal works are completed in accordance with specification.

6.5 Two (2) replenishment trees of 45L potted volumes are to be planted in suitable locations at least 3-5 metres away from buildings and away from power lines, hard-surface infrastructure and underground services. The replenishment trees are to be certified by an AQF Level 5 arborist and planted in accordance with Australian Standard® AS 2303-2018 – Tree Stock for Landscape Use.

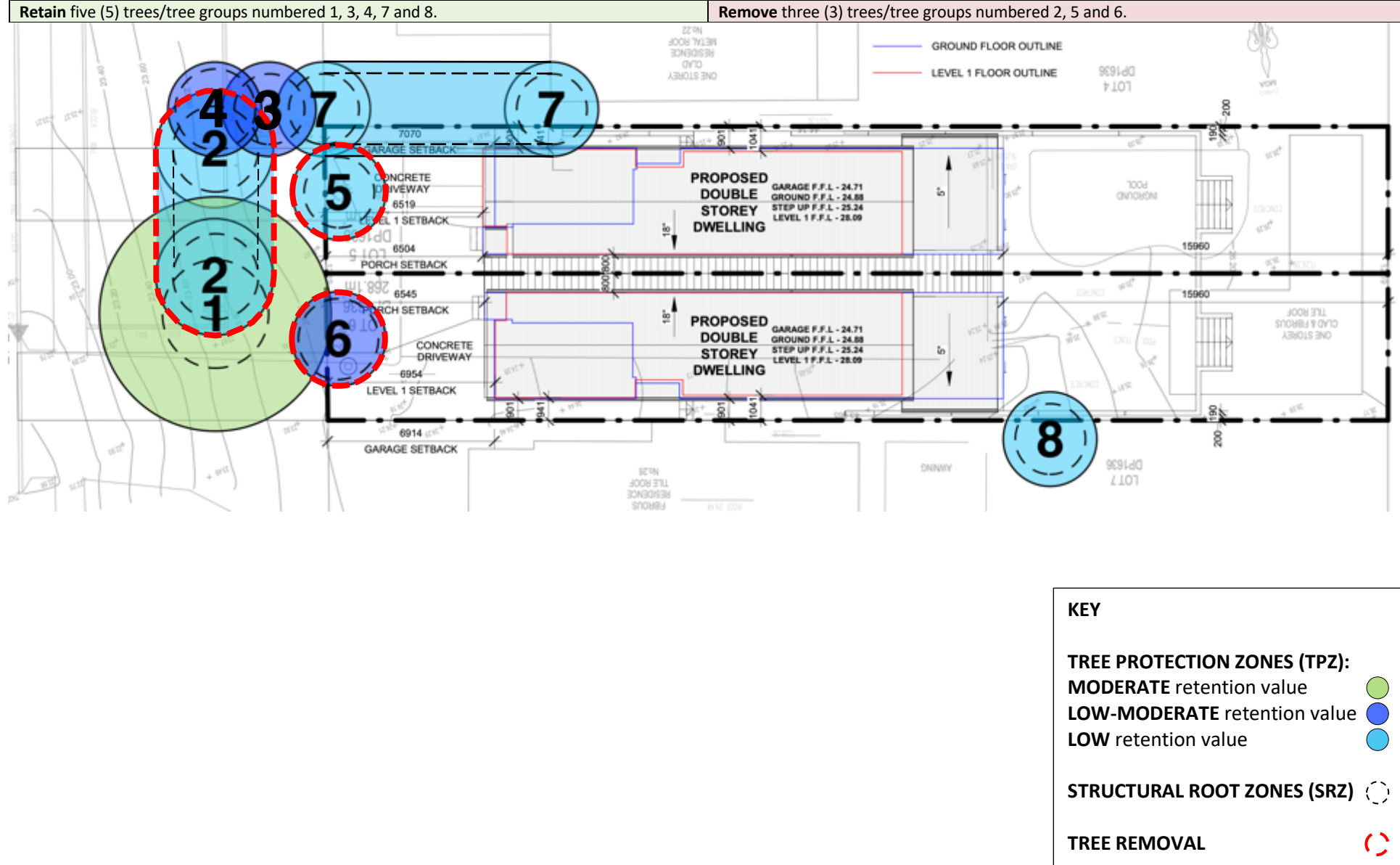
6.6 Inspections monthly or every second month are to be carried out by an AQF Level 5 arborist to ensure the retained trees are preserved in viable condition, and to certify that tree protection measures are compliant and being maintained around the trees.

