Vertical

Tree Management & Consultancy

# *Arboricultural Impact Assessment*

# *&*

# *Tree Protection Plan*

Commissioned by: Dick Crampton

Site: 918 Barrenjoey Road Palm Beach 2108

Date of review: 24 March 2022

Version: 3.1


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# 1. Introduction / Aims/ Objectives

## 1.1. Introduction

This Arboricultural Impact Assessment has been prepared by Derek Arnaiz of Vertical Tree Management and Consultancy for the client Dick Crampton. The report shall assess the viability of the site trees and neighbouring property trees in relation to the proposed alteration & addition of a multi-storey dwelling.

The trees mentioned within this report are located within the site, 918 Barrenjoey Road and within 2 neighbouring properties known as 916 and 920 Barrenjoey Road Palm Beach.

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 Northern Beaches (Pittwater) Development Control Plan and Local Environmental Plan.

The trees inspected for the purpose of this report are trees numbered 1-5.

## 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

918 Barrenjoey Road, Palm Beach, 2108 (16/-/DP650061) is located within The Northern Beaches Local Government Area, 5 individual trees have been assessed in this Arboricultural Impact Assessment within the site and neighbouring properties.

The site has been identified on the Biodiversity Values Map and Threshold Tool as a parcel containing sensitive vegetation. Threatened species or communities (Pittwater Spotted Gum Forest, Littoral Rainforest) with potential for serious and irreversible impacts (figure 2).

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

The site is zoned as E4 – Environmental Living

**Figure 1 - Aerial image of the site (sixmaps 2021)**

**Figure 2 - Aerial image of the site indicating threatened communities in purple**

## 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 Review** was undertaken by the author and the client on 24 March 2022.

**2.2 Assessment of potential impacts** on the trees in the immediate vicinity of the property and adjacent nature strip.

**2.3 Plans Provided by the Client**

Vertical Tree Management has received the below plans prepared by Matt Goodman ARCHITECTURE OFFICE.

- Site Survey Drawing Number DA005 Revision 2
- Site Analysis Drawing Number DA005 Revision 2
- Existing Demolition and Site Plan Drawing Number DA005 Revision 2
- Proposed Site Plan Drawing Number DA005 Revision 2
- Garage Floor Plan Drawing Number DA005 Revision 2 Lower Ground Floor Plan
- Ground Floor Plan Drawing Number DA005 Revision 2
- Demolition Elevations Drawing Number DA005 Revision 2
- Proposed Elevations Dwelling/Garage Drawing Number DA005 Revision 2
- Proposed Elevation Pool Drawing Number DA005 Revision 2
- Proposed Sections Drawing Number DA005 Revision 2
- 3D Perspectives Drawing Number DA005 Revision 2
- Shadow Diagrams Drawing Number DA005 Revision 2
- Landscape Area Plan Drawing Number DA005 Revision 2
- Elevation & Fill Plan Drawing Number DA005 Revision 2
- Waste Management Site Plan Drawing Number DA005 Revision 2

**2.4 Tree numbering** system was assigned to the trees 1-5 (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. Preliminary Tree Assessment Data of trees located on site

| | Species | Height | Spread | *DBH | **DGL | ***TPZ | ^SRZ | Age Class | Health | Condition | Significance | ULE | Retention Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Eucalyptus piperita* Sydney Peppermint | 17 | 21 | 690 | 790 | 8.2 | 3 | Mature | Fair | Fair | Low | 3 Short | Remove |

Notes:

The Sydney Peppermint tree growing adjacent to the top stairs in the rear yard of the property is in fair health and fair structure. The root crown of the tree appears to be growing on a rock shelf. This rock shelf is predominantly sandstone with a soil type of loamy sand. The root crown of the tree appears strong with good taper and no obvious defects. The tree is growing on a 45 degree lean towards the South. The tension roots of the tree are under significant stress due to this phototropic lean. The stem of the tree appears strong with no obvious defects; however, it is heavily phototropic. On the main stem of the tree are various locations of previous pruning, these appears to be healing well. Within the crown of the tree the branches extending from the main stem are poorly structured with a moderate to high likelihood of failure. The crown of the tree is 30% epicormic and poorly structured. At 10 metres from ground level the tree is overextended and horizontal. The canopy of the tree appears to be in fair declining health with a sparse canopy. Most of the canopy is over the existing dwelling and over the proposed dwelling. This tree is in a moderate risk category.

