Vertical
Tree Management & Consultancy

Arboricultural Impact Assessment

Commissioned by: Suzy Smith

Site: 55 Kangaroo Road Collaroy Plateau 2097

Date of Inspection: 4 August 2021

Version: 2

Prepared by

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Contents

Table of Figures

1. Introduction / Aims/ Objectives

1.1. Introduction

This Arboricultural Impact Assessment has been prepared by Michael Garton of Vertical Tree Management and Consultancy for the client Suzy Smith. The report shall assess the viability of the site trees and Council trees in relation to the proposed construction of a two-storey dwelling.

The trees mentioned within this report are located within the site, 55 Kangaroo Road Collaroy Plateau 2097 and Council nature strip adjacent to the property.

The site is located within The Northern Beaches Local Government Area and is subject to the relevant local government and legislative framework. All trees within this report are considered 'Trees' according to the Warringah Development Control Plan and Local Environmental Plan.

Individual trees inspected for the purpose of this report are trees numbered 1-10. At the time of inspection, there were several dead trees and exempt trees within the site. These trees have not been included within this report.

1.2. Aims

This report shall assess the site trees and nature strip tree to assist the planning phase and viability of the site. The report shall include the following requirements.

- Methodology used in tree evaluation, retention value and Tree Protection Zones & Structural Root Zones.
- Tree data table with retention values.
- A scale plan showing the location of the trees on the subject site and neighbouring properties.
- Allocation of a number to each tree.
- Provide canopy spread and diameter at breast height and at ground level of each tree.
- Indicate the tree retention values, Tree Protection Zone (TPZ), Structural Root Zone (SRZ) and assessment of the developable environment.
- Address the impacts of the proposed development on the retained trees and discuss mitigation measures to minimise adverse impact.

1.3. Objectives

- Assess the condition of the trees.
- Determine the impact of development on the site trees.
- Provide recommendation for management and protection strategies for site trees.
- Develop a tree protection plan to protect retained trees during the development.

1.4. The Site

55 Kangaroo Road, Collaroy Plateau 2097 (49/A/DP11449) is located within The Northern Beaches Local Government Area, 1 group of trees and 10 individual trees have been assessed in this Arboricultural Impact Assessment with the site and Council nature strip.

The site has not been identified on the Biodiversity Values Map and Threshold Tool as a parcel not containing sensitive vegetation.

The site is not a Heritage Item nor forms part of a Heritage Conservation Area.

The site is zoned as R2 – Low Density Residential

Figure 1 - Aerial photo of the site: 55 Kangaroo Road Collaroy Plateau, accessed on the 10 August 2021.

2. Methodology:

A summary of the methodology used in the tree impact assessment took into consideration the possible location of the proposed structures, the depth of excavations, fill and their proximity to the tree including the tree roots. The incursion to the Tree Protection Zones and Structural Root Zones was also considered in the assessment. Construction techniques and the required space for excavation were taken into consideration in the assessment.

2.1 Site inspection was undertaken by the author on 4th August 2021.

2.2 Assessment of potential impacts on the trees in the immediate vicinity of the property and adjacent nature strip. The following concept plans were produced Bonza Homes and supplied by the client:

2.3 Plans Provided by the Client

Vertical Tree Management has received the follow plans by the client.

- Existing Site Plan
- Draft Architectural Plans of the proposed two-storey dwelling (Untitled)
- Proposed Landscape Plans – Noble Architecture Pty Ltd

2.4 Tree numbering system was assigned to the trees 1-10 (No tree tagging was conducted)

2.4 Tree Protection Zone (TPZ) - Calculated using the Australian standard AS4970- "Protection of Trees on Development Sites" formula.

2.5 Structural Root Zone (SRZ) – Calculated using the Australian standard AS4970- "Protection of Trees on Development Sites" formula.

2.6 Recommendations for amendments for the proposed development were based on Australian Standards for AS 4970 - 2009 "Protection of Trees on Development Sites".

2.7 Allowable incursions to Tree Protection Zones were based on Australian Standards for AS 4970 2009 "Protection of Trees on Development Sites" and the author's extensive experience with trees on development sites.

2.8 Potential destabilization from root severance within the Structural root Zone (SRZ) based on data compiled from findings of Matheck (1994).

2.9 Plans showing canopy, retention value, Tree Protection Zone and Structural Root zone and tree protection device locations indicated in Appendix.

2.10 Tree protection & specification in accordance with AS4970-2009

2.11 Assumptions:

- The information provided is accurate and true to the conditions of the site.
- The information provided has been ground truth or has been otherwise stated.
- The techniques for excavation, construction boring, and dismantling are in keeping with traditional methods unless otherwise stated.

3. Tree Assessment Data of trees located on site

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
1	*Eucalyptus botryoides* Bangalay	13	13	580	670	6.9	2.8	Mature	Fair	Fair	Moderate	3 Short	Remove
Notes: **The mature bangalay tree is in fair health and fair structure. The root crown of the tree appears in fair condition with minor decay present between root buttressing root zone. The stem of the tree has several areas of bulging and swelling, this is likely an indicator of internal decay. There are several locations of minor stem canker. The tree has sustained several minor branch failures throughout its life. There is 20% deadwood contained within the tree. The canopy of the tree appears to be in fair health.**													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
2	*Leptospermum laevigatum* Coast Tea Tree	5	8	310	81	3.7	3	Mature	Fair	Poor	Low	3 Short	Remove
Notes: **The mature tea tree growing within the front yard of the property is in fair health and fair structure. The multi-stemmed tree branches out into five stems from the root crown. The root crown of the tree appears to have several locations of minor decay. The various stems extending from the root crown have several locations of minus stem decay at one metre from ground level. The canopy of the tree appears sparse and is in declining health. This tree has a low landscape significance and low retention value and should be considered for removal.**													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
3	*Eucalyptus haemastoma* Scribbly Gum	11	10	570	700	6.8	2.8	Mature	Fair	Fair	Moderate	3 Short	Remove
Notes: **The mature Scribbly Gum located within the centre of the front yard of the property is in fair health and fair structure. The root crown of the tree appears strong with no obvious defects. At one metre from ground level on the southern side of the stem is a significant occlusion. This occlusion has opened up the tree's internal structure. The heartwood of the tree has minor decay however given the species profile this is considered typical. There are several locations of occlusions within various stems contained within the canopy. These locations of occluded bark have the potential to compromise the internal structure of the tree. The canopy of the tree appears sparse and is in decline.**													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
4	*Eucalyptus haemastoma* Scribbly Gum	10	5	380	440	4.5	2.3	Mature	Good	Good	Low	2 Medium	Remove
Notes: **The mature scribbly gum is growing 2.6 metres from the external wall of the dwelling. This tree is in good health and good structure with no obvious defects. The root crown of the tree has minor stem canker. The stem of the tree appears strong with no obvious defects. The canopy of the tree appears strong with no obvious defects.**													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
5	*Banksia serrata* Old Man Banksia	9	3	138	180	2	2	Semi-Mature	Fair	Fair	Low	3 Short	Retain
Notes: **The semi-mature Banksia tree growing on the front property boundary is in good health and good structure with no obvious defects. The root crown of the tree appears strong with no obvious defects. The stem of the tree appears strong with no obvious defects. The crown of the tree is in fair health due to encroaching canopy trees reducing sunlight availability.**													
***DBH-Diameter at Breast Height; **DGL – Diameter at Ground Level ***TPZ – Tree Protection Zone; ^SRZ – Structural Root Zone – Explanatory notes in Appendix.**													

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
6	*Acacia baileyana* Cootamundra wattle	5	4	170	210	2	2	Over Mature	Poor	Poor	Low	4 Remove	Removal

Notes:

The overmature Acacia tree located on the front property boundary is in poor health and poor structure. The short-lived tree has reached over maturity and is in advanced stages of decline. There is a total of 25% live canopy remaining.

