Project No: F23/USYD/15 Report No: F23/USYD/AIA/C

ARBORICULTURAL IMPACT ASSESSMENT
TREE PROTECTION SPECIFICATION

F23 Administration Building
University of Sydney

Prepared for: UNIVERSITY OF SYDNEY

11th April 2016
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 construction of a new multi-storey building (F23 Building) to the south of the Madsen Building within the University's Camperdown Campus. 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 For consistency, the tree numbers used within this report correlate with the University's tree inventory database (ArborPlan). In preparing this report, the author is aware of and has taken into account the objectives of the City of Sydney's *Development Control Plan 2012 (Section 3.5 Urban Ecology),* University of Sydney's *Tree Management Plan, Australian Standard 4970 Protection of Trees on Development Sites (2009)*, *Australian Standard 4373 Pruning of Amenity Trees (2007)* and *Australian Standard 2303 (2015) Tree Stock for Landscape Use.*

Refer to Methodology **(Appendix 1)**

1.1.3 The following documentation/plans were viewed in the preparation of this report:

- DA Package F23-A-DA-0101-103 – prepared by Grimshaw, dated 06.04.16
- DA Package F23-A-DA-0201-206 – prepared by Grimshaw, dated 06.04.16
- DA Package F23-A-DA-0301-309 – prepared by Grimshaw, dated 06.04.16
- DA Package F23-A-DA-0601-604 – prepared by Grimshaw, dated 06.04.16
- DA Package F23-A-DA-0701-702 – prepared by Grimshaw, dated 06.04.16
- Landscape Plan F23-L-DA-100/101 – prepared by Oculus, dated 08.04.16

Refer to Plans **(Appendix 2)**

2.0 RESULTS

2.1 The Site

2.1.1 The site is a roughly triangular-shaped area within the University of Sydney, Camperdown Campus. The site is located adjacent to the northern side of City Road and fronts the Madsen Building.

2.1.2 The site is currently occupied by a University carpark, entrance road and small landscape areas.

2.1.3 The site also includes the footpath and carriageway of Fisher Road. A temporary haulage road constructed as part of the enabling works for Australian Institute of Nanoscience runs roughly north/south along the top of the oval embankment, turning south-east down the embankment between the row of the Hills Weeping Figs.

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2.2 The Proposal

2.2.1 The supplied plans show the proposal includes the construction of a new multi-storey F23 Building with basement levels and associated works.

2.2.2 The proposal also includes works to Fisher Road.

Refer to Plans **(Appendix 2)**

2.3 The Trees

2.3.1 An assessment of the trees was undertaken as part of the preparation of the Preliminary Arboricultural Report prepared by TreeiQ (Report No. F23/USYD/PAR/A, dated 1st July 2015). The Tree Assessment Schedule **(Appendix 3)** contains the results of the tree assessment from the Preliminary Arboricultural Report.

2.3.2 Trees 1142 and 1144 have been identified as *Syzygium paniculatum* (Magenta Lillypilly). A search of the BioNet Atlas of NSW Wildlife Database was undertaken in June 2015. This species is listed as *Endangered* under the NSW *Threatened Species Conservation Act (1995)* and *Vulnerable* under the commonwealth *Environment Protection and Biodiversity Conservation Act (1999).*[1] Based on the age, size and location of Trees 1142 and 1144, it is assumed these trees are planted specimens. 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.[2] The ecological significance and habitat value of the trees has not been assessed and is beyond the scope of this report.

2.3.3 Trees 499-509 (*Ficus microcarpa* var. *hillii* - Hill's Weeping Figs) are listed on Council's *Register of Significant Trees 2013*. The Register notes that the trees are significant visual elements and probably were planted c. 1940 as they are evident as very small trees in the 1943 aerial of the area.[3]

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees to be removed

3.1.1 **Trees 471 and 473** have been identified as *Stenocarpus sinuatus* (QLD Firewheel Tree) and have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention.* **Tree 476** has been identified as *Callistemon viminalis* (Weeping Bottlebrush), **Trees 478, 1139 and 1141** have been identified as *Syzygium luehmannii* (Riberry), and **Trees 1142 and 1144** have been identified as *Syzygium paniculatum* (Lillypilly). These trees have been allocated a low Landscape Significance and a Retention Value of *Consider for Removal.* All of these trees are located in the garden bed area directly south of the Madsen Building.

3.1.2 The supplied plans show that the Trees 471, 473, 476, 478, 1139, 1141, 1142 and 1144 are proposed for removal due to the extent of works (demolition of existing pavements/structures, regrading works, and installation of retaining walls and new pavements) within their Tree Protection Zone (TPZ) areas. The removal of these trees should have a relatively low visual impact due to their relatively small size and location. Replacement planting using healthy, advanced-size specimens could replace the loss of amenity within a short to medium timeframe.

[1] NSW Office of Environment and Heritage's Atlas of NSW Wildlife (2011), *BioNet Atlas of NSW Wildlife.*
[2] Australian Museum Consulting (2013), *University of Sydney Ecological Assessment.*
[3] City of Sydney (2013) *Register of Significant Trees.*

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3.1.3 **Tree 475** is a *Eucalyptus* sp. (Eucalypt). No fruit was present to enable identification at species level. **Tree 477** has been identified as *Eucalyptus globulus* subsp. *bicostata* (Southern Blue Gum). These trees are located in the garden bed area directly south of the Madsen Building. These trees have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention.*

3.1.4 The health of Trees 475 and 477 was determined to be fair due to a reduced crown density range of 50-75% and the presence of low to moderate volumes of small diameter (<25mm) epicormic growth within their crowns.

3.1.5 The structural condition of Tree 475 was determined to be fair due to the presence of irregular, vertical sections of wound wood and adaptive growth on the lower trunk which may indicate vascular dysfunction and potential internal defects. Fungal fruiting bodies were present at the base of the trunk. Samples of these fruiting bodies were sent to the Royal Botanic Gardens Plant Disease Diagnostic Unit for DNA identification. The results outline that the sample was most likely *Gymnopilus junonius*. *Gymnopilus* spp. are generally considered to be saprophytic, or weak, stress-related pathogens. If the host becomes stressed, *Gymnopilus* spp. can become pathogenic and cause disease problems. However, *Gymnopilus junonius* have also been reported to cause white rots in Eucalypts.

Refer to RBG DNA Results **(Appendix 4)**

3.1.6 The structural condition of Tree 477 was determined to be good, with no significant structural defects observed at the time of assessment.

3.1.7 The supplied plans show that the Trees 475 and 477 are proposed for removal due to the extent of works (demolition of existing pavements/structures and the installation of new pavements) within their TPZ areas. The trees have a reduced crown density and are producing epicormic growth which are indicators of physiological stress, which in part, may have resulted from high levels of shading from the adjacent Madsen Building during the earlier stages of the trees' development. Even with the use of tree sensitive demolition and construction methods, it is likely the trees' health would continue to decline. Replacement planting using healthy, advanced-size specimens of a more shade tolerant species could replace the loss of amenity within a medium timeframe and would better contribute to the University's canopy cover over the long term.

3.1.8 **Tree 485** has been identified as *Tristaniopsis laurina* (Water Gum) and **Tree 486** has been identified as *Lophostemon confertus* (Brush Box). These trees are located in a garden bed area within the existing carpark. These trees have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention.*

3.1.9 The supplied plans show that Trees 485 and 486 will need to be removed to accommodate the proposed building footprint.

3.1.10 **Tree 487** has been identified as *Jacaranda mimosifolia* (Jacaranda) and **Trees 488-491** have been identified as *Lophostemon confertus* (Brush Box). These trees are located in garden bed areas within the existing carpark. These trees have been allocated a low Landscape Significance and a Retention Value of *Consider for Removal.*

3.1.11 The supplied plans show that Trees 487-491 will need to be removed to accommodate the proposed building footprint and landscape treatment.