| Number | Species | Height | Spread | *DBH | **DGL | ***TPZ | ^SRZ | Age Class | Health | Condition | Significance | ULE | Retention Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | *Eucalyptus piperita* Sydney Peppermint | 18 | 22 | 640 | 720 | 7.7 | 2.9 | Mature | Fair | Fair | Low | 3 Short | Remove |

Notes:

The mature Sydney Peppermint tree is growing on the shared property boundary, with over 50% of the stem growing from 920 Barrenjoey Road. This tree is growing on a 45 degree lean towards the South. The lean appears to have corrected itself overtime as most of the canopy from 15 metres from ground level is up right. This heavily phototropic lean is putting significant strain on the tension roots of the tree within the loamy sand. The stem of the tree appears strong with no obvious defects. The canopy of the tree is in fair health however it is sparse. The tree contains over 30% deadwood with significant tip dieback within every branch in the canopy. This tree has poorly structured branch unions throughout the overextended stem. Since most of the canopy is over the existing dwelling and over the proposed dwelling, it places this tree in a moderate risk category.

| Number | Species | Height | Spread | *DBH | **DGL | ***TPZ | ^SRZ | Age Class | Health | Condition | Significance | ULE | Retention Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | *Corymbia gummifera* Red Bloodwood | 16 | 13 | 330 | 520 | 3.9 | 2.5 | Mature | Fair | Fair | Low | 2 Medium | Remove |

Notes:

The mature Red Bloodwood tree is growing on the shared property boundary within 916 Barrenjoey Road. This tree is in good health and good structure with no obvious defects. The tree is growing at 2.8 metres from the external wall of the current dwelling within the site. The tree's root zone and root crown appear strong with no obvious defects. The stem of the tree appears strong with no obvious defects however minor stem canker was observed on the western side of the stem at ground level to 1 metre. The canopy of the tree has been significantly crown raised to accommodate both dwellings in proximity of this tree. The canopy of the tree is in good health and good structure with no obvious defects. The tree has 30% epicormic growth likely because of reduced sunlight availability from the surrounding canopy trees to the north.

***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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | *Eucalyptus acmenoides* White Mahogany | 21 | 17 | 530 | 940 | 6.3 | 3.2 | Mature | Good | Fair | Moderate | 2 Medium | Remove |

Notes:

The White Mahogany located within the centre of the front yard is in good health and fair structure. The root crown of the tree appears strong with good taper and buttressing within the exposed 50% of the stem and root crown visible, the remaining 50% is supporting the retaining wall to the north and was unable to be observed. This tree is believed to be reaching over maturity as small pockets of decay were observed between the root buttressing when probed. At this location from ground level to 1 metre from ground level there was some termite mudding observed however no live termites or arboreal nests were discovered at time of inspection. At 6 metres from ground level there is a heavily included branch union extending from the mainstem to the southwest. This tightly compressed union has a high likelihood of failure and is considered a defect. Above this location throughout the stem of the tree there were no additional obvious defects observed. The crown of the tree appears to be in good health and good structure with no obvious defects. The tree has been significantly crown raised over the years to improve water views. The upper crown of the tree appears sparse and contains approximately 10% deadwood.

| Number | Species | Height | Spread | *DBH | **DGL | ***TPZ | ^SRZ | Age Class | Health | Condition | Significance | ULE | Retention Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | *Glochidion ferdinandi* Cheese Tree | 16 | 17 | 510 | 620 | 6.1 | 2.7 | Over Mature | Poor | Poor | Low | 4 Remove | Remove |

Notes:

