Vertical

Tree Management & Consultancy

Tree Survey and Tree Condition Report

Commissioned by [redacted]

Site: 27 Fourth Avenue Llandilo 2747

Date of Inspection: 24 May 2021

Version: 3

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AQF 5 Diploma Horticulture, Arboriculture

Cert IV Environmental Management & Sustainability

Tree Risk Assessment Qualification – (TRAQ)

Quantified Tree Risk Assessment – (QTRA)

VERTICAL TREE MANAGEMENT & CONSULTANCY

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1. Introduction

This Arboricultural Tree Survey and Tree Condition Report version 3 has been prepared by Consulting Arborist Michael Garton for the client [redacted] The report shall provide a detailed summary of trees within the property in relation to the placement of a proposed dwelling.

The trees are located within the subject property known as 27 Fourth Avenue Llandilo. The location will be referred to as the site from here within. The site is located within The Penrith City Council Local Government area and is subject to the relevant Local Government Local Environmental Plan and legislative framework. The property is zoned RU4: Primary Production Small Lots.

1.1. Aims

This report shall assess the trees within the site that have the potential to be impacted by a potential dwelling. 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.
- 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).

1.2. Objectives

- Assess the condition of the trees.
- Provide recommendation for management and protection strategies for site trees.
- Calculate Tree Protection Zones and Structural Root Zones.

1.3. The Site

Located within The Penrith City Local Government area, the trees on this site are being assessed for the proposed construction of a single storey dwelling.

The property is zoned RU4: Primary Production Small Lots. The street frontage is on Fourth Road. Surrounding the site are neighbouring properties to the East and West with Berkshire Park / Castlereagh Nature reserve to the North of the property. No trees on adjacent properties were requested for inspection for the purpose of this report.

11 trees and 2 groupings of trees were assessed for the purpose of this report.

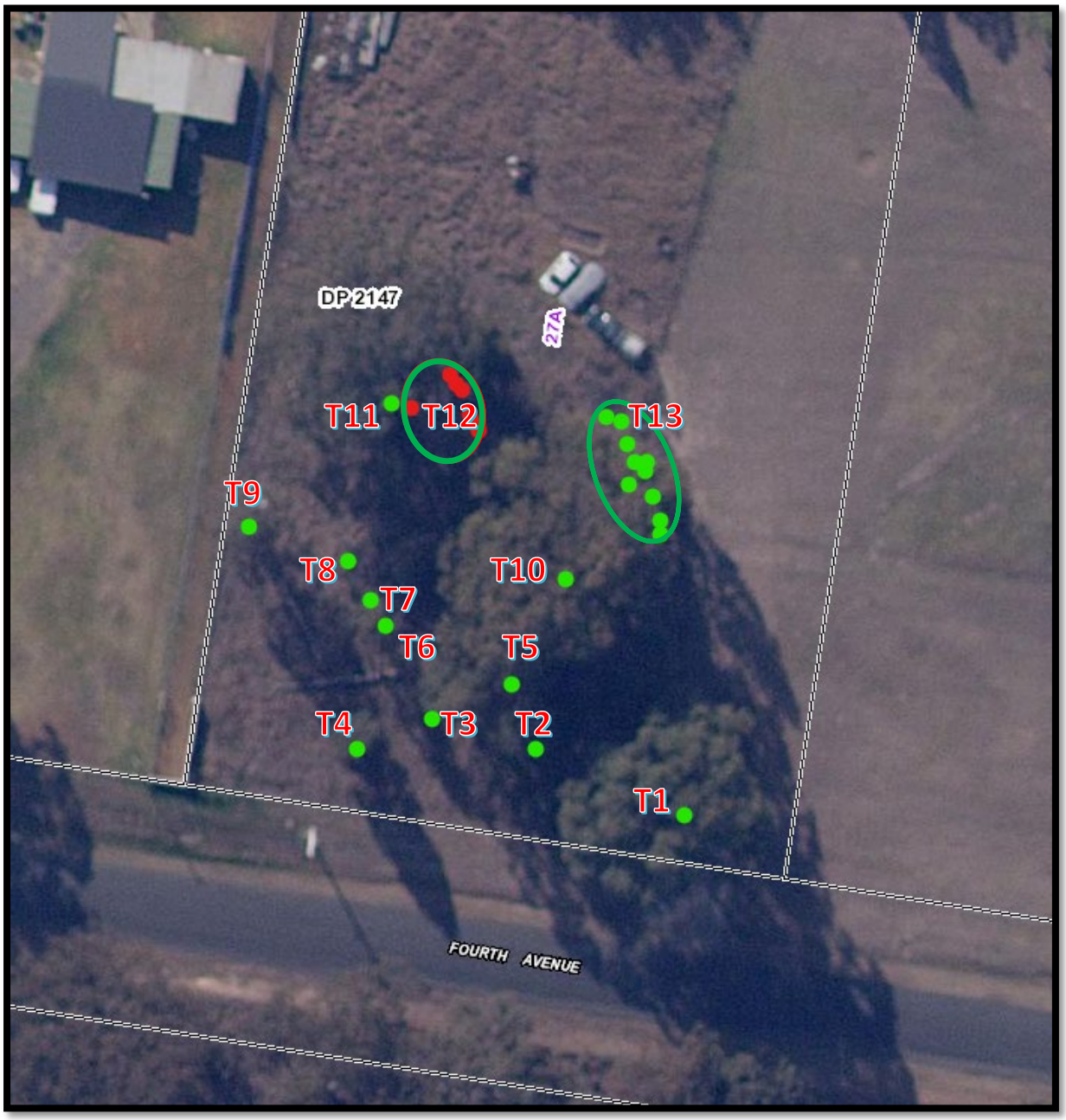

Figure 1 - Aerial photo of site trees indicated by coloured dots. Ovals indicate groupings of trees.

2. Methodology

A summary of the methodology used in the tree impact assessment took into consideration the location of the proposed dwelling, the Tree Protection Zones and Structural Root Zones, construction techniques and the required space for the site dwelling were taken into consideration when data was collected.

2.1. Site Inspection

Site inspection was undertaken by the author on 24 August 2020. A visual inspection was performed at ground level at the base of the subject trees.

2.2. Tree Numbering and tagging

A tree numbering system was assigned to the trees indicated in figure 1.