3.2 Trees to be retained

3.2.1 **Trees 435-437** have been identified as *Ficus macrophylla* (Moreton Bay Fig) and are located in a garden bed areas fronting Eastern Avenue. These trees have been allocated a moderate Landscape Significance and a Retention Value of *Consider for Retention.*

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3.2.2 A heavy psyllid infestation was present throughout the crown of Tree 435 at the time of assessment. Over a prolonged period, heavy psyllid infestations may cause a reduction in crown density and physiological stress. The tree should be monitored and where signs of stress (such as significant foliar discolouration and/or reduction in crown density) manifest, an appropriate pest management regime should be implemented.

3.2.3 The supplied plans show that no works are proposed within the TPZ areas of Trees 435-437.

3.2.4 **Trees 499-509** have been identified as *Ficus microcarpa* var. *hillii* (Hill's Weeping Figs) and are located between oval embankment near the St Paul's College boundary and the footpath and carriageway of Fisher Road. These trees have been allocated a very high Landscape Significance and a Retention Value of *Priority for Retention.*

3.2.5 Tree 507 has a significant bark inclusion located between co-dominant stems. Whist this structural defect is not considered to represent a significant hazard at the present time, ongoing monitoring should be undertaken on an annual basis.

3.2.6 The supplied plans show that the existing pavement surfaces and kerbs within the TPZ areas of Trees 499-509 are to be demolished and new pavement areas and kerbs are to be installed, with minor realignment of the road layout. It is understood that the existing kerb directly adjacent to the trees is to remain in-situ. The extent of works represents a *Major Encroachment* as defined by AS-4970. In addition, the south-western corner of the roofline of the proposed building extends above sections of the crowns of Trees 503 and 504. However, this roof projection sits above the trees' crowns and is not anticipated to impact their health or Useful Life Expectancies.

3.2.7 Recommendations

In accordance with Clause 3.3.4 of AS-4970, the following tree sensitive demolition/construction methods should be used to minimise the impact of works on Trees 499-509:

- Demolition: Tree sensitive demolition methods should be used for the removal of existing pavements/structures within TPZ areas. The existing kerb directly adjacent to the trees should remain in-situ.
- Basement: The proposed basement falls outside of the TPZ areas however it is likely that roots will extend beyond the perimeter of the TPZ areas. Trenching (using a compact excavator) and root pruning should be undertaken prior to the commencement of the bulk excavation works to prevent shattering damage to the roots (which can extend beyond the point of excavation back towards the trees). The trench should be excavated to a depth of 1m along the entire length of the basement section adjacent to the TPZ areas, and all exposed roots cleanly severed with sharp pruning saw/secateurs. No over-excavation (battering, benching or drainage) beyond the proposed footprint of the basement should be undertaken.
- Pavements: New pavement surfaces within the TPZ areas should be installed at or above the existing grade. Excavation works should be limited to less than 10% of the individual TPZ areas.
- Underground services: Underground services should be located outside of TPZ areas. Where this is not possible, they should be installed using tree sensitive excavation methods with the services fed below roots. Alternatively, boring methods may be used for underground service installation where the installation depth is greater than 800mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the TPZ areas or located to avoid roots (>25mmø, or as determined by the Project Arborist).

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- Road Height Clearances: Sections of Fisher Road are currently being utilized as a temporary haulage road for trucks and heavy vehicles. However, with the development of the F23 Building, Fisher Road will become the main vehicular access point from City Road for the Camperdown Campus for vehicles up to 4.3m in height and some Selective Pruning will be required to provide clearances. Refer to Section 3.3. In three locations directly above the kerbline, it will not be possible to provide this clearance due to the branching structure of the trees. As a preventative measure, reflectors should be installed onto the lower branches over the kerbline. The reflectors should be installed using methods which do not cause significant damage to the trees' cambium and may require annual maintenance to allow for tree growth. Low clearance signage should also be installed.

3.3 Pruning

3.3.1 Trees 499-501 and 503-508 will need to be pruned to provide building and road clearance. These pruning works represent less than 5% of each individual tree's total crown volume and are not expected to reduce their Useful Life Expectancies or significantly affect their visual symmetry. Provision should be made within the design so that additional pruning for construction access and scaffolding/hoarding is not required.

Refer to Pruning Specification **(Appendix 8)**

3.3.2 At the time of a site visit undertaken on the 16th February 2016, it was noted that three (3) lower branches in the crowns of Trees 503 and 505 had sustained vehicle impact damage. One (1) 75mm diameter (approx.) branch in the crown of Tree 505 had been broken off leaving a short, torn branch stub and two (2) lower branches in the crown of Tree 503 had missing/torn bark. The broken branch is of relatively small diameter and the bark wounds appear relatively superficial. However, the broken branch stub should be pruned back to the branch collar and the torn bark should be carefully trimmed back with a sharp knife around the perimeter of the wound margin to leave a clean wound face that will promote wound occlusion.

3.3.3 The Practising Arborist undertaking the pruning works detailed above 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), Workcover Code of Practice for the Amenity Tree Industry* (1998) and other applicable legislation and codes.

3.4 Replacement Planting

3.4.1 The supplied plans show that replacement tree planting is proposed as part of the development. Replacement trees should be supplied as advanced-size stock to help offset the loss of amenity resultant from the tree removals. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use.*

3.4.2 Sufficient soil volumes 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. 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. It should be noted that based on typical root morphology of most tree species, a minimum soil depth of 700mm is required. Irrigation should be provided to aid in the establishment of the new tree plantings.

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4.0 CONCLUSION

4.1 Thirty one (31) trees were addressed within this report and consist of a mix of locally indigenous, Australian native and exotic species. Trees 499-509 (*Ficus microcarpa* var. *hillii* - Hill's Weeping Figs) are listed on Council's *Register of Significant Trees 2013*.

4.2 The supplied plans show the proposal includes the construction of a new multi-storey F23 Building with basement levels and associated works. The proposal also includes works to Fisher Road.

4.3 The supplied plans show that Trees 471, 473, 475, 476, 477, 478, 485, 486, 487, 488, 489, 490, 491, 1139, 1141, 1142 and 1144 will need to be removed to accommodate the proposed development.

4.4 The supplied plans show that Trees 435-437 and 499-509 are to be retained as part of the proposed development. Tree sensitive design and construction methods should be utilized within TPZ areas to minimise the impact of the works. Refer to Tree Protection Specification **(Appendix 6).**

4.5 Trees 499-501 and 503-508 will need to be pruned to provide building and road clearance. These pruning works represent less than 5% of each individual tree's total crown volume and are not expected to reduce their Useful Life Expectancies or significantly affect their visual symmetry. Provision should be made within the design so that additional pruning for construction access and scaffolding/hoarding is not required. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007), Workcover Code of Practice for the Amenity Tree Industry* (1998) and other applicable legislation and codes. Refer to Pruning Specification **(Appendix 8).**

4.6 The supplied plans show that replacement tree planting is proposed as part of the development. Replacement trees should be supplied as advanced-size stock to help offset the loss of amenity resultant from the tree removals. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use.*

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5.0 LIMITATIONS & DISCLAIMER

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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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7.0 APPENDICES

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Appendix 1: Methodology

1.1 **Site Inspection**: This report was determined as a result of a comprehensive site during June 2015. The comments and recommendations in this report are based on findings from this site inspection.

