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Arboricultural Impact Assessment

University of Sydney
Camperdown Campus
CCW Museum project

12th May 2017

C90889

ASSESSMENT & REPORT COMMISSIONED BY:

Chris Burns- Project Manager
Campus Infrastructure & Services
The University of Sydney
The Services Building G12
Sydney, NSW 2006

ASSESSMENT & REPORT PREPARED BY:

Alex Austin
Grad Cert Arb, Dip. Hort. Arb AQF Level 8
Consulting Arborist
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Consulting Arborist

12th May 2017

Chris Burns
Project Manager
Campus Infrastructure & Services
The University of Sydney
The Services Building G12
Sydney, NSW 2006

Ref: University of Sydney – CCW Museum Arboricultural Impact Assessment

Covering Letter

RE: Arboricultural Impact Assessment for Seventy-two (72) trees located adjacent to the Proposed CCW Museum development at the University of Sydney's Camperdown Campus.

Dear Chris,

We are pleased to provide you with the following Arboricultural Impact Assessment for seventy-two (72) trees within the property of the University of Sydney's Camperdown Campus in relation to the proposed Chau Chak Museum project located at the Fisher Tennis Courts site.

Complete use of this report is authorised under the conditions limiting its use as stated in Appendix A Item 7 of *"Arboricultural Reporting Assumptions and Limiting Conditions"*.

Should you have any queries relating to this report, its recommendations, or the options considered, please do not hesitate to contact us on 1300-272-671.

Regards,

Alex Austin
Dip. Hort. Arb, Grad. Cert. Arb, AQF Level 8.
Consulting Arborist

Luke Dawson
Dip. Hort. Arb, BSc Hons Bus
Consulting Arborist

Table of Contents

1 Executive Summary

1.1.1 The following Arboricultural Impact Assessment (Report) regards seventy-two (72) trees located within the University of Sydney's Camperdown Campus that may be impacted by the proposed construction of the new Chau Chak Wing Museum (CCW) within the area adjacent to the current Fisher Tennis Courts.

1.1.2 This report follows a Preliminary Arboricultural Report and Root Investigation completed by Arborsafe, dated the 2nd September 2016. Both this Arboricultural Impact Assessment and the Preliminary Arboricultural Report and Root Investigation must be used in conjunction with each other.

1.1.3 The scope of this Arboricultural Impact Assessment (AIA) report was to determine subject trees that can be retained, or require removal to facilitate the proposed development, as well as to identify and reduce potential conflicts between subject trees and site development.

1.1.4 Accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction has been provided.

1.1.5 An arborist site inspection of the subject trees was undertaken on the 13th July 2016 where tree data was collected. Tree assessment and impact data for all subject trees can be found in Appendix C.

1.1.6 Tree Retention Values have been determined based upon the assessment of the trees' health, structure, dimensions, age class, life expectancy, location and environmental amenity/ significance. For complete data on tree retention values, visual tree reference via photos and tree attributes assigned to each of the subject trees refer to the Preliminary Arboricultural Report and Root Investigation.

1.1.7 The Tree Protection Zone (TPZ) method has been derived from the Australian Standard *4970–2009: Protection of Trees on Development Sites*. The TPZ is defined as a specified area above and below ground and at a given distance measured radially away from the centre of the tree's trunk and which is set aside for the protection of its roots and crown.

1.1.8 Thirteen (13) trees were considered to have High Retention Values. Tree numbers 25, 26, 29, 33, 34, 35, 44, 51, 68, 70, 83, 85 and 86 were determined as possessing High Retention Values. As a result of the proposed development;

i. Retention Value Tree numbers 25, 26, 33, 34, 35 & 68 have no foreseeable impact from the proposed development.

ii. The High Retention Value Tree numbers 85 & 86 are within the proposed foot print and will require removal to facilitate the proposed development.

iii. The High Retention Value Tree number 44 is not impacted by the building foot print, however, the landscape concept encroaches to 56% of the TPZ. Design of the landscape surrounding this tree must be altered to reduce impacts by installing permeable surfaces above grade, avoiding level changes and by reducing the requirement for retaining wall construction.

iv. The High Retention Value tree number 83 has a 23.5 % incursion into its TPZ area which is considered to be a major encroachment. It is anticipated that if tree protection measures are adhered to during construction, a short term reduction in tree health is expected.

v. The High Retention Value Tree number 29 has a minor encroachment of 2% into its TPZ. This tree will remain viable providing tree protection measures are adhered to during construction.

vi. The High Retention Value Tree number 70 has a 6.8% incursion into its TPZ which is considered to be a minor encroachment. Tree number 70 will remain viable providing tree protection measures are adhered to during construction

vii. The High Retention Value Tree number 51 has a 9.3% incursion into its TPZ area which is considered to be a minor encroachment. This tree will remain viable providing tree protection measures are adhered to during construction.

1.1.9 Thirty-two (32) trees were considered to have Moderate Retention Values being tree numbers 21, 22, 24, 27, 30, 31, 38, 40, 42, 43, 45, 46, 47, 49, 50, 53, 56, 57, 58, 59, 60, 62, 63, 64, 65, 69, 71, 77, 78, 79, 80 and 87. As a result of the proposed development:

i. Tree numbers 38, 40, 42, 43, 78 and 79 are within the proposed development foot print and will require removal to facilitate the development.

ii. Tree number 87 is located within the construction access and material handling area and is likely to be adversely impacted and should be removed to facilitate the development's construction method.

iii. Tree number 77 has a 17.9% incursion into its root zone which is considered to be a major encroachment. Due to the fair health of this tree, this incursion is likely to add extra pressure on tree health and results in the retention of this tree becoming unviable. Tree number 77 should be removed due to the impact of the proposal.

iv. Tree numbers 57, 60, 62, 80 and 83 have minor works within their TPZ's and will remain viable providing tree protection measures are adhered to during construction.

v. Tree numbers 21, 22, 24, 27, 30, 31, 45, 46, 47, 49, 50, 53 56, 58, 59, 63, 64, 65, 69 & 71 have no foreseeable impact from the proposed development.

1.1.10 Twenty-six (26) trees were found to have Low Retention Values. Trees with a Low Retention Value are tree numbers 32, 37, 39, 41, 48, 52, 54, 55, 61, 66, 67, 72, 73, 74, 75, 81, 82, 84, 484, 1001, 1002, 1003, 1004, 1006, 1007 and 1233. As a result of the proposed development:

i. Tree numbers 37, 39, 41, 73, 75, 84 & 1006 are within the proposed foot print and will require removal to facilitate the proposed development.

ii. Tree 74 is severely impacted by the rerouting of the fiber optic communication line and requires removal to enable these works.

iii. Tree numbers 54 & 72 are able to be retained with minor works within their TPZ's and will remain viable providing tree protection measures are adhered to during construction.

iv. Tree numbers 32, 48, 52, 55, 61, 66, 67, 81, 82, 484, 1001, 1002, 1003, 1004 & 1007 have no foreseeable impact from the proposed development

1.1.11 One (1) tree was found to have significant structural issues that resulted in it possessing a Remove Retention Value. This tree should be removed irrespective of any future development on the site. The tree with a Remove Retention Value is Tree 1005.

1.1.12 Tree number 1233 is a small commemorative planting that should be transplanted.

2 Introduction

2.1.1 ArborSafe Australia Pty Ltd was engaged by Chris Burns of the University of Sydney in relation to completion of an Arboricultural Impact Assessment (AIA) report on seventy-two (72) trees that may be impacted by the proposed construction of the new Chau Chak Wing Museum (CCW) within the area adjacent to the current Fisher Tennis Courts at the University's Camperdown Campus.