6.7 Hoarding, waste and amenities (HWA) should be stored outside the TPZs of the retained trees.

6.8 If any of the retained trees are damaged during the proposed development, then a remedial plan must be prepared by an AQF Level 5 arborist for each damaged tree.

7. MAPS

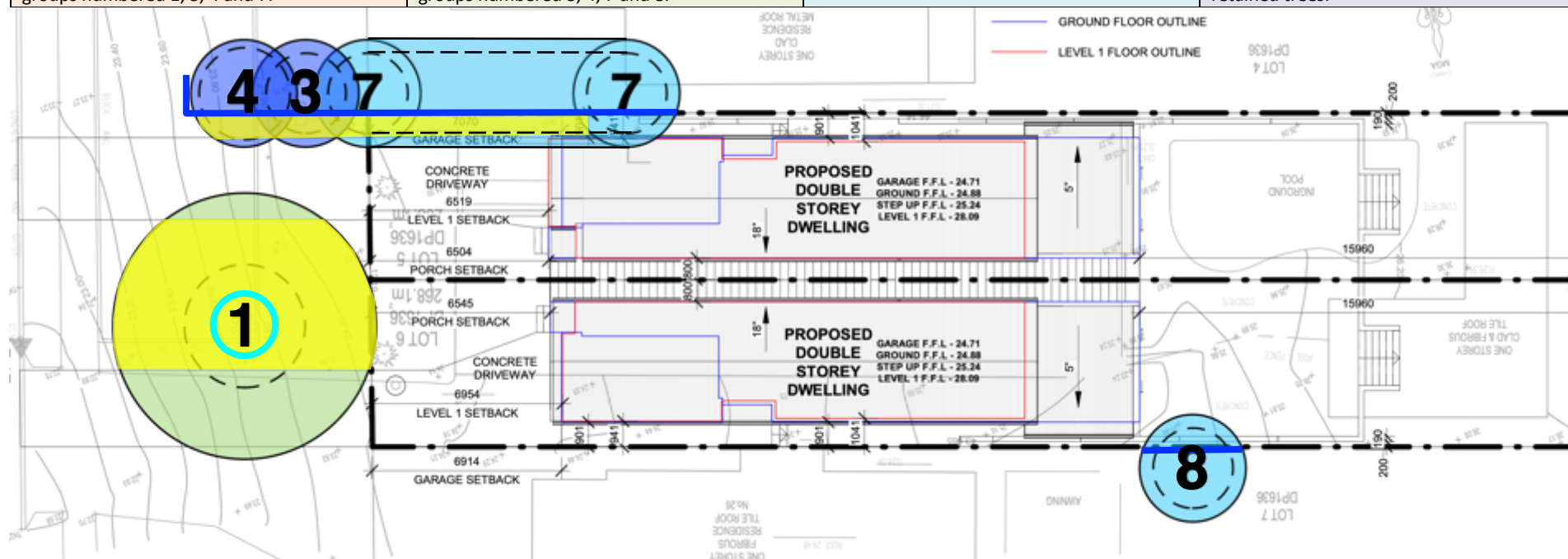
MAP A TREE RETENTION AND REMOVAL PLAN



Site Plan (Issue 1)	Obliq Design	24 Oliver Street, Freshwater NSW 2096	Scale: 1:200	Dated: 10/08/2022
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MAP B TREE PROTECTION PLAN

Place mulch ground cover protection over the TPZs (where viable) of four (4) trees/tree groups numbered 1, 3, 4 and 7.	Install tree protection fencing around the TPZs (where viable) of four (4) trees/tree groups numbered 3, 4, 7 and 8.	Install tree trunk protection around the stems of one (1) tree numbered 1.	AQF Level 5 arborist supervision is required for all works carried out within the TPZs of the retained trees.
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KEY

- Mulch Ground Cover Protection
- Tree Protection Fencing
- Tree Trunk Protection

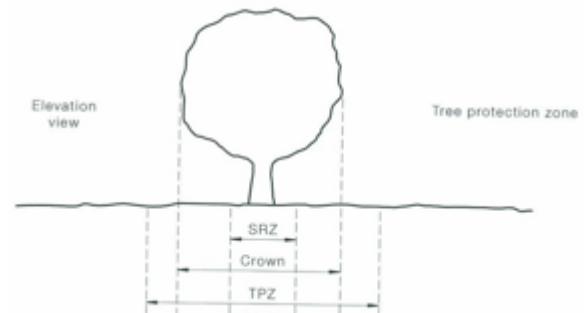
- Minimal excavations** to a depth of 100mm permitted to remove topsoil and debris for driveway.
- The driveway is to be constructed using **reinforced concrete** or **permeable paving** over **geotextile fabric**.
- Pier holes for boundary fence and retaining walls are to be excavated by hand under AQF Level 5 arborist supervision using **NDD methods**.
- Excavations for cut areas are to be excavated by hand under AQF Level 5 arborist supervision using **NDD methods**.

