HUGH
THE ARBORIST

Arboricultural Impact Assessment

Client Name: Jenna & Richard Mair
Site Address: 9 Roosevelt Pl, Allambie heights, NSW
Authors Details: Jack Williams
Date Prepared: 12 August 2025
Email: hugh@hughtheArborist.com.au
Phone: 0426 836 701

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1. INTRODUCTION

1.1 Hugh the Arborist have been instructed by the client Jenna & Richard Mair to provide an Arboricultural Impact Assessment Report for trees located on and adjoining the site in relation to a proposed development.

1.2 The site and tree inspections were carried out on 6 August 2025. Access was available to the subject site and adjoining public areas only.

Table 1: Documents Provided for the Assessment

Title	Author	Date	Revision
Detail Survey	Vmark Survey	23/7/25	00
Architectural Plans	Blake Letnic Architects	28/7/25	WIP
Stormwater Plan	ML Civil	27/9/24	B

2. SCOPE OF THE REPORT

2.1 This report has been undertaken to meet the following objectives.

2.1.1 Conduct a visual assessment from ground level of all significant trees located within 5 metres of development works. For the purpose of this report, a significant tree is a tree with a height equal to or greater than 5 metres.

2.1.2 Determine the trees estimated contribution years and remaining, useful life expectancy and award the trees a retention value.

2.1.3 Provide an assessment of the potential impact the proposed development is likely to cause to the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).

2.1.4 Provide pragmatic recommendations for the management of trees and mitigation of construction impacts on retained trees.

2.1.5 Specify tree protection measures for trees to be retained in accordance with AS 4970-2009.

3. LIMITATIONS

3.1 All of the observations were carried out from ground level. The accuracy of the assessment of the subject trees structural condition and health is limited to the visibility of the tree at the time of inspection.

3.2 The tree inspections were visual from ground level only. No soil or tissue testing was carried out as part of the tree inspection. None of the surrounding surfaces adjacent to trees were lifted or removed during the tree inspections.

3.3 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.

3.4 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.

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

3.6 All diagrams, plans and photographs included in this report are visual aids only and are not to scale unless otherwise indicated.

3.7 Hugh The Arborist neither guarantees, nor is responsible for, the accuracy of information provided by others that is contained within this report.

3.8 While an assessment of the subject trees estimated useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of trees at the site.

3.9 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.

3.10 Alteration of this report invalidates the entire report.

4. METHODOLOGY

4.1 The following information was collected during the assessment of the subject tree(s).

4.1.1 Tree common name

4.1.2 Tree botanical name

4.1.3 Tree age class

4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres.

4.1.5 Estimated height - metres

4.1.6 Estimated crown spread (Radius of crown) - metres.

4.1.7 Health

4.1.8 Structural condition

4.1.9 Amenity value

4.1.10 Estimated remaining contribution years (SULE)[1]

4.1.11 Retention value (Tree AZ)[2]

4.1.12 Notes/comments

4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).[3]

4.3 Tree diameter was measured using a DBH tape or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tools I used during the assessment were a digital camera, Japanese made 170mm blade digging knife and a Leica DistoD410 digital laser tape.

4.4 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009). See appendices for more information.

4.5 Details of how the observations in this report have been assessed are listed in the appendices.

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[1] Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, http://www.treeaz.com/.

[2] Barrell Tree Consultancy, *Tree AZ version 10.10-ANZ*, http://www.treeaz.com/.

[3] Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (1994).

5. SITE LOCATION & BRIEF DESCRIPTION OF DEVELOPMENT WORKS ASSESSED

5.1 The site is located in the Northern Beaches Local Government Area (LGA), this assessment has been carried out in accordance with the following legislation and policy.

5.1.1 Warringah Local Environmental Plan (LEP) 2011[4]

5.1.2 Warringah Development Control Plan (DCP) 2011.[5]

5.1.3 State Environmental Planning Policy (Biodiversity and Conservation) 2021

5.2 The site is not located inside the heritage conservation area and is not identified as a heritage item in the NSW Planning Portal Spatial Viewer.[6]

6. OBSERVATIONS AND GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES

6.1 **Tree information**: Details of each individual tree assessed, including the observations taken during the site inspection, can be found in the tree inspection schedule in appendix 2, where the indicative tree protection zone (TPZ) and Structural Root Zone (SRZ) has been calculated for each of the subject trees. The TPZ and SRZ should be measured in radius from the centre of the trunk. Each of the subject trees have been awarded a retention value based on the observations using the Tree AZ method. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The Tree AZ categories sheet (Barrell Tree Consultancy) has been included in appendix 3 to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline.

[4] *Warringah Local Environmental Plan 2011*, https://legislation.nsw.gov.au/view/whole/html/inforce/2017-06-30/epi-2011-0649, accessed accessed 10 August 2025.

[5] *Warringah Development Control Plan 2011,* https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=DCP, accessed accessed 10 August 2025.

[6] *NSW Planning Portal Spatial Viewer,* https://www.planningportal.nsw.gov.au/propertyreports/e55b63e2-a32c-40df-b2e7-abcd749f14c3.pdf, accessed 10 August 2025.

6.2 **Site Plans:** In appendix 1 site plans have been prepared, where the tree information including canopy spread, TPZ and SRZ have been overlaid onto the site plans.

6.3 **Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection.

6.4 **Structural Root Zone (SRZ):** This is the area around the base of a tree required for the tree's stability in the ground. An area larger than the SRZ always needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula: $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ. See the appendices for more information about the SRZ.

6.5 **Minor encroachment into TPZ:** Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

6.6 **Major encroachment into TPZ:** Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted. Root investigations may be required to identify roots that will be impacted during major TPZ encroachment.

7. ASSESSMENT OF CONSTRUCTION IMPACTS

7.1 **Table 2:** In the table below the impact of the proposed development has been assessed.