2.3. Tree Protection Zone

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

2.4. Structural Root Zone

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

2.5. Potential Hazards

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

2.6. Assumptions and Limitations

Care has been taken to obtain all information for reliable sources. All data has been verified as far as possible, however Michael Garton – Consulting Arborist and Derek Arnaiz – Principal Consulting Arborist can neither guarantee nor be responsible for the accuracy of information provided by others unless stated otherwise

No detailed plans for the proposed dwelling on the site have been provided by the client. Vertical Tree Management has not been made aware of locations of driveways, footprint of dwellings or locations of future structures. This tree survey and tree data collection will assist with planning and location of the proposed dwelling.

The information covered within this document, relates only to the trees requested to be inspected by the client. The report covers the trees examined and reflects the health and structure of the tree at the time of inspection. Liability will not be accepted for damage to persons or property because of natural processes, unforeseeable actions or occurrences.

The inspection was limited to a ground level assessment from the base of the subject trees. No below ground assessments were conducted. No aerial assessments were conducted.

3. Observations

3.1. Site Description

The site is zoned RU4: Primary Production Small Lots. The upper northern section of the site predominately vacant block comprised of dense bushland. The Southern side of the property is comprising of mainly endemic mature and semi mature trees. Within these two wooded areas is a cleared space for a proposed dwelling. 11 trees and 2 groupings of trees were assessed within the southern side of property between the cleared plat and Fourth Avenue.

3.2. Native Vegetation within Critically Endangered Ecological Communities

Eucalyptus fibrosa and *Eucalyptus moluccana* are species that are represented within Cumberland Plain Woodland (CPW). This community is considered a Critically Endangered Ecological Community (CEEC). The trees contained in this report as well as trees located within the neighbouring properties are endemic vegetation and considerations should be made regarding the importance of these species within CPW.

Biodiversity Values Mapping Tool:
https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap

BV Map Criteria indicated in purple: Threatened species or communities with potential for serious and irreversible impacts.

Figure 2 - Threatened Communities Mapping Indicated in Purple – Area surveyed indicated by red arrow.

4. Tree Assessment Data

An assessment of all trees contained within the front section of the property of 27 Fourth Avenue Llandilo

Number	Species	Height	Spread	*DBH	**DGL	***TPZ	^SRZ	Age Class	Health	Condition	Significance	ULE	Retention Value
1	*Eucalyptus fibrosa* Red Ironbark	19	17	1100	1200	14.4	3.44	Mature	Good	Good	High	2 Medium	High
Notes: The Red Ironbark located at the front property fence and gate is in good health and good structure with no obvious major defects. Previous locations of branch failures can be seen throughout the main stem and canopy of the tree, however, it appear to have reacted well. The tree is largely epicormic with a 10% amount of deadwood contained within the canopy. The tree bifurcates at 9 m with a slightly included bark union, however, tree appears strong.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
2	*Eucalyptus moluccana* Grey Box	9	6	260	1000	3.12	3.31	Semi-Mature	Good	Fair	Moderate	2 Medium	Medium
Notes: The multi-trunked mallee tree is located adjacent to the small pond. This tree is in fair health and structure with moderate landscape significance and retention value. The canopy appears sparse with poorly structured unions throughout.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
3	*Eucalyptus fibrosa* Red Ironbark	11	4	280	330	3.36	2.08	Mature	Good	Good	Moderate	2 Medium	Medium
Notes: This single trunk tree is in good health and good structure with no obvious defects. The tree is growing in upright form, which is typical for the species.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
4	*Eucalyptus spp*	12	5	300	380	3.6	2.2	Mature	Good	Good	Moderate	2 Medium	Medium
Notes: Tree is in good health with poor structure. The tree is single stem from ground level where it trifurcates at 3 m from ground level with tightly compressed unions. Tree is in good shape and form, however, the unions are concerning. The compressed branch unions have a high likelihood of failure, however, as there is no target area in the vicinity of the tree, the risk of harm is low.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
5	*Eucalyptus spp*	8	5	120+80	200	2	2	Semi-Mature	Good	Fair	Moderate	2 Medium	Medium
Notes: Tree is a small heavily suppressed eucalypt. The tree is surrounded by other dominating canopy trees. This small tree is in good health and fair structure with no obvious defects. The tree is growing adjacent to tree 6.													

***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	*Eucalyptus fibrosa* Red Ironbark	8	4	130	160	2	2	Mature	Good	Good	Moderate	2 Medium	Medium
Notes: Tree appears to be in good health and good structure with no obvious defects. Single stemmed upright tree. The tree is bifurcated at 6 m from ground level. Union appears good. The tree has high landscapes retention value and long ULE.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
7	*Eucalyptus fibrosa* Red Ironbark	8	4	130	160	2	2	Mature	Good	Good	Moderate	2 Medium	Medium
Notes: Tree appears to be in good health and good structure with no obvious defects. Single stemmed upright tree growing within the established canopy of adjacent trees. The tree has high landscapes retention value and long ULE.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
8	*Eucalyptus moluccana* Grey Box	9	5	280	410	3.36	2.28	Semi-Mature	Fair	Poor	Moderate	3 Short	Medium
Notes: The semi-mature Grey Box tree is in fair health and poor structure with no obvious defects that would warrant removal. The tree grows in mallee form. Tree is in fair health and poor structure, however, it is considered to have a high retention value and high landscape significance due to its high ecological value.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
9	*Eucalyptus spp*	12	8	520	510	6.24	2.49	Mature	Good	Good	Moderate	2 Medium	High
Notes: The eucalypt tree adjacent to the fence and side boundary property is in good health and good structure with no obvious defects. he tree is bifurcated at 1.5 m from ground level. This union appears to be strong and in good structure. Tree has a high retention value, high ecological value and high landscape significance.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
10	*Eucalyptus fibrosa* Red Ironbark	22	16	890	1260	10.68	3.65	Mature	Good	Fair	Moderate	2 Medium	High
Notes: The significant, mature Red Ironbark located within the centre of the front woodland area is in good health and good structure with no major defects observed. The tree grows dominantly in the area and one of three feature trees. The root crown appears strong with no obvious defects. The trunk of the tree is a single trunk up till 12 m from ground level when it then branches out to various unions to form the upper and middle broad canopy. The canopy of the tree is moderately epicormic, however, tree appears to be in good health and good structure.													