Root mapping investigations are to be conducted by an AQF Level 5 arborist prior to the proposed works to locate roots of three (3) trees/tree groups numbered 1, 7 and 8 that may be situated within the footprint of the proposed development.

8. TREE MANAGEMENT SPECIFICATIONS

Tree Protection Zone (TPZ) Specifications

Tree protection fencing ensures construction does not encroach into a tree's TPZ. The Structural Root Zone (SRZ) of a tree is the area essential for tree stability. Works conducted within the SRZ may destabilise the tree and lead to potential failure.

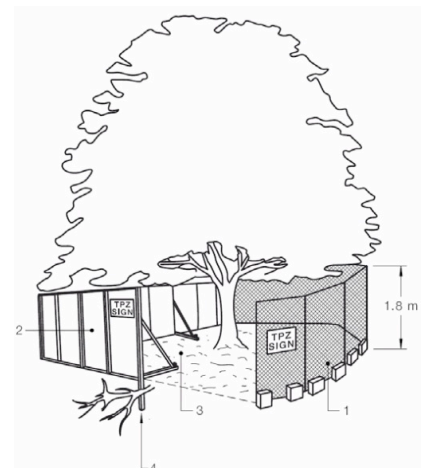


Tree Protection Fencing: Fencing must not be removed or altered. Specifications for tree protection fencing must be as follows:

- Installed prior to development and certified by a project arborist.
- Fully enclosed around a tree's TPZ.
- 1.8-metre-high temporary chain wire mesh cyclone fencing.
- Signposted with 300mm x 450mm signage that reads "No Entry. Tree Protection Zone".
- Add mulch across the surface of the TPZ and water regularly.

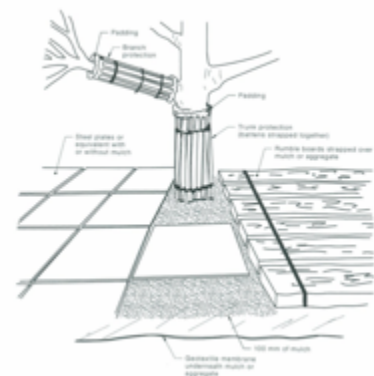
Specifications for tree protection fencing on slopes or uneven ground must be as follows:

- Star pickets spaced at 2 metre intervals with a minimum height of 1 metre.
- Connected by a continuous high-visibility barrier or hazard mesh.
- Alternative plywood or wooden paling fence panels.



Tree Trunk and Branch Protection: Specifications for tree trunk protection when fencing is impractical must be as follows:

- A layer of padding, geotextile fabric or similar wrapped around the trunk to a minimum height of 2 metres.
- 1.8 metre lengths of timbers aligned vertically and spaced at small gaps evenly around the trunk.
- Boards are to be strapped to trees, not nailed or screwed to the tree.



Prohibitions for Tree Protection Zones: The following activities shall **not** be carried out within any TPZ:

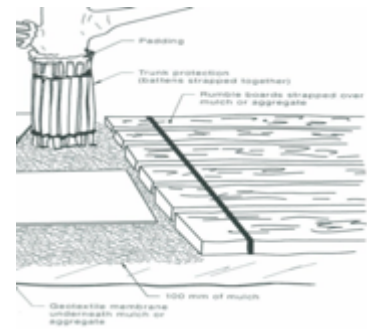
- Disposal of chemicals and liquids (including concrete and mortar slurry, solvents, paint, fuel or oil).
- Stockpiling, storage or mixing of materials.
- Refuelling, parking, storing, washing and repairing tools, equipment, machinery and vehicles.
- Disposal of building materials and waste.

The following activities shall **not** be carried out within any TPZ **unless** under the supervision of a project arborist:

- Increasing or decreasing soil levels (including cut and fill).
- Soil cultivation, excavation or trenching.
- Placing offices or sheds.
- Assembly of scaffolding or hoardings; and/or another act that may adversely affect the tree.

