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ARBORICULTURAL IMPACT ASSESSMENT TREE PROTECTION SPECIFICATION

Health Precinct – Stage 1 University of Sydney

Prepared for: UNIVERSITY OF SYDNEY

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Revision C

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1.0 INTRODUCTION

1.1 Background

1.1.1 This Arboricultural Impact Assessment Report and Tree Protection Specification was prepared for the University of Sydney in relation to the proposed Health Precinct – Stage 1 project. The purpose of this Report is to determine the impact of the proposed works on the trees, and where appropriate, recommend the use of sensitive construction methods to minimise adverse impacts.

1.1.2 In preparing this report, the author is aware of and has taken into account the objectives of the City of Sydney's *Sydney Local Environmental Plan 2012, Development Control Plan 2012 (Section 3.5 Urban Ecology)*, University of Sydney's *Tree Management Plan (2016)*, *Australian Standard 4970 Protection of Trees on Development Sites (2009)*, *Australian Standard 4373 Pruning of Amenity Trees (2007)* and *Australian Standard 2303 Tree Stock for Landscape Use (2015)*.

Refer to Methodology (**Appendix 1**)

1.1.3 This Report utilises the University's Tree Management Inventory Database (ArborPlan) numbering system.

1.1.4 This impact assessment is based on an assessment of the following supplied documentation/plans only:

- Vegetation Management Plan (dated September 2017, Issue F) – prepared by Arcadia Landscape Architecture
- GA- Level 0 (DA18-0001/3, dated July 2017) – prepared by DS+R

Refer to Plans (**Appendix 2**)

2.0 RESULTS

2.1 The Site

2.1.1 The site is located within the University of Sydney's Camperdown Campus and comprises an area of land to the south of Oval No. 1. The site is bound by Oval No. 1 to the north, Bosch Buildings 1A and 1B to the south, Western Avenue to the east and the Royal Prince Alfred Hospital (RPAH) site to the west. An additional section of the site projects to the south between Bosch Buildings 1A and 1B, and connects to Cadigal Lane.

2.1.2 An internal road, the Blackburn Circuit, is located in the north eastern section of the site. A large, rectangular landscape area is located in the center of the Blackburn Circuit. This landscape area is elevated above the carriageway and is surrounded by a brick retaining wall. Short access roads branch off at the western end of the Blackburn Circuit, providing access to the Grandstand and Bosch Buildings.

2.2 The Proposal

2.2.1 The proposed Health Precinct Stage 1 is a multi-disciplinary health and education project. The project involves the vacating and redevelopment of the current Blackburn Building and is adjacent to the RPAH.

2.2.2 The new building will co-locate the Faculties of Nursing and Midwifery (currently located at Mallett Street), Health Sciences (currently located at the Cumberland Campus) and the Central Clinical School from the Sydney Medical School (currently located in the RPAH and the Blackburn building).

2.2.3 The proposed building comprises of eight levels with Level 0 cutting into existing ground levels at its eastern end.

2.3 The Trees

- 2.3.1 Twenty eight (28) trees/groups of trees were assessed using the Visual Tree Assessment¹ (VTA) criteria and notes, and comprise a mix of Australian native and exotic species such as *Lagunaria patersonii* (Norfolk Island Hibiscus), *Jacaranda mimosifolia* (Jacaranda), *Platanus xacerifolius* (Plane Tree), *Ficus microcarpa* var. *hillii* (Hills Weeping Fig) and *Liquidambar styraciflua* (Liquidambar). In general the trees were of good health and structural condition.
- 2.3.2 At the request of the University of Sydney this Report addresses Trees 557, 560, 691-693, 904, 905, 913-927, 929-935, 1242, 1243, 1244, 1245 and 1246 only. Trees A, B, C and D are located outside of the University boundaries and within the neighbouring properties (RPAH) and are included as pruning works maybe required to facilitate the works.
- 2.3.3 Tree 557 *Lagunaria patersonii* (Norfolk Island Hibiscus) is listed an exempt species within *Section 3.5 Urban Ecology of the Sydney Development Control Plan 2012*.²
- 2.3.4 Tree D *Celtis sinensis* (Chinese Hackberry) is listed as a Class 4 Noxious Weed for the City of Sydney Local Government Area by the Department of Primary Industries.³
- 2.3.5 A search of the BioNet Atlas of NSW Wildlife Database was undertaken in July 2017. No individual threatened tree species that were listed within this database for the area were identified during the current field investigations of the site.⁴ In addition, an ecological assessment of the University was conducted in 2013 and determined that no threatened flora species or threatened ecological communities exist on the Camperdown and Darlington Campuses.⁵ The ecological significance and habitat value of the trees has not been assessed and is beyond the scope of this report.
- 2.3.6 As required by Clause 2.3.2 of *Australian Standard 4970 Protection of Trees on Development Sites (2009)*, each of the trees assessed has been allocated a Retention Value. The Retention Value is based on the trees' Useful Life Expectancy and Landscape Significance with consideration to their health, structural condition and site suitability. The Retention Values do not take into account any proposed development works and are not a schedule for tree retention or removal. The trees have been allocated one of the following Retention Values:
- Priority for Retention
 - Consider for Retention
 - Consider for Removal
 - Priority for Removal

Refer to Tree Assessment Schedule (**Appendix 3**)

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees to be removed

- 3.1.1 Trees 691 and 692 have been identified as *Citharexylum spinosum* (Fiddlewood) and *Casuarina cunninghamiana* (River She-Oak) respectively, and are located in a landscape area to the north of the Blackburn Circuit. These trees have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention*.
- 3.1.2 The supplied plans show Trees 691 and 692 are proposed for removal to accommodate the building footprint.

¹ Mattheck & Breloer (2003)

² City of Sydney (2012)

³ Department of Primary Industries (2017)

⁴ NSW Office of Environment and Heritage (2011)

⁵ Australian Museum Consulting (2013)

