



HARWOOD
TREE CARE & CONSULTING

ARBORICULTURAL IMPACT ASSESSMENT

ADDRESS: 24 MYOLA RD UMINA
PREPARED FOR: SHAUN KENNEY
PREPARED BY: TIM HARWOOD

VERSION: 2.5

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1. Executive summary

The following Arboricultural Impact Assessment covers (22) trees located within the development area at 24 Myola Rd Umina, (7) Trees (T) T1 - 4, T20 - T22 will require protection and retention, these trees are located on the neighbouring premises at 26 Myola Rd

(14) T5-T19 trees will require removal to facilitate the proposal, this takes into account the recommendations made from the bushfire report supplied by *Clarke Dowdle and Associates*

The Arborist recommends driveway redesign due the TPZ (Tree Protection Zone) encroachments from the neighbouring trees, specifically T1 – 4. Under *Australian Standard 4970-2009 Protection of Trees on Development Sites*, the Arborist is required to retain and protect these trees during and after construction completion

Harwood Tree Consulting advises our client to read this report in its entirety and understand the requirements pertaining to tree retention and removal.

Specifications pertaining to TPZ protections can be found in Appendix I Tree Protection Methods

this report is to be sent to the relevant consenting authority, as accompanying documentation for the Development Application, for final determination.



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2. Introduction

Harwood Tree Care and Consulting was commissioned by (**Shaun Kenney**) to prepare an Arboricultural Impact Assessment (AIA) for a proposed new development located at (24 Myola Rd Umina) this report covers all trees within and adjacent to the site that may be impacted upon by development

The site falls within the Central Coast Council Local Government Area (LGA) and is subject to the *Central Coast Council 2022 DCP, Central Coast Council LEP 2022, AS4970-2009 Protection of Trees on Development Sites* and *AS 4373-2007 Amenity Tree Pruning*

The purpose of this report is to assess the site pertaining to trees that could be removed to facilitate the development and trees that should be retained based upon their landscape retention value, The Arborist assessed the site on Monday 22nd May 2023 and recorded trees that will be impacted by development, each tree has had an aluminium identification tag placed on the tree with a numerical value, the trees have then had all their necessary attributes including GPS co-ords (accuracy to 0.5m) recorded by the TDC 600 Geo – locator by *Trimble®* which is available in the **Impacted Trees**

After the site survey is completed, the Arborist compiles the report which involves calculating tree retention values and TPZ which form the basis relating to tree removal and tree retention, the report is then made available to our client for council submission

3. Scope

- Assess the current overall health and condition of the subject tree(s)
- Record all relevant height and dimensional measurements in order to calculate TPZ and SRZ zones
- Assess and discuss the impacts to the subject tree(s) as a result of the proposed development
- Provide an objective appraisal of the subject trees in relation to their species, estimated age, health structural condition useful life expectancy (ULE) and viability within the landscape
- Nominate trees that should be retained or require removal to facilitate the development
- Identify and reduce potential conflicts between subject trees and site development by providing accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction

This assessment is based on the findings of the site assessment and the documents and plans referenced below

- *AS 4970-2009 Protection of Trees on Development Sites*
- *AS 4373-2007 Amenity Tree Pruning*
- *Gosford Council: Development Control Plan (DCP) 2022*
- *Gosford Council: Local Environment Plan (LEP) 2022*
- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*
- Plans supplied by Coral Homes REF: 40625 Date: 25/04/2023
- Bushfire report supplied by *Clarke Dowdle and Associates*

4. Methodology

- The Arborist Tim Harwood AQF5 assessed the trees in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck & Breloer (1994)¹, under normal weather conditions, thusly the report's findings are applicable to the trees under normal weather circumstances
- Trees were inspected from ground level, without the use of any invasive or diagnostic tools, testing, soil analysis or any subterranean inspection
- Trees within adjacent properties or restricted areas may not have been subject to a complete visual inspection due to access constraints (i.e., defects and abnormalities may be present but not recorded)
- Tree heights, canopy spread was estimated and diameter at breast height (DBH) was recorded by tape measure
- Tree identification was based on broad taxonomical features present, industry experience and "keying" (identifying via textbooks)
- Genus & species, Common name, age, vigour and crown characteristics, general health and condition, defects, pest and disease if present and visible were recorded and results are available within this assessment
- An appraisal of trees with reference to ULE (Useful Life Expectancy), and a Tree Retention Value (STARS Matrix) assesses the trees significance and value for retention on the site where development occurs. (Refer to Appendix for further clarification of all scales and values)
- Calculations of TPZ and SRZ impacts are undertaken by using an interactive calculator (Treetec, 2014)
- Photographs in this report were taken by the Arborist using an iPhone 11.
- Tree attributes and Geo-location were recorded onto the TDC600 *Trimble*® GPS locator

¹VTA is an internationally recognised practice in the visual assessment of trees as formulated by Mattheck & Breloer (1994). Principle explanations and illustrations are contained within the publication, Field Guide for Visual Tree Assessment by Mattheck, C., and Breloer, H. *Arboricultural Journal* 1, Vol 18 pp 1-23 (1994).

5. Site Photos





6. Site Observations

The site is referred to as Lot 300, Central Coast Council

The site is a regular rectangular shape at 928m² in total area

Site topography notes a soft fall 4° (Est) towards Myola Rd, South East

The site has a stand of mature and immature specimens, some remnant forest was recorded in the neighbouring premises of 26 Myola Rd, also located onsite are endemic, non-locally native and exotic deciduous taxa within the current proposal.

The property has boundary fences located to the West and South, The Northern Boundary separating 24 and 26 Myola Rd does not have any boundary fencing in place, however there are surveyors posts that clearly mark the boundary, the trees T1 - 4 and T22 are located in the area of 26 Myola Rd, these trees will require protective tree installations to ensure their retention and viability during and post development

The site is densely forested with (22) trees having been recorded, the grounds are free of vegetation aside from low kept grass and leaf litter, site access and egress is permissible and visualisation of trees was made easily possible

A bushfire assessment was obtained from *Clarke Dowdle and Associates* and recommends tree removal

No fauna habitat was recorded

7. TPZ - SRZ Information

According to the Australian Standard 4970-2009 Protection of Trees on Construction Sites, the encroachment of a TPZ for any tree should not exceed more than 10%, if an encroachment surpasses a 10% threshold, a cert5 Arborist will need to prove that the tree will remain viable and may deploy a range of mitigation options to ensure impacts are reduced or restricted wherever possible. Mitigation must be increased relative to the level of encroachment within the TPZ to ensure the subject tree remains viable.