The over mature Cheese Tree located at the front driveway and access steps to the property is in poor health and poor structure. This tree has reached over maturity and is in advanced stages of decline. The tree at ground level has fair structure and appears to be growing on top of a rock shelf. The tree has good taper with no visual defects within the root crown. The stem of the tree appears strong however has a gnarled and twisted appearance and structure. The branch unions throughout the tree appear strong with no visual defects. The canopy of the tree has 20% live canopy remaining. This tree is in over maturity and in advanced, irreversible 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.

| Tree Number | Incursion Percentage % | Retention Value |
|---|---|---|
| 1 | Asymmetric root plate N/A | Retain with conditions |
| 2 | 15 | Remove (APZ Targets) |
| 3 | <5 | Retain |
| 4 | 6.4% minor | Retain |
| 5 | 100 | Remove poor health and condition |

## 6. Discussion

### 6.1.1 Tree 1 – *Eucalyptus piperita*

The Sydney Peppermint tree growing adjacent to the top stairs in the rear yard of the property is in fair health and structure. The root crown of the tree appears to be growing on a rock shelf. This rock shelf is predominantly sandstone with a soil type of loamy sand. The root crown of the tree appears strong with good taper and no obvious defects. The tree is growing on a 45 degree lean towards the South. The tension roots of the tree are under significant stress due to its significant phototropic lean. The stem of the tree appears strong with no obvious defects; however, it is heavily phototropic. Within the crown of the tree the branches extending from the main stem are poorly structured with a moderate to high likelihood of failure. The crown of the tree is 30% epicormic and poorly structured. At 10 metres from ground level, the tree is overextended and horizontal. The canopy of the tree appears to be in fair declining health with a sparse canopy. With most of the canopy being over the existing dwelling and over the proposed dwelling place, it falls in the moderate risk category.

**6.1.2 Review information -** The construction of the above ground pool, stairs and re-construction of the retaining wall will be in the existing footprint of the existing retaining wall and concrete slab. The location of the existing infrastructure has resulted with the tree having an asymmetric root plate. Therefore, the TPZ incursion calculations may be inaccurate in accordance with the Australian standard 7970 “Protection of trees on Development Sites”.

It is imperative that works do not exceed beyond the existing footprint. No tree roots may be affected adjacent to the tree. The root plate has accommodated to existing structures and are likely to be hard against the retaining wall. Tree roots on the uphill aspect are under tensile forced and cannot be disrupted or affected in anyway. The site arborist must be present during demolition and excavation within the Tree protection Zone. Excavation shall not exceed the existing footprint of the existing structures. Furthermore, Tree sensitive engineering pier footings must be used within the TPZ. For structural support footings the location must be verified via root mapping. Non-destructive excavation and certified by the site arborist.

### 6.2.1 Tree 2 – *Eucalyptus piperita*

The mature Sydney Peppermint tree is growing on the shared property boundary with the majority within 920 Barrenjoey Road and is considered a priority for removal. This tree is growing on a 45 degree lean towards the South. The lean appears to have corrected itself overtime as most of the canopy from 15 metres above ground level is up right. This heavily phototropic lean is putting significant strain on the tension roots of the tree within the loamy sand. The canopy of the tree is in fair health; however, it is sparse. The tree contains over 30% deadwood with significant tip dieback within every branch in the canopy. This tree has poorly structured branch unions throughout the overextended stem. With most of the canopy over the existing dwelling and over the proposed dwelling, it falls in a moderate risk category. The excavations required for the installation of the inclinator, side access and proposed dwelling will have a significant impact on the SRZ and TPZ of this tree (figure 3). The proposed construction will have an irreversible effect on this tree.

**6.2.2 Review information.** The tree has a heavy lean over the existing dwelling. To be able to achieve Asset protection Zone targets the tree is recommended to be removed as there is no viable pruning optionfor branches in a manner that does not overhang the dwelling and in accordance with the Australian Standard AS4373 “Pruning of Amenity Trees”. This is due to the entire canopy overhanging the dwelling.

