ARBORICULTURAL IMPACT ASSESSMENT

(AIA) REPORT

CLIENT: Mike Mangan

15 Chisholm Avenue
Avalon Beach
NSW2107

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1 Executive Summary

Mr Mike Mangan (the client) has requested an inspection of the tree population and an Arboricultural Impact Assessment (AIA) report for a proposed development at:

15 Chisholm Avenue
Avalon Beach
NSW2107.

The proposed development includes alterations and additions to the existing house, including a pool and cabana with a garden shed attached, extending out the ground floor and deck into the garden and a new first floor, as well as demolishing the existing carport and replacing it with a garage.

The trees that will be impacted by this development were inspected and guidance has been provided for the client and their principal contractor/architect on the constraints these trees impose on the use of the site.

Fivbe Trees in total were assessed, and were given high, medium and low landscape significance were. It was calculated that the development will have a major encroachment upon all two of the trees.

The trees are part of the Pittwater Spotted Gum Forrest, which is listed as an Endangered Ecological Community.

Tree sensitive construction methods, such as the use of hand tools in Tree Protection Zones during demolition operations, pier and beam, suspended slabs and canter levered floors to reduce the impact and minimise potential root loss should be considered as part of the design process.

All works within Tree Protection Zones must be carried out under supervision from a project arborist.

Two of the trees assessed are recommended to be remove and the other four retained and protected during construction.

The development proposal is expected to have a low impact to the trees on the site.

1.1 Introduction

Mr Mike Mangan (the client) has requested an inspection of the tree population and an Arboricultural Impact Assessment (AIA) report for a proposed development at:

15 Chisholm Avenue
Avalon Beach
NSW2107.

The site falls under the jurisdiction of the Northern Beaches Council.

This report will provide quantitative and qualitive information and investigate the impact of the proposed development on the trees.

Trees and vegetation on the Northern Beaches, even those on private land, are protected under the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP). The Vegetation SEPP regulates proposed tree and vegetation removal that is not associated with a development application but still requires a permit from Council.
The Northern Beaches Development Control Plan (DCP) protects;

- Trees that are five (5) metres in height or more.
- Located more than two metres from an existing approved building (not including decks, pergolas, sheds, patios or the like, even if they are attached to a building). The measurement is made from the building to the base of the tree trunk.

The trees are part of the Pittwater Spotted Gum Forrest, which is listed as an Endangered Ecological Community.

Consent from Council, where works to trees is required as part of other works for which development consent is required, the works will be assessed as part of the Development Application.

1.2 Scope

The report shall identify all trees equal to or greater than five (5) metres in height located within the subject site and adjoining properties, where located within three (3) metres of the common property boundary or where a tree protection area extends into the development site.

It will assess the impact that the proposed development will have and make recommendations to reduce the impact on the trees, with additional guidance on appropriate management and tree protection measures in accordance with AS4970-2009.

The preliminary assessment will be a ground based Visual Tree Assessment (VTA). It will not include an aerial assessment, below ground root investigation or advanced diagnostics such as Resistograph or Picus Sonic Tomograph testing. If further testing is required, recommendations will be made.

Tree identification is based on visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where a tree species is unknown, it is indicated with an *spp.*

The schedule of trees to be retained can be found in Appendix A

1.3 Methodology

Site visit conducted on Thursday 6th February 2025

All observations of the trees were made at ground level (VTA). Multiple dimensions were measured including:

- **Heights** of the trees were measured using mobile application called Arboreal. Arboreal use's Augmented Reality (AR) technology within a mobile phone to measure the distance from the tree and the angle to the top of the tree to calculate an approximate height.
- **Trunk Diameters at Breast Height (DBH)** were measured at the Australian standard height of 1.4m where possible using a 5m diameter tape. See Australian Standard AS4970-2009 (Appendix A) for measurement methods where a 1.4m DBH is not achievable.
- **Diameters at Root Junction (DRJ)** were measured at the start of the root flare using a 5m diameter tape.
- **Canopy spread** of the trees from North to South and from East to West using a 50m tape measure.

The Useful life expectancy (ULE) of the trees was calculated based on an estimate of the average life span of the species in an urban area, less its estimated current age and then further modified where necessary in consideration of its current health, condition, structural integrity, and suitability to the site.
A full methodology can be found in Appendix B

The Institute of Australian Consulting Arboriculturists (IACA) Significance of a Tree, Assessment Rating System (STARS) was used to define the landscape significance of the trees and determine the retention value for each individual tree.
A full methodology can be found in Appendix C

The Tree Protection Zone (TPZ) and the Structural Root Zone (SRZ) were calculated for each tree using the Treetec.net calculator.

Documents and information that was relied upon:

165-15 Chisholm Av Avalon Beach-part surv with trees.pdf

1.4 Site Observations

1.4.1 A Brief Site Description

The site is located within the suburb of Avalon Beach with several neighbouring properties surrounding. It is part of the Pittwater Spotted Gum Forrest, which is listed as an Endangered Ecological Community (EEC).

The site has a shared concrete driveway which splits off to No.13 Chisholm Ave. on the left. No. 15 has a detached carport, which is proposed to be demolished and a new garage built in its place.

The site is heavily treed with large *Angophora* and *Eucalyptus spp.* and other smaller native trees, shrubs and palms.

The existing house is set back from the road with a terraced rear garden that gets steeper as it goes down towards the houses at the rear to the east.

The proposed development includes alterations and additions to the existing house, including a pool and cabana with a garden shed attached, extending out the ground floor and deck into the garden and a new first floor, as well as demolishing the existing carport and replacing it with a garage.

