ARBORICULTURAL IMPACT ASSESSMENT & TREE PROTECTION MANAGEMENT PLAN

Project

Maitland Mental Health Rehabilitation

Site Address

51 Metford Road, Metford NSW 2323

Assessment Date

August 2024

Consulting Arborist

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Diploma of Arboriculture (AQF Level 5)

Consulting Arborist & Author

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Graduate Certificate of Arboriculture (AQF Level 8), LLB

Acknowledgement of Country

We acknowledge Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of this land – Australia; and in particular we would like to acknowledge the Dharug people as the Traditional Custodians of this area and recognise their continued connection to the land and their primary custodial care obligations.

Preface

The planting of trees in urbanised areas for their nutritional, aesthetic and spiritual value has been commonplace for centuries. Historical documents show that trees were planted for their known benefits along the main thoroughfares of Egypt approximately 4000 years ago, and in the communal areas of China during the Qin Dynasty, 221-206 B.C. (Gerhold. 2007). Closer to home, trees in Australia have always been, and will continue to be celebrated. Especially by the Aboriginal peoples, as trees represent significant connections to Country, their ancestry and lore (Long. 2005).

Now the benefits of urban forests are considered to span environmental, economic, cultural and socio-political domains alike. Communities around the world regard trees as critical urban infrastructure. This 'Green Infrastructure' is considered to be as important to the day-to-day functionality of an urban locale as the roads, public transport and its other 'Grey Infrastructure'. Therefore, by default any urban tree with a 'positive' retention value is a community asset and as such should be afforded protection.

However, trees grow in a delicate balance with their environment and any changes to that balance must be minimized if the tree is to remain healthy and fulfil its potential. Therefore, tree protection is of critical importance, and especially when it comes to the root system. Tree roots not only physically anchor the tree to the ground but are the critical supply lines of water and minerals and are essential for both carbohydrate storage and hormonal signalling. This in turn governing tree functionality, vigour and longevity.

Ergo, the aim of this Arboricultural Report is to pragmatically guide the proposed development works around any retained tree(s) so arboricultural impact is minimised. This through the formulation and implementation of best management practice tree protection methodologies.

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1 Executive Summary

Active Green Services Pty Ltd (AGS) has been engaged to author an Arboricultural Impact Assessment (AIA) and a site-specific Tree Protection Management Plan (TPMP) per *AS4970-2009 Protection of trees on developments sites*. This regarding the trees that are growing in or are within proximity of the proposed Maitland Mental Health Rehabilitation development site - Maitland Hospital, Metford NSW 2323. During August 2024 individual Visual Tree Assessments (VTA) were carried out on the subject tree population by suitably qualified and experienced AQF Level 5 arborists from AGS. The following arboricultural recommendations in this Report are based on this VTA data, which includes trees biometrics, pedology, useful life expectancy, vitality, ecophysiology, biomechanics, and landscape significance *in situ*. In addition, the identified trees were further assessed with regards to the proposed development footprint and their calculated Tree Protection Zones[1] (TPZ). This information providing the elements needed to calculate foreseeable arboricultural impact, tree viability, and the formulation of a site-specific TPMP. Whereby, on review it was concluded that:

- One hundred-forty (141) trees are in direct conflict with the proposed construction footprint and foreseeably will not remain biologically viable under the current design. These trees will need to be removed to accommodate the future construction. (*Low* & *Medium* Retention Value trees only).
- One hundred twenty-seven (127) trees have a TPZ encroachment calculated as *Major*[2], with a number of these encroachments extending into the Structural Root Zone[3] (SRZ). Albeit the majority of these encroachments (impact) will be caused by stormwater excavations and the subsequent altered soil levels around these trees. Therefore, to err on the side of caution and prevent unwarranted tree removal these trees are to be assessed onsite by a Consulting Arborist in consultation with the relevant Civil Engineer. This to determine the final soil level(s), tree viability post-development from an evidence-based perspective, and whether tree sensitive design modifications or installations are practicable. This especially important regarding the sixteen (16) *'High'* Retention Value trees, as tree sensitive alternatives will need to be candidly considered.
- Twenty-eight (28) trees have a TPZ encroachment calculated as *Minor*[4]. These trees will foreseeably remain viable, so are to be initially retained and afforded protection per the site-specific TPMP.

Ultimately, tree retention will depend on the findings of the arboricultural investigations, whether Tree Sensitive Urban Design (TSUD) alternatives are practicable, and the priorities of the Tree Manager/Owner. The details supporting this summary follow.

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[1] *AS4970-2009: Tree Protection Zone* (TPZ): A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.

[2] *AS4970-2009: Major (>10%):* The proposed encroachment is greater than 10% of the TPZ, the project arborist must demonstrate that the tree(s) will remain viable. The area lost to this encroachment should be compensated for elsewhere and be contiguous with the TPZ. Tree sensitive construction techniques may be used within this area providing no structural roots are likely to be impacted, and the project arborist can demonstrate that the tree(s) will remain viable. Root investigation by non-destructive methods (NDRE) will be required in conjunction with these proposed works.

[3] *AS4970-2009*: SRZ is the area of the root system used for stability, mechanical support, and anchorage of the tree. Severance of structural roots (>50 mm in diameter) within the SRZ is not recommended as it may lead to the destabilisation and/or serious decline of the tree.

[4] *AS 4970-2009: Minor encroachment (<10%): If the proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and be contiguous with the TPZ.*

2 Introduction

2.1 Overview

i. AGS has been engaged to author an AIA and a site-specific TPMP ('Report') per *AS4970-2009 Protection of trees on development sites*. This Report will accompany a Review of Environmental Factors (REF) for the construction and operation of a new mental health services building within the Maitland Hospital campus, and includes the following arboricultural elements:

- The geo-location and visual assessment of any tree that is growing within the proposed construction footprint and/or is within close proximity of any infrastructure works associated with the project.
- The calculated encroachment level of the proposed works on the assessed tree. This so tree viability can be objectively determined post-development.
- A site-specific Tree Protection Management Plan. This regarding the mitigation of foreseeable arboricultural impact to any tree that is to be retained whilst the development works are carried out pursuant to *AS4970-2009 Protection of trees on development sites.*

2.2 Objective

i. The purpose of this Report is to provide all parties with standing an objective and unbiased arboricultural assessment of the trees within the proposed development area per *AS4970-2009 Protection of trees on development sites* and Arboricultural Best Management Practice. This so prior to the commencement of works, practicable tree sensitive design and/or installations can be candidly considered; pragmatic tree retention or tree removal ascertained; and a site-specific TPMP formulated for enactment.

2.3 Limitations

i. All arboricultural reasonings that have been discussed and provided are based on extensive empirical arboricultural knowledge, the internationally recognised Visual Tree Assessment (VTA) methodology (Dunster et al. 2019), the recognised *Significance of a Tree, Assessment Rating System (STARS)* and *AS4970-2009 Protection of trees on development sites*. Albeit, whilst this arboricultural assessment is thorough it should be noted that trees are dynamic living organisms exposed to both unforeseeable biotic and abiotic variables which on occasion can be harsh and severe. Therefore, this arboricultural assessment will consider on the balance of probabilities the most likely outcome(s) as opposed to those which could, may or fancifully occur; and where applicable further arboricultural investigation required.

2.4 Arboricultural References

i. As a progressive arboricultural company AGS keeps abreast of relevant legislation, industry standards and research relating to all aspects of arboriculture and urban forestry. Hence, the following arboricultural reasonings, conclusions and recommendations of this Report are founded on current research and industry standards.

2.5 Scope of Works

i. A new Maitland Hospital Mental Health Rehabilitation facility is to be built. In addition to the new infrastructure the sites topography is to be amended to best manage stormwater volumes per a Bulk Excavation Plan which is indicatively highlighted in the below satellite maps. (A comprehensive scope of works and design plans can be made available upon request courtesy of Turner & Townsend).

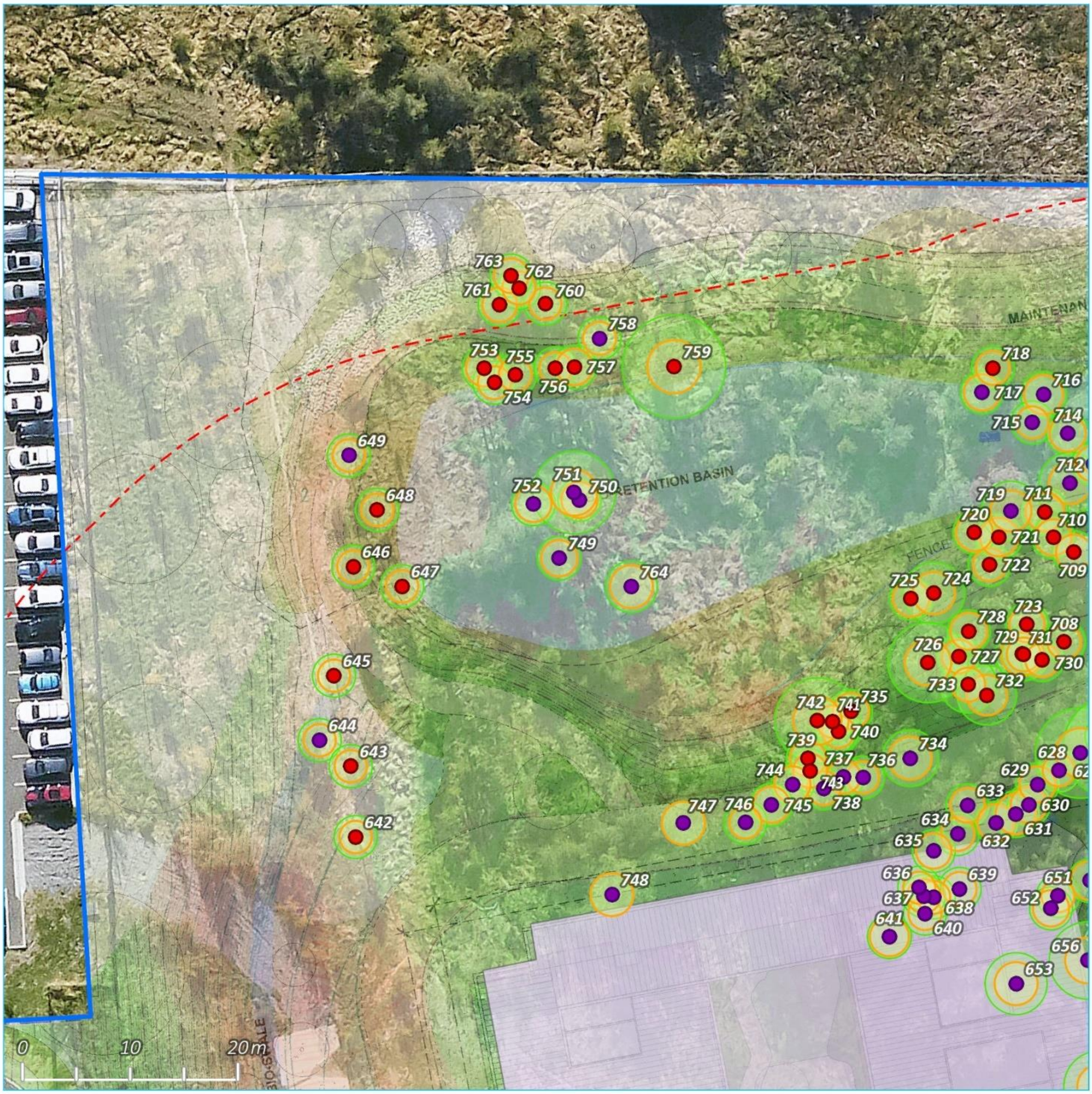
Maitland Mental Health Rehabilatation Project, Maitland NSW

3 Mapping

3.1 Mapping Overview

i. Two hundred ninety-six (296) significant trees within the provided study area were individually assessed and GPS located using the Esri FieldMaps application. For convenience all of the subject trees have been individually tree tagged at approximately 1.5m This tree tag has an engraved number that corresponds to the satellite maps and the Visual Tree Assessment Data tables in this Report. Therefore, all the subject trees can be physically identified and where applicable further assessed with regards to the amended soil levels per the appended Bulk Excavation Plan and tree viability.

ii. The following six (6) satellite maps indicate the trees Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) as calculated per *AS4970-2009 Protection of trees on development sites.* This to aid in the visualisation of the works footprint, foreseeable arboricultural impact and where TSUD and/or NDRE may need to be implemented concurrent with tree protection installation per the included site-specific TPMP.



ACTIVE GREEN SERVICES

Scale :
1:600

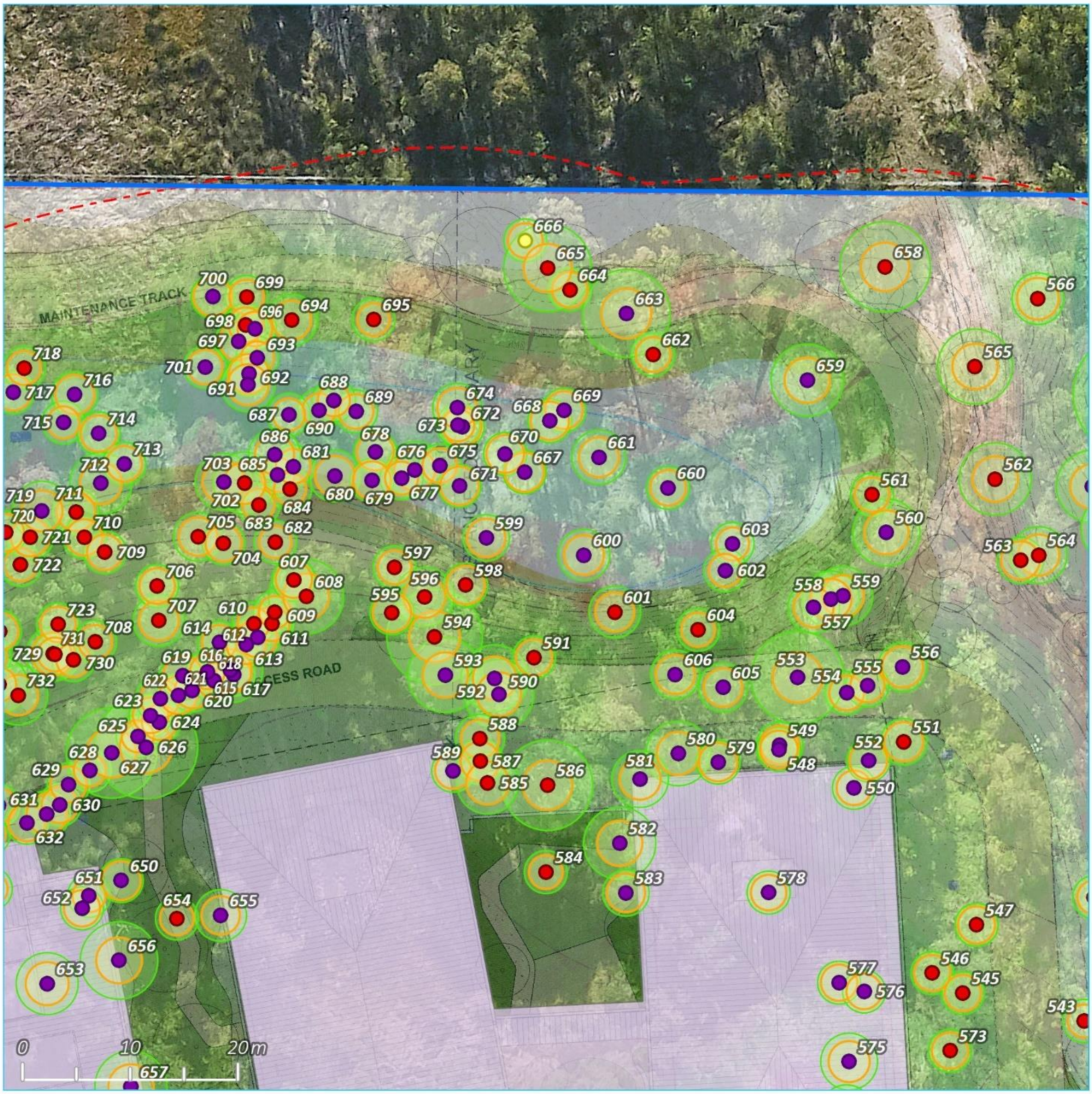
Spatial Reference :
GDA2020 MGA Zone 56

Legend
- Proposed Development Zone
- Bushfire Asset Protection Zone
- Building Footprint
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)

Tree Lcoation & Impact Level
- Removal
- Major- TSUD
- Major- Viable
- Minor

Project :
NEW MAITLAND HOSPITAL
MENTAL HEALTH
Metford Rd, Metford NSW 2323

Map :
Tree Impact Map 01 of 06



ACTIVE GREEN SERVICES

Scale :
1:600

Spatial Reference :
GDA2020 MGA Zone 56

Legend
- Proposed Development Zone
- Bushfire Asset Protection Zone
- Building Footprint
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)

Tree Lcoation & Impact Level
- Removal
- Major- TSUD
- Major- Viable
- Minor

Project :
NEW MAITLAND HOSPITAL
MENTAL HEALTH
Metford Rd, Metford NSW 2323

Map :
Tree Impact Map 02 of 06

ACTIVE GREEN SERVICES

Scale :
1:600

Spatial Reference :
GDA2020 MGA Zone 56

Legend
- Proposed Development Zone
- Bushfire Asset Protection Zone
- Building Footprint
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)

Tree Lcoation & Impact Level
- Removal
- Major- TSUD
- Major- Viable
- Minor

Project :
NEW MAITLAND HOSPITAL
MENTAL HEALTH
Metford Rd, Metford NSW 2323

Map :
Tree Impact Map 03 of 06

ACTIVE GREEN SERVICES

Legend
- Proposed Development Zone
- Bushfire Asset Protection Zone
- Building Footprint
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)