AS 4970-2009	Requirement Controls Under AS 4970-2009	Encroachment	Mitigation Controls
No Encroachment 0%	N/A	None	N/A
Minor Encroachment <10%	<ul style="list-style-type: none"> The area lost to encroachment should be made up elsewhere, contiguous with the TPZ 	Minor Encroachment <10%	<ul style="list-style-type: none"> The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ Tree protection must be installed
Major Encroachment >10%	<ul style="list-style-type: none"> The project Arborist must demonstrate the tree(s) would remain viable Root investigation by non-destructive methods may be required Consideration of relevant factors root location and distribution, tree species, condition, site constraints and design factors The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ 	Major Encroachment >10%	<ul style="list-style-type: none"> The project Arborist must demonstrate the tree(s) would remain viable The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ Non-destructive root investigation may be required for any trees proposed for retention The project Arborist will be required to supervise any works within the TPZ Tree protection must be installed
		Total Encroachment 100%	<ul style="list-style-type: none"> Subject trees cannot be retained

Figure 1 Encroachment table

8. Tree Schedule

ID No	Botanical name	Common Name	Height	Canopy Spread				Age	ULE	Health	Landscape Significance	Retention Value	DAB Diameter at base (mm)	DBH Diameter at breast height (mm)	TPZ (m)	SRZ (m)	Impact/Comments
				N	E	S	W										
1	<i>Brachychiton acerifolius</i>	Illawarra flame tree	8	3	1	3	1	Mature	Low	Fair	Low	Low	110	100	1.5	1.5	None Stunted phototropic specimen, located in neighbouring premises
2	<i>Angophora costata</i>	Sydney red gum	26	13	13	14	12	Mature	High	Good	High	High	920	900	10.8	3.2	Major Healthy specimen large deadwood, located in neighbouring premises
3	<i>Angophora costata</i>	Sydney red gum	26	13	3	3	13	Mature	High	Good	High	High	780	770	9.2	3.0	Major large deadwood over proposed development, located in neighbouring premises
4	<i>Angophora costata</i>	Sydney red gum	14	2	2	2	2	Mature	High	Good	High	High	270	260	3.1	1.9	Major large scar on tree possible lightning strike, located in neighbouring premises
5	<i>Syncarpia glomulifera</i>	Turpentine	15	2	9	2	2	Mature	High	Good	High	High	820	800	9.6	3.0	Total co-dominant inclusion
6	<i>Syncarpia glomulifera</i>	Turpentine	17	5	2	3	5	Mature	High	Good	High	High	790	790	9.4	3.0	Total co-dominant inclusion
7	<i>Glochidion ferdinandii</i>	Cheese tree	14	3	8	2	4	Mature	Medium	Good	Low	Low	700	690	8.2	2.8	Total co-dominant inclusion
8	<i>Glochidion ferdinandii</i>	Cheese tree	14	5	5	2	4	Mature	Medium	Good	Low	Low	770	750	9.0	3.0	Total multi stem, large deadwood
9	<i>Pittosporum undulatum</i>	Sweet pittosporum	5	1	2	1	1	Immature	Medium	Fair	Low	Low	100	100	1.5	1.5	Total juvenile specimen
10	<i>Eucalyptus resinifera</i>	Red mahogany	13	5	3	5	1	Mature	Medium	Good	Low	Low	240	240	2.8	1.8	Total stunted phototropic specimen

11	<i>Syncarpia glomulifera</i>	Turpentine	20	5	6	9	3	Mature	Medium	Good	Low	Low	590	590	7.0	2.6	Total single stem near boundary
12	<i>Syncarpia glomulifera</i>	Turpentine	21	5	8	9	5	Mature	Medium	Good	Low	Medium	850	830	9.9	3.0	Total co-dominant specimen
13	<i>Eucalyptus resinifera</i>	Red mahogany	14	2	3	3	10	Mature	Medium	Good	Low	Low	360	360	4.3	2.1	Total slender phototropic specimen
14	<i>Jacaranda mimosfolia</i>	Jacaranda	22	12	3	3	4	Mature	Low	Good	Low	Low	330	320	3.8	2.0	Total slender phototropic specimen
15	<i>Syncarpia glomulifera</i> x3	Turpentine	28	4	4	4	4	Mature	Medium	Good	Low	Low	600	600	7.2	2.6	Major slender phototropic specimen
16	<i>Jacaranda mimosfolia</i>	Jacaranda	20	3	2	5	6	Mature	Low	Good	Low	Low	330	320	3.8	2.0	Major slender phototropic specimen
17	<i>Angophora costata</i>	Sydney red gum	9	0	0	0	0	Dead	Dead	Dead	Dead	Dead	Dead	Dead			None dead
18	<i>Jacaranda mimosfolia</i>	Jacaranda	1	1	1	1	1	Immature	Low	Fair	Low	Low	100	100	1.5	1.5	None slender phototropic specimen
19	<i>Syncarpia glomulifera</i> x4	Turpentine	18	5	2	3		Mature	Medium	Good	Low	Low	510	500	6.0	2.5	None 4x trees grouped, phototropic vine entangled, bushfire report requires removal of these specimens, tree removal recommended Bushfire report
20	<i>Eucalyptus resinifera</i>	Red mahogany	24	3	3	3	3	Mature	Low	Good	Low	Low	290	290	3.4	2.0	None slender phototropic specimen large deadwood
21	<i>Eucalyptus botryioides</i>	Southern Mahogany	24	8	8	6	7	Mature	Low	Fair	Low	Low	380	380	4.5	2.2	None slender phototropic specimen
22	<i>Glochidion ferdinandii</i>	Cheese tree	19	9	8	8	8	Mature	Medium	Fair	Low	Low	760	760	9.1	2.9	None large deadwood

9. Discussion

(8) trees, T1 – 4, T20 - T22 will be required to be retained and protected via the implementation of adequate TPZ (Tree Protection Zone) installations.

(14) trees, T5 – T19 will require removal under the current proposal in order to facilitate the development

The Arborist recommends tree trunk protection for trees T1 – 4, specifications found in Appendix I Tree Protection Methods, the Arborist has grouped these specimens as one TPZ and opted for trunk protection in order to avoid TPZ fencing which will impact safe ingress and egress to the site, a layer of native mulch at 75mm of thickness covering the entire proposed developed area of the combined TPZ of trees 1 - 4 will also be required in order to protect the established root zones from compaction. No underground services shall enter the combined TPZ of T1 – 4 unless authorised by the Arborist, no mechanical excavation is permitted within the TPZ of these specimens at any time – hand tools only.