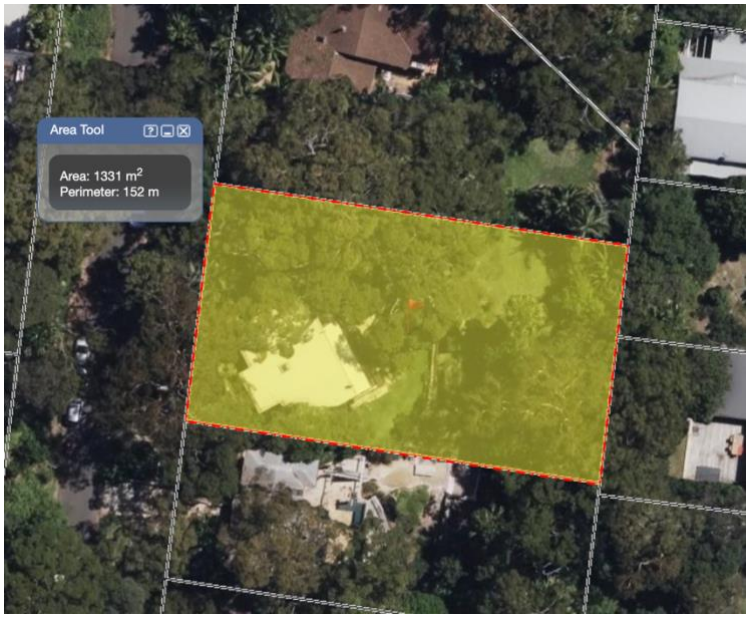


Figure 1 shows the site (yellow box) and its approximate area. Aerial photo taken from SIXMAPS.com.au

1.4.2 Trees

Only trees within approximately 10m of the proposed development where assessed, trees outside of this area will not be impacted by the development.
Six trees were assessed, and information was collected regarding the species, approximate height, DBH, maturity and landscape significance as well as notes made on their health and condition.

The trees are part of the Pittwater Spotted Gum Forrest, which is listed as an Endangered Ecological Community (EEC).
The trees are protected under the NBDCP due to their species and size.

See Appendix A for the tree schedule.

2 AS 4970-2009 (Protection of trees on development sites) definitions.

2.1 Tree Protection Zone (TPZ)

A specified area above and below ground and at a given distance from the trunk set aside for the purpose 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.
The TPZ incorporates the structural root zone.

2.2 Structural Root Zone (SRZ)

The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres.

This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.

2.3 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. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

2.4 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. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods and consideration of relevant factors listed in clause 3.3.4 of the standard. (AS4970, 2009)

3 Arboricultural Impact Assessment (AIA)

The impact of the proposed development on the tree and the encroachment of structures into the TPZ is laid out below.

Table 1 summary of existing trees that may be affected by development.

Tree ID	Species	Retention value	TPZ radius (M)	TPZ area (M^2)	SRZ radius (M)	TPZ encroachment	Discussion/ Conclusion	Recommendation
1	*Eucalyptus pilularis*	Low	8.64	234.52	3.01	15.72% (Major)	The tree sits on the boundary line between No.13 and No. 15 Chisholm Ave. It is growing to the side and overhangs the existing carport of No.15. In the development proposal the existing carport is to be demolished, and a new garage built in its place. The tree is heavily asymmetrical and has a poor form. It has been heavily pruned in the past and the canopy is quite sparse. The tree has been given a low retention value (consider for removal) The proposed construction of the new garage sits within the trees SRZ and will have a major encroachment into the trees TPZ.	Remove

Tree ID	Species	Retention value	TPZ radius (M)	TPZ area (M^2)	SRZ radius (M)	TPZ encroachment	Discussion/ Conclusion	Recommendation
2	*Angophora costata*	High	11.76	434.47	3.4	9.31% (Minor)	The tree is a feature of the front garden. It has an asymmetrical canopy with some large deadwood over the driveway. In the development proposal the existing carport is to be demolished, and a new garage built in its place. The new garage will have a minor encroachment into the trees TPZ however the corner of the garage will encroach into the trees SRZ. It is recommended the new garage be constructed with a slab on ground foundation without excavation to reduce the impact to the tree. The New entry is to be built on piers where the existing deck is. Footing position should be flexible to accommodate for any tree roots. NO excavation to be done except for a couple of piers if old once can't be reused. Any excavation within the trees TPZ will need to be carried out under the supervision of the project arborist. The impact to the tree is expected to be minimal.	Retain and protect
3	*Angophora costata*	High	9	254.47	3.08	0.04% (Minor)	The tree is a large *A. costata,* with an asymmetrical canopy. A large, overextended branch is growing towards the house and proposed pool, it is recommended that this branch is reduce back by approximately 5-6m to a suitable growth point to reduce the chance of damage from machinery. The proposed addition of a pool and cabana will have a minor impact to the tree.	Retain and protect
4	*Livistona australis*	High	4.44	61.93	2.92	0%	The palm is protected under the NBDCP. The proposed development will not have an impact into the trees TPZ	Retain and protect

Tree ID	Species	Retention value	TPZ radius (M)	TPZ area (M^2)	SRZ radius (M)	TPZ encroachment	Discussion/ Conclusion	Recommendation
5	*Pittosporum undulatum*	Medium	3.72	43.47	2.25	0%	The tree is protected under the NBDCP. The proposed development will not have an impact into the trees TPZ	Retain and protect

3.1 Design Review.

Tree sensitive construction methods, such as a pier and beam, suspended slabs or canter lever floors would reduce the impact and minimise potential root loss and should be considered as part of the design process.

Access to the tree protection areas should be prohibited and any access should be approved and supervised by the project arborist.
The successful retention of the trees mentioned above will depend on the quality of the protection and procedures to ensure protective measures remain in place for the duration of the development, such as areas for re-fuelling and washing of equipment/machinery placed away from TPZ's, no stockpiling of materials within TPZ's, limiting over excavation etc. Specifications for all tree protection measures can be found in section 3- tree protection plans and specifications.