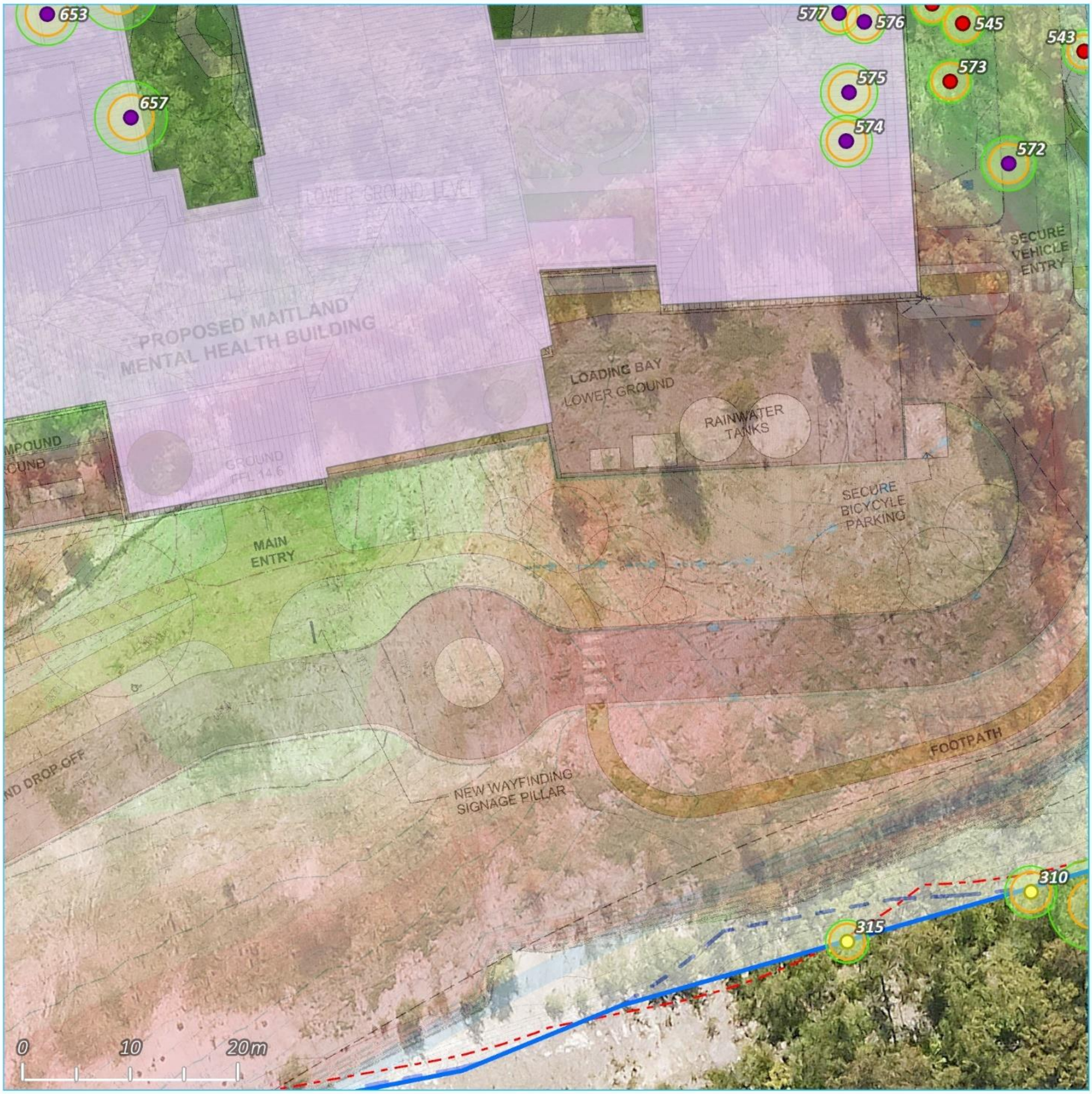
Tree Lcoation & Impact Level
- Removal
- Major- TSUD
- Major- Viable
- Minor

Scale : 1:600

Spatial Reference : GDA2020 MGA Zone 56

Project : NEW MAITLAND HOSPITAL MENTAL HEALTH
Metford Rd, Metford NSW 2323

Map : Tree Impact Map 04 of 06



ACTIVE GREEN SERVICES

Scale :
1:600

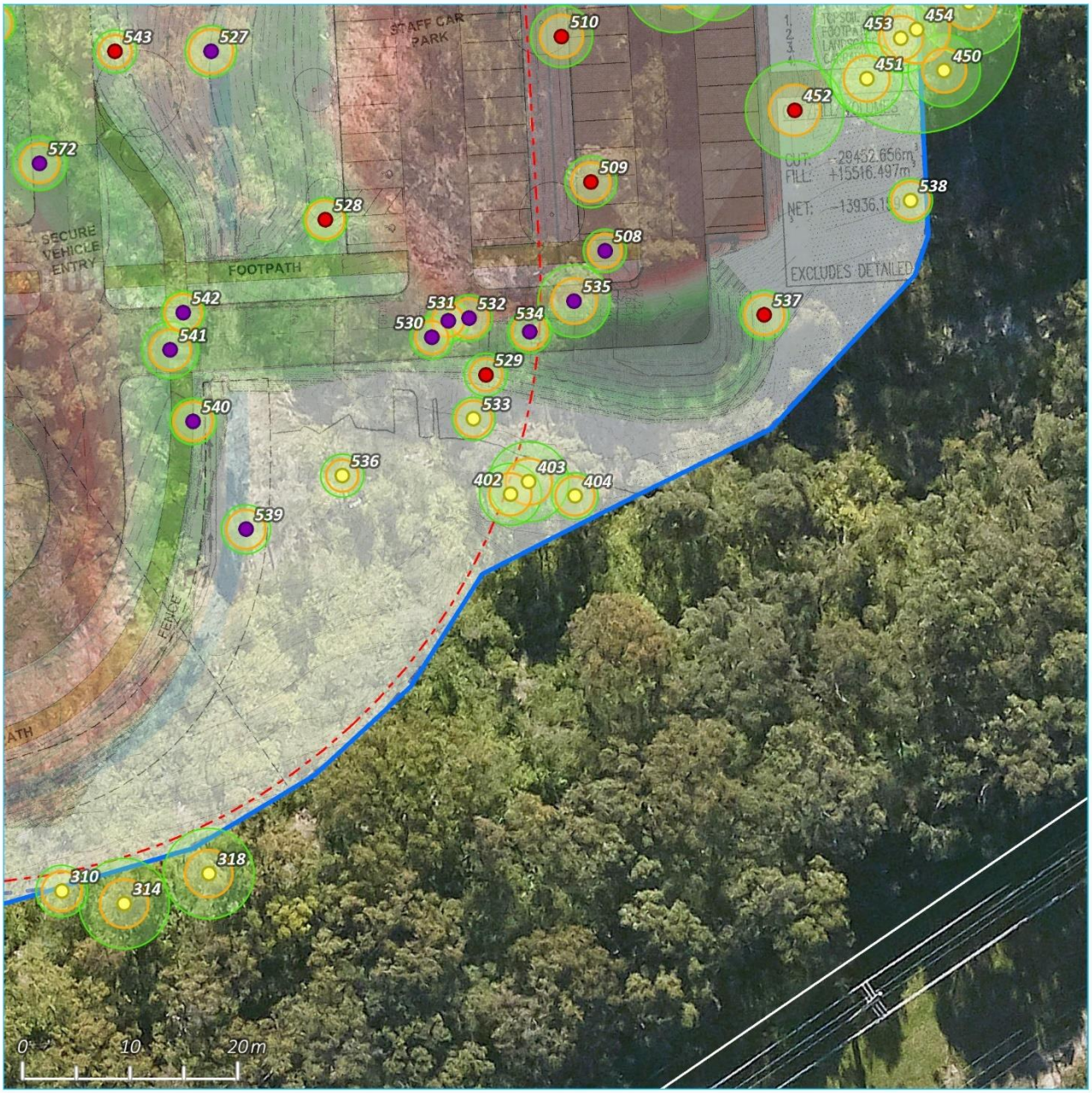
Spatial Reference :
GDA2020 MGA Zone 56

Legend
- Proposed Development Zone
- Bushfire Asset Protection Zone
- Building Footprint
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)

Tree Lcoation & Impact Level
- Removal
- Major- TSUD
- Major- Viable
- Minor

Project :
NEW MAITLAND HOSPITAL
MENTAL HEALTH
Metford Rd, Metford NSW 2323

Map :
Tree Impact Map 05 of 06



ACTIVE GREEN SERVICES

Scale :
1:600

Spatial Reference :
GDA2020 MGA Zone 56

Legend
- Proposed Development Zone
- Bushfire Asset Protection Zone
- Building Footprint
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)

Tree Lcoation & Impact Level
- Removal
- Major- TSUD
- Major- Viable
- Minor

Project :
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Map :
Tree Impact Map 06 of 06

4 Tree Assessment Methodology

4.1 Visual Tree Assessment Methodology

i. Visual Tree Assessments (VTA) consistent with modern arboricultural practices and the International Society of Arboriculture standards were conducted by a suitably qualified and experienced arborist on the subject tree population. These assessments were conducted at ground level and therefore classified as *Level 2: Basic Assessment* (Dunster et al. 2019).

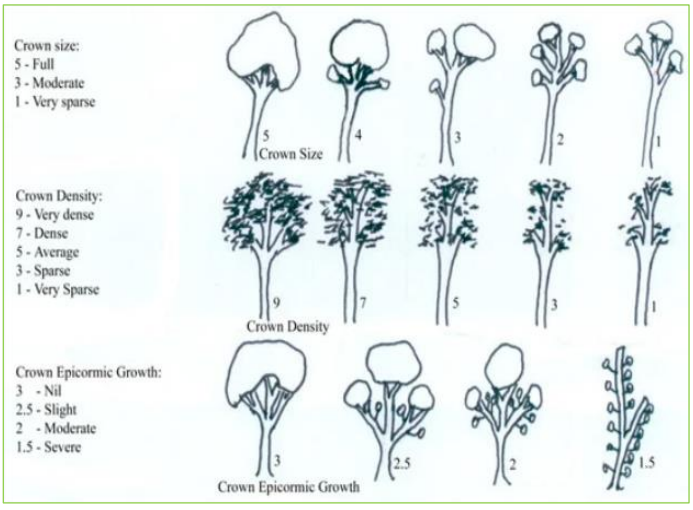
i. The tools used onsite to gather the necessary VTA data were a nylon percussion hammer, mobile phone, and an iPad. Tree height and canopy spread were recorded using a digital laser range finder (Nikon Forestry Pro). The trunk diameter and DBH height measurements were made by using a forestry DBH measuring tape. No dendrological diagnostics, soil analysis, tissue sampling and/or geological investigations were conducted at that time. For ease of identification the subject trees have been GPS located and photographed.

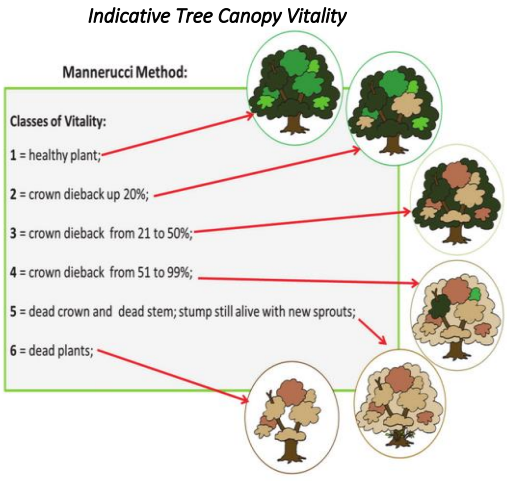
4.2 Visual Tree Assessment attributes

i. The following descriptors are used to visually assess a tree. These parameters relate to the tabled Visual Tree Assessment data below.

Tree Vitality: is categorised through a visual determination using:

- leaf, twig or needle size, shape, and colour
- seasonal growth rates
- reaction wood development
- foliage density & foliage coverage throughout the crown
- branch architecture & ecophysiology
- species specific traits & biomechanics
- branch-tip dieback
- typical branch senescence.





Visual vitality index for mature trees (Callow. 2018)

Pedology: a visual assessment of the general health and condition of the soil within the trees root zone. For example, such considerations such as soil porosity, compaction level, topography, hydrology, soil profile and root zone growth frustrations both infrastructural and/or otherwise.

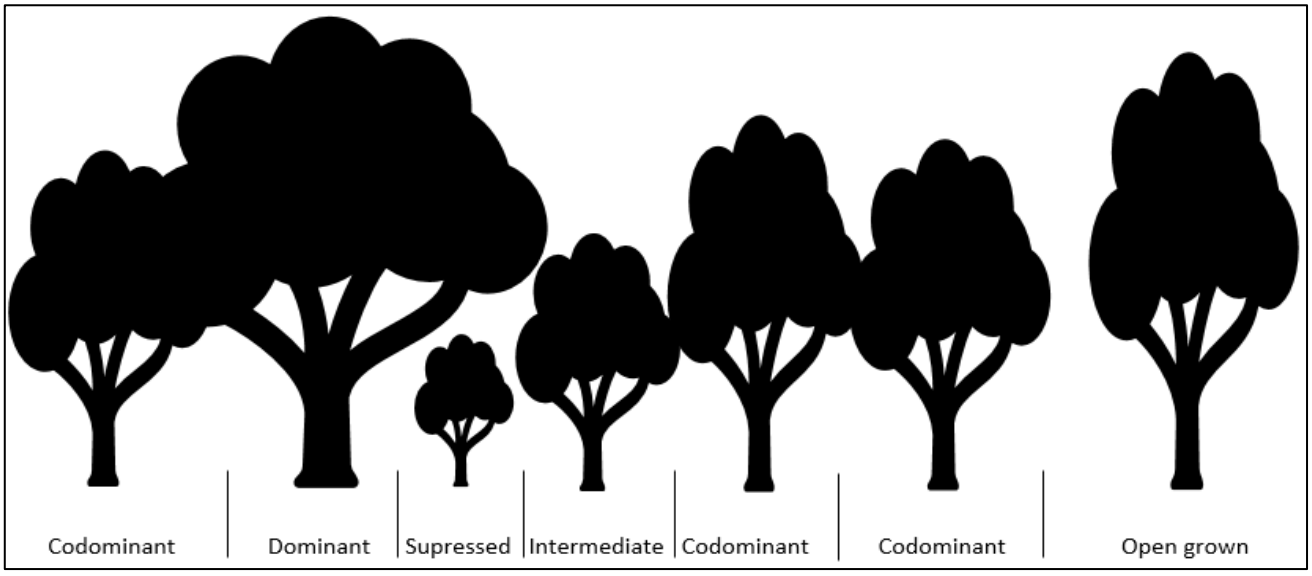
Structure & Biomechanics: a general evaluation of a tree's branch union formation, growth formation and architecture (this may affect branch weight and/or mass damping). This assessment is species-specific as it is derived from the typical structure and branch formation of the subject species.

Form: *'Trunk Form'* is an assessment of the trees basal flare, taper, decay, cavities, formation of multi-stems that develop near and/or at ground level, girdling roots and growing angles. Whilst general *'Tree Form'* is an indication of crown shape. Crown shapes are influenced by their surroundings, light availability and branch loss, which can have varying impacts on their symmetry. A tree is assessed on its individual crown shape. However, as the tree may be growing within a group environment, this could lead to the individual shape being assessed further down the scale. Although a poor rating may be attributed to the tree, the tree's contribution to the setting may be high through association within the group canopy. This can be generally recognised through the Crown Class rating.

Function: this assesses the site-specific usefulness of the tree *in situ*. Examples include soil retention, stormwater attenuation and mitigation of the Urban Heat Island. This is weighed up against any negative issues the tree(s) may be causing regarding persons, utilities and/or infrastructure.

Impediments: (rootzone & canopy) are structures that impede or supress normal tree development and/or function. This can include hard impervious surfaces within the rootzone or powerlines and other structures within or adjacent to the canopy.

Crown Class: this rating provides an indication on the tree's relationship with other trees in the subject environment. The categories used include Dominant, Codominant, Intermediate, Suppressed and Open grown, as shown in the below diagram.



Indicative Crown Class (adapted from the International Society of Arboriculture)

Useful Life Expectancy: A Useful Life Expectancy (ULE) rating is determined by using the adapted Safe Useful Life Expectancy (SULE) and TreeAZ methodologies (Barrell. 1996, 2000). The aim of these two systems is to convert what amounts to a complex arboricultural assessment into a few broad categories that are more logically understood. A ULE rating provides an estimate of a tree's expected remaining lifespan after considering the current condition, vigour, and vitality of the subject tree(s) *in situ*. The main aim is the establishment of a tree Retention Value. The objective of a calculated ULE assessment is to contribute to the relative value of individual trees for the purpose of informing future management options and residual risk. This calculated ULE rating will be inserted into the above-mentioned STARS Matrix (please refer to the Appendix section for further information).

Retention Value: The *Significance of a Tree, Assessment Rating System (STARS)* provides the Retention Value of a tree and/or group of trees by balancing a combination of environmental, cultural, physical, amenity and social values. The Landscape Significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the Retention Value for a tree. Therefore, a tree retention assessment is undertaken in accordance with the *Institute of Australian Consulting Aboriculturalists (IACA) Significance of a Tree, Assessment Rating System (STARS)*. The system uses a scale of *High, Medium,* and *Low* significance in the landscape. Once the landscape significance of a tree has been defined, the Retention Value can be determined congruent with the trees' abovementioned Useful Life Expectancy (ULE).

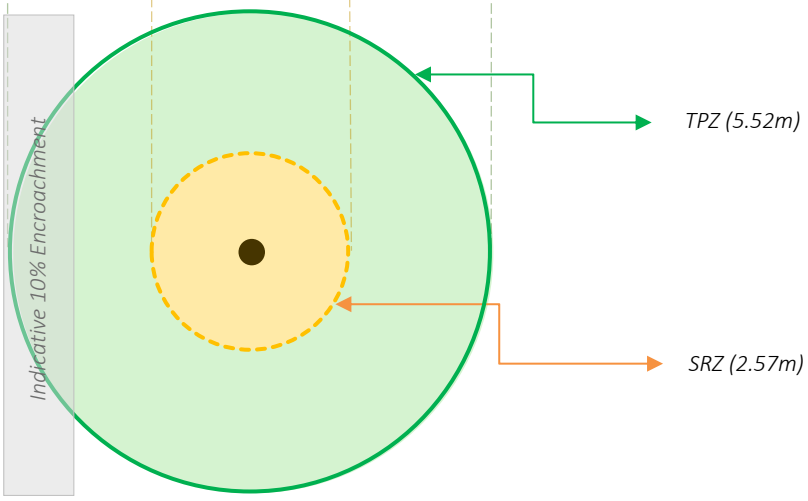
	Prioritise for Retention (High) - These trees are considered important for retention and must be retained and protected. Design modification or the re-location of building(s) should be considered to accommodate the setbacks as prescribed by *AS4970-Protection of trees on development sites.* Tree sensitive construction measures must be implemented (e.g., Buildouts, Pier and Beam cantilever, Screw Piling, Structural Confinement Cells if works are to proceed within the TPZ).
	Consider for Retention (Medium) - These trees should be retained and protected. However, these trees are considered less critical; but their retention should remain as a priority with 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.
	Priority for Removal (Removal) - These trees are considered hazardous, in irreversible decline and/or are a listed weed species and therefore should be removed irrespective of development.

4.3 Root Zone Encroachment

i. Root depth and extension can be severely limited and highly irregular in urban settings. When root restrictions are minimal, root spread shows a strong relationship with trunk diameter, which is a more reliable predictor than canopy diameter ('drip-line') or tree height (Day et al. 2010). Therefore, all arboricultural recommendations and conclusions contained in this AIA with regards to tree root protection/retention were based upon and determined in accordance with *AS4970-2009 Protection of Trees on Development Sites.*

ii. An infographic indicative of a calculated Tree Protection Zone (TPZ), a Structural Root Zone (SRZ) and Encroachment is included below to aid in the visualisation of the 'No-Dig' zones; and where initial Non-Destructive Root Exploration (NDRE) must be carried out under the direct supervision of the Project Arborist if the tree is to be retained. This diagram can be used to indicatively portray a SRZ and TPZ of any tree within close proximity to works concurrent with the application of the recommended 'stair-step' Construction Encroachment Descriptors & Stair-step Approach table that follows.