2.1.2 The report has been requested as part of a Development Application (DA) for the demolition of the existing tennis courts and construction of a new multi-storey building in a similar location. This report is required to assist in the planning and design of the new development in a similar location to the existing tennis courts, being to the south of Parramatta Road, north of University Avenue and west of University Place within the University's Camperdown Campus.

2.1.3 The proposal comprises the construction of the new Chau Chak Wing Museum in the north-eastern sector of the Camperdown Campus. The proposed museum will comprise a new five level building (maximum of three storeys above ground) with central void and will include:

- Entry foyer and museum shop
- Gallery space
- CERC (Collections Education Research & Conservation Facility) space
- Collection storage and workshop areas
- Staff offices, facilities and boardroom
- Study rooms and schools education area
- A 130 seat Auditorium
- Café and terrace facilities
- Loading dock
- Plant rooms

2.1.4 The proposed works also include associated earthworks, tree removal, landscape works and augmentation to existing infrastructure and services.

2.1.5 This report follows on from a Preliminary Arboricultural Report and Root Investigation for the site completed by ArborSafe Pty Ltd in September 2016.

2.1.6 During this initial assessment and consultation, ArborSafe was engaged to undertake collection of preliminary tree data, as well as root exploration at specific locations within the site to assist in the design process. A total of nine (9) exploratory trenches were excavated around the site for the purposes of root investigation to allow informed recommendations as to building alignments in relation to significant tree roots.

3 Scope

3.1.1 Carry out a visual examination of the nominated trees located within the vicinity of the Fisher Tennis Courts at the University's Camperdown Campus.

3.1.2 Inspect the nominated trees and their growing environment in the context of a proposed development.

3.1.3 Provide an objective appraisal of the subject trees in relation to their species, estimated age, health, structural condition and viability within the landscape.

3.1.4 Based on the findings of this investigation, provide independent recommendations on the retention value of the trees.

3.1.5 Nominate subject trees that can be retained, or require removal to facilitate this development.

3.1.6 Review proposed development plans against the proposed construction methods and design. Undertake below ground investigation (root investigation) at specific locations within the site to determine the presence of roots and provide guidance in the design process based on the significance of roots identified.

3.1.7 Identify and reduce potential future conflicts between trees and site development by providing accurate information on the area required for tree protection and the restricted activities within the vicinity of each tree prior to any proposed construction taking place.

3.1.8 Provide information on restricted activities within the area nominated for tree protection, as well as suitable construction methods to be adopted during construction.

4 Methodology

4.1 Initial Assessment

4.1.1 Alex Austin and Luke Dawson of ArborSafe Australia Pty Ltd carried out a site inspection of the subject trees on the 13th July 2016.

4.1.2 The subject trees were inspected from ground level. No foliage or soil samples were taken. No aerial or internal investigations were undertaken.

4.1.3 Tree height and canopy width were estimated and have been provided to the nearest whole metre. Trunk diameter at breast height (DBH) was measured with a diameter tape and provided to the nearest centimetre.

4.1.4 Data collected on site was analysed by Alex Austin and Luke Dawson, collated into report format, and relevant recommendations were formulated.

4.2 Root investigation

4.2.1 Kane Hollstein AQF L5 Consulting Arborist of ArborSafe Australia Pty Ltd in conjunction with Australian Utilities Management carried out below ground investigation using sensitive excavation techniques (hydro-vac) at specific points within the site between the 9th-16th August 2016.

4.2.2 Nine (9) trenches were excavated to expose roots as part of this investigation. The trenches were located along the proposed preliminary building footprint with trench-lines and positions provided by The University of Sydney prior to excavation.

4.2.3 Documentation and analysis of root size, distance from trunk, depth and orientation in relation to tree species was recorded and considered during this investigation. The investigation identified potential impacts on tree health and structural stability, as well as determine if the trees would remain viable if the roots are severed to facilitate construction.

4.2.4 Data collected on site during the root investigations and all subsequent arborist site visits was analysed by Alex Austin and Luke Dawson, collated into report format, and relevant recommendations were formulated.

4.3 Tree Protection Zones

4.3.1 The Tree Protection Zone method has been derived from the Australian Standard 4970–2009: *Protection of trees on development sites*.

4.3.2 The Tree Protection Zone (TPZ) is defined as a specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown. It is the area required to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development. The radius of the TPZ is calculated for each tree by multiplying its Diameter at Breast Height (DBH) by 12. TPZ radius = DBH × 12.

4.3.3 The Structural Root Zone (SRZ) is the area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. SRZ radius = (D x 50)^0.42 x 0.64.

4.3.4 Retention values are determined based upon the assessment of the tree's health, structure, dimensions, age class, life expectancy, location and its Amenity, Heritage and Environmental significance. A breakdown of attributes required for each category can be obtained from Appendix B (Explanation of Tree Assessment Terms).

4.4 Images and site photographs

4.4.1 All photographs were taken at the time of the site inspection by the inspecting Arborist. Photographs have been altered for brightness and/or cropped only.

4.4.2 Other images used within this report have been sourced from ArborPlan or via the internet. The source of all images have been referenced accordingly.

5 Observations

5.1 Aerial Images

Figure 1: The red lines indicate approximate site boundary. All trees within this area have the potential to be impacted by the proposed development, or may be a constraint on development so therefore have been assessed & documented in this report. Source: SixMaps 2016.

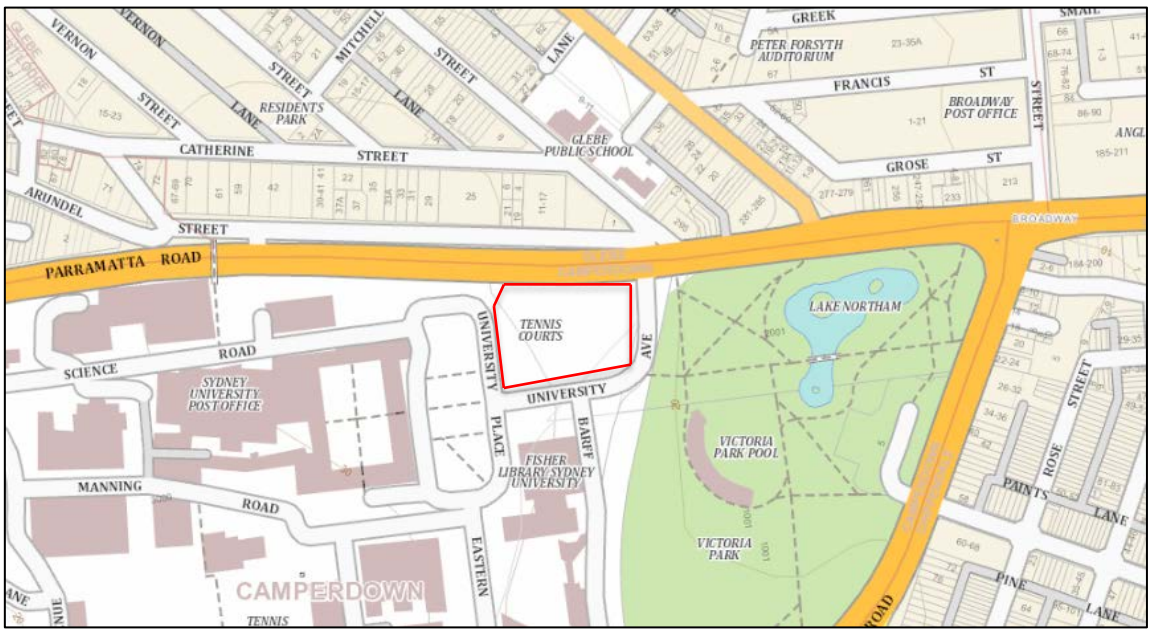


Figure 2: Plan showing property boundaries and street names. Red line delineates approximate site boundary. Source: SixMaps 2016

5.2 The Site and Surrounds

5.2.1 The development site is located to the northeast of the University's grounds adjacent to the Parramatta Road entrance, within the area currently used as the Fisher Tennis Courts site.