3.2 Tree locations

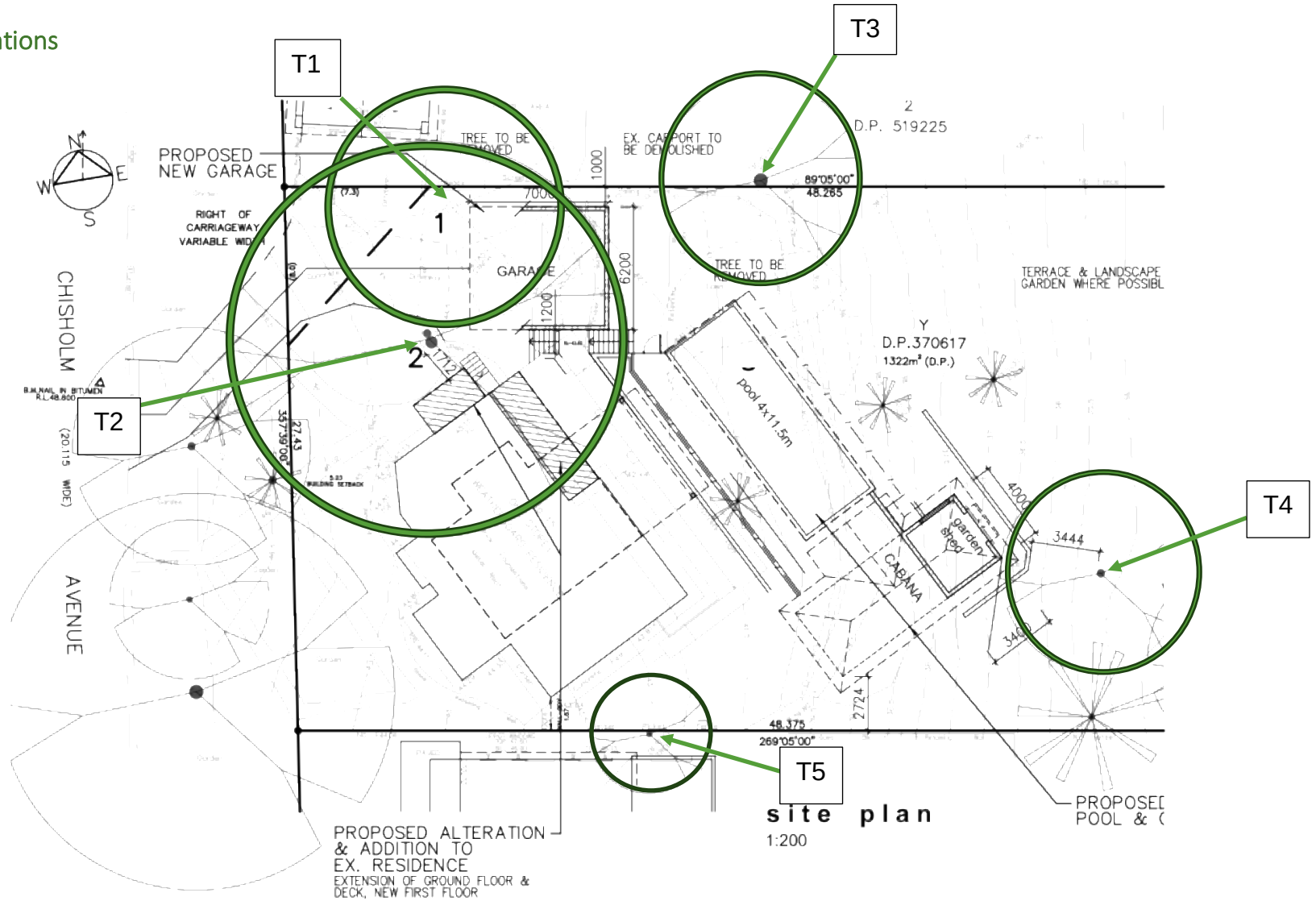


Figure 2 shows the approximate location of the trees (Not to Scale)

3.3 Additional remedial actions

The project arborist should assess the condition of trees and their growing environment, and make any recommendations for any necessary remedial actions, post construction.

Following the final inspection and the completion of any remedial works, the project arborist should certify (as appropriate) that the completed works have been carried out in compliance with the approved plans and specification for tree protection. (AS4970-2009)

Recommended remedial actions for trees impacted by construction include:

- Irrigation – trees that have suffered loss of roots may not be able to exploit as large a soil volume as they did before injury. Implementing a daily watering regime or irrigation system approximately 8 weeks before planned excavations in a TPZ can greatly increase the growth rate of absorbing roots which can lessen the impact from root loss.
- Pruning – trees on construction sites should be inspected annually to determine pruning requirements, crowns may need to have dead, dying, diseased, broken, and otherwise structurally weak branches removed. This may also involve reducing the size of the crown where dieback is extensive. Pruning should be carried out in accordance with AS4373-2007, Pruning of Amenity Trees.
- Mulch – trees preserved on construction sites generally will benefit from having a 100 to 200mm layer of organic mulch beneath the canopy. The mulch will reduce loss of moisture from the soil, protect against compaction, and moderate soil temperatures.
- Pest management – tree death often follows a pattern of weakening by predisposing stresses, such as injury from construction, followed by attack from opportunistic pests and pathogens. Developing a pest management program is an important part of a post construction maintenance program.
- Tree removal – trees that have died or become structurally unsound are no longer assets to the community and will require a risk assessment, which may involve removing the tree.
- Removing fill soil – in situations where grades have been raised within the dripline, the fill soil should be removed to the original grade. If the entire root area cannot be cleared of fill, a minimum 1.5m radius around the trunk should be returned to natural grade.
- Remediation of soils damage during construction – by whatever means its accomplished, compaction results in increased soil density and decreased porosity. It is an unfavourable environment for roots as well as soil microflora. In post construction situations, holes and fractures can be created to increase air space. This is accomplished by injecting high pressure water or air and physically auguring openings. In some cases, voids are filled with porous material such as sand or gravel, a process known as vertical mulching. Another method is to remove soil from radially oriented trenches and replace with porous soil material.

(Matheny & Clark, 1998)

Trees that are removed as part of the development should be replaced with suitable native species during the landscaping phase of the project.

4 Tree protection specifications

This part of the report specifies management and tree protection details that must be implemented to ensure successful tree retention, following guidance from AS4970-2009 section 4: Tree Protection Measures.

Before beginning work, the contractor is required to meet with the project arborist/consultant at the site to review all work procedures, access routes, storage areas, and tree protection measures. (Matheny & Clark, 1998). Any clarifications or modifications to the consent details must be recorded and circulated to all parties in writing.
Intervals for supervision and certification will be outlined at this meeting.
The approved tree protection plan must be available onsite prior to the commencement of and during works.

4.1 Preconstruction treatments

Before construction starts, several activities may be implemented to invigorate trees and thereby increase their tolerance of construction impacts. Appropriate treatments should be applied as early as possible because mature trees take time to respond.