Tree (498) *Corymbia maculata*



- Whilst working within the Tree Protection Zone (TPZ) of any retained tree it is recommended that initial Non-Destructive Root Exploration (NDRE) is utilised under the guidance of an appointed Project Arborist; and
- Any retained tree within five (5) metres of development works requires tree protection. The tree protection is to be installed per the calculated TPZ and the site-specific TPMP prior to the commencement of works. On satisfactory completion, the appointed Project Arborist will inspect and issue a Tree Protection Compliance Memorandum.

Root Zone Calculations

- *AS4970-2009 Protection of trees on development sites s3:* The radius of the TPZ is calculated for each tree by multiplying its Diameter @ Breast Height measured @ 1.4m from ground level (DBH × 12 = TPZ). (DBH = Trunk Girth @ 1.4m ÷ π).
- To calculate the SRZ: Radius SRZ = **D**iameter above **R**oot **C**rown (**DRC** x 50) ^ 0.42 x 0.64. If the DRC is less than 0.15m the SRZ will be 1.5m. (Please note that the SRZ should be no less than 1.5m; and a TPZ should not be less than 2m).

Construction Encroachment Descriptors & Stair-step Approach

LEVEL	IMPACT CATEGORY	DESCRIPTION
1	*Removal* *(Non-Viable)*	The design and tree encroach upon each other to a point that either the design must be modified, or the tree removed. *Please note that transplanting may be an option.
2	*Major* *(Viable with TSUD)*	The proposed development works encroachment is greater than 10% (total area) of the Tree Protection Zone; and impacts the calculated Structural Root Zone of the tree. Therefore, the Project Arborist must demonstrate that the subject tree will foreseeably remain viable post-development. Thereby, the tree does require immediate removal; however, the impact is significant enough to cause serious decline and/or premature mortality in the foreseeable future. Therefore, if the tree is to be retained Tree Sensitive Urban Design (TSUD) is required to reduce the construction footprint on the tree to an acceptable level; or Non-Destructive Root Exploration (NDRE) identifies minimal root biomass in the construction footprint. *Please note that Directional-drilling or transplanting may be an option.
3	*Major* *(Viable)*	The proposed development works encroachment is greater than 10% (total area) of the Tree Protection Zone, but outside the calculated Structural Root Zone of the tree. Therefore, the tree does not require immediate removal, but the Project Arborist must demonstrate that the subject tree will remain viable post-development. This may be adjudged by: - • The area lost to this encroachment is compensated for elsewhere contiguous with the TPZ. • Tree sensitive construction techniques may be used for minor works within this area, providing no structural roots are likely to be significantly impacted upon. • Non Destructive Root Exploration (NDRE) is undertaken and root mapping shows minimal root biomass and/or minimal impact in the contruction footprint.
4	*Minor*	The proposed development works encroachment is less than 10% (total area) of the Tree Protection Zone, and no impact to the Structural Root Zone of the tree. Therefore, the tree is expected to remain viable and is to be retained. Tree protection is to be installed; and the site-specific Tree Protection Management Plan must be adhered too for the duration of the project.
5	*No Impact*	No impact is foreseeable. However, tree protection is to be installed if the subject tree is within five (5) metres of the development works; and the site-specific Tree Protection Management Plan must be adhered too for the duration of the project.

5 Visual Tree Assessment Data

Visual Tree Assessment Data: August 2024 (all measurements are shown in metres)

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
1	310	*Corymbia maculata* Spotted Gum	Semi Mature	10	EW:6 NS:6	0.20	0.25	1.8	2.4	Good	Fair	Fair	Long	Medium	Medium	Minor		*06*
2	314	*Eucalyptus fibrosa* Broad-leaved Ironbark	Semi Mature	12	EW:7 NS:7	0.35	0.40	2.3	4.2	Fair	Fair	Fair	Medium	Medium	Medium	Minor		*06*
3	315	*Corymbia maculata* Spotted Gum	Semi Mature	9	EW:4 NS:4	0.14	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Low	Minor		*05*
4	318	*Eucalyptus fibrosa* Broad-leaved Ironbark	Semi Mature	13	EW:7 NS:9	0.35	0.38	2.2	4.2	Poor	Fair	Fair	Medium	Medium	Medium	Minor		*06*
5	402	*Corymbia maculata* Spotted Gum	Mature	7	EW:2 NS:3	0.24	0.29	2.0	2.9	Fair	Fair	Fair	Long	Medium	Medium	Minor		*06*
6	403	*Eucalyptus punctata* Grey Gum	Mature	8	EW:3 NS:3	0.31	0.36	2.2	3.7	Fair	Fair	Fair	Long	Medium	Medium	Minor		*06*
7	404	*Corymbia maculata* Spotted Gum	Mature	7	EW:2 NS:2	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Long	Medium	Medium	Minor		*06*
8	450	*Corymbia maculata* Spotted Gum	Mature	8	EW:3 NS:3	0.28	0.32	2.1	3.4	Fair	Fair	Fair	Long	Medium	Medium	Minor		*06*
9	451	*Corymbia maculata* Spotted Gum	Mature	11	EW:3 NS:4	0.28	0.35	2.1	3.4	Fair	Fair	Fair	Long	Medium	Medium	Minor		*06*
10	452	*Eucalyptus punctata* Grey Gum	Mature	15	EW:4 NS:5	0.38	0.45	2.4	4.6	Fair	Good	Fair	Long	High	High	Major - TSUD		*06*
11	453	*Corymbia maculata* Spotted Gum	Mature	10	EW:3 NS:3	0.27	0.32	2.1	3.2	Fair	Good	Fair	Long	Medium	Medium	Minor		*03*
12	454	*Eucalyptus fibrosa* Broad-leaved Ironbark	Mature	20	EW:5 NS:6	0.80	0.87	3.1	9.6	Fair	Fair	Fair	Long	High	Medium	Minor		*03*
13	455	*Corymbia maculata* Spotted Gum	Mature	16	EW:5 NS:5	0.41	0.50	2.5	4.9	Fair	Fair	Fair	Long	High	Medium	Minor		*03*
14	481	*Corymbia maculata* Spotted Gum	Mature	13	EW:2 NS:3	0.35	0.40	2.3	4.2	Good	Good	Fair	Long	Medium	Medium	Minor		*03*
15	482	*Corymbia maculata* Spotted Gum	Mature	13	EW:3 NS:3	0.36	0.43	2.3	4.3	Good	Good	Fair	Long	Medium	Medium	Major - TSUD		*03*
16	483	*Corymbia maculata* Spotted Gum	Mature	12	EW:2 NS:2	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Long	Medium	Medium	Minor		*03*
17	484	*Corymbia maculata* Spotted Gum	Mature	16	EW:3 NS:4	0.34	0.40	2.3	4.1	Good	Good	Fair	Long	High	High	Major - TSUD		*03*

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
18	485	*Corymbia maculata* Spotted Gum	Mature	16	EW:3 NS:3	0.33	0.38	2.2	4.0	Good	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
19	486	*Corymbia maculata* Spotted Gum	Mature	18	EW:3 NS:3	0.35	0.41	2.3	4.2	Good	Good	Fair	Long	High	High	Minor		*03*
20	487	*Corymbia maculata* Spotted Gum	Mature	7	EW:2 NS:2	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Minor		*03*
21	488	*Corymbia maculata* Spotted Gum	Mature	14	EW:2 NS:2	0.31	0.35	2.1	3.7	Good	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
22	489	*Corymbia maculata* Spotted Gum	Mature	15	EW:3 NS:3	0.28	0.33	2.1	3.4	Good	Good	Fair	Long	Medium	Medium	Minor		*03*
23	490	*Corymbia maculata* Spotted Gum	Mature	15	EW:4 NS:4	0.29	0.33	2.1	3.5	Fair	Fair	Fair	Long	Medium	Medium	Minor		*03*
24	491	*Corymbia maculata* Spotted Gum	Mature	9	EW:2 NS:2	0.16	0.22	1.8	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Minor		*03*
25	492	*Corymbia maculata* Spotted Gum	Mature	19	EW:4 NS:4	0.44	0.50	2.5	5.3	Good	Good	Fair	Long	High	High	Minor		*03*
26	493	*Corymbia maculata* Spotted Gum	Mature	18	EW:2 NS:2	0.34	0.38	2.2	4.1	Good	Good	Fair	Medium	Medium	Medium	Minor		*03*
27	494	*Corymbia maculata* Spotted Gum	Mature	18	EW:2 NS:2	0.32	0.36	2.2	3.8	Good	Good	Fair	Long	Medium	Medium	Minor		*03*
28	495	*Corymbia maculata* Spotted Gum	Mature	18	EW:6 NS:4	0.43	0.48	2.4	5.2	Good	Good	Fair	Long	High	High	Minor		*03*
29	496	*Corymbia maculata* Spotted Gum	Mature	9	EW:3 NS:3	0.25	0.30	2.0	3.0	Good	Good	Fair	Long	Medium	Medium	Major - TSUD		*03*
30	497	*Corymbia maculata* Spotted Gum	Mature	10	EW:1 NS:1	0.15	0.19	1.6	2.0	Good	Good	Fair	Long	Medium	Medium	Major - TSUD		*03*
31	498	*Corymbia maculata* Spotted Gum	Mature	15	EW:5 NS:5	0.46	0.55	2.6	5.5	Fair	Fair	Fair	Long	High	High	Major - TSUD		*03*
32	499	*Eucalyptus punctata* Grey Gum	Mature	8	EW:3 NS:3	0.28	0.33	2.1	3.4	Poor	Poor	Dead	Dead	Low	Remove	Removal		*03*
33	502	*Corymbia maculata* Spotted Gum	Semi Mature	9	EW:1 NS:2	0.12	0.16	1.5	2.0	Poor	Fair	Fair	Long	Medium	Medium	Minor		*03*
34	503	*Corymbia maculata* Spotted Gum	Mature	17	EW:4 NS:4	0.28	0.34	2.1	3.4	Fair	Good	Fair	Long	High	High	Major - TSUD		*03*
35	504	*Corymbia maculata* Spotted Gum	Mature	18	EW:4 NS:4	0.26	0.30	2.0	3.1	Good	Good	Fair	Long	High	High	Major - TSUD		*03*
36	505	*Corymbia maculata* Spotted Gum	Mature	18	EW:4 NS:4	0.36	0.40	2.3	4.3	Good	Good	Fair	Long	High	High	Major - TSUD		*03*

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
37	506	*Corymbia maculata* Spotted Gum	Mature	17	EW:5 NS:3	0.26	0.34	2.1	3.1	Fair	Fair	Fair	Long	High	High	Major - TSUD		*03*
38	507	*Corymbia maculata* Spotted Gum	Mature	22	EW:6 NS:6	0.39	0.46	2.4	4.7	Fair	Fair	Good	Long	High	High	Major - TSUD		*03*
39	508	*Casuarina cunninghamiana* River She-oak	Semi Mature	9	EW:2 NS:2	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Long	Low	Low	Removal		*06*
40	509	*Eucalyptus fibrosa* Broad-leaved Ironbark	Semi Mature	10	EW:6 NS:6	0.20	0.24	1.8	2.4	Good	Poor	Fair	Medium	High	Medium	Major - TSUD		*06*
41	510	*Corymbia maculata* Spotted Gum	Semi Mature	16	EW:8 NS:8	0.24	0.30	2.0	2.9	Good	Good	Fair	Long	High	High	Major - TSUD		*03*
42	511	*Corymbia maculata* Spotted Gum	Semi Mature	18	EW:7 NS:7	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Long	High	Medium	Major - TSUD		*03*
43	512	*Corymbia maculata* Spotted Gum	Mature	17	EW:9 NS:9	0.36	0.40	2.3	4.3	Fair	Fair	Fair	Long	High	Medium	Major - TSUD		*03*
44	513	*Corymbia maculata* Spotted Gum	Semi Mature	17	EW:3 NS:3	0.19	0.23	1.8	2.3	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
45	514	*Corymbia maculata* Spotted Gum	Mature	17	EW:5 NS:7	0.24	0.27	1.9	2.9	Fair	Fair	Fair	Long	High	High	Major - TSUD		*03*
46	515	*Corymbia maculata* Spotted Gum	Semi Mature	8	EW:7 NS:4	0.20	0.24	1.8	2.4	Poor	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
47	516	*Corymbia maculata* Spotted Gum	Semi Mature	16	EW:7 NS:6	0.29	0.34	2.1	3.5	Fair	Fair	Fair	Long	High	Medium	Major - TSUD		*03*
48	517	*Corymbia maculata* Spotted Gum	Semi Mature	16	EW:5 NS:5	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
49	518	*Corymbia maculata* Spotted Gum	Mature	18	EW:10 NS:11	0.48	0.55	2.6	5.8	Fair	Fair	Fair	Long	High	High	Major - TSUD		*03*
50	519	*Corymbia maculata* Spotted Gum	Mature	17	EW:9 NS:8	0.40	0.51	2.5	4.8	Good	Fair	Fair	Long	High	High	Major - TSUD		*03*
51	520	*Corymbia maculata* Spotted Gum	Semi Mature	10	EW:6 NS:6	0.14	0.20	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
52	521	*Corymbia maculata* Spotted Gum	Mature	17	EW:14 NS:14	0.65	0.74	2.9	7.8	Good	Good	Fair	Long	High	High	Major - TSUD		*03*
53	522	*Corymbia maculata* Spotted Gum	Semi Mature	8	EW:6 NS:6	0.14	0.20	1.7	2.0	Poor	Fair	Fair	Long	Medium	Medium	Major - TSUD		*03*
54	523	*Corymbia maculata* Spotted Gum	Semi Mature	6	EW:2 NS:2	0.18	0.23	1.8	2.2	Good	Good	Fair	Long	Medium	Medium	Major - TSUD		*03*
55	524	*Corymbia maculata* Spotted Gum	Semi Mature	7	EW:3 NS:3	0.23	0.26	1.9	2.8	Fair	Good	Fair	Long	Medium	Medium	Major - TSUD		*03*

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
56	525	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	4	EW:3 NS:3	0.25	0.30	2.0	3.0	Fair	Good	Fair	Long	Medium	Medium	Major - TSUD		03
57	526	*Corymbia maculata* Spotted Gum	Semi Mature	6	EW:2 NS:2	0.16	0.20	1.7	2.0	Fair	Good	Fair	Long	Medium	Medium	Major - TSUD		03
58	527	*Melaleuca sp.* Paperbark	Mature	4	EW:2 NS:3	0.20	0.32	2.1	2.4	Fair	Fair	Fair	Medium	Medium	Medium	Removal		03
59	528	*Eucalyptus punctata* Grey Gum	Semi Mature	5	EW:2 NS:2	0.17	0.23	1.8	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		06
60	529	*Casuarina cunninghamiana* River She-oak	Semi Mature	7	EW:1 NS:1	0.10	0.13	1.5	2.0	Fair	Fair	Fair	Long	Medium	Low	Major - TSUD		06
61	530	*Casuarina cunninghamiana* River She-oak	Semi Mature	6	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Long	Medium	Medium	Removal		06
62	531	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	4	EW:1 NS:1	0.11	0.15	1.5	2.0	Fair	Fair	Fair	Long	Medium	Medium	Removal		06
63	532	*Casuarina cunninghamiana* River She-oak	Semi Mature	7	EW:2 NS:2	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Long	Medium	Medium	Removal		06
64	533	*Corymbia maculata* Spotted Gum	Semi Mature	7	EW:1 NS:1	0.15	0.20	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Minor		06
65	534	*Eucalyptus acmenoides* White Mahogany	Semi Mature	4	EW:1 NS:1	0.15	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Removal		06
66	535	*Eucalyptus acmenoides* White Mahogany	Mature	8	EW:4 NS:4	0.28	0.34	2.1	3.4	Fair	Fair	Fair	Long	Medium	Medium	Removal		06
67	536	*Eucalyptus punctata* Grey Gum	Semi Mature	7	EW:1 NS:3	0.12	0.15	1.5	2.0	Fair	Poor	Fair	Medium	Medium	Low	Minor		06
68	537	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:3 NS:3	0.19	0.25	1.8	2.3	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		06
69	538	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:2 NS:2	0.17	0.23	1.8	2.0	Fair	Fair	Fair	Long	Medium	Medium	Minor		06
70	539	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.19	0.24	1.8	2.3	Good	Good	Fair	Long	Medium	Medium	Removal		06
71	540	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.18	0.24	1.8	2.2	Fair	Good	Fair	Long	Medium	Medium	Removal		06
72	541	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:3 NS:2	0.22	0.27	1.9	2.6	Fair	Fair	Fair	Long	Medium	Medium	Removal		06
73	542	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.16	0.21	1.7	2.0	Poor	Fair	Fair	Long	Medium	Medium	Removal		06
74	543	*Pittosporum undulatum* Sweet Pittosporum	Semi Mature	3	EW:2 NS:2	0.13	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		03

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
75	544	*Eucalyptus moluccana* Grey Box	Semi Mature	6	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		03
76	545	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
77	546	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:1	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
78	547	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:2	0.16	0.21	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
79	548	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:2 NS:1	0.17	0.22	1.8	2.0	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
80	549	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:1	0.18	0.23	1.8	2.2	Good	Fair	Fair	Long	Medium	Medium	Removal		02
81	550	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
82	551	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:2	0.18	0.24	1.8	2.2	Good	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
83	552	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:1	0.16	0.22	1.8	2.0	Good	Fair	Fair	Long	Medium	Medium	Removal		02
84	553	*Eucalyptus tereticornis* Forest Red Gum	Mature	7	EW:4 NS:4	0.36	0.43	2.3	4.3	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
85	554	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
86	555	*Eucalyptus moluccana* Grey Box	Semi Mature	6	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
87	556	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:3	0.19	0.27	1.9	2.3	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
88	557	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:1	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
89	558	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:2	0.22	0.27	1.9	2.6	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
90	559	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.23	0.28	1.9	2.8	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
91	560	*Eucalyptus moluccana* Grey Box	Semi Mature	7	EW:3 NS:4	0.26	0.32	2.1	3.1	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
92	561	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
93	562	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:3 NS:3	0.28	0.34	2.1	3.4	Fair	Good	Fair	Long	Medium	Medium	Major - TSUD		02