5.2.2 Parramatta Road runs in an approximate east to west alignment and borders the site to the north. University Place that runs in a north south direction is located to the west, beyond which is the University's main Quadrangle Building. University Avenue borders the site to the south, with Victoria Park located beyond the University grounds to the east.

5.2.3 The main portion of the site consists of three tennis courts, to the north of which is a small weatherboard tennis pavilion building. An area of lawn is located to the east of the site.

5.2.4 The northern boundary between the University campus and Parramatta Road features a retaining wall above which is a linear garden bed containing significant trees. Ground conditions of the area consist of a sloped garden bed.

5.2.5 The development site is bound on all sides by trees of varying significance.

Figure 3: Aerial view of the site showing surrounding buildings. Red shaded area shows approximate site footprint location. Source: University of Sydney, 2017

5.3 Heritage status

5.3.1 The site is within the grounds of the University of Sydney's Camperdown Campus that has significant heritage value at both a State Government and Local Government Level. The University is listed under the State Agency Heritage register.

Heritage Listing	Listing Title
Heritage Act - s.170 NSW State agency heritage register	University of Sydney

Source: Office of environment and Heritage website, 2016

5.3.2 A portion of the statement of significance in relation to the University states:

'The first University to be constructed in Australia..... The University is a heritage cultural landscape containing buildings of exceptional individual value set within a designed landscape with large areas enclosed by a historic fence. The place developed into a series of precincts each with a special character." (Office of Environment and Heritage website, 2016)

5.3.3 The specific portion of the site that forms the basis for this report is the Fisher Tennis Courts and surrounding landscape. A review of heritage information identified no specific statement relating to this portion of the site, beyond generic landscape comments made for the whole of the Camperdown Campus site.

5.3.4 The 1943 Aerial Image of Sydney has been reviewed and specific subject trees can be identified (see Fig. 4 below). The linear group of mature Port Jackson Fig Trees that are located along the southern boundary of the site adjacent to University Avenue can be identified. Further Port Jackson Fig Trees to the north, as well the Holm Oak adjacent to the most westerly tennis court also appear to be in existence when the aerial photograph was taken.

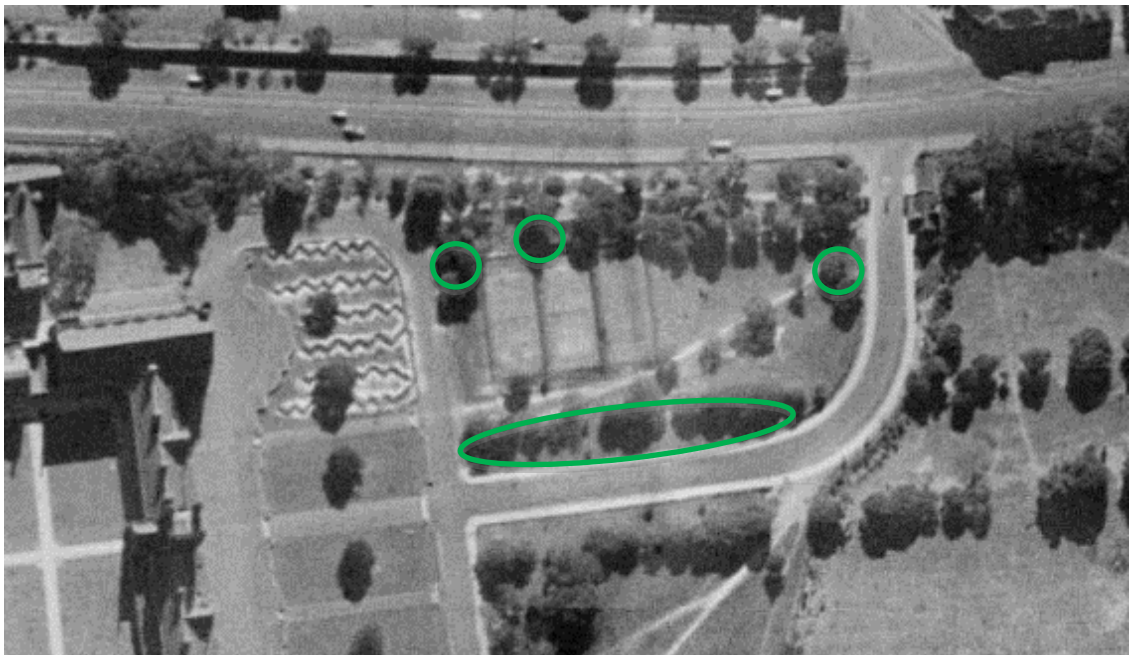


Figure 4: 1943 aerial image of Sydney. Green circles indicate likely presence of trees in existence today. Source: SixMaps 2016.

5.3.5 Trees along the Parramatta Road frontage and University Avenue are recognised at a Local Government Level through inclusion into the City of Sydney's Register of Significant Trees.

5.3.6 Trees that feature on the Significant Tree Register provide increased value to the landscape and community due to the eligibility criteria that must be met in order to be included. However, while trees that feature within a Significant Tree Register have a perceived higher significance than those trees that do not, it should be noted that there is no increased legislative protection for trees on this Significant Tree Register.

5.3.7 An extract relating to trees along Parramatta Road derived from the Significant Tree Register is provided below:

'*The row plantation along the Parramatta Road frontage (including the Footbridge precinct group) continues an important thematic planting style dating from this period. This group includes …. Port Jackson Figs (Ficus rubiginosa)…. The predominant native rainforest figs and pines are typical of many of the City of Sydney's public parks developed in the latter part of the nineteenth century. This group provides outstanding visual and aesthetic continuity, linking to Victoria Park. A more or less contiguous massing of mature, evergreen trees has been created along Parramatta Road from Broadway to the Footbridge theatre precinct.*' (City of Sydney, 2016)

5.3.8 The location of trees to the north of the site that are identified within the City of Sydney's Register of Significant Trees are provided within Figure 5 below:

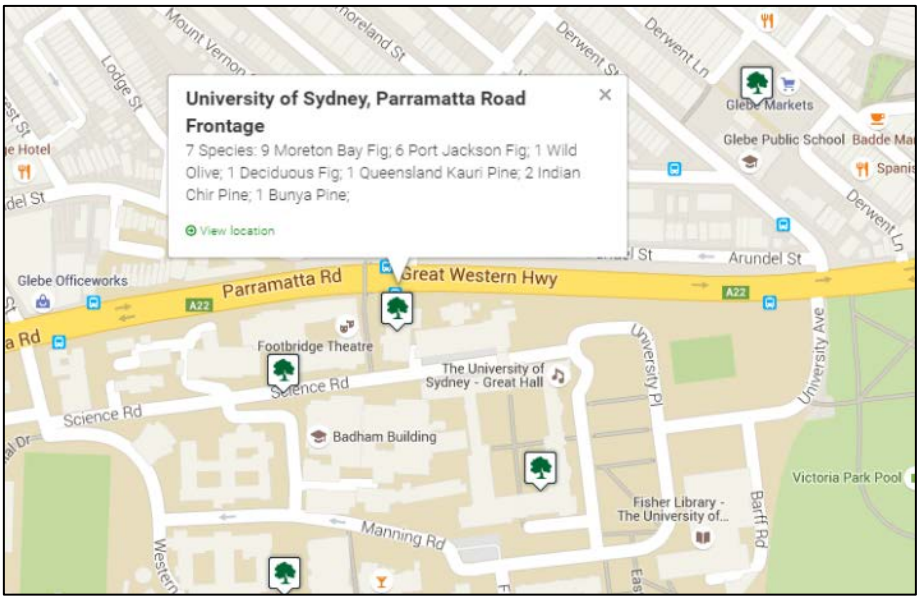


Figure 5: Aerial image showing indicative location of trees featured within the City of Sydney's Register of Significant Trees. Note that not all trees within this part of the register feature within this portion of the site and are thus not included in the report. Some of the six (6) Port Jackson Figs identified are those located along the Parramatta Road frontage. Source: City of Sydney, 2016