1.2 **Visual Tree Assessment (VTA)**: The subject tree was assessed using the Visual Tree Assessment criteria and notes as described in *The Body Language of Trees – A Handbook for Failure Analysis.*[4] The inspection was limited to a visual examination of the subject tree from ground level only. The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic 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 structure of the subject tree(s) was assessed by:

I. Visible evidence of structural defects or instability
II. Evidence of previous pruning or physical 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

[4] Mattheck & Breloer (2003)

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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 *Local Environmental Plan* 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 *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.
	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.
	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

<table>
<tr><th>ULE</th><th></th><th colspan="4">Landscape Significance</th></tr>
<tr><td></td><td>Very High</td><td>High</td><td>Moderate</td><td>Low</td><td>Insignificant</td></tr>
<tr><td>40 years +</td><td rowspan="3">Priority for Retention</td><td colspan="2">Priority for Retention</td><td rowspan="3">Consider for Removal</td><td rowspan="3">Priority for Removal</td></tr>
<tr><td>15-40 years</td><td>Priority for Retention</td><td>Consider for Retention</td></tr>
<tr><td>5-15 years</td><td colspan="2">Consider for Retention</td></tr>
<tr><td>Less than 5 years</td><td>Consider for Removal</td><td colspan="4">Priority for Removal</td></tr>
</table>

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

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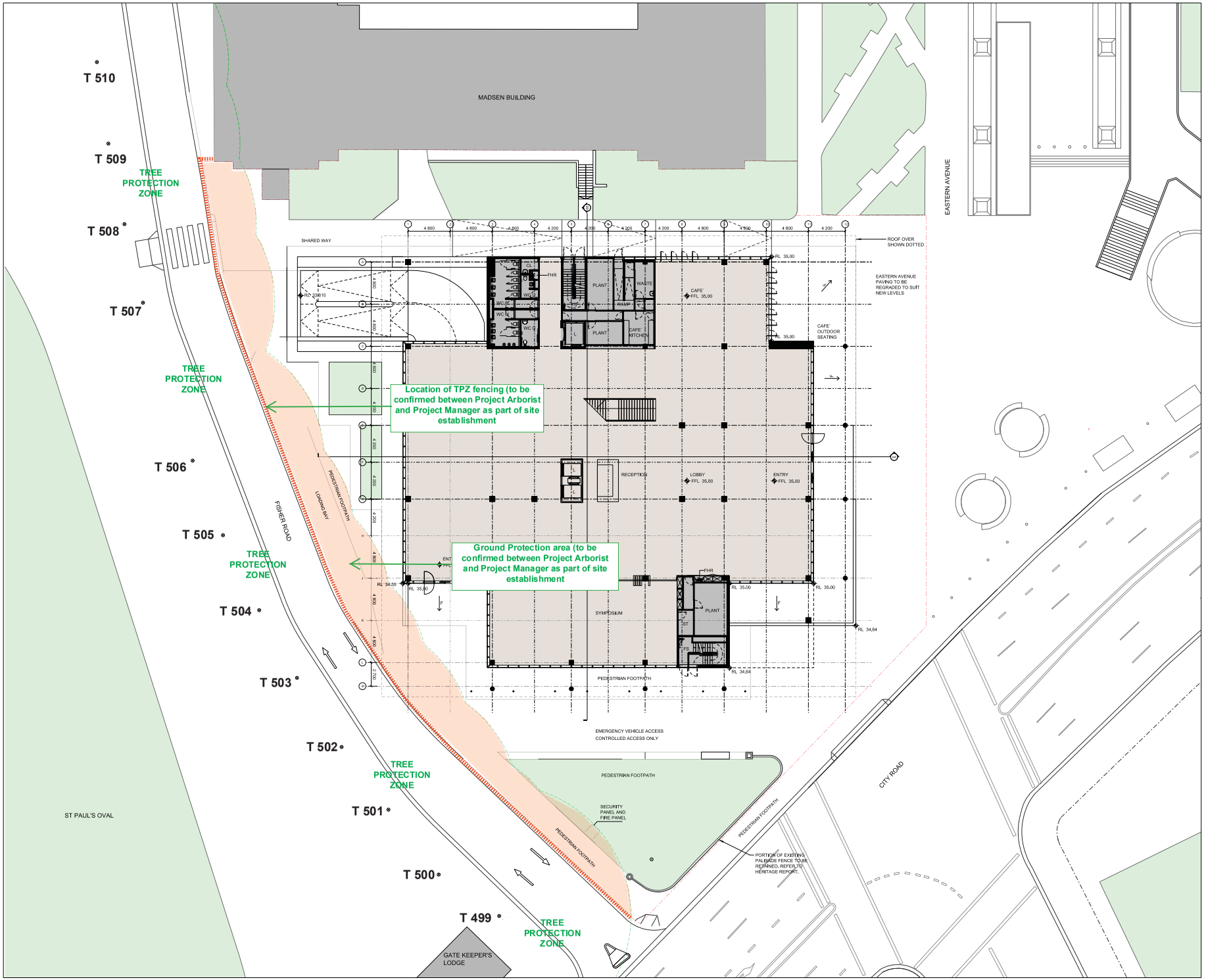

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REV	DATE	FOR
0	06/04/2016	DEVELOPMENT APPLICATION