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
7	*Eucalyptus haemastoma* Scribbly Gum	14	17	530	800	6.3	3	Mature	Good	Good	Moderate	2 Medium	Retain

Notes:

The mature Scribbly Gum tree located on the council nature strip is in good health and good structure with no obvious defects. The root crown of the tree appears strong with no obvious defects. The slightly phototropic stem of the tree appears strong with no obvious defects. This phototropism is caused by encroaching canopy trees. This encroachment has resulted in 80% of the canopy growing towards the roadway and encroaching over above ground service lines. The canopy of the tree appears to be in good health with no obvious defects.

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
8	*Eucalyptus haemastoma* Scribbly Gum	16	12	430	600	5.1	2.6	Mature	Poor	Poor	Low	3 Short	Remove

Notes:

The mature scribbly gum located adjacent to the driveway is in fair health and fair structure. The root crown was unable to be observed due to soil build-up around the stem of approximately 40 centimetres. Above this soil build up is an occlusion. This occlusion of the sap wood had opened the tree resulting in the heartwood decay extending from the root crown to 1m from ground level. This decay is on the tension side of the stem and root crown will increase the likelihood of whole tree failure at this location. Above this location the stem appears to be in good health with no obvious defects. The crown of the tree is in fair health with a sparse canopy. This is likely the result of decay at ground level.

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
9	*Eucalyptus botryoides* Bangalay	24	20	970	1350	11.6	3.7	Mature	Good	Fair	High	3 Short	Remove

Notes:

The mature Bangalay tree is located 3.4 metres from the external wall of the dwelling. The tree appears to be in good health. At one point throughout the trees life, it appears to have shifted at ground level towards the north-northwest, this 20-degree lean is likely the result of a significant wind event. This has resulted in most of the tree's canopy encroaching over low voltage service wires, footpath and roadway. This significant weather events are likely to have occurred more than 10 years ago, as the canopy of the tree appears to have corrected. At the time of inspection, the author was unable to determine when the shift occurred as there are no signs of heaving or subsidence within the root zone. Upon closer inspection it is highly likely that the tension roots on the southern side of the tree have snapped off when the shift occurred, as there are no visible tension roots on the southern side of the stem at ground level visible above ground. This has resulted in significant reaction wood developing on the northern side of the stem at ground level, to compensate for the lack of tension roots. The stem of the tree appears strong with no obvious defects. At three metres from ground level there is an included branch union. This union appears to have been there for some time and has developed significant reaction wood around the wound. Throughout the canopy of the tree are several locations of compressed branch unions. These unions appear strong. The canopy of the tree appears to be in good health. The tree contains approximately 10% deadwood.

***DBH-Diameter at Breast Height; **DGL – Diameter at Ground Level ***TPZ – Tree Protection Zone; ^SRZ – Structural Root Zone – Explanatory notes in Appendix.**

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
10	*Eucalyptus haemastoma* Scribbly Gum	14	9	470	900	5.6	3.1	Mature	Poor	Poor	Low	4 Remove	Remove
Notes: **The multi-stemmed scribbly gum located within the centre of the rear yard is in poor health and poor structure. Within the root crown of the tree are several locations of occlusions. The multi-stem tree is also included at ground level with a poorly structured union. There are various pockets of decay visible at various locations throughout both stems. These locations have opened the internal structure of the tree to decay. The canopy of the tree is sparse and appears to be in declining health. This tree appears to be in advanced stages of decline.**													
***DBH-Diameter at Breast Height; **DGL – Diameter at Ground Level ***TPZ – Tree Protection Zone; ^SRZ – Structural Root Zone – Explanatory notes in Appendix.**													

4. Tree Protection Zone & Structural Root Zone

Tree Protection Zone (TPZ) - The TPZ is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. It is calculated using the Australian standard AS4970- “Protection of Trees on Development Sites” formula.

Structural Root Zone (SRZ) – The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when major encroachment into a TPZ is proposed. It is calculated using the Australian standard AS4970- “Protection of Trees on Development Sites” formula.

5. Tree Protection Zone & Structural Root Zone Incursion Calculations.

The trees identified to have an incursion within the calculated TPZ or SRZ by excavations, disturbance or soil fill will require an assessment of the impact to the tree. The incursion must be assessed and determined in accordance with AS4970 “Protection of Trees on Development Sites”. Trees with major incursions may be adversely impacted with long term health and stability problems. Identification of work within the TPZ or SRZ will allow the site Arborist to recommend alternative solutions where possible.

There 8 trees on site that have a major incursion of their Structural Root Zones and/or Tree Protection Zones within the footprint of the proposed construction. Trees 1, 2, 3, 4, 6, 8,9 and 10 are considered a priority for removal.

6. Discussion

6.1. Tree 1 – *Eucalyptus botryoides*
The mature bangalay tree is in fair health and fair structure. This tree is located on council the nature strip and adjacent to the proposed driveway location. The tree protection zone of this tree is 6.9 metres from the base of the tree. For the proposed development to be undertaken this tree will sustain an incursion of greater than 20% incursion, this level of incursion is considered major and would require tree removal for the proposed development to be undertaken. Given the trees overall fair / poor health and structure, it is recommended the tree be removed for the proposed development. Design modifications have been explored, however due the location of the proposed driveway, the tree is not considered viable for retention.

6.2. Tree 2 – *Leptospermum laevigatum*
The mature tea tree growing within the front yard of the property is in fair health and fair structure. The canopy of the tree appears sparse and in declining health. This tree has a low landscape significance and low retention value and should be considered for removal.

6.3. Tree 3 – *Eucalyptus haemastoma*
The mature Scribbly Gum located within the centre of the front yard of the property is in fair health and fair structure. There are various locations of occlusions that have opened the trees' internal structure to decay. These locations of occluded bark have the potential to compromise the internal structure of the tree. The canopy of the tree appears sparse and in decline. This tree is considered a priority for removal.