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
94	563	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.18	0.23	1.8	2.2	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
95	564	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:2 NS:2	0.22	0.27	1.9	2.6	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		03
96	565	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:3 NS:3	0.29	0.34	2.1	3.5	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
97	566	*Melaleuca styphelioides* Prickly-leaved Paperbark	Semi Mature	5	EW:3 NS:3	0.20	0.28	1.9	2.4	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		03
98	567	*Corymbia maculata* Spotted Gum	Semi Mature	7	EW:1 NS:1	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		03
99	568	*Corymbia maculata* Spotted Gum	Mature	13	EW:3 NS:3	0.27	0.30	2.0	3.2	Fair	Good	Good	Long	Medium	Medium	Removal		03
100	569	*Casuarina glauca* Swamp she-oak	Mature	9	EW:3 NS:3	0.28	0.33	2.1	3.4	Fair	Fair	Fair	Medium	Medium	Medium	Removal		03
101	570	*Casuarina glauca* Swamp she-oak	Mature	9	EW:4 NS:3	0.48	0.54	2.6	5.8	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		03
102	571	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:2 NS:2	0.13	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		03
103	572	*Eucalyptus acmenoides* White Mahogany	Semi Mature	5	EW:3 NS:3	0.21	0.24	1.8	2.5	Fair	Fair	Fair	Long	Medium	Medium	Removal		05
104	573	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		05
105	574	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.20	0.24	1.8	2.4	Fair	Fair	Fair	Long	Medium	Medium	Removal		05
106	575	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.22	0.27	1.9	2.6	Poor	Poor	Fair	Medium	Low	Low	Removal		05
107	576	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:1	0.15	0.19	1.6	2.0	Poor	Fair	Fair	Medium	Medium	Medium	Removal		02
108	577	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.16	0.20	1.7	2.0	Poor	Fair	Fair	Medium	Medium	Medium	Removal		02
109	578	*Melaleuca sp.* Paperbark	Semi Mature	4	EW:2 NS:2	0.15	0.19	1.6	2.0	Poor	Poor	Fair	Medium	Low	Low	Removal		02
110	579	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.17	0.23	1.8	2.0	Poor	Fair	Fair	Medium	Medium	Medium	Removal		02
111	580	*Melaleuca sp.* Paperbark	Mature	5	EW:6 NS:6	0.25	0.30	2.0	3.0	Good	Fair	Fair	Medium	Low	Medium	Removal		02
112	581	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.22	0.27	1.9	2.6	Fair	Fair	Fair	Long	Medium	Medium	Removal		02

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
113	582	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:3	0.28	0.34	2.1	3.4	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
114	583	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	4	EW:2 NS:2	0.18	0.23	1.8	2.2	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
115	584	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
116	585	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:3	0.24	0.30	2.0	2.9	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
117	586	*Eucalyptus tereticornis* Forest Red Gum	Mature	8	EW:3 NS:3	0.35	0.42	2.3	4.2	Fair	Poor	Poor	Medium	Low	Low	Major - TSUD		02
118	587	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
119	588	*Eucalyptus moluccana* Grey Box	Semi Mature	8	EW:1 NS:1	0.19	0.23	1.8	2.3	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
120	589	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:1	0.16	0.20	1.7	2.0	Good	Fair	Fair	Medium	Medium	Medium	Removal		02
121	590	*Eucalyptus tereticornis* Forest Red Gum	Mature	11	EW:3 NS:2	0.27	0.32	2.1	3.2	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
122	591	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:2 NS:2	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
123	592	*Eucalyptus tereticornis* Forest Red Gum	Mature	12	EW:2 NS:2	0.26	0.31	2.0	3.1	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
124	593	*Eucalyptus tereticornis* Forest Red Gum	Mature	12	EW:2 NS:2	0.29	0.34	2.1	3.5	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
125	594	*Eucalyptus tereticornis* Forest Red Gum	Mature	9	EW:2 NS:2	0.37	0.45	2.4	4.4	Fair	Fair	Poor	Short	Low	Low	Major - TSUD		02
126	595	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.17	0.23	1.8	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
127	596	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.23	0.28	1.9	2.8	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
128	597	*Eucalyptus moluccana* Grey Box	Semi Mature	5	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
129	598	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.17	0.23	1.8	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
130	599	*Eucalyptus moluccana* Grey Box	Semi Mature	8	EW:1 NS:2	0.18	0.23	1.8	2.2	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
131	600	*Eucalyptus moluccana* Grey Box	Semi Mature	8	EW:2 NS:2	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
132	601	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.20	0.24	1.8	2.4	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
133	602	*Eucalyptus moluccana* Grey Box	Semi Mature	5	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
134	603	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
135	604	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Major - TSUD		02
136	605	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.19	0.23	1.8	2.3	Very Poor	Very Poor	Fair	Short	Low	Remove	Removal		02
137	606	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.19	0.24	1.8	2.3	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
138	607	*Casuarina glauca* Swamp she-oak	Mature	7	EW:2 NS:2	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
139	608	*Casuarina glauca* Swamp she-oak	Mature	10	EW:3 NS:4	0.29	0.35	2.1	3.5	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
140	609	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:1	0.12	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
141	610	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.11	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
142	611	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
143	612	*Casuarina glauca* Swamp she-oak	Mature	8	EW:2 NS:2	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Medium	Low	Low	Removal		02
144	613	*Casuarina glauca* Swamp she-oak	Semi Mature	9	EW:1 NS:1	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Medium	Low	Low	Removal		02
145	614	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:1 NS:1	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
146	615	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
147	616	*Casuarina glauca* Swamp she-oak	Mature	11	EW:2 NS:2	0.25	0.29	2.0	3.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
148	617	*Casuarina glauca* Swamp she-oak	Mature	8	EW:2 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
149	618	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
150	619	*Casuarina glauca* Swamp she-oak	Semi Mature	10	EW:1 NS:1	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Medium	Low	Low	Removal		02

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
151	620	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.15	0.19	1.6	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		*02*
152	621	*Casuarina glauca* Swamp she-oak	Mature	9	EW:1 NS:2	0.17	0.22	1.8	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
153	622	*Casuarina glauca* Swamp she-oak	Mature	9	EW:1 NS:2	0.19	0.24	1.8	2.3	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
154	623	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.15	0.19	1.6	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		*02*
155	624	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:1 NS:1	0.14	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
156	625	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.11	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
157	626	*Casuarina glauca* Swamp she-oak	Mature	11	EW:3 NS:3	0.40	0.48	2.4	4.8	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
158	627	*Casuarina glauca* Swamp she-oak	Mature	10	EW:3 NS:3	0.35	0.42	2.3	4.2	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
159	628	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.11	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
160	629	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:1 NS:1	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
161	630	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
162	631	*Casuarina glauca* Swamp she-oak	Mature	8	EW:2 NS:2	0.18	0.26	1.9	2.2	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
163	632	*Casuarina glauca* Swamp she-oak	Mature	7	EW:1 NS:1	0.16	0.21	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
164	633	*Casuarina glauca* Swamp she-oak	Mature	8	EW:1 NS:2	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
165	634	*Casuarina glauca* Swamp she-oak	Mature	8	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
166	635	*Casuarina glauca* Swamp she-oak	Mature	7	EW:1 NS:2	0.15	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
167	636	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:2	0.13	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
168	637	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:1	0.15	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
169	638	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.13	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
170	639	*Casuarina glauca* Swamp she-oak	Semi Mature	9	EW:2 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
171	640	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
172	641	*Casuarina glauca* Swamp she-oak	Mature	8	EW:2 NS:2	0.17	0.24	1.8	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
173	642	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	4	EW:1 NS:1	0.10	0.13	1.5	2.0	Fair	Fair	Fair	Long	Low	Low	Major - TSUD		01
174	643	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	3	EW:1 NS:1	0.10	0.13	1.5	2.0	Fair	Fair	Fair	Long	Low	Low	Major - TSUD		01
175	644	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	3	EW:1 NS:1	0.10	0.12	1.5	2.0	Fair	Fair	Fair	Long	Low	Low	Removal		01
176	645	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	3	EW:1 NS:1	0.10	0.14	1.5	2.0	Fair	Good	Fair	Long	Low	Low	Major - TSUD		01
177	646	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.12	0.15	1.5	2.0	Fair	Good	Good	Long	Low	Low	Major - TSUD		01
178	647	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	4	EW:1 NS:1	0.10	0.13	1.5	2.0	Fair	Good	Fair	Long	Low	Low	Major - TSUD		01
179	648	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	3	EW:1 NS:1	0.10	0.13	1.5	2.0	Poor	Fair	Fair	Long	Low	Low	Major - TSUD		01
180	649	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	3	EW:1 NS:1	0.10	0.12	1.5	2.0	Poor	Fair	Fair	Long	Low	Low	Removal		01
181	650	*Casuarina glauca* Swamp she-oak	Mature	8	EW:2 NS:2	0.17	0.24	1.8	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
182	651	*Casuarina glauca* Swamp she-oak	Mature	8	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
183	652	*Casuarina glauca* Swamp she-oak	Mature	9	EW:1 NS:2	0.15	0.20	1.7	2.0	Fair	Fair	Poor	Medium	Low	Low	Removal		02
184	653	*Casuarina cunninghamiana* River She-oak	Mature	9	EW:2 NS:2	0.24	0.30	2.0	2.9	Poor	Fair	Poor	Medium	Low	Low	Removal		01
185	654	*Casuarina glauca* Swamp she-oak	Mature	6	EW:2 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
186	655	*Casuarina glauca* Swamp she-oak	Mature	9	EW:2 NS:1	0.20	0.23	1.8	2.4	Fair	Fair	Fair	Medium	Low	Low	Removal		02
187	656	*Dead Tree* Dead Tree	Mature	6	EW:2 NS:2	0.30	0.35	2.1	3.6	Fair	Very Poor	Dead	Dead	Low	Remove	Removal		02
188	657	*Angophora costata* Smooth-barked Apple Myrtle	Semi Mature	4	EW:3 NS:3	0.28	0.34	2.1	3.4	Poor	Fair	Poor	Medium	Low	Low	Removal		05

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
189	658	*Eucalyptus tereticornis* Forest Red Gum	Mature	9	EW:3 NS:3	0.35	0.40	2.3	4.2	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
190	659	*Eucalyptus tereticornis* Forest Red Gum	Mature	10	EW:3 NS:3	0.28	0.34	2.1	3.4	Fair	Fair	Fair	Long	Medium	Medium	Removal		02
191	660	*Casuarina glauca* Swamp she-oak	Mature	7	EW:2 NS:2	0.15	0.19	1.6	2.0	Poor	Fair	Fair	Long	Low	Low	Removal		02
192	661	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:1	0.21	0.25	1.8	2.5	Good	Fair	Fair	Long	Medium	Medium	Removal		02
193	662	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
194	663	*Eucalyptus tereticornis* Forest Red Gum	Mature	11	EW:3 NS:4	0.34	0.43	2.3	4.1	Fair	Good	Fair	Medium	Medium	Medium	Removal		02
195	664	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:2	0.14	0.19	1.6	2.0	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		02
196	665	*Eucalyptus tereticornis* Forest Red Gum	Mature	10	EW:3 NS:3	0.34	0.39	2.2	4.1	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
197	666	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:2 NS:2	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Minor		02
198	667	*Casuarina glauca* Swamp she-oak	Mature	10	EW:2 NS:2	0.16	0.24	1.8	2.0	Fair	Fair	Fair	Long	Low	Low	Removal		02
199	668	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:2 NS:1	0.17	0.23	1.8	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		02
200	669	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:1	0.17	0.22	1.8	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
201	670	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:1	0.15	0.22	1.8	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
202	671	*Casuarina glauca* Swamp she-oak	Semi Mature	9	EW:1 NS:1	0.16	0.23	1.8	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
203	672	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:1	0.17	0.23	1.8	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		02
204	673	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:1	0.10	0.14	1.5	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		02
205	674	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.19	0.25	1.8	2.3	Poor	Fair	Fair	Medium	Medium	Medium	Removal		02
206	675	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:1 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
207	676	*Casuarina glauca* Swamp she-oak	Mature	10	EW:2 NS:2	0.22	0.27	1.9	2.6	Good	Fair	Fair	Medium	Low	Low	Removal		02

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
208	677	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	6	EW:1 NS:1	0.13	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
209	678	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:1 NS:1	0.15	0.21	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
210	679	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:1 NS:2	0.17	0.22	1.8	2.0	Fair	Good	Fair	Medium	Medium	Medium	Removal		02
211	680	*Casuarina glauca* Swamp she-oak	Mature	11	EW:2 NS:2	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Medium	Low	Low	Removal		02
212	681	*Casuarina glauca* Swamp she-oak	Mature	7	EW:1 NS:1	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
213	682	*Casuarina glauca* Swamp she-oak	Mature	7	EW:1 NS:1	0.11	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
214	683	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.11	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
215	684	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.12	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
216	685	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
217	686	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:1	0.20	0.24	1.8	2.4	Fair	Fair	Fair	Medium	Medium	Medium	Removal		02
218	687	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.10	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
219	688	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.10	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
220	689	*Casuarina glauca* Swamp she-oak	Mature	10	EW:1 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
221	690	*Casuarina glauca* Swamp she-oak	Mature	10	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
222	691	*Casuarina glauca* Swamp she-oak	Mature	8	EW:3 NS:2	0.21	0.27	1.9	2.5	Fair	Fair	Fair	Medium	Low	Low	Removal		02
223	692	*Casuarina glauca* Swamp she-oak	Mature	9	EW:2 NS:1	0.17	0.25	1.8	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
224	693	*Casuarina glauca* Swamp she-oak	Mature	8	EW:1 NS:1	0.13	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
225	694	*Casuarina glauca* Swamp she-oak	Mature	11	EW:2 NS:2	0.20	0.24	1.8	2.4	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
226	695	*Casuarina glauca* Swamp she-oak	Semi Mature	5	EW:1 NS:1	0.11	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
227	696	*Casuarina glauca* Swamp she-oak	Mature	7	EW:1 NS:1	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
228	697	*Casuarina glauca* Swamp she-oak	Mature	10	EW:1 NS:2	0.18	0.23	1.8	2.2	Poor	Fair	Fair	Medium	Low	Low	Removal		02
229	698	*Casuarina glauca* Swamp she-oak	Mature	10	EW:1 NS:2	0.14	0.18	1.6	2.0	Poor	Fair	Fair	Medium	Low	Low	Major - TSUD		02
230	699	*Casuarina glauca* Swamp she-oak	Semi Mature	5	EW:2 NS:2	0.13	0.18	1.6	2.0	Poor	Fair	Fair	Medium	Low	Low	Major - TSUD		02
231	700	*Casuarina glauca* Swamp she-oak	Mature	9	EW:2 NS:2	0.16	0.23	1.8	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		02
232	701	*Casuarina glauca* Swamp she-oak	Mature	6	EW:2 NS:2	0.15	0.18	1.6	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		02
233	702	*Eucalyptus tereticornis* Forest Red Gum	Mature	11	EW:2 NS:2	0.24	0.28	1.9	2.9	Fair	Good	Fair	Medium	Medium	Medium	Major - TSUD		02
234	703	*Melaleuca sp.* Paperbark	Mature	4	EW:2 NS:2	0.22	0.29	2.0	2.6	Fair	Poor	Fair	Medium	Low	Low	Removal		02
235	704	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:1 NS:1	0.15	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
236	705	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.19	0.23	1.8	2.3	Poor	Fair	Fair	Medium	Low	Low	Major - TSUD		02
237	706	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.15	0.19	1.6	2.0	Poor	Fair	Fair	Medium	Low	Low	Major - TSUD		02
238	707	*Casuarina glauca* Swamp she-oak	Mature	10	EW:2 NS:2	0.20	0.25	1.8	2.4	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
239	708	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:2	0.13	0.17	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		02
240	709	*Casuarina glauca* Swamp she-oak	Mature	10	EW:1 NS:1	0.15	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
241	710	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:1 NS:1	0.15	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		02
242	711	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	10	EW:2 NS:2	0.18	0.23	1.8	2.2	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		02
243	712	*Casuarina glauca* Swamp she-oak	Mature	10	EW:3 NS:3	0.24	0.28	1.9	2.9	Fair	Fair	Fair	Medium	Low	Low	Removal		02
244	713	*Casuarina glauca* Swamp she-oak	Semi Mature	10	EW:2 NS:2	0.15	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02
245	714	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:1 NS:1	0.15	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		02

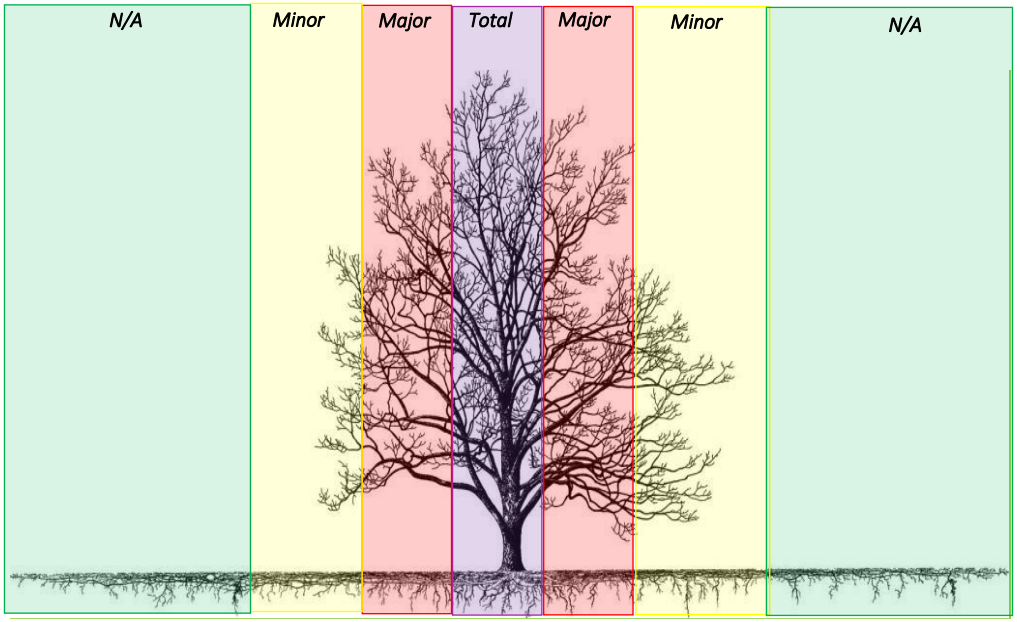
No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
246	715	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:1 NS:1	0.10	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
247	716	*Casuarina glauca* Swamp she-oak	Mature	7	EW:2 NS:2	0.18	0.24	1.8	2.2	Fair	Fair	Fair	Medium	Low	Low	Removal		*02*
248	717	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:2 NS:2	0.15	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		*01*
249	718	*Casuarina glauca* Swamp she-oak	Semi Mature	6	EW:2 NS:2	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
250	719	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:2 NS:2	0.23	0.27	1.9	2.8	Fair	Fair	Fair	Long	Medium	Medium	Removal		*01*
251	720	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:2 NS:2	0.16	0.21	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
252	721	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:2 NS:2	0.18	0.23	1.8	2.2	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
253	722	*Casuarina glauca* Swamp she-oak	Semi Mature	5	EW:1 NS:1	0.12	0.16	1.5	2.0	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		*01*
254	723	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	9	EW:1 NS:1	0.15	0.19	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
255	724	*Casuarina glauca* Swamp she-oak	Mature	10	EW:2 NS:2	0.24	0.29	2.0	2.9	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		*01*
256	725	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	5	EW:2 NS:2	0.16	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
257	726	*Eucalyptus tereticornis* Forest Red Gum	Mature	9	EW:3 NS:3	0.31	0.36	2.2	3.7	Fair	Poor	Fair	Medium	Medium	Medium	Major - TSUD		*01*
258	727	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:1 NS:1	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
259	728	*Casuarina glauca* Swamp she-oak	Mature	9	EW:2 NS:2	0.16	0.21	1.7	2.0	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		*01*
260	729	*Casuarina glauca* Swamp she-oak	Mature	12	EW:2 NS:2	0.21	0.30	2.0	2.5	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
261	730	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.13	0.17	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		*02*
262	731	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.13	0.17	1.6	2.0	Fair	Fair	Fair	Long	Medium	Medium	Major - TSUD		*01*
263	732	*Casuarina glauca* Swamp she-oak	Semi Mature	10	EW:4 NS:4	0.23	0.26	1.9	2.8	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
264	733	*Casuarina glauca* Swamp she-oak	Semi Mature	11	EW:6 NS:4	0.22	0.17	1.6	2.6	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
265	734	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:4 NS:4	0.22	0.30	2.0	2.6	Fair	Fair	Fair	Medium	Low	Low	Removal		01
266	735	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:4 NS:4	0.16	0.20	1.7	2.0	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		01
267	736	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:2 NS:2	0.12	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
268	737	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:4 NS:4	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
269	738	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:4 NS:4	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
270	739	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:6 NS:6	0.14	0.20	1.7	2.0	Fair	Very Poor	Fair	Medium	Low	Low	Major - TSUD		01
271	740	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:2 NS:2	0.12	0.14	1.5	2.0	Fair	Poor	Fair	Medium	Low	Low	Major - TSUD		01
272	741	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:6 NS:6	0.12	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		01
273	742	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:6 NS:6	0.33	0.40	2.3	4.0	Good	Fair	Fair	Medium	Low	Medium	Major - TSUD		01
274	743	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:3 NS:3	0.14	0.17	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		01
275	744	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	8	EW:3 NS:3	0.14	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
276	745	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:6 NS:6	0.13	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
277	746	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:6 NS:6	0.10	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
278	747	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:6 NS:6	0.13	0.30	2.0	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
279	748	*Casuarina glauca* Swamp she-oak	Semi Mature	8	EW:6 NS:6	0.12	0.30	2.0	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
280	749	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	7	EW:6 NS:6	0.17	0.20	1.7	2.0	Fair	Fair	Fair	Medium	Low	Low	Removal		01
281	750	*Melaleuca styphelioides* Prickly-leaved Paperbark	Semi Mature	6	EW:6 NS:6	0.15	0.20	1.7	2.0	Poor	Fair	Fair	Medium	Low	Low	Removal		01
282	751	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	7	EW:7 NS:7	0.32	0.36	2.2	3.8	Good	Good	Fair	Medium	Low	Medium	Removal		01
283	752	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:6 NS:6	0.17	0.20	1.7	2.0	Fair	Poor	Fair	Medium	Low	Low	Removal		01

