



Vertical
Tree Management & Consultancy

ARBORICULTURAL IMPACT ASSESSMENT & TREE PROTECTION PLAN

COMMISSIONED BY:

TIM AND JO HARPUR

Site: 22 Suffolk Avenue, Collaroy, NSW 2097

Within: Northern Beaches Council

Date of Inspection: 17 January 2025

Version: 1.2

PREPARED BY:

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1 Introduction / Aims / Objectives

1.1 Introduction

This Arboricultural Impact Assessment, Version 1.2, has been prepared by Vertical Tree Management and Consultancy, on behalf of the client, Tim and Jo Harpur. The report aims to assess the existing viability of the trees on the site, considering their retention value and risk assessment as observed during the inspection. The assessment will be conducted in relation to the proposed small dual occupancy, alterations and associated infrastructure.

The trees within the site have been evaluated and assigned a retention value rating. Trees with low retention value are recommended for removal, while those with medium retention value may be removed for the benefit of the project. Trees with high retention values should be retained wherever feasible.

The site, located at allotment A DP396160, 22 Suffolk Ave, Collaroy, NSW 2097, falls under the jurisdiction of the Northern Beaches Council and is subject to relevant local government regulations and legislation.

1.2 Aims

This report aims to:

- Assess the site trees and advise on acceptable setback distances and impacts within the Tree Protection Zones (TPZ).
- Provide details on the methodology used in tree evaluation, retention value assessment, and determination of Tree Protection Zones and Structural Root Zones (SRZ) (see page 4).
- Present a tree data table including retention values (see page 6).
- Include a scaled plan illustrating the location of trees on the site (see Appendix A).
- Assign a number to each tree (see page 6 and Appendix A).
- Provide measurements such as canopy spread, diameter at breast height, and ground level of each tree (see page 6).
- Indicate tree retention values, Tree Protection Zones (TPZ), Structural Root Zones (SRZ), and assess the impact of development on the environment (see page 6).

1.3 Objectives

The objectives of this assessment are to:

- Evaluate the condition of the trees.
- Determine the impact of development on the site trees.
- Offer recommendations for management and protection strategies for site trees.

1.4 The site

Situated in the Northern Beaches Council (NBC) local government area, the site is zoned as R2 Low Density Residential. The site has been identified to have non-specific vegetation schedule throughout. This is consistent with urban plantings of the modern era where native and exotic species have been used. However, the site does contain weed species. The vegetation on the site appeared maintained. Other vegetation was observed on the site however does not form part of the report as it does not fulfill the criteria of being a tree under the definition.

A summary of land control checks can be found in Table 1 below. The information has been obtained from the NSW Government ePlanning Spatial Viewer website as of 17 January 2025.

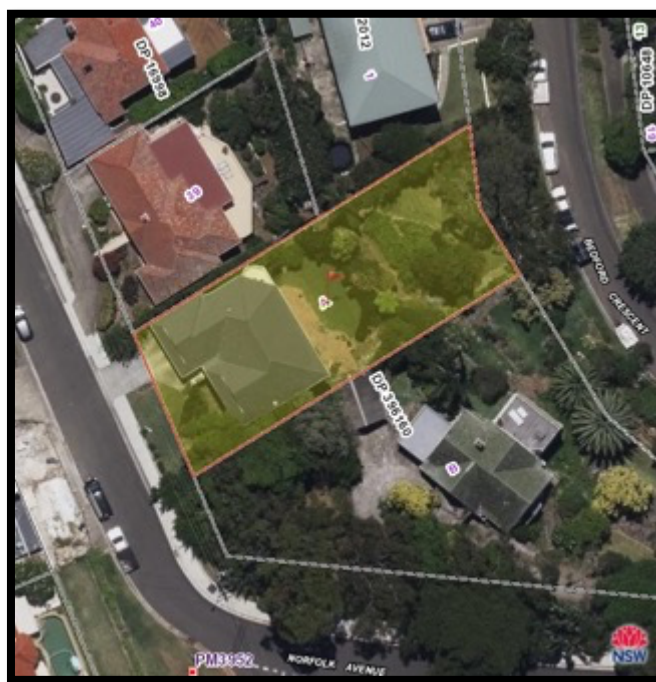


Figure 1. Aerial photo of the site 22 Suffolk Ave, Collaroy, NSW 2097. Sixmaps, accessed 17 January 2025.

Table 1: Outline of site control measures listed on the land 22 Suffolk Ave, Collaroy, NSW 2097.

Planning Control	Conditioned	Not Conditioned
Zoning	R2 Low 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 17 January 2025.

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:

- Incidental Architecture, Survey, 01/2025
- Incidental Architecture, Garage Plan, Page SD 1a, 01/2025
- Incidental Architecture, South and East Elevations, Page DA5, 01/2025
- Incidental Architecture, Ground Floor Plan, Page DA2, 02/2025

2.3 Tree Heights

Heights of trees were measured using a Nikon clinometer, a tool designed to accurately gauge vertical distances. This method provides precise measurements by employing trigonometric calculations.

