



# Vertical Tree Management & Consultancy

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*Arboricultural Assessment  
and Tree Protection Plan  
Panel Determination – Council correspondence  
D418/21JD(CIS)*

Commissioned by: T + P Dugal

Site: 37 Bay View Street, Lavender Bay 2060

Within: North Sydney Council

Date of Inspection: 22 August & 5 November 2022

Version: R 2.1

Prepared by:

**Vertical Tree Management & Consultancy**

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QTRA – Quantified Tree Risk Assessment

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# **1 Introduction / Aims/ Objectives:**

## **1.1 Introduction**

This Arboricultural Impact Assessment version Review 1.0 has been prepared by Vertical Tree Management and Consultancy, Derek Arnaiz for the client, T + P Dugal. The report shall assess the existing viability of the site trees, consider the retention value. An assessment will be in relation to the design and construction of the driveway cross and layback adjacent to the existing street trees x 3 requested by North Sydney Council Panel Determination in Council correspondence D418/21JD(CIS).

The trees are located at allotment 2 DP413201, 37 Bay View St, Lavender Bay, NSW 2060. The location will be referred to as the site from here within. The site is located within the North Sydney Council local government area and is subject to the relevant local government and legislative framework.

## **1.2 Aims**

This report shall assess the site trees and advise on acceptable setback distances and impacts within the Tree Protection Zones:

- Methodology used in tree evaluation, retention value and Tree Protection zones & Structural Root Zones, p3.
- Tree data table with retention values p4.
- A scale plan showing the location of the trees on the subject site, Appendix A.
- Allocation of a number to each tree, p4 and Appendix A.
- Provide canopy spread and diameter at breast height and at ground level of each tree, p4.
- Indicate the tree retention values, Tree Protection Zone (TPZ), Structural Root Zone (SRZ) and assessment of the developable environment, p4.

## **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.

## **1.4 The site**

Located in the North Sydney Council (NSC) local government area, the site is Zoned R3 Medium Density Residential. The site has an existing street tree located on Bay View Street adjacent to the center of the site. The proposal includes driveway access installation retrospectively to the existing street tree.

A summary of the control checks for the land can be seen below in Table 1. Information within has been gained from NSW Government e Planning Spatial viewer website 17 August 2022.



Figure 1. Aerial photo of the site 37 Bay View St, Lavender Bay, NSW 2060. Sixmaps, accessed 17 August 2022.

Table 1: Outline of site control measures listed on the land 37 Bay View St, Lavender Bay, NSW 2060.

Planning Control	Conditioned	Not Conditioned
Zoning	R3 Medium Density Residential	
Heritage Listed Property		X
Heritage Conservation Area		X
Terrestrial Biodiversity (CEEC-EEC)		X
Bush Fire Prone Land		X

## **2 Methodology:**

### **2.1 Site Inspection**

Site inspection was undertaken by the author on the 22 August 2022.

### **2.2 Plans Provided**

Assessment of potential impacts on the trees in the immediate vicinity of the development site was based on various PDF plans supplied by the client and include the following:

- Architecture Saville Isaacs Pty Ltd, Site Analysis Plan, Dwg No DA098, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Site Plan, Dwg No DA100, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Plan\_Storage, Dwg No DA101, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Plan\_Basement, Dwg No DA102, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Plan\_Lower Ground, Dwg No DA103, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Plan\_Ground (Garage), Dwg No DA104, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Plan\_First Floor, Dwg No DA105, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Roof Plan, Dwg No DA106, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Site Coverage, Dwg No DA111, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Elevation Streetscape, Dwg No DA200, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Elevation West (Street), Dwg No DA201, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Elevation North, Dwg No DA202, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Elevation East (Water), Dwg No DA203, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Elevation South, Dwg No DA098, Rev A, 11 November 2021

- Architecture Saville Isaacs Pty Ltd, Section Long, Dwg No DA301, Rev A, 11 November 2021
- Architecture Saville Isaacs Pty Ltd, Section Cross, Dwg No DA302, Rev A, 11 November 2021
- C.M.S. Surveyors Pty Ltd, Survey Plan, Dwg No 19606Adetail, Issue 4, 28 April 2021
- Architecture Saville Isaacs Pty Ltd, Plan\_Ground (Garage) with TPZ Diagram, Dwg No DA104, Rev A, 15 July 2022
- Architecture Saville Isaacs Pty Ltd, Arboricultural Impact Assessment and Management Plan, July 2022
- North Sydney Council, Proposal: Erection of Dwelling house and associated works, 13 April 2023
- Architecture Saville Isaacs Pty Ltd, Plan\_Basement, Dwg No DA102, Rev C, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Plan\_Lower Ground, Dwg No DA103, Rev C, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Plan\_Ground (Garage), Dwg No DA104, Rev C, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Plan\_First Floor, Dwg No DA105, Rev D, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Plan\_Roof, Dwg No DA106, Rev D, 14 April 2023
- Architecture Saville Isaacs Pty Ltd, Elevation West (Street), Dwg No DA201, Rev E, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Elevation North, Dwg No DA202, Rev E, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Elevation East (Water), Dwg No DA203, Rev E, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Elevation South, Dwg No DA204, Rev E, 21 April 2023
- Architecture Saville Isaacs Pty Ltd, Section Long, Dwg No DA301, Rev C, 21 April 2023.