5.3.9 An extract relating to trees along University Avenue derived from the Significant Tree Register is provided below:

"The formal avenue planting of Port Jackson Figs (Ficus rubiginosa …) beside University Avenue is one of the great formal, single species avenues in the City of Sydney. Although these native figs are relatively small in stature (averaging 10-12 metres in height/ 10-12 metres in canopy diameter), they make a memorable contribution to the formal, structured character of this entry precinct to the University. These trees reinforce the axial geometry and define the major pedestrian linkage between Victoria Park and the Main University Building. These trees are prominent visual elements, directing and controlling the line of view and framing distant vistas of the City sky-line over Victoria Park…The formal avenue planting of Port Jackson Figs (Ficus rubiginosa …) beside University Avenue is visible in 1860 and 1880 photos. (City of Sydney, 2016)

5.3.10 The locations of trees within the southern portion of the site that are identified within the City of Sydney's Register of Significant Trees are provided within Figure 6 below:

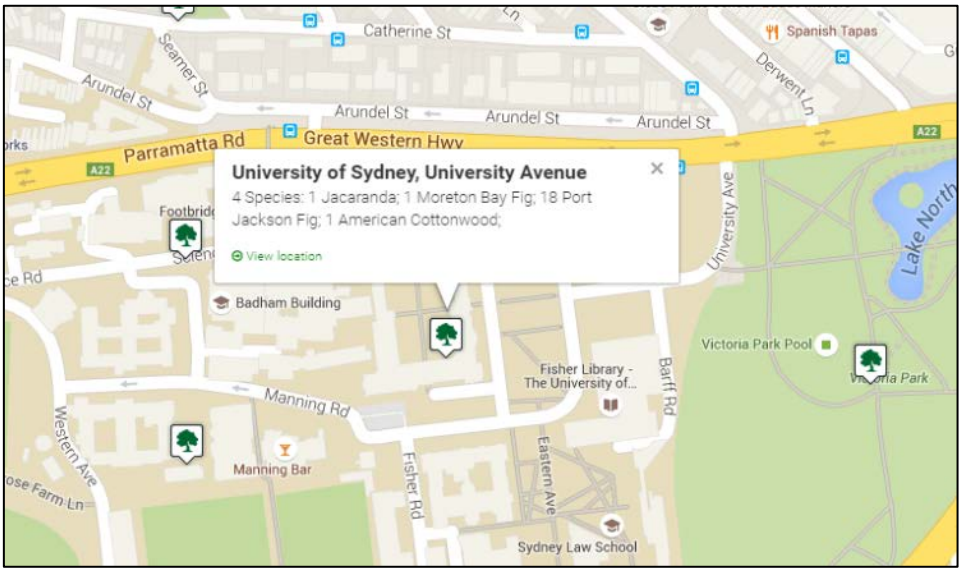


Figure 6: Aerial image showing indicative location of trees featured within the City of Sydney's Register of Significant Trees. Note that not all trees within this part of the register feature within this portion of the site and are thus not included in the report. Some of the eighteen (18) Port Jackson Figs identified are those located along University Avenue. Source: City of Sydney, 2016

Figure 7: View to east showing University Avenue bordered by significant Fig Trees. Note that only trees to the left of the photograph feature within this report. Source: Dawson, July 2016

5.4 Site Trees.

5.4.1 A total of seventy-two (72) trees were inspected and are the subject of this report. Complete attributes for each tree can be found in Appendix C (Tree Assessment Data).

5.4.2 Trees to be included in the report were detailed by the client in a project briefing email dated 4th July 2016. No trees beyond the scope outlined by the client have been inspected as part of this report.

5.4.3 All subject trees are located within the University of Sydney's Camperdown campus. No trees on adjoining properties have been inspected as part of this report.

5.4.4 The subject trees form part of the existing ArborPlan Tree Management System for the entire University Campus site and as such have been tagged, positioned on aerial imagery and visually assessed annually since 2009.

5.4.5 The subject trees have been numbered in line with the existing ArborPlan tree numbering system. Trees can be identified on site using tree tags which are typically located at approximately 2.0m from ground level on the trunk. As these tree numbers form part of a previous survey undertaken for the entire Camperdown Campus site, tree numbers are not in sequential order and range from Tree 21 to Tree 1233.

Figure 8: The 72 trees included within the report as represented in the ArborPlan Tree Management system. Note tree icon colour represents existing risk status (not Retention Value). Source: ArborPlan 2016.

6 Retention Values

6.1.1 Retention Values are determined based upon the assessment of the tree's health, structure, dimensions, age class, life expectancy, location and its Amenity, Heritage and Environmental significance. A breakdown of attributes required for each category can be obtained from Appendix B (Explanation of Tree Assessment Terms).

6.1.2 For complete data on the Retention Values, visual tree reference via photos and tree attributes assigned to the subject trees refer to the Preliminary Arboricultural Report and Root Investigation completed by ArborSafe and dated the 2nd September 2016. A summary of Tree Retention Value is provided below.

6.2 High Retention Value Trees

6.2.1 Thirteen (13) trees were considered to have High Retention Values. These trees are of a significant size in the landscape, have fair or good health and fair or good structure, have a Useful Life Expectancy (ULE) of more than 25 years, make significant amenity contributions to the landscape and have some heritage significance.

6.2.2 Trees 25, 26, 29, 33, 34, 35, 44, 51, 68, 70, 83, 85 and 86 were determined as possessing High Retention Values.

6.3 Moderate Retention Value Trees

6.3.1 Thirty-two (32) trees were considered to have Moderate Retention Values. These trees are of a Moderate size, have good/fair health and good/fair structure, have a Useful Life Expectancy (ULE) of more than 20 years, make moderate amenity contributions to the landscape, and make low/moderate environmental contributions.

6.3.2 Trees with a Moderate Retention Value are: Trees 21, 22, 24, 27, 30, 31, 38, 40, 42, 43, 45, 46, 47, 49, 50, 53, 56, 57, 58, 59, 60, 62, 63, 64, 65, 69, 71, 77, 78, 79, 80 and 87.

6.4 Low Retention Value Trees

6.4.1 Twenty-six (26) trees were found to have Low Retention Values. Trees in this category are of low significance in the landscape, may have poor health and/or structure, are easily replaceable and do not warrant design consideration.

6.4.2 Trees with a Low Retention Value are: Trees 32, 37, 39, 41, 48, 52, 54, 55, 61, 66, 67, 72, 73, 74, 75, 81, 82, 84, 484, 1001, 1002, 1003, 1004, 1006, 1007 and 1233.

6.5 Remove Retention Value Trees (None/Nil Retention Value)

6.5.1 One (1) tree was found to have significant structural issues that resulted in it possessing a Remove Retention Value (None/Nil Retention Value). This tree should be removed irrespective of any future development on the site.