Root Protection Specifications: If temporary access for machinery is required within the TPZ, ground protection measures will be required to prevent root damage and soil compaction. Specifications for ground protection are as follows:

- Permeable membrane such as geotextile fabric.
- Layer of mulch or crushed rock (at minimum depth of 100mm).
- Or rumble boards strapped over mulch or aggregate.



Mulch Within TPZ: Maintain aged *Eucalyptus spp.* mulch around the retained trees for the duration of the development in accordance with Australian Standard® AS 4454-2003 – Compost, Soil Conditioners and Mulches.

Mulch should have at least 70% by mass of its particles, with a maximum size of greater than 16mm and spread 50-75mm deep to the extent of the dripline, (never exceed 100mm depth). Mulch should not have contact with a tree's trunk. Apply 200mm from the trunk, shaping a soil berm dish close to the root ball to facilitate establishment of watering.

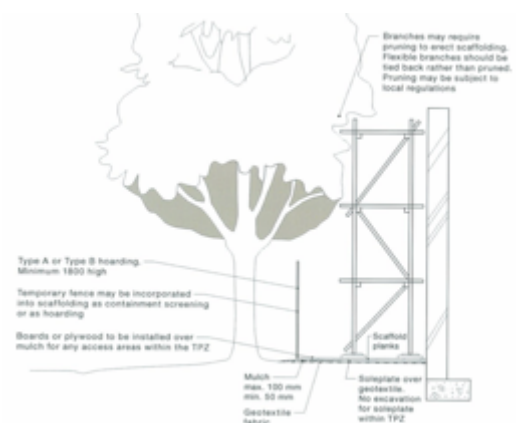
Watering Schedule: Maintain a watering schedule for retained trees at a rate of approximately 45 litres daily (Trees Impact: 2021).

Excavation Within TPZ's: Excavations shall be undertaken under the supervision of a project arborist, using tree-sensitive, non-destructive methods (e.g. manual excavation with hand tools, air-spade or hydro-vacuum machinery).

- No roots greater than 40mm in diameter are to be damaged, pruned or removed. All care shall be taken to preserve and avoid damaging roots. Excavations should not occur within a tree's SRZ.
- Exposed roots shall be protected from direct sunlight by covering with hessian or similar fabric and kept moist at all times.
- Hand excavation and root mapping shall be undertaken along excavation lines within the TPZ. Any conflicting roots greater than 40mm in diameter shall be pruned using clean, sharp secateurs or a pruning saw to ensure a clean cut that is free from tears.

Installing Underground Services Within TPZ: All services should be routed outside the TPZ.

- If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches.
- The directional drilling boring methods, such as horizontal drilling (HDD) may be at least 600mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.
- Excavations for entry/exit pits must be located outside the TPZ.



9. GLOSSARY

Aerial inspection: Where a tree is climbed by an arborist to inspect the upper stem and crown for signs or symptoms of defects and disease.

Assets Protection Zone (APZ): A fuel-reduced area surrounding a built asset or structure.

Bracket fungus: The rigid fruiting body of some fungus species.

Branch collar: The ring of wood tissue, which forms around the base of a branch (near the branch attachment).

Cavity: A void, initiated by a wound within the trunk, branches or roots. These voids are referred to as hollows.

Canker: Fungal infections of the bark and cambium that can occur on all parts of the tree.

Co-dominant: Stems or branches equal in size and relative importance.

Crown: All the parts of a tree arising above the trunk where it terminates by its division forming branches e.g. the branches, leaves, flowers and fruit, or the total amount of foliage supported by branches.

Crown lifting: The removal of the lower branches of the tree.

Dead wood: Refers to any whole limb that no longer contains living tissues

Decay: Process of degradation of woody tissues by fungi or bacteria through decomposition of cellulose and lignin.

Deciduous: Describes trees and bushes that shed their leaves in the autumn (opposite to evergreen).

Dieback: Tree deterioration where the branches and leaves die.

Drip line: Where the canopy releases water shed from the foliage during precipitation.

DBH: Diameter at breast height, about 1.4 metres of trunk height.

Epicormic Shoots: These shoots often have a weak point of attachment. Epicormic growth/shoots are generally a survival mechanism, often indicating the presence of a current, or past stress event such as fire, pruning, drought, etc.

Flush cut: A cut that damages or removes the branch collar or removes the branch and stem tissue and is inconsistent with the branch attachment as indicated by the bark branch ridge.

Genus/species: Identified using its botanical name. Where the species name is not known, species (spp.) is used. The common name for trees may vary considerably in each area by geographical differences.