### 6.3.1 Tree 3 – *Corymbia gummifera*

The mature Red Bloodwood tree is growing on the shared property boundary with 916 Barrenjoey Road. This tree is in good health and good structure with no obvious defects. The tree is growing at 2.8 metres from the external wall of the current dwelling within the site. The canopy of the tree has been significantly crown raised to accommodate both dwellings in proximity of this tree. The canopy of the tree is in good health and good structure with no obvious defects. The tree has 30% epicormic growth, likely because of reduced sunlight availability from the surrounding canopy trees to the north. The construction of the proposed dwelling has proposed a permeable deck which will all rainwater filtration to promote root growth. The construction of the proposed structures will result in an incursion of less than 5%. This level of incursion is considered acceptable. No mechanical excavation within the highlighted area within figure 7 is permissible unless under the supervision of The Project Arborist or an AQF5 Consulting Arborist. This tree is requiring tree protection fencing and signage to be erected during the proposed construction.

### 6.4.1 Tree 4– *Eucalyptus acmenoides*

The White Mahogany located within the centre of the front yard is in good health and fair structure. The root crown of the tree appears strong with good taper and buttressing. This tree is believed to be reaching over maturity as small pockets of decay were observed between the root buttressing when probed. At this location from ground level to 1 metre from ground level there was termite mudding observed, however no live termites or arboreal nests were discovered at time of inspection. At 6 metres from ground level there is a heavily included branch union extending from the mainstem to the southwest. This tightly compressed union has a high likelihood of failure and is considered a defect. The tree has been significantly crown raised over the years to improve water views. The upper crown of the tree appears sparse.

**6.4.1 Review** The proposed garage, driveway entrance, retaining wall and pathway, have been significantly re-designed. The modifications have been applied resulting in a minor incursion of the TPZ only. The incursion has been calculated to be 6.4% of the outer perimeter of the TPZ. The impact to the tree will be negligible to the health and vitality to the tree.

### 6.5. Tree 5 – *Glochidion ferdinandi*

The over mature Cheese Tree located at the front driveway and access steps to the property is in poor health and structure. This tree has reached over maturity and is in advanced stages of decline. The tree at ground level has fair structure and appears to be growing on top of a rock shelf. The canopy of the tree has 20% live canopy remaining. This tree is in over maturity and in advanced, irreversible stages of decline and considered a priority for removal.

## 7. Recommendations:

- Tree 1 - The site arborist must be present during demolition and excavation within the Tree protection Zone. Excavation shall not exceed the existing footprint of the existing structures. Furthermore, tree sensitive engineering pier footings must be used within the TPZ. For structural support footings the location must be verified via root mapping. Non-destructive excavation is required in addition to certification by the site arborist. The tree is recommended to be retained.

- Tree 2 - To be able to achieve Asset Protection Zone targets there is no viable pruning option of branches in a manner that does not overhang the dwelling and in accordance with the Australian Standard AS4373 “Pruning of Amenity Trees”. The tree is recommended to be removed.

- Tree 3 - The tree is recommended to be retained.

- Tree 4 – Works will result in a minor incursion of 6.4% of the TPZ. No adverse impact will result from the works.

- Tree 5 - The tree is in advanced decline and there are no viable remediation methods. The tree may be replaced with the same species.

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**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.

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| Date | Version | Prepared By | Approved by Principal |
|---|---|---|---|
| 19 August 2021 | 1 | Michael Garton | Derek Arnaiz |
| 29 October 2021 | 2 | Michael Garton | Derek Arnaiz |
| 14 February 2022 | 3.0 - Review | Derek Arnaiz | Derek Arnaiz |
| 24 March 2022 | 3.1 Review (redesign) | Derek Arnaiz | Derek Arnaiz |

## 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

The site has been identified on the Biodiversity Values Map and Threshold Tool as a parcel containing sensitive vegetation, threatened species or communities with potential for serious and irreversible impacts (figure 2). Tree protection measures to protect these areas identified within biodiversity mapping tool are required.

Figure 7 indicates the locations of tree protection fencing and signage to be erected. This plan is to be used as a guide. Site constraints, location of services and unforeseen obstacles may impede fencing. The Project Arborist (Vertical Tree Management & Consultancy) or an AQF5 Arborist can modify and certify all tree protection measures.