6.5.2 The Tree with a Remove Retention Value is Tree 1005.

7 Proposed Construction

7.1.1 Plans of the proposed development were provided to ArborSafe for review by the Client. In summary, the proposal comprises the construction of the new Chau Chak Wing Museum in the north eastern sector of the Camperdown campus. The proposed museum will comprise a new five level building (maximum of three storeys above ground) with central void and will include:

- Entry foyer and museum shop
- Gallery space
- CERC (Collections Education Research & Conservation Facility) space
- Collection storage and workshop areas
- Staff offices, facilities and boardroom
- Study rooms and schools education area
- A 130 seat Auditorium
- Café and terrace facilities
- Loading dock
- Plant rooms

7.1.2 The proposed works also include associated earthworks, tree removal, landscape works and augmentation to existing infrastructure and services.

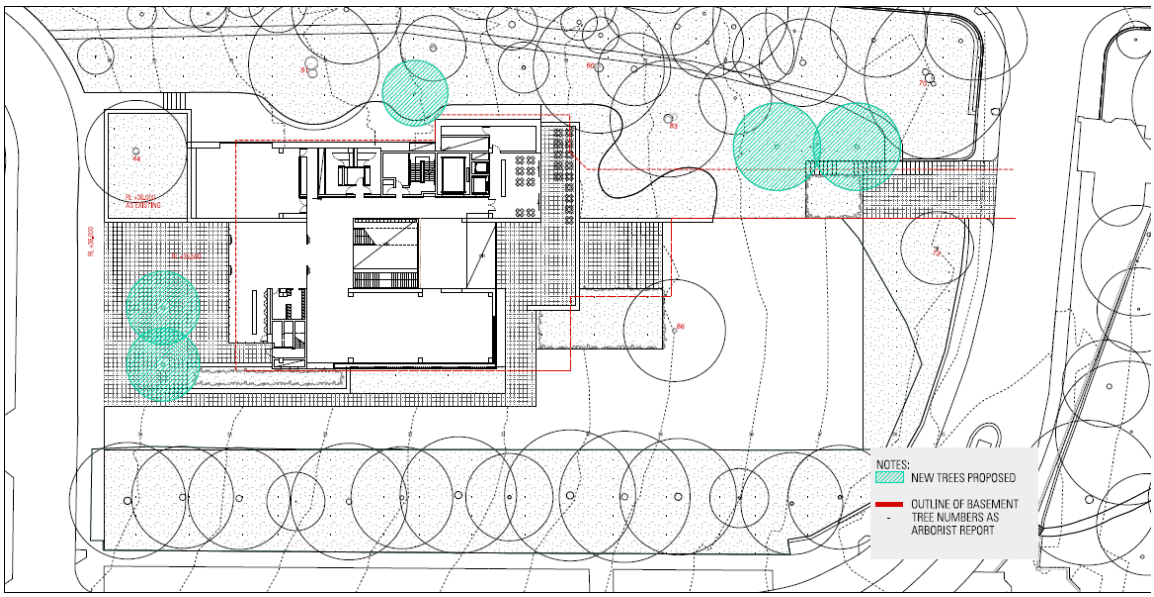


Figure 9: Excerpt from Basement Extent Plan (JPW-SK-0127) showing proposed building location and alignment of basement edge. New trees proposed are indicative only and the final landscape design may differ from the image above. Source: JPW Architects, 30.03.2017

7.2 The Project

7.2.1 The Project Proposal involves the co-location and consolidation of the Macleay Museum, Nicholson Museum and University Art Gallery as well as collections from a number of currently different buildings and locations into a new single museum building to be known as the Chau Chak Wing Museum. Currently, the University's museums, galleries and collections are significantly fragmented and located in numerous buildings.

7.2.2 At the heart of the project is the University vision to:

- Upgrade the quality of Museum and Gallery facilities to promote object based learning and research.
- Create teaching and research space that can be shared across all faculties.
- Consolidate collections to promote education, research and conservation.
- Recognise and celebrate Aboriginal significance.
- Develop a healthy and sustainable Campus environment.
- Ensure equitable access to and through Campus.
- Respect the heritage “Sandstone University” significance.

The new museum building will be a five level facility comprising of:

- Gallery space;
- CERC (Collections Education Research & Conservation Facility) space;
- Collection storage and workshop areas;
- Staff offices, facilities and boardroom;
- Project and study rooms;
- A 200 seat Auditorium;
- Restaurant, café and terrace facilities;
- Loading dock;
- Plant rooms

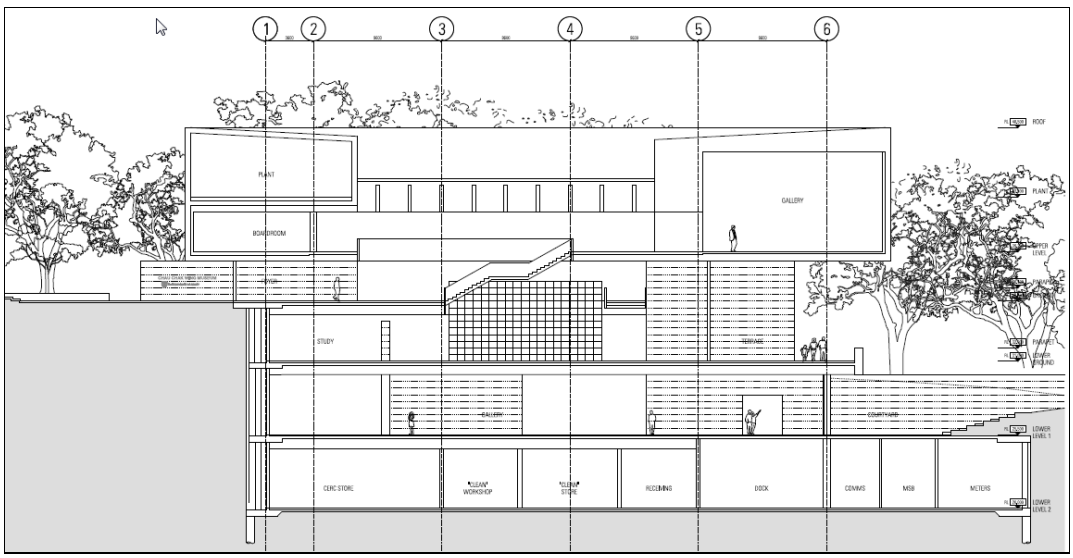


Figure 10: Excerpt from Option 11 Section Plan (JPW-SK-1000) showing proposed building floors and alignment. Source: JPW Architects, 10.02.2017

8 Tree Protection Zone (TPZ) Encroachment

8.1 Major and Minor encroachment

8.1.1 An encroachment of up to 10% of the Tree Protection Zone (TPZ) area is deemed a minor encroachment by the Australian Standard AS 4970:2009 *Protection of trees on building sites.* If the proposed encroachment is less than 10% of the area of the TPZ and is outside the Structural Root Zone (SRZ), detailed root investigations should not be required.

8.1.2 An encroachment of more than 10% of the TPZ area is deemed a major encroachment by the AS 4970:2009 *Protection of trees on building sites.* If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ the project arborist (an assigned AQF Level 5 Arborist) must demonstrate that the trees would remain viable.

8.1.3 Wherever TPZ encroachment has been determined to be tolerable and included within the design, alternative space has been allowed elsewhere around the tree for future root development. For example: if a tree were to sustain a 10% incursion across its TPZ (area) to the west, additional root space to the same 10% (area) should be allowed beyond the eastern, southern or northern TPZ to offset the initial loss of area.

8.1.4 The external building wall boundary within the site (red hatched line in Figure 11) has been used to determine the incursions to root zones.