PRINCIPAL

THE UNIVERSITY OF SYDNEY

CLIENT

lendlease

DRAWING KEY

- SITE BOUNDARY
- TREE PROTECTION ZONE - TPZ
- EXTENTS OF PERMANENT WORKS

PROJECT
F23
ADMINISTRATION BUILDING

ADDRESS
THE UNIVERSITY OF SYDNEY
NSW 2006 AUSTRALIA

PROJECT NO.
15167

NORTH

SCALE
1:400 @ A3
1:200 @ A1

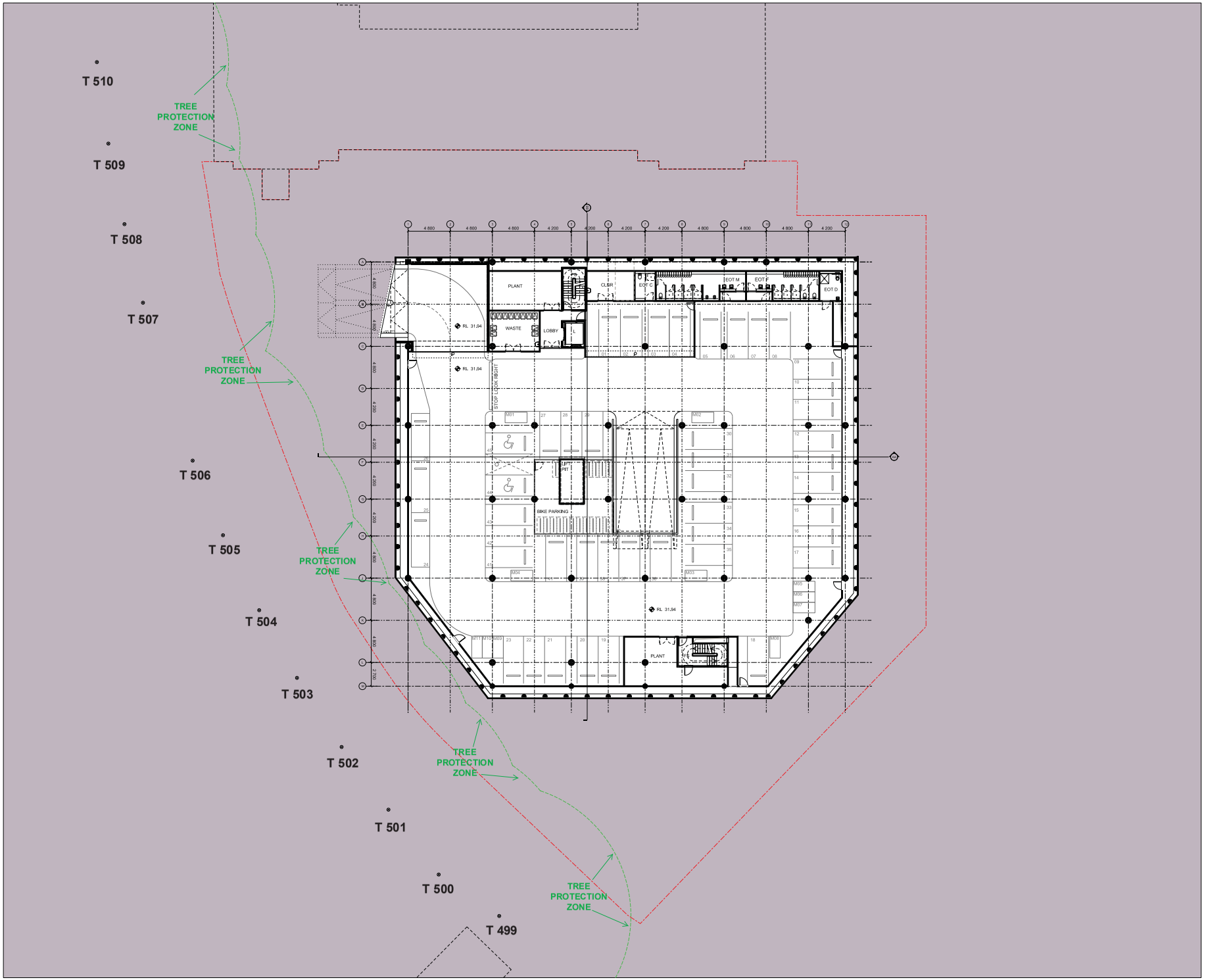
STATUS
DEVELOPMENT APPLICATION

DRAWING
GA PLAN - LEVEL 1

DRAWN	CHECKED	AUTHORISED
PR	BD	JM

DRAWING NUMBER
F23-A-DA-0303

REVISION
0



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REV	DATE	FOR
0	06/04/2016	DEVELOPMENT APPLICATION

PRINCIPAL

THE UNIVERSITY OF SYDNEY

CLIENT

lendlease

DRAWING KEY

- SITE BOUNDARY
- TREE PROTECTION ZONE - 15.00M
- EXTENTS OF PERMANENT WORKS
- TREE TRUNK
- 45 CAR PARKING SPOTS
- 11 MOTORBIKE PARKING
- 32 BICYCLE SECURE PARKING

PROJECT
F23
ADMINISTRATION BUILDING

ADDRESS
THE UNIVERSITY OF SYDNEY
NSW 2006 AUSTRALIA

PROJECT NO.
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NORTH

SCALE
1:400 @ A3
1:200 @ A1

STATUS
DEVELOPMENT APPLICATION

DRAWING
GA PLAN - BASEMENT LEVEL 1

DRAWN	CHECKED	AUTHORISED
LS	BD	JM

DRAWING NUMBER
F23-A-DA-0302

REVISION
0

LEGEND

EXISTING TREES RETAINED

EXISTING TREES REMOVED

NOTE: REFER TO AIA PREPARED BY TREE IQ

O C U L U S

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landscape architect

GRIMSHAW — architect

THE UNIVERSITY OF SYDNEY — client

lendlease — developer

REV	DATE	STATUS	REV	DATE	STATUS
01	10.08.15	EOI TENDER	A		
02	15.12.15	EOI TENDER	B		
03	07.03.16	DEVELOPMENT APPLICATION	C		
04	22.03.16	DEVELOPMENT APPLICATION	D		
05	08.04.16	DEVELOPMENT APPLICATION	E		

revision

F23 - UNIVERSITY OF SYDNEY — project

TREE PROTECTION / REMOVAL PLAN — drawing title

job no.: S15-028
date: 08-04-2016 — drawing information

drawn by: DW
checked: KS

north

F23-L-DA-101 — drawing number

E — rev.

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landscape architect: OCULUS | architect: GRIMSHAW | client: THE UNIVERSITY OF SYDNEY | developer: lendlease

REV	DATE	STATUS
01	10.08.15	EOI TENDER
02	15.12.15	EOI TENDER
03	07.03.16	DEVELOPMENT APPLICATION
04	22.03.16	DEVELOPMENT APPLICATION
05	08.04.16	DEVELOPMENT APPLICATION

REV	DATE	STATUS
A		
B		
C		
D		
E		

revision

project: F23 - UNIVERSITY OF SYDNEY

drawing title: LANDSCAPE PLAN

drawing information: job no.: S15-028
date: 08-04-2016
drawn by: DW
checked: KS

north

drawing number: F23-L-DA-100

rev.: E

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	TPZ (m)	SRZ (m)	Implication
435	*Ficus macrophylla* (Moreton Bay Fig)	450	5	4	Good	Good	Psyllid.	15-40	Moderate	Consider for Retention	5.4	2.4	Retain. No works within TPZ.
436	*Ficus macrophylla* (Moreton Bay Fig)	350	5	4	Fair	Good	Crown density 75-95%. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.2	2.2	Retain. No works within TPZ.
437	*Ficus macrophylla* (Moreton Bay Fig)	400	6	4	Good	Good	Wound/s, early stages of decay. Structures within SRZ.	15-40	Moderate	Consider for Retention	4.8	2.3	Retain. No works within TPZ.
471	*Stenocarpus sinuatus* (QLD Firewheel Tree)	300 150	9	4	Good	Good	Branch inclusion/s, minor. Structures in SRZ. Small (<25mm) diameter epicormic growth in low volumes.	15-40	Moderate	Consider for Retention	4.1	2.2	Remove.
473	*Stenocarpus sinuatus* (QLD Firewheel Tree)	50 50 50 150 150 100	6	3	Good	Fair	Co-dominant inclusion. Partially suppressed.	15-40	Moderate	Consider for Retention	3.6	2	Remove.
475	*Eucalyptus* sp. (Eucalypt)	500	18	5	Fair	Fair	Partially suppressed. Crown density 50-75%. Small (<25mm) diameter epicormic growth in low volumes. Adaptive growth. Dysfunctional vascular tissue on trunk. Fungal bruiting bodies at base of trunk. No fruit present to identify at species level.	5-15	Moderate	Consider for Retention	6	2.5	Remove.
476	*Callistemon viminalis* (Weeping Bottle Brush)	75 75	3	5	Good	Poor	Co-dominant inclusion. Partially suppressed.	5-15	Low	Consider for Removal	2	1.5	Remove.
477	*Eucalyptus globulus subsp. bicostata* (Southern Blue Gum)	500	20	6	Fair	Good	Crown density 50-75%. Small (<25mm) diameter epicormic growth in moderate volumes. Overhang building.	5-15	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	TPZ (m)	SRZ (m)	Implication
478	*Syzygium luehmannii* (Riberry)	100-150	6	1	Good	Good	Limited building clearance. Partially suppressed.	5-15	Low	Consider for Removal	2	1.5	Remove.
485	*Tristaniopsis laurina* (Water Gum)	250 150 300	8	4	Good	Fair	Wound/s, early stages of decay. Branch inclusion/s, minor.	15-40	Moderate	Consider for Retention	5	2.3	Remove.
486	*Lophostemon confertus* (Brush Box)	500	8	5	Good	Good	Structures within SRZ.	15-40	Moderate	Consider for Retention	6	2.5	Remove.
487	*Jacaranda mimosifolia* (Jacaranda)	150 200	5	4	Good	Fair	Structures within SRZ. Wound/s, early stages of decay. Mechanical damage to lower trunk. Medium (25-75mm) diameter epicormic growth in low volumes.	15-40	Low	Consider for Removal	3	2.3	Remove.
488	*Lophostemon confertus* (Brush Box)	300	5	3	Fair	Fair	Structures within SRZ. Crown density 75-100%. Adaptive growth. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	3.6	2	Remove.
489	*Lophostemon confertus* (Brush Box)	350	6	5	Good	Good	Structures within SRZ. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	4.2	2.2	Remove.
490	*Lophostemon confertus* (Brush Box)	350	6	5	Good	Good	Structures within SRZ. Mechanical damage to exposed roots. No tag.	15-40	Low	Consider for Removal	4.2	2.2	Remove.
491	*Lophostemon confertus* (Brush Box)	350	5	4	Good	Good	Structures within SRZ. Wound/s, early stages of decay.	15-40	Low	Consider for Removal	4.2	2.2	Remove.
499	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
500	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
501	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
502	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
503	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
504	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
505	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
506	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400 est.	20	18 approx.	Good	n/a	No access to base. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
507	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1400	20	0	Good	Fair	Ramp in SRZ. Co-dominant inclusion, major. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
508	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	400 1100 750	20	19	Good	Fair	Limited building clearance. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	15	3.9	Retain. Use tree sensitive methods.
509	*Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)	1150	20	14	Good	Fair	Crown overhangs building. Branch inclusion/s, typical of species. Wounds various stages of decay. Partially suppressed.	15-40	Very High	Priority for Retention	13.8	3.6	Retain. Use tree sensitive methods.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	SRZ (m)	Implication
1139	*Syzygium luehmannii* (Riberry)	100-150	6	1	Good	Good	Limited building clearance. Partially suppressed.	5-15	Low	Consider for Removal	2	1.5	Remove.
1141	*Syzygium luehmannii* (Riberry)	100-150	6	1	Good	Good	Limited building clearance. Partially suppressed.	5-15	Low	Consider for Removal	2	1.5	Remove.
1142	*Syzygium paniculatum* (Lillypilly)	100-150	6	1	Good	Good	Limited building clearance. Partially suppressed. Small (<25mm) diameter deadwood in low volumes.	5-15	Low	Consider for Removal	2	1.5	Remove.
1144	*Syzygium paniculatum* (Lillypilly)	100-150	6	1	Good	Good	Limited building clearance. Partially suppressed. Small (<25mm) diameter deadwood in low volumes.	5-15	Low	Consider for Removal	2	1.5	Remove.