### **2.3 Tree Numbering System**

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



## **2.4 Tree Protection Zone (TPZ)**

TPZ was calculated using the Australian standard AS4970 - "Protection of Trees on Development Sites" formula.

## **2.5 Structural Root Zone (SRZ)**

SRZ was calculated using the Australian standard AS4970 - "Protection of Trees on Development Sites" formula.

## **2.6 Amendments**

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

## **2.7 Incursions**

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 Destabilisation**

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

## **2.9 Plans and retention value**

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

## **2.10 Tree protection & specification**

Tree protection & specification in accordance with AS4970-2009.

## **2.11 Assumptions**

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

### 3 Tree Assessment Data

Table 2. Tree Assessment Data for tree located in 37 Bay View St, Lavender Bay, NSW 2060.

Number	Botanic/Common name	Height	Width	DBH	DGL	TPZ	SRZ	Age Class	Health	Condition	Amenity	Retention Value	Notes
1	<i>Lagerstroemia indica</i> crepe myrtle	6	10	23/21	33	3.8	2.1	Mature	Good	Good	High	High	Located in the street verge adjacent to the site (centre). An assessment of the impact of the proposed works on the tree has been provided in the Observation & Discussion section 5 of this report.
2	<i>Lagerstroemia indica</i> crepe myrtle	~6	~7	~20/18	~28	~3.2	~2	Mature	Good	Good	High	High	Located adjacent to the left neighbouring property within the street verge. The tree is in good health and condition with no impact anticipated.
3	<i>Lagerstroemia indica</i> crepe myrtle	~4	~5	~18	~23	~2.2	~1.8	Mature	Good	Good	High	High	Located adjacent to the right neighbouring property within the street verge. The tree is in good health and condition with no impact anticipated.

\*DBH – Diameter at Breast Height; \*\*DGL – Diameter at Ground Level \*\*\*TPZ – Tree Protection Zone; ^SRZ – Structural Root Zone, ~ Approximately. Appendix B – Explanatory notes

## **4 Tree Protection Zone & Structural Root Zone**

### **4.1 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.

The TPZ is calculated using the Australian standard AS4970 - "Protection of Trees on Development Sites" formula. Development encroachments are referred to as: 1) No impact (0%) incursion; 2) Low impact (<10%) of minor consequence; 3) Medium impact (<20%) incursion where the project arborist is to demonstrate the tree(s) remain viable by tree sensitive construction techniques; and 4) High level impact (>20%) where design changes or further information is required to manage tree vitality.

### **4.2 Minor Encroachment**

If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, Detailed root investigations should not be required. Variations can only be made by an AQF5 Consulting Arborist (Project Arborist).

### **4.3 Major Encroachment**

If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. this may require root investigation by non-destructive methods and consideration of relevant factors listed in AS4970 Clause 3.3.4.

### **4.4 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. The SRZ calculated using the Australian standard AS4970 - "Protection of Trees on Development Sites" formula. Excavation within the structural root zone should be avoided. In the event this cannot be avoided the site arborist (AQF level 5) must be present. Excavation must be non-destructive such as hand excavation or Airspade® or other.

The trees identified to have a major 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.

#### 4.5 Variations of the TPZ

It may be possible to encroach into or make variations to the standard TPZ. Encroachment includes excavation, compacted fill, and machine trenching. Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Any loss of TPZ compensated for elsewhere.