The location of the build is conducive to tree retention for the prescribed retained trees T1 - 4

The Arborist would be satisfied with a low impact driveway design in its current position if utilising materials such as gravel or permeable pavement designs, all laid above grade - no excavation permitted within T1 – 4 TPZ, the encroachment from the low impact driveway can then be offset utilising the 10% encroachment allowed under *AS 4970 Protection of Trees on Development Sites* and the Arborist can designate a contiguous compensatory TPZ to the North and East.

Permeable pavement and gravel materials minimise root zone disturbances such as excavation and compaction, whilst, allowing water infiltration and the necessary gaseous exchange between tree roots and the atmosphere, the Arborist would need to approve such plans before ensuring tree viability and health post development, all underground would need to be rerouted outside of the TPZ to avoid root severances

The Bushfire report obtained from *Clarke Dowdle and Associates* recommends the removal of trees, all trees except T19 in that recommendation are located directly within the development footprint, the Arborist has taken these recommendations into account

Where appropriate, the Landscape Plan will include planting new trees of a preferably native and endemic species, council expects a 2:1 replanting ratio for every tree removed – this is to align development with the Greener Spaces initiative that councils nationwide are implementing in order to retain a healthy tree canopy

(14) trees are nominated for removal and replacement with species in accordance with the associated Landscape plan for the development, these specimens could be removed to facilitate the development pending consenting authority approval, all tree works must comply with the regulations set out in Recommendations.

10. Impacted Trees Table

Retention values

Retention Value:	Tree number
High	2,3,4,5,6
Medium	12
Low	1,7,8,9,10,11,12,13,14,15,16,20,21,22

Figure 2 Tree retention value using the STARS methodology

Trees requiring removal or retention, based on plans provided

Proposed for:	Tree number
Removal	5,6,7,8,9,10,11,12,13,14,15,16,17,18 and 19
Retention	1,2,3,4,18,20,21, and 22

Figure 3 Table detailing trees proposed for removal and retention

11. Conclusion

1. The Arborist concludes that the trees listed within the **Impacted Trees Table** will be required to be removed in order to facilitate the proposal. Trees listed under retention will be required to be retained and protected during each construction phase and post development.
2. Retain and protect the trees within the combined TPZ of **T1 – 4** and trees **T20 - T22** with adequate TPZ protection
3. The location of the development is conducive for the retention of trees **T1 – 4**
4. The retained specimens located on the neighbouring premises at 26 Myola Rd, must be retained and protected during **ALL** phases of construction including demolition (tree works) all underground services are to be rerouted outside of the combined TPZ of **T1 – 4**, sympathetic construction techniques for the driveway are required within this TPZ to ensure minimal root damage is incurred
5. Provide plans to the Arborist detailing permeable pavement and low impact (no excavation) designs pertaining to the driveway construction – these plans will require Arborist signoff
6. Efforts are to be made to replant trees at a **2:1** replanting ratio, the specimens should be considered trees that are able to achieve heights greater than 5m at full maturity and preferably native Australian specimens, the tree planting specifications can be found in **Appendix IV Tree Planting Diagram**

12. Recommendations

1. Remove trees T5-19
2. Erect the necessary tree protection mechanisms prior to any works onsite, this includes:
3. Trunk protection on trees T1 – 4 to eliminate damage from machinery, entire TPZ of T1 – 4 to be covered in native mulch to 75mm to avoid compaction from machinery and materials, specifications found in **Appendix I Tree Protection Methods**
4. TPZ fencing for T20 - T22 as shown in **Tree Protection Plan – Map under current proposal**
5. Move all underground services outside of the TPZ of T1 – 4, provide Arborist with updated plans detailing driveway design utilising low impact materials and construction methods, reroute underground services outside the TPZ
6. Update development plans to detail permeable pavement driveway design, ensure all contractors are aware of the TPZ requirements
7. Read and adhere to the Milestones in **Summary: Tree Management Plan**

Ensure that the contractor who is removing or pruning the trees is a minimum cert3 Arborist, ensure the Arborist complies with the rules and regulations set out in

- a) *Australian Standards 4373-2007 Amenity Tree Works*
- b) *Australian Standards 4970-2009 Protection of Trees on Development Sites*
- c) *NSW WorkCover Code of Practice for the Amenity Tree Industry (1998)*

Any pruning recommended in this report is to be to the Australian Standard® AS4373 Pruning of amenity trees and conducted in accordance with the NSW Work Cover Authority Code of Practice, Tree Work, 2007

All pruning or removal works are to be in accordance with the appropriate Tree Management Policy where applicable, or Tree Management Order (TMO), or Tree Preservation Order (TPO)

Tree maintenance work is specialised and in order to be undertaken safely to ensure the works carried out are not detrimental to the survival of a tree being retained, and to assist in the safe removal of any tree, should be undertaken by a qualified arboriculturist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of 5 years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.

13. Summary: Tree Management Plan

General – Milestones

Milestone – a milestone is a reference to the completed stages of the development, prior to demolition works, a site arborist shall be appointed to supervise all tree protection procedures detailed in this specification. The Site Arborist shall have a minimum level 5 AQF qualification in Arboriculture. Milestones are to be adhered to throughout the duration of this development and all relevant documentation is to be submitted to the local authority

Milestone 1 – Demolition

Milestone 2 – Development

Milestone 3 – Post development

The Tree Protection Zones for the tree(s) are to be incorporated into the construction works for the site and the protection to be situated as indicated on the Tree Protection Plan Map. The setbacks from building works on the side closest to each tree are to be carried out as indicated in Tree Management Plan, tree protection zones are to be constructed to the specifications in **Appendix I Tree Protection Methods**. The trees to be retained and managed are to form part of the new site curtilage

Milestone 1

1. Remove and prune trees according to the regulations set out in **Recommendations**
2. Post tree removal install tree trunk protections on **T1 - 4** adhere to the specifications in **Appendix I Tree Protection Methods** for tree trunk protection installation
3. Place 75mm of native mulch within the entire TPZ of **T1 - 4** to act as a buffer to ground compaction from machinery and materials
4. Install TPZ fencing for trees **T20, T21** and **T22** as shown in the **Error! Reference source not found.**