***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
11	*Eucalyptus fibrosa* Red Ironbark	20	17	1130	1240	13.44	3.65	Mature	Fair	Fair	Moderate	3 Short	Medium
Notes: The Red Ironbark tree is believed to be reaching over maturity. The large tree grows dominantly in the landscape. The tree is bifurcated at 1 m with a tight compression fork. The mature tree has a sparse canopy and is suffering from a secondary leaf chewing pest. The tree is in fair health and structure with a high ecological value and high landscape significance. As the tree is reaching over maturity, the likelihood of failure will increase. Considerations will need to be made in relation to the location of a proposed dwelling in proximity of this tree. The tree contains 15% Deadwood and there are some signs of possible termite activity, however, this cannot be verified due to location of nesting site 10m from ground level.													
	Species	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
12 (Grouping of 7 shrubs)	*Melaleuca nodosa* Ball Honey-myrtle	5	5	140	220	2	2	Mature	Good	Good	Low	2 Medium	Low
Notes: The grouping of understory Melaleuca trees are all in good health and good structure with no obvious defects. The grouping starts at the large ironbark in centre of the property as well as heading north. The understory trees and have a low ecological significance as they are not considered endemic to the surrounding area. Removal of these trees would be a better alternative to removal of other adjacent significant trees.													
Number	**Species**	**Height**	**Spread**	***DBH**	****DGL**	*****TPZ**	**^SRZ**	**Age Class**	**Health**	**Condition**	**Significance**	**ULE**	**Retention Value**
13 (Grouping of 10 Juvenile & Semi-mature trees)	Various *Eucalyptus spp.*	Ranging from 3-9m	17	Maximum 240	Maximum 280	2.88	2	Juvenile to Semi-mature	Good	Good	Moderate	2 Medium	Medium
Notes: The grouping of various Eucalyptus species of trees are ranging from Juvenile to Semi-mature. All trees classified within this section are considered to have a high ecological value with a high retention value.													

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

5. 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.

6. Standards

It is the responsibility of the owner/property management company to make this report available to all contractors associated with the site where required.

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”
- 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.

6.1. The Site Arborist (Vertical Tree Management & Consultancy)

Vertical Tree Management & Consultancy has recorded tree health at the date of inspection and provided a Tree Protection Plan as a reference outlining tree protection measures, methods and supervision required on site. The Site Arborist will oversee work and provide advice for tree work within the Tree Protection Zone and Structural Root Zone should it be required.

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

7. Tree Protection Information & Specifications

In order to achieve the best possible outcome in protecting the relevant trees, compliance with the tree protection measures is crucial in ensuring the long-term success of the site trees outlined for retention. The fundamental element for tree protection for this site is tree protection fencing to protect and delineate an area where no development activities occur.

7.1. Tree Protection Zone (TPZ)

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. The TPZ is calculated using the Australian standard AS4970- “Protection of Trees on Development Sites” formula.

7.2. Structural Root Zone (SRZ)

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed. The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ is calculated using the Australian standard AS4970- “Protection of Trees on Development Sites” formula. Tree Protection Measures and Recommendations within this report are in accordance with Australian Standard AS4970-2009 “Protection of Trees on Development Sites”. Tree protection measures are to be implemented prior to commencement of construction and post construction phases to ensure adequate protection for the retained trees on site.

7.3. Specifications

Tree Protection Zones (TPZ) are to be erected prior to any work or machinery entering the site. The TPZ will remain in place until all site works are complete (refer to Tree Protection Plan).

Tree Protection Fencing shall protect the tree from mechanical damage. Ensure no materials are stored at the base of the trees. It is the site foreman’s and owner’s responsibility to ensure this area is maintained throughout the development. The Tree Protection Fencing must be checked and Certified by the Site Arborist – Michael Garton/Derek Arnaiz Vertical Tree Management & Consultancy (Refer to Tree Protection Plan).

No other activity is to take place within the TPZ. This includes and is not restricted to the following: silt fence excavation, soil level changes, storage of material or waste, run off from wash down, slurry etc., refuelling, parking, and various other activities (refer to AS4970-2009 4.2 page 15)

Maintenance of the tree protection zones during construction shall be completed by the site Arborist. The site Arborist shall make regular checks and maintain the tree protection structures during construction.

Adequate signs (figure 22) regarding the delegated areas of “TPZ” shall be clearly visible from within the development site. The area indicates the zone required for protecting trees and all of their parts. The sign shall be made from durable all-weather material and be securely fixed to the outer visible side of the tree protection fencing. The signage shall be visible from all areas of the work site and may include multiple signs. (Refer to Tree Protection Plan)

Alterations to the TPZs require the site Arborist approval.

Root pruning Trees requiring root pruniung prior to excavation shall be done under the supervision of the site arborist. Roots equal to 10mm or greater shall require pruning by the site arborist. The root pruning cuts made shall be made at a 90 degree angel and use a clean sharp pruning implement.

Trenching and boring underground services within the TPZ shall be done under the supervision of the site arborist. Where possible all services should be routed outside the minimum set back distance. Where this is not possible the underground service should be installed by directional drilling at a depth of no less than 600mm or use manual excavation techniques. When the Structural Root Zone is affected the project Arborist must demonstrate that the tree(s) would remain viable.

Tree pruning, crown lifting, crown reduction, branch removal shall be carried out by an Arborist with minimal qualification of certificate 3 (Australian Qualification Framework AQF Level 2) in arboriculture.

8. Bushfire Attack Level – Preliminary Advice Recommendations and ideal location of development

Figure 3 - Blue zone indicates location permissible for development according to BAL Report and Arborist Report.

9. Discussion

All Eucalypt trees located within the front wooded section of the property have a high retention value, high landscape value and high ecological significance. The property is located within a critically endangered ecological community.

Due to the tree's high ecological significance, tree protection fencing is to be erected around the entire perimeter of the wooded area located within the front of 27 Fourth Ave. The tree protection fencing should be erected from the front entrance of the driveway and proceed on the current driveway to protect the woodland area. Specifications for the erection of the Tree Protection Zone can be found within the appendix (Figure 4).

9.1. Tree 1 – *Eucalyptus fibrosa*

The Red Ironbark located at the current property fence and gate is in good health and structure with no obvious major defects. Previous minor and major branch failures can be seen throughout the main stem and canopy of the tree, however, it appears to be reacting well with new growth and caulis wood. The tree is largely epicormic with a 10% amount of deadwood contained within the canopy. The tree bifurcates at 9 m with a slightly included bark union, however, the tree appears strong. An existing driveway has been constructed using tree friendly techniques. This is comprising of porous materials enabling water penetration within the root zone. It is recommended that maintenance pruning be conducted to remove the significant amount of deadwood that is located within this tree. Selective pruning of up to 10% should be conducted to alleviate and remove any dead dying defective or conflicting branches within the canopy. Tree protection fencing is required to be erected around this tree.