Tree ID	Species	Retention value	TPZ radius (m)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
1	*Angophora floribunda*	Z4	12.0	3.6	Minor	The tree is located in an adjoining site. The proposed garage, carport and stormwater services will encroach into the TPZ by 9% (42.3m^2) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
2	*Schefflera actinophylla*	Z3	3.8	2.3	Major	The tree is located in an adjoining site. The proposed garage, carport and stormwater services will encroach into the TPZ by 31% (13.6m^2) and into the SRZ, which is major TPZ encroachment and indicates that the stability and/or condition of the tree will potentially be impacted. However, the area where these structures are proposed in covered by existing hard surfacing, it is not known if significant roots extend below the existing hard surfacing. To retain the tree in a viable condition, the footings of the proposed car port/garage, new hard surfacing and underground services must be installed via tree sensitive methos to avoid impacting significant roots, see section 8.2 for more information.	Tree sensitive design/ construction
3	*Ficus rubiginosa*	A1	6.0	2.7	Minor	The tree is located in an adjoining site. The proposed dwelling and stormwater services will encroach into the TPZ by 4% (4.5m^2) but not into the SRZ, which is minor TPZ encroachment and indicates that the tree will not be impacted.	Retain and protect
4	*Jacaranda mimosifolia*	Z10	3.6	2.1	None	No proposed encroachment into the TPZ.	Retain and protect

8. CONCLUSIONS

8.1 **Table 3:** Summary of the impact to trees during the development.

Impact	Reason	Category A	Category Z
		A	Z
Trees to be removed	Building/landscape construction, new surfacing and/or proximity, condition or re-landscaping	None	None
Trees requiring tree sensitive design/construction to be retained	Removal of existing surfacing/structures and/or installation of new surfacing/structures	None	2
Trees to be retained	Removal of existing surfacing/structures and/or installation of new surfacing/structures	3	1, 4

8.2 **Construction Design/Specification Requirements for Tree 2:** The proposed construction will encroach into the TPZ and SRZ of tree 2. To ensure the trees are not adversely impacted by the construction, it must be demonstrated the following design and construction specifications can be implemented within the TPZ of the trees. If the construction cannot be implemented in accordance with these specifications, the trees may not be viable for retention.

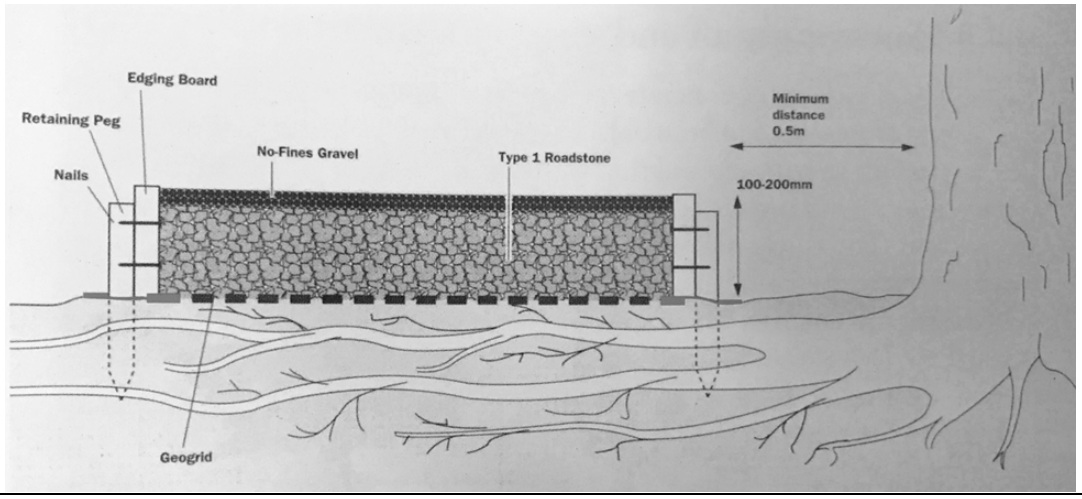
8.2.1 **Tree Sensitive Carport/Garage Footings:** To minimise root loss in the TPZ of the trees, the footings of the proposed structures should be pier and beam/suspended slab style footings to bridge over significant tree roots and minimise root loss. To ensure that significant roots are retained, it must be demonstrated by the project engineer that the following construction methods can be implemented:

- All excavations for piers must be carried out manually under the supervision of the Project arborist (see Section 11 for details of manual excavations and Project arborist).
- The location of piers must be flexible to avoid significant roots greater than 40mm in diameter. All roots greater than 40mm in diameter must be retained unless the Project arborist has assessed and approved in writing that severing the root will not impact the condition or stability of the tree.
- Cross beams/slabs must be located on or above existing soil grades.
- The piers should be located a minimum of 200mm from any root to be retained that is greater than 40mm in diameter.

8.2.2 **Tree Sensitive Footpath Construction:** To retain the trees in a viable condition, the footpath must be constructed in a tree sensitive method. The footpath should be constructed above existing grades in the NRZ of the trees. The diagrams below gives an example of a no-excavation method for constructing hard surfacing close to trees. The location of retaining pegs should be flexible, avoiding damage to structural roots.

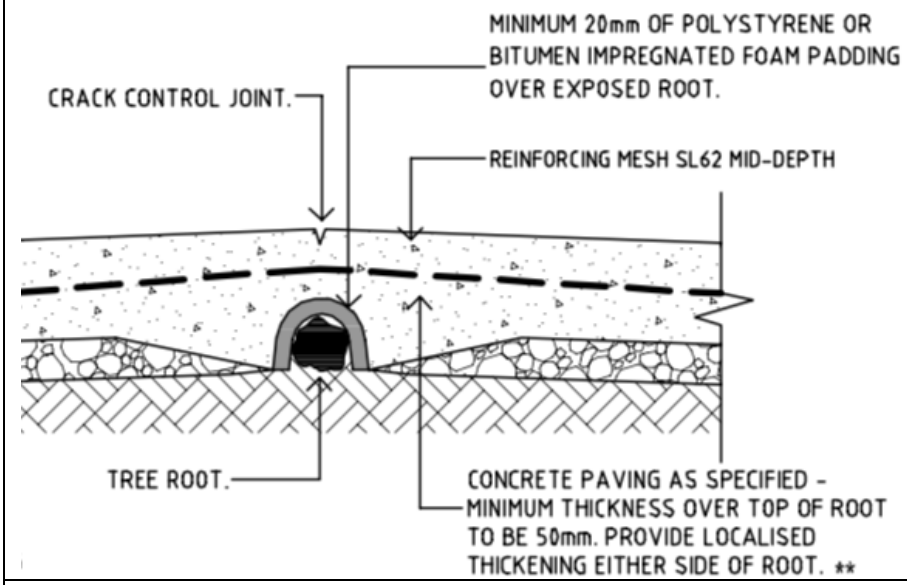
If excavations are essential, they must not exceed 100mm below the existing grades. The excavations should be supervised by a Project arborist with a minimum AQF Level 5 qualification. All excavations for the footpath should be carried out manually to avoid impacting retained tree roots. All tree roots greater than 40mm in diameter should be retained unless the Project arborist has assessed and advised that the pruning/severing of the root will not impact the condition or stability of the tree. Manual excavation may include the use of pneumatic and hydraulic tools, high pressure air, or a combination of high-pressure water and a vacuum device.