1. **Irrigation –** providing supplemental irrigation for trees under water stress probably is the single most important treatment. Irrigations should be designed to wet the soil within the TPZ to approximately 80% moisture levels and to replace that water once it is depleted. Light, infrequent irrigations should be avoided.
2. **Fertilization –** the need for supplemental fertilization depends on the history of care of the tree. In general, fertilizing is recommended if the tree has been growing slowly or has poor colour, or if leaf litter has been removed. Harris (1992) notes that, in most cases, nitrogen is the only element required.
3. **Pest control –** pests that significantly affect tree health should be controlled before and during construction.
4. **Pruning –** should be performed to clean the crown of dead, diseased, crossing, and weak branches. In most cases no more than 20% of the live foliage should be removed from the tree. Consider the time of year of pruning and the tree's susceptibility to insect and diseases. (Matheny & Clark, 1998)

4.2 Site clearance

All council approved tree removal and pruning shall be carried out by a qualified arborist (AQF level 3) to AS4373-2007 pruning of amenity trees, before the installation of tree protection measures, the limits of all TPZ's shall be staked in the field.
The qualified arborist shall remove/prune the tree(s) in a manner that causes no damage to the tree(s) and understory to remain. (Matheny & Clark, 1998)

4.3 Protective fencing

Protective fencing must comply with AS4970 section 4.3 see Appendix F for protective fencing specifications.
The approximate location of the fencing and TPZ's is shown in Appendix E. The precise location of TPZ's must be agreed with the project Arborist before any development activity starts.
Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project Arborist. The TPZ should be secured to restrict access. (AS4970-2009)

4.4 Signs

Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site. Contact details for the project Arborist should be displayed on the sign. The lettering on the sign should comply with AS1319. See Appendix F For an example of a suitable TPZ sign. (AS4970-2009)

4.5 Ground protection

Where it is not practical to install protective fencing, TPZ's must be covered with ground protection.
Ground protection must comply with AS4970 section 4.5.3 see Appendix G for ground protection specifications.

4.6 Trunk and branch protection

Where it is not practical to install protective fencing, trunk and branch protection maybe necessary.
Trunk and branch protection must comply with AS4970 section 4.5.3 see Appendix G for trunk and branch protection specifications.
The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2m is recommended.
Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunk or branches. (AS4970-2009)

4.7 Activities restricted within the TPZ

Activities generally excluded from the TPZ include but are not limited to –

a) Machine excavation including trenching
b) Excavation for silt fencing
c) Cultivation
d) Storage
e) Preparation of chemicals, including preparation of cement products
f) Parking of vehicles and plant
g) Refuelling
h) Dumping of waste
i) Wash down and cleaning of equipment
j) Placement of fill
k) Lighting of fires
l) Soil level changes
m) Temporary or permanent installation of utilities and signs, and
n) Physical damage to the tree.

4.8 Installing underground services within TPZ

All services should be routed outside the TPZ. If underground services must be installed within the TPZ, they should be installed by directional drilling or in manually excavated trenches.

The directional drilling bore should be at least 600mm deep. For manual excavation of trenches the project Arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

Where the project arborist identifies roots to be pruned, they should be pruned with a final cut to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaw, or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for roots to be 'pruned' within the TPZ with machinery such as backhoes or excavators.

Where roots within a TPZ are exposed by excavation, temporary root protection should be installed to prevent them drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged in place and kept moist during the period that the root zone is exposed.
(AS4970-2009)

4.9 Scaffolding

Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimised. This can be achieved by designing scaffolding to avoid branches or tying back branches (branches that are tied back should be released as soon as the scaffold is taken down). Where pruning is unavoidable it must be specified by the project Arborist in accordance with AS4373. (Pruning works may require council approval).

Ground below the scaffolding should be protected by boarding (e.g., scaffold board or plywood sheeting) See Appendix H For an example of a suitable scaffold ground protection.

Where access is required, a board walk, or other surface material should be installed to minimise soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed. (AS4970-2009).

4.10 Site storage, cement mixing and washing stations

All site storage areas, cement mixing and washing stations for equipment and vehicles must be outside the TPZ's unless otherwise agreed with the project Arborist and/or council. Where there is a risk of polluted water runoff into TPZ's, heavy duty plastic sheeting and sandbags must be used to contain spillages and prevent contamination.

4.11 Site supervision

Once construction is underway, the project Arborist must visit at intervals agreed at the preconstruction meeting. The project Arborists initial role is to liaise with the site management to ensure that the appropriate protective measures are in place before any work commences. Once the site is active, the project Arborist will need to monitor compliance with arboricultural conditions and advise on any problems that arise or modifications that become necessary.

4.12 Hold points

To ensure that protection measures are being adhered to during the pre-construction and construction stages, there should be a predetermined number of site inspections carried out by the project Arborist. Matters to be monitored and reported should include tree condition, tree protection measures and impact of site works which may arise from changes to the approved plans.
If there is non-compliance with tree protection measures or if trees have been damaged, a timeframe for compliance and remedial works should be specified by the project Arborist. The determining authority may need to be notified of non-compliance issues. Monitoring, reporting and certification should be carried out following the critical stages of construction outlined in Table 2