- 3.1.3** Trees 904, 905 and 1242-1246 have been identified as *Elaeocarpus reticulatus* (Blueberry Ash) and are located in a narrow garden bed to the front of the existing Blackburn Building. These trees have been allocated a low Landscape Significance and a Retention Value of *Consider for Removal*.
- 3.1.4** The supplied plans show Trees 904, 905 and 1242-1246 are proposed for removal to accommodate the building footprint. It is understood consent for removal these trees has been obtained through a Review of Environmental Factors (REF).
- 3.1.5** Trees 913-920, 922 and 923 have been identified as *Platanus xacerifolius* (Plane Tree) and Tree 921 has been identified as *Ficus microcarpa* var. *hillii* (Hills Weeping Fig). These trees are located in the elevated landscape area in the centre of the Blackburn Circuit. Trees 913-923 have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention*.
- 3.1.6** Collectively, Trees 913-923 provide an area of continuous canopy cover however as individual specimens the form of the Plane Trees (Trees 913-920, 922 and 923) have been affected by their close spacings, and the trees have developed asymmetric crowns due to mutual suppression.
- 3.1.7** Trees 913-923 have been planted in close proximity to the perimeter of the landscape area and the brick retaining wall adjacent to the base of Tree 921 starting to become displaced. It is assumed that the trees, particularly Tree 921 with its extensive root system and buttressing (typical of *Ficus* spp.), is generating pressure on the rear of the wall.
- 3.1.8** The supplied plans show Trees 913-923 are proposed for removal to accommodate the building footprint.
- 3.1.9** Trees 924-927 have been identified as *Liquidambar styraciflua* (Liquidambar) and are located in a triangular landscape area to the east of the elevated landscape area in the centre of the Blackburn Circuit. Trees 924, 926 and 927 have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention*, and Tree 925 has been allocated a low Landscape Significance and a Retention Value of *Consider for Removal*.
- 3.1.10** The supplied plans show Trees 924-927 are proposed for removal to accommodate the building footprint.
- 3.1.11** Tree 929 has been identified as *Magnolia grandiflora* (Bull Bay Magnolia) and is located in the centre of a garden bed at the eastern end of the Blackburn Circuit. It has been allocated a low Landscape Significance and a Retention Value of *Consider for Removal*.
- 3.1.12** The supplied plans show Tree 929 is proposed for removal as part of the landscape treatment.
- 3.1.13** Trees 930-935 have been identified as *Cupressus torulosa* (Bhutan Cypress) and are located in a narrow garden bed to the south of the Blackburn Circuit. These trees have been allocated a low Landscape Significance and a Retention Value of *Consider for Removal*.
- 3.1.14** The supplied plans show Tree 930-935 are proposed for removal to accommodate a new vehicular access.

3.2 Trees to be retained

3.2.1 Trees 557, 560 and 693 have been identified as *Lagunaria patersonii* (Norfolk Island Hibiscus), *Jacaranda mimosifolia* (Jacaranda) and *Citharexylum spinosum* (Fiddlewood), respectively. Trees 557 and 693 have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention*. Tree 560 has been allocated a high Landscape Significance and a Retention Value of *Priority for Retention*.

3.2.2 The supplied plans show landscape works are proposed within the TPZ areas of Trees 557, 560 and 693. The extent of works represents *Major Encroachments* as defined by AS-4970. Clause 3.3.4 of AS-4970 outlines that design factors and tree sensitive construction methods should be considered when determining the potential impact of the encroachment.

3.2.3 Recommendations: The following tree sensitive demolition/construction methods should be used to minimise the impact of works on Trees 557, 560 and 693:

- **Demolition Works:** Tree sensitive methods should be used for the removal of existing structures and pavements within TPZ areas. Where possible, existing footings and sub-base materials should be left in situ and reused. Where footings of demolished walls cannot be left in situ, these structures should be demolished in small sections and removed by hand.
- **Landscape Levels:** Existing levels within TPZ areas should be maintained wherever possible. Where required lowering or raising of levels shall be limited to no greater than 10% of any TPZ area.
- **Landscape Structures:** Walls and seating (and other structures as required) within TPZ areas should be supported on piered footings (with all other parts of the structures positioned above existing ground levels to minimise excavation and root loss). Excavation for the pier holes should be undertaken using tree sensitive methods. Pier hole locations should be flexible to enable the retention of roots (>25mmØ) as determined by the Project Arborist.
- **Building-Level 0:** No over excavation, benching or battering beyond the building footprint should be undertaken within TPZ areas.
- **Drainage:** Drainage for retaining walls (where required) should be designed and constructed as to avoid the requirement for over-excavation within TPZ areas. Where standard drainage (i.e. slotted ag pipe and aggregate drainage) is proposed to the rear of walls, these materials should be substituted for a slimline draincell type product to reduce the requirement for additional excavation.
- **Pavement Installation:** New pavements (including sub-base materials) within TPZ areas should be installed above or at existing grade and utilise existing sub-base layers where possible. Surfaces and sub-base materials should be thinned as required above roots (with appropriate root protection installed). New pavements/kerbs should be modified to enable the retention of roots (>25mmØ), where deemed necessary by the Project Arborist.
- **Landscape Planting:** The installation of plants within TPZ areas should be undertaken using hand tools and roots (>25mmØ) should be protected. No mechanical cultivation/ripping of soils should be undertaken within TPZ areas. Other than the installation of soil conditioners to a maximum depth of 50mm above the existing soil profile, excavation and installation of imported soil mixes should be excluded from TPZ areas.

- 3.2.4 In addition to above, Tree 560 will be subject to encroachment from the proposed building footprint. However, as an individual encroachment, it is less 10% of the TPZ and should not impact the tree's Useful Life Expectancy. Hand excavation and root pruning should be undertaken along the line of the building prior to the commencement of mechanical excavation to prevent shattering of roots by excavation equipment. Root pruning should be undertaken by the Project Arborist only. No over excavation should be undertaken within the TPZ.

3.3 Pruning

- 3.3.1 The supplied plans show that Trees A, B, C and D may need to be pruned to provide clearance for the proposed building. The extent of pruning required should not significantly impact the trees' health, form or amenity value. Refer to Tables 1-4.

3.3.2 Table 1: Tree A *Jacaranda mimosifolia* (Jacaranda)

Branch Orientation	Order of Branch	Branch Diameter	Height Above Grade	Comments	Plate No.
SE	1st	100mm	0.5m	Basal epicormic shoot	4

3.3.3 Table 2: Tree B *Platanus xacerifolius* (Plane Tree)

Branch Orientation	Order of Branch	Branch Diameter	Height Above Grade	Comments	Plate No.
E	1 st x2	250mm 300mm	5m	-	5
E	Lower order only	<75mm	Upper crown	Reduction Prune if required for scaffolding/hoardings	5

3.3.4 Table 3: Tree C *Flindersia australis* (Crows Ash)

Branch Orientation	Order of Branch	Branch Diameter	Height Above Grade	Comments	Plate No.
S	Lower order only	<50mm	Upper crown	Reduction Prune if required for scaffolding/hoardings	-

3.3.5 Table 4: Tree D *Celtis sinensis* (Chinese Hackberry)

Branch Orientation	Order of Branch	Branch Diameter	Height Above Grade	Comments	Plate No.
S	2nd	150mm	4m	Prune for vehicle access and scaffolding/hoardings	6
S	Lower order only	<50mm	Upper crown	Reduction Prune if required for scaffolding/hoardings	6

- 3.3.6 Provision should be made within the design so that additional pruning for construction access and scaffolding/hoarding is not required. Where additional clearance is required, branches may be temporarily pushed or tied. Where branches cannot be pushed or tied back without damage, scaffolding/hoarding should be modified and constructed around branches (with appropriate branch protection installed as required).

- 3.3.7 Deadwood greater 30mmØ should be removed from the crowns of the trees.

- 3.3.8 Pruning works should be carried out by a Practising Arborist. The Practising Arborist should hold a minimum qualification equivalent (using the Australian Qualifications Framework) of Level 3 or above, in Arboriculture or its recognised equivalent. The Practising Arborist should have a minimum of 3 years' experience in practical Arboriculture. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007)*, *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable legislation and codes.