Height: Height has been estimated to +/- 2 metres.

Inclusion: The pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet.

Maturity: Tree age, assessed as over-mature (last 1/3 of life expectancy), mature (1/3 to 2/3 life expectancy) and semi-mature (less than 1/3 life expectancy).

Remedial (restorative) pruning: The removal of damaged or dead wood; or the trimming of diseased or infested branches. Trimming branches back to undamaged tissue in order to induce shoots, from which a new crown will be established.

Resistograph® testing: A resistograph® is a specialised machine that measures timber density by a drilling a 3mm diameter probe through the wood, simultaneously plotting the results on a graph at full scale.

Structural integrity: Describes the internal supporting timber (substantial to frail).

Structural Root Zone (SRZ): Refers to the radial distance in metres, measured from the centre of the tree stem, which defines the critical area required to maintain stability of the tree.

Targets: Are people, property, or activities that could be injured, damaged, or disrupted by a tree.

Tree Protection Zone (TPZ): Refers to the radius distance in metres, measured from the centre of the tree stem which defines the tree protection zone for a tree to be retained. This is generally the minimum distance from the centre of the tree trunk where protective fencing is to be installed to create an exclusion zone associated with construction works.

Vigour: Refers to the tree's health as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease/invasion, and the degree of dieback.

Windthrow: Tree failure when a force exerted by wind against the foliage crown and trunk overcomes resistance to that force in the root plate.

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APPENDICES

Appendix A Visual Tree Assessment (VTA)

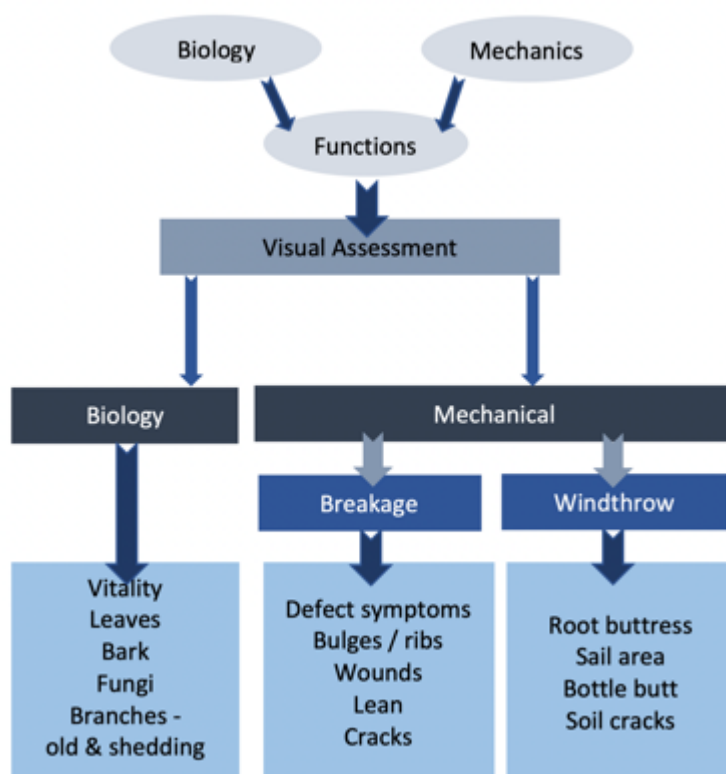


Diagram 1: VTA Chart by Claus Mattheck (1994) *The Body Language of Trees* adapted

Schedule 1: Categories for VTA.

Visual Tree Diagnostics	
1	Maturity: J - Juvenile; IM - Immature; SM - Semi-Mature; M - Mature
Health & Vigour	Condition of Tree
KEY	KEY
4 Dieback is more than 20%.	2 Good condition
4b Epicormics	3 Good condition but poor development
5 Sparse foliage	3b Moderate condition
7 Insect damage – foliage	3c Poor condition
7b Borers	5b Unbalanced Canopy
8 Fungal attack – pathogen	6 Physical Damage
10 Termite activity	9 Cavity
12b Dying	10b Inclusions
14 Parasitic vine present	11 Lean
15 Damage from a climbing plant	12 Heavily pruned
17 Habitat tree	13 Damaged roots
18 Endangered species	13b Encroachment
	16 Inclusions

Appendix B Tree A-Z Categories
Schedule 2: Tree A-Z Categories Field Sheet (version 10.04-U8C)

Barrell (2019) Criteria for Assessing the Importance of Trees on Development Sites.