Table 2 project arborist hold points

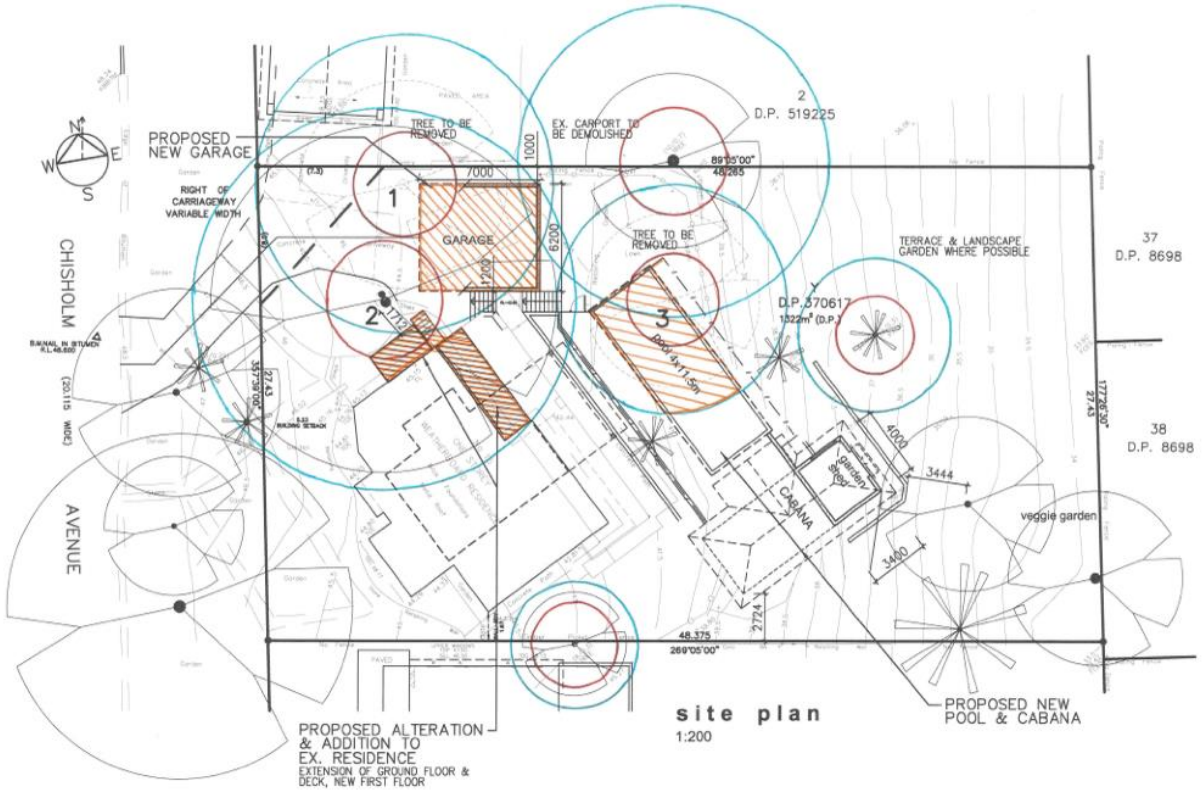
Hold point	Task	Responsibility	Certification	Timing of supervision
1	Clearly mark trees for removal and confirm they correspond with the tree schedule/plan	Principal contractor	Project Arborist	Prior to site establishment
2	Tree removal, transplanting and pruning	AQF LVL3 Arboricultural contractor	Project Arborist	Prior to site establishment
3	Fencing and other protection measures to be installed in compliance with AS4970 section4 and as detailed in the tree protection plan	Principle contractor	Project Arborist	Prior to demolition and site establishment
4	Tree protection measures comply with the tree protection plan	Principle contractor	Project Arborist	At completion of site establishment
5	Installation of services, footings, slabs, scaffolding and works within TPZ's	Principle contractor	Project Arborist	Site manager to liaise with the Project Arborist to advise when any of these activities are to take place
6	Inspection of trees during construction and monitoring impacts	Principle contractor	Project Arborist	Monthly intervals during construction or in consultation with site manager
7	Landscape works within TPZ's including retaining walls, irrigation, lighting installation, topdressing, planting, and paving	Principle contractor	Project Arborist	Site manager to liaise with the Project Arborist to advise when any of these activities are to take place
8	Practical completion of all construction and landscaping works and removal of remaining tree protection	Principle contractor	Project Arborist	At the end of the construction process
9	Final inspection of trees by project Arborist	Principle contractor	Project Arborist	Prior to the issue of occupation certificate

4.13 Final certification

The project Arborist should assess the condition of trees and their growing environment and make recommendations for any necessary remedial actions.

Following the final inspection and the completion of any remedial works, the project Arborist should certify (as appropriate) that the completed works have been carried out in compliance with the approved plans and specifications for tree protection. Certification should include a statement on the condition of the retained trees, details of any deviations from the approved tree protection measures and their impacts on trees. Copies of monitoring documents may be required.

5 Appendix A – Proposed extensions, additions and Tree Protection Zones



Legend:

TPZ-

SRZ-

Area of Incursion

Figure 3 shows the proposed extensions, additions and tree protection plans.

6 Appendix B – Tree Schedule

Table 3 Tree schedule

Tree No.	Species	Common name	Maturity	Height (M)	DBH (@1.4M) in CM	DRJ in CM	Health	Structural Condition	Tree Significance	ULE Estimate	Retention Value	Tree Protection Zone (TPZ) Radius in M	Structural Root Zone (SRZ) Radius in M
1	*Eucalyptus pilularis*	Black Butt	Mature	17	72	80	Good	Fair	Med	Low	Low	8.64	3.01
2	*Angophora costata*	Sydney Red Gum	Mature	23	98	107	Good	Good	High	Long	High	11.76	3.4
3	*Angophora costata*	Sydney Red Gum	Mature	25	75	84	Fair	Poor	High	Long	High	9	3.08
4	*Livistona australis*	Cabbage tree palm	Mature	16	37	74	Good	Good	High	Long	High	4.44	2.92
5	*Pittosporum undulatum*	Sweet Pittosporum	Mature	11	31	40	Fair	Fair	Med	Med	Med	3.72	2.25

6.1 Explanatory notes

- Tree tag no. relates to the reference number used on the site diagram/ report.
- Height was calculated using the Arboreal Tree mobile application.
- The average crown spread was visually estimated to the nearest metre from the outermost tips of the live lateral branches using a surveyor's measuring wheel.
- Diameter at breast height (DBH) the nominal trunk diameter measured at 1.4m above ground level. The diameter is measured with a diameter tape. Multi stemmed trees or shrubs are indicated as 'MS'.
- Useful life expectancy (ULE)
  Long - 40+ years
  Medium - 15-40 years
  Short - 5-15 years
  Remove - <5 years
  Small/Young
- Retention value
  High (priority for retention)
  Medium (consider for retention)
  Low (consider for removal)
  Very Low (priority for removal)

7 Appendix C – ULE methodology

This reference sheet should be included as supplementary information with all reports where a SULE assessment is an element.

Useful Life Expectancy Categories (Updated 01/04/01)

1: Long ULE: Trees that appeared to be retainable at the time of assessment for more than **40 years** with an acceptable level of risk.
(a) Structurally sound trees located in positions that can accommodate future growth.
(b) Trees that could be made suitable for retention in the long term by remedial tree care. **(c)** Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.

2: Medium ULE: Trees that appeared to be retainable at the time of assessment for **15–40 years** with an acceptable level of risk.
(a) Trees that may only live between 15 and 40 more years.
(b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.

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

3: Short ULE: Trees that appeared to be retainable at the time of assessment for **5–15 years** with an acceptable level of risk.
(a) Trees that may only live between 5 and 15 more years.
(b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.