6.4. Tree 4 – *Eucalyptus haemastoma*
The mature Scribbly Gum is currently growing 2.6 metres from the external wall of the dwelling. This tree is in good health and good structure with no obvious defects. The root crown of the tree has minor stem canker. This tree has low landscape significance and low retention value due to its semi mature age. The tree in its current location is required to be removed as the draft plans provided show it will lay 1m from the external wall of the dwelling with a 40% incursion in to the SRZ and TPZ of the tree. This level of incursion is considered unacceptable. Significant design modifications to accommodate this tree will reduce the square meter footprint of the building reducing living space. To construct the proposed dwelling this tree is a priority for removal.

6.5. Tree 5 – *Banksia serrata*
The semi-mature Banksia tree growing on the front property boundary is in good health and good structure with no obvious defects. This tree will not be affected by the proposed development.

6.6. Tree 6 – *Acacia baileyana*
The overmature Acacia tree located on the front property boundary is in poor health and poor structure. The short-lived tree has reached over maturity and is in advanced stages of decline. There is a total of 25% live canopy remaining. This tree is considered for removal.

6.7. Tree 7 – *Eucalyptus haemastoma*
The mature Scribbly Gum tree located on council nature strip is in good health and good structure with no obvious defects. The root crown of the tree appears strong with no obvious defects. The slightly phototropic stem of the tree appears strong with no obvious defects. This phototropism is caused by encroaching canopy trees. This encroachment has resulted in 80% of the canopy growing towards the roadway and encroaching over above ground service lines.

The canopy of the tree appears to be in good health with no obvious defects. This tree will not be affected by the proposed development.

6.8. Tree 8 – *Eucalyptus haemastoma*

The mature Scribbly Gum located adjacent to the driveway is in fair health and fair structure. The tree has a sap wood occlusion located within the root crown to .6m from ground level. This occlusion will likely result in heartwood decay extending from the root crown. This decay is on the tension side of the stem and root crown and will increase the likelihood of whole tree failure at this location. This tree is considered a priority for removal.

6.6. Tree 9 – *Eucalyptus botryoides*

The mature Bangalay tree is located 3.4 metres from the external wall of the current dwelling. The tree appears to be in good health. At one point throughout the trees life, it appears to have shifted at ground level towards the north-northwest, this 20-degree lean is likely the result of a significant wind event. This has resulted in most of the tree's canopy encroaching over low voltage service wires, footpath, and roadway. This significant weather event is likely to have occurred more than 10 years ago as the canopy of the tree appears to have corrected. At the time of inspection, the author was unable to determine when the shift occurred as there are no signs of heaving or subsidence within the root zone. Upon closer inspection it is highly likely that the tension roots on the southern side of the tree have snapped off when the shift occurred, as there are no visible tension roots on the southern side of the stem at ground level visible above ground. This has resulted in significant reaction wood developing on the northern side of the stem at ground level, to compensate for the lack of tension roots. The stem of the tree appears strong with no obvious defects. At three metres from ground level there is an included branch union. This union appears to have been there for some time and has developed significant reaction wood around the wound. Throughout the canopy of the tree are several locations of compressed branch unions. These unions appear strong. The canopy of the tree appears to be in good health. The tree has returned a low-risk rating (TRAQ) and 1-40K (QTRA), however the author cannot guarantee its overall stability. To construct the proposed dwelling, this tree is considered a priority for removal.

6.7. Tree 10 – *Eucalyptus haemastoma*

The multi-stemmed scribbly gum located within the centre of the rear yard is in poor health and poor structure. Within the root crown of the tree are several locations of occlusions. The multi-stemmed tree is also included at ground level with a poorly structured union. There are various pockets of decay visible throughout both stems. These locations have opened the internal structure of the tree to decay. The canopy of the tree is sparse and appears to be in declining health. This tree appears to be in advanced stages of decline and is a priority for removal.

7. Recommendations:

Retention Value	Tree Number
Priority for Retention (High)	**5, 7**
Consider for Retention (Medium)	
Consider for Removal (Low)	
Priority for Removal (Low)	**1, 2, 3, 4, 6, 8, 9, 10**

- Trees 1, 2, 3, 4, 6, 8, 9, 10 are a Priority for Removal.
- Trees 5, 7 are a Priority for Retention and require Tree Protection Fencing and Signage (See 9. Tree Protection Plan)

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Date	Version	Prepared By	Checked by Principal
5 August 2021	1	Michael Garton	Derek Arnaiz
2 February 2022	2	Michael Garton	Derek Arnaiz

Disclaimer statement. The response of a living tree to its immediate environment is dynamic throughout its entire life cycle due to external influences giving each tree a unique natural variability. A visual tree assessment addresses the external symptoms presented by a tree. This cannot exclude a tree from the potential for failure due to unforeseen circumstances. This report cannot provide a conclusive recommendation regarding any part of a tree root system that is not exposed for visual inspection. Additionally, it cannot not be assumed, that a tree will be safe in all conditions in the future. Appropriate management, assessment, and maintenance aim to mitigate risks to an acceptable level. This report is the opinion, advise or recommendation based on the information supplied by the client or observation of the author.

8. Standards

It is the responsibility of the owner/builder to make this report available to all contractors associated with the development at site**.**

All tree related work relevant to this report is to be conducted in accordance with:

- The NSW Workcover Code of Practice: Amenity Tree Industry 1998.
- The AS4970-2007 “Protection of Trees on Development Sites”
- AS4373-2007 “Pruning of Amenity Trees”

All tree related work must be undertaken by an Arborist with an Australian Qualification Framework Level 3 in Arboriculture or above.

All tree related work carried out in the vicinity of overhead power lines must be undertaken by a qualified Arborist with a current Power lines Awareness Certificate.

The Site Arborist (Vertical Tree Management & Consultancy) has record tree health prior to commencement of construction.

All tree related work must have written consent from the relevant control authority (local Council).

9. Tree Protection Plan

9.1. Objectives

This tree protection plan should assist with the design planning and implementation of proposed works. This plan is to outline tree protection requirements for trees that may be affected by the proposed works. This report will provide the following information for trees likely to be affected.

Tree details and plans.

- Tree species and other relevant details of trees recommended for removal end of trees recommended for retention and protection.
- A plan showing location of trees with numbers.

Protection during earthworks and construction

- All necessary trade protection measures to ensure that trees that are to be retained are not damaged during all stages of the project.
- Contact details of the project arborist

9.2. Tree Damage

Trees can be affected during development in several ways. Direct damage to roots through trenching and site cuts can remove absorbing roots and sever structural roots. Root activity can be inhibited by various activities such as, soil compaction within the root zone, sealing the soil surface or adding soil over root zones. these activities limit the amount of oxygen and moisture that may reach the roots, and without which the roots cannot function. This will lead to drought stress and eventually death. this decline of the tree may take several years to become evidence in the crown.

Tree trunks and branches easily damaged by machinery during works. Damage to trees can face sudden and irreversible it is important that trees are properly protected throughout all stages of the project.

9.3. Tree Plans

See appendix for tree plans.