Figure 11: Excerpt from Tree Protection Plan (ASTPP01 Rev 2 03/05/2017) showing proposed building footprint in relation to site trees. Source: ArborSafe, May 2017

9 Arboricultural Impact

9.1 Landscape works

9.1.1 The impact of landscape works has not been reviewed as part of this report. No plans detailing the design or construction type have been provided.

9.1.2 ArborSafe have been informed that landscape works will remain flexible to ensure tree retention and viability remains as a result of both “soft” and “hard” landscape works.

9.1.3 ArborSafe have advised that all landscape works need to be above grade, have permeable properties and have to have Arborist approval prior to installation.

9.2 Enabling Works

9.2.1 To facilitate this development enabling works including the installation of underground services at various locations around the site are required. Information received on behalf of the client indicates the following works will be undertaken as part of this development:

i. An electrical substation kiosk is to be located to the north-west of the proposed building.
ii. A gas main, the location of which is to be confirmed.
iii. A sewer main is to be located to east of the site.
iv. Stormwater and improved OSD requirements including 50 cubic metre detention pond.

9.2.2 Given the locations and details of the above named enabling works are yet to be finalised, no assessment of the impact of these works upon site trees has been undertaken in the preparation of this report.

9.3 Fibre Optic Cable Rerouting

9.3.1 The major communications currently supplying the University run through the middle of the site and require rerouting if the proposal is to proceed.

9.3.2 Confirmation of the indicative service location has been completed onsite using a locating device as per Figure 12 below.

9.3.3 The installation of an access pit and subsequent rerouting of the fibre optic cable will require the removal of one (1) low retention value tree being tree number 74.

9.3.4 Hydro excavation and sensitive installation of the conduit will occur within the root zone of the High Retention value tree number 70. These works are expected to have no impact on the health and condition of Tree number 70.

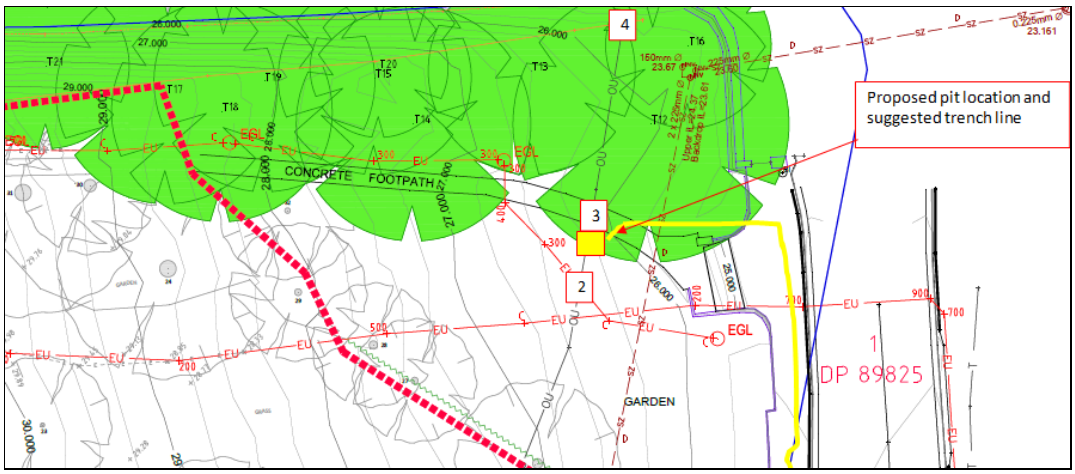


Figure 12: Excerpt from plan showing current location of fibre optic cable and proposed pit locations (between 2 & 4) and rerouting marked by the yellow line. Source: USYD, C. Burns, 21/04/2017

9.4 Impact to High Retention Value Trees

9.4.1 Tree numbers 25, 26, 33, 34, 35 & 68 have no foreseeable impact from the proposed development.

9.4.1 Trees 85 & 86 are High Retention Value trees are within the proposed development footprint and will require removal.

9.4.2 Tree 83 has a 23.5 % incursion into its TPZ area which is considered to be a major encroachment.

i. Tree 83 has a TPZ of 15.0m and SRZ of 4.0m measured as a radial distance.

ii. Exploratory root investigation indicated that roots were present along this alignment albeit 1.0m further from the trunk at the southern end and 2.4m further from the trunk at the northern end. The location of the exploratory trench was determined based on preliminary design.

iii. Exploratory trench 9 was located 7.87m to the south from the trunk at its closest point and 10.5m to the southwest at its furthest point. The proposed construction is located 1.0m closer to trunk at the location of the major (root 7) identified in the exploratory excavation. It is unlikely that there would be significant variation in the root size and quantity due to this limited distance estimated to a further 3.8% encroachment by area into the TPZ.

iv. The location of the root system of tree number 81 is likely to have restricted the root development of tree number 83 in this area due to competition.

v. The impacts to the root system of tree number 83 would at a minimum result in the severance of ten (10) roots as observed in Trench 9. Two (2) roots of significance ranging between 120-130mm diameter are included in this encroachment.

vi. Development at the proposed excavation line is considered tolerable and a minor short term loss in tree health is expected. Tree 83 can be retained with a minor effect on tree health considered likely in the short term, providing sensitive construction practices and tree protection measures are adhered to during construction

vii. Minor pruning of the south-western corner of the canopy may be required for construction access.

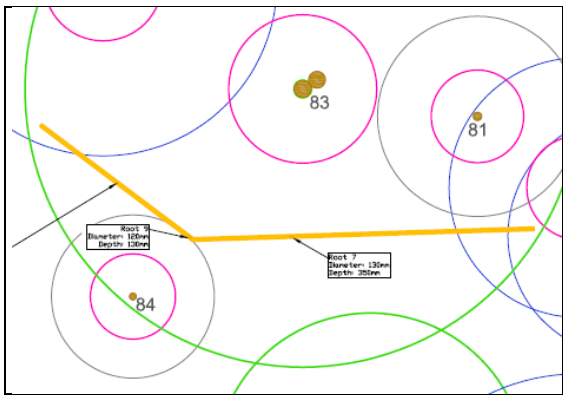


Figure 13: The location of Trench 9**.** Source: Preliminary Arboricultural Report and Root Investigation completed by ArborSafe and dated the 2nd September 2016, Appendix F Root Investigation Plan.

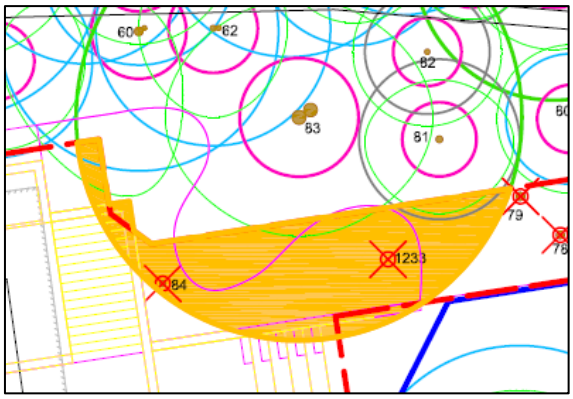


Figure 14: The proposed 23.8% incursion into the TPZ of Tree 83**.** Source: Tree Protection Plan

9.4.3 Tree 70 has a minor encroachment into its TPZ, which is estimated to be 6.8% of the total TPZ area.

i. The TPZ of this tree is considered to be skewed due to the location of existing structures (paths and retaining walls) within the site that are likely to have restricted root development to the north.

ii. The rerouting of the fibre optic cable described in Section 9.3 will occur within the root zone of tree number 70. Hydro excavation, sensitive conduit installation and arborist supervision will result in no impact to the health and structure to this tree.

iii. Tree 70 can be retained providing tree protection measures are adhered to during construction.