2.4 Diameter at Breast Height (DBH)

The diameter at breast height (DBH) was obtained using a diameter tape. This is the standard practice for measuring tree diameter, typically taken at 1.4 meters above the ground, allowing for consistent and comparable data across multiple trees.

2.5 Tree Canopy Width

The width of the tree canopy was measured by pacing out the distance from the canopy edge on one side to the canopy edge on the opposite side, aligning with a compass for directional accuracy. This method facilitates an understanding of the canopy's spread.

2.6 Tree Numbering System

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

2.7 Tree Protection Zone (TPZ)

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

2.8 Structural Root Zone (SRZ)

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

2.9 Amendments

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

2.10 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.

2.11 Tree sensitive construction techniques

Tree-sensitive construction methods like pier and beam foundations, suspended slabs, cantilevered building sections, screw piles, and contiguous piling can significantly minimise the impact of construction encroachment on trees. When these techniques are employed, the extent of incursion and its potential effects on a tree's roots and canopy are carefully re-calibrated and assessed in accordance with AS4970 - 2009 "Protection of Trees on Development Sites". Other tree environmental improvement techniques such as irrigation, moisture monitoring, mulching can also mitigate adverse impacts to the trees. Tree sensitive construction aims at maintaining tree vitality.

2.12 Destabilisation

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

2.13 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.

2.14 Tree protection & specification

Tree protection & specification in accordance with AS4970-2009.

2.15 Assumptions/Limitations

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.
4. Neighbouring tree dimensions have been measured from within the site using the authors experience and measuring tape parallel to the tree or extended within. No access to neighbouring properties has been consented by the owner(s).

3 Tree Assessment Data

Table 2. Tree Assessment Data for trees located in 22 Suffolk Ave, Collaroy NSW 2097, accessed on 17 January 2025.

Number	Botanic Name	Common Name	Height	Width	*DBH (cm)	**DGL (cm)	***TPZ Radius (m)	^SRZ Radius (m)	Age Class	Health	Condition	Amenity	Retention Value	Notes
1	<i>Mangifera indica</i>	Mango	~12	~6	~35	~40	~4.2	~2.3	Mature	Fair	Good	Medium	High	A single-stem tree with no significant defects, exhibiting dieback and moderate deadwood <40mm, suppressed by an adjacent tree, and located at the neighbouring property.
2	<i>Pittosporum undulatum</i>	Australian cheesewood	12	6	20	25	2.4	1.9	Mature	Good	Good	Medium	High	A single-stem tree, typical of its species, with no significant defects.
3	<i>Syzygium luehmannii</i>	Riberry	12	6	15/13	45	2.4	2.4	Mature	Fair	Fair	Medium	Medium	Co-dominant stems with multiple stems at ground level, bifurcated branches, and an included union with poor attachment. Affected by sooty mold.
4	<i>Syzygium luehmannii</i>	Riberry	12	6	28	37	1.8	2.2	Mature	Fair	Fair	Medium	Medium	Co-dominant stems with multiple stems at ground level, bifurcated branches, and an included union with poor attachment. Affected by sooty mold.



Number	Botanic Name	Common Name	Height	Width	*DBH (cm)	**DGL (cm)	***TPZ Radius (m)	^SRZ Radius (m)	Age Class	Health	Condition	Amenity	Retention Value	Notes
5	<i>Eucalyptus resinifera</i>	Red mahogany	12	12	38/35	80	6.2	3.1	Mature	Fair	Fair	Medium	Medium	Co-dominant stems with an included union exhibiting poor attachment, epicormic regrowth, dieback, large deadwood >40mm, and a sparse crown.
6	<i>Melaleuca bracteata</i>	Black tea-tree	15	8	32	36	3.8	2.2	Mature	Fair	Good	Medium	Medium	Co-dominant stems with an included union that has a fair attachment, upper crown dieback, and minor deadwood <30mm.
7	<i>Agonis flexuosa</i>	Peppermint	15	15	72	83	8.6	3.1	Mature	Fair	Poor	Medium	Low	Co-dominant stems with lower crown dieback, moderate deadwood <40mm, decay, and a cavity. The decay and cavity extend from the ground level to approximately 3 meters.
8	<i>Lagerstroemia indica</i>	Crepe myrtle	3	3	30	35	3.6	2.2	Mature	Good	Good	Low	Low	Multiple stems at ground level, heavily pruned back, with the crown consisting of epicormic growth.
9	<i>Camellia sasanqua</i>	Sasanqua camellia	~6	~7	~35	~35	~4.2	~2.2	Mature	Good	Good	Medium	High	A multi-stem tree, typical of its species, with good vigour and no significant defects, located on a neighbouring property. The crown overhangs the site by approximately 2 meters.