Milestone 2

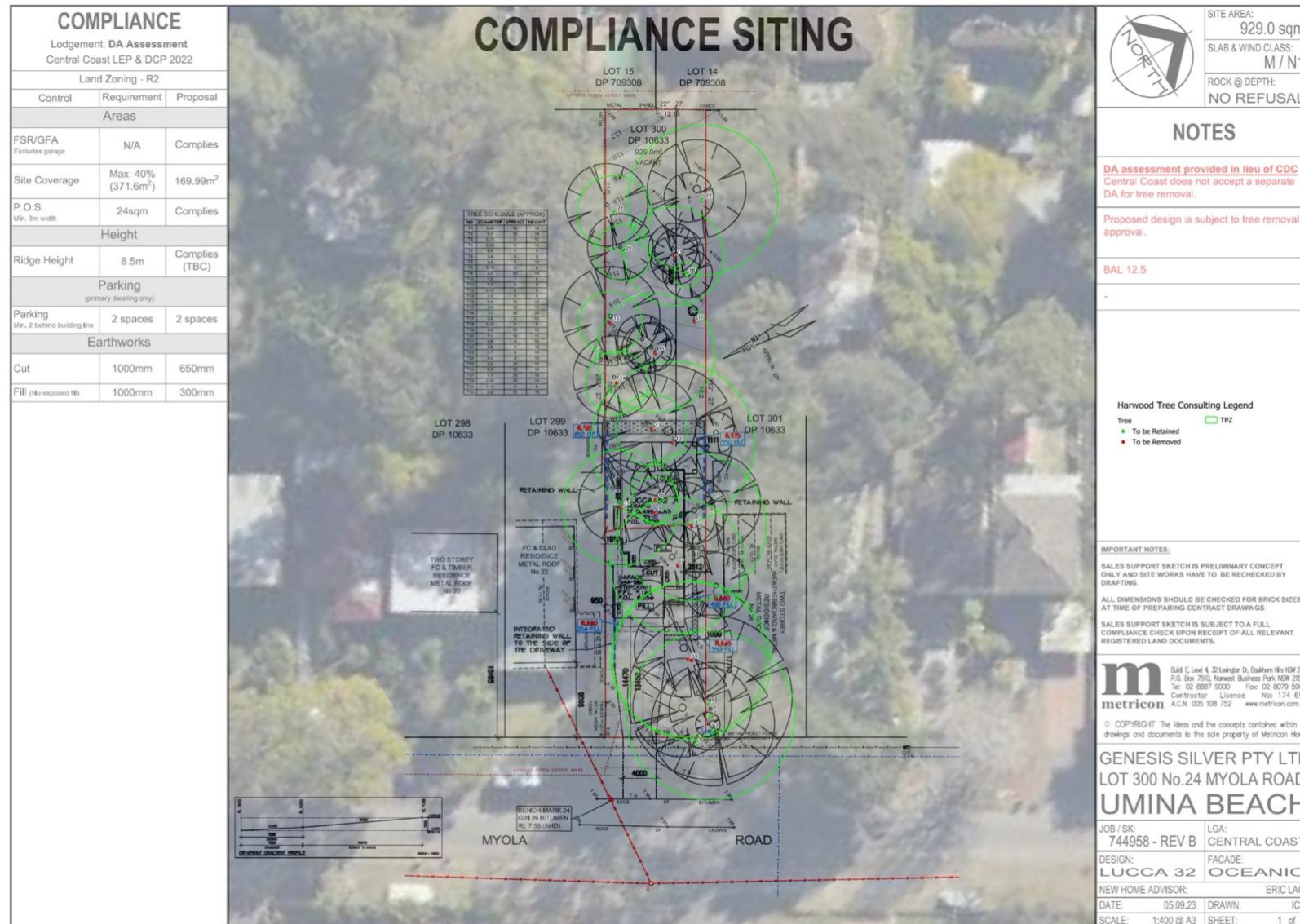
1. Ensure Arborist has approved updated driveway plans before construction works begin
2. Arborist required to sign off on tree protection installation before construction works begin