3.4 Replacement Planting

- 3.4.1 The supplied plans show that twenty one (21) replacement trees are to be planted as part of the proposed development. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use* and the University of Sydney's *Tree Management Plan (2016)*.
- 3.4.2 Sufficient soil depth (minimum 750mm) and volumes (species dependent) should be provided for the new tree plantings to support healthy tree growth over a long-time frame. Wherever possible, isolated planting areas should be increased in size or linked below pavement surfaces to adjacent planting areas to maximize the available growing environment.
- 3.4.3 Various products are available which can be used beneath pavement surfaces to provide adequate support for the pavement whilst providing a suitable growing environment for tree roots. In addition, research shows that the use of tree friendly paving products can significantly reduce pavement damage and maintenance costs over the long term.
- 3.4.4 In addition to the above, a 1000L *Ficus* spp. (Fig) is being procured as part of the development. This tree is being sourced to specifically replace Tree 921. In the early stages of the project treeIQ was asked to provide comment on the potential to transplant Tree 921. Although the species, health and structural condition of Tree 921 makes it potentially suitable for transplanting, the likelihood of a reduction in vigour as a result of transplant-shock, lack of available space to store the tree during the construction phase, and an asymmetrical rootplate were raised as potential limiting factors. Super-advanced size replacement tree planting was recommended as the most viable to provide a better long term outcome for the amenity and canopy cover of the site.
- 3.4.5 It is understood that the landscape area within the RPAH grounds which adjoins the western boundary of the site is to be managed by the University as part of the development of the new Health Precinct project. This area provides additional opportunity for new tree planting to help offset tree removal within the site.

4.0 CONCLUSION

- 4.1 Twenty eight (28) trees/groups of trees were assessed using the VTA criteria and notes, and comprise a mix of Australian native and exotic species. Tree 557 *Lagunaria patersonii* (Norfolk Island Hibiscus) is listed an exempt species within *Section 3.5 Urban Ecology* of the *Sydney Development Control Plan 2012*. Tree D *Celtis sinensis* (Chinese Hackberry) is listed as a Class 4 Noxious Weed for the City of Sydney Local Government Area by the Department of Primary Industries.⁶
- 4.2 The proposed Health Precinct Stage 1 project involves the vacating and redevelopment of the current Blackburn Building adjacent to the Royal Prince Alfred Hospital. The proposed building comprises of eight levels with Level 0 cutting into existing ground levels at the eastern end.

⁶ Department of Primary Industries (2017)

- 4.3 The supplied plans show that twenty four (24) trees are proposed for removal. These are 691, 692, 913-927 and 929-935. Of these:
- Sixteen (16) trees have been allocated a Retention Value of *Consider for Retention*
 - Eight (8) trees have been allocated a Retention Value of *Consider for Removal*
- 4.4 The supplied plans show that three (3) trees are proposed for retention as part of the development. These are Trees 557, 560 and 693. Works are proposed within the TPZ areas of these trees and will require the use of tree sensitive methods (as outlined within Section 3.2.3). The trees to be retained should be protected in accordance with the Tree Protection Specification (**Appendix 5**).
- 4.5 The supplied plans show that Trees A, B, C and D may need to be pruned to provide clearance for the proposed building. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007)*, *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable legislation and codes.
- 4.6 The supplied plans show that twenty one (21) replacement trees and a 1000L *Ficus* spp. (Fig) are to be planted as part of the proposed development. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use* and the University of Sydney's *Tree Management Plan (2016)*.

5.0 LIMITATIONS & DISCLAIMER

TreeiQ takes care to obtain information from reliable sources. However, TreeiQ can neither guarantee nor be responsible for the accuracy of information provided by others. Plans, diagrams, graphs and photographs in this Arboricultural Report are visual aids only and are not necessarily to scale. This Report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction/ecological/heritage etc issues.

This Report has been prepared for exclusive use by the client. This Report shall not be viewed by others or for any other reason outside its intended target or without the prior written consent of TreeiQ. Unauthorised alteration or separate use of any section of the Report invalidates the Report.

Many factors may contribute to tree failure and cannot always be predicted. TreeiQ takes care to accurately assess tree health and structural condition. However, a tree's internal structural condition may not always correlate to visible external indicators. There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the trees or site may not arise in the future. Information contained in this report covers only the trees assessed and reflects the condition of the trees at the time of inspection. Additional information regarding the methodology used in the preparation of this Report is attached as Appendix 1. A comprehensive tree risk assessment and management plan for the trees is beyond the scope of this Report.

Reference should be made to any relevant legislation including Tree Management Controls. All recommendations contained within this Report are subject to approval from the relevant Consent Authority.

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Standards Australia (2007), *Pruning of Amenity Trees AS-4373*

TreeiQ (2016), *University of Sydney Tree Management Plan*

Appendix 1: Methodology

- 1.1 Site Inspection:** This report was determined as a result of a comprehensive site during July 2017.
- 1.2 Visual Tree Assessment (VTA):** The subject tree(s) was assessed using the Visual Tree Assessment criteria and notes as described in *The Body Language of Trees – A Handbook for Failure Analysis*.⁷ The inspection was limited to a visual examination of the subject tree(s) from ground level only. The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic or tissue testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.
- 1.3 Tree Dimensions:** The dimensions of the subject tree(s) are approximate only.
- 1.4 Tree Locations:** The location of the subject tree(s) was determined from the supplied plans.
- 1.5 Trees & Development:** Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

The *Tree Protection Zone* (TPZ) is described in AS-4970 as a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The *Structural Root Zone* (SRZ) is described in AS-4970 as the area around the base of a tree required for the tree's stability in the ground. Severance of structural roots within the SRZ is not recommended as it may lead to the destabilisation and/or demise of the tree.

In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the area of the TPZ and is outside the SRZ. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. In this situation the Project Arborist must demonstrate that the tree would remain viable. This may require root investigation by non-destructive methods or the use of sensitive construction methods.

- 1.6 Tree Health:** The health of the subject tree(s) was determined by assessing:
- I. Foliage size and colour
 - II. Pest and disease infestation
 - III. Extension growth
 - IV. Crown density
 - V. Deadwood size and volume
 - VI. Presence of epicormic growth
- 1.7 Tree Structural Condition:** The structural condition of the subject tree(s) was assessed by:
- I. Assessment of branching structure
(i.e co-dominant/bark inclusions, crossing branches, branch taper, terminal loading, previous branch failures)
 - II. Visible evidence of structural defects or instability
(i.e root plate movement, wounds, decay, cavities, fungal brackets, adaptive growth)
 - III. Evidence of previous pruning or physical damage
(root severance/damage, lopping, flush-cutting, lions tailing, mechanical damage)
- 1.8 Useful Life Expectancy (ULE):** The ULE is an estimate of the longevity of the subject tree(s) in its growing environment. The ULE is modified where necessary to take in consideration tree(s) health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (Modified from Barrell, 2001):
- I. 40 years +
 - II. 15-40 years
 - III. 5-15 years
 - IV. Less than 5 years

⁷ Mattheck & Breloer (2003)

1.9 Landscape Significance: Landscape Significance was determined by assessing the combination of the cultural, environmental and aesthetic values of the subject tree(s). Whilst these values are subjective, a rating of high, moderate, low or insignificant has been allocated to the tree(s). This provides a relative value of the tree's Landscape Significance which may aid in determining its Retention Value. If the tree(s) can be categorized into more than one value, the higher value has been allocated.