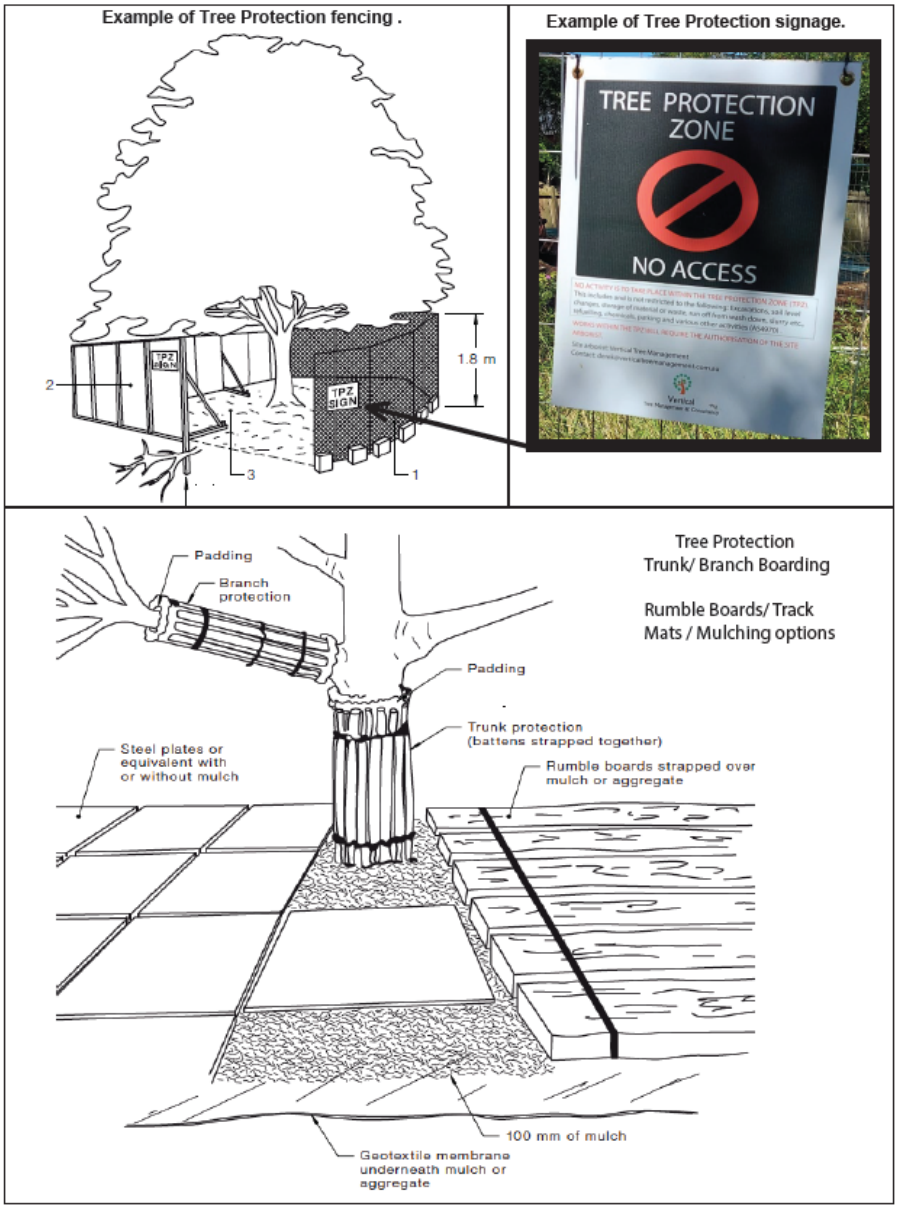



**Figure 3 - Example