9.2. Trees 2 – 9 – Various *Eucalyptus species*

The trees located within the front section and internal section of the wooded area will not be affected nor enter during the construction phase of the single storey dwelling. Trees located within this area are in varying stages of age, size and significance. At no time during the construction phase are there to be any storage of materials within this zone of trees. These trees have a high landscape and ecological significance due to their presence within the critically endangered ecological area. It is recommended that maintenance pruning be conducted to remove the significant amount of deadwood that is located within these trees. Selective pruning of up to 10% should be conducted to alleviate and remove any dead, dying defective or conflicting branches within the canopy. Tree protection fencing should be erected around the entire perimeter of the front woodland section of the property.

9.3. Tree 10 – *Eucalyptus fibrosa*

The significant mature Red Ironbark located within the centre of the front of the property is in good health and good structure with no major defects. The tree grows dominantly in the area and is one of three feature trees. The root crown appears strong with no obvious defects. The trunk of the tree is a single trunk up till 12 m from ground level when it then branches out to various unions to form the upper and middle broad canopy. The canopy of the tree is moderately epicormic, however, the tree appears to be in good health and good structure. At the time of construction of the dwelling there are to be no storage of materials and no excavations within 10 metres of this tree. It is recommended that maintenance pruning be conducted to remove the significant amount of deadwood that is located within this tree. Selective pruning of up to 10% should be conducted to alleviate and remove any dead dying

defective or conflicting branches within the canopy. Tree protection fencing is required to protect this tree and rootzone.

9.4. Tree 11 – *Eucalyptus fibrosa*

The Red Ironbark tree is fair health and structure and reaching over maturity. The tree grows dominantly in the landscape and is considered the most significant within the front of the property. The tree is bifurcated at 1m with a tight compression fork; however, this union appears strong. The mature tree has a sparse canopy and is suffering from a secondary pest infestation. The tree is in fair health and structure with a high ecological value and high landscape significance. The tree contains 15% deadwood and there are signs of possible termite activity, however, this cannot be verified due to location of nesting site been 10m from ground level. As the tree is reaching over maturity the likelihood of failure will increase over time. Considerations will need to be made in relation to the location of a proposed dwelling in proximity of this tree. A minimum setback of 8m away from the base of the tree is allowable to reduce impact within the tree protection zone. An incursion of 12% to the tree protection zone has been calculated (figures 16, 17, & 18) for the proposed cut required for the proposed dwelling. The building footprint is setback of 12m from the base of the tree at ground level.

As the tree is in decline, it is recommended that the dwelling be constructed as a sufficient distance from the tree as possible and reduce the likelihood of a failed part of the tree impacting the proposed dwelling. Removal of the tree part encroaching towards the proposed dwelling is recommended. Should the dwelling be constructed within reach of the tree, the owner must accept and tolerate the level of risk involved. Once the proposed dwelling is completed, the owner must engage a AQF5 Consulting Arborist to conduct a risk assessment on the tree and associated targets within reach of the tree.

Tree protection fencing is required to be erected to a minimum radius of 7 metres from the base of this tree at ground level. It is recommended that maintenance pruning be conducted to remove the significant amount of deadwood that is located within this tree. Selective pruning of up to 10% should be conducted to alleviate and remove any dead dying defective or conflicting branches within the canopy. Tree protection fencing is required to protect this tree and rootzone.

9.5. Group of *Melaleuca nodosa*

The grouping of understory Melaleuca trees are in good health and good structure with no obvious defects. The understory trees have a low ecological significance as they are not considered endemic to the surrounding area. These trees will no be impacted by the proposed construction.

9.6. Group of *Eucalyptus species*

The grouping of various Eucalyptus species of trees are ranging from Juvenile to Semi-mature. All trees classified within this section are considered to have a high ecological value with a high retention value. Tree protection fencing is required to be erected to a minimum of two metres from the base of the various trees at ground level.

Tree protection measures can be found in the Tree Protection Plan.

10. Recommendations

- Figure 3 shows the recommended permissible development space indicated in blue.
- Tree protection fencing and signage is to be erected from the front gate, along the current driveway, extending past all trees to the western boundary (See - Tree Protection Plan).
- The proposed dwelling is proposed to be constructed 12m from the base of Tree 11. The required cut is measured 7.5m from the base of the tree. This will result in an incursion of 12% within the TPZ of Tree 11. This level of incursion is considered acceptable. The Site Arborist is to be onsite during the excavation of the cut.
- A redirection of the driveway (figure 19) is required. This will reduce the incursion and impact on Tree 11. The driveway is recommended to be constructed of porous materials as to allow for water penetration into the ground.
- No trees within the property are required to be removed for the proposed construction.
- Maintenance pruning of all trees is recommended to manage and reduce the risk of branch failure. However, this is a recommendation, not a requirement. The owner of the property is to accept and tolerate the risks associated with the trees on their property.

[redacted]

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ISA International Society of Arboriculture — CERTIFIED ARBORIST ISA — QTRA Quantified Tree Risk Assessment

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.

Date	Version	Prepared	Reviewed by Principal
31 May 2021	1	Michael Garton	Derek Arnaiz
14 June 2021	2	Michael Garton	Derek Arnaiz
8 December 2021	3	Michael Garton	Derek Arnaiz

11. Site Photos

Figure 4 – Tree 1 (Owner Photo)

Figure 5 - Tree 1 - Red line indicates tree protection fencing along western.

Figure 6 - Trees 2, 3, 4

Figure 7 - Tree 5

Figure 8 - Trees 6, 7 & 9

Figure 9 - Tree 8

Figure 10 - Tree 9

Figure 11 - Tree 10

Figure 12 - Tree 11

Figure 13 - Tree 12 - Grouping of Melaleuca trees

Figure 14 - Tree 13 Grouping of Eucalyptus trees - Tree protection to follow existing driveway 2m from base of tree.