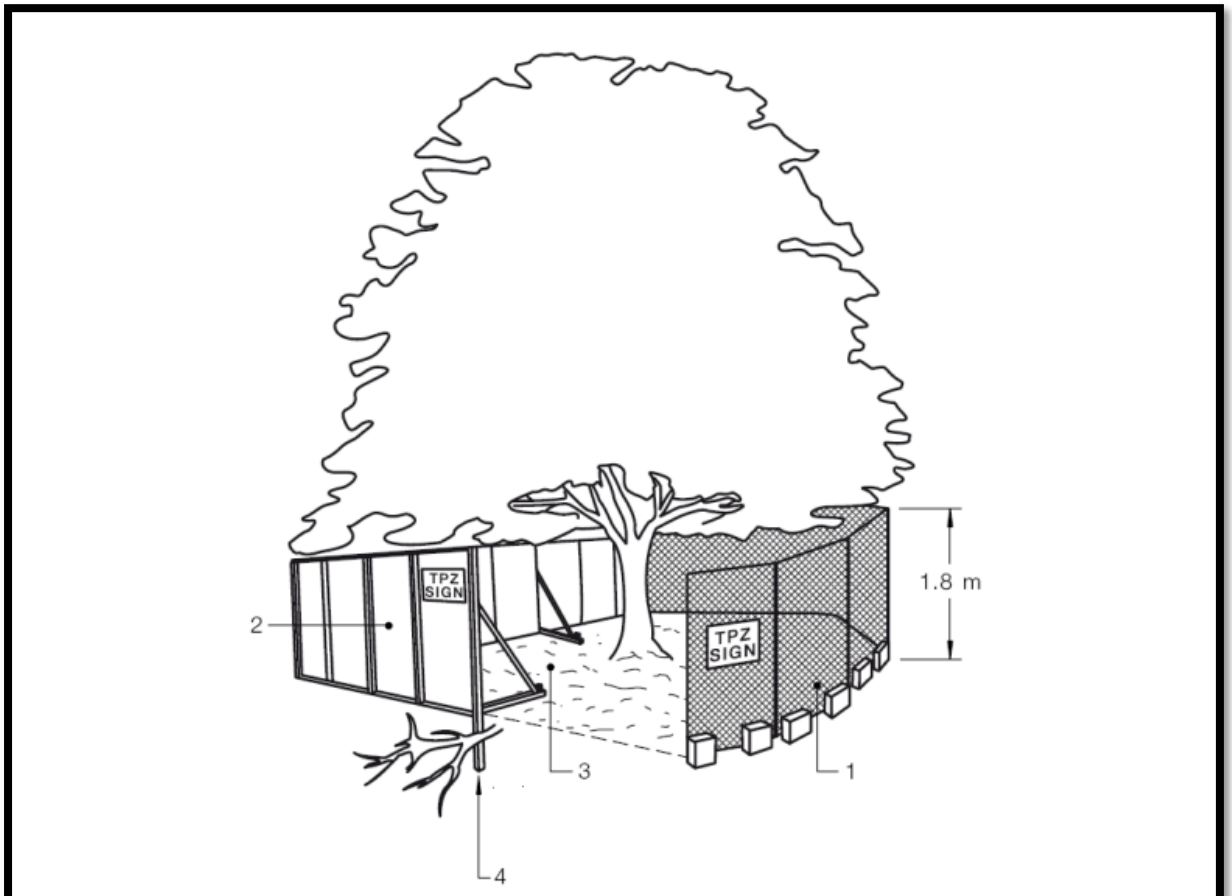
9.4. Restricted Activities

Activities excluded from the TPZ include but are not limited to:

- machine excavation including trenching (unless on approved plans)
- excavation for silt fencing
- cultivation
- storage
- preparation of chemicals, including the preparation of cement products
- parking of vehicles and plant
- refuelling
- dumping of waste
- washdown and cleaning of equipment
- placement of fill
- lighting of Fires
- soil level changes (unless on approved plans)
- temporary or permanent installation of utilities and signs
- physical damage to the tree

9.5. Tree Protection Fencing

Fencing should be a minimum of 1.8 metres high wire mesh or equivalent fence supported on concrete pads as per AS4687. the following diagram from AS4970 indicates suitable fencing.



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.

Figure 2 - Example of Tree Protection Fencing as per AS4970

9.6 Tree Protection Signage

Figure 5 taken from AS4970, indicates a suitable sign. signs must be placed on any mesh TPZ fencing at regular intervals so that the sign can be viewed from any angle outside the TPZ. (Vertical Tree Management can provide signage)

Figure 3 - Example of Tree Protection Signage - AS4970

9.7. Trunk and Branch Protection

Where works will be occurring near retained trees, instal protection to the trunk and branches of the trees as shown below in figure 6. A minimum height of two metres is recommended. Hessian or other padding is to be placed beneath strapped battens to protect the trunk and branches from physical damage.

Do not attach temporary power lines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

9.8. Ground Protection in areas of Temporary Access

Because temporary access will pass within TPZ's, ground protection measures are required. The purpose of ground protection is to prevent root damage and soil compaction within TPZ's. in areas of temporary construction access over TPZ's, instal a layer of permeable membrane such as geotextile fabric beneath a layer of mulch or single grain crushed rock (no fine materials or compacted). Finally, cover this with a layer of strapped rumble boards or manufactured rumble plates as per figure 6.