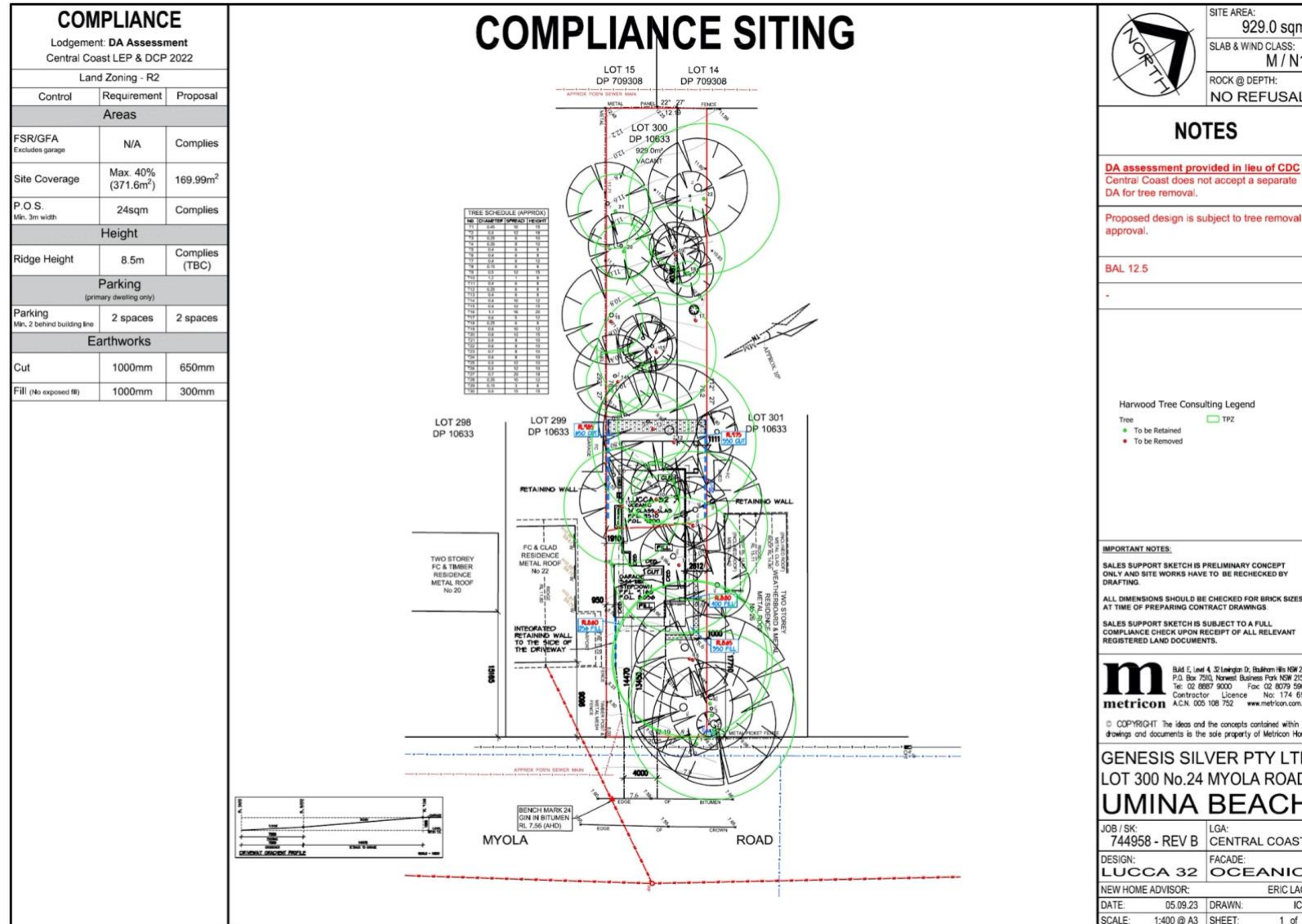
Milestone 3

1. Complete development and remove all tree trunk protection and TPZ fencing
2. Arborist to perform health checks on the retained specimens at **3,6** and **9** month intervals post development completion

14. Tree Protection Plan – Map under current proposal

Figure 4 TPZ Map





15. Appendix I Tree Protection Methods



Figure 5 Tree protection fencing

Tree protection fencing must be installed prior to site establishment and remain intact until completion of works, the correct installation and area to be covered is detailed in this report. Once erected, protective fencing must not be removed or altered without the approval of the project arborist, maintaining protective fencing is the responsibility of the primary contractor.

Tree protection fencing shall be:

- Enclosed to the full extent of the TPZ (or as specified in the Recommendations and Tree Protection Plan).
- Temporary mesh panel fencing (minimum height 1.8m).
- Certified and inspected by the project arborist.
- Installed prior to the commencement of works.
- Prominently signposted with 300mm x 450mm boards stating, "NO ACCESS - TREE PROTECTION ZONE".

If tree protection fencing cannot be installed due to sloping or uneven ground, tree protection barriers must be installed as an alternative.

- Star pickets spaced at 2m intervals,
- Connected by a continuous high-visibility barrier/hazard mesh.
- Maintained at a minimum height of 1m. Where approved works are required within the TPZ, fencing may be setback to provide construction access. Trunk, branch and ground protection shall be installed and must comply with AS 4970-2009, Protection of Trees on Development Sites. Any additional construction activities within the TPZ of the subject trees must be assessed and approved by the project arborist.

Tree and Ground protection

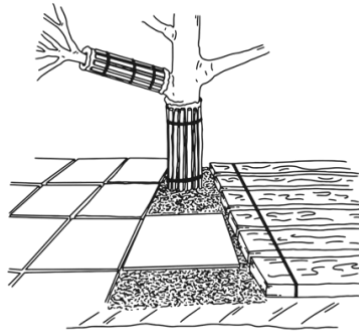


Figure 6 trunk, cambium, branch and ground protection methods

- Trunk protection is necessary where provision of tree protection fencing is impractical or must be temporarily removed, trunk protection shall be installed to avoid accidental mechanical damage.
- Specifications for trunk protection are:
- A thick layer of carpet underfelt, geotextile fabric or similar wrapped around the trunk to a minimum height of 2m.
- 1.8m lengths of softwood or hardwood timbers aligned vertically and spaced evenly around the trunk (with a small gap of approximately 50mm between the timbers).
- The timbers must be secured using galvanised hoop strap (aluminium strapping). The timbers shall be wrapped around the trunk but not fixed to the tree, as this will cause injury/damage to the tree.

If temporary access for vehicle, plant or machinery is required within the TPZ, ground protection and cambium, trunk and branch protection shall be installed. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Where possible, areas of existing pavement shall be used as ground protection.

Specifications for light traffic access (<2.5t) are as follows:

- Permeable membrane such as geotextile fabric.
- Layer of native mulch at a minimum depth of 100mm

Specifications for heavy traffic access (>2.5t)

- Permeable membrane such as geotextile fabric with a layer of native tree mulch at 75mm thickness applied above
- Rumble boards, hardwood planks evenly spaced 50mm apart and strapped together.

Pedestrian, vehicular and machinery access within the TPZ shall be restricted solely to areas where ground protection has been installed.

Excavations

All approved excavations (including root investigations) within the TPZ must be carried out using tree sensitive methods under supervision of the project arborist. These methods may include:

- Manual excavation (hand tools).
- Air spade.

- Hydro-vacuum excavations

Where approved by the project arborist, excavations using compact machinery is permissible. Excavations using compact machinery shall be undertaken carefully and guided by the Project Arborist who is to supervise all works and prevent any damage to roots and tree trunk. Exposed roots shall be protected from direct sunlight and drying out by covering with wet geotextile fabric (where practical). No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the project arborist. Hand excavation and root mapping shall be undertaken along excavation lines within the TPZ prior to the commencement of mechanical excavation (to prevent tearing and shattering of roots from excavation equipment). Any roots found during excavation shall be pruned by arborist. All root pruning must be documented and carried out by the project arborist.

Underground services

All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they must be installed using tree sensitive excavation methods under supervision of the project arborist. Alternatively, boring methods such as horizontal directional drilling (HDD) may be used for underground service installation, providing the installation is at minimum depth of 800mm below grade. Excavations for entry/exit pits must be located outside the TPZ

16. Appendix II – Tree Protection Zones Explained

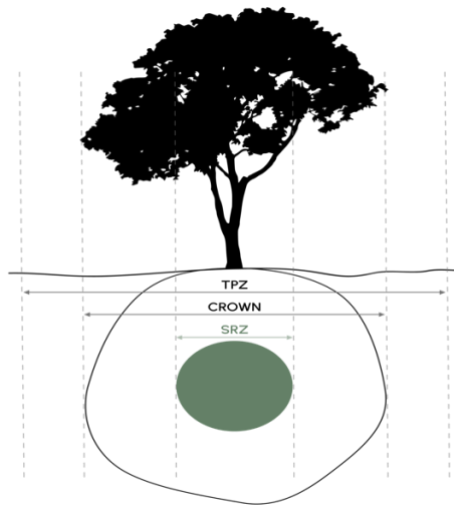


Figure 7 TPZ diagram indicating SRZ and TPZ

$$\text{TPZ (Radius)} = \text{DBH} \times 12$$

$$\text{SRZ (Radius)} = (\text{D} \times 50)^{0.42} \times 0.64$$

Tree Protection Zone (TPZ)

Tree protection zones are areas around tree's, that start below ground and extend to the top (crown) of the tree that is identified by Arborists as areas that are sensitive to the trees growth and health, these areas cannot be encroached upon greater than the 10% threshold allowed by the governing Australian standard *AS 4970-2009 Protection of Trees on Development Sites*, encroachment greater than 10% can be achieved only when authorised by a Certificate 5 Arborist, who must demonstrate that the tree will remain healthy post encroachment. A TPZ is a calculation of a trees Diameter at Breast Height (DBH) X 12, the calculation provides us with a value that is used as a perimeter around the base of the tree extending outwards and to the crown to serve as an exclusionary zone from building, foot traffic, runoff, material storage and machinery.