Appendix 4: RBG DNA Test Results

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Anna Hopwood
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Plant Disease Diagnostic Unit
Tel (61 2) 9231 8189
Fax (61 2) 9241 1135

7 July 2015

The Royal
BOTANIC GARDEN
Sydney

Dear Anna,

Mushroom Identification (QT Ref E15 137)

We have completed processing the mushroom specimen sent to our laboratory for DNA identification.

Species identification was based on Basic Local Alignment Search Tool (BLAST) using DNA sequences from the ribosomal DNA, internal transcribed spacer 1 and 2 (ITS). This method compares the similarity of the sample DNA with all samples in the National Center for Biotechnology Information database (International online database). The BLAST then returns a list of species that are most similar to the sample DNA based on sequence identity (similarity) and assigns a probability value (E) that gives an indication of the reliability of the match. Because of this, BLAST usually returns multiple species but we have only included the top three matches. This gene region was selected as it can be used to identify the largest number of fungal species. The results of the BLAST are in the table below.

P Ref	Gen an Accession	pecies	Identit	E alue
E15/137-1	AY280987	*Gymnopilus junonius*	100	0
	JX684001	*Gymnopilus junonius*	100	0
	AY281011	*Gymnopilus spectabilis*	100	0

The mushroom specimen was most likely *Gymnopilus junonius* (synonym *G. spectabilis*). *Gymnopilus* species are generally considered to be saprophytic or weak stress related pathogens. If the host becomes stressed, *Gymnopilus* species can become pathogenic and cause disease problems. However, *G. junonius* and its synonyms have also been reported to cause white rots in eucalypts. Therefore, we recommend that the structural integrity of the tree is assessed, especially if it is located near buildings or a thoroughfare.

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Environmental stress is known to predispose trees to disease. Identifying and reducing the environmental stress (es) and improving tree health may help to slow disease progression. Plant health can be improved with the application of an organic fertiliser and root growth promoter (such as a seaweed based fertiliser) combined with deep-watering whenever necessary. Appropriate mulching to improve soil moisture and texture is also recommended.

Please do not hesitate to contact me if you have any questions regarding this report. An invoice for $308 (inc. GST) will be sent to you separately.

Report written by: **Dr Matthew Laurence**
Diagnostics and Facilities Coordinator
matthew.laurence@rbgsyd.nsw.gov.au

Report Reviewed by: **Dr Edward Liew**
Manager Plant Pathology
edward.liew@rbgsyd.nsw.gov.au

Appendix 5: Plates

Plate 1: Showing Tree 435

Plate 2: Showing Trees 436 & 437

Plate 3: Showing garden bed fronting Masden Building

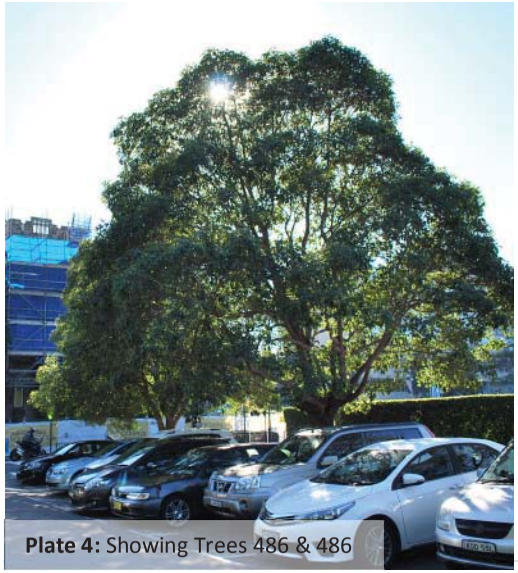

Plate 4: Showing Trees 486 & 486

Plate 4: Showing Trees 487-491

Plate 5: Showing Trees 499-506

Appendix 6: 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 requirements for 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.

1.2 Tree & Vegetation Removal

Trees approved for removal by the determining authority shall be removed prior to the establishment of the tree protection measures. Tree removal shall not damage the trees to be retained.

Tree removal works shall be undertaken in accordance with the *Workcover Code of Practice for the Amenity Tree Industry* (1998).

1.3 Tree Protection Zone

The trees 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 Site Arborist.

1.4 Tree Protection Fencing

Tree Protection Fencing shall be installed as shown on the GA Plan – Level 1. Refer to Plans **(Appendix 2).** Where works approved by the determining authority are required within the TPZ areas, fencing may be setback to provide temporary access, only where ground and trunk protection has been provided. Refer to Sections 1.5 & 1.8.

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 fence must have a lockable opening for access. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) **(Appendix 7)**.

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1.5 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.

1.6 Trunk & Branch Protection

Where deemed necessary by the Project Arborist, trunk protection shall be installed by wrapping padding around the trunk to a minimum height of 2m or as the lower branches permit. 2m lengths of timber batons (75mm x 45mm) spaced at 100mm centres shall be strapped together and placed over the padding. Branch protection shall be installed to those branches 1m or closer to scaffolding. Branch protection shall be installed by wrapping padding around the branch. Refer to Typical Tree Protection Details (4) **(Appendix 7)**.

1.7 Site Management

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

1.8 Ground Protection & Temporary Access

Ground protection shall be installed as shown on the GA Plan – Level 1. Refer to Plans **(Appendix 2).**

Where light traffic access <3.5tons is required the ground surface shall be protected by a 100mm deep mulch cover overlaid with rumble boards/road plates. The mulch shall be Horticultural Grade Pine Bark as certified to *AS4454: Composts, Soil Conditioners and Mulches* (1997). The mulch shall be spread by hand to avoid soil disturbance and compaction.

Where heavy traffic access >3.5 tons is required the ground surface shall be protected by a layer of geo-textile fabric over which a 300mm layer of compacted road base is to be installed. The geo-textile shall extend a minimum of 300mm beyond the edge of the road base. When removing temporary access road the material shall be removed with care to prevent disturbance of natural ground levels below. Refer to Typical Tree Protection Details (4) **(Appendix 7)**.

1.9 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 7)**.

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 Demolition

Demolition of existing structures 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 1.8). Machinery should not contact the tree's roots, trunk, branches and crown.