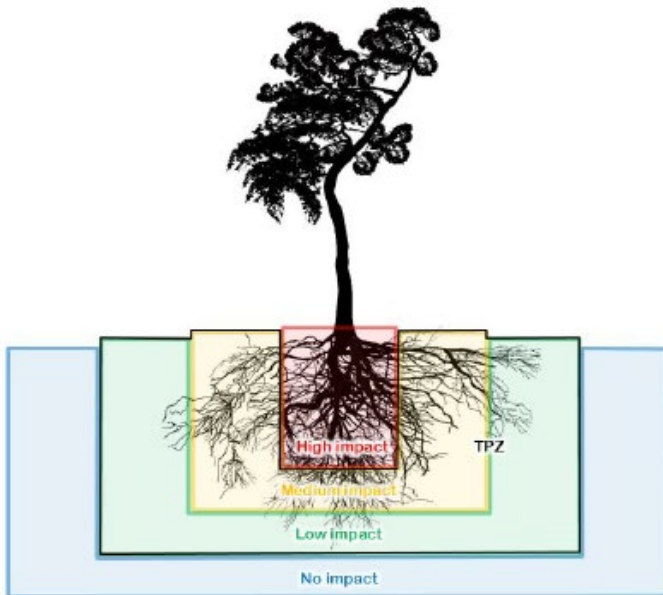


Figure 2. Low medium and high impact zones in reference to the tree

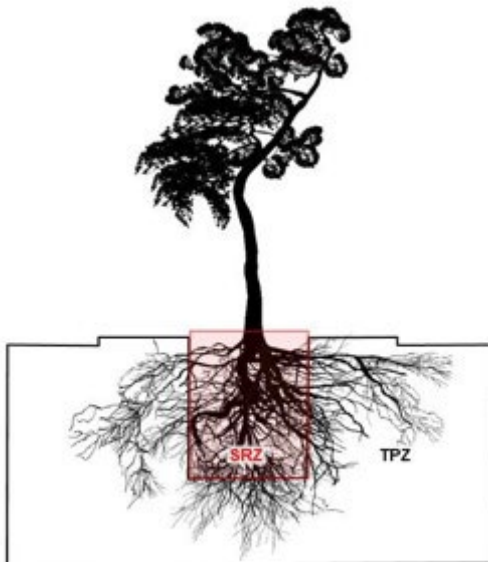


Figure 3. Structural root Zone the area required for tree stability

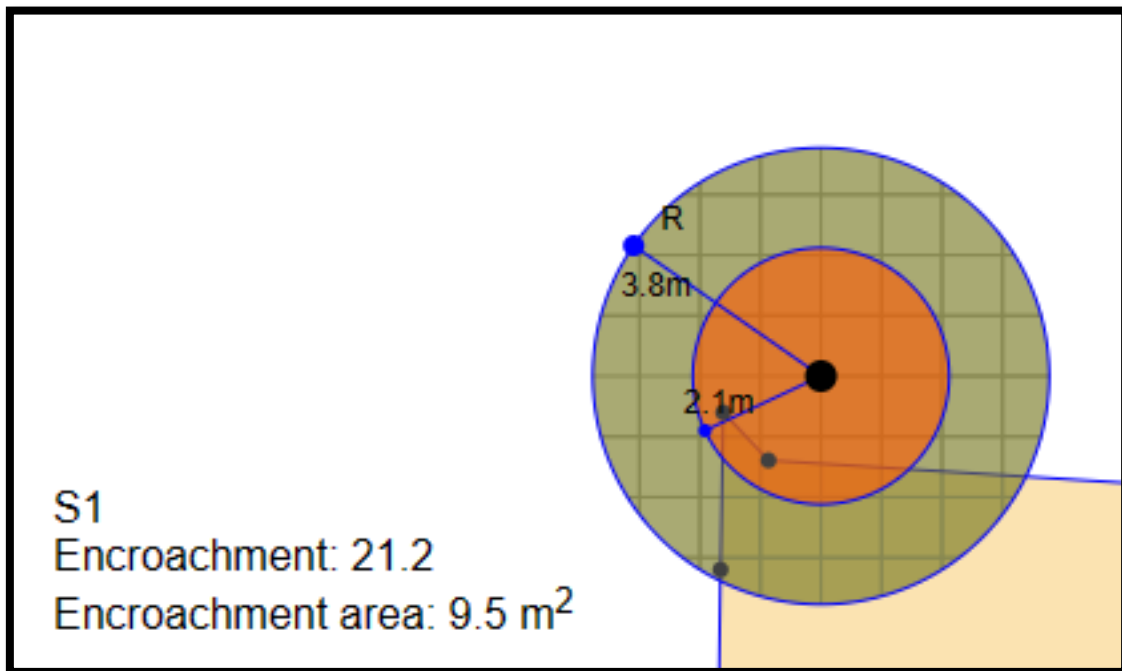


Figure 4. *Lagerstroemia indica*, Total incursion of 21.2% into the Tree Protection Zone & 12 % of the Structural Root Zone from the driveway footprint for development at 37 Bay View St, Lavender Bay, NSW 2060.