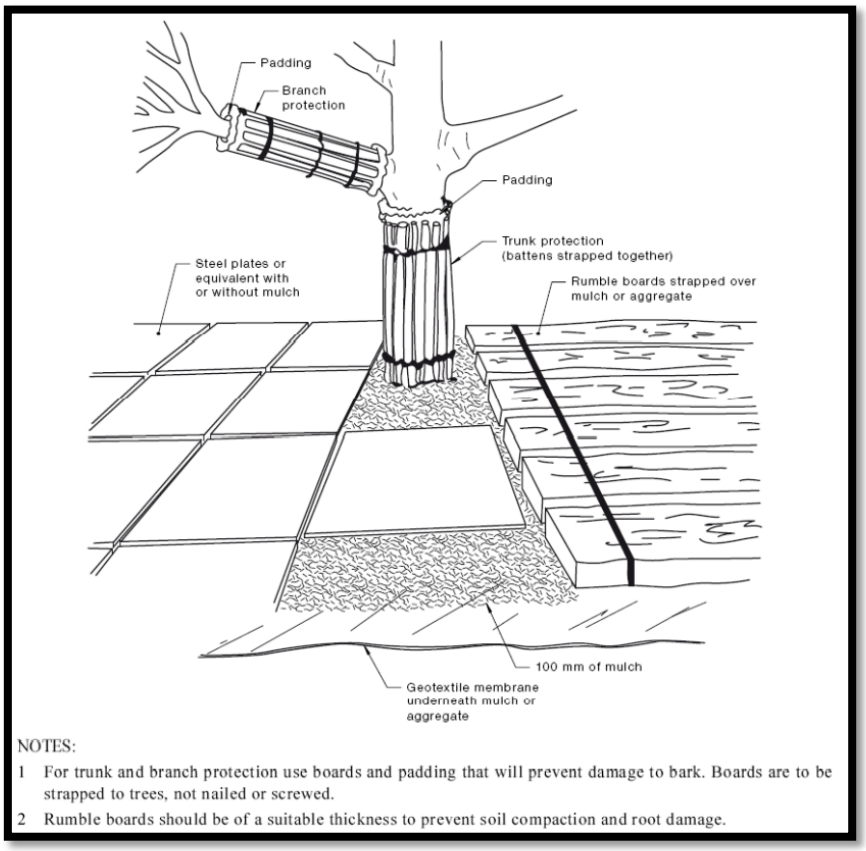


Figure 4 - Trunk, Branch and Ground Protection - AS4970

9.9. Program for Tree Protection

Project Arborist Monitoring

- All tree related matters must be discussed with the project arborist
- The builder / site manager is responsible to inform the project arborist of any issues during works
- The project arborist MUST supervise all work within any Tree Protection Zone
- The project arborist must maintain a monthly log including site visits, notes and photographs
- The project arborist must provide feedback to the owner / builder / notes and site manager / council.
- All tree related matters must be discussed with the project arborist
- Any pruning required must be in accordance with AS 4373-2007 Pruning of Amenity Trees, Standards Australia and completed by a level 3 qualified arborist or higher.
- Climbing spikes MUST NOT be used.

Project Hold Points

Prior to demolition of existing structures

1. Tree Protection Plan & Specifications must be onsite prior to works
2. Project arborist must oversee tree retention
3. Project arborist must inspect Tree Protection Fencing including adequate signage

During All works

1. The builder / site manager is responsible to inform the project arborist of any issues during works
2. Project arborist must inspect trees monthly, or as directed by the consent authority

Post Construction

1. Final Tree Inspection

Tree Removal Retention Plan (figure 5)

- Trees 1, 2, 3, 4, 6, 8, 9, 10 are a Priority for Removal.
- Trees 5, 7 are a Priority for Retention and require Tree Protection Fencing and Signage