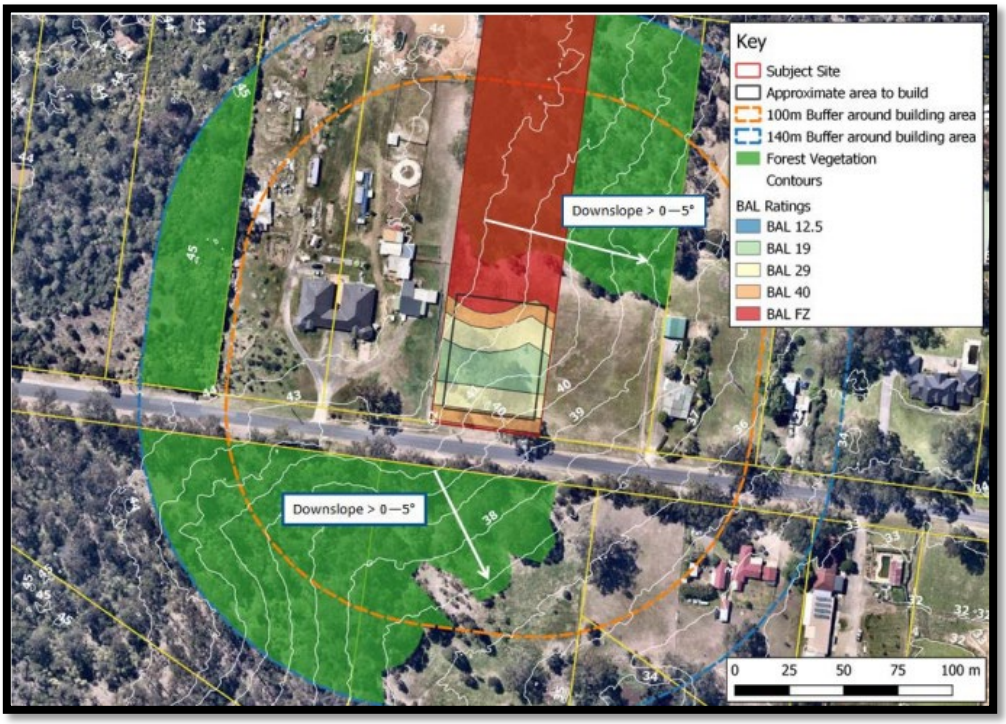


Figure 15 - Bushfire Attack Levels

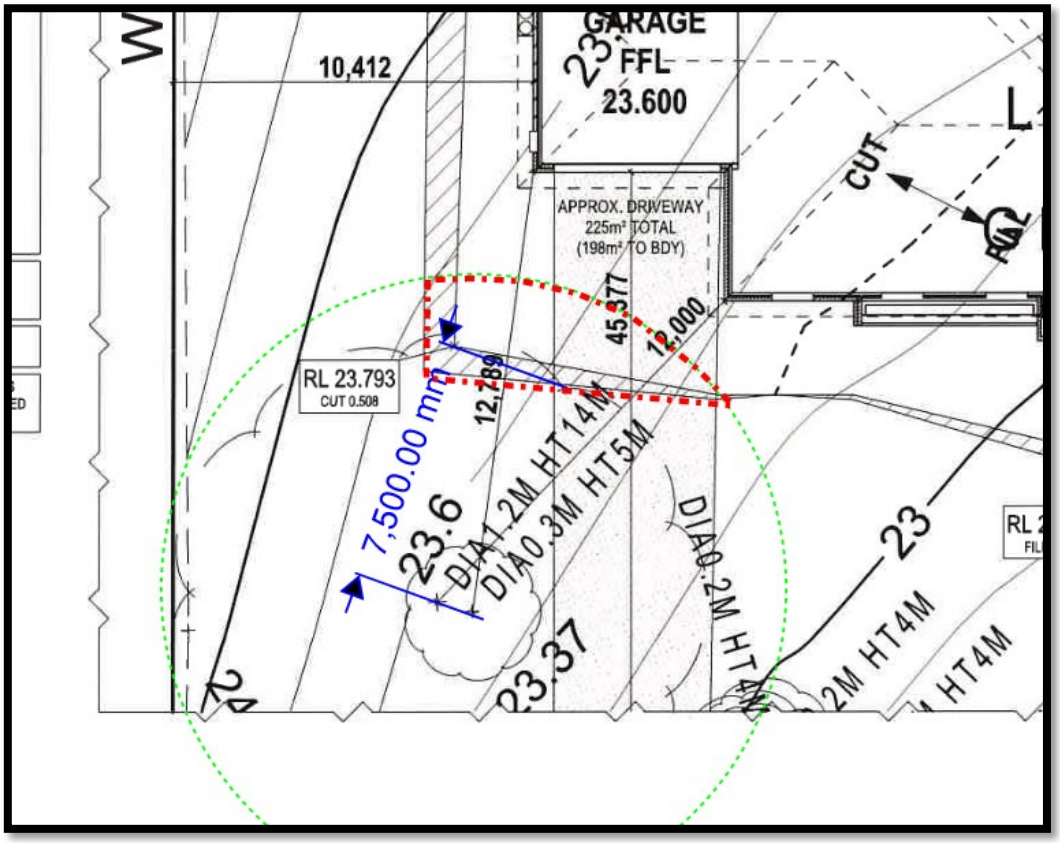


Figure 16 – Image detailing level of encroachment for Tree 11

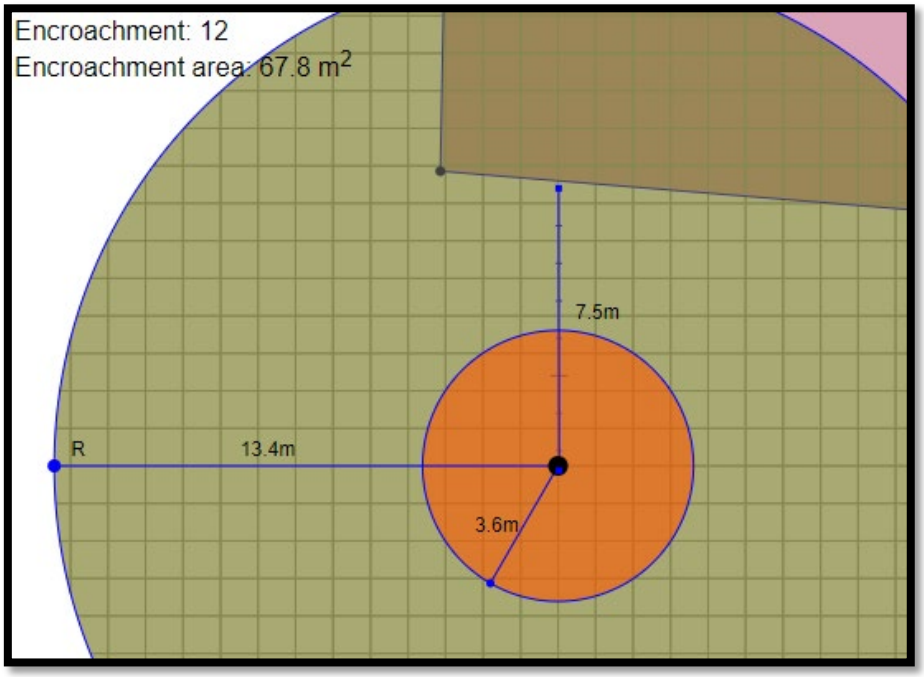


Figure 17 - Encroachment Calculations for Tree 11

DBH (cm):	111.67
TPZ radius (m):	13.4
TPZ area (m²):	564.1
DAB (cm):	122.83
SRZ radius (m):	3.61
SRZ area (m²):	40.9
Encroachment % (S1):	0
Encroachment area (S1):	0
Encroachment % (S2):	11.95
Encroachment area (S2):	67.79