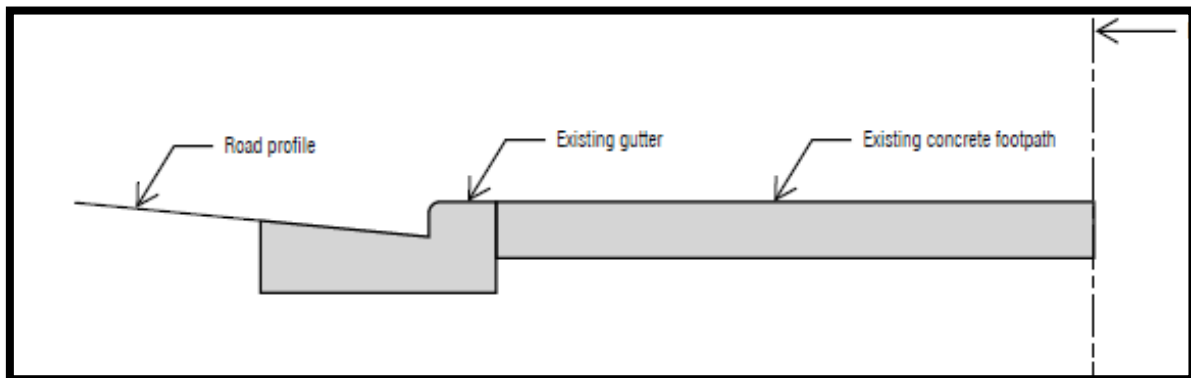


Figure 5. Existing gutter and footpath footprint for development at 37 Bay View St, Lavender Bay, NSW 2060.

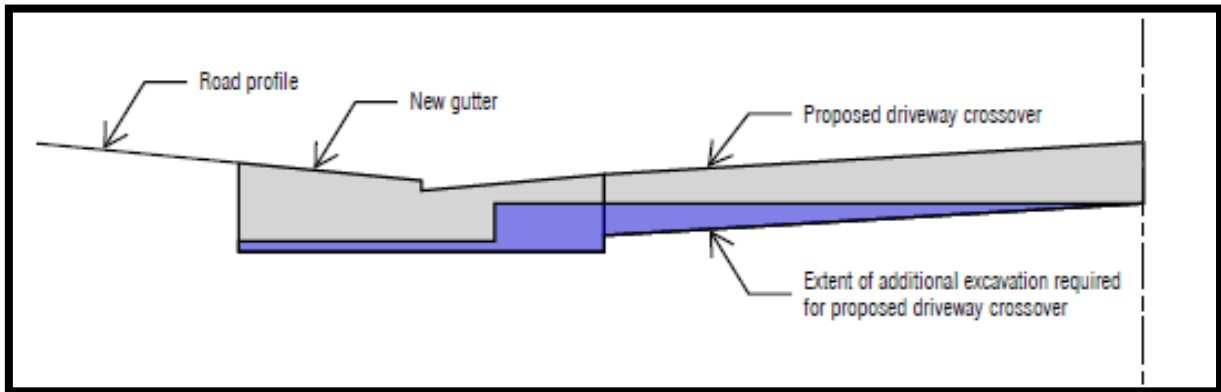


Figure 6. Reduced area required for new excavation at 37 Bay View St, Lavender Bay, NSW 2060.

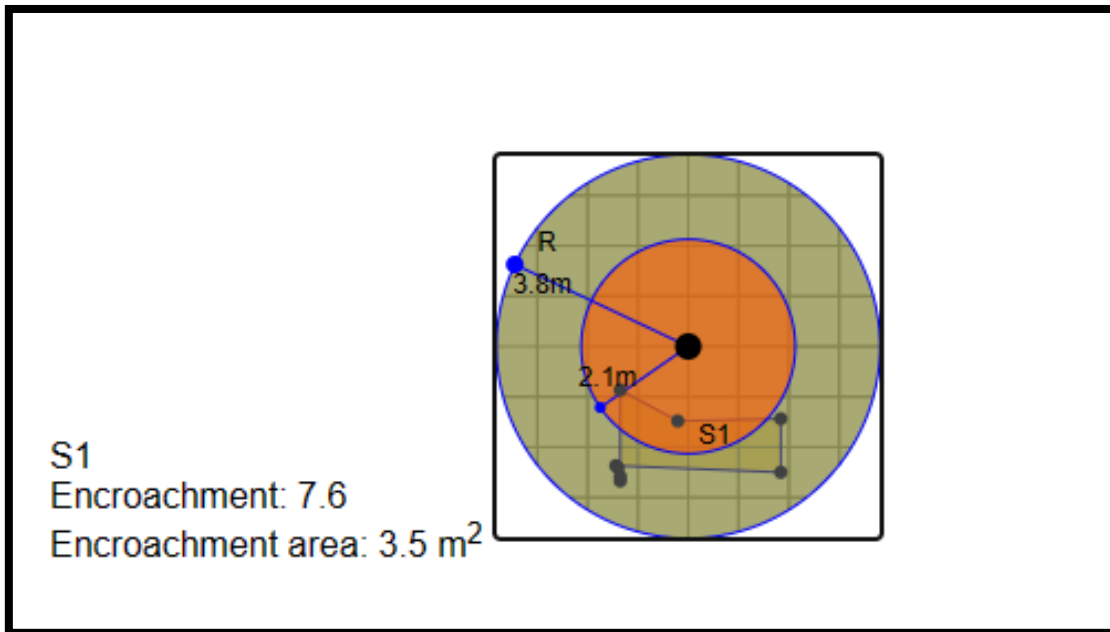


Figure 7. Reduced incursion from additional excavation requirements, 7.6% into the Tree Protection Zone & Structural Root Zone from the driveway according to the new location as outlined at 37 Bay View St, Lavender Bay, NSW 2060

## **5 Discussion**

**5.1 Tree 1 crepe myrtle; Lagerstroemia indica** Located directly adjacent to 37 Bayview Street Lavender Bay, the street tree has been identified as six meters in height and 10 meters wide, in good health and structural condition. It is a single stemmed tree to approximately one meter where the trunk bifurcates into a broad spreading canopy with sound branch attachment.