Where tree roots greater than 40mm are encountered that must be retained, footpath should be elevated over the individual tree root to allow for its retention. Examples of methods that can be used to bridge individual tree roots have been included below Using pier and beam bridges as per the image below is the recommended/preferred method, as it will allow for future growth of the tree roots, reducing future damage to the pavement from the roots.

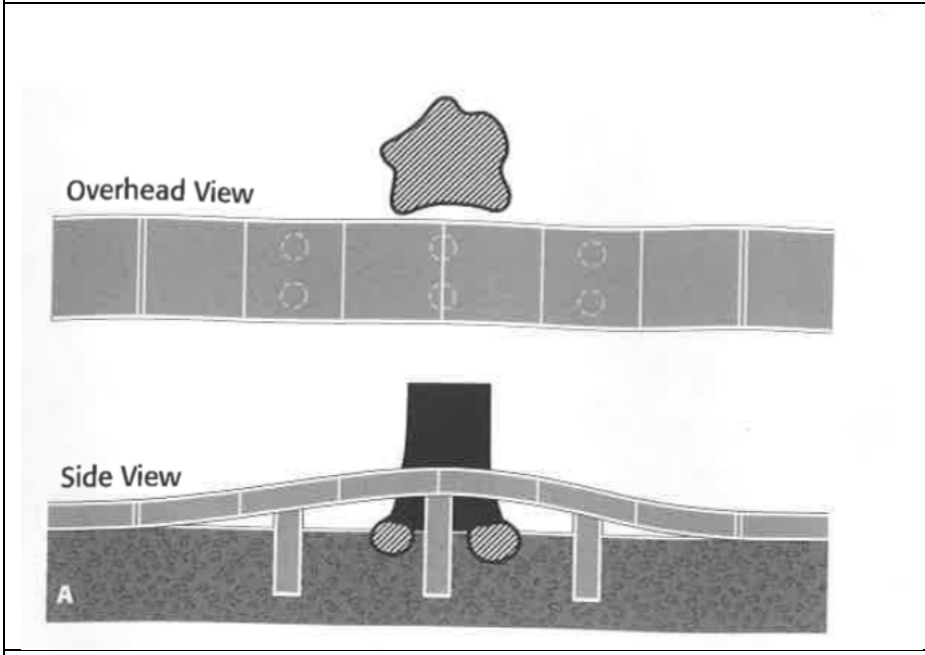


An image from 'Tree Roots in the Built Environment'[7], showing how to construct hard surfacing above a tree's root system without excavation. Type 1 Roadstones are an example of blue metal or crushed sandstone.

[7] Roberts, J., Jackson, N., & Smith, M., *Tree Roots in the Built Environment*, The Stationary Office, London, England (2006), page 305 & 306



Example method for bridging concrete footpaths over tree roots provided in the Canterbury-Bankstown Council standard drawings[8]



Example method from 'Reducing infrastructure damage by tree roots: A compendium of strategies'[9]

[8] *Canterbury-Bankstown Council standard drawing S-209 Existing Street tree treatments*, https://www.cbcity.nsw.gov.au/development/planning-control-policies/council-standard-drawings, accessed 3 October 2019.

[9] Costello, L. R., & Jones, K. S., *Reducing infrastructure damage by tree roots: A compendium of strategies,* Western Chapter of

8.2.3 **Tree Sensitive Underground Services:** AS4970-2025 recommends that all underground services located inside the NRZ of any tree to be retained should be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention.

If directional drilling is proposed, section 4.5.5 of AS4970-2025 says that 'The upper surface of the directional drilling bore should be at least 0.6 m deep and preferably outside the SRZ. Assessment of the likely impacts of boring, launch pits and exit pits on retained trees should be undertaken.10

If manual excavations are proposed, all excavations for the services should be carried out manually under the supervision of the project arborist (minimum qualification AQF 5). Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. All roots greater than 40mm in diameter should be retained in the service trench. The service pipe should then be threaded below the retained roots where practical. Roots greater than 40mm within the alignment of the service pipe should only be severed/pruned under the approval of the project arborist. All root pruning should be in accordance with AS4373 Pruning of amenity trees (2007).

the International Society of Arboriculture, 31883 Success Valley Drive, Porterville, CA (2003), page 27.

9. RECOMMENDATIONS

9.1 This report assesses the impact of a proposed development at the subject site to all significant trees located within five metres of development works. Four trees have been identified and assessed.

9.2 In Appendix 1 site plans have been prepared, where the tree information including canopy spread, TPZ and SRZ have been overlaid onto the site plans provided.

9.3 No trees have been recommended to be removed to accommodate the development works,.

9.4 One tree (tree 2) requires tree sensitive design and construction to be retained in a viable condition, see section 7 and 8.2 for more information.

9.5 All other trees can be retained in a viable condition, including tree 1, 3 and 4.

9.6 All trees to be retained must be protected in accordance with AS4970-2009, details of which are included in section 11.

9.7 No landscape plan has been assessed in this report. See section 11.10 for general guidance in relation to minimising the impact of proposed landscaping to retained trees and replacement tree planting.

9.8 Where possible underground services should be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques in accordance with AS4970-2009, see section 8.2 for more information.