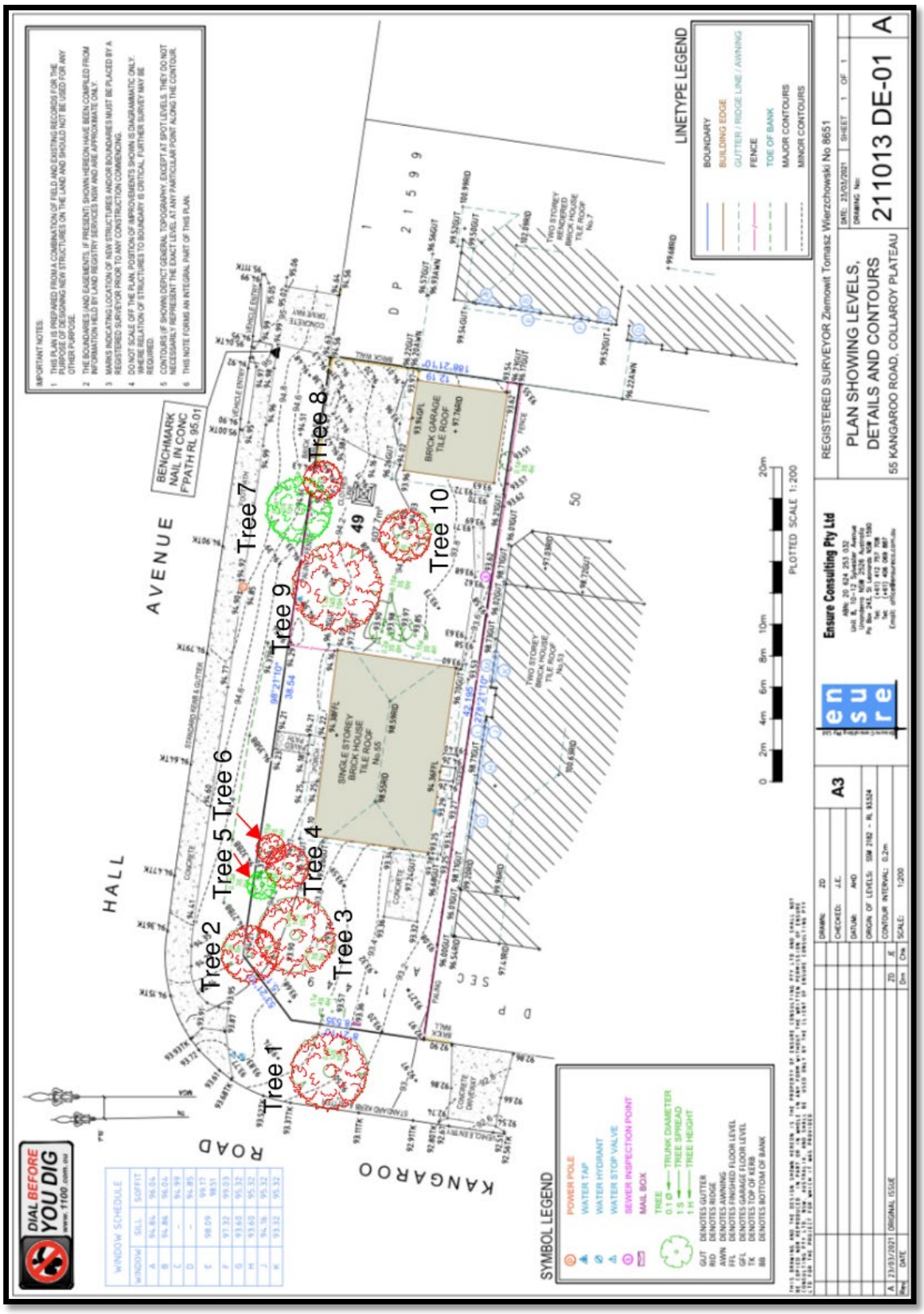


Figure 5 - Tree Retention and Removal Plan

10. Appendix

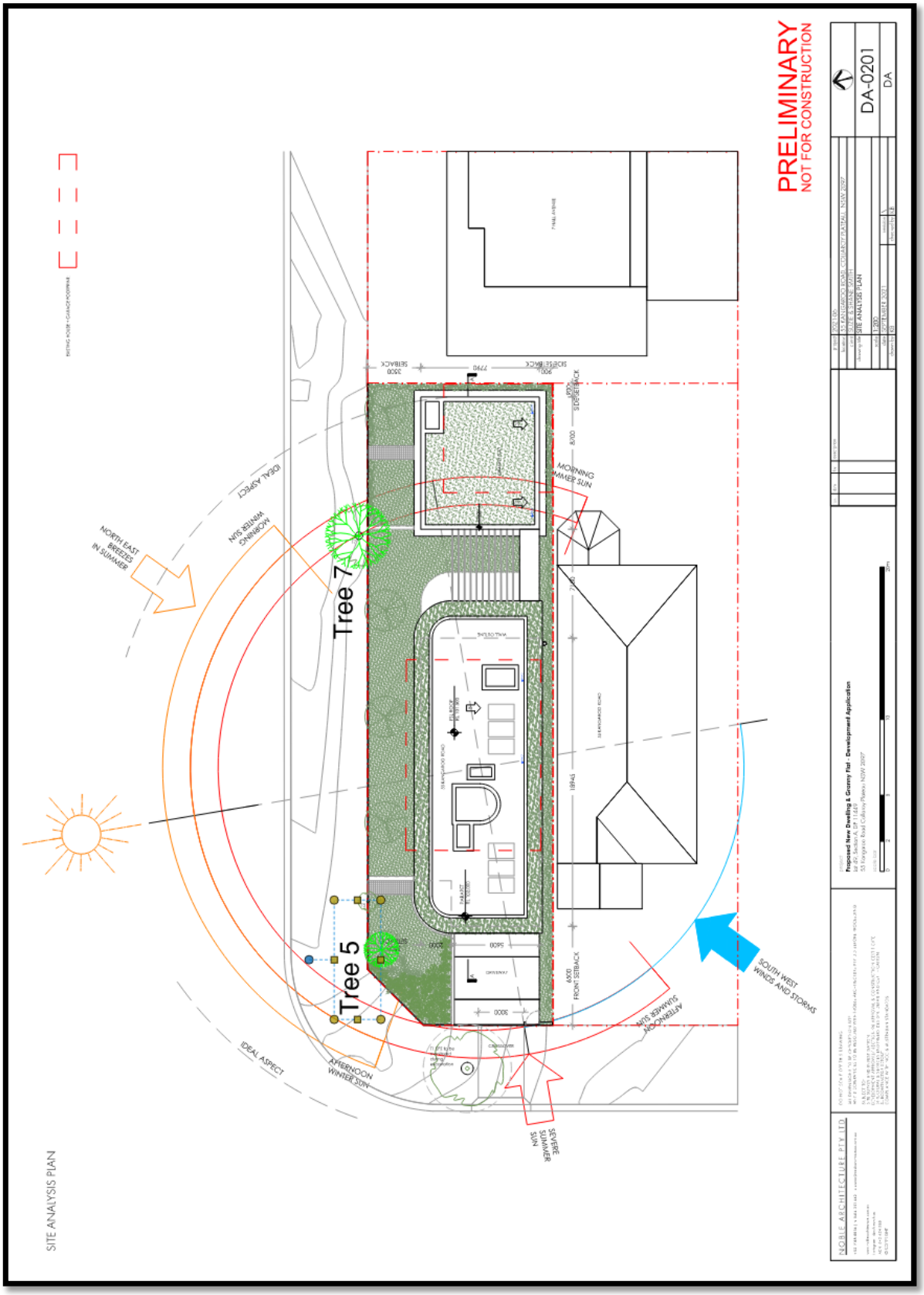


Figure 6- Plans of proposed dwelling with retained existing trees

IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA2010) ©

In the development of this document IACA acknowledges the contribution and original concept of the footprint green tree significance and retention value matrix, developed by Footprint Green Pty Ltd in June 2001.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on the site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the ACA dictionary for managing trees in urban environments 2009.

This rating system will assist in the planning process for proposed works, above and below ground where trees are to be retained on or adjacent a development site. This system uses a scale of *High, Medium*, and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined.

Tree Significance - Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vigour,
- The tree has a form typical for the species,
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age,
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils Significant Tree Register,
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity,
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values,
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour,
- The tree has form typical or atypical of the species,
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area,
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour,
- The tree has form atypical of the species,
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxonomy *in situ* - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

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

Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

***The tree is to have a minimum of three (3) criteria in a category to be classified in that group.**

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g., hedge.

USE OF THIS DOCUMENT AND REFERENCING

The IACA significance of a tree assessment rating system is free to use, but only in its entirety and must be cited as follows:

IACA, 2010 IACA significance of a tree assessment rating systems, institute of Australian consulting arborists, Australia www.iaca.org.au

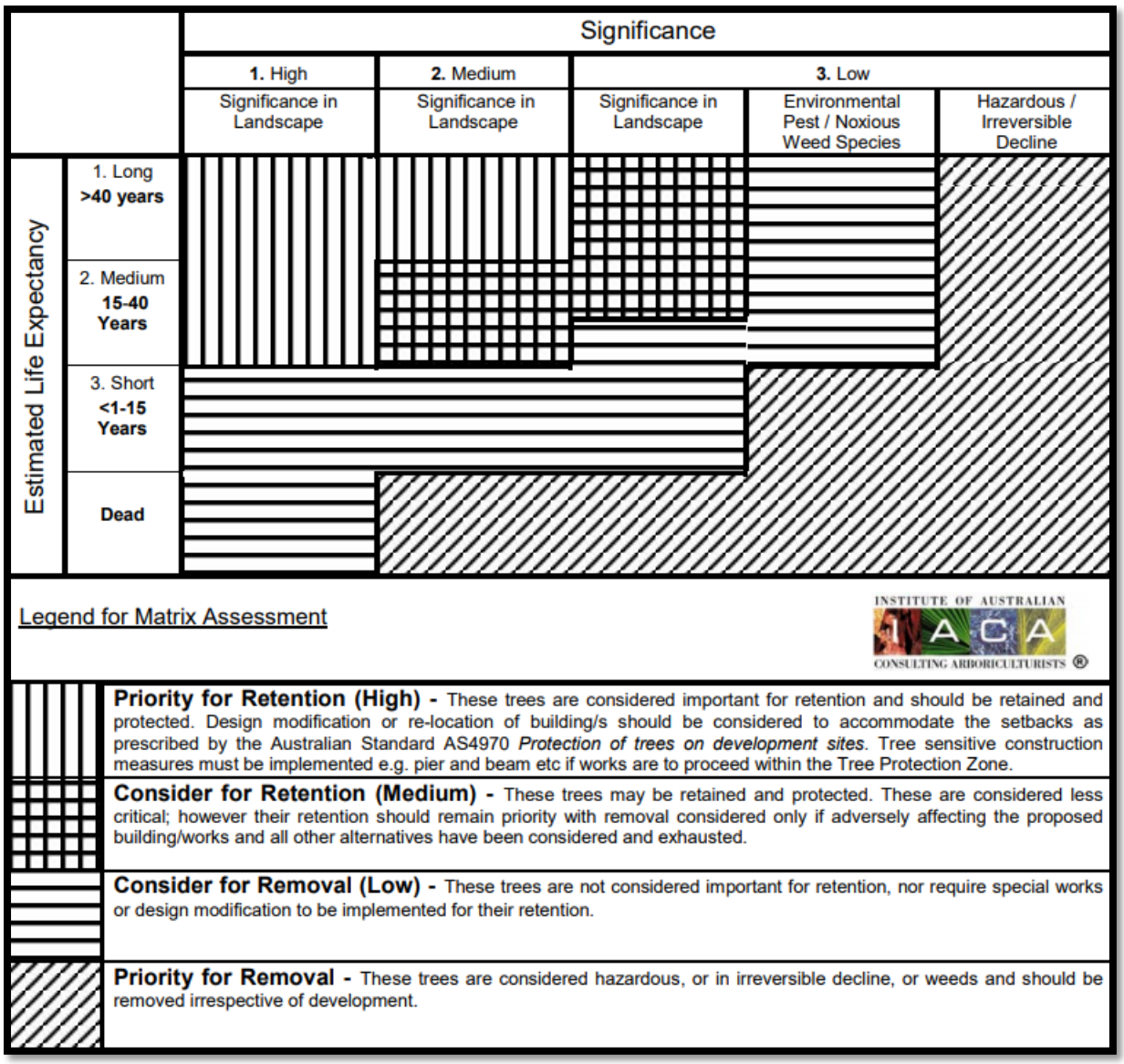
REFERENCES

Australia ICOMOS incorporated. 1999, *The Burra Charter – The Australian ICOMOS Charter for places of Cultural Significance. International Council of Monuments and Sites. www.icomos.org.australia*