No.	Tree Tag	Botanical Name Common Name	Age Class	Height	Canopy Spread	DBH	DRC	SRZ	TPZ	Form	Structure	Vitality	ULE	Landscape Signaficance	Retention Value	Impact Level	Photo Link	Map No.
284	753	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	6	EW:6 NS:6	0.17	0.20	1.7	2.0	Fair	Fair	Poor	Medium	Low	Low	Major - TSUD		*01*
285	754	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	6	EW:2 NS:2	0.13	0.16	1.5	2.0	Fair	Fair	Poor	Medium	Low	Low	Major - TSUD		*01*
286	755	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	6	EW:4 NS:4	0.13	0.16	1.5	2.0	Poor	Poor	Fair	Medium	Low	Low	Major - TSUD		*01*
287	756	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	6	EW:2 NS:2	0.12	0.14	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
288	757	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	6	EW:6 NS:6	0.17	0.20	1.7	2.0	Poor	Poor	Fair	Medium	Low	Low	Major - TSUD		*01*
289	758	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	6	EW:4 NS:4	0.12	0.16	1.5	2.0	Fair	Poor	Fair	Medium	Low	Low	Removal		*01*
290	759	*Angophora floribunda* Rough-barked Apple Myrtle	Semi Mature	7	EW:7 NS:7	0.40	0.50	2.5	4.8	Good	Poor	Fair	Medium	Medium	Low	Major - TSUD		*01*
291	760	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:6 NS:6	0.12	0.15	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
292	761	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:6 NS:6	0.15	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
293	762	*Eucalyptus tereticornis* Forest Red Gum	Semi Mature	7	EW:6 NS:6	0.12	0.16	1.5	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
294	763	*Casuarina glauca* Swamp she-oak	Semi Mature	7	EW:5 NS:5	0.14	0.18	1.6	2.0	Fair	Fair	Fair	Medium	Low	Low	Major - TSUD		*01*
295	764	*Melaleuca styphelioides* Prickly-leaved Paperbark	Semi Mature	6	EW:6 NS:6	0.20	0.30	2.0	2.4	Fair	Poor	Fair	Medium	Low	Low	Removal		*01*
296	765	*Eucalyptus punctata* Grey Gum	Semi Mature	9	EW:4 NS:4	0.30	0.38	2.2	3.6	Fair	Good	Fair	Long	Medium	Medium	Major - TSUD		*04*

Key

- **Remove:** (Total Encroachment)
- **Major TSUD:** (SRZ + TPZ Encroachment. Assess onsite, consider Tree Sensitive Urban Design options & retain where practicable)
- **Major Viable:** (TPZ Encroachment >10%. Use NDRE & retain where practicable)
- **Minor:** (TPZ Encroachment <10% & retain)
- **Age Class, Form, Structure & Vitality:** per the International Society of Arboriculture descriptors.
- **Canopy Spread**: estimation of canopy spread to the four (4) cardinal points in metres. (North-South) & (East-West)
- **Diameter at Breast Height (DBH) & Diameter at Root Collar (DRC):** per *AS4970-2009* & calculated per the QAA & ProofSafe Calculators.
- **Structural Root Zone (SRZ) & Tree Protection Zone (TPZ):** per *AS4970-2009* & calculated per the QAA & ProofSafe Calculators.
- **Useful Life Expectancy (ULE):** adapted per (Barrell, 1996) & (Barrell, 2000).



Indicative Encroachments

- **Landscape Significance & Retention Value:** *Significance of a Tree, Assessment Rating System (STARS) Institute of Australian Consulting Aboriculturalists (2010).*

Please Note: For convenience all of the subject trees have been individually tree tagged at approximately 1.5m. On this round aluminium tree tag is an engraved number that corresponds to the above maps and Visual Tree Assessment Data tables. Thus, the subject tree can be physically identified, and any recommended arboricultural inspection, works and/or tree protection installation carried out. For example, the adjudged High Retention trees - Tree 452, 484, 486, 492, 495, 498, 503-507, 510, 514, 518, 519 and 521.

6 Summary

6.1 Key Summary Points

i. Any tree with an adjudged *'High'* Retention Value is considered important for retention and should be retained and protected where possible. Albeit a tree with an adjudged *'Low'* or *'Medium'* Retention Value is not to be automatically removed. Established trees more than often provide better outcomes than newly planted trees, both economically and ecologically (Tyrväinen. 2005). Case studies have shown that new plantings are costly, often fail, are sporadically removed, and even when they succeed it takes on average 25yrs to match the eco-benefits provided by an existing mature-age tree (Geiger. 2004). Therefore, Compensatory Replanting should not be exclusively relied upon to secure good tree outcomes and tree retention always objectively considered. However, when tree removal is deemed necessary Compensatory Replanting is to be adopted to offset tree canopy loss.

ii. To err on the side of caution, initial Non Destructive Root Exploration (NDRE) is to be utilised whilst working within the calculated TPZ of any retained tree, and prior to tree Remove if tree viability is arguable. It can also be utilised to explore 'tree sensitive' options and installations.

iii. Two hundred eighty-eight (296) significant trees were identified and assessed at the Maitland Mental Health Rehabilitation development site. Whereby, under the currently proposed design footprint it was calculated that:

- One hundred-forty (141) trees are in direct conflict with the currently proposed development footprint. On the balance of probabilities these trees will not remain biologically viable and will need to be removed prior to construction. Compensatory replanting is recommended to offset tree canopy loss.
- One hundred twenty-seven (127) trees have a TPZ encroachment calculated as *Major,* with a number of these encroachments extending into the Structural Root Zone (SRZ) of the tree. The majority of these encroachments and impact are associated with altered soil levels due to excavations necessary for managing stormwater. Therefore, per arboricultural due diligence and to prevent the unnecessary removal any tree, these trees will need to be further assessed onsite by a Consulting Arborist in consultation with the relevant Civil Engineer. This to determine soil levels, tree viability post-development from an evidence-based perspective; and whether tree sensitive design modifications or installations are practicable. Especially with regards to the sixteen (16) trees with an adjudged 'High' Retention Value, as tree sensitive alternatives must be candidly considered as outlined above. These *High* Retention trees are - Tree 452, 484, 486, 492, 495, 498, 503-507, 510, 514, 518, 519 and 521.
- Twenty-eight (28) trees have a TPZ encroachment calculated as Minor. These trees will foreseeably remain viable, so are to be retained and afforded protection per the site-specific TPMP.
- Ultimately, tree retention will depend on the findings of the arboricultural investigations, Non-Destructive Root Exploration, whether Tree Sensitive Urban Design (TSUD) alternatives are practicable, and the priorities of the Tree Manager/Owner. Whereby an Arboricultural Memorandum can be authored and this document amended to reflect the findings.

7 Tree Protection Management Plan

7.1 Disclaimer

i. The following site-specific Tree Protection Management Plan (TPMP) is to be used throughout the duration of the abovementioned Project. Although the framework includes monitoring controls operated by the appointed Project Arborist, compliance to the TPMP is the responsibility of the 'Client,' and as such AGS cannot accept liability for any adverse effects arising from 'non-compliance' to documented controls and/or any subsequent changes to the scope or methods documented in the TPMP provided to the 'Client.'

7.2 Overview

i. Trees are dynamic living organisms and therefore are susceptible to development impact either direct and/or indirect, biotic and/or abiotic. Arboricultural impact due to development encroachment, especially within the calculated Tree Protection Zone (TPZ), causes 'dendrological stress' in varying degrees. This stress has the potential to heavily impact upon tree vitality and thus tree longevity (Boddy. 1983). Therefore, the Australian Standard *AS4970-2009 Protection of trees on development sites* must always be adhered to. The objective of this Standard is to provide guidance through the use of a science-based methodology to arborists and others concerned with the care and protection of trees; and all others interested in the integration between trees and construction. Hence safeguarding community tree assets.

ii. This Tree Protection Management Plan (TPMP) includes both activity specific controls as well as a range of generic tree protection controls. The control framework pre-dominantly focuses on identifying and mitigating aspects of the design and construction process that can adversely affect tree vitality, stability and/or useful life expectancy. In addition, it includes preventative controls (designed to prevent adverse outcomes), directive controls (designed to promote desired outcomes) and detective controls (designed to monitor compliance with any statutory requirements and the agreed control framework). The engagement of a Project Arborist is a key element of the control framework and is a multi-faceted control, in terms of preventing damage, providing direction, and detecting areas of non-compliance/improvement.

7.3 Project Arborist Site Inspection Schedule

i. In accordance with the Australian Standard *AS4970-2009 Protection of Trees on Development Sites,* inspections must be conducted by the appointed Project Arborist at the following key project stages:

- Prior to any work commencing on-site (including demolition, earthworks, or site clearing) and following the installation of tree protection.
- During any excavations, building works, and any other activities carried out within the Tree Protection Zone (TPZ) of any tree to be retained and protected.

- A minimum of once per month during the construction phase.
- After all major construction has ceased, following the Remove of tree protection. It shall be the responsibility of the project manager to notify the project arborist prior to any works within the TPZ of any protected tree at a minimum of forty-eight (48) hours' notice. To ensure the tree protection plan is implemented, hold points have been specified in the following table.

Development Stage	Hold Point	Description
Pre-Construction	1	• Appoint a Project Arborist (minimum AQF Level 5) • Prior to any development works, any tree for Remove is to be marked clearly (tape, paint, tag etc.) by the Project Arborist
	2	• Scheduled *'Pre-Start'* meeting. • Tree Protection for any retained tree(s) will be installed prior to demolition and/or site establishment. The appointed arborist will inspect and certify the tree protection per the Tree Protection Management Plan. A Tree Protection Compliance Memorandum issued.
During Construction	3	• Monthly scheduled site inspections of the retained tree population will be conducted (if works are outside the TPZ) and memorandum provided.
	4	• The appointed Project Arborist will oversee, and document all works carried out within the TPZ of any retained tree. A weekly Works Memorandum to be provided.
	5	• Visual tree inspection by the appointed arborist of the retained tree population once the major works have been completed and the tree protection has been removed.
Post Construction	6	• Final Visual Tree Inspection of the retained tree population and a Completion of Arboricultural Works Memorandum provided. • Ongoing Monthly Inspections & Memorandums issued at the discretion of the Project Arborist.
Plant Health Care (PHC) *(Recommended s.9)*	7	• Top dressing of Organic Mulch – where applicable. • Liquid solution of Organic nutrients (Botanicals). • PHC Memorandum provided.

7.4 Summary

i. A Pre-commencement of Work ('Pre-Start') onsite meeting must be held with the appointed Project Arborist and all other parties deemed to have *locus standii.*

ii. Proactive canopy modifications (pruning) options with regards to the facilitation of machinery and/or pedestrian access should be considered, discussed and if deemed necessary scheduled prior to the commencement of the main development works.

iii. Tree Protection Fencing is to be erected around any tree within five (5) metres of the development works; and temporary hard surfaces are to be made readily available and on site whilst working within close proximity of any trees calculated Tree Protection Zone (i.e., rumble boards & track-mats).

iv. The appointed onsite Project Arborist is to guide/supervise any works within close proximity of the tree(s) Tree Protection Zone. Whilst working within the Tree Protection Zone (TPZ) of any tree, the excavations must be undertaken by initial Non-Destructive Root Exploration through the use of Hand-digging, Air - Spade, Air- Vac or a combination thereof under the direct supervision/guidance of the appointed onsite Project Arborist.

v. The Project Arborist is to author and issue a Completion of Arboricultural Works Memorandum at the end of the works/project.

vi. A Plant Health Care regimen is to be undertaken post-development and a memorandum issued.

vii. The caveat for the abovementioned project proceeding and its continuance is that the site-specific Tree Protection Management Plan provided must be strictly adhered to at all times.

7.5 General Comments

i. All construction work within the TPZ of any retained tree must be authorised & supervised by the appointed Project Arborist and/or the Tree Manager/Owner.

ii. The use of 'strip-style' excavation adjacent to and/or within the TPZ of any retained tree is strictly prohibited.

iii. When removing an existing surface (concrete or similar hardscape), excavation must occur from above the existing surface; the Remove work is to be carried out with a straight batter bucket; a 'lifting motion' is to be adopted; and the machinery is to move in a backward direction toward the extremity of the trees TPZ. In addition, all due care must be taken to ensure that the TPZ of any adjacent tree(s) are isolated and protected from vehicular entry (both above and below ground); and soil compaction is minimised within the TPZ by utilising ground protection as outlined in the Tree Protection Installation protocols.

iv. On completion of the hardscape Remove, the onsite Project Arborist is to document any significant root observations; and where applicable carry out NDRE (root mapping) with regards to future construction, arboricultural impact. TSUD options and alternatives are also to be provided where applicable.

v. With regards to the reinstatement of ground, the addition and application of any new soil (or replanting mediums) must be carried out with all due care (e.g., root collar, topography and hydrology considerations), and with prior express consent from the Project Arborist. All new mediums are to comply with *AS4454-2003 Composts, soil conditioners and mulches*.

vi. Where fencing is to be replaced, it is preferable to use existing post holes when they located within TPZs. New pier holes are to be hand dug or by air-vac excavation under the supervision/guidance of the Project Arborist.

vii. It is imperative that TPZ fencing, or main stem, branch and ground protection measures are installed for the protection of all retained trees prior to the commencement of the future Construction Phase, and that it remains *in situ* for the duration and until completion of proposed construction works.

viii. TPZ fencing and other measures must be fixed so that they cannot be moved either by accidental physical impact or other inadvertent means. There shall be no entry within any TPZ by any construction crew or other persons during the construction phase without authorisation and/or attendance of the Project Arborist. That includes, no storage of builders' materials, machinery, pedestrian traffic, disposal of waste paints, fuels etc as listed below.

7.6 Restricted activities within the Tree Protection Zone

i. As per *AS4970-2009 Protection of trees on development sites* - Activities generally excluded from the TPZ include but are not limited to are as follows:

a) Machine excavation including trenching.

b) Cultivation.

c) Storage.

d) Preparation of chemicals, including preparation of cement products.

e) Parking of vehicles and plant.

f) Refuelling.

g) Dumping of waste.

h) Wash down and cleaning of equipment.

i) Placement of fill.

j) Soil level changes.

k) Temporary or permanent installation of utilities and signs, and

l) Physical damage to the tree.

8 Tree Protection Control Framework

8.1 Compliance and Reporting

i. The generic tree protection controls in this section are designed to be used in conjunction with the recommendations of this site-specific Arboricultural Report.

ii. All relevant standards, specifications, policies, and resource conditions of consent are incorporated into the TPMP.

iii. The Project Arborist will undertake scheduled and unscheduled site visits to monitor compliance with all aspects of the TPMP.

iv. Any deviations from the TPMP must be approved by the Council Arborist. Non-compliance issues must be reported to the Project Management immediately.

v. An Arboricultural Completion Memorandum must be prepared by the Project Arborist including but not limited to comments and observations about any root pruning/root retention and compliance to the TPMP.

vi. The TPMP must always be available on site and be included in site inductions and 'toolbox' sessions.

vii. Any damage to tree protection fencing or trees must be reported to the Project Arborist immediately (including damage not caused by activities associated with the project).

viii. Non-compliance issues must be documented and addressed at daily pre-start meetings/toolbox sessions.

8.2 Root Protection

i. Root pruning should be kept to the absolute minimum and should only be completed by the Project Arborist. All root pruning assessments should be made initially by the Project Arborist, and the Council Arborist contacted where approval is required. All roots larger than 25mm in diameter are to be retained in an undamaged state and protected, unless the Council Arborist gives permission for them to be pruned. Irrespective of size, any roots which have a significant effect on the health and stability of a tree shall not be removed without the prior approval of the Council's Arborist, and this may include tree roots that are less than 25mm in diameter.

ii. Roots must be severed using a sharp pruning saw/tool to create a clean cut that is flush with the face of the completed excavations.

iii. Retained roots and cut surfaces should be protected from desiccation and physical/frost damage. The method will depend on the seasonal weather conditions and length of time expected between completing the excavations and reinstatement works and should be determined by the Project Arborist. Typically, retained roots must be wrapped in a suitable wool much or hessian product that is secured in place using bio-degradable string and kept moist, however supplementary watering may be required depending on the weather conditions based on the Project Arborist's discretion.