9.9 This report does not provide approval for tree removal or pruning works. All recommendations in this report are subject to approval by the relevant authorities and/or tree owners. This report should be submitted as supporting evidence with the development application.

10. TREE PROTECTION REQUIREMENTS

10.1 **Use of this report:** All contractors must be made aware of the tree protection requirements prior to commencing works at the site. This report and a copy of the site plans (Appendix 1) drawing must also be made available to any contractor prior to works commencing and during any on site operations. Appendix 1B includes the recommended location of tree protection overlaid onto the proposed site plan.

10.2 **Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.

10.3 **Tree work:** All tree work should be carried out by a qualified and experienced Arborist with a minimum of AQF level 3 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).

10.4 **Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principal contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. Site inspections are recommended on a monthly frequency throughout the development.

10.5 **Site Specific Tree Protection Recommendations:** It is the responsibility of the principal contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing. See section 11.6 for requirements of tree protection. See Appendix 1 for indicative fencing location.

Tree ID	Tree Species	TPZ Radius (m)	SRZ Radius (m)	Recommendations
1	*Angophora floribunda*	12.0	3.6	Retain and protect. Ground protection is required for the area of the TPZ that extends into the site.

Tree ID	Tree Species	TPZ Radius (m)	SRZ Radius (m)	Recommendations
2	*Schefflera actinophylla*	3.8	2.3	Tree sensitive construction. Ground protection is required for the area of the TPZ that extends into the site. .
3	*Ficus rubiginosa*	6.0	2.7	Retain and protect. Ground protection is required for the area of the TPZ that extends into the site.
4	*Jacaranda mimosifolia*	3.6	2.1	Retain and protect. No tree protection required.

Tree Protection Specifications:

10.5.1 Trunk and Branch Protection: The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie wire, or strapping and connections finished or covered to protect pedestrians from injury. The hessian and timber planks must not be fixed to the tree in any instance. The trunk and branch protection shall be installed prior to any work commencing on site and shall be maintained in good condition for the entire development period.

10.5.2 Protective fencing: The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing should only be removed for the landscaping phase, and this should be approved by the project Arborist. Where it is not feasible to install fencing at the specified location due to factors such restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.

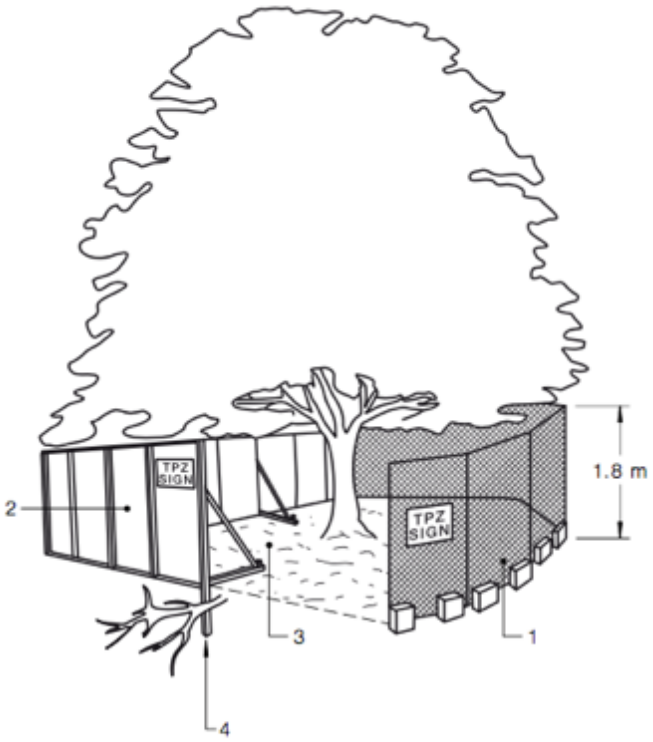
10.5.3 TPZ signage: Tree protection signage is to be attached to the protective fencing, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:

- Tree protection zone/No access.
- This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
- The name, address, and telephone number of the developer/builder and project Arborist

10.5.4 Mulch: Any areas of the TPZ located inside the subject site must be mulched to a depth of 75mm with good quality mulch. Mulch must not be built-up around the trunk the trees as it can cause collar rot.

10.5.5 Ground Protection: Ground protection is required to protect the underlying soil structure and root system in areas where it is not practical to restrict access to whole TPZ, while allowing space for construction. Ground protection must consist of good quality composted wood chip/leaf mulch to a depth of between 150-300mm, laid on top of geo textile fabric, with timber/plywood boards overlaid. If vehicles are to be using the area, additional protection will be required such as rumble boards or track mats to spread the weight of the vehicle and avoid load points. Ground protection is to be specified and approved by the project Arborist as required.

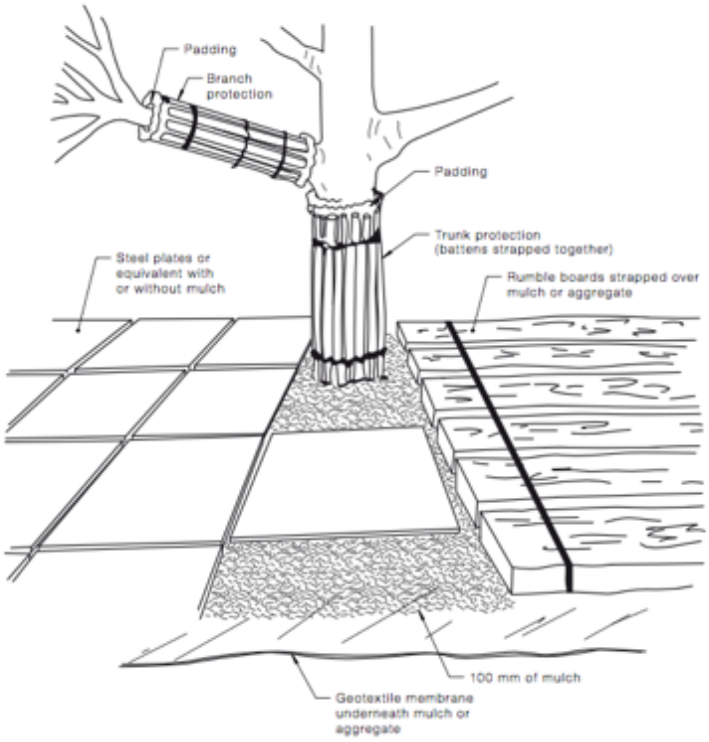
10.5.6 Temporary irrigation: Temporary irrigation should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum two hours weekly throughout all stages of the development, and may be required a higher frequency, this should be advised by the project Arborist.



LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

An image from AS4970-2009,[10] with example tree protection.

[10] Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

An image from AS4970-2009,[11] with example tree protection.

10.6 **Restricted activities inside TPZ:** The following activities must be avoided inside the TPZ of all trees to be retained unless approved by the project Arborist. If at any time these activities cannot be avoided an alternative must be agreed in writing with the project Arborist to minimise the impact to the tree.

A) Machine excavation.
B) Ripping or cultivation of soil.
C) Storage of spoil, soil or any such materials
D) Preparation of chemicals, including preparation of cement products.
E) Refuelling.
F) Dumping of waste.
G) Wash down and cleaning of equipment.

[11] Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.

H) Placement of fill.
I) Lighting of fires.
J) Soil level changes.
K) Any physical damage to the crown, trunk, or root system.
L) Parking of vehicles.

10.7 **Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the 'top down, pull back' method.

10.8 **Excavations:** The project Arborist must supervise and certify that all excavations and root pruning are in accordance with AS4373-2007 and AS4970-2009. For continuous strip footings, first manual excavation is required along the edge of the structures closest to the subject trees. Manual excavation should be a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by project Arborist). Next roots must be pruned back in accordance with AS4373-2007. After all root pruning is completed, machine excavation is permitted within the footprint of the structure. For tree sensitive footings, such as pier and beam, all excavations inside the TPZ must be manual. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. No pruning of roots greater 30mm in diameter is to be carried out without approval of the project arborist. All pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3. Root pruning is to be a clean cut with a sharp tool in accordance with AS4373 Pruning of amenity trees (2007).[12] The tree root is to be pruned back to a branch root if possible. Make a clean cut and leave as small a wound as possible.

10.9 **Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimise the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.

- All excavations for landscaping works should be manual and in accordance with section 11.9.
- Replacement planting for all trees recommended for removal should be incorporated into the landscape plan. It is recommended that at minimum one tree for each tree

[12] Council Of Standards Australia, *AS 4373 Pruning of amenity trees* (2007) page 18

proposed to be removed are planted to maintain/increase overall canopy cover at the site when mature. Any replacement tree must be selected in accordance with AS2303-2015 Tree stock for landscape use.

- The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 40mm in diameter.
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 50mm or increased by more 100mm without assessment by a consulting Arborist.
- New retaining walls should be avoided. Where new retaining walls are proposed inside the TPZ of trees to be retained, they should be constructed from tree sensitive material, such as timber sleepers, that require minimal footings/excavations. If brick retaining walls are proposed inside the TPZ, considerer pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.
- New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are proposed, they should be constructed on or above existing soil grades to minimise root disturbance and consider using a permeable surface. Footpaths should be located outside the SRZ.
- Where fill/subbase is used inside the TPZ, fill material should be a coarse granular material that does not restrict the flow of water and air to the root system below. This type of material will also reduce the impact of soil compaction during construction.
- Any new fencing in the TPZ of trees should constructed carefully to avoid impacting significant roots. The location of fence posts should be flexible to allow for the retention of root greater than 40mm in diameter. The base of fence panels should be located above existing soil grades.

10.10 **Underground Services:** Where possible underground services should be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention. No roots greater than 30mm in diameter should be severed during the installation of service pipes unless approved in writing by the project Arborist.

10.11 **Sediment and Contamination:** All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.

10.12 **Tree Wounding/Injury:** Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.

10.13 **Completion of Development Works:** After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

11. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION

11.1 **Hold Points:** Below is a sequence of hold points requiring project Arborist certification throughout the development process**.** It provides a list of hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principal contractor should be responsible for implementing all tree protection requirements.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principal contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. Site inspections are recommended on a monthly frequency.	On-going throughout the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the project Arborist.	Demolition	
Project Arborist to supervise all manual excavations and root pruning inside the TPZ of any tree to be retained. Project Arborist to approve all pruning of roots greater than 30mm inside TPZ. All root pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3.	Construction	
Project Arborist to certify that all underground services including storm water inside TPZ of any tree to be retained have been installed in accordance with AS4970-2009.	Construction	
Project Arborist to approve relocation of tree protection for landscaping. All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the project Arborist to minimise the impact to trees.	Construction/ Landscape	

After all demolition, construction and landscaping works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of development	

12. BIBLIOGRAPHY/REFERENCES

- Council of Standards Australia, *AS4970 Protection of trees on development sites* (2009).
- Council of Standards Australia, *AS4373 Pruning of amenity trees* (2007).
- Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (1994).
- Barrell, J. (2001), *'SULE: Its use and status in the new millennium' in Management of Mature Trees proceedings of the 4th NAAA Workshop, Sydney*, 2001. Barrell
- Barrell Tree Consultancy, *Tree AZ version 10.10-ANZ*, http://www.treeaz.com/.
- *Warringah Local Environmental Plan 2011*, https://legislation.nsw.gov.au/view/whole/html/inforce/2017-06-30/epi-2011-0649.
- *Warringah Development Control Plan 2011,* https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=DCP.
- State Environmental Planning Policy *(Biodiversity and Conservation) 2021*

13. LIST OF APPENDICES

The following are included in the appendices:
Appendix 1: Site Plan
Appendix 2: Tree inspection schedule
Appendix 3: Health
Appendix 4: Amenity Value
Appendix 5: Age Class
Appendix 6: Structural Condition
Appendix 7: SULE Categories
Appendix 8: Retention Values
Appendix 9: Trees AZ
Appendix 10: TPZ Encroachment