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the <i>Local Environmental Plan</i> with a local or state level of significance.
	The subject tree is listed on Council's Significant Tree Register or is considered to meet the criteria for significance assessment of trees and/or landscapes by a suitably qualified professional. The criteria are based on general principles outlines in the Burra Charter and on criteria from the Register of the National Estate.
	The subject tree is a remnant tree.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species or forms part of an Endangered Ecological Community associated with the subject site, as defined under the provisions of the <i>Threatened Species Conservation Act 1995 (NSW)</i> or the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> .
	The subject tree is known to provide habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Management Controls
	The subject tree makes little or no contribution to the amenity of the locality or is considered easily replaceable in the short term.
	The subject tree is a poor representative of the species in terms of aesthetic value.
Insignificant	The subject tree is declared a Noxious Weed under the Noxious Weeds Act

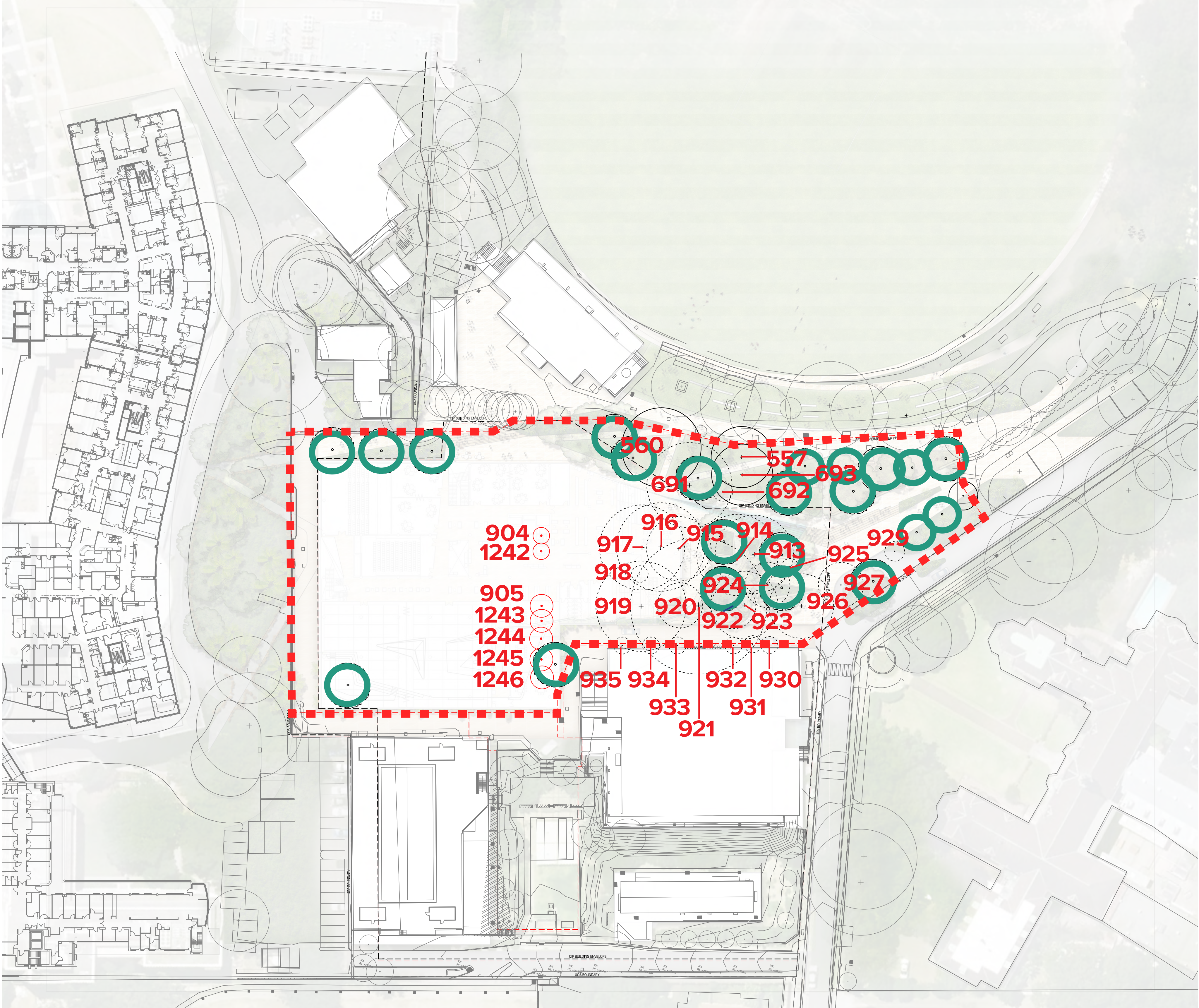
1.10 Retention Value: Retention Value was based on the subject tree's Useful Life Expectancy and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structural condition and site suitability. The subject tree(s) has been allocated one of the following Retention Values:

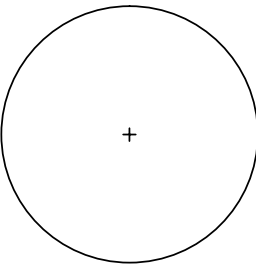
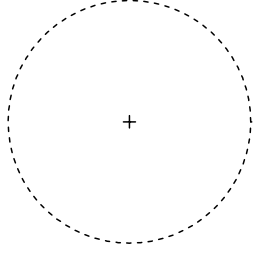
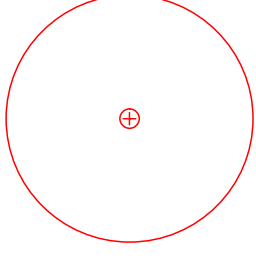
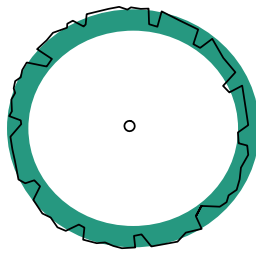
- I. Priority for Retention
- II. Consider for Retention
- III. Consider for Removal
- IV. Priority for Removal

ULE		Landscape Significance			
	Very High	High	Moderate	Low	Insignificant
40 years +	Priority for Retention	Priority for Retention		Consider for Removal	Priority for Removal
15-40 years		Priority for Retention	Consider for Retention		
5-15 years		Consider for Retention			
Less than 5 years	Consider for Removal	Priority for Removal			

The above table has been modified from the Footprint Green Tree Significance and Retention Value Matrix.