Number	Botanic Name	Common Name	Height	Width	*DBH (cm)	**DGL (cm)	***TPZ Radius (m)	^SRZ Radius (m)	Age Class	Health	Condition	Amenity	Retention Value	Notes
10	<i>Lagerstroemia indica</i>	Crepe myrtle	7	6	35	35	4.2	2.2	Mature	Good	Good	Medium	High	A multi-stem tree, typical of its species, with no significant defects, pruned back with a crown made from epicormic growth. Located on a neighbouring property, with the crown overhanging the site by approximately 2 meters.
11	<i>Syagrus romanzoffiana</i>	Queen palm	12	8	20	25	2.4	1.9	Mature	Good	Good	Medium	Low	A single-stem tree with no significant defects, likely exempt.
12	<i>Backhousia citriodora</i>	Lemon myrtle	12	6	24	25	2.9	1.9	Mature	Good	Fair	Medium	Medium	Co-dominant stems with an included union that has a poor attachment, bark deformation along the trunk, and bifurcated branches. The tree has been pruned back, with epicormic regrowth comprising most of the crown.
13	<i>Magnolia grandiflora</i>	Southern magnolia	12	6	11	15	1.5	1.5	Mature	Good	Good	Medium	Medium	A single-stem tree with good vigour and no significant defects.
14	<i>Magnolia grandiflora</i>	Southern magnolia	12	6	16	18	1.9	1.7	Mature	Good	Good	Medium	Medium	A single-stem tree with good vigour and no significant defects.

*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)

Tree Protection Zone definition:

“A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree’s roots and crown. to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development” (Australian Standard AS4970 – 2009: “Protection of Trees on Development Sites.” – clause 1.4.7).

Crown - *Portion of the tree consisting of branches and leaves and any part of the trunk from which branches arise.*

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.

4.6 TPZ Development design and construction / encroachment considerations

“Tree sensitive construction measures such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling can minimise the impact of encroachment.” (Australian Standard AS 4970 – 2009: “Protection of Trees on Development Sites.” – clause 2.3.4 & 3.3.4 (h)).

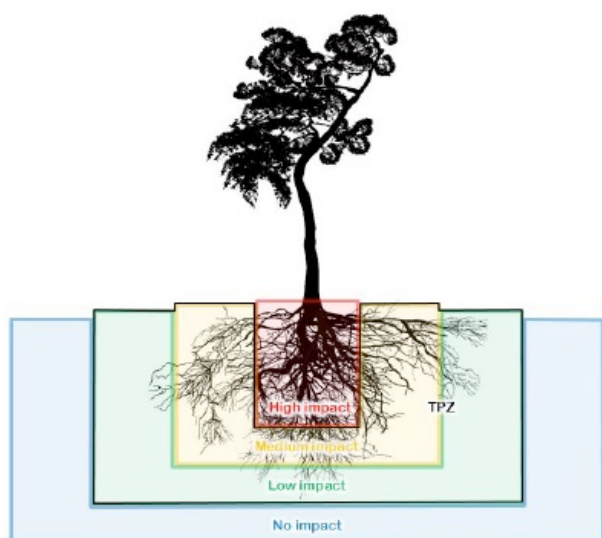


Figure 2. Image showing low, medium and high impact zones in reference to the tree.

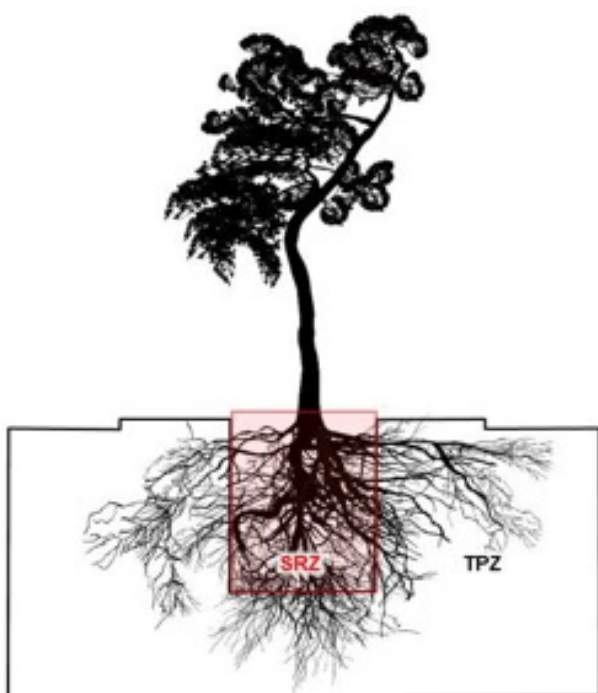


Figure 3. Image showing Structural Root Zone. This is the area required for tree stability.

Table 3 – Tree Protection Zone (TPZ) & Structural Root Zone (SRZ) Incursion Calculations Table for 22 Suffolk Ave, Collaroy, NSW 2097.