Figure 18 - Encroachment Calculations for Tree 11

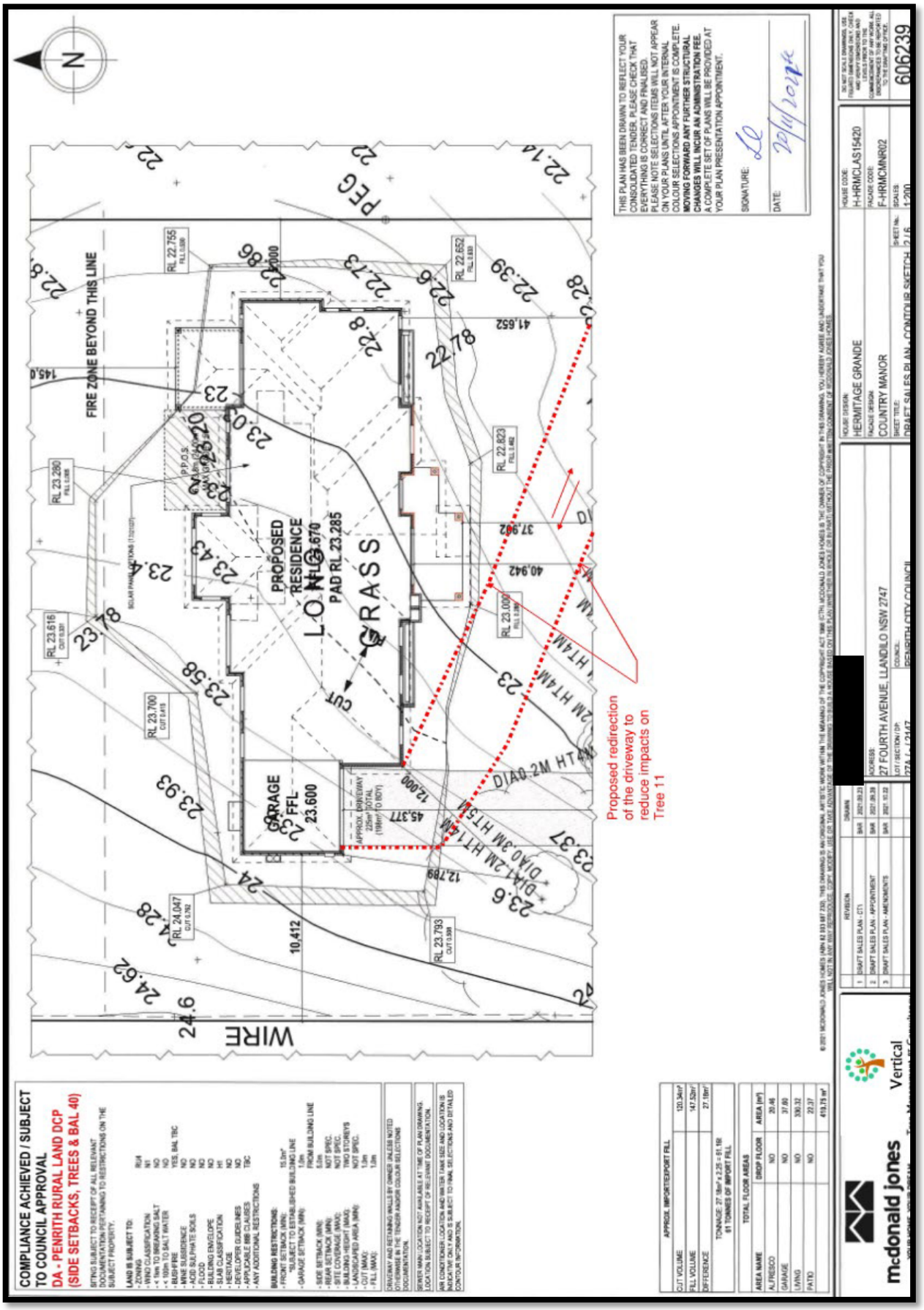


Figure 19 - Proposed dwelling with minor alteration of driveway

12. Tree Protection Plan

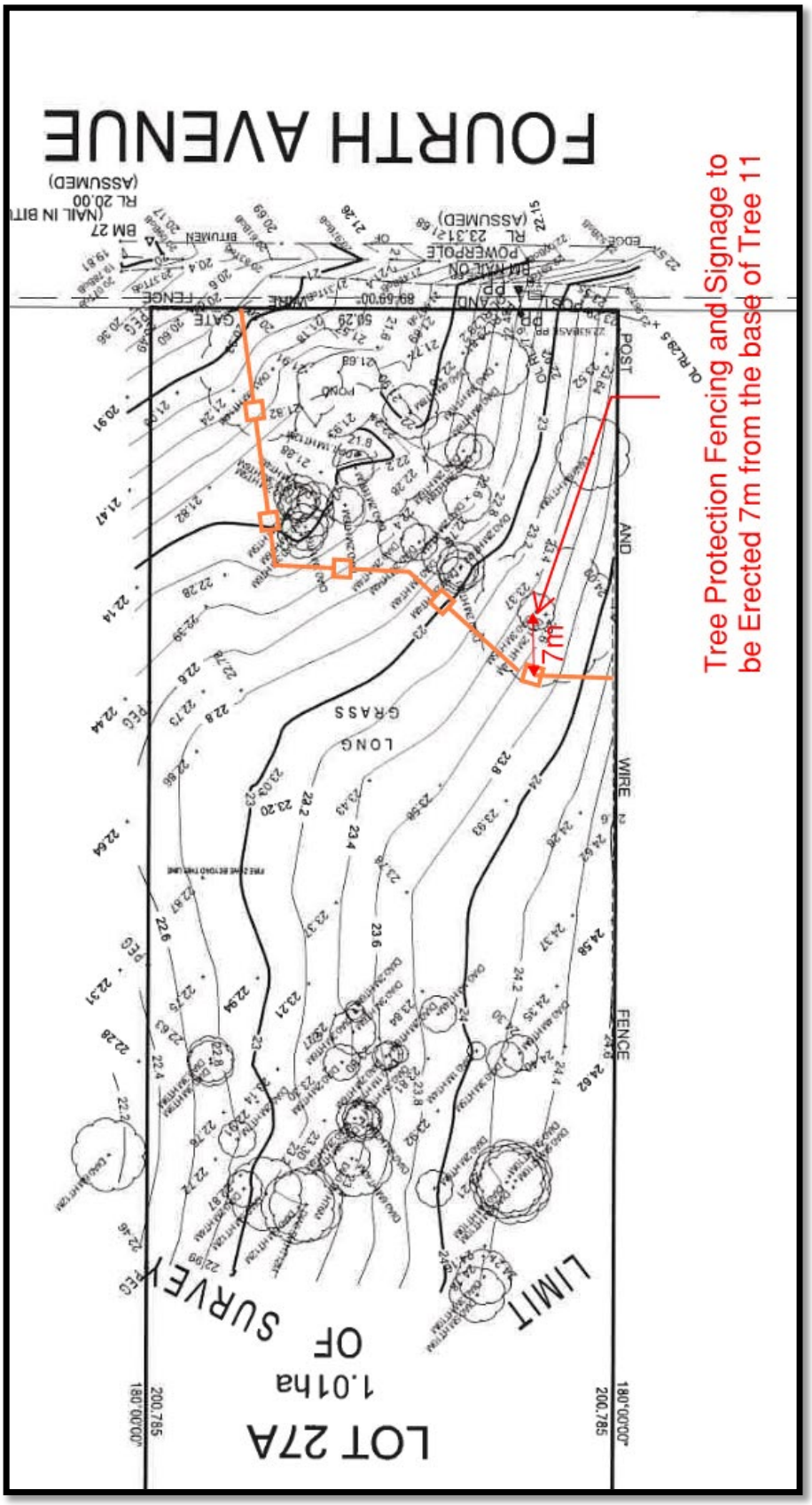


Figure 20 - Tree Protection Fencing Plan

12.1. 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

12.2. 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.

12.3. Tree Plans

See appendix for tree plans.

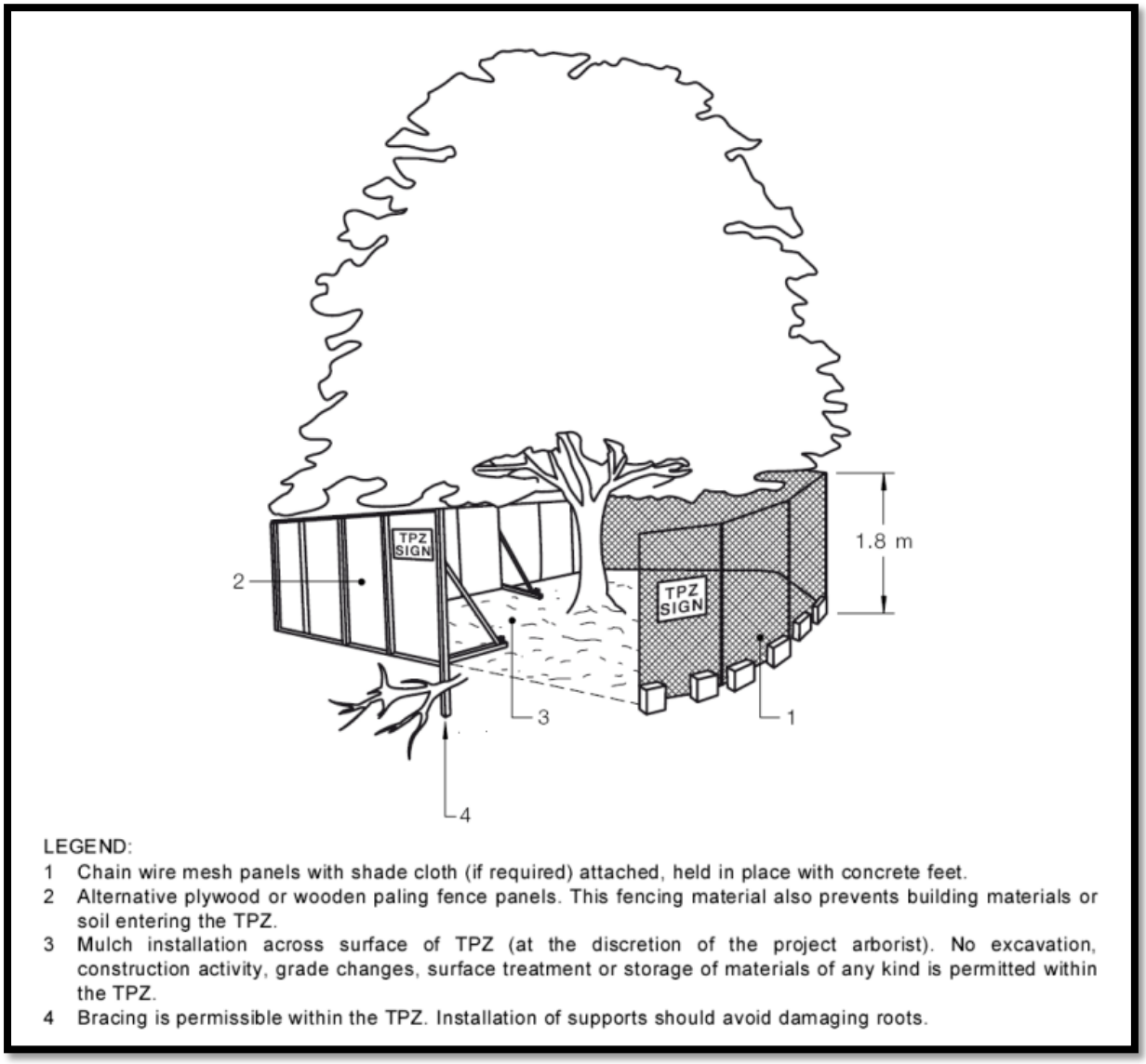
12.4. Restricted Activities

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

12.5. 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 21 - Example of Tree Protection Fencing as per AS4970

12.6 Tree Protection Signage

The below image 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 22 - Example of Tree Protection Signage - AS4970

12.7. Trunk and Branch Protection (Reference only)

Where works will be occurring near retained trees, instal protection to the trunk and branches of the trees as shown below. 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.