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

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

5: Small, young or regularly pruned: Trees that can be reliably moved or replaced. **(a)** Small trees less than 5m in height.**(b)** Young trees less than 15 years old but over 5m in height.
(c) Formal hedges and trees intended for regular pruning to artificially control growth.

8 Appendix D – STARS methodology

IACA Significance of a **Tree**, **Assessment Rating System (STARS)© (IACA 2010)©**

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & 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 a 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 IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The 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. An example of its use in an Arboricultural report is shown as Appendix A.

Tree Significance - Assessment Criteria

1. High Significance in landscape

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

2. Medium Significance in landscape

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

3. Low Significance in landscape

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

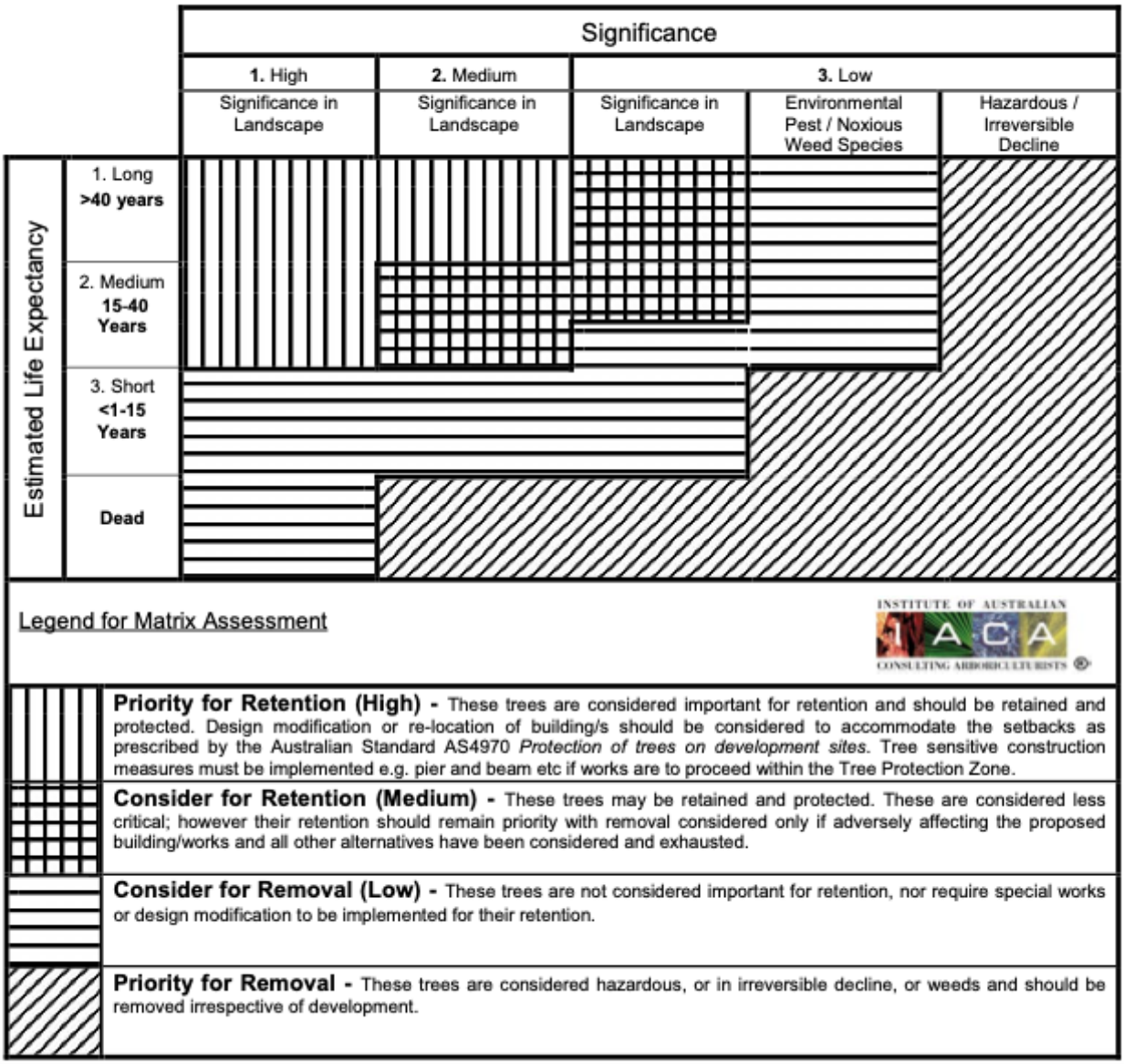
The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

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

INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS

IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au

Table 1.0 Tree Retention Value - Priority Matrix.



USE OF THIS DOCUMENT AND REFERENCING

The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES

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

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia. Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

9 Appendix E– Tree protection fencing and signs

9.1 Protective fencing

Protective 1.8m high fencing should be erected at the final location determined by the project Arborist and as illustrated on the tree management plan before any machinery or materials are brought onto the site and before the commencement of works including demolition.

AS4687 specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area and signage must be attached to the outside of fencing.

Fence posts and supports should have a diameter greater than 20mm and be located clear of roots.

Once erected, protective fencing must not be removed or altered without consulting first with the project arborist.

Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

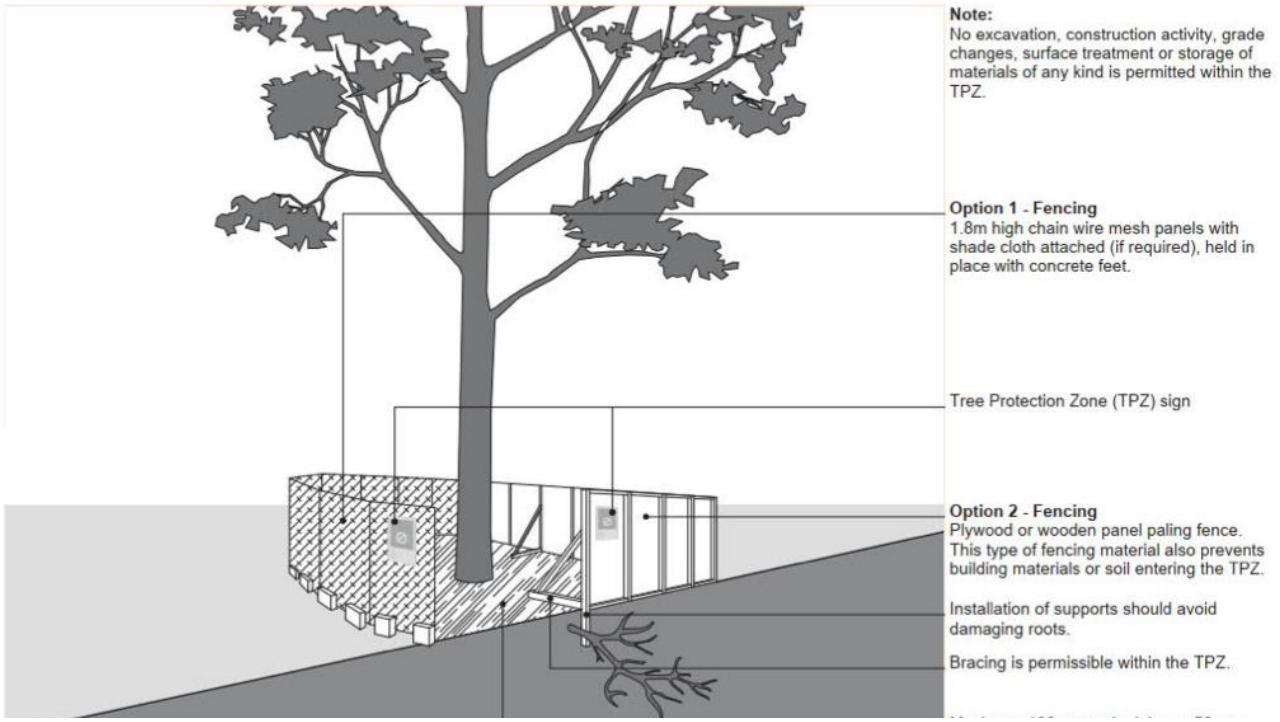


Figure 4 tree protection fencing diagram (Jacobs Australia PTY LTD, 2019)

9.2 Signage

All signs are to provide clear and readily available information to indicate that a TPZ has been established. Signage identifying the TPZ must be attached to the outside of the fencing and be visible from within the development site. The lettering on the sign should comply with AS1319.
It should also have the contact details for the project Arborist printed.

Figure 5 example of a tree protection sign

10 Appendix F – ground and trunk protection

10.1 Trunk and branch protection

Where fencing cannot be installed, the vertical trunk of exposed trees shall be protected by the placement of 3.6m lengths of 50 x 100mm hardwood timbers, spaced vertically at 150mm centres and secured by 30mm x 0.8mm galvanised punched strapping. Timbers to be placed over a suitable protective padding material e.g. jute matting. Low branches that are not to be pruned but are at risk of damage from passing vehicles and machinery must be protected in the same way. The trunk and branch protection shall be maintained intact until the completion of all site work.

Do not attach any temporary powerlines, stays, guys and the like to the tree. Do not drive nails or screws into the trunks or branches.

10.2 Ground protection

If temporary access for machinery is required within the TPZ, ground protection measures will be required.
The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards.
These measures may be applied to root zones beyond the TPZ.

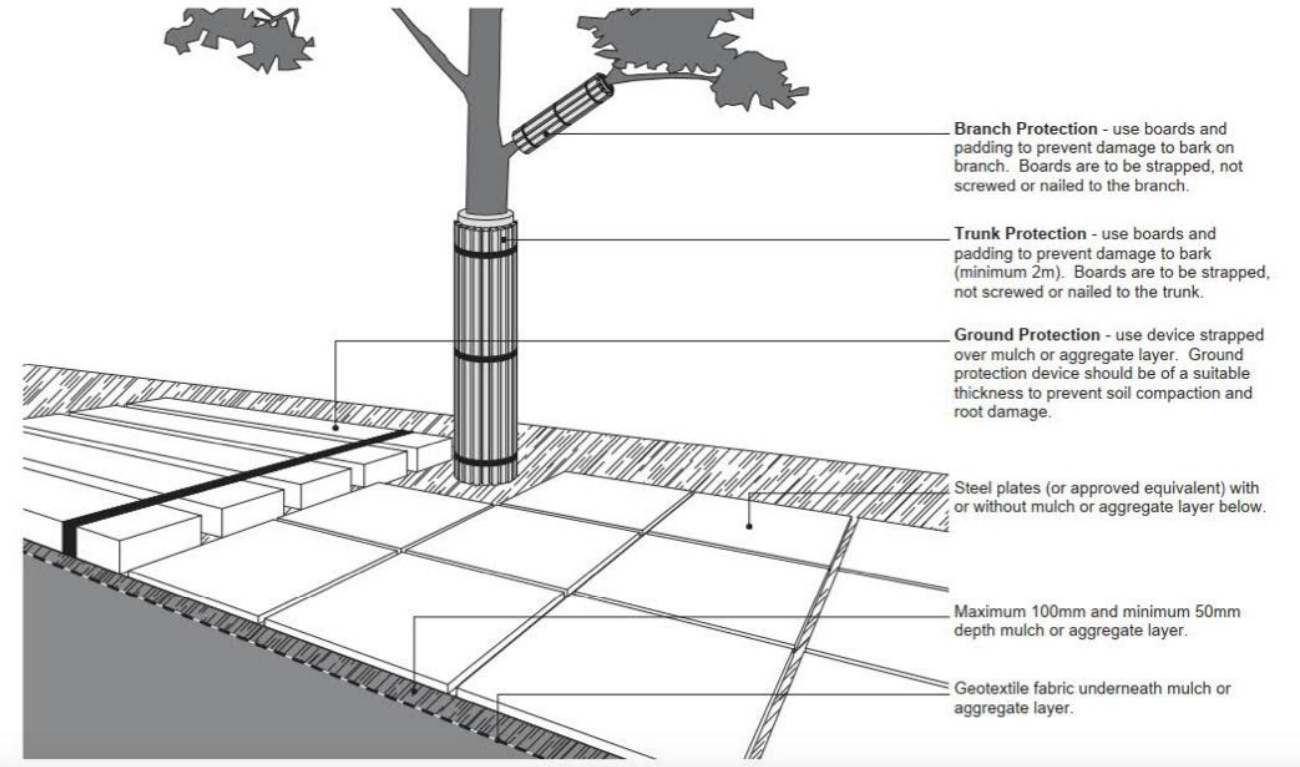


Figure 6 ground, trunk, and branch protection diagram (Jacobs Australia PTY LTD, 2019)

11 Appendix G – scaffolding

Where scaffolding is required, it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimised. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable it must be specified by the project Arborist in accordance with AS4374.