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

Where deemed necessary by the Project Arborist, the structures shall be shattered prior to removal with a hand-operated pneumatic/electric breaker.

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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 subject tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

1.12 Pavement Demolition

Demolition of the existing pavements within the TPZ shall be supervised by the Project Arborist. The existing pavement shall be carefully lifted by hand to minimise damage to the existing sub-base and to prevent damage to tree roots. Wherever possible, the existing sub-base material shall remain in-situ.

The 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.

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 subject tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

1.13 Pavement/Kerb Installation

Installation of the pavements and sub-base within the TPZ shall be supervised by the Project Arborist. The new surfaces and sub-base materials shall be placed above grade to minimise excavations and retain roots (unless prior root mapping results show above sensitive construction to be unnecessary).

If roots (>25mmø) are encountered during the installation of the new sub-base and surfaces, 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 structural roots (>25mmø) where deemed necessary by the Project Arborist. Compaction of the ground surface prior to the installation of fill shall not be permitted.

New sub-base material shall be a 20mm no-fines road base (Benedict Sand & Gravel - Product Code 20NF/RB or similar approved material). Recycled concrete aggregates shall not be used to avoid raising soil pH levels.

If required, bedding sand shall be a washed river sand (recycled crushed paving blends shall not be used). The bedding sand shall be consolidated with a pedestrian-operated plate compactor only. If possible, the pavement material shall be permeable.

Where required, new kerbs within the TPZ should be modified to bridge tree roots (>25mmø) unless root pruning is approved and undertaken by the Project Arborist.

Root pruning and excavations shall be undertaken as outlined within Section 1.15.

1.14 Underground Services

Installation of underground services within the TPZ shall be supervised by the Project Arborist. Wherever possible, underground services shall not be located within the TPZ.

The location of stormwater pipes shall be excavated by hand/hydrovac to a depth of 600mm. When undertaking hydro-vacuum excavation, the tip of the high pressure lance is not to be pointed directly at roots at close range to avoid the removal or damage to bark. It is essential that the bark of roots remain intact.

Where roots (>25mmø) are present and are to be retained (as determined by the Project Arborist), the pipes shall be installed by either inserting pipes beneath roots or using thrust (trenchless) boring methods.

Excavations for starting and receiving pits for thrust boring equipment shall be located outside the TPZ wherever possible. The top of the pipe being installed must be installed at a minimum depth of 600mm below existing grade. Boring techniques involving external lubrication of the boring head with materials other than water (e.g. oil, bentonite, etc.) shall be avoided.

Root pruning and excavations shall be undertaken as outlined within Section 1.15.

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1.15 Excavations & Root Pruning

Excavations and root pruning within the TPZ shall be supervised by the Project Arborist. Excavations within the TPZ shall be avoided wherever possible.

Excavations within the TPZ shall be undertaken by hand or using hydro vacuum excavation methods (or similar approved device) to protect tree roots. If there is any delay between excavation works and backfilling, 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.

Roots to be pruned shall be cleanly severed with sharp pruning implements to ensure a smooth wound face, free from tears. Severance of structural roots (>25mmø) within the Structural Root Zone is not recommended as it may lead to tree destabilisation. **All root pruning requires approval from the Project Arborist.**

Other than for approved works only, no over excavation, benching or battering should be permitted when excavating adjacent to or within TPZ areas.

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Appendix 7: Typical Tree Protection Details

Adapted from *AS 4970-2009 Protection of Trees on Development Sites*
(Source: Institute of Australian Consulting Arboriculturists)

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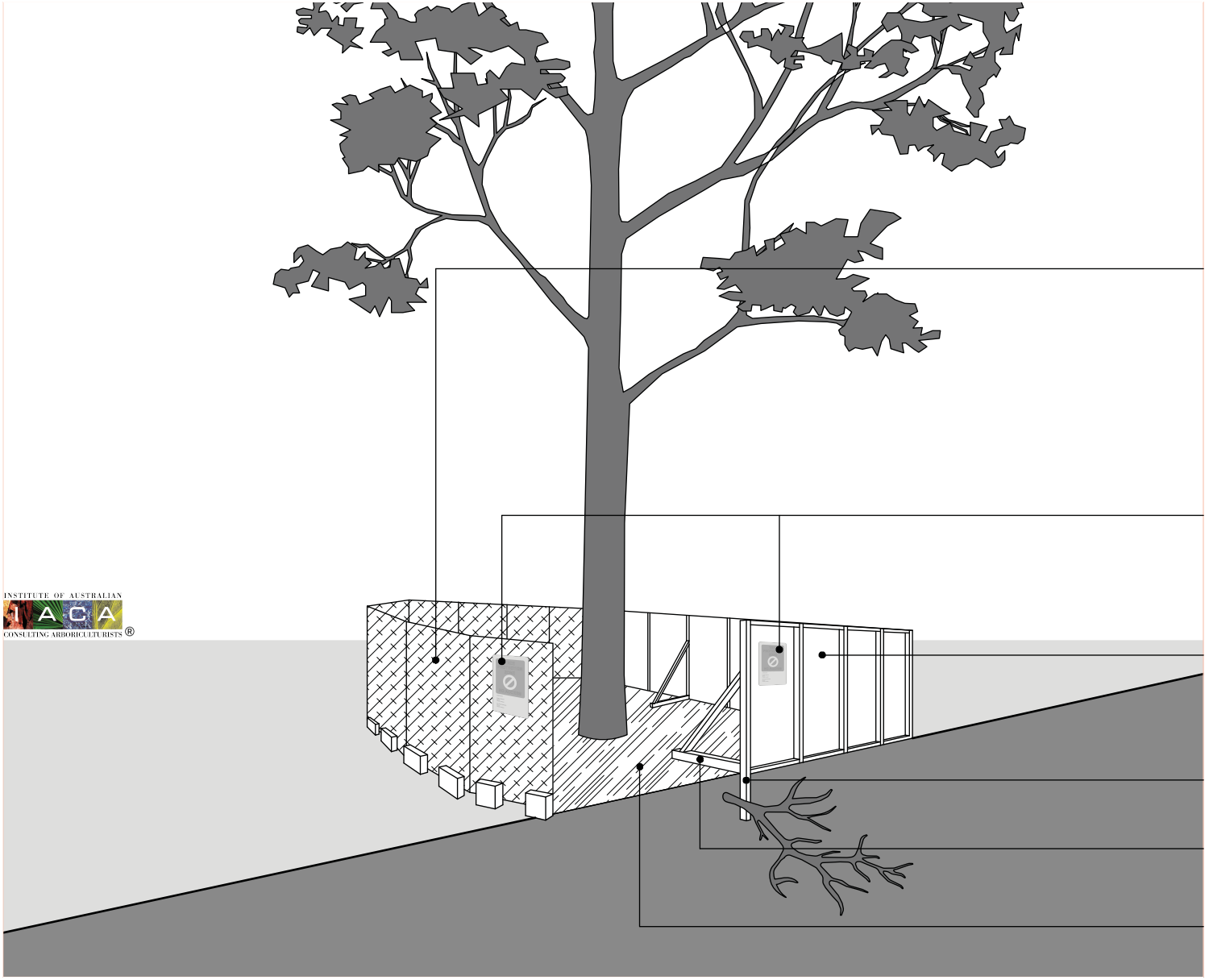

Note:
No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

Option 1 - Fencing
1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

Installation of supports should avoid damaging roots.

Bracing is permissible within the TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TPZ.