5.1 PLANTING DESIGN_VEGETATION MANAGEMENT PLAN



-  TREES TO BE RETAINED (4)
 -  TREES TO BE REMOVED (24)
Exotic: Platanus x acerifolia , Native: Ficus Sp.
 -  TREES APPROVED FOR REMOVAL
AS PART OF REF. (7)
 -  PROPOSED TREES (22)
Native: Angophora costata
Native: Banksia integrifolia
Native: Corymbia gummifera
Native: Eucalyptus resinifera
Native: Eucalyptus punctata
Native: Eucalyptus saligna
Native: Ficus microcarpa 'Hillii'
- 925** TREE NUMBERS
As per Arborists Report

0 10 20 30 40 50M
SCALE 1:500 @ A1

Appendix 3: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
557	<i>Lagunaria patersonii</i> (Norfolk Island Hibiscus)	600	14	5	Good	Good	Partially suppressed. Small (<25mm) diameter epicormic growth in low volumes.	15-40	Moderate	Consider for Retention	7.2	2.7	Retain. Major Encroachment. Landscape treatment.
560	<i>Jacaranda mimosifolia</i> (Jacaranda)	850	10	10	Good	Good	Wound/s, early stages of decay.	15-40	High	Priority for Retention	10.2	3.1	Retain. Major Encroachment. Landscape treatment.
691	<i>Citharexylum spinosum</i> (Fiddlewood)	500	11	6	Good	Good	Wound/s, early stages of decay. Small (<25mm) epicormic growth in low volumes.	15-40	Moderate	Consider for Retention	6	2.5	Remove.
692	<i>Casuarina cunninghamiana</i> (River She-Oak)	600	20	5	Good	Good	Wound/s, early stages of decay. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	7.2	2.7	Remove.
693	<i>Citharexylum spinosum</i> (Fiddlewood)	450	15	6	Good	Good	Partially suppressed. Small (<25mm) diameter epicormic growth in low volumes. Wound/s, early stages of decay. Wound/s, no visible signs of decay.	15-40	Moderate	Consider for Retention	5.4	2.4	Retain. Major Encroachment. Landscape treatment.
904	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	150	9	3	Good	Good	Phototropic lean, moderate. Partially suppressed.	15-40	Low	Consider for Removal	2	1.5	Remove. Approved for removal under REF.
905	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	150	9	3	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2	1.5	Remove. Approved for removal under REF.
913	<i>Platanus xacerifolius</i> (Plane Tree)	500	18	10	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	6	2.5	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
914	<i>Platanus xacerifolius</i> (Plane Tree)	450	17	7	Good	Good	Large (>75mm) diameter deadwood in low volumes. Partially suppressed.	15-40	Moderate	Consider for Retention	5.4	2.4	Remove.
915	<i>Platanus xacerifolius</i> (Plane Tree)	400	16	7	Good	Good	Partially suppressed. Wound/s, no visible signs of decay.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove.
916	<i>Platanus xacerifolius</i> (Plane Tree)	400	15	7	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove.
917	<i>Platanus xacerifolius</i> (Plane Tree)	450	13	5	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	5.4	2.4	Remove.
918	<i>Platanus xacerifolius</i> (Plane Tree)	300	16	5	Good	Good	Partially suppressed. Phototropic lean, slight.	15-40	Moderate	Consider for Retention	3.6	2	Remove.
919	<i>Platanus xacerifolius</i> (Plane Tree)	500	13	6	Good	Good	Partially suppressed. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	6	2.5	Remove.
920	<i>Platanus xacerifolius</i> (Plane Tree)	400	18	5	Good	Good	Partially suppressed. Wound/s, no visible signs of decay.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove.
921	<i>Ficus microcarpa</i> var. <i>hillii</i> (Hills Weeping Fig)	950	17	11	Good	Good	Partially suppressed. Wound/s, early stages of decay.	15-40	Moderate	Consider for Retention	11.4	3.3	Remove.
922	<i>Platanus xacerifolius</i> (Plane Tree)	350	18	7	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
923	<i>Platanus xacerifolius</i> (Plane Tree)	550	18	8	Good	Good	Partially suppressed. Girdling root.	15-40	Moderate	Consider for Retention	6.6	2.6	Remove.
924	<i>Liquidambar styraciflua</i> (Liquidambar)	300	14	3	Good	Good	Partially suppressed. Medium (25-75mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	3.6	2	Remove.
925	<i>Liquidambar styraciflua</i> (Liquidambar)	250	14	3	Good	Fair	Heavily suppressed. Etiolated form. Medium (25-75mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	3	1.9	Remove.
926	<i>Liquidambar styraciflua</i> (Liquidambar)	400	14	6	Good	Good	Wound/s, early stages of decay.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove.
927	<i>Liquidambar styraciflua</i> (Liquidambar)	450	13	5	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	5.4	2.4	Remove.
929	<i>Magnolia grandiflora</i> (Bull Bay Magnolia)	200	5	3	Good	Good	Wound/s, early stages of decay. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	2.4	1.7	Remove.
930	<i>Cupressus torulosa</i> (Bhutan Cypress)	400	11	2	Good	Good	Limited building clearance. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	4.8	2.3	Remove.
931	<i>Cupressus torulosa</i> (Bhutan Cypress)	400	11	2	Good	Good	Limited building clearance. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	4.8	2.3	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
932	<i>Cupressus torulosa</i> (Bhutan Cypress)	350	11	2	Good	Good	Limited building clearance. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	4.8	2.3	Remove.
933	<i>Cupressus torulosa</i> (Bhutan Cypress)	300	11	2	Good	Good	Limited building clearance. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	3.6	2	Remove.
934	<i>Cupressus torulosa</i> (Bhutan Cypress)	300	11	2	Good	Good	Limited building clearance. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	3.6	2	Remove.
935	<i>Cupressus torulosa</i> (Bhutan Cypress)	300	11	2	Good	Good	Limited building clearance. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	3.6	2	Remove.
1242	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	200	9	3	Good	Good	Phototropic lean, slight. Partially suppressed.	15-40	Low	Consider for Removal	2.4	1.7	Remove. Approved for removal under REF.
1243	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	150	9	2	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2	1.5	Remove. Approved for removal under REF.
1244	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	200	9	2	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2.4	1.7	Remove. Approved for removal under REF.
1245	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	150	9	2	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2	1.5	Remove. Approved for removal under REF.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
1246	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	150	9	3	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2	1.5	Remove. Approved for removal under REF.
A	<i>Jacaranda mimosifolia</i> (Jacaranda)	700									8.4	2.9	Outside stage 1. Retain. Pruning required.
B	<i>Platanus xacerifolius</i> (Plane Tree)	1000									12	3.4	Outside stage 1. Retain. Pruning required.
C	<i>Flindersia australis</i> (Crows Ash)	1000									12	3.4	Outside stage 1. Retain. Pruning required.
D	<i>Celtis sinensis</i> (Chinese Hackberry)	500 400									7.8	2.8	Outside stage 1. Retain. Pruning required.