9.4.4 Tree 51 has a minor encroachment into its TPZ, which is estimated to be 9.3% of the total TPZ area.

i. Tree 51 can be retained providing tree protection measures are adhered to during construction.

9.4.5 Tree 29 has a minor encroachment into its TPZ, which is estimated to be 2.0% of the total TPZ area.

ii. Tree 29 can be retained providing tree protection measures are adhered to during construction.

9.4.6 Tree 44 has a 56.1 % incursion into its TPZ area which is considered to be a major encroachment.

i. Tree 44 has a TPZ of 10.4m and SRZ of 3.3m measured as a radial distance.

ii. The building foot print encroachment is 0% and therefore, the design and placement of the proposed building layout does not impact upon this tree.

iii. The landscape concept provides an incursion of 56.1% which is a major and detrimental impact to tree number 44.

iv. Roots under the existing pavement to the west are unlikely to be impacted if the existing surfaces remain in situ.

v. The path through the root zone also provides for root protection and it should be incorporated into the design.

vi. This tree is only retainable through landscape design change that incorporates flexible pier and beam footings (for all surrounding walls), no level changes and permeable pavement surfaces above existing grade.

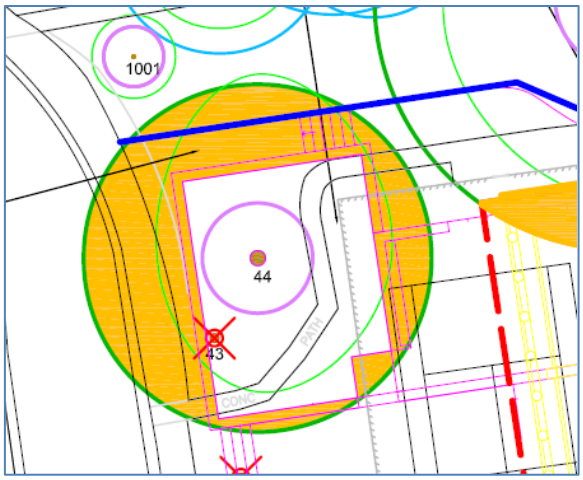


Figure 15: The proposed 56.1% incursion into the TPZ of Tree 83 due to landscape works**.** Source: Tree Protection Plan

9.5 Impact to Moderate Retention Value Trees

9.5.1 Tree numbers 21, 22, 24, 27, 30, 31, 45, 46, 47, 49, 50, 53 56, 58, 59, 63, 64, 65, 69 & 71 have no foreseeable impact from the proposed development.

9.5.2 Tree numbers 38, 40, 42, 43, 78 & 79 are Moderate Retention Value trees within the proposed development footprint and will require removal to facilitate this development.

9.5.3 Tree number 87 is located within the middle of the construction access and materials handling area and its removal is required to enable this construction plan.

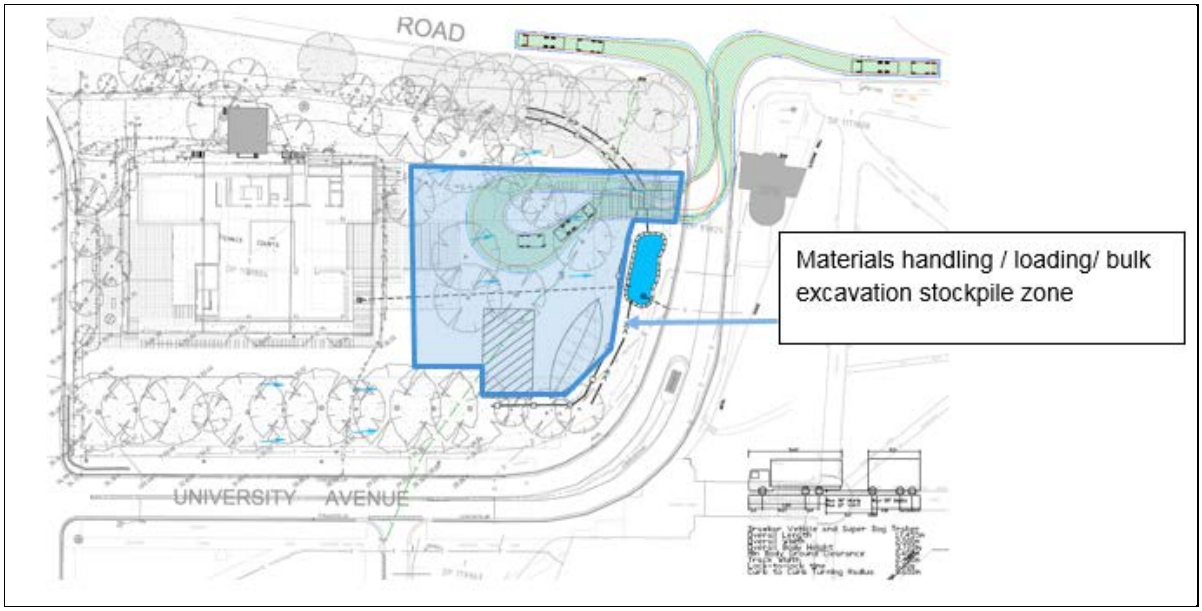


Figure 16: The proposed materials handling and construction access that results in the required removal of tree number 87**.** Source: Draft Construction Management Plan, April 2017

9.5.4 Tree 77 has a 17.9 % incursion into its TPZ area which is considered to be a major encroachment.

i. Tree 51 has a TPZ of 15.0m and an SRZ of 4.2m measured as a radial distance.

ii. As the tree is in reduced health, this major encroachment is likely to add further pressure to tree health making retention unviable.

9.5.5 Tree numbers 57, 60, 62, 80 and 83 have minor incursions within their TPZ's and will remain viable providing tree protection measures are adhered to during construction.

9.6 Impacts to Low Retention Value Trees

9.6.1 Tree numbers 32, 48, 52, 55, 61, 66, 67, 81, 82, 484, 1001, 1002, 1003, 1004 & 1007 have no foreseeable impact from the proposed development.

9.6.2 Tree numbers 37, 39, 41, 73, 75, 84 & 1006 are within the proposed building footprint and will require removal to facilitate the development.

9.6.3 Tree number 74 requires removal to permit the rerouting of the fibre optic cable.

9.6.4 Tree numbers 54 & 72 are able to be retained with minor works within their TPZ's and will remain viable providing tree protection measures are adhered to during construction.

9.7 Impacts to Remove Retention Value (None/Nil Retention Value) Trees

9.7.1 One (1) tree was found to have significant structural issues that resulted in it possessing a Remove Retention Value. This tree should be removed irrespective of any future development on the site. The tree with a Remove Retention Value is Tree 1005.

10 Recommendations

10.1 Tree Removal

10.1.1 Eighteen (18) trees would require removal to facilitate this development. Trees that will require removal include:

i. High Retention Value tree numbers 85 and 86.
ii. Moderate Retention Value tree numbers 38, 40, 42, 43, 77, 78, 79 & 87.
iii. Low Retention Value tree numbers 37, 39, 41, 73, 74 75, 84 & 1006.
iv. Remove retention value tree number 1005 should also be removed due to its condition.

10.2 Tree Retention

10.2.1 Fifty-four (54) trees are retainable under the proposed design.

10.2.2 All trees to be retained require protection during the demolition and construction stage. Tree protection should be applied in the form of:

- Restricted activities within the TPZ
- Protective fencing
- Trunk and ground protection
- Tree protection signage
- Involvement from the project arborist
- Project milestones
- Compliance reporting

10.3 Tree transplanting

10.3.1 Tree number 1233 is a small commemorative planting that should be transplanted elsewhere on site.

10.4 Enabling Works

10.4.1 Details of the required enabling works must be assessed by the site arborist and impacts to trees nominated for retention must be minimised.