03

Tree Protection Fencing

Not to Scale

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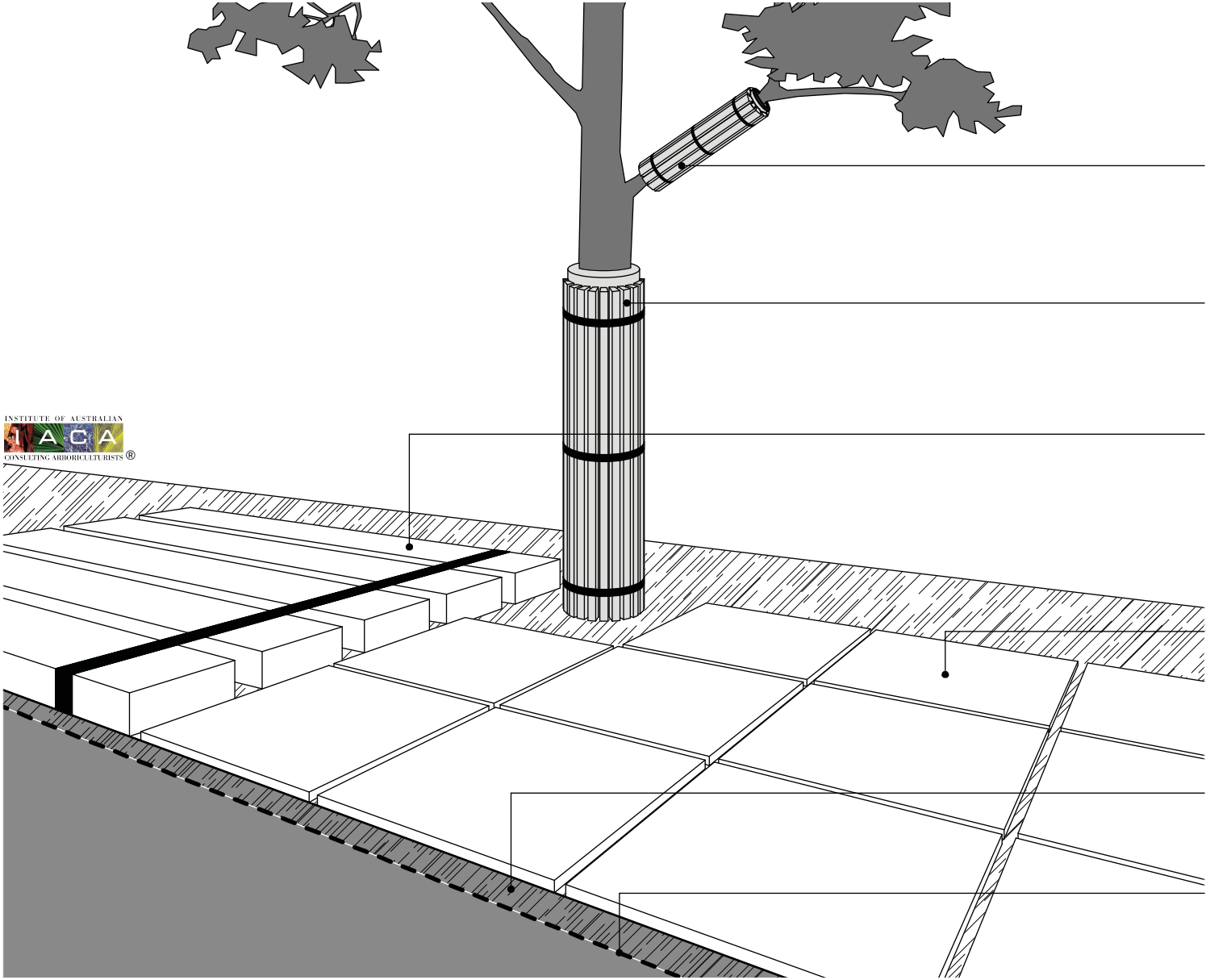

Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.

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.

04

Examples of Branch, Trunk and Ground Protection

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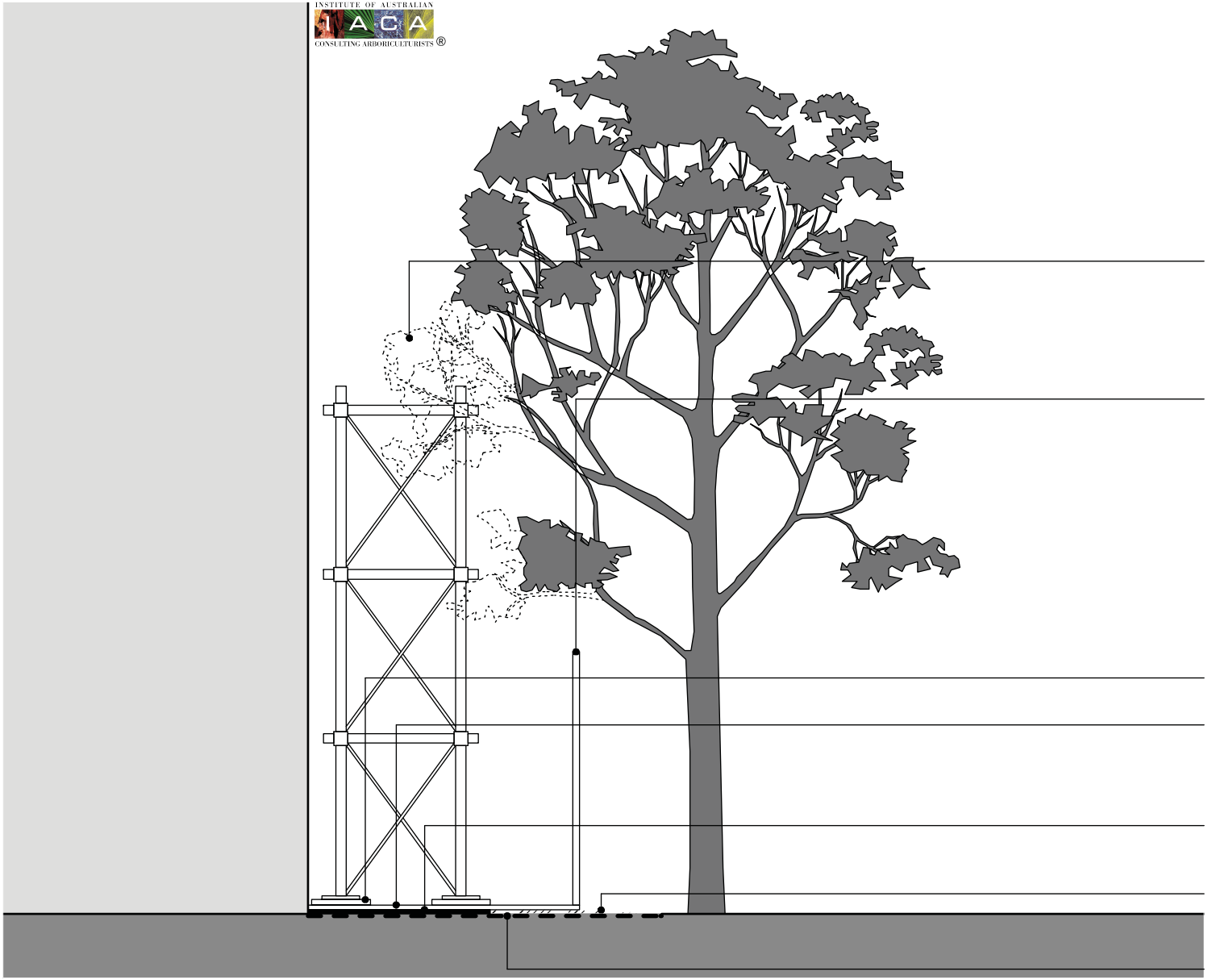

Branches may require pruning to erect scaffolding. Pruning may be subject to local regulations. Flexible branches should be tied back in preference to pruning.