Appendix 4: Plates



Plate 1: Showing Trees 913-923



Plate 2: Showing Trees 924-927



Plate 3: Showing Trees 904, 905 and 1242-1246



Plate 4: Showing Tree A - pruning

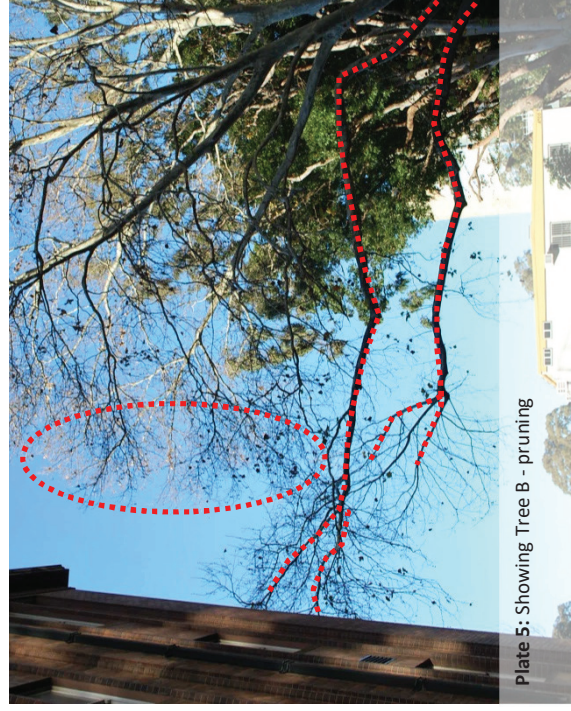


Plate 5: Showing Tree B - pruning

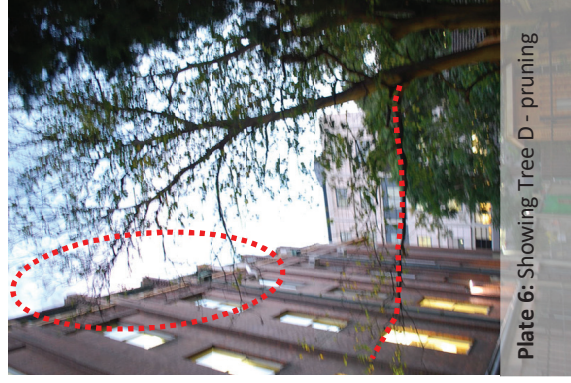


Plate 6: Showing Tree D - pruning

Appendix 5: Tree Protection Specification

1.0 Appointment of Project Arborist

A Project Arborist shall be engaged prior the commencement of work on-site and monitor compliance with the protection measures. The Project Arborist shall inspect the tree protection measures and Compliance Certification shall be prepared by the Project Arborist for review by the Principal Certifying Authority prior to the release of the Compliance Certificate.

The Project Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture.

The site specific requirement for mulching, irrigation, the location of tree protection fencing and temporary access, and other specific tree protection measures shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works.

1.1 Compliance

Contractors and site workers shall receive a copy of these specifications a minimum of 3 working days prior to commencing work on-site. Contractors and site workers undertaking works within the Tree Protection Zone shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

1.3 Tree & Vegetation Removal

The trees to be removed shall be removed prior to the establishment of the tree protection measures. Tree removal works shall be undertaken in accordance with the *Workcover Code of Practice for the Amenity Tree Industry* (1998).

Tree and vegetation removal shall not damage the trees to be retained.

1.4 Tree Protection Zone

The tree to be retained shall be protected prior and during construction from activities that may result in an adverse effect on their health or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, unless otherwise stated:-

- Modification of existing soil levels, excavations and trenching
- Mechanical removal of vegetation
- Movement of natural rock
- Storage of materials, plant or equipment or erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials, refueling or disposal of waste materials and chemicals
- Lighting fires
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Any other activities that may cause damage to the tree

NOTE: If access, encroachment or incursion into the TPZ is deemed essential, prior authorisation is required by the Project Arborist.

1.5 Tree Protection Fencing

TPZ fencing shall be located at perimeter of the TPZ. The exact location of the fencing shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works. Fencing may be setback to allow for demolition/construction access and for the installation of pavements only where appropriate ground protection is installed and approved by the Project Arborist.

As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Panels shall be fastened together and supported to prevent sideways movement. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) (**Appendix 6**).

1.6 Signage

Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site. The lettering on the sign should comply with *Australian Standard - 1319 (1994) Safety signs for the occupational environment*. The signage shall be installed prior to the commencement of works on-site and shall be maintained in good condition for the duration of the development period.

1.7 Site Management

Materials, waste storage, and temporary services shall not be located within the TPZ.

1.8 Scaffolding

Where possible, scaffolding shall not be located within the TPZ. Scaffolding shall not be in contact with the tree. As necessary, this shall be achieved by erecting scaffolding around branches. Branches shall be tied back and protected as deemed necessary by the Project Arborist. Refer to Typical Tree Protection Details (5) (**Appendix 6**).

1.9 Ground Protection

To protect the underlying soil from compaction, machinery movements shall be restricted to areas of existing pavement or from areas of temporary ground protection such as ground mats or steel road plates. Refer to Typical Tree Protection Details (3) (**Appendix 6**).

1.10 Works within the Tree Protection Zones

In some cases works within the TPZ may be authorized by the determining authority. **These works shall be supervised by the Project Arborist.** When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

If roots (>25mmØ) are encountered during the demolition, excavation and construction works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of roots (>25mmØ) where deemed necessary by the Project Arborist.

1.11 Structure & Pavement Demolition

Demolition of existing structures/pavement within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs, pavements or areas of ground protection (refer to Section 1.6). Machinery should not contact the tree's roots, trunk, branches and crown.

Where deemed necessary by the Project Arborist, structures shall be shattered with a hand-operated pneumatic/electric breaker to minimise disturbance to the tree's roots, and demolition waste removed by hand.

The existing pavement shall be carefully lifted to minimise damage to the underlying soil profile (or sub-base materials) and to prevent damage to tree roots. Wherever possible, existing sub-base materials shall remain in-situ.

When removing slab sections within TPZ, machinery shall work backwards out of the TPZ to ensure machinery remains on undemolished sections of slab at all times. Wherever possible, footings or elements below grade shall be retained to minimise disturbance to the tree's roots.

If roots (>25mmØ) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute geotextile fabric. The geotextile fabric shall be kept in a damp condition at all times. Where the Project Arborist determines that the tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

1.12 Building Installation

Hand excavation and root pruning shall be undertaken by the Project Arborist along the line of the building within TPZ areas prior to machine excavation. No over excavation for wall installation shall be permitted. Subsurface drainage (where required) shall utilise slim line products. Refer to Section 1.17.

1.13 Pavement Installation

New pavements (including sub-base materials) within TPZ areas shall be installed above or at existing grade and utilise existing sub-base layers where possible. Pavement sub-base layers shall be either, thinned or finished pavement levels amended as required to enable the retention of significant roots (as determined by the Project Arborist).