8.3 Soil Protection

i. All machines shall only operate from either formed surfaces, surfaces that will be excavated or from an appropriate load bearing protective matting. The area covered by the protective matting shall be sufficient to allow ground protection for all vehicle movements, including the turning of any vehicles. (Please refer to Branch, Trunk & Ground Protection in the Appendix).

ii. No chemicals, re-fueling operations, spoil, fill, soil, materials of any kind, or equipment will be stored,

emptied, disposed of, or temporarily placed in areas that the tree's root system could be utilizing unless approved by the Project Arborist and this is on an existing hard impermeable surface.

iii. Water used for washing down machinery must not be allowed to runoff and contaminate soil volumes/water sources that are either currently or are likely to be utilised by the tree.

iv. The risk of soil borne infections being introduced to the site from equipment, tools and footwear must be assessed by the Project Arborist and mitigated as necessary (mitigation will typically involve cleaning the equipment before it is used on the site with a sterilizing agent, such as Trigene or Sterigene).

8.4 Canopy Modifications

i. Trees are complex living organisms and the intervention in the natural growth of a tree should only occur where the biology and the physiology of the organism are understood to such a level that intervention will have clear and predictably beneficial outcomes.

ii. However, pruning may be required to accommodate construction, plant & equipment and/or vehicles. Thus, any pruning assessments pertaining to the development must be visually made by an AQF Level 5 arborist; and if pruning is deemed necessary a Pruning Specifications Report is to be authored *per AS4373-2007 Pruning of amenity trees* by an AQF Level 5 arborist and provided to the relevant Tree Manager/Owner and Council representative.

iii. Once the Pruning Specifications Report is formerly approved by the appropriate authority the requested the pruning can be carried out by a minimum AQF Level 3 arborist pursuant to *AS4373-2007 Pruning of amenity trees.*

iv. In addition, the risk of damaging agents being introduced from pruning saws/tools must be assessed by the Project Arborist and mitigated as necessary (mitigation will typically involve cleaning the equipment before it is used on the site with a sterilizing agent, such as Trigene or Sterigene). It may be necessary to clean pruning tools during work on the site if there is the potential of transmitting a damaging biotic agent between trees on the same site.

8.5 Tree Protection Zones

i. Tree Protection Zones are also Exclusion Zones and must be created using tree protection fencing that is consistent with the requirements of *AS4970-2009 Protection of trees on development sites.* The position of the fencing will be determined by the Project Arborist and once positioned shall not be altered without the prior consent from the Project Arborist.

ii. If it is not pragmatic to use the abovementioned tree protection fencing then individual trunk, branch and ground protection must be installed to any retained tree located within five (5) metres of any proposed work zone. (Please refer to the diagram in the appendix).

iii. Tree protection zones must be clearly labelled displaying the words 'Tree Protection Zone'. Signs will be placed on fencing of individual trees or every 10 linear metres on groups of trees.

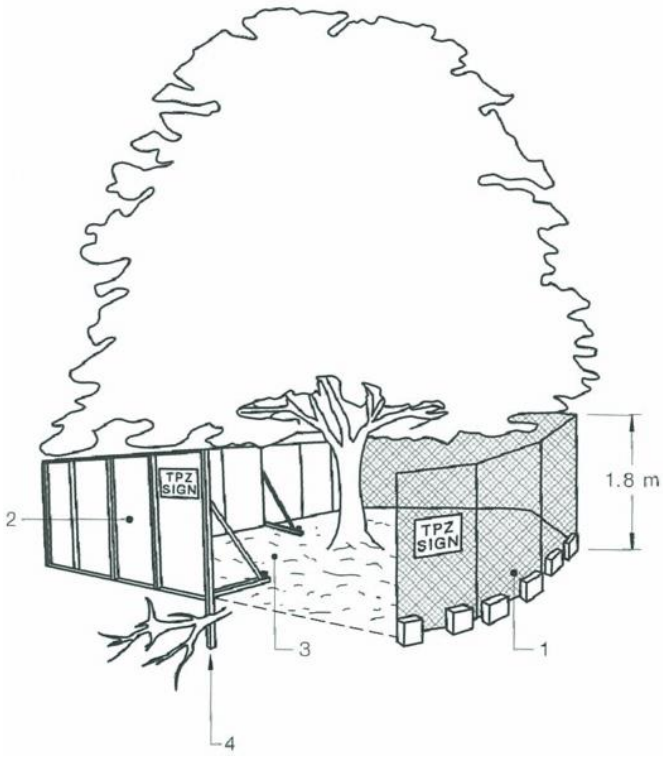
iv. Where the work site is only on one side of the tree, the barrier may be erected along the face of the tree adjacent to the work site.

v. Tree Protection Barriers must be erected before any site works commence and shall not be removed or moved closer to the trunk of the tree, until after site works are complete. No person, vehicle or machinery may enter the Tree Protection Zone unless otherwise authorised to do so by the Project Arborist.

vi. Operating plant must be positioned to avoid the expellant of exhaust fumes and radiant operating heat damaging the physiological functions of the tree.

8.6 Tree Protection Installations

i. Tree Protection is to be erected around any tree within five (5) metres of development per *AS4970-2009 Protection of trees on development sites.*



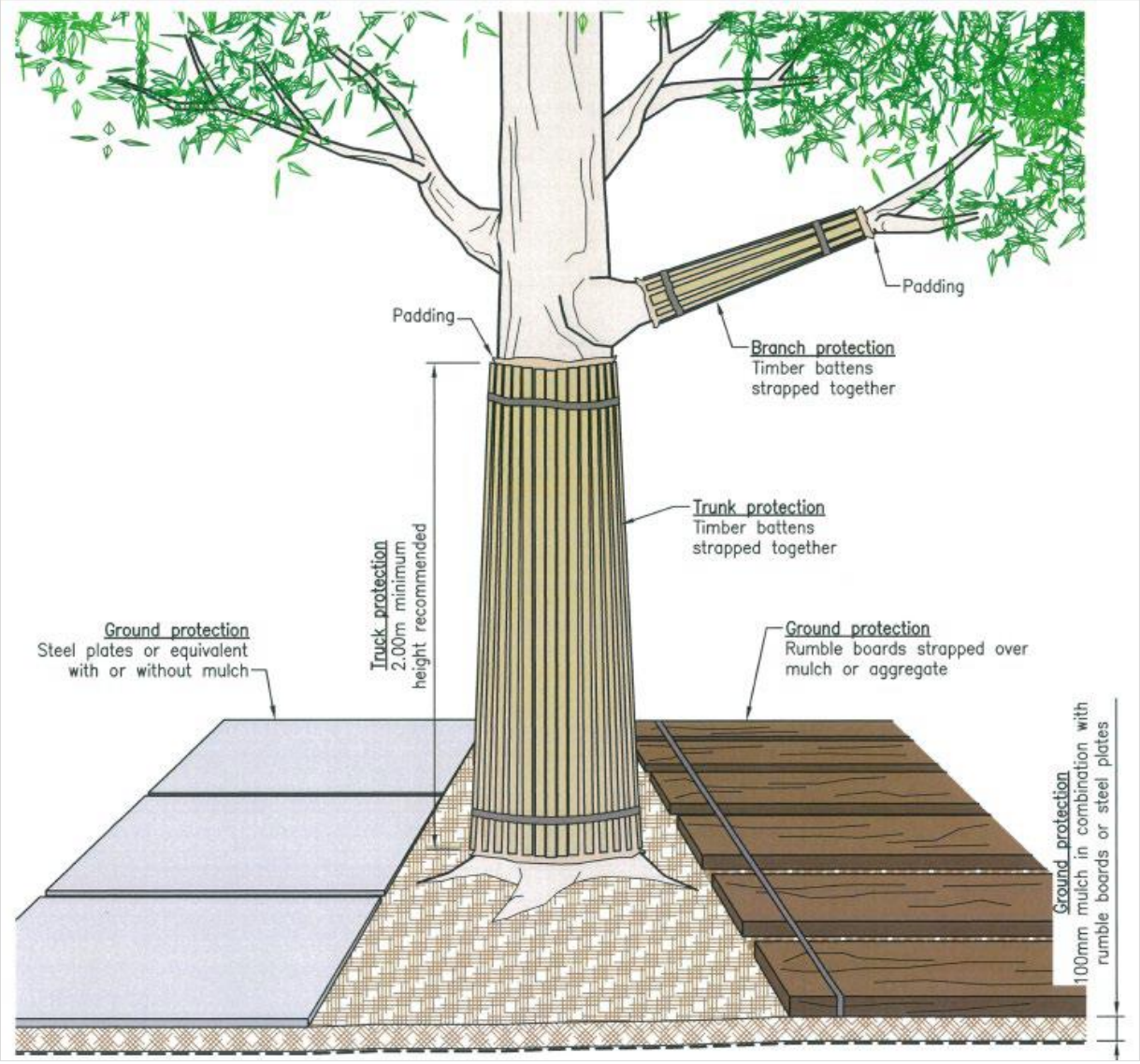
LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

Alternative Trunk, Branch & Ground Protection

i. When tree protection fencing cannot be installed or requires temporary Remove, other tree protection measures should be used. Where necessary, install protection to the trunk and branches of trees as pictured below.

ii. The materials and positioning of protection are to be specified by the Project Arborist and are to include:

- For the trunk and branch protection use boards and padding that will prevent damage to the bark. For the trunk boards a minimum height of two (2) metres is recommended. Boards are to be strapped to trees, not nailed or screwed. Do not attach temporary powerlines, stays or guys to the tree.
- If temporary access for machinery is required within the Tree Protection Zone (TPZ) such as site access, ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards. (These measures may be applied to root zones beyond the TPZ).
- Rumble boards should be of a suitable thickness to prevent soil compaction and root damage and a top dressing of Organic Mulch (60mm-70mm deep) is to be applied where pragmatically possible.



9 Plant Health Care

9.1 Overview

i. It is well documented that even minor encroachments due to urban development and construction pressures can 'stress' a tree, which in turn can result in a reduced useful life expectancy (Watson, 2014). Therefore, it is strongly recommended that a proactive species-specific Plant Health Care Plan is formulated and implemented with regards to any development and tree vitality. Plant Health Care (PHC) is a holistic approach to best management practice with regards to urban tree care and the understanding of the various interactions within the environment in which they grow. The core objectives being the management and enhancement of the tree(s) biological, physiological, and aesthetic traits whilst maintaining and/or improving the surrounding landscape's appearance. As PHC is science-based it involves routine arboricultural monitoring, proactive soil, and plant treatments, along with the identification and mitigation of foreseeable arboricultural risks to person, property and/or the environment.

9.2 Post Development Plant Health Care Recommendations

i. With an educated understanding of the functions of tree roots and the potentially negative effects of development impact it is strongly recommended that a post-development Plant Health Care regimen is formulated by the Project Arborist and enacted. This should include:

a) *An application of Organic Botanicals:* Organic materials are essential components which stimulate vitality leading to root development and thus development of new tissue. This whilst enacting a tree's defence system improving resistance to disease and increasing defence responses and capabilities.

b) *Top-dressing of Organic Mulch:* It is strongly recommended that a top-dressing of organic composted mulch or woodchips is applied to the TPZ of all retained trees post-development. This layer should be added to a depth of 60-70mm (Urban. 2008). A composted mulch application will:

- Prevent soil compaction and minimise future root damage.
- Amend soil structure to improve the water-holding capacity and fertility by affecting both texture, porosity and structure.
- Reduces soil moisture loss through lower temperatures & supress undesirable plant species.
- Promote root generation & increase soil organic matter and avail nutrients to the tree.
- Stimulate soil microflora and micro fauna activity and assist in the survival of affected tree(s) maintaining and ensuring optimum vitality and structural stability so as to maximize its ability to resist pest and diseases (Watson et. al. 2014).

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11 Glossary

The following definitions are stated in the Glossary of Arboricultural Terms, International Society of Arboriculture 2011, unless otherwise stated.

Abiotic: plant ailment caused by non-living, environmental, or man-made agents

Adaptive Growth: or Response Growth is new wood produced in response to damage or loads, which compensates for higher strain (deformation) in marginal fibres; it includes reaction wood (compression & tension) and wound wood.

Barrier Zone: chemically defended tissue formed by the still living cambium, after a tree is wounded or invaded by pathogens to inhibit the spread of decay into new annual growth rings. Wall 4 in CODIT model. Contrast with reaction zone

Bifurcation: Natural division of a branch or stem into two or more stems or parts

Biotic: pertaining to non-human living organism/ biotic agent: a living organism capable of causing disease/ biotic disorder: disorder caused by a living organism.

Bracket: British English term for fruiting body of a decay fungus. See *Conk*.

Codominant Structure: Stems or trunks of about the same size originating from the same position from the main stem52. When the stem bark ridge turns upward the union is strong; when the ridge turns inward the union is weak, a likely point of failure in storm or windy weather conditions or where increasing weight causes undue stress on the defective union.

CODIT: acronym for Compartmentalisation of Decay/Disease In Trees (refer Compartmentalisation).

Compartmentalisation: Dynamic tree defence process involving protection features that resist the spread of pathogens and decay causing organisms. Natural defence process in trees by which chemical and physical boundaries are created that act to limit the spread of disease and decay organisms.

Compaction: Results from loads or stress forces applied to the soil as well as shear forces. Both foot traffic and vehicle traffic exert both forces on soils. Vehicle traffic may cause significant compaction at depths of 150–200 mm (the area in which most absorbing roots are located). The degree of compaction will depend on weight of vehicles, number of movements, soil moisture levels and clay content. Soil handling, stockpiling, and transporting also tend to lead to the breakdown of soil structure and thus to compaction. Vibration as a result of frequent traffic or adjacent construction activities will also compact soils.

Compression wood: (1) in mechanics, the action of forces to squeeze, crush or push together any material (s) or substance(s): contrast with tension. (2) the ability of an internal combustion engine to contain or pressurized a combustible fuel - air mixture.

Conk: Fruiting body or non-fruiting body (sterile conk) of a fungus. Often associated with decay.

Crown/Canopy: The main foliage bearing section of the tree, these terms are interchangeable.

Crown damage: The canopy of trees can be directly or indirectly damaged. Incorrect techniques of pruning such as lopping or flush cutting may produce wounds that are susceptible to infection by wood decay organisms. Similarly, mechanical damage to branches by machinery, etc. will also create wounds. Trees automatically respond to wounding and in doing so use stored sugars. Any wound places an additional load on trees that will inevitably be stressed during construction.

Damping: Damping occurs where energy is dissipated. In trees, damping occurs naturally in three main ways with aerodynamic damping of the leaves, internal damping in the wood and root zones, and with mass damping of the branches.

Deadwood: Dead branches within the canopy of tree. Deadwood is a naturally occurring feature of most tree species and comprises dead or decaying branches within the canopy of a tree. Deadwood may have habitat value and require Remove only according to the considered risk of its location, i.e. high use pedestrian area or damage to adjacent infrastructure.

Remove of deadwood is generally recommended only where it represents an unacceptable level of hazard. Consideration of the need for deadwood Remove should take into account the occupancy of the target zone, i.e. high use pedestrian area or presence of infrastructure, possible damage to the tree during its Remove as well as its conservation for habitat value. In some instances, retention of a reduced tree structure for habitat purposes maybe considered appropriate, especially when hollows are present.

Further reference: *Principles of Tree Hazard Assessment. Lonsdale, David. TSO, (2009).*

Dead wooding: **(Crown cleaning)**: The Remove of dead branches60. Recommendation to remove deadwood is for Remove of all dead branches within tree canopy > 30mm diameter in trees which overhang pedestrian or vehicular areas and Remove of all dead branches within tree canopy > 50mm diameter if trees are located in a Parkland or similar area.

Decay: The process of degradation of woody tissues by micro-organisms.

Desiccation: Severe drying out. Dehydration.

Drip Line: Is the imaginary perimeter line at soil surface level which is directly below the outermost edge of the tree's foliage or canopy.

Estimated Life Expectancy (ELE): Assessed on trees of particular species in the urban environment, including health and structural conditions which may exist.

Epicormic bud: Latent or adventitious bud located at the cambium and concealed by the bark.

Epicormic shoots: Shoots produced from epicormic buds at the cambium of trunks or branches.

Field Capacity: Maximum soil moisture content following the drainage of water due to the force of gravity.

Hollow: is a semi-enclosed cavity which has naturally formed in the trunk or branch of a tree.

Included bark: Inwardly formed bark within the junction of branches or codominant stems.

Kino: Dark red to brown resin-like substance produced by trees in the genera Eucalyptus, Pterocarpus and Butea and related genera. Kino forms in the barrier zones. Large kino veins form in some tree in response to injury and infection.

Leaves: The main function of leaves is photosynthesis, that is, the production of sugars and oxygen. The sugars produced by the leaves (and any other green tissue) are the source of chemical energy for all living cells in the entire plant and as such are essential for the normal functioning and survival of the tree. Anything that directly or indirectly damages the leaves will interfere with photosynthesis.

Non-Destructive Root Exploration (NDRE): is the most reliable way to conscientiously locate tree roots pre-development; and thus, assist in TSUD options and the subsequent determination of tree viability. Therefore, all excavations that are calculated as a *'Major'* Encroachment must be initiated by non-destructive means (Hand-digging, Air Vac and/or Air -Spade) under the guidance of the Project Arborist. Machine excavations will only be permitted within the TPZ if and when the Project Arborist is satisfied that the excavation envelope is free of any significant root biomass.

Non-woody part of tree: 'organs that increase the surface area of vascular plants, thereby capturing more solar energy for photosynthesis'. … maybe classified as microphylls (usually spine-shaped leaves with a single vein) or megaphylls (leaves with a highly branched vascular system). Needles and leaves are major energy trapping organs of a tree. Flowers are modified leaves …. as they fit the definition of an organ (*Shigo.2003).*

Macropore: Relatively larger space between soil particles that is usually air-filled and allows for water movement and root penetration. Contrast with micropore.

Minor encroachment (<10%): If the proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and be contiguous with the TPZ.

Major encroachment (>10%): If the proposed encroachment is greater than 10% (total area) of the TPZ, the project arborist must demonstrate that the tree(s) remain viable. The area lost to this encroachment should be compensated for elsewhere and be contiguous with the TPZ. Tree sensitive construction techniques may be used for minor works within this area providing no structural roots are likely to be impacted, and the project arborist can demonstrate that the tree(s) remain viable. Root investigation by non-destructive methods may be required for proposed works within this area. All work within the TPZ must be carried out under the supervision of the project arborist.

Micropore: Space between soil particles that is relatively small and likely to be water filled.

Mortality Spiral: Sequence of stressful events or conditions causing the decline and eventual death of a tree. Once in a mortality spiral trees are more likely to succumb to any further or additional stress factors such as drought, pest infestation or disease. (See definition Stress)

Necrosis: Localised death of tissue in a living organism.

Occlusion (See wound): Shut in or out. Occlusion is the process of trees forming callus and clear wood over wounds.

Pathogen: A disease-causing organism.

Phototropism: Influence of light on the direction of plant growth. Tendency of plants to grow towards light.

Phloem: Plant vascular tissue that transports photosynthates and growth regulators. Situated on the inside of the bark, just outside the cambium. Is bidirectional (transports up and down). Contrast with xylem.

Photosynthesis: Process in green plants (and in algae and some bacteria) by which light energy is used to form glucose (chemical energy) from water and carbon dioxide.

Reaction wood: Wood forming in leaning or crooked stems or on lower or upper sides of branches as a means of counteracting the effects of gravity. See compression wood and tension wood.