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

05

Indicative Scaffolding within a Tree Protection Zone (TPZ)

Not to Scale

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Appendix 8: Pruning Specification

Tree 499 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
E	4m & 4.5m	3rd & 4th	120mm & 80mm	2 x branches. Prune to achieve minimum 4.3m vertical clearance over Fisher Road.	1
E	4.5m		<75mm	Minor pruning to achieve minimum 4.3m vertical clearance over Fisher Road.	2

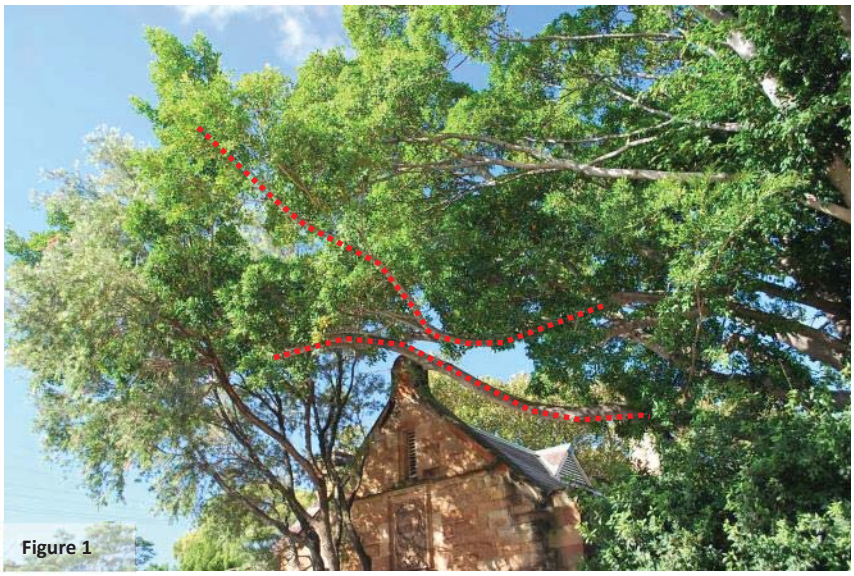

Figure 1

Figure 2

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Tree 500 – *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
NE	2.5m	1st	100mm	Prune to achieve minimum 4.3m vertical clearance over Fisher Road.	3

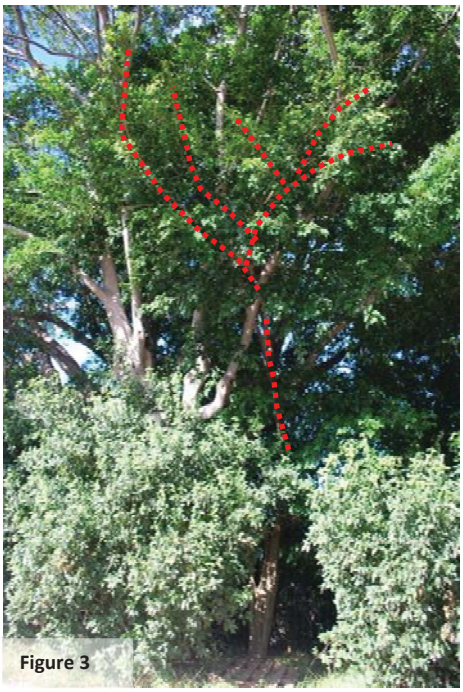

Figure 3

Tree 501 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
NE	4.5m	5th	100mm	Remove lower branch at junction.	4

Figure 4

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Tree 503 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
N/NE			80mm & 120mm	2 x branches to be pruned for building clearance.	
E	4.5m	2nd	250mm	Damaged by recent vehicle impact.	5
NE	4.5m	2nd	150mm	Minor damage by recent vehicle impact.	6

Figure 5

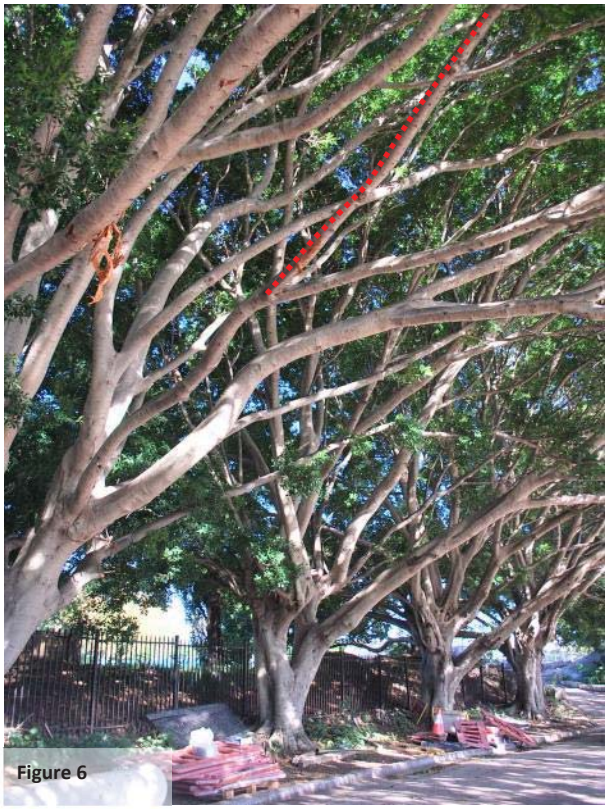

Figure 6

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Tree 504 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
N/NE			100mm & 120mm	2 x branches to be pruned for building clearance.	
E	4.5m	4th	120mm	Recently torn lateral towards terminal end of branch.	7
NE	4.5m		<75mm	Minor pruning to achieve minimum 4.3m vertical clearance over Fisher Road	8

Figure 7

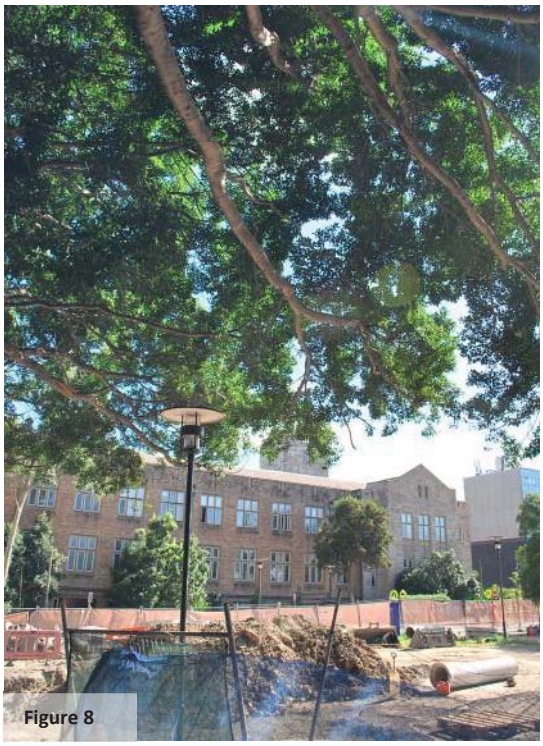

Figure 8

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Tree 505 – *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
E/NE	4.5m		<75mm	Minor pruning to achieve minimum 4.3m vertical clearance over Fisher Road and to provide building clearance.	

Tree 506 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
E	4.5m	Epicormic	25mm	Prune to main branch	9
E/NE	4.5m		<75mm	Minor pruning to achieve minimum 4.3m vertical clearance over Fisher Road and to provide building clearance.	10

Figure 9

Figure 10

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Tree 507 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
E	4.5m	3rd	300mm	Pruning to achieve minimum 4.3m vertical clearance over Fisher Road and basement access road.	11
E/NE	4.5m		<75mm	Minor pruning to achieve minimum 4.3m vertical clearance over Fisher Road and to provide building clearance.	

Figure 11

Tree 508 - *Ficus microcarpa* var. *hillii* (Hill's Weeping Fig)

Orientation of Branch	Height of Branch above Grade	Order of Branch	Branch Diameter	Comments	Figure
NE	4.5m	3rd	120mm	Pruning to achieve minimum 4.3m vertical clearance over Fisher Road.	12
E/NE	4.5m		<75mm	Minor pruning to achieve minimum 4.3m vertical clearance over Fisher Road and to provide building clearance.	12

Figure 12

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