1.14 Landscape Walls, Seating, Isolated Structures etc.

Walls and seating (and other structures as required) within TPZ areas shall be supported on pierced footing with all other parts of the structures positioned above existing ground levels. Excavation for the pier holes shall be undertaken using tree sensitive methods. Pier holes shall be flexible to enable the retention of roots (>25mmØ) as determined by the Project Arborist.

1.15 Underground Services

Underground service installation within the TPZ shall be supervised by the Project Arborist.

The installation of underground services shall be located outside of the TPZ. Where this is not possible, they shall be installed using either hydrovac or hand excavation methods with the services installed around/below roots (>25mmØ, or as determined by the Project Arborist).

Alternatively, boring methods may be used for underground service installation where the installation depth is greater than 1500mm below existing grade. Excavations for starting and receiving pits for boring equipment shall be located outside of the TPZ or located to avoid roots (>25mmØ, or as determined by the Project Arborist).

1.16 Plant Installation

Plant installation within TPZ areas shall be undertaken using hand tools and roots (>25mmØ) shall be protected. No mechanical cultivation/ripping of soils shall be undertaken within TPZ areas.

Landscape planting shall be completed in the final stage of the development works and tree protection fencing and trunk protection shall remain in place until these works are due to commence.

1.17 Excavations, Root Protection & Root Pruning

All excavation works (including root investigations) within TPZ areas shall supervised by the Project Arborist and utilise tree sensitive methods. These methods include hand, airspade or hydrovac excavation. Where approved by the Project Arborist, excavation using compact machinery fitted with a flat bladed bucket is permissible. Unless specified otherwise, excavation using compact machinery shall be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmØ).

Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat, followed by a layer of plastic membrane. Coverings shall be weighted to secure them in place. The mat shall be kept in a damp condition at all times.

No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the Project Arborist. Hand excavation and root pruning shall be undertaken along the excavation line prior to the commencement of mechanical excavation to prevent tearing and shattering damage to the roots from excavation equipment.

Roots (>25mmØ) shall be pruned by the Project Arborist only. Roots (<25mmØ) may be pruned by the Principal Contractor. Root pruning shall be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears. Damaged roots shall be pruned behind the damaged tissues with the final cut made to an undamaged part of the root.

This is a technical architectural section drawing. On the left, a large, dark silhouette of a tree with a thick trunk and several branches with leafy canopies is shown. The main part of the drawing is a cross-section of a building. A thick, dark horizontal line represents the ground level or a major structural element. Above this, there's a hatched area representing a roof or a specific material. Within this hatched area, there's a rectangular section with a diagonal line and a small circle, possibly indicating a window or a specific material. To the right of the hatched area, there's a series of small, rectangular blocks arranged in a row, possibly representing a wall or a foundation. The background is divided into several vertical and horizontal sections by thin lines, suggesting different materials or structural layers. The overall style is minimalist and technical, using black lines and gray shading on a white background.

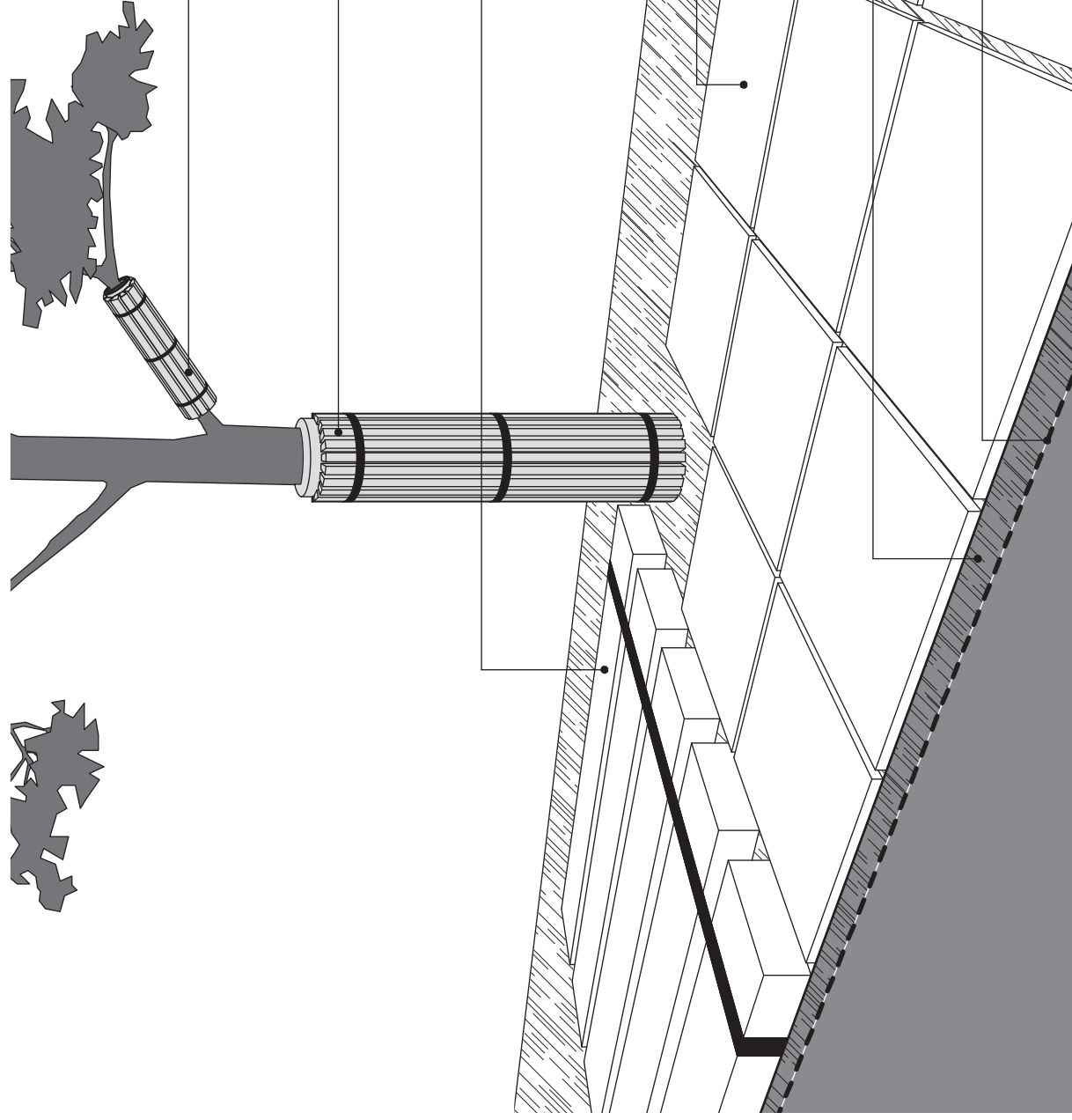
This is a technical architectural section drawing of a building. The drawing is oriented vertically on the page. On the left side, a large, dark gray silhouette of a tree with a thick trunk and several branches with leafy canopies is shown. The building's structure is depicted with various lines: a thick horizontal line represents the ground level, and several vertical lines indicate internal walls and structural elements. A prominent feature is a large, rectangular section of the building's interior, which is filled with a cross-hatch pattern, suggesting a specific material or structural type. This section is located in the lower-middle part of the drawing. Above this section, there is a smaller, rectangular area with a solid gray fill, containing a small circle with a diagonal line through it, possibly representing a window or a specific structural detail. To the right of the main building structure, there is a sloped roofline, indicated by a diagonal line. Below the roofline, there are several small, rectangular blocks, possibly representing foundation elements or structural supports. The background is divided into several vertical bands of different shades of gray, ranging from light to dark, which might represent different materials or environmental conditions. The overall style is that of a technical drawing, with clean lines and a focus on structural representation.