Structural Root Zone (SRZ)

Structural Root Zone is a calculation of the Diameter At Base (DAB) (where the below ground root system meets the above ground parts) the equation is: $(\text{DRJ} \times 50)^{0.42} \times 0.64$ this calculation is the representation of the trees root system that is required to ensure structural stability for the tree, no encroachment is allowed into this zone.

TPZ of palms, ferns and cycads is calculated as no greater than 1m of its radial canopy span and no SRZ is calculated

Compensatory TPZ Explained

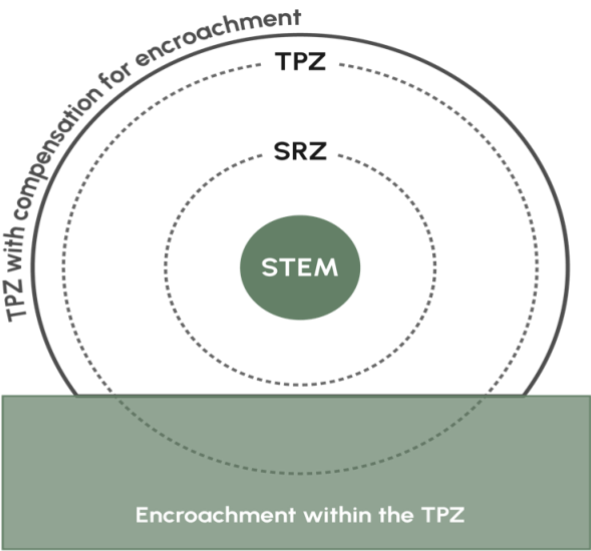


Figure 8 TPZ encroachment and offset area

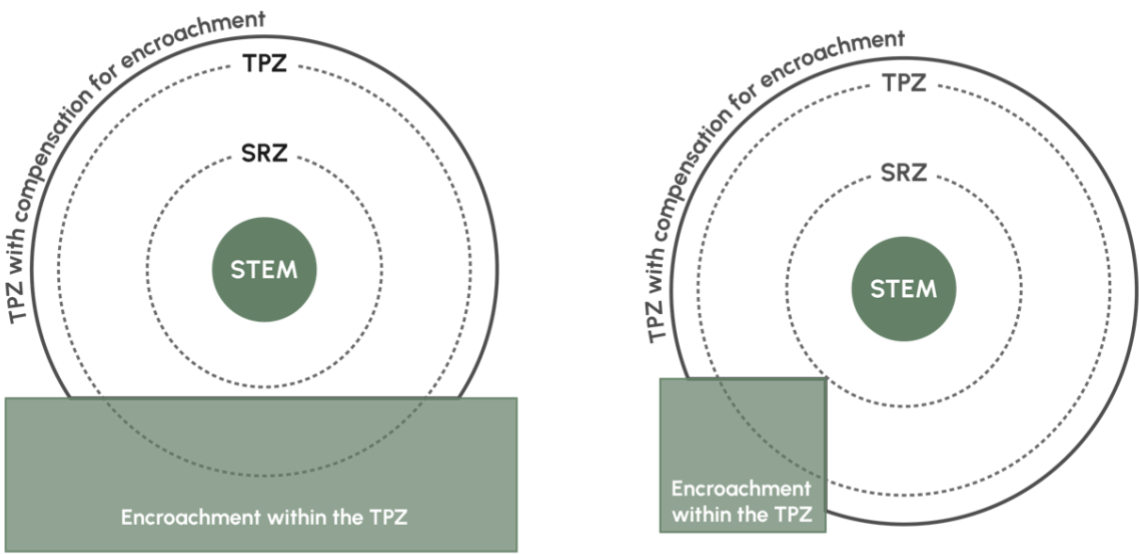


Figure 9 TPZ encroachment and offset example 2

17. Appendix III – stars tree significance and retention values

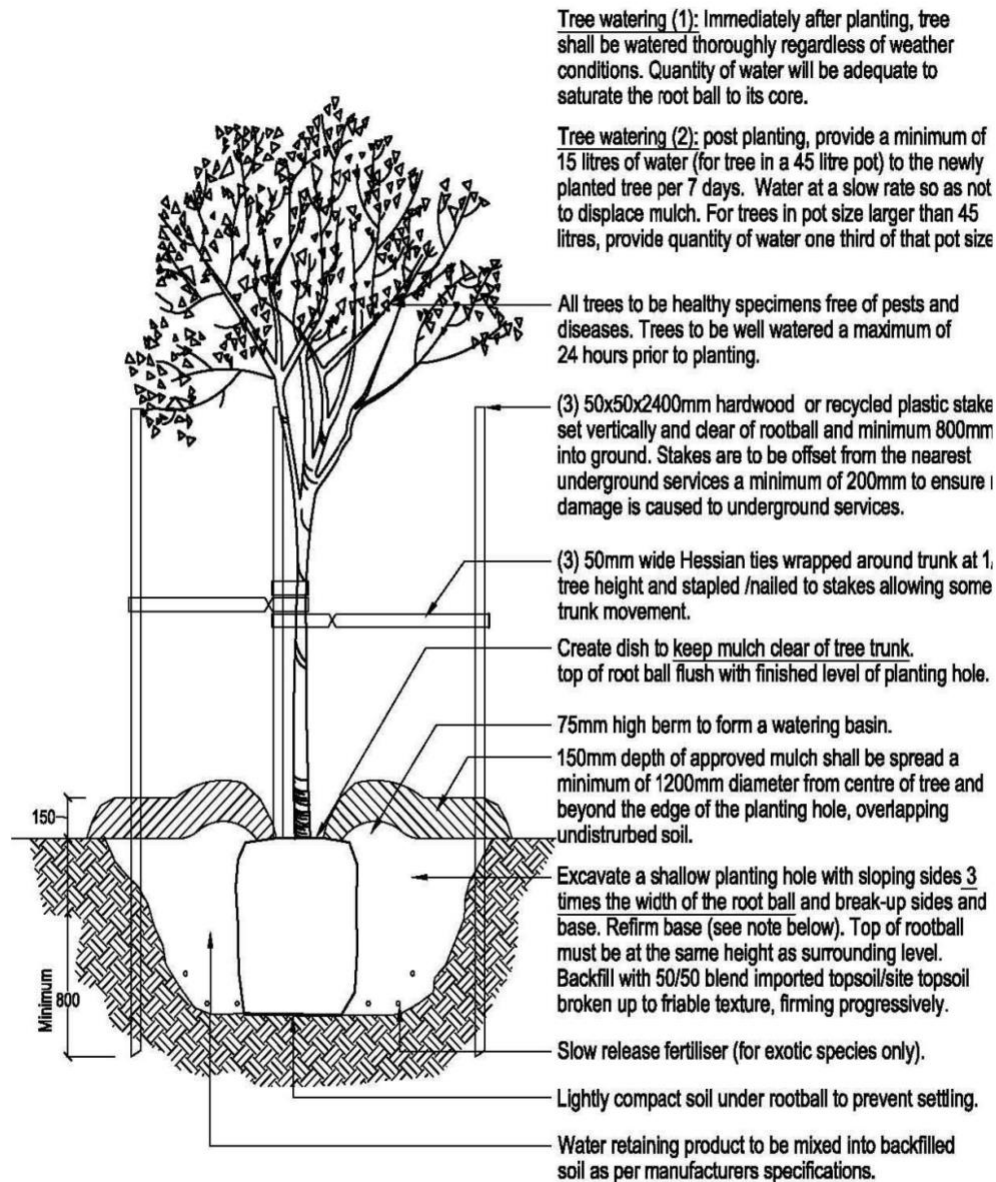
Tree Significance - Assessment Criteria - STARS®		
Low	Medium	High
<p>The tree is in fair-poor condition and good or low vigour.</p> <p>The tree has form atypical of the species</p> <p>The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings</p> <p>The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area</p> <p>The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen</p> <p>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</p> <p>The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms</p> <p>The tree has a wound or defect that has the potential to become structurally unsound.</p> <p>The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.</p> <p>The tree is a declared noxious weed by legislation</p>	<p>The tree is in fair to good condition</p> <p>The tree has form typical or atypical of the species</p> <p>The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area</p> <p>The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street</p> <p>The tree provides a fair contribution to the visual character and amenity of the local area</p> <p>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</p>	<p>The tree is in good condition and good vigour</p> <p>The tree has a form typical for the species</p> <p>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.</p> <p>The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on councils' significant tree register</p> <p>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.</p> <p>The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values.</p> <p>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.</p>

Useful Life Expectancy - Assessment Criteria			
Dead	Short	Medium	Long
<p>Trees with a high level of risk that would need removing within the next 5 years.</p> <p>Dead trees.</p> <p>Trees that should be removed within the next 5 years.</p> <p>Dying or suppressed or declining trees through disease or inhospitable conditions.</p> <p>Dangerous trees through instability or recent loss of adjacent trees.</p> <p>Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.</p> <p>Damaged trees that considered unsafe to retain.</p> <p>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.</p> <p>Trees that will become dangerous after removal of other trees for the reasons.</p>	<p>Trees that appear to be retainable with an acceptable level of risk for 5-15 years.</p> <p>Trees that may only live between 5 and 15 more years.</p> <p>Trees that may live for more than 15 years but would be removed to allow the safe development of more suitable individuals.</p> <p>Trees that may live for more than 15 years but would be removed during the course of normal management for safety or nuisance reasons.