Ground below the scaffolding should be protected by boarding (e.g. scaffold board or plywood sheeting). Where access is required, a board walk, or other surface material should be installed to minimise soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed.

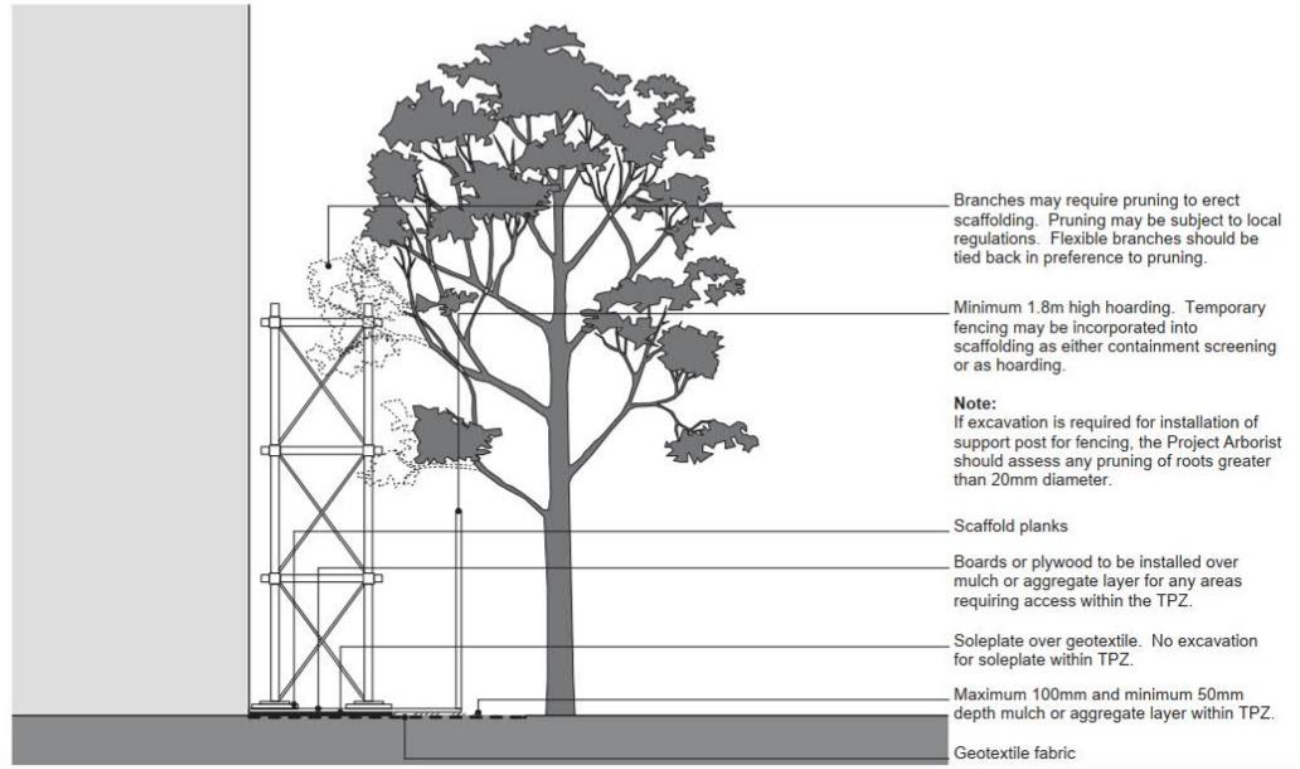


Figure 7 scaffolding diagram (Jacobs Australia PTY LTD, 2019)

11.1 Maintaining the TPZ

11.1.1 Mulching

The area within the TPZ should be mulched. The mulch must be maintained to a depth of 50-100mm using material that complies with AS4454. Where existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) much may not be required.

11.1.2 Watering

Soil moisture levels should be regularly monitored by the project Arborist. Temporary irrigation or watering may be required within the TPZ. An above-ground irrigation system should be installed and maintained by a competent individual.

11.1.3 Weed removal

All weeds should be removed by hand without soil disturbance or should be controlled with appropriate use of herbicide.

12 Glossary

Abiotic- Pertaining to non-living agents; e.g. environmental factors

Adventitious shoots- shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

Age – Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as Young, Mature and Over-mature.

Anchorage- The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from aerial parts of the tree.

Asymmetry - having parts or aspects that are not equal or equivalent, unequal.

Bark - the outermost layers of stems and roots of woody plants.

Buttress zone – The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions.

Cambium - layer of actively dividing cells between xylem (wood) and phloem (bast) tissues that is responsible for the secondary growth of stems and roots

Dead wood – refers to any whole limb that no longer contains living tissues.

Decay – (1) (noun) an area of wood that is undergoing decomposition. (2) (verb) decomposition of organic tissues by fungi or bacteria.

Dripline – The dripline is the guide measurement used to prevent unnecessary damage to trees, it is defined as the outermost circumference of the tree's canopy from which water drips to the ground.
The dripline area is taken to include the soil and roots that lie within that circumference.

Epicormic – arising from a latent adventitious bud (growth point). Usually in reference to a shoot.

Lion's tail - The limbs of the tree look like a lion's tail after pruning. The limbs will appear "long and slender" with a "puff" of foliage at the end.

Mature – Tree aged 20-80% of life expectancy, *in situ.*

Occlusion – the process whereby a wound is progressively closed by the formation of new wood and bark around it.

Over Mature – Tree aged greater than >80%of life expectancy, *in situ*, or *senescent* with or without reduced *vigour,* and declining gradually or rapidly but irreversibly death.

Phloem - the vascular tissue in charge of transport and distribution of the organic nutrients.

Phototropism – influence of light on the direction of plant growth. Tendency of plants to grow toward light.

Risk – the likelihood of the potential harm from a particular hazard becoming actual harm.

Trifurcate - divide into three branches or forks

Vitality/vigour – overall health. Ability of a plant to deal effectively with stress.

Xylem - the specialised tissue of vascular plants that transports water and nutrients from the plant.

Young – Tree aged less than <20%of life expectancy, in situ.