12.8. Ground Protection in areas of Temporary Access (Reference only)

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 shown below.

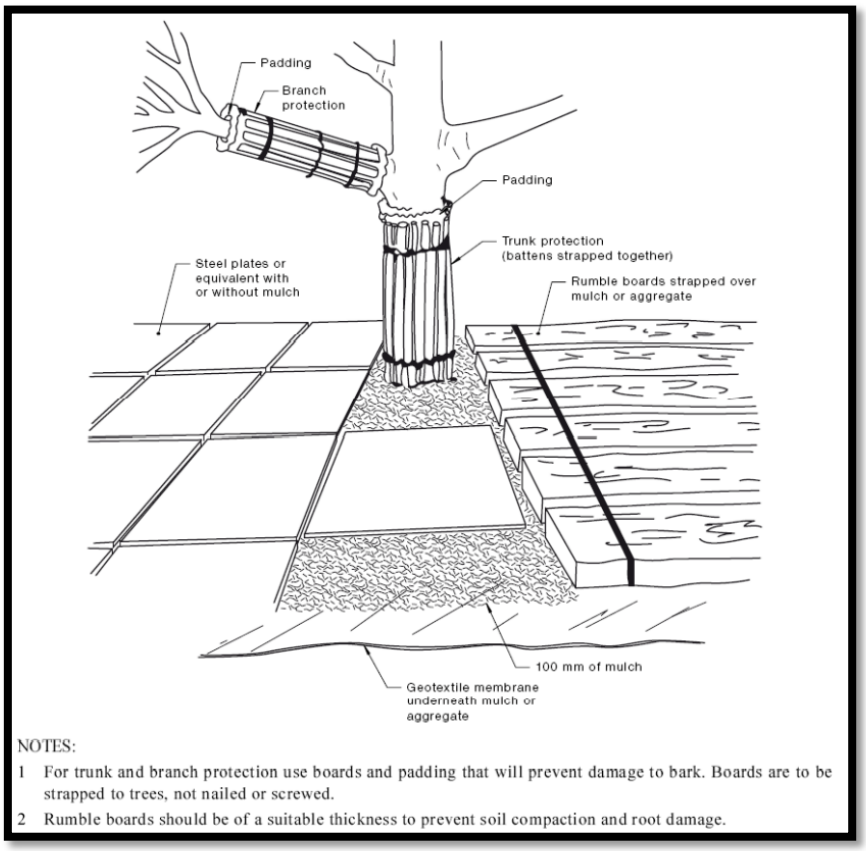


Figure 23 - Trunk, Branch and Ground Protection - AS4970

13. Appendix

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

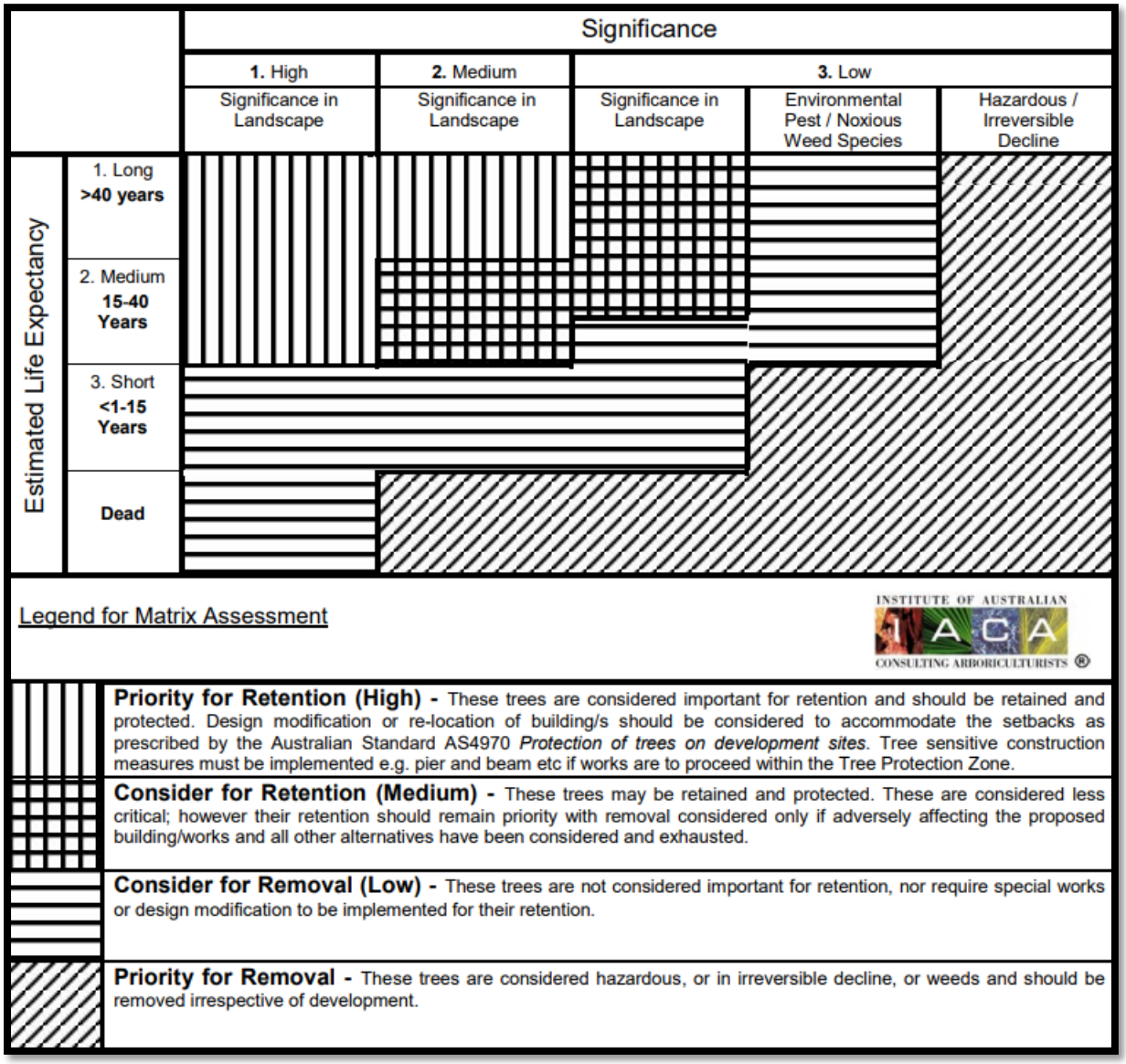
REFERENCES

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)

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)	

14. 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.