Tree Number/ Species	Incursion Percentage TPZ	Incursion Percentage SRZ	Action	Notes
1 <i>Mangifera indica</i>	0.0	0.0	Retain and protect.	No impact anticipated.
2 <i>Pittosporum undulatum</i>	0.0	0.0	Retain and protect.	No impact anticipated.
3 <i>Syzygium luehmannii</i>	100	100	Remove.	Within proposed dwelling footprint.
4 <i>Syzygium luehmannii</i>	100	100	Remove.	Within proposed dwelling footprint.
5 <i>Eucalyptus resinifera</i>	100	100	Remove.	Within proposed driveway footprint.
6 <i>Melaleuca bracteata</i>	12	0.0	Retain and protect. Non-destructive excavation within the TPZ under level 5 site arborist supervision.	Minor impact to TPZ anticipated from proposed dwelling and driveway.
7 <i>Agonis flexuosa</i>	21.8	0.0	Remove.	Major impact anticipated from proposed dwelling and driveway. Tree in poor condition.
8 <i>Lagerstroemia indica</i>	0.0	0.0	Retain and protect.	No impact anticipated.
9 <i>Camellia sasanqua</i>	Without tree sensitive design 24.8	Without tree sensitive design 8.9	Retain. Non-destructive excavation within the TPZ under level 5 site arborist supervision. Existing fence to act as tree protection.	Tree sensitive design must be used to ensure the viability of this tree. the use of suspended slabs and pier and beam footings are recommended to minimize impact to the root system.
	With tree sensitive design <10	With tree sensitive design <10		
10 <i>Lagerstroemia indica</i>	Without tree sensitive design 27	Without tree sensitive design 9.8	Retain. Non-destructive excavation within the TPZ under level 5 site arborist supervision. Existing fence to act as tree protection.	Tree sensitive design must be used to ensure the viability of this tree. the use of suspended slabs and pier and beam footings are recommended to minimize impact to the root system.
	With tree sensitive design <10	With tree sensitive design <10		

Tree Number/ Species	Incurion Percentage TPZ	Incurion Percentage SRZ	Action	Notes
11 <i>Syagrus romanzoffiana</i>	100	100	Remove.	Within proposed dwelling footprint.
12 <i>Backhousia citriodora</i>	>20	>10	Remove.	Major impact to TPZ and SRZ from propose dwelling.
13 <i>Magnolia grandiflora</i>	100	100	Remove.	Within footprint of proposed terraced area.
14 <i>Magnolia grandiflora</i>	100	100	Remove.	Within footprint of proposed terraced area.