of Tree Protection**

## 10. Appendix

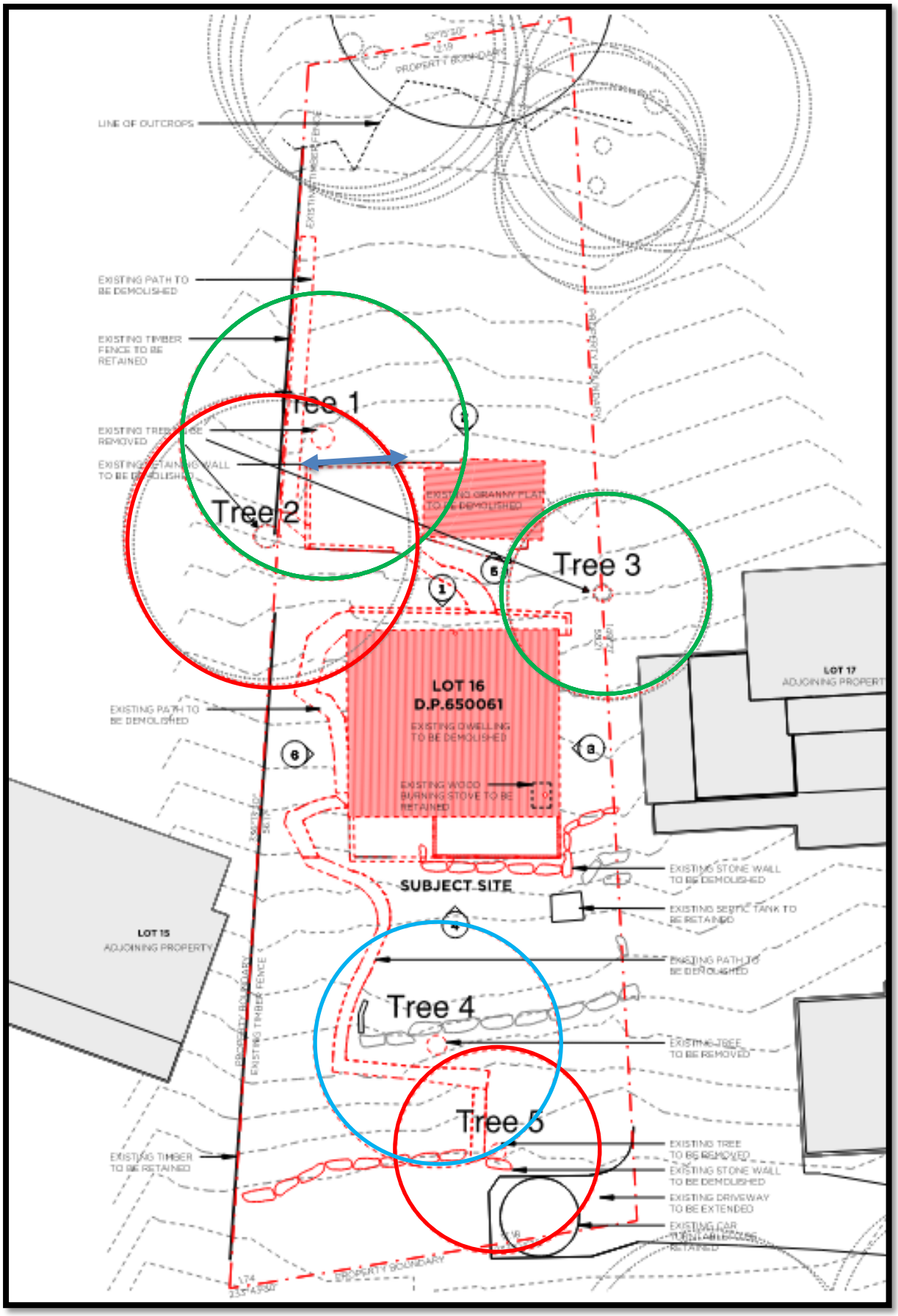