</p> <p>Storm damaged or defective trees that require substantial remedial work to make safe, and are only suitable for retention in the short term.</p>	<p>Trees that appear to be retainable with an acceptable level of risk for 15-40 years.</p> <p>Trees that may only live between 15 and 40 more years.</p> <p>Trees that may live for more than 40 years but would be removed to allow the safe development of more suitable individuals.</p> <p>Trees that may live for more than 40 years but would be removed during the course of normal management for safety or nuisance reasons.</p> <p>Storm damaged or defective trees that require substantial remedial work to make safe, and are only suitable for retention in the short term.</p>	<p>Trees that appear to be retainable with an acceptable level of risk for more than 40 years.</p> <p>Structurally sound trees located in positions that can accommodate future growth.</p> <p>Storm damaged or defective trees that could be made suitable for retention in the long term by remedial tree surgery.</p> <p>Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.</p>

Tree Significance					
Useful Life Expectancy		High	Medium	Low	
	Long >40 years				
	Medium 15-40 years				
	Short <1-15 years				
	Dead				

Legend for Matrix Assessment	
	Priority for retention (High): These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 Protection of trees on development sites. Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.
	Consider for retention (Medium): These trees may be retained and protected. These are considered less critical; however, their retention should remain priority with the removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for removal (Low): These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Consider for removal (Low): These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.

18. Appendix IV Tree Planting Diagram



Note: It is the responsibility of the contractor to confirm the location of all underground services prior to commencement of any excavation or staking works.

19. Appendix V Glossary

Glossary of Terms

Taken from: Draper, D. B and Richards, P.A. (2009) *Dictionary for Managing Trees in Urban Environments*, CSIRO Publishing, Victoria, Australia

Arborist An individual with competence to cultivate, care and maintain trees from amenity or utility purposes.

Basal Proximal end of the trunk or branch, e.g. trunk wound extending to the ground is a basal wound, or as epicormic shoots arising from lignotuber

Branch failure The structural collapse of a branch that is physically weakened by wounding or from the actions of pests and diseases or overcome by loading forces in excess of its load – bearing capacity.

Buttress A flange of adaptive wood occurring at a junction of a trunk and root or trunk and branch in response to addition loading.

Callus wood Undifferentiated and unlignified wood that forms initially after wounding around the margins of a wound separating damaged existing wood from the later forming lignified wood or wound wood.

Canker A wound created by repeated localized killing of the vascular cambium and bark by wood decay fungi and bacteria usually marked by concentric disfiguration. The wound may appear as a depression as each successive growth increment develops around the lesion forming a wound margin (Shigo 1991, p. 140)

Canopy cover The amount of area of land covered by the lateral spread of the tree canopy, when viewed from above that land.

Codominant stem Two or more first order structural branches or lower order branches of similar dimensions arising from about the same position from a trunk or stem.