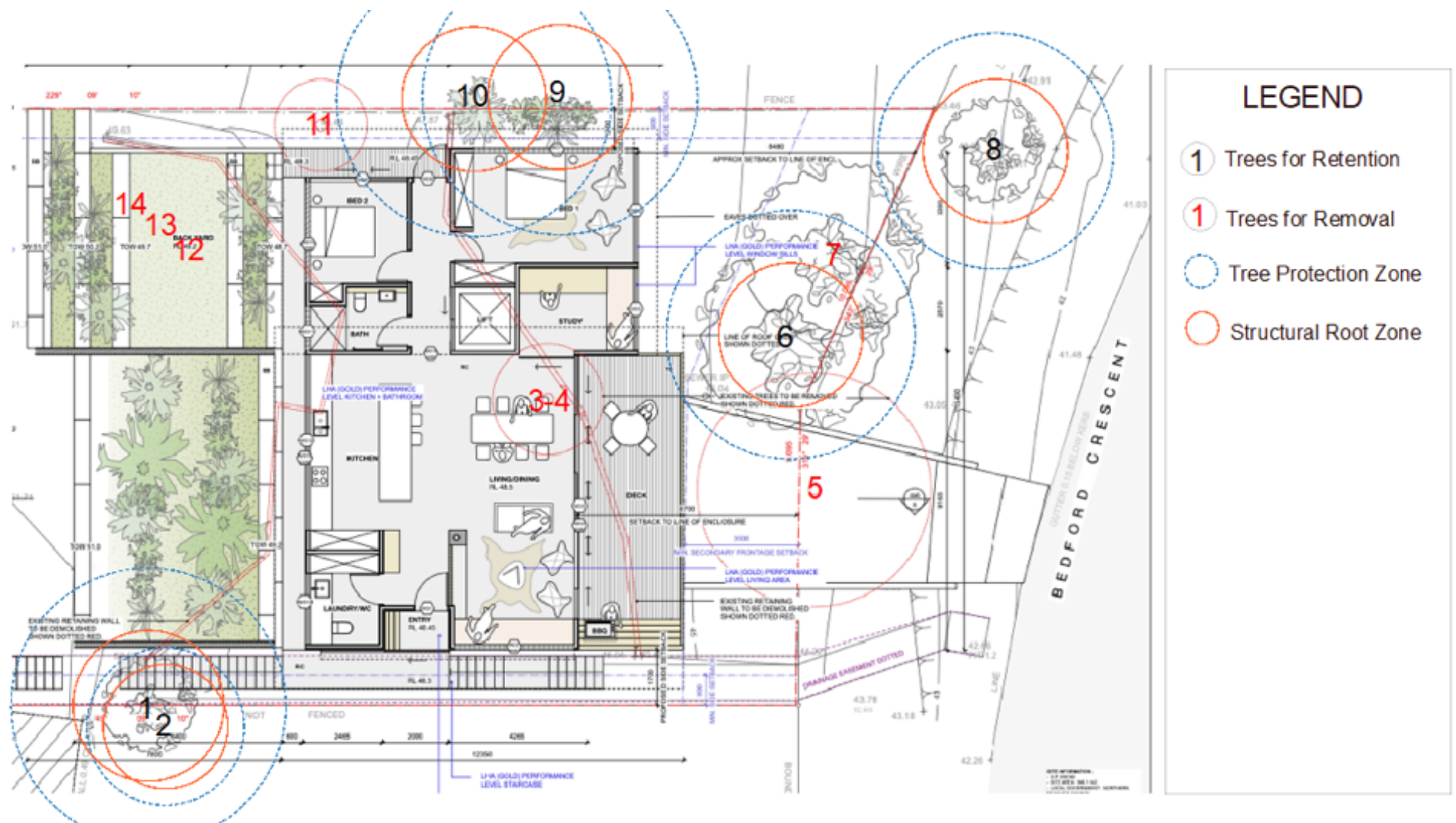


Figure 4. Tree Location Plan for 22 Suffolk Ave, Collaroy NSW 2097.



5 Discussion

The arboricultural impact assessment for the site at 22 Suffolk Ave, Collaroy, NSW 2097, focuses on the impact of the proposed development on existing trees, considering both direct and indirect effects during construction. The trees on site have been assessed based on their Tree Protection Zone (TPZ) and Structural Root Zone (SRZ), with calculations provided for any potential incursions. This assessment also outlines trees to be retained, those to be removed, and the protection measures necessary to ensure the survival of retained trees.

Trees Identified for Removal

The proposed development involves the removal of several trees due to direct encroachment into their TPZ and SRZ or their placement within areas required for the construction of the dwelling, driveway, or other infrastructure. The following trees have been identified for removal:

- Tree 3 (*Syzygium luehmannii*)
- Tree 4 (*Syzygium luehmannii*)
- Tree 5 (*Eucalyptus resinifera*)
- Tree 7 (*Agonis flexuosa*)
- Tree 11 (*Syagrus romanzoffiana*)
- Tree 12 (*Backhousia citriodora*)
- Tree 13 (*Magnolia grandiflora*)
- Tree 14 (*Magnolia grandiflora*)

These trees have either significant TPZ and SRZ incursions or are located within the footprints of the proposed dwelling or driveway. Given these trees' location within the proposed built environment, their removal is essential for the successful execution of the development plan.

Trees Identified to be Retained

The following trees are considered suitable for retention and protection, as their TPZ and SRZ incursions are minimal or non-existent:

- Tree 1 (*Mangifera indica*)
- Tree 2 (*Pittosporum undulatum*)
- Tree 6 (*Melaleuca bracteata*)
- Tree 8 (*Lagerstroemia indica*)
- Tree 9 (*Camellia sasanqua*)

- Tree 10 (*Lagerstroemia indica*)

These trees have either no significant incursion into their TPZ or SRZ, or they are located in areas that will not be disturbed by the proposed construction. Specific measures, such as tree protection fencing, will be implemented to ensure that these trees remain undisturbed during the course of the development.

Tree 9 (*Camellia sasanqua*) and **Tree 10 (*Lagerstroemia indica*)** are located on the neighbouring property directly adjacent to the property fence. To ensure their viability, a tree-sensitive design approach, including the use of suspended slabs and pier-and-beam footings, is recommended to minimize the impact on their root systems. Non-destructive excavation methods within their TPZ, under the supervision of a qualified arborist, will also be employed to mitigate potential damage.

Tree Protection Zones (TPZ) and Structural Root Zones (SRZ)

The assessment includes detailed calculations of TPZ and SRZ incursions, as outlined in Table 3. These calculations are critical for understanding the extent of root zone disturbance and guiding the appropriate protection measures for retained trees.

- **Tree 6 (*Melaleuca bracteata*)**, while retaining a minor incursion into the TPZ (12%), will be retained and protected. Non-destructive excavation will be permitted within the TPZ under the supervision of a Level 5 arborist to ensure that any impact remains minimal. This tree's protection is important due to its proximity to the proposed dwelling and driveway, but its location allows for reasonable mitigation measures.
- **Tree 9 (*Camellia sasanqua*)** and **Tree 10 (*Lagerstroemia indica*)** show significant incursion into the TPZ when a tree-sensitive design is not employed. If these trees are to be successfully retained, specialized construction techniques will be necessary to prevent damage to their root systems.