Draper BD & Richards PA 2009, Dictionary for Managing Trees in Urban Environments, Institute of Australian Consulting Arborists, CSIRO publishing, Collingwood, Victoria, Australia.

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

Table 1. Tree Retention Value – Priority Matrix



S.U.L.E. (Safe Useful Life Expectancy) CATEGORIES (Barrell, 1995)

Commonly known as U.L.E in modern Arboriculture, however the methodology remains the same.

Safe Useful Life Expectancy (S.U.L.E) is a tree assessment method that estimates how long trees can be expected to be retained on a site, safely and usefully. It is best described as a planning tool that is used to indicate the most important and the least important trees on a construction site. Complex Arboricultural information is collected and transferred into an easy to interpret format that planners can use without too much distortion. This information is then used by a planner to design a development around the most appropriate of the existing trees.
Scope and limitations of SULE

S.U.L.E. is a method of assessing the relative importance of individual trees within an identified group (normally a development site with finite boundaries). It is based on subjective assessment and cannot be considered an absolute judgement. Realistically, the best that can be achieved is a broad categorisation of good, medium, and bad. Identifying the extremes of good and bad is not usually contentious; the medium category is normally the most difficult. S.U.L.E. helps the making of informed judgements on which trees are the most important in planning decisions. The nature of trees and opinions on trees is extremely variable; this means that there are always exceptions to the rules and common sense is an important aspect of applying the method. Only a person experienced and knowledgeable in the management of trees can carry out a competent S.U.L.E. assessment. S.U.L.E. is a means of presenting complex tree information in a simplified form that professionals with no tree expertise can understand and use to make judgements in the wider context. These professionals are normally layout designers who must decide which trees to keep and lose in planning new developments close to trees.

The S.U.L.E. assessment can be broken down into 12 separate stages that can each be recorded on a field assessment form. WARNING: Making these assessments requires extensive practical experience with trees and a high level of technical knowledge. These are summarised below but require further reference for more detailed explanation.

1. Estimate the age of the tree.
2. Establish the average life span of the species.
3. Consider how local environmental circumstances may modify average life span.
4. Estimate life expectancy (Subtract 1 from 3).
5. Consider how health will affect safety.
6. Consider how tree structure and size will affect safety.
7. Consider how location will affect safety.
8. Estimate safe life expectancy (4 modified by 5, 6 & 7).
9. Consider economics of management - costs must be reasonable.
10. Consider adverse effects on better trees.
11. Consider sustaining amenity - making space for new trees.
12. Estimate SAFE USEFUL LIFE EXPECTANCY (8 modified by 9, 10 & 11).

Benefits of S.U.L.E

Other methods of tree appraisal include the US Guide for Plant Appraisal published by the Council of Tree & Landscape Appraisers and the UK Helliwell Amenity Valuation System published by the Arboricultural Association. SULE is more appropriate for development site assessments for the following reasons:

1. It is quick: There are often many trees on development sites and time consuming methods are not cost effective. Experienced users can assess a tree in a matter of minutes, sometimes less, using SULE.
2. It is easy to understand: A categorisation of good, medium, and bad is easy for non-tree experts to understand and use.
3. It is traceable: The systematic nature of the methodology makes it easy to trace the reasoning behind an assessment, focusing the areas of disagreement between opposing experts.

Safe Useful Life Expectancy Categories (Updated 04/01)

This reference sheet should be included as supplementary information with all reports where a S.U.L.E assessment is an element.

1: Long SULE: Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.

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

2: Medium SULE: Trees that appeared to be retainable at the time of assessment for 15–40 years with an acceptable level of risk.

(a) Trees that may only live between 15 and 40 more years.
(b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.
(c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(d) Trees that could be made suitable for retention in the medium term by remedial tree care.

3: Short SULE: Trees that appeared to be retainable at the time of assessment for 5–15 years with an acceptable level of risk.

(a) Trees that may only live between 5 and 15 more years.
(b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
(c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.

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

(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions.
(b) Dangerous trees because of instability or recent loss of adjacent trees.

(c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
(d) Damaged trees that are clearly not safe to retain.
(e) Trees that could live for more than 5 years but may be removed to prevent interference with
(f) more suitable individuals or to provide space for new planting.
(g) Trees that are damaging or may cause damage to existing structures within 5 years.
(h) Trees that become dangerous after removal of other trees for the reasons given in (a) to (f).
(i) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.

5: Small, young, or regularly pruned: Trees that can be reliably moved or replaced.

(a) Small trees less than 5m in height.
(b) Young trees less than 15 years old but over 5m in height.
(c) Formal hedges and trees intended for regular pruning to artificially control growth.

NOTE:
No tree is "safe" i.e., entirely without hazard potential. The SULE rating given to any tree in this report assumes that reasonable maintenance will be provided by & qualified arborist AQF Level 2, 3, 5, 8 using correct and acknowledged techniques as outlined in various Guidelines, Acts, Legislation and Australian Standards. Retained trees are to have a reasonable setback and be protected from root damage. Incorrect practices can significantly accelerate tree decline and increase hazard potential. Vertical Tree Management and Consultancy holds no responsibility for what happens on a development site that is out of our control.

For an end user appreciation, further reading and understanding may be required. Should you wish to obtain a further understanding of this content, VTM can direct you, to obtain a more substantial content of information and research material.

References:
Barrell, J., (2001) 'Safe Useful Life Expectancy Categories updated 4/01' from Management of Mature Trees

	1 LONG	2 MEDIUM	3 SHORT	4 REMOVAL	5 MOVED OR REPLACED
	Likely to be useful for over 40 years with acceptable risk and assuming reasonable maintenance	Likely to be useful for 15-40 years with acceptable risk and assuming reasonable maintenance	Trees that appeared to be retainable at the time of assessment for 5 to 15 years with acceptable level of risk.	Tree to be removed within the next 5 years	Tree which can be reliably moved or replaced.
A	Structurally sound trees growing in positions that can accommodate future growth	Trees which may only live 15-40 years	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small tree less than 5m in height.
B	Trees which could be made suitable for long term retention by further care	Trees which may live for more than 40 years but which would be removed for safety or nuisance reasons	Trees which may live for more than 15 years but which would be removed for safety or nuisance reasons	Dangerous trees through instability or recent loss of adjacent trees.	Young trees less than 15 years old but over 5m in height.
C	Trees of special significance for history, commemorative or rarity reasons that warrant extraordinary efforts to secure their long term future	Trees that may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings	Dangerous trees through structural defects including cavities, decay included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees which could be made suitable for medium term retention by remedial care	Trees which require substantial remediation tree care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings	
F				Trees damaging Or which may cause damage to existing structures within the next 5 years	
G				Trees that will become dangerous after removal of other tress for reasons given in A) to F)	

11. Glossary

Aerial inspection - a close inspection of the aerial part of a tree, either by elevated work platform (EWP) or by an AQF level 3 arborist (climbing inspection).