Shrub: A woody plant similar to a tree except it is usually several-stemmed and smaller than a tree.

Significance: The quality of being worthy of attention; importance.

Stem / Trunk: Organ which supports branches, leaves, flowers and fruit; may also be referred to as 'the trunk'.

Stress: In Plant Health Care, (1) a factor that negatively affects the health of a plant; a factor that stimulates a response. (2) mechanics, a force per unit area.

Stress – acute: Disorder or disease that occurs suddenly and over a short period of time.

Stress – chronic: Disorder or disease occurring over a longer time.

Structural Root Zone (SRZ): The SRZ is the area of the root system (as defined by AS 4970-2009) used for stability, mechanical support, and anchorage of the tree. Severance of structural roots (>50 mm in diameter) within the SRZ is not recommended as it may lead to the destabilisation and/or serious decline of the tree.

Tree: Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks. A tree has 3 major organs – roots, stem and leaves.

Tree Protection Zone (TPZ): *AS4970-2009 Protection of trees on development sites s1.4.7,* Tree Protection Zone (TPZ): A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development.

Vigour: Ability of a tree to sustain its life processes. The term 'vigour' in this document is synonymous with commonly used terms such as 'health' and 'vitality'. Inherent genetic capacity of a plant to deal with stress. Physical strength and health. A tree with good vigour has the ability to sustain life processes and synonymous with good health.

Visual Tree Inspection (VTA): Is a detailed visual inspection of a tree and surrounding site.

Vitality: Ability of plant to deal effectively with stress.

Watersprouts/ Epicormic growth (Usually multiple shoots): Shoots produced from epicormic buds at the cambium of trunks or branches. Grows 'from the stub ends and only grows from the outermost living tissue layer of that year's growth. They are weakly attached and prone to falling out or being blown off with the risk increasing markedly as they increase in size. When epicormic shoots arise from stub ends that are decaying, the chances of them falling out are significantly greater'.

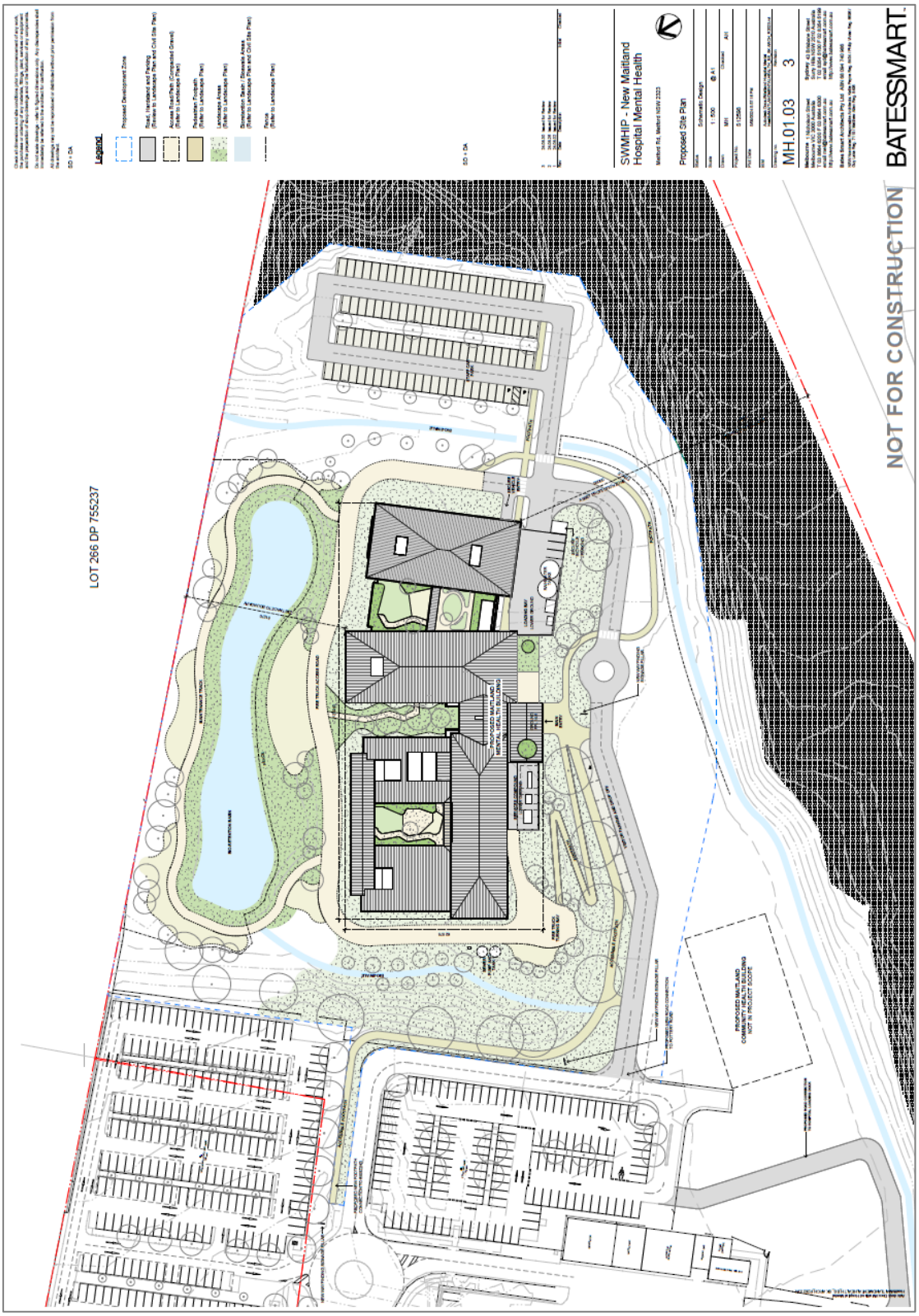
Wound: An opening that is created when the bark is cut, removed, or injured.

Xylem: Main water and mineral-conducting (unidirectional, up only) tissue in trees and other plants. Provides structural support. Arises (inward) from the cambium and becomes wood after lignifying. Contrasted with phloem.

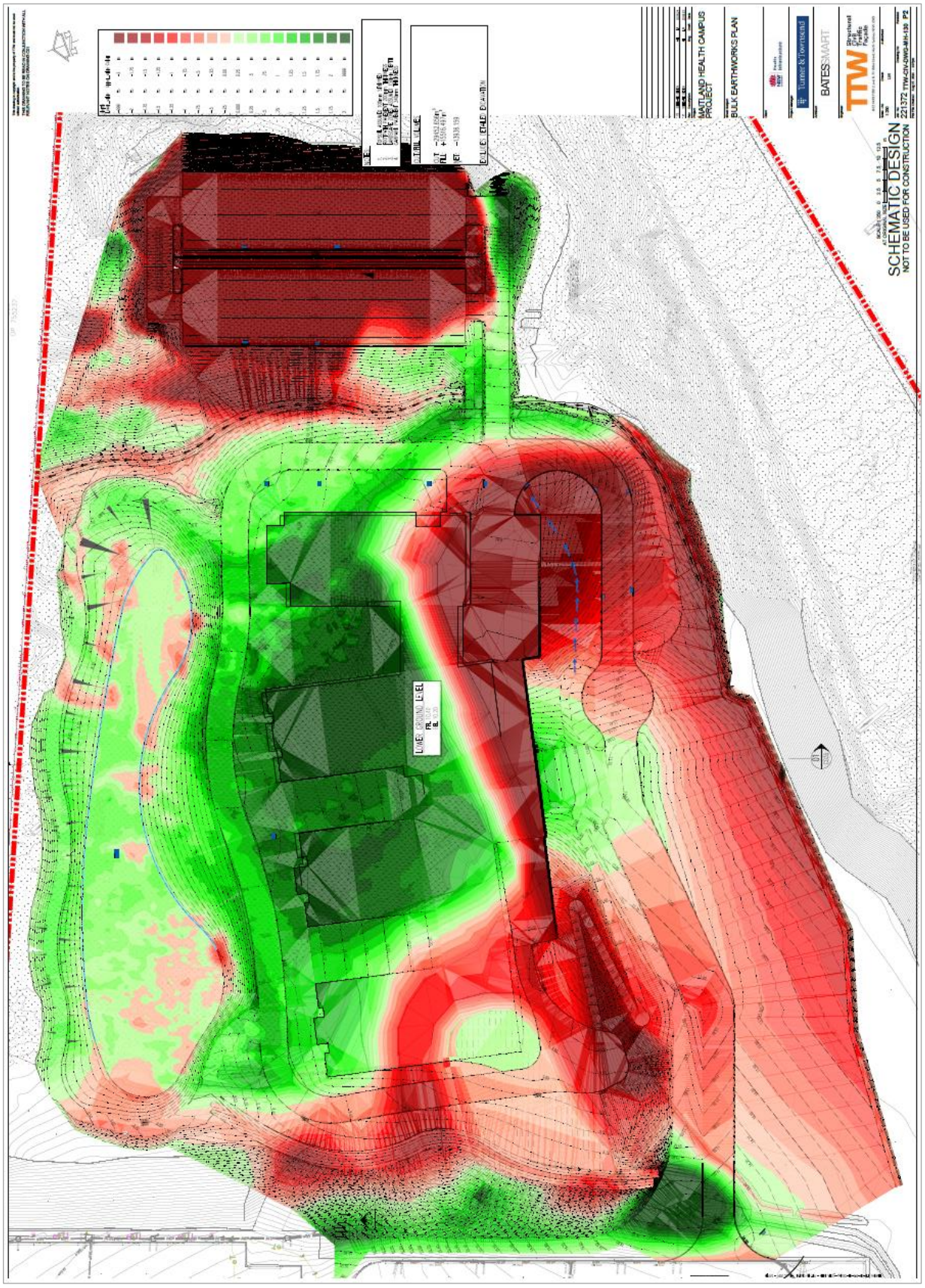
Zone of *Rapid Taper*: The area within 1–2m of the trunk on larger trees is frequently referred to as the *'Zone of Rapid Taper'* because structural roots found there often exhibit considerable secondary thickening- not present on roots farther from the trunk (*Wilson 1964*). *Wilson (1964)* additionally reviews the development of this zone and its relation to mechanical stability.

12 Appendix

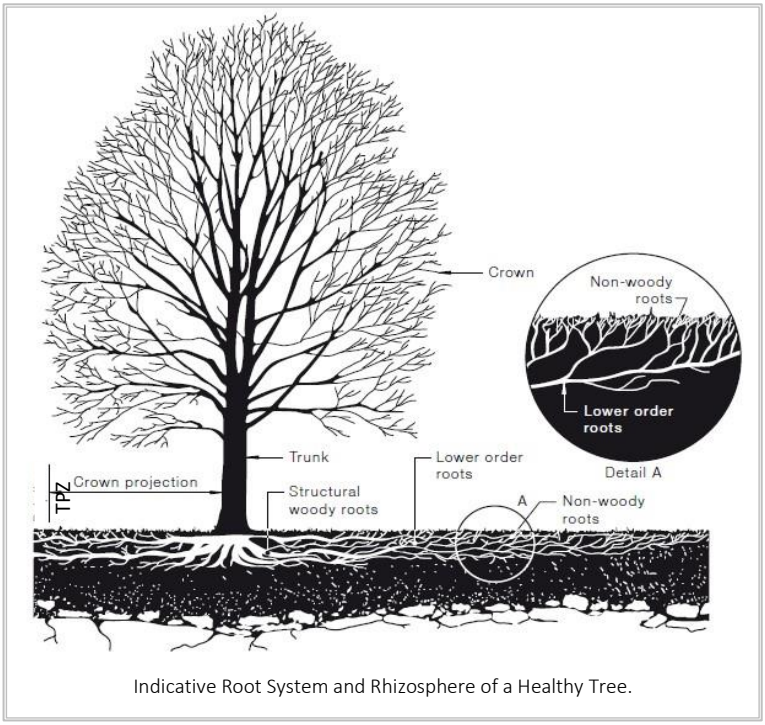
12.1 Drawing: Maitland Hospital Mental Health Rehabilitation Project



12.2 Bulk Excavation Plan



12.3 Root Morphology Considerations



Indicative Root System and Rhizosphere of a Healthy Tree.

Image credit: *AS4970-2009 Protection of trees on developmnet sites*

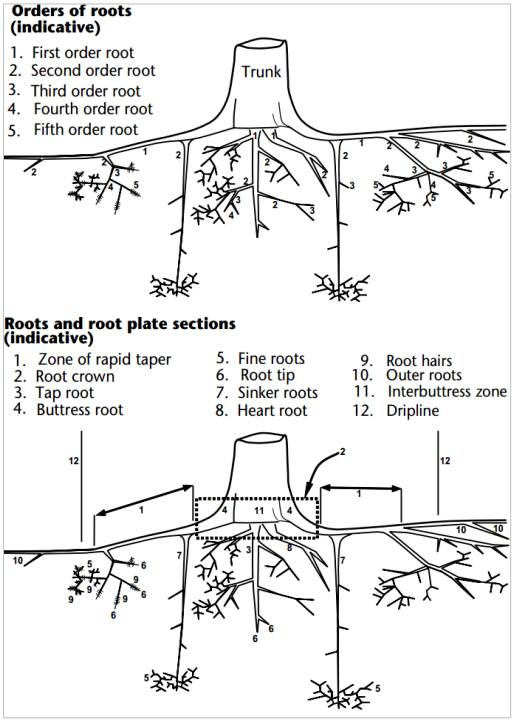


Image credit: Perry. 1992

i. The main functions of roots include the uptake of water and nutrients, anchorage, storage of sugar reserves and the production of some plant hormones required by the shoots. For roots to function, they must be supplied with oxygen from the soil. The root system of trees consists of several 'types' of roots found in different parts of the soil and is generally much more extensive than commonly thought. The importance of roots is easily overlooked because they are not visible, that is 'out of sight, out of mind'. Damage to the root system is a common cause of tree decline and death and is the most common form of damage associated with development sites (Matheny et. al, 1998).

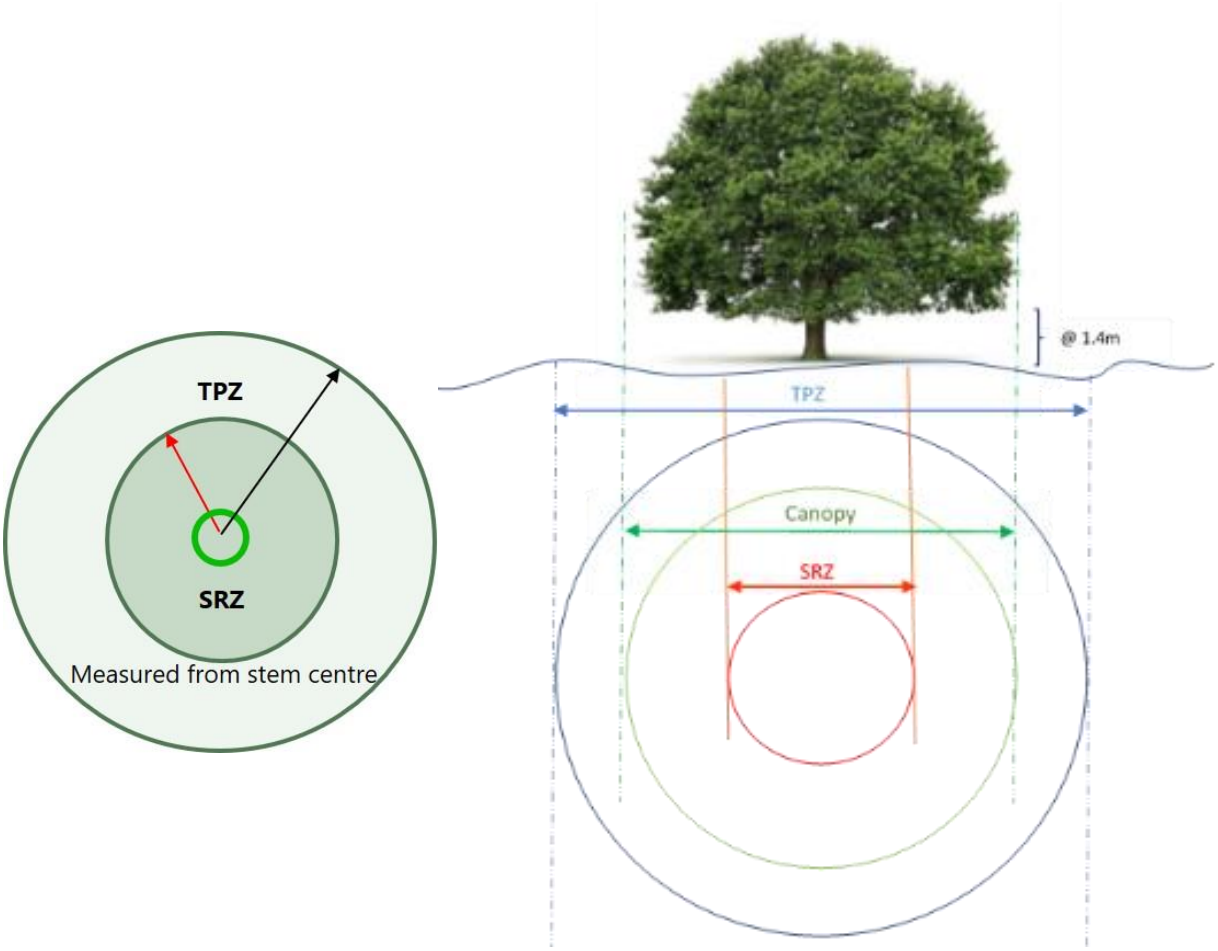
ii. Root systems consist of three main parts: (Sutton and Tinus, 1983).

- The structural woody roots (anchorage, storage and transport);
- Lower order roots (anchorage, storage and transport); and
- Non-woody roots (absorption of water and nutrients, extension, synthesis of amino acids and growth regulators) (please refer to Drawing above).

iii. In addition to lateral root spread being underestimated, root depth in trees has also been grossly exaggerated. Deep root systems or taproots are the exception rather than the rule. Most roots of most trees are found in the very top of the soil. The vast majority of these roots are small non-woody absorbing roots which grow upward into the very surface layers of the soil and leaf litter. This delicate, non-woody system, because of its proximity to the surface, is very vulnerable to injury (Watson et. al, 2014).

12.4 Tree Protection Zone (TPZ) & Structural Root Zone (SRZ).

i. The Australian Standard *AS 4970-2009 - Protection of trees on development sites* is used for the allocation of tree protection zones. This method provides a TPZ that addresses both tree stability and growth requirements. TPZ distances are measured as a radius from the centre of the trunk at ground level.