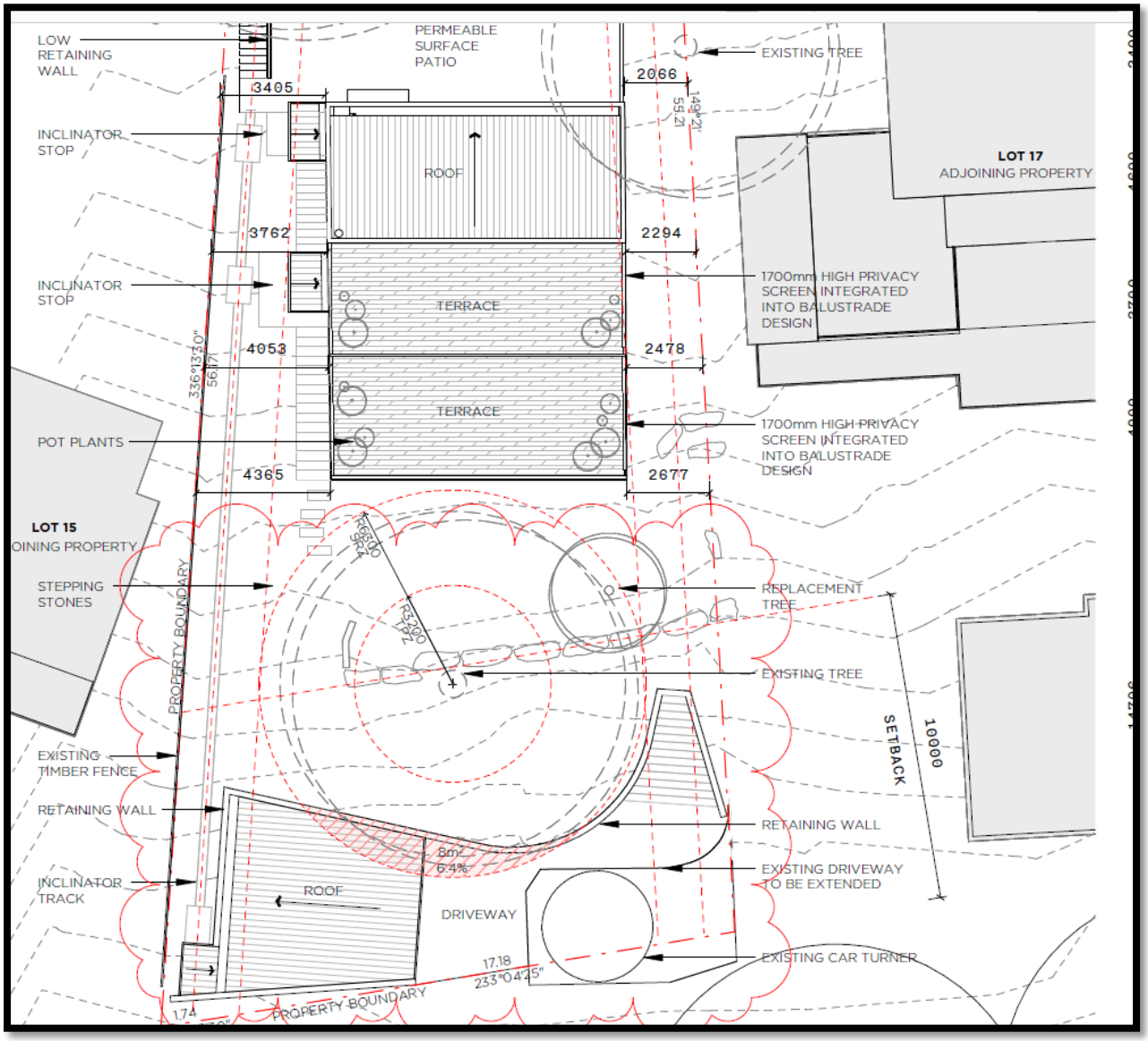