Jack Williams
Diploma of Arboriculture (AQF5)
FdSc Arboriculture

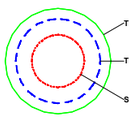
Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
1	Rough Barked Apple	*Angophora floribunda*	Mature	17	7	1000				1000	1200	Fair	Fair	High	3. Short	Z4	12.0	3.6	Selective dieback throughout crown, approximately 30-40% of crown has died back. Health in decline.
2	Umbrella	*Schefflera actinophylla*	Mature	6	1.5	180	150	120	130	313	400	Good	Fair	Low	2. Medium	Z3	3.8	2.3	Exempt species.
3	Port Jackson Fig	*Ficus rubiginosa*	Semi-mature	7	2.5	500				500	600	Good	Good	Medium	1. Long	A1	6.0	2.7	None.
4	Blue Jacaranda	*Jacaranda mimosifolia*	Mature	6	3	300				300	350	Good	Fair	Medium	2. Medium	Z10	3.6	2.1	Asymmetric crown shape and significant trunk lean. Not marked on survey.

Explanatory Notes

Tree Species - Where species is unknown it is indicated with an *'spp'.*
Age Class - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y).
Diameter at Breast Height (DBH) - Measured with a DBH tape or estimated at approximately 1.4m above ground level.
Diameter Above root Buttresses (DAB): Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.
Height - Height from ground level to top of crown. All heights are estimated unless otherwise indicated.
Spread - Radius of crown at widest section. All tree spreads are estimated unless otherwise indicated.
Tree Protection Zone (TPZ) - DBH x 12. Measured in radius from the centre of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 metre outside the crown projection.
Structural Root Zone (SRZ) - $(DAB \times 50)^{0.42} \times 0.64$. Measured in radius from the centre of the trunk. Rounded up to nearest 0.1m.
Health - Good/Fair/Poor/Dead
Structure - Good/Fair/Poor
Safe Useful Life Expectancy (SULE) - 1. Long (40+years), 2. Medium (15 - 40 years), 3. Short (5 - 15 years), 4. Remove (under 5 years), 5. Small/young.
Amenity Value - Very High/High/Medium/Low/Very Low.
Retention Value: Tree AZ, see appendix 3 for categories.

Tree Legend



0 8m

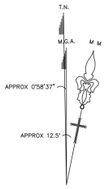
Hugh The Arborist Pty Ltd
hugh@hughthearborist.com.au
www.hughthearborist.com.au
0426836701