**5.2 It is the belief and experience of the author** that the street tree will not be adversely impacted by the realignment of the driveway as outlined in the revised plans provided.

**5.3 The proposed driveway** works include a driveway, cross over with a layback. This work will result in a total of 21.2% incursion of the TPZ and 12% incursion of the Structural root Zone.

It is noted that the roots have grown to accommodate the existing concrete infrastructure footprint. In particular the depth of the footprint is a significant consideration as this will result in less excavation for the installation of the new infrastructure. The tree roots within this area are likely to be deeper in the soil profile and will not be required to be pruned. Therefore, the extent of excavation required, is reduced due to the existing footprint (Figure 5,6).

Removal of the existing foot path, kerb and gutter is to be under the supervision of the site arborist. The site arborist will also undertake root pruning as required, within the Australian standard AS4970 "Protection of Trees on development Sites".

**5.4 Information and images provided** by Cantilever Consulting Engineers (Figure 5 & 6) shows the existing infrastructure and the level of new excavation required for the driveway. This has been calculated to be a minor 7.6% incursion into the TPZ and will also include a 6% incursion of the SRZ.

**5.5 This tree genus** is highly tolerant to pruning often seen as a pollarded tree to encourage prolific flowering. In addition, the tree species is highly tolerant to root pruning. The root mass including the basal flare and callus roots are on the eastern aspect of the tree and will not be affected. It is believed there are sufficient other supportive roots to compensate for the removal of roots within the driveway cross over.

**5.6 Demolition and excavation** for the driveway will require non-destructive excavation such as hand digging, and/or airspade and/or hydro vacuum truck.

**5.7 Works adjacent to trees.** All work within the TPZ must be undertaken in the presence of the site arborist. Any tree root exposed must be assessed and determined by the site arborist in accordance with Australian Standard AS4970 "Protection of trees on development sites. Any root pruning must be undertaken by the site arborist.

**5.8 Tree protection** has been outlined in section 8 and appendix A of this report.

**5.9 Trees 2 & 3 crepe myrtle; Lagerstroemia indica is** located on the left & right neighbouring property, within the street verge. No impact is anticipated for the trees and therefore will not be subject of this report.



## 6 Recommendations

- The driveway, cross over and layback requires excavation within the TPZ & SRZ of the street tree.
- Required excavation additional to the existing footprint has been calculated to be a minor ~7.6% incursion into the TPZ and will also include a ~6% incursion of the SRZ.
- It is believed there are sufficient supportive roots to compensate for the removal of roots within the new excavation area.
- Crape myrtle is a hardy species that can adapt to pruning.
- Removal of the existing foot path, kerb and gutter is to be under the supervision of the site arborist.
- The site arborist will undertake root pruning as required, within the Australian standard AS4970 "Protection of Trees on development Sites".

### 6.1 Trees identified to be retained

Table 3 - Trees identified to be retained 37 Bay View St, Lavender Bay, NSW 2060.

Number	Botanic/Common name
1	<i>Lagerstroemia indica</i> crepe myrtle

## **7 Standards**

### **7.1 Owners/builders responsibilities**

It is the responsibility of the owner/builder to make this report available to all contractors associated with the development at the site. The following Tree protection Plan, report version one should be adhered to ensure that the trees are viable into the future.

### **7.2 Tree related works**

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.

### **7.3 The Site Arborist (Vertical Tree Management & Consultancy)**

The site arborist will record tree health prior to commencement of construction and provide a Tree Protection Plan setting out tree protection measures, methods and supervision requirements.

### **7.4 Certification of works**

The site arborist will provide certification at three stages of the project, prior, during and at the final stages for the compliance of tree protection measures. Changes to the tree protection will also be recorded as required.

### **7.5 The Site Arborist**

The arborist will oversee work and provide advice for tree work within the tree protection zone and Structural Root Zone. A report will be required for pruning tree roots greater than 40mm in diameter.

### **7.6 Consent for works**

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

## 8 Tree Protection Information & Specifications

To achieve the best possible outcome in protecting the relevant trees during the development, compliance with the tree protection measures is crucial in ensuring the long-term success of the site trees.