TreeAZ Categories Field Sheet (Version 10.04-USC)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

Z1	Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
Z2	Too close to a building, i.e. exempt from legal protection because of proximity, etc
Z3	Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

Z4	Dead, dying, diseased or declining
Z5	Severe damage and/or structural defects where a high risk of failure <u>cannot</u> be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
Z6	Instability, i.e. poor anchorage, increased exposure, etc

Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people

Z7	Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
Z8	Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

Z9	Severe damage and/or structural defects where a high risk of failure can be <u>temporarily</u> reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
Z10	Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
Z11	Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
Z12	Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

A1	No significant defects and could be retained with minimal remedial care
A2	Minor defects that could be addressed by remedial care and/or work to adjacent trees
A3	Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

Appendix C Tree Useful Life Expectancy – (TULE)

Schedule 3: Adapted with permission Jeremy Barrell (SULE) 2014 for TCAA consulting arborists.

	1 LONG TULE	2 MEDIUM TULE	3 SHORT TULE	4 REMOVE	5 NO POTENTIAL FOR RETENTION	6 SMALL, YOUNG OR REGULARLY CLIPPED
	Trees that appear to be retainable for more than 40 years with a low level of risk.	Trees that appear to be retainable for 15-40 years with a low to medium level of risk.	Trees that appear to be retainable for 5-15 years with a medium to high level of risk.	Trees that should be removed within the next 5 years with a high to very high level of risk.	Trees that should be removed immediately with a very high to extreme level of risk.	Trees than can be easily transplanted or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live for between 15 and 40 more years.	Trees that may only live for between 5 and 15 more years.	Dead, dying or declining trees through disease or inhospitable conditions.	Dead, dying or declining trees diseased or inhospitable conditions.	Small trees less than 5 metres in height.
B	Trees that could be made suitable for retention in the long term by intervention works.	Trees that may live for more than 40 years, but would need to be removed for safety or nuisance reasons.	Trees that may live for more than 15 years, but would need to be removed for safety or nuisance reasons.	Dangerous trees through instability or recent loss of adjacent trees.	Dangerous trees through instability or recent loss of adjacent trees.	Young trees less than 15 years old but over 5 metres in height.
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.	Trees that may live for more than 40 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been regularly pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by intervention works.	Trees that require substantial intervention works and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	Damaged trees that are clearly not safe to retain and must be removed immediately.	
E				Trees that may live for more than 5 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	High toxicity/allergen trees, asthmatic and poisonous trees that must be removed immediately.	
F				Trees that may cause damage to existing structures within 5 years.	OTHER, with legitimate explanation to be removed immediately.	
G				Trees that will become dangerous after removal of other trees for reasons given in 4A to 4F.		

INSPECTION FREQUENCY					
Every 1-5 years by a competent inspector, or event monitored.	Every 1-5 years by a competent inspector, or event monitored.	Every 1-3 years by a competent inspector, or event monitored.	Annually by a competent inspector, or event monitored.	Every 1-7 days by a competent inspector and event monitored.	Bi-annually by a competent inspector.

Appendix D Landscape Significance Rating

Schedule 4: Heritage, Ecological and Amenity Significance. Source: Morton, A (2006) Criteria for Assessment of Landscape Significance.

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state, or national level of significance or is listed on Council's Significant Tree Register.	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999.	The subject tree has a very large live crown size exceeding 300m ² with normal to dense foliage cover, is in a visually prominent position in the landscape, exhibits very good form and habit typical of the species.
	The subject tree forms part of the curtilage of a Heritage Item (building/structure/artefact as defined under the LEP) and has a known or documented association with that item.	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter, or nesting tree for endangered or threatened fauna species.	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity.
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event.	The subject tree is a remnant tree, being a tree in existence prior to development of the area.	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc..) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m ² , a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence.	The tree is a locally indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link/Wildlife Corridor or has known wildlife habitat value.	The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.
MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m ² ; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc.) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item.	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance, or position relative to building or other structures.	The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5-10 years) with new tree planting.
VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
INSIGNIFICANT	The tree is completely dead and has no visible habitat value.	The tree is a declared Noxious Weed under the Biosecurity Act 2015 (NSW) within the relevant Local Government Area.	The tree is completely dead and presents a potential hazard.

Appendix E Retention Value Rating

Schedule 5: Determining the Tree Retention Value Morton, A (2011).