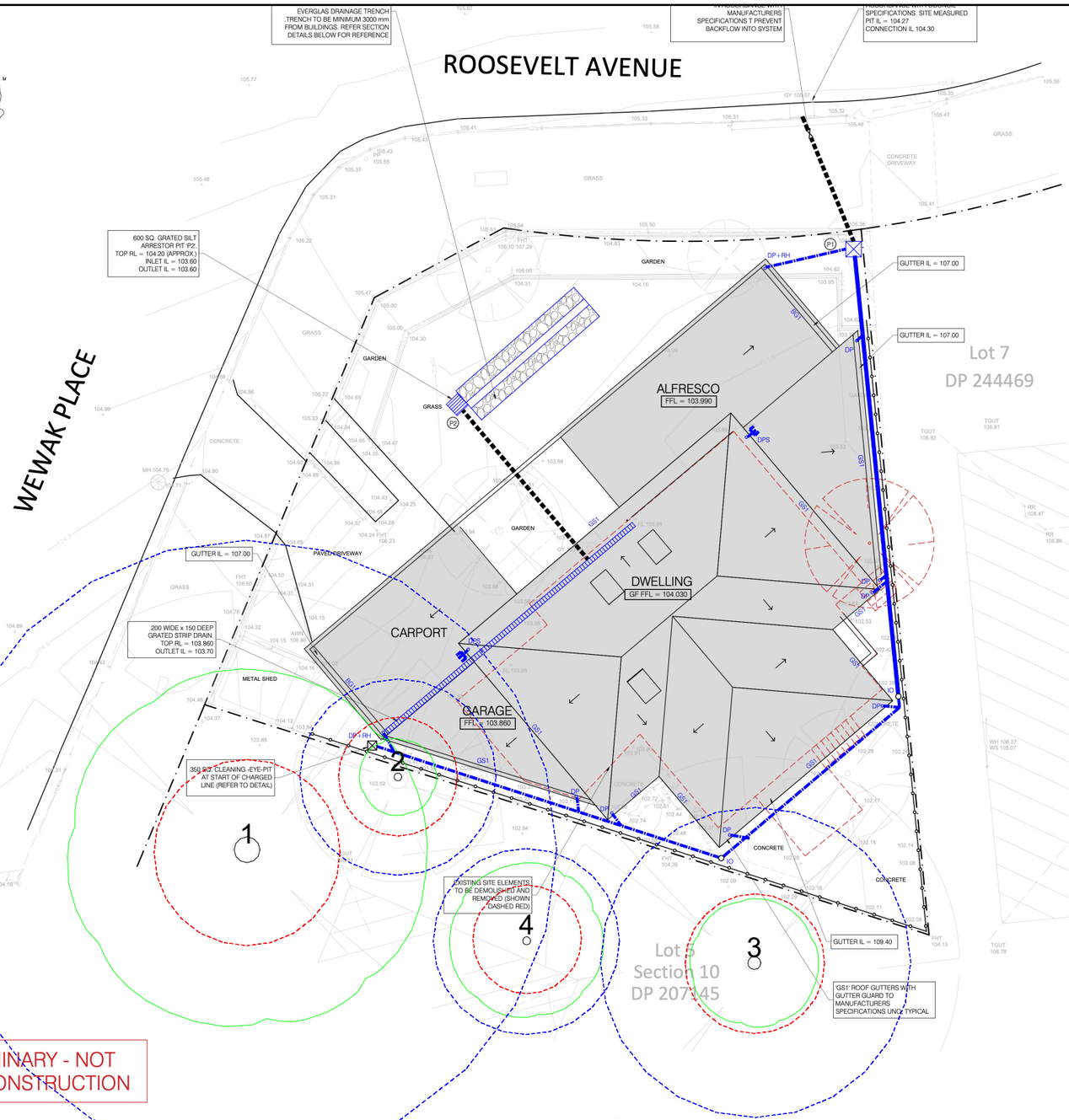
9 Roosevelt Ave
Allambie Heightst NSW

SCALE :	DATE :
1 :200 @ A3	10/08/2025

MAP FILENAME : Appendix 1 - Site Plan

Prepared by Jack Williams





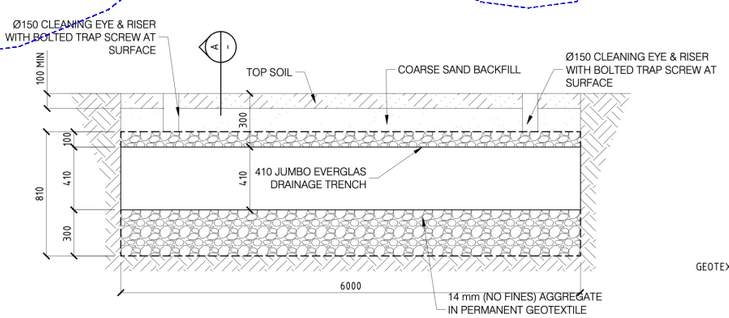
PRELIMINARY - NOT FOR CONSTRUCTION

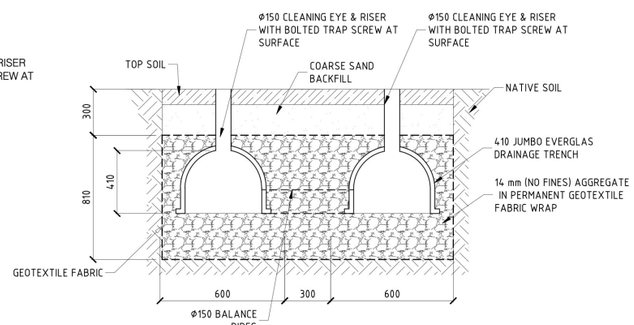
STORMWATER DRAINAGE PLAN 1:100

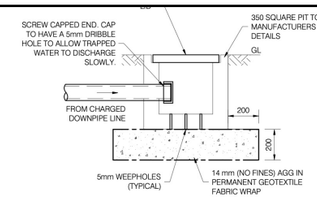
- All drainage lines shall be UPVC (Class SH) Stormwater Drainage Pipe, UNO.
- All drainage lines shall be laid @ 1% min fall, UNO.
- DP = 1Ø100 Down Pipe UNO
- DPS = Ø100 Dowp Pipe spreader (to lower roof) to NCC requirements
- RH = Rainhead to manufacturers specifications (with overflow fitted)
- IO = Inspection Opening with riser for maintenance

DRAWING KEY:

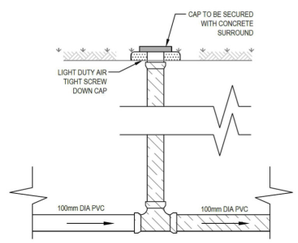
- Proposed Ø100 charged UPVC Stormwater Line solvent welded at joints
- Proposed Ø150 charged UPVC Stormwater Line solvent welded at joints
- Proposed Ø150 UPVC Stormwater Drainage Line laid @ 1% Min. Fall
- Sediment Fence (refer notes)



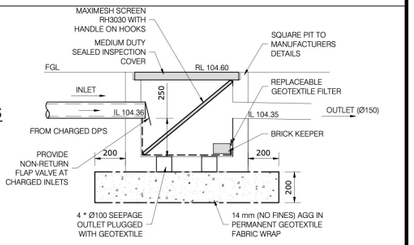




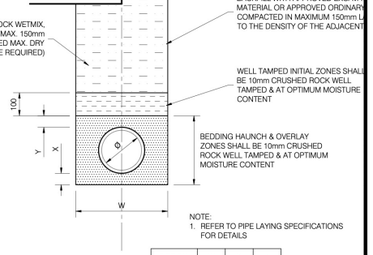
'CLEANING-EYE' PIT DETAIL 1:20



INSPECTION OPENING RISER (IO) DETAIL NTS



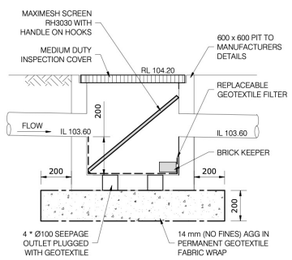
SILT ARRESTOR PIT 'P1' DETAIL 1:20



NOTE:
1. REFER TO PIPE LAYING SPECIFICATIONS FOR DETAILS

PIPE DIA Ø	W	X MIN.	Y
100-150	300	75	75
225-300	600	75	75

TYPICAL PIPE LAYING DETAILS 1:20



SILT ARRESTOR PIT 'P2' DETAIL NTS

Council: Northern Beaches Council
Site area = 524.8 m² (0.05248 ha)

Pre-developed impervious area = 339.40 m² (64.67%)
Post-developed impervious area = 377.40 m² (71.9%)
Increased impervious area = 38.00 m²

Single Residential Alterations and Additions with site location in stormwater Region 2 ; therefore OSD system is not required.
Rainwater Tank Storage Requirements per BASIX Report:

DOWNPIPE & GUTTER SCHEDULE

MARK	GUTTER SIZE	DP
GS1	Stramit half round 150	Ø100
BG1	200 Wide x 150 Deep Box Gutter	Ø100

DRAINAGE LINE NOTE:
All underground pipes and pits shall not disturb tree roots.
All sub-soil drainage shall be installed to BCA requirements and connected to the drainage system.
Drainage line location is indicative and shown for clarity. Exact location subject to change to engineer's approval.