- The fundamental element for tree protection for this site is tree protection boarding to protect the street tree from mechanical damage.
- The trees requiring protection include

Number	Botanic/Common name
1	<i>Lagerstroemia indica</i> crepe myrtle

- The Tree protection measures are to be implemented prior to commencement of construction and remain until post construction phases to ensure adequate protection for the retained trees on site, refer to Appendix D.
- The tree protection must be checked and certified by the site arborist, Vertical Tree Management & Consultancy during and after construction.
- No materials are to be stored within 3m of the neighbouring property trees.
- The effectiveness of the tree protection measures recommended depends on the degree of cooperation between the developer, construction contractor, and the site arborist.

**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.

**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 demolition, during construction and post construction phases to ensure adequate protection for the retained trees on site.

## **8.1 Specification**

### **8.1.1 Tree Protection Zones (TPZ)**

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 Appendix A).

### **8.1.2 Tree Protection - Boarding**

Trees, on a development site can be damaged by vehicles, heavy loaders and bobcats during the demolition and construction phase. Trees are easily protected by installing tree protection which usually consists of cordoning off the trees with temporary fencing panels. Where fencing is not possible due to site conditions tree protection boarding will prevent mechanical damage

### **8.1.3 Tree Protection - rumble Boards or trac mats**

Soil compaction can be caused by vehicles, heavy loaders and bobcats during the demolition and construction phase. Trees are easily protected by installing tree protection rumble Boards or trac mats which cover the ground frequently used by machinery. This will prevent soil compaction and prevent the tree from declining in health.

### **8.1.4 Activities**

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 pg 15)

### **8.1.5 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.

### **8.1.6 Adequate signs**

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.

### **8.1.7 Alterations**

Alteration to the TPZs requires the site arborist approval.

### **8.1.8 Root pruning**

Trees requiring root pruning 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 angle and use a clean sharp pruning implement.

### **8.1.9 Trenching and boring underground services**

Trenching and boring 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.

### **8.1.10 Tree pruning**

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.

### **8.1.11 Hold points**

Requiring certification by the site arborist include:

- Installation of tree protection and signage.
- Excavation within TPZ/SRZ.
- Various unforeseen changes in the field.
- Mid construction
- Completion of construction works.



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### **TREE CONSULTANCY / LANDSCAPE ARCHITECT**

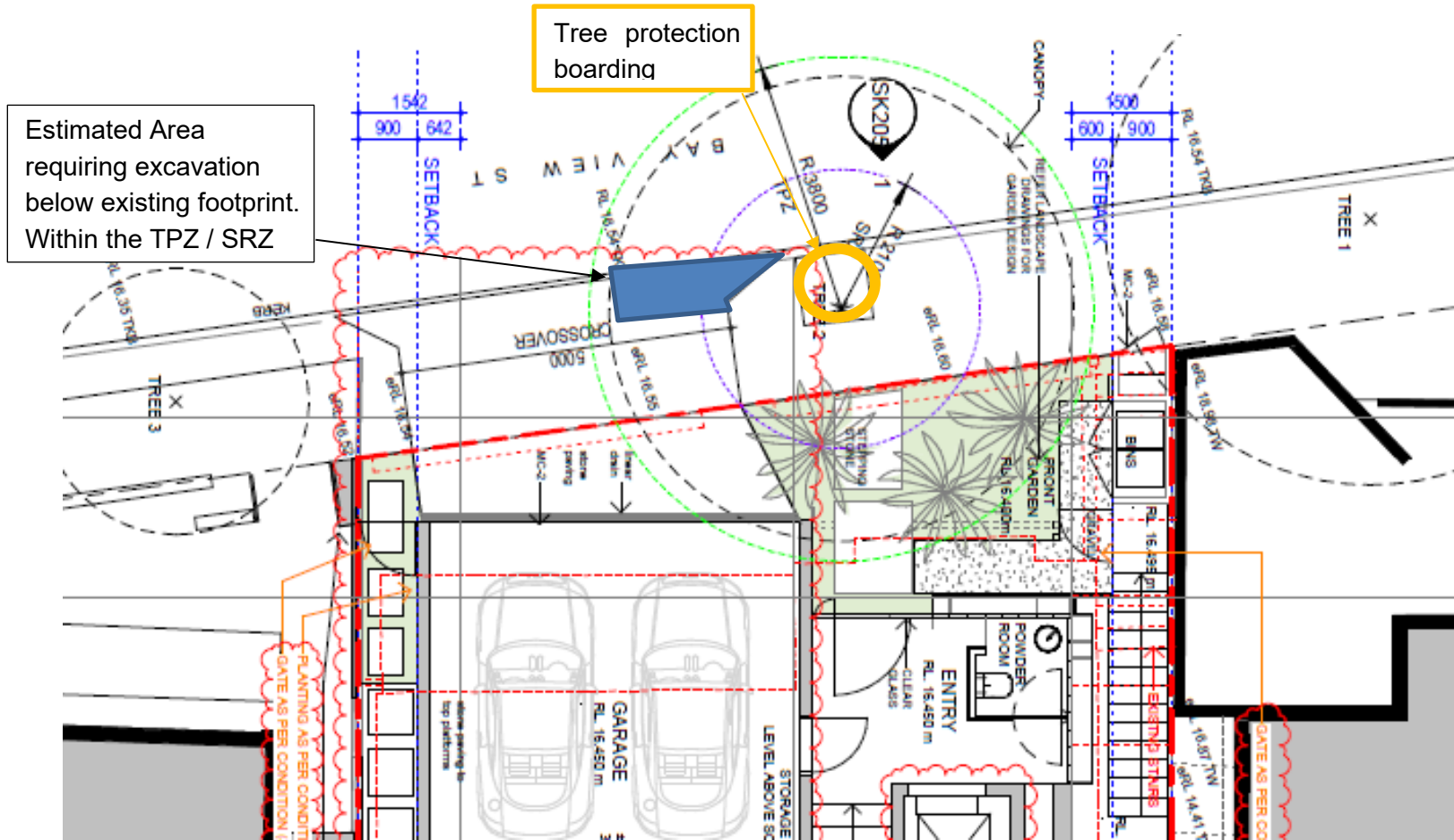
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**Disclaimer statement.** The response of a living tree to its immediate environment is dynamic throughout its entire life cycle due to external influences giving each tree a unique natural variability. A visual tree assessment addresses the external 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, advice or recommendation based on the information supplied by the client or observation of the author.