Tree Protection Measures

To safeguard the health of the retained trees throughout the construction process, tree protection fencing will be established around the TPZs of all retained site trees. The fencing must be installed before any construction begins and must remain in place until the completion of the project.

6 Recommendations

6.1 Trees identified for removal

Table 4 - Trees identified for removal at 22 Suffolk Ave, Collaroy NSW 2097.

Number	Species	Action
3	<i>Syzygium luehmannii</i>	Remove
4	<i>Syzygium luehmannii</i>	Remove
5	<i>Eucalyptus resinifera</i>	Remove
7	<i>Agonis flexuosa</i>	Remove
11	<i>Syagrus romanzoffiana</i>	Remove

Number	Species	Action
12	<i>Backhousia citriodora</i>	Remove
13	<i>Magnolia grandiflora</i>	Remove
14	<i>Magnolia grandiflora</i>	Remove

6.2 Trees identified to be retained

Table 5 - Trees identified to be retained at 22 Suffolk Ave, Collaroy NSW 2097.

Number	Species	Action
1	<i>Mangifera indica</i>	Retain
2	<i>Pittosporum undulatum</i>	Retain
6	<i>Melaleuca bracteata</i>	Retain
8	<i>Lagerstroemia indica</i>	Retain
9	<i>Camellia sasanqua</i>	Retain
10	<i>Lagerstroemia indica</i>	Retain

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 1.2 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 fencing to protect and delineate an area where no development activities occur.
- The trees requiring protection include:

Number	Species	Action
1	<i>Mangifera indica</i>	Tree Protection Fencing
2	<i>Pittosporum undulatum</i>	Tree Protection Fencing

Number	Species	Action
6	<i>Melaleuca bracteata</i>	Tree Protection Fencing
8	<i>Lagerstroemia indica</i>	Tree Protection Fencing

- 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 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 - Derek Arnaiz, Vertical Tree Management & Consultancy.

8.1.3 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.

8.1.4 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.

8.1.5 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)

8.1.6 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.

8.1.7 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.

8.1.8 Alterations

Alteration to the TPZs requires the site arborist approval.

8.1.9 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.

8.1.10 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.

8.1.11 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.

8.1.12 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.

Date	Version	Prepared by	Checked by
19 February 2025	1.2	Ashlee Smith	Derek Arnaiz
13 February 2025	1.1	Ashlee Smith	Derek Arnaiz
20 January 2025	1	Ashlee Smith	Derek Arnaiz



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TREE CONSULTANCY / LANDSCAPE ARCHITECT

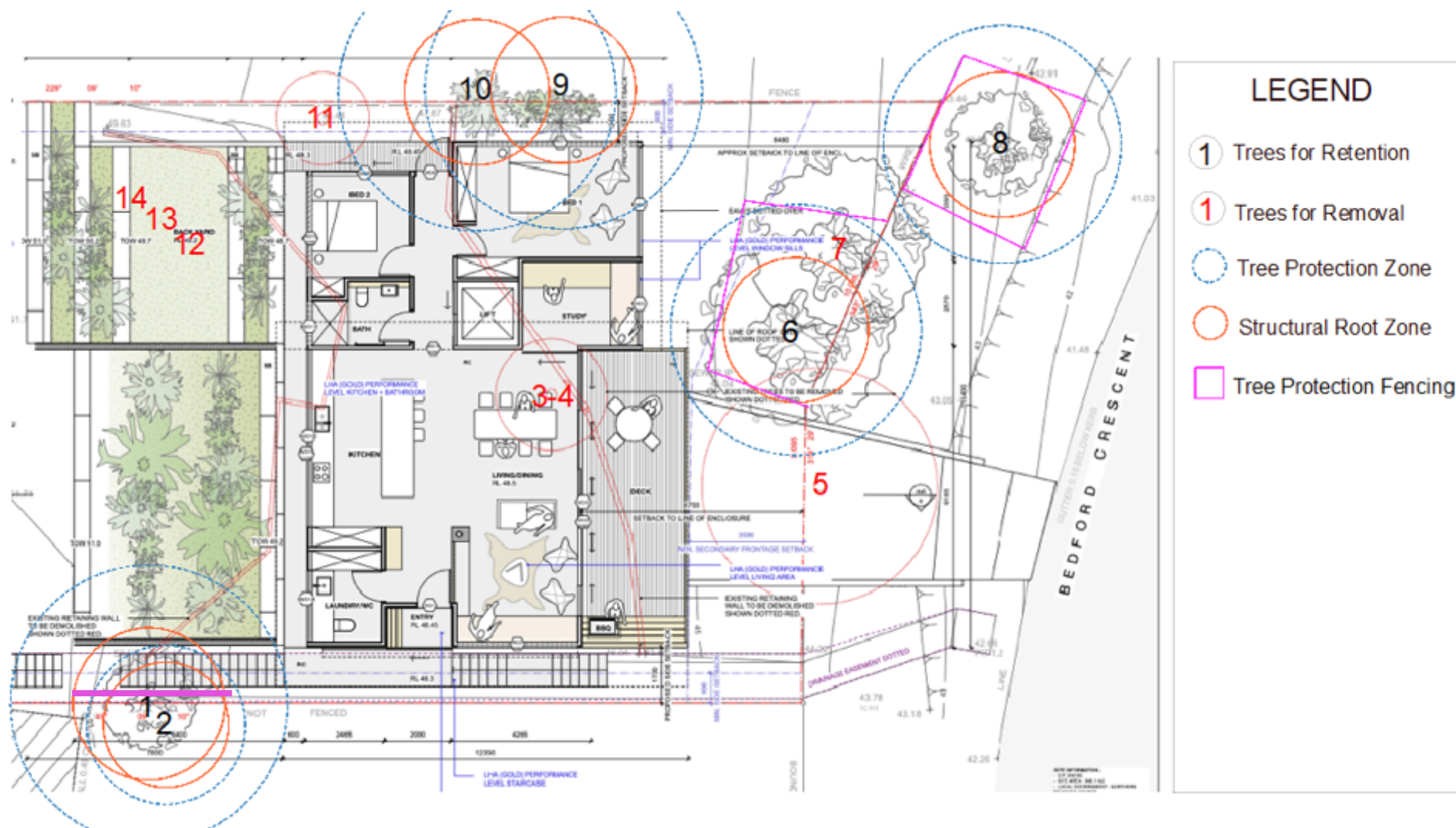
TREE ASSESSMENTS / TREE REPORTS / GPS SURVEYING / TREE PROTECTION / PEST & DISEASE/ TREE INJECTION / ROOT MAPPING / STUMP GRINDING /GARDEN DESIGN/ /TREE SUPPLY AND PLANTING