Air spade - equipment providing a jet of compressed air to a hand-held device which helps to excavate roots almost non-destructively.

Amenity tree – a tree grown for purposes other than for production**.**

***AS4373*-2007** – Current Australian Standard for the Pruning of Amenity Trees**.**

AQF – Australian Qualification Framework for all educational and training purposes.

Axiom of uniform stress - is a self-optimizing structure because the growth of new wood tends to eliminate any stress concentrations, maintaining a uniform stress distribution.

Bacteria - one of the five kingdoms of living things. Some cause diseases, many are decomposers, and some are beneficial (such as nitrifying bacteria and those in the gut of animals).

Bark cambium (cork cambium, phellogen) - Layers of meristematic cells on the outer side of the phloem that give rise to the bark.
Branch order - The seedling axis, typically giving rise to the main stem, has a branch order of 0. Branches arising from axillary buds on the seedling axis are first-order branches, branches arising from them are second order and so on, the shoots at the periphery of the crown having the highest order.

Callus - cells that forms over an injury or scar, that develops from actively dividing plant tissue.

Canker - A discrete area of dead or malformed bark caused by a pathogen.

Canopy - Of a single tree, its crown, emphasizing its spreading and enclosing character. Of a forest, the crowns of the larger trees considered collectively.

Chlorophyll - The pigment in green plants and a kind of bacteria (cyanobacteria) that permits photosynthesis. Chlorophyll is green because it absorbs light most strongly in the blue and red regions of the visible spectrum, reflecting the green.

Compartmentalization - A form of defense in woody plants, in which barriers resistant to invasion by pathogens or wood decay fungi are laid down while the wood is living (sapwood), and which continue to act passively once the wood is incorporated into heartwood.

Deadwood - Dead and decomposing wood including dead trees (whether standing, snapped or fallen), branches of any size, stumps and roots.

Defect - Any feature of a tree that is likely to make it less safe (in the case of a structural defect) or otherwise to reduce its health, longevity, landscape prominence or conservation value for any other reason.

Diameter - Broadly, the width of a cylindrical object like the main stem of a tree.
dbh – the diameter of a stem measured at breast height i.e. 1000mm.

Dip. Arb. – Diploma in Arboriculture.

Drip zone – the area from one edge of the canopy to the other.
Expert witness - Someone capable of giving an expert opinion, to be relied upon in some official or legal process.

Fastigiate - A growth habit with branches strongly ascending, like Lombardy poplar. A common ornamental form.

Fiber buckling A local transverse failure in compression of the outer wood of a stem as it sways in a strong wind. The resulting adaptive growth gives rise to a characteristic ring-like bulge around the stem.

First-order branch – a branch which emanates directly from the trunk, in contrast to a scaffold branch, sometimes referred to as a primary branch.

Flush cut - A pruning cut that removes the branch collar and/or part of the branch ridge, slowing the occlusion of the wound.

Footing - A relatively broad base to a foundation to help spread load and improve the stability of a structure.

Fungi (singular 'fungus') - One of the four main groups (kingdoms) of organisms. There are two groups of higher fungi, the Basidiomycetes and Ascomycetes, while other groups are moulds. Many fungi are decomposers, including the relatively specialized wood decay fungi. Some are plant pathogens, some are symbiotic (see mycorrhiza, lichen) and some are cultivated by insects for food (see ambrosia beetle).

Included bark - Areas of bark on adjacent parts of a tree, typically on the inner faces of a narrow fork, which become grown over to occupy part of the internal joint.

Ganoderma spp. - A common wood decay fungus of the selective delignification type, causing root rot and butt rot mainly in

broadleaf trees. The fruiting bodies of the fungus are woody brackets, commonly occurring in the flutes between the buttresses of big trees near ground level.

Heartwood - In a branch, main stem or root of sufficient diameter, the non-living inner wood, in contrast to the sapwood in which the xylem parenchyma cells are alive.

Lignin - A constituent of some plant cell walls making them stiff and woody. About 1/3 of the dry weight of wood is lignin.

Lion-tailing - A long branch with a tuft of secondary branches near the tip, a marked form of end loading, either arising naturally or from poor pruning practice.

Mistletoe - A semi-parasite, having green leaves for photosynthesis but growing into the host to obtain water and nutrients.

Mycelium - A network of hyphae making up the vegetative part of a fungus.

Mycelium - A network of hyphae making up the vegetative part of a fungus.

Osmosis - The flow of water across a semi-permeable membrane from a dilute solution to a more concentrated one, as from the soil water into a root cell or from the xylem into a leaf cell.

Quantified tree risk assessment (QTRA) - A refinement of visual tree assessment with emphasis on seeking to quantify the component probabilities of tree risk, particularly the occupancy of the target area, to arrive at an overall numerical or categorical risk.

Root Zone - Area encompassing the tree roots

Scaffold branch – a branch which emanates from a first-order branch, also known as a second-order branch.

Structural defect - A defect in a structure that makes it less able to withstand the forces applied to it.

t/R ratio - In hollow tree stems, the ratio of the thickness of sound wood to the radius. A criterion helpful in evaluating tree risk developed by Mattheck & Breloer (1994)

Tension wood - The kind of reaction wood found in broadleaf trees which is strong in tension and is characterized by a low lignin content.

Tree risk - The risk that a tree causes damage or injury if it (or part of it) suffers structural failure. Tree risk is a composite of several variables: hazard, probability, target value and occupancy.

Urban forest - Trees and other woody vegetation in the built environment considered collectively over an extensive area (eg. the jurisdiction of a local authority).

Vigour – the genetic capacity (potential) of a tree to resist strain. Vigour can be measured by applying a known stimulus [such as a wound] and then measuring the trees response. Vigour cannot be increased. Vigour is classified as either ‘normal’ or ‘low’ (Shigo, 1986, p.120).

Vitality – the ability (dynamic) of a tree to adapt to the conditions in which it finds itself. Vitality can be improved by; watering, mulching, fertilizing, aerating etc. (Shigo, 1986, p. 120). For the purpose of this report vitality shall be classified as either low or good.

VTA - Visual Tree Assessment

Windthrow- The fall of a tree in a high wind, with the breakage of the outer roots, so that the tree is uprooted. There are three main modes of windthrow.