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# Appendix A - Tree Assessment data 37 Bay View St, Lavender Bay, NSW 2060



## Appendix B - TREE ASSESSMENT TABLE EXPLANATORY NOTES Thyer Tree Valuation Method (1996)

**AGE CLASS** (Modified from *British Standard BS5837-1991*).

**Immature (I):** Young trees, less than 20% of life expectancy.

**Semi-mature (S):** Middle aged trees, 20-40% of life expectancy.

**Mature (M):** Trees between 40-80% of life expectancy.

**Over-mature (O):** Senescent trees, or those declining irreversibly. Less than 20% of life expectancy.

**HEALTH** - This evaluates a trees vitality and vigour as indicated by its crown density, leaf size, foliage colour and its ability to withstand wounding, pests, diseases, or changes to the growing environment.

**Good: (G)** Tree is generally healthy and showing signs of normal vigour and is expected to continue to remain so, provided conditions around the tree required for its survival do not change.

**Average: (A)** Tree is typical of the species, considering its age, without noticeable decline.

**Fair: (F)** Tree shows signs of normal vigour but shows some indications of decline due topsets and diseases or changes to its growing environment.

**Poor: (P)** Tree exhibits symptoms of advanced and irreversible decline due to fungal decay, severe dieback of branch and crown canopy, predation of pests, storm or lightning damage, root damage or instability of the tree and alterations to its growing environment.

**STRUCTURAL CONDITION** - This refers to the trees form, and growth habit modified by its environment, the state of the trunk and the main structural branches. It includes the presence of defects such as decay, weak branch junctions and other visible abnormalities. Although some trees without defects fail in storms, the presence of any defect will increase the chances of failure.

**Good: (G)** Trees with a single dominant trunk along which evenly spaced branches are spread. Branches have properly formed collars which provide strong attachment to the trunk and are about 25% of the trunk diameter. Minor structural defects may be present with low failure potential.

**Average: (A)** Trees which have structural defects and low failure potential.

**Fair: (F)** Trees with structural defects and medium failure potential, which require monitoring on an annual basis.

**Poor: (P)** Trees with defects which have failed, or have a high risk of failing soon, and corrective action must be taken as soon as possible.





## Appendix C - 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 vigor,
- 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 vigor,
- 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](http://www.iaca.org.au)