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This is a technical architectural section drawing. On the left, a large, dark silhouette of a tree with a thick trunk and several branches with leaves is shown. The main part of the drawing is a cross-section of a building. It features a sloped roofline on the right side, with a series of small, rectangular elements (possibly solar panels or roof tiles) arranged along its edge. Inside the building, there are several horizontal layers or floors, some of which are hatched with diagonal lines to indicate specific materials. A large, dark, rectangular object is positioned in the center of the building, possibly representing a core or a large piece of equipment. Various lines, dots, and a hatched area represent different materials or components. The drawing is set against a light gray background, with a dark gray area on the right side representing the ground or a slope.

This is a technical architectural section drawing. On the left, a large, dark silhouette of a tree with a thick trunk and several branches with leaves is shown. The main part of the drawing is a cross-section of a building. It features a sloped roofline on the right side, with a series of small, rectangular elements (possibly solar panels or roof tiles) arranged along its edge. Inside the building, there are several horizontal layers or floors, some of which are hatched with diagonal lines to indicate specific materials. A large, dark, rectangular object is positioned in the center of the building, possibly representing a core or a large piece of equipment. Various lines, dots, and a hatched area represent different materials or components. The drawing is set against a light gray background, with a dark gray area on the right side representing the ground or a slope.

[illegible][illegible]



Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.

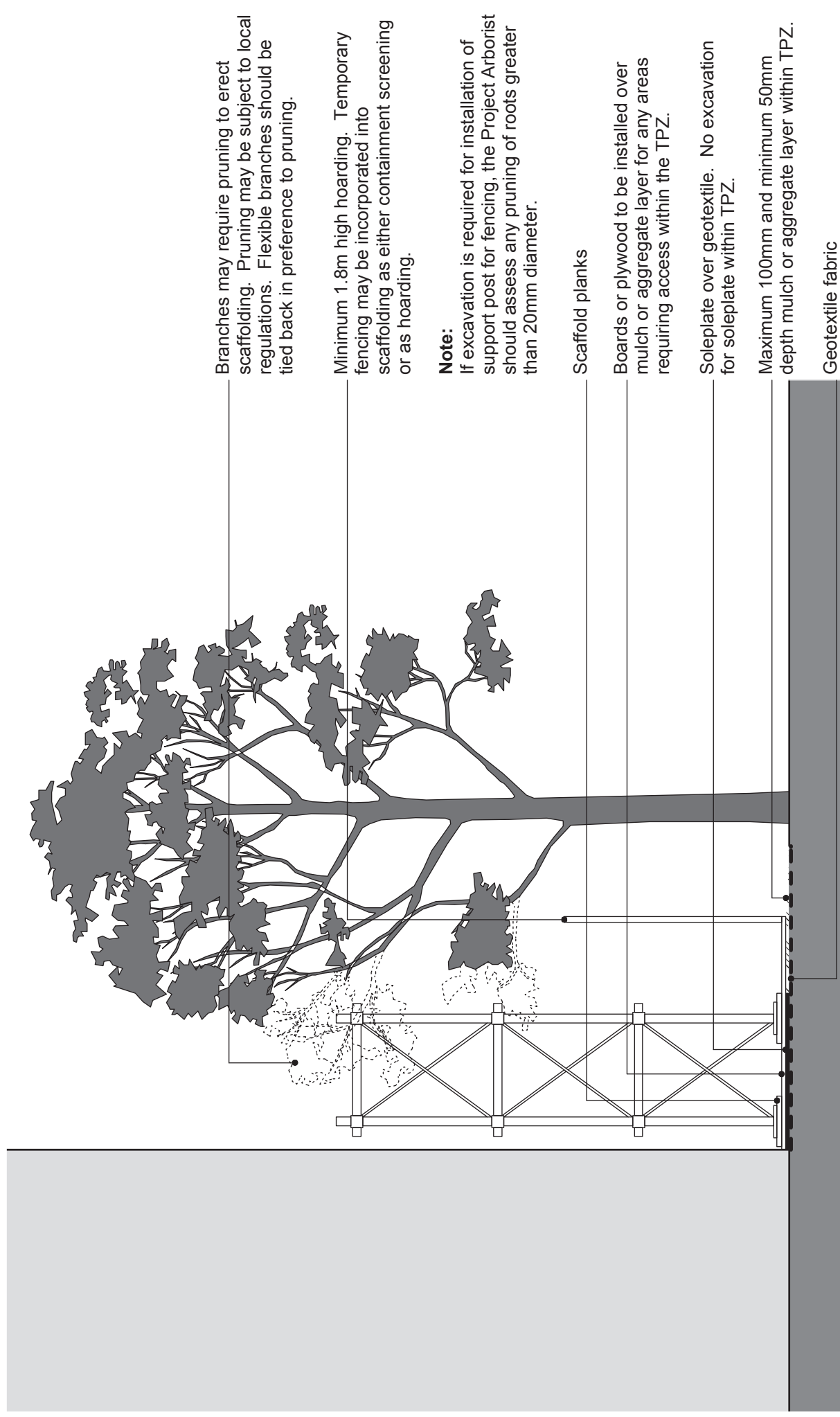
Trunk Protection - use boards and padding to prevent damage to bark (minimum 2m). Boards are to be strapped, not screwed or nailed to the trunk.

Ground Protection - use device strapped over mulch or aggregate layer. Ground protection device should be of a suitable thickness to prevent soil compaction and root damage.

Steel plates (or approved equivalent) with or without mulch or aggregate layer below.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer.

Geotextile fabric underneath mulch or aggregate layer.



Branches may require pruning to erect scaffolding. Pruning may be subject to local regulations. Flexible branches should be tied back in preference to pruning.

Minimum 1.8m high hoarding. Temporary fencing may be incorporated into scaffolding as either containment screening or as hoarding.

Note:

If excavation is required for installation of support post for fencing, the Project Arborist should assess any pruning of roots greater than 20mm diameter.

Scaffold planks

Boards or plywood to be installed over mulch or aggregate layer for any areas requiring access within the TPZ.

Soleplate over geotextile. No excavation for soleplate within TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer within TPZ.

Geotextile fabric