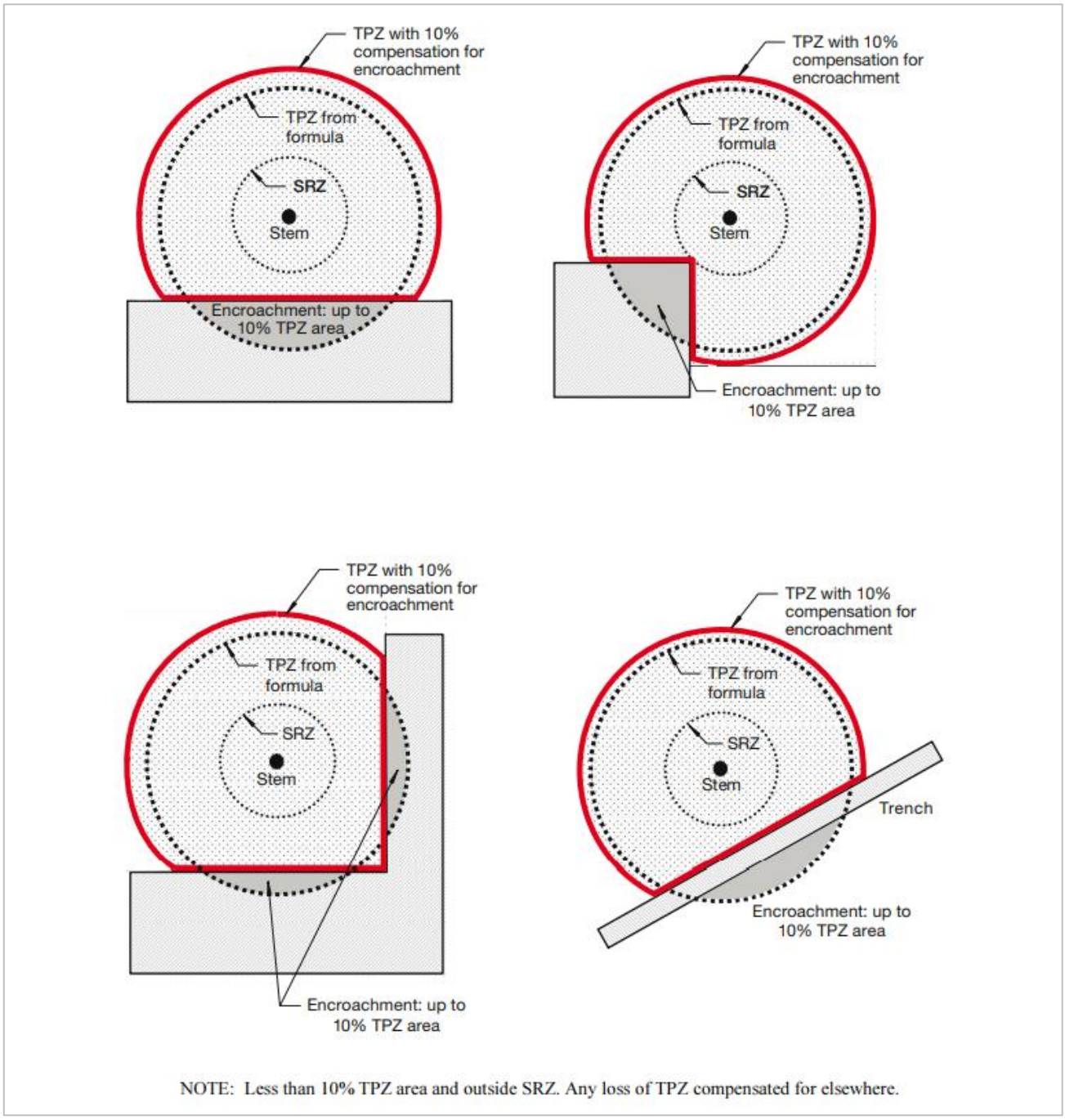
ii. As per AS4970-2009 Protection of trees on development sites the following calculations are to be used:

- *s3: The radius of the TPZ is calculated for each tree by multiplying its Diameter @ Breast Height measured @ 1.4m from ground level (DBH × 12 = TPZ). (DBH = Trunk Girth @ 1.4m ÷ π).*
- *To calculate the SRZ: Radius SRZ = **D**iameter above **R**oot **C**rown (**DRC** x 50) ^ 0.42 x 0.64. If the DRC is less than 0.15m the SRZ will be 1.5m.*
- *Note: A TPZ should not be less than 2m or more than 15m from the tree stem.*

You do not need to calculate the TPZ of palms, cycads and tree ferns. For these plants, the TPZ should not be less than 1m outside the crown.

12.5 Compensation for Tree Protection Zone Encroachment

i. Encroachment into the Tree Protection Zone (TPZ) is sometimes unavoidable. The images above are analogous to the abovementioned works scenario and indicate how encroachment within the tree protection zone can be compensated for elsewhere per *AS4970-2009 Protection of Trees on Development Sites.*



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

12.6 Non-Destructive Root Exploration & Root Mapping

i. Non-Destructive Root Exploration (NDRE) or Root Mapping is the most reliable way to locate tree roots pre-development and therefore should always be implemented when a tree is to be retained and impending earthworks are to be undertaken within the TPZ. This NDRE should consist of Hand-digging and/or AirSpade under the guidance of the Project Arborist (Watson et. al. 2014).

ii. NDRE will often be initiated with the excavation of a 'Slot-Trench' on the edge of the TPZ and/or the required excavation footprint. This will assist in determining the extent of the tree root architecture and provide accurate root location(s) along with additional morphological data. This objective root mapping data can then be utilised to explore and/or implement pragmatic tree sensitive design modifications regarding site-specific tree protection, tree retention and Plant Health Care regimens post development.

iii. Please note that the Root Mapping findings will ultimately determine foreseeable tree viability and whether tree sensitive design modifications and/or tree Remove will need to be undertaken on this Project. (All of the findings from the NDRE should be paroled by the appointed Project Arborist and made available to all parties with *locus standii* upon request. This in the form of a Root Mapping Report).

12.7 Tree Sensitive Urban Design (TSUD)

i. A commonsensical approach with regards to tree retention and development should always be adopted. I.e., any excavations within the calculated TPZ of a retained tree should be initiated with NDRE; and where practicable should be limited in depth so as to not impact tree roots. However, if during the NDRE a 'significant root' (>30mm in diameter) is encountered candid tree sensitive design modifications will need to be discussed and/or incorporated into the project where reasonably practicable.

ii. Tree Sensitive Urban Design (TSUD) for both new and existing trees simply aims to provide adequate space for desirable root growth, whilst safeguarding against infrastructure and root damage from potential conflict alike. Some of these proactive solutions include:

- Sensitive Construction: Directional-drilling, Screw-Piling, Cantilevers, 'Build-outs' and 'Build-overs'.
- Irrigation, Tree Root Trenches & Paths, Root Barrier, Root Deflectors and Root Directors and De-Compaction/Compaction to direct root growth.
- Porous Permeable Pavers, Asphalt, Concrete and Resin Bound Aggregates.
- Structural Confinement System installations with structural soil: Some of these include Natural Cell, Silva Cell, Strata Vault, Strata Pit, Geo Cell, and Terra Vault. In summary these cells can be installed in an urban scape to provide space for root growth limit soil and root compaction, whilst facilitating necessary infrastructure installations.

iii. Please note that tree roots travel the 'path of least resistance' and like most living organisms require oxygen and water (an aerobic soil with good moisture levels). Therefore, one of the easiest techniques to keep tree roots from growing in unwanted areas is to remove these two essential elements by heavily compacting the soil. Alternatively, by providing ideal levels of these essential resources (water, friable aerobic soil, and organic nutrients), tree roots can be encouraged to grow in that direction.

12.8 Compensatory Replanting

i. As abovementioned, Compensatory Replanting should not be exclusively relied upon to secure good tree outcomes. However, understandably tree retention is not always practicable, so replanting to offset tree loss is required.

ii. By definition Compensatory Replanting simply refers to the planting of trees or vegetation to offset or compensate for the loss of existing trees or vegetation. The key goals of Compensatory Replanting include:

- *Replacement of lost canopy cover* - Replanting helps restore the canopy coverage and its associated benefits such as shade-cast and urban heat island mitigation, oxygen production, carbon sequestration erosion control, stormwater reduction and ecological services. Thus, a tree species with the potential for a large canopy is always preferred where practicable.

- *Restores aesthetic appeal* - Where tree Remove has significantly impacted neighbourhood aesthetics or property appeal, Compensatory Replanting helps re-green the area and return it to a naturalized state. Species selected should complement the surrounding landscape.

- *Meet statutory & regulatory requirements* – Many Councils and other regulatory bodies have tree protection ordinances that requires Compensatory Replanting when removing trees. Thus, Compensatory Replanting ensures compliance with these local regulations and policies.

iii. The key considerations for Compensatory Replanting regimes include:

- *Species selection* – The 'best-suited' tree for the planting opportunity is paramount. In addition, Biodiversity Modelling needs to be factored in to prevent challenges with monocultures.

- *Size of Plant Stock* - While smaller stock may establish more quickly, replanting with a larger, more advanced tree has an instant impact and helps offset the canopy lost from mature tree Removes.

- *Site Preparation & Aftercare* - Proper site preparation including soil assessment and amelioration which will promote tree vitality and growth of newly planted trees; and the adoption of a holistic Plant Health Care regimen, which includes cyclic inspections, pruning (remedial & formative), applications of organic botanicals, mulching and pest and disease management.

12.9 Visual Tree Assessment Descriptors

(Age Class relates to the ecophysiological stage of the trees life cycle – *UK Veteran Trees & Forestry Commission*)

TREE AGE CLASS

Life Cycle Stage	Category & Descriptor
Formative Stage	**Young or Juvenile:** Recently planted or approximately 1-7 years.
Maturing or Mature Stage	**Semi-mature:** Tree actively growing in size and yet to achieve the expected size *in situ.* **Mature:** Tree is approaching the expected size or has reached the expected size *in situ*
Senescent Stage	**Over Mature:** Tree is full-size and has started to decline (possible crown retrenchment)

TREE VITALITY

Good	Foliage of the tree is entire, with good colour, very little sign of pathogens and of good density. Growth indicators are good i.e., Extension growth of twigs and wound wood development. Minimal or no canopy dieback (deadwood).
Fair	Tree is showing one or more of the following symptoms: <25% dead wood, minor canopy dieback, foliage generally with good colour though some imperfections may be present. Minor pathogen damage present, with growth indicators such as leaf size, canopy density and twig extension growth typical for the species in this location.
Poor	Tree is showing one or more of the following symptoms of decline; >25% deadwood, canopy dieback is observable, discoloured or distorted leaves. Pathogens present, stress symptoms are observable as reduced leaf size, extension growth and canopy density.
Very Poor	The tree appears to be in a state of decline. The tree is not growing to its full capacity. The canopy may be very thin and sparse. A significant volume of deadwood may be present in the canopy and/or pest and disease problems may be causing a severe decline in tree vitality.
Serious Decline or Dead	Tree is in severe decline; >55% deadwood, very little foliage, possibly Epicormic shoots and minimal extension growth or the tree is completely dead and exhibits no new growth or live tissue.

***Please note that tree vitality cannot be measured directly, hence growth and physiological parameters that indicate tree vitality are used. Health or Vitality of a tree is evidenced by the general appearance of crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion including pathogens and presence of dieback in crown at the time of inspection. Vigour may vary according to seasonal weather patterns and rainfall received (Dobbertin, 2005).*

***Tree Condition: The assessment of a tree(s) condition evaluates factors of tree vitality, form and structure. These descriptors of vitality, form and structure attributed to a tree evaluate the individual specimen to what could be reasonably considered by the arborist as typical for that species growing in situ. It is well documented that specific tree species can display inherently poor biomechanics, such as acute branch attachments with included bark, co-dominant leaders and other poor branch and root architecture. Whilst these 'structural defects' may be deemed arboriculturally flawed, they are typical for the species and my not constitute a foreseeable increased risk. These trees may be assigned a 'structural rating' of 'fair-poor' (as opposed to poor) at the arborist's discretion*

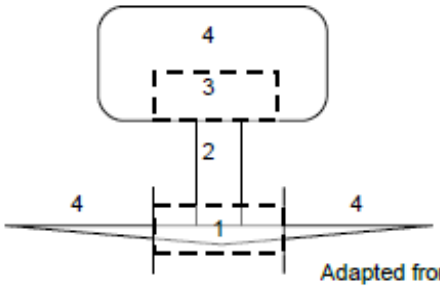
TREE STRUCTURE

Good: Trunk and scaffold branches show good taper and attachment with minor or no structural defects. Tree is a good example of species with well-developed form showing no obvious root problems or pests and diseases.
Fair/Fair-Poor: Tree shows minor structural defects or minor damage to trunk e.g., bark missing, there could be cavities present. Minimal damage to structural roots. Tree could be seen as typical for this species.
Poor/Very Poor: There are major structural defects, damage to trunk or bark missing. Co-dominant stems could be present with likely points of failure. Girdling or damaged roots obvious. Tree is structurally problematic.
Hazardous: Tree is immediate hazard with potential to fail, this should be rectified as soon as possible.

Tree Structure Matrix

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No damage, disease or decay; obvious basal flare / stable in ground	No damage, disease or decay; well tapered	Well formed, attached, spaced and tapered	No damage, disease, decay or structural defect
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Typically formed, attached, spaced and tapered	Minor damage, disease or decay; minor branch end-weight or over-extension
Fair to Poor	Moderate damage or decay; minimal basal flare	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence	Moderate damage, disease or decay; moderate branch end-weight or over-extension
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump resprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump resprout	Decayed, cavities or branch attachments with active split; failure imminent	Excessive damage, disease or decay; excessive branch end-weight or over-extension

Diagram 2: Tree structure zones
1. Root plate & lower stem
2. Trunk
3. Primary branch support
4. Outer crown & roots



Adapted from Coder (1996)

Structure ratings will also take into account general tree architecture which considers aspects of stem taper, live crown ratio, branch distribution or crown bias and position such as a tree being suppressed amongst more dominant trees.

Useful Life Expectancy (ULE)

The ULE is adapted from (*Barrell, 2001)*. The objective of a ULE assessment is to determine the relative value of individual trees for the purpose of informing future management options.

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

Additional Useful Life Expectancy indicia

i. The Useful Life Expectancy (ULE) is an estimate of how long a tree is likely to be viable in the landscape based on its current health, vitality, amenity, environmental services contribution, and risk to the community. Visual dendrological cues as listed below can assist in this determination.

Useful Life Expectancy	Typical Characteristics
< 1 year	Tree may be dead or mostly dead. Tree may exhibit major structural faults and/or may pose an imminent failure hazard.
1-5 years	Tree is exhibiting severe chronic decline. Crown is likely to be less than 50% typical density. Crown may be mostly epicormic growth. Dieback of large limbs is common (stag-horn).
6-15 years	Tree is exhibiting chronic decline. Crown density will be less than typical and epicormic growth is likely to present. The crown may still be mostly entire, but some dieback is likely to be evident. Dieback may include large limbs.
16-20 years	Tree is not showing symptoms of chronic decline, but growth characteristics are likely to be reduced (bud development, extension growth etc.). Tree may be over-mature and senescing.
21-30 years	Tree is displaying normal growth characteristics. However, it may be growing in a restricted environment (i.e., Streetscapes) or may be in late maturity.
31-60 years	Tree is exhibiting normal growth characteristics. Juvenile trees in streetscapes.
61+ years	Tree is exhibiting normal growth characteristics and is growing in an unfettered a Park or Open greenspace environment.

IACA Significance of Tree, Assessment Rating System (STARS)

Institute of Australian Consulting Arboriculturists: Significance of a Tree Assessment Rating System (STARS) *The tree is to have a minimum of three (3) criteria in a category to be classified in that group*		
Low	**Medium**	**High**
The tree is in fair-poor condition and good or low vigour. The tree has form atypical of the species. The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings. The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area. The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen. The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions. The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms. The tree has a wound or defect that has the potential to become structurally unsound.	The tree is in fair to good condition. The tree has form typical or atypical of the species. The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area. The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street. The tree provides a fair contribution to the visual character and amenity of the local area. The tree's growth is Mediumly restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.	The tree is in good condition and good vigour. The tree has a form typical for the species. The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age. The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on councils' significant/notable tree register. The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity. The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values. The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.
Remove ***ENVIRONMENTAL PEST/NOXIOUS WEED*** The tree is a listed environmental weed species. This due to invasiveness or its poisonous/allergenic properties/ declared noxious weed. **HAZRADOUS / IRREVERSIBLE DECLINE** The tree is structurally unsound unstable and considered potentially dangerous. The tree is dead or in irreversible decline with the potential to fail/collapse.		

Additional Landscape Significance Considerations

CATERGORY	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
SIGNIFICANT	*The subject site is listed as a Heritage Item at a local, state or National level of significance or is listed as a Significant/Notable tree. * 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 scheduled as a 'Threatened Species' as defined under the Biodiversity Conservation Act 2016. *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. *The subject tree is a Remnant Tree, being a tree in existence prior to development of the area.	*The subject tree has a very large live crown size exceeding 100m2 with normal to dense foliage cover, is located in a prominent position in the landscape, and exhibits very good form typical of the species. *The subject tree makes a significant contribution to the amenity & visual character of the area by creating a sense of identity. *The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
HIGH	The tree has a strong historical association with a Heritage Item (building/structure/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 formerly occurring in the area occupied by the site.	The subject tree has a very large live crown exceeding 60m2; crown density exceeding 70%, very good representative of the species in terms of form & branching habit, is aesthetically distinctive & makes a positive contribution to the visual character & the amenity of value of the area.
MODERATE	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 & representative of the original vegetation of the area & the tree is located within a defined Vegetation Link/Wildlife Corridor or has well known habitat value.	A good representative of the species in terms of form & branching habit with minor deviations from normal. Crown density at least 70% (normal); the tree is visible from the street and/or surrounding properties & makes a positive contribution to the visual amenity of the area.
LOW	The subject tree detracts from Heritage values or diminishes the value of a Heritage Item.	The subject tree is possibly scheduled as exempt under the provisions of this Development Control Plan due to its species, or tree can be a nuisance or its position problematic – relative to buildings or other structures.	The subject tree has a small live crown size of less than 25m2 & can be replaced within the short-term (5-10yrs) with new planting.
VERY LOW	The subject tree is causing damage to a Heritage Item.	The subject tree is listed as an Environmental Weed Species in the Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties & has a negative impact on the amenity & visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form & branching habit with a crown density of less than 50%.

(STARS) Tree Retention Value - Priority Matrix

Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia 2010.

		Landscape Significance				
		1.High	2.Medium	3.Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest/Noxious Weed Species	Hazardous / Irreversible Decline
Useful Life Expectancy	1.Long >40 Years					
	2.Medium 15-40 Years					
	3.Short <1-15 Years					
	Dead					

	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 (pier and beam cantilever, Structural Confinement Cells etc if works are to proceed within the TPZ).
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however, their retention should remain priority with Remove considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Remove (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Remove - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

12.10 AGS Quality Control

Document control

File reference	File type	Modifications	Date
JN140634	AR	Original document Revised: Re Bulk Excavation Plan	18/09/2024 18/10/2024

Communication register

Date	Type	From	To	Description
19/09/2024 18/10/2024	PDF	AGS	Turner & Townsend	AIA & TPMP

Review register

Date	File reference	Reviewer	Qualification	Company
19/09/2024 18/10/2024	JN140634	A. Dandan	Dip of Arb (AQF 5)	Active Green Services