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

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Appendix A - Tree Protection Plan for 22 Suffolk Ave, Collaroy NSW 2097



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.**

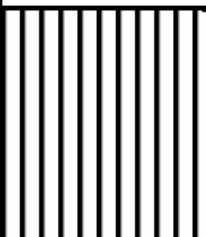
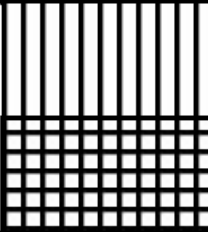
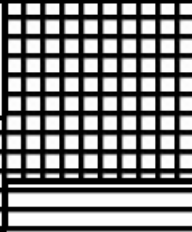
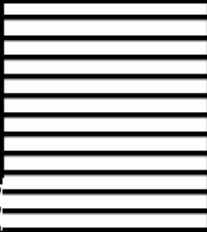

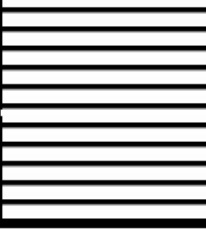
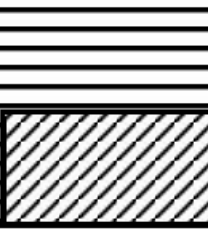



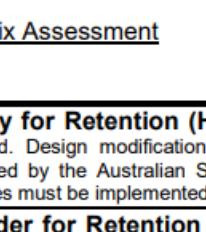
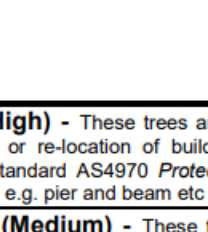
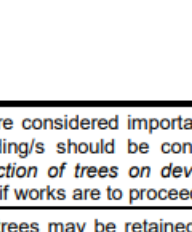
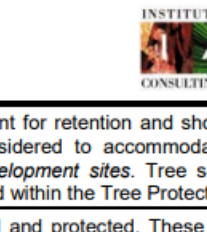
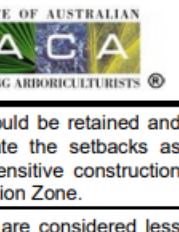
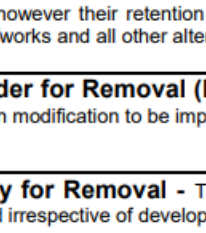
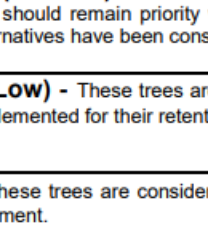
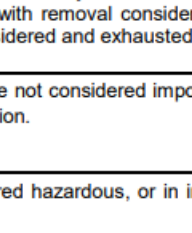
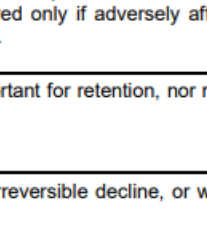
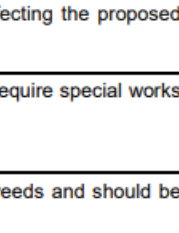
Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g., hedge.