Evaluating Sustainability and Landscape Significance to Determine Retention Value	
Retention Value	Criteria and Categories
HIGH	<p>These trees are worthy of preservation. As such, careful consideration should be given to their retention as a priority.</p> <p>Proposed site design and placement of buildings and infrastructure should consider the Tree Protection Zones (TPZ), as discussed in the following section, to minimise any adverse impact.</p> <p>In addition to TPZs, the extent of the canopy (canopy dripline) should also be considered, particularly in relation to a high-rise development. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.</p>
MODERATE	<p>The retention of these trees is desirable.</p> <p>These trees should be retained as part of any proposed development, if possible; however, these trees are less critical for retention.</p> <p>If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.</p>
LOW	<p>These trees are not considered to be worthy of any special measures to ensure their preservation, due to current health, condition, or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE.</p> <p>These trees should not be considered as a constraint to the future development of the site.</p>
VERY LOW	<p>These trees are potentially hazardous or very poor specimens, or may be environmental or noxious weeds.</p> <p>The removal of these trees is therefore recommended regardless of the implications of any proposed development.</p>

Appendix F Tree Planting Specifications

Tree planting specifications are in accordance with NATSPEC Specification for Trees, Ross Clark (2003) and Australian Standard® AS 2303-2018 – Tree Stock for Landscape Use.

BEFORE PLANTING

- Don't plant trees too close to buildings, in-ground pools, avoid planting under power lines and over drainage pipes or near other large trees.
- A consider the effect on neighbouring properties (i.e. shade, loss of views, impact on foundations, fences and services).
- Plant deciduous trees if you want in summer shade and winter sun. Consider shadows cast from evergreen trees.
- Use locally native to attract native fauna and to reduce watering required.

BASIC TREE PLANTING

1. Dig the hole at least twice as wide as the pot size.
2. Loosen the soil at the sides of the hole. Fill hole with water and allow to drain away.
3. Place the loosened root ball in the hole. Fill back soil. The top of the root ball should be level with the surrounding soil.
4. Water the plant deeply after planting, once a week for the first two months.

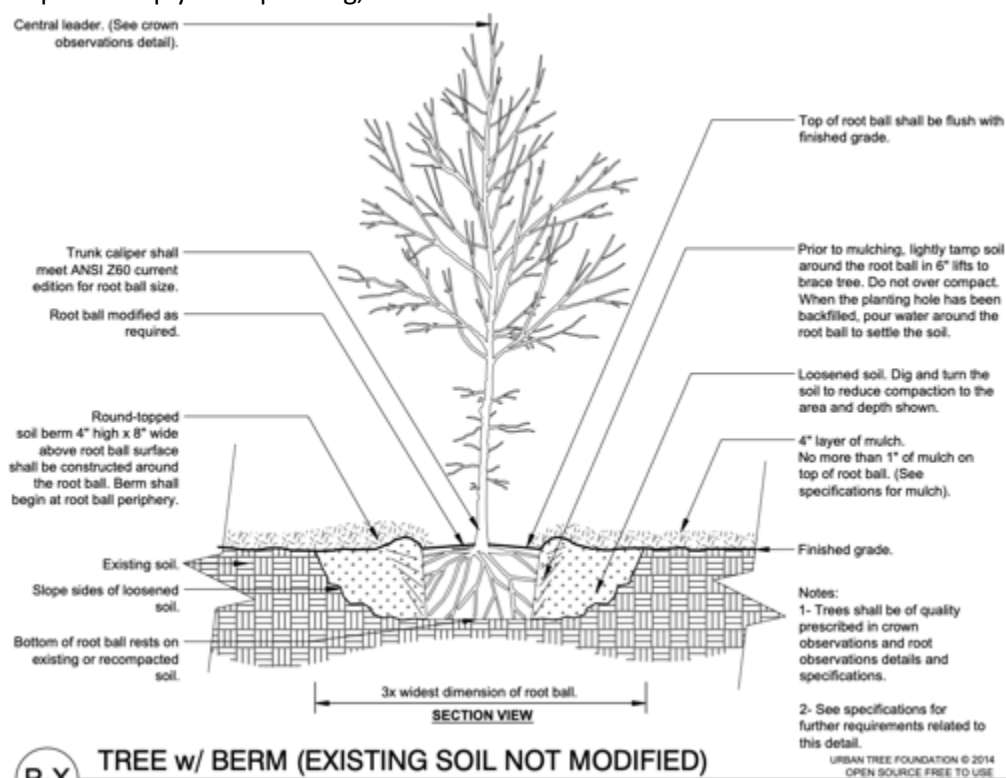


Diagram 2: Urban J (2014) Tree Planting Specification diagram

Schedule 6: Watering Frequency Table.