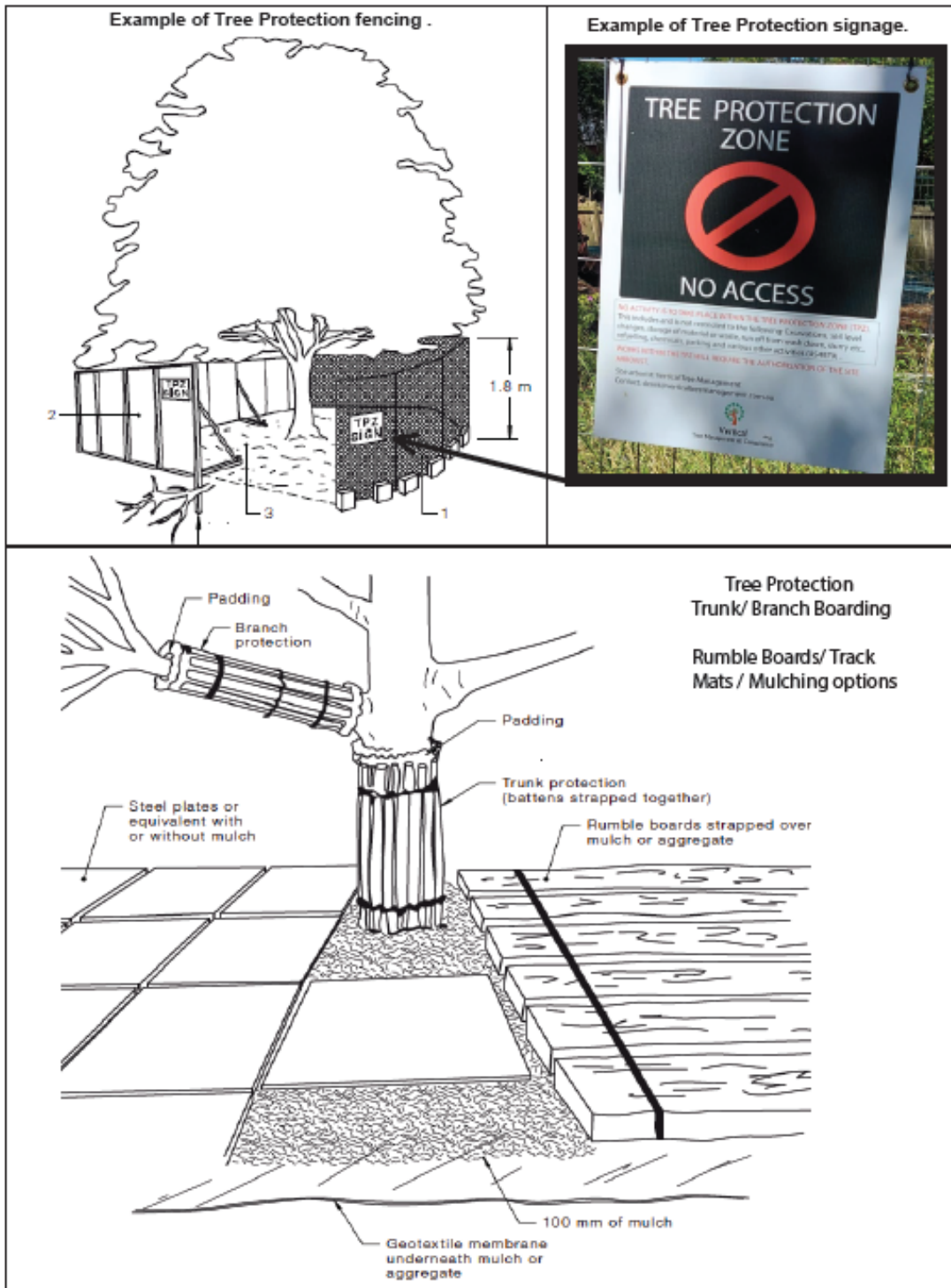


Table 4. Tree Retention Value – Priority Matrix

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
<p><u>Legend for Matrix Assessment</u></p> <div style="text-align: right;">  <p>INSTITUTE OF AUSTRALIAN <b>ACA</b> CONSULTING ARBORICULTURISTS®</p> </div>						
	<p><b>Priority for Retention (High)</b> - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i>. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.</p>					
	<p><b>Consider for Retention (Medium)</b> - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.</p>					
	<p><b>Consider for Removal (Low)</b> - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.</p>					
	<p><b>Priority for Removal</b> - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>					

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

## Appendix D - Tree protection



[Vertical Tree – Vertical Tree Management & Consultancy](#)

## Appendix E – TPZ & SRZ Incursion table

	Requirements under AS 4970-2009	Impact	Mitigation measures
<b>No encroachment</b> (0%)	N/A	<b>No impact</b> (0%)	N/A
<b>Minor encroachment</b> (<10%)	<ul style="list-style-type: none"> <li>The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ.</li> <li>Detailed root investigations should not be required.</li> </ul>	<b>Low impact</b> (<10%)	<ul style="list-style-type: none"> <li>The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ.</li> <li>Tree protection must be installed.</li> </ul>
<b>Major encroachment</b> (>10%)	<ul style="list-style-type: none"> <li>The project arborist must demonstrate the tree(s) would remain viable.</li> <li>Root investigation by non-destructive methods may be required.</li> <li>Consideration of relevant factors including: Root location and distribution, tree species, condition, site constraints and design factors.</li> <li>The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ.</li> </ul>	<b>Medium impact</b> (<20%)	<ul style="list-style-type: none"> <li>The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ.</li> <li>The project arborist will be required to supervise any works within the TPZ.</li> <li>Tree protection must be installed.</li> </ul>
		<b>High impact</b> (>20%)	<ul style="list-style-type: none"> <li>The project arborist must demonstrate the tree(s) would remain viable.</li> <li>Non-destructive root investigation will be required for any trees proposed for retention.</li> <li>The project arborist will be required to supervise any works within the TPZ.</li> <li>Tree protection must be installed.</li> </ul>



## **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 disease, 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.

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

**Fibre 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.