Crown Of an individual tree all the parts arising above the trunk where it terminates by its division forming branches, e.g. the branches, leaves, flowers and fruits; or the total amount of foliage supported by the branches.

Decline The response of the tree to a reduction of energy levels resulting from stress. Recovery from a decline is difficult and slow, and decline is usually irreversible.

Diameter at Breast Height (DBH) Measurement of a trunk width calculated at a given distance from above ground from the base of the tree often measured at 1.4m.

Dominance A tendency in a leading shoot to maintain a faster rate of apical elongation and expansion other than other nearby lateral shoots, and the tendency also for a tree to maintain a taller crown than its neighbours (Lonsdale 1999, p.313)

Dripline A line formed around the edge of a tree by the lateral extent of the crown.

Dynamic Load Loading force that is moving and changes over time, e.g. from wind movement (James 2003, p. 166)

Endemic A native plant usually with a restricted occurrence limited to a particular country, geographic region or area and often further confined to a specific habitat.

Epicormic Branch derived from an epicormic shoot

Frass The granular wood particles produced from borer insects and can be categorized as fine frass, medium frass, and coarse frass with the different types being of different sizes and caused by different insects.

Habitat tree A tree providing a niche supporting the life processes of a plant or animal

Hazard The threat of danger to people or property from a tree or tree part resulting from changes in the physical condition, growing environment, or existing physical attributes of the tree, e.g. included bark, soil erosion, or thorns or poisonous parts, respectively.

Included bark The bark on the inner side of the branch union, or in within a concave crotch that is unable to be lost from the tree and accumulates or is trapped by acutely divergent branches forming a compression fork

Indigenous A native plant usually with a broad distribution in a particular country, geographic region or area. See also Endemic, Locally indigenous and non-locally indigenous.

In situ Occurring in its original place, e.g. soil level, remnant vegetation, the place from where a tree was transplanted, or where a tree is growing.

Irreversible decline The decline of a tree where it has progressively deteriorated to a point where no remedial works will be sufficient to prevent its demise, usually of poor form and low vigour.

Isolated tree A tree growing as a solitary specimen in an exposed location away from other trees as a result of natural or artificial causes and may be naturally occurring.

Kino The extractive polyphenols (tannins) formed in veins in a cambial zone as a defense in response to wounding in eucalypts. Often visible as an exudate when the kino veins rupture or are injured (Boland, *et al.* 2006, p. 691)

Lignotuber A woody tuber developed in the axils of the cotyledons.

Loading Weight that is carried, e.g. as bending stress on a branch.

Locally Indigenous A native plant as remnant vegetation, self-sown or planted in an area or region where it occurred originally.

Longevity Long lived, referring to a plant living for a long period of time.

Mechanical wound -Wound inflicted by abrasion, by mechanical device

Naturalised A plant introduced from another country or region to a place where it was not previously indigenous where it has escaped from agriculture or horticulture or as a garden escape and has sustained itself unassisted and given rise to successive generations of viable progeny.

Necrotic Dead area of tissue that may be localized e.g. on leaves, branches, bark or roots

Negligence With regard to trees, failure to take reasonable care to prevent hazardous situations from occurring which may result in injury to people or damage to property (Lonsdale 1999, p. 317)

Noxious weed A plant species of any taxa declared a weed by legislation. Treatment for the control or eradication of such weeds is usually prescribed by legislation...

Remnant A plant /s of any taxa and their progeny as part of the floristics of the recognised endemic ecological community remaining in a given location after alteration of the site or its modification or fragmentation by activities on that land or on adjacent land

Useful Life Expectancy (ULE) A system used to determine the time a tree can be expected to be usefully retained

Shedding - Shedding of plant organs when it is mature or aged, by the formation of a corky layer across its base. This may be influenced by stress, drought, senescence, declining condition, reduced vigour and also occurs

Stability Resistance to change especially from loading forces or physical modifications to a trees growing environment

Stress A factor in a plants environment that can have adverse impacts on its life processes e.g. altered soil conditions, root damage, toxicity, drought or water logging. The impact of stress may be reversible given good arboricultural practices that may lead to plant decline.

Structural defect A weak point in or on a tree causing its structural deterioration diminishing its stability in full or part

Structural integrity The ability of a load bearing part of a tree, and its resistance to loading forces

Structural roots- Roots supporting the infrastructure of the root plate providing strength and stability of the tree.

Symbiotic An association between different species usually but not always mutually beneficial.

Termite leads Tunnels of mud on the stem and between the bark created by termites that may be active or inactive.

Tree Protection Zone (TPZ) A combination of RPZ and CPZ as an area around the tree set aside for the protection of a tree and a sufficient proportion of its growing environment above and below ground established prior to demolition or construction and maintained until the completion of works to allow for its viable retention including stability.

Visual Tree Assessment (VTA) A visual inspection of a tree from the ground. Such assessment should only be undertaken by suitably competent practitioners.

20. Appendix VI Disclaimer

This report has been compiled using knowledge & expertise relating to trees, and makes recommendations based on this. It should be noted that trees are affected by many elements, environmental, mechanical and situational, some of which cannot be predicted or foreseen by qualified Arborists, thusly this report was undertaken during “normal” weather conditions and is thusly relevant for “normal” weather conditions and represents the trees at the time of inspection.

The client and all subsequent contractors when reading this report should take the following factors into consideration;

- It is not feasible to assume that Arborists identify all hazards or risks associated with trees at the time of consultation or indeed in this report
- This Assessment is valid for 3 months from the date stipulated on the report, and may require updates during and after this time period
- Regular maintenance and monitoring by a Qualified Arborist will minimize the risks associated with tree and contribute to its longevity in its environment, however there is no guarantee that all risks can be mitigated and that the tree is not privy to external factors that will impact on the tree after it has been assessed by our service
- The report is compiled in good faith, where any information given to our service is correct and true, and where interested parties and/or stakeholders are notified. This includes title and ownership of property, orders as directed by relevant authorities, development application determinations and other matters that affect the tree(s) in question
- The Arborist shall not be required to give testimony or to attend court by reason of this report unless other arrangements are made prior
- This Arborist Report does not issue permission for any recommendations made in this report, particularly where trees are to be removed. Permission must be sought and obtained from Council and owner(s) of the tree(s)
- Any treatments recommended by the Arborist cannot be guaranteed, due to the volatile and ever changing environment in which trees are growing
- Clients may choose to accept or disregard the recommendations of the Arborist, or to seek additional advice
- This report is intended for the recipient, no part of this report is to be copied or altered without the authors permission

21. Reference

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