DIAL 1100 BEFORE YOU DIG www.1100.com

REV	APP.	AMENDMENT DESCRIPTION	D
B	ML	GENERAL REVISIONS	27
A	ML	GENERAL REVISIONS PER UPDATED ARCH. DWGS.	20

ML CIVIL
ABN 87 161 429 090
ML Civil And Structural D
Suite 2201, Le
101 Grafton St
BONDI JUNCTIO
ph: 9875
info@mlcivil.c
Morteza Lotfi
Bachelor of Civil Engineering
Master Of Proj. MBA
Member No: 338933

PROPOSED ALTERATIONS
9 ROOSEVELT AVENUE
ALLAMBIE HEIGHTS NSW 2100

JENNA & RICHARD MAIR

Concept Stormwater Drainage Plan

DATE:	SCALE:	DESIGN:	RE

Appendix 3 – Assessment of Health

Category	Example condition	Summary
Good	• Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development.	• The tree is in above average health and condition and no remedial works are required.
Fair	• The tree may be starting to dieback or have over 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be early signs of pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The may be in decline, have extensive dieback or have over 30% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

Appendix 4 Landscape Value

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to Commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m²;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crowndensity of more than 50% (thinning to normal); and The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

Ref: *Determining the retention value of trees of development sites,* presentation handouts at TAFE NSW Ryde College, March 2012

Appendix 5 - Age class

Determining the exact age of a tree is difficult without carrying out potentially invasive testing. The age class of the subject tree has been estimated using the definitions below.

Category	Description
Young/Newly planted	• Young or recently planted tree.
Semi Mature	• Up to 20% of the usual life expectancy for the species.
Early mature/Mature	• Between 20% - 80% of the usual life expectancy for the species.
Over mature	• Over 80% of the usual life expectancy for the species.
Dead	• Tree is dead or almost dead.

Appendix 6 - Structural condition

Category	Example condition	Summary
Good	• Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing.	• The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	• The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure.	• The identified defects are likely to cause either partial or whole failure of the tree.

Appendix 7 - Safe Useful Life Expectancy (SULE), (Barrel, 2001)

A trees safe useful life expectancy is determined by assessing a number of different factors including the health and vitality, estimated age in relation to expected life expectancy for the species, structural defects, and remedial works that could allow retention in the existing situation.

Category	Description
1. Long	Useful life expectancy over 40 years
2. Medium	Useful life expectancy 15 to 40 years
3. Short	Useful life expectancy 5 to 15 years
4. Remove	Useful life expectancy under 5 years
5. Small/Young	Trees that could be transplanted or replaced with similar specimen.
6. Unstable	Tree has become hazardous or structurally unstable.

TreeAZ Categories (Version 10.04-ANZ)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species	
Z1	Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
Z2	Too close to a building, i.e. exempt from legal protection because of proximity, etc
Z3	Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc
High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure	
Z4	Dead, dying, diseased or declining
Z5	Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
Z6	Instability, i.e. poor anchorage, increased exposure, etc
Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people	
Z7	Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
Z8	Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc
Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population	
Z9	Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
Z10	Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
Z11	Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
Z12	Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

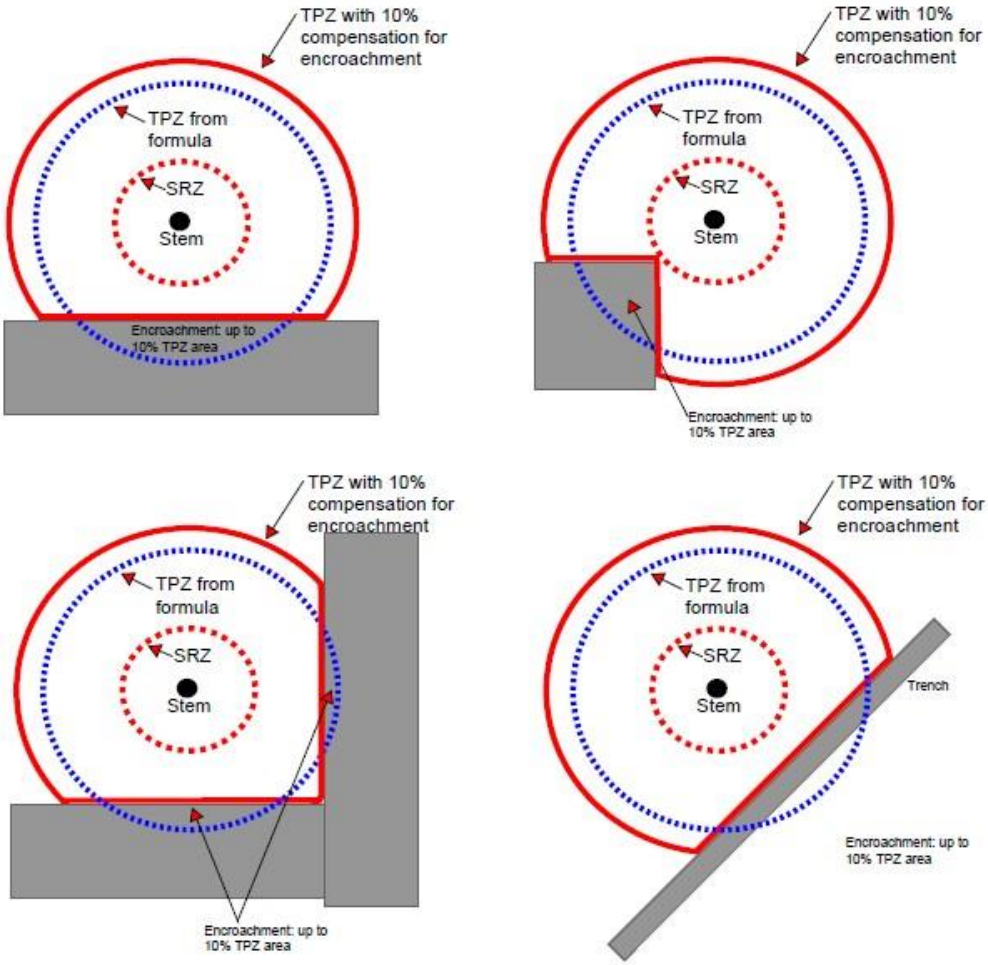
Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

A1	No significant defects and could be retained with minimal remedial care
A2	Minor defects that could be addressed by remedial care and/or work to adjacent trees
A3	Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

Appendix 9 – Examples of TPZ Encroachment

Encroachment into the Tree Protection Zone is sometimes unavoidable. The following diagram shows examples of acceptable levels of encroachment and how they may be compensated for by providing additional space contiguous to the TPZ area.



Note: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.