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:


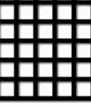
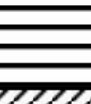

IACA, 2010 IACA significance of a tree assessment rating systems, institute of Australian consulting arborists, Australia www.iaca.org.au

Table 6. 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					

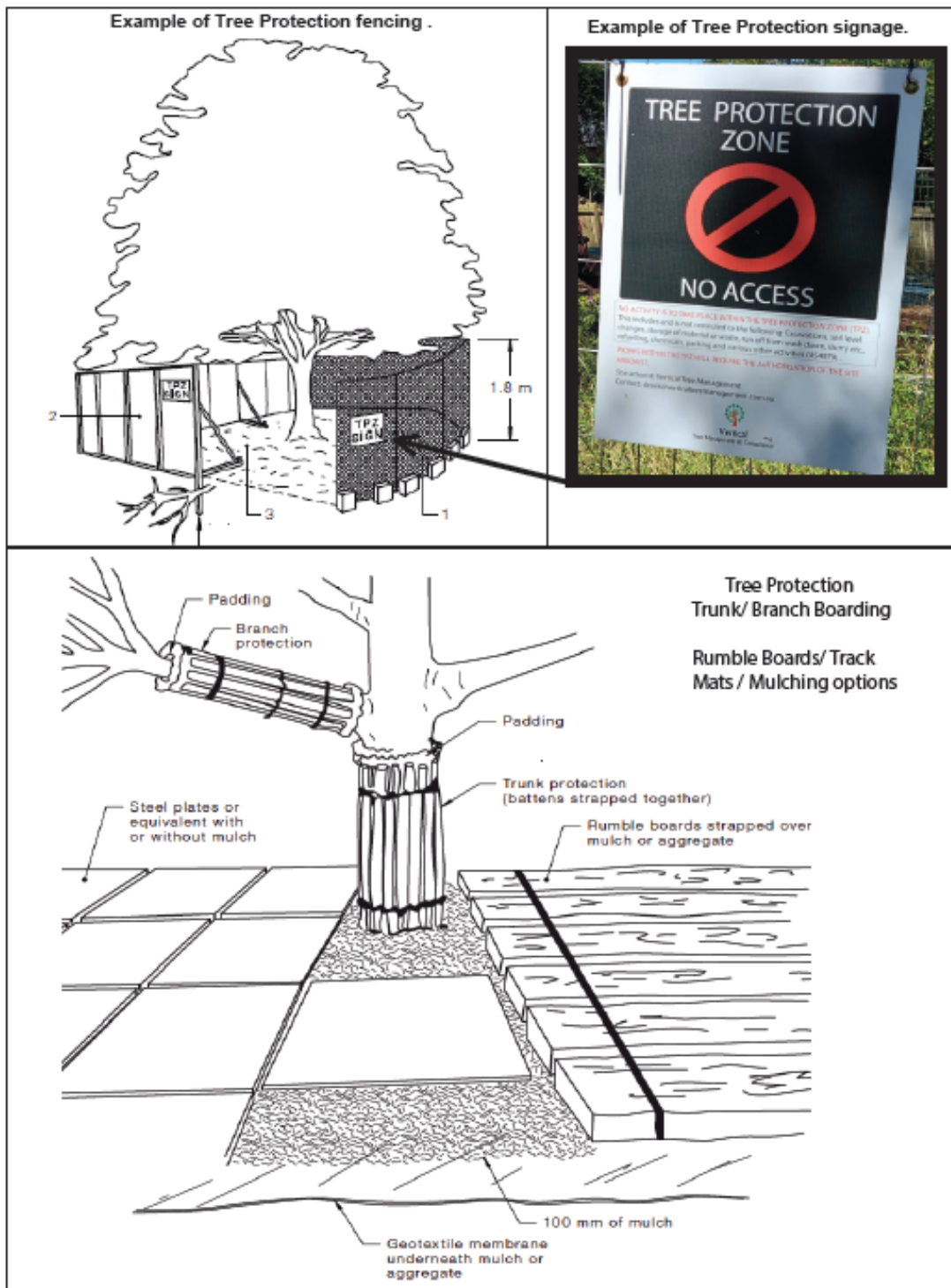
Legend for Matrix Assessment



	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <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.
	Consider for Retention (Medium) - 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.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

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

Appendix D - Tree protection



[Vertical Tree – Vertical Tree Management & Consultancy](http://verticaltree.com.au)

Appendix E – TPZ & SRZ Incursion table

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

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).

Fungus - Several fungal diseases, sometimes called heart rots, sap rots, or canker rots, decay wood in tree trunks and limbs. Under conditions favoring growth of specific rot fungi, extensive portions of the wood of living trees can decay in a relatively short time (i.e., months to years). Decay fungi reduce wood strength and may kill storage and conductive tissues in the sapwood.

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.

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.

TPZ (m) - Radius measured from the centre of the tree.

SRZ (m) - Radius measured from the centre of the tree.

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.