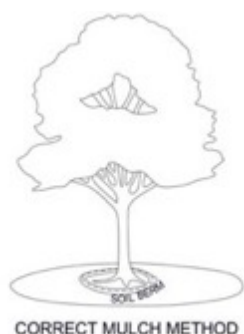
Watering frequency for 45L pot			
Time of year	1st month	2nd and 3rd month	4th to 6th month
Sept-Feb.	4x week	3 x week	2 x week
Mar-May	3 x week	2 x week	1 x week
Jun-August	2 x week	1 x week	1x fortnight

Appendix G Replenishment of Native Trees Species

Schedule 7: Tree Species and Sizes.

Botanical Name	Common Name	Height (m) at maturity	Crown Spread (m)
<i>Leptospermum petersonii</i>	Lemon-Scented Tea Tree	5	6
<i>Agonis flexuosa</i>	Willow Myrtle	7	6
<i>Elaeocarpus eumundi</i>	Quandong	8	4
<i>Corymbia ficifolia</i>	Red Flowering Gum	8	5
<i>Syzygium luehmannii</i>	Riberry	8	5
<i>Waterhousea floribunda</i>	Weeping Lilly Pilly	8	5
<i>Acacia implexa</i>	Hickory Wattle	8	6
<i>Hymenosporum flavum</i>	Native Frangipani	8	6
<i>Tristaniopsis laurina</i>	Water Gum	9	5
<i>Corymbia eximia</i>	Yellow Bloodwood	10	7
<i>Callistemon viminalis</i>	Weeping Bottlebrush	10	8
<i>Melaleuca linariifolia</i>	Narrow-Leaved Paperbark	10	8
<i>Cupaniopsis anacardioides</i>	Tuckeroo	10	10
<i>Callistemon salignus</i>	Willow Bottlebrush	12	6
<i>Eucalyptus cinerea</i>	Argyle Apple	12	7
<i>Elaeocarpus reticulatus</i>	Blueberry Ash	15	8
<i>Flindersia australis</i>	Australian Teak	15	10
<i>Brachychiton populneus</i>	Kurrajong Tree	15	12
<i>Backhousia citriodora</i>	Lemon Myrtle	18	6
<i>Angophora costata</i>	Sydney Red Gum	20	10
<i>Lophostemon confertus</i>	Brush Box	20	16

MULCH: Adding a layer of mulch to reach 75mm, encourages water retention and microbes, that will break down and incorporate organic matter into the soil. Organic mulch will reduce weeds and root development.



- Add at least 70% by mass of its particles with a maximum size of greater than 16 mm in accordance with Australian Standard® AS 4454-2003 – Compost, Soil Conditioners and Mulches. Apply 200mm from trunk and shaping a soil berm dish close to the root ball to facilitate establishment of watering.
- The TPZ of retained trees should be maintained with a 75mm depth of organic, certified, coarse Eucalyptus mulch.
- Mulch should be retained at 5075mm depth and never exceed 100mm in depth.
- Do not allowed mulch to contact the tree trunk. Retain a mulch free gap of not less than 75mm and preferably 200mm clear from the base of the tree trunk.

Disclaimer

McArdle Arboricultural Consultancy Pty Ltd does not assume responsibility for liability associated with the tree on/or adjacent to this project site, the future demise and/or any damage which may result therefrom. They take care to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

McArdle Arboricultural Consultancy Pty Ltd cannot be held responsible for any consequences as result of work carried out outside specifications, not in compliance with Australian Standard® or by inappropriately qualified staff. If further investigations such as, aerial, drill and root test are recommended, the report shall not be considered final until all investigations have been completed, as further defects may be found.

STATEMENT OF LIMITATIONS

McArdle Arboricultural Consultancy Pty Ltd makes every effort to accurately identify current tree health and hazards. Results may or may not correlate to actual tree structural integrity. There are many factors that may contribute to limb or total tree failure. Not all these symptoms are visible. There can be hidden defects that may result in a failure even though it would seem that other, more obvious defects would be the likely cause of failure. All standing trees have an element of unpredictable risk.

The inspection was limited to a visual ground examination of the tree, without aerial inspections and below ground excavations. The assessments are limited and do not include specialised analysis. No internal diagnostics, aerial inspection and pathology test were conducted. Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale.



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