Figure 4 - Existing Site Plan – Trees retained – Green, Remove – red, Further investigation – blue.




Tree 4 – redesign will result in a minor incursion 6.4%

## 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

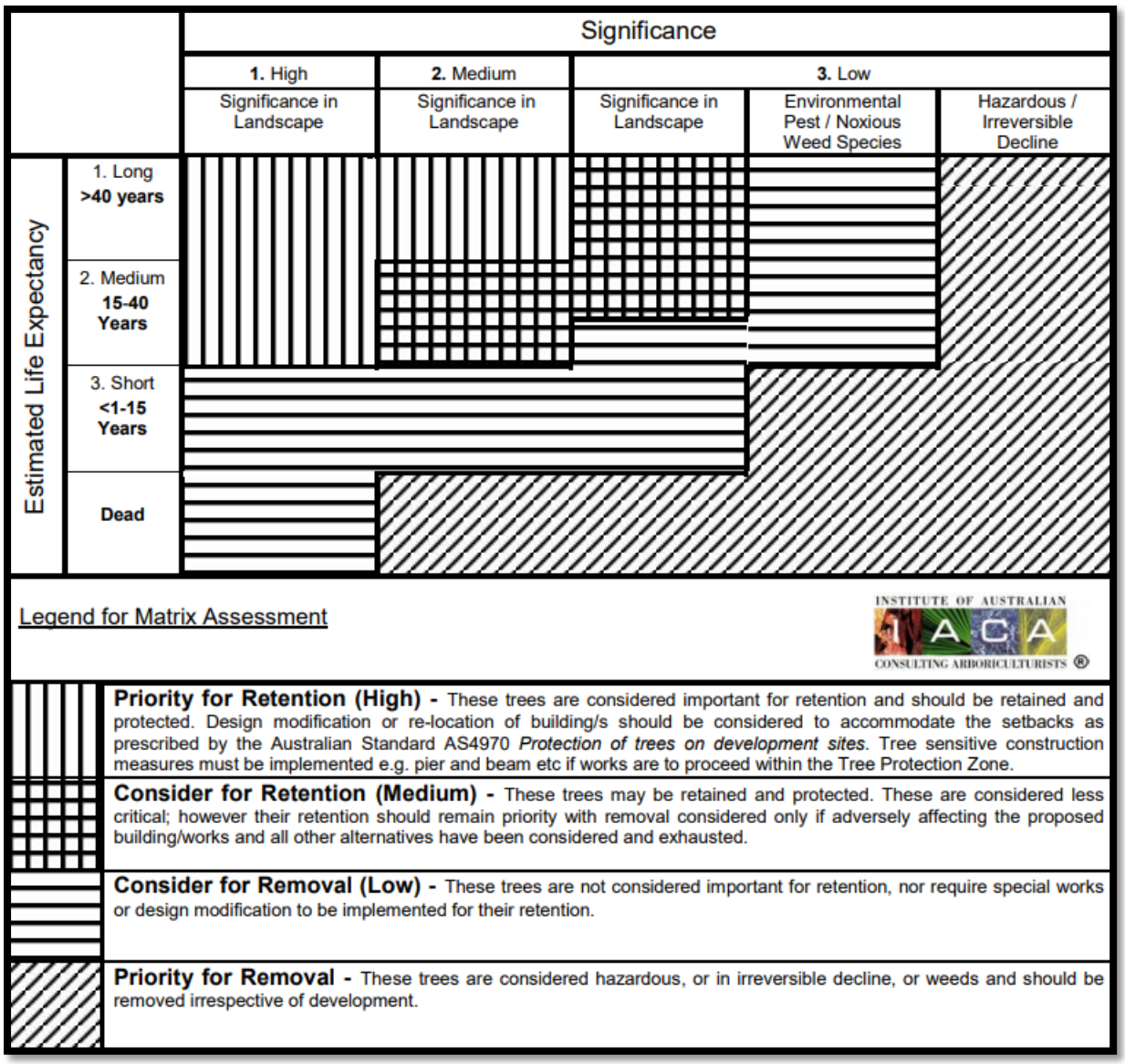
**REFERENCES**


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**




IACA2010, IACA Significance of a Tree Assessment Rating System (STARS), Institute of Australian Consulting Arborists. www.iaca.org.au

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

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## 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<br>LONG | 2<br>MEDIUM | 3<br>SHORT | 4<br>REMOVAL | 5<br>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<br>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.