10.5 Works within TPZ's of trees to be retained

10.5.1 All works within TPZ's of trees to be retained must be approved and supervised by the Project Arborist.

10.6 Demolition

10.6.1 Where demolition access into the TPZ of trees cannot be avoided, the root zone of each tree must be protected using either steel plates or rumble board strapped over mulch/aggregate until such a time as permanent above ground fencing is to be installed.

10.6.2 Demolition of existing structures to the centre of the site will be required to facilitate the project. All demolition within the TPZ's of trees would need to be supervised by the Project Arborist.

10.6.3 Demolition of the structure within the TPZ of Tree number 51 must not include the use of heavy plant within the TPZ. A small (<3 ton) rubber tracked excavator may be used within the TPZ with Arborist supervision, providing suitable ground protection is installed prior to works.

10.7 Proposed construction methods

10.7.1 The use of pilling equipment must consider and avoid impact with the canopies of trees to be retained.

10.7.2 If over excavation is required approval must be sort from the Project Arborist.

10.8 Crown protection

10.8.1 The protection of tree canopies during lifting operation is mandatory and tree canopies must be depicted on any lift plans and when considering site crane placement.

10.8.2 Lifting loads near the crowns of trees to be retained should be supervised.

10.8.3 Damaged branches must be reported to the site arborist.

10.8.4 Branches within lifting zones should be wrapped.

10.9 Excavation

10.9.1 Excavation around TPZ edges must be supervised and roots are to be identified and cut cleanly.

10.9.2 The excavation face of exposed TPZ's must have hessian or shade mesh pegged to the exposed soil to prevent the TPZ drying out.

10.10 Root severance

10.10.1 Root must be cut with sharp saw or secateurs by the Project Arborist to prevent tearing and to minimise wound size.

10.10.2 Roots should be cut early in the excavation plan to prevent unnecessary root damage.

10.11 Protective Fencing Specification

10.11.1 Protective fencing is to be installed as per the blue line on the tree protection plan. Fencing should be erected as per the image below before any machinery or materials are brought into site and before commencement of works (including demolition).

10.11.2 Once erected, protective fencing must not be removed or altered without approval from the project arborist. The TPZ fencing should be secured to restrict access.

10.11.3 Tree Protection Zone fencing is to be a minimum of 1.8m high and mesh or wire between posts must be highly visible. Fence posts and supports should have a diameter greater than 20mm and should ideally be freestanding, otherwise located clear of the roots. See image below.

10.11.4 Tree protection fencing must remain intact throughout all proposed construction works and must only be dismantled at project conclusion. The temporary dismantling of tree protection fencing must only be carried out with the authorisation of a consulting arborist and/or the responsible authority.

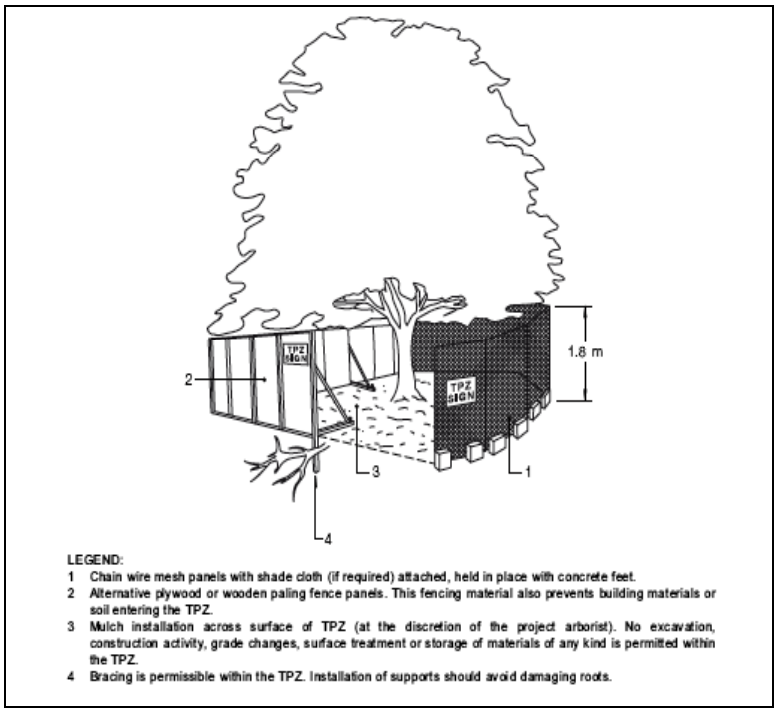


Figure 17: Showing example of tree protection fencing. Source: AS4970-2009 Protection of trees on development sites.

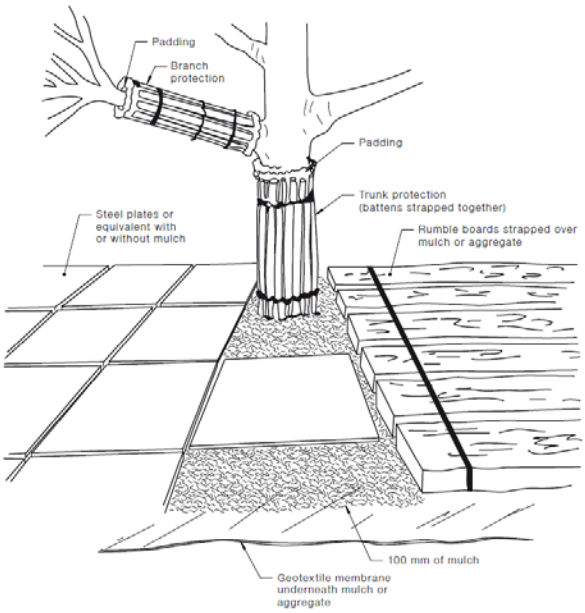
10.12 Trunk and ground protection

10.12.1 Trunk protection must be installed on trees in close proximity to the construction zone. Trunk and ground protection should be undertaken in line with AS4790 2009 as per the image below and installed prior to the commencement of works and remain in place until after construction works have been completed.

10.12.2 Given that proposed works are often within the TPZs of retained trees, standard protective fencing may not always be a viable method of protection. In these areas trunk protection and ground protection should be installed prior to the commencement of works and remain in place until after construction works have been completed.

10.12.3 Where construction access into the TPZ of retained trees cannot be avoided, the root zone of each tree must be protected using either steel plates or rumble board strapped over mulch/aggregate until such a time as permanent above ground surfacing (cellular confinement system or similar) is to be installed.

10.12.4 Trunk and ground protection should be undertaken in line with the *Australian Standard AS 4790 2009 Protection of Trees on Development Sites* as per the image below:



NOTES:

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

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

Figure 18: Depicts trunk and ground protection techniques. Source AS 4970:2009

10.13 Activities prohibited within the TPZ's

1. Machine excavation including trenching
2. Storage
3. Preparation of chemicals, including cement products
4. Parking of vehicles and plant
5. Refuelling
6. Dumping of waste
7. Wash down and cleaning of equipment
8. Placement of fill
9. Lighting of fires
10. Soil level changes
11. Temporary or permanent installation of utilities and signs
12. Physical damage to the tree

10.14 Tree Protection Signs

10.14.1 Signs identifying the TPZ should be placed at 10m intervals around the edge of the TPZ and should be visible from within the development site.

Figure 18: Depicts standard fencing techniques. Source AS 4970:2009

10.15 Underground Services

10.15.1 An investigation as to the location, condition and size of underground services should also be undertaken and plotted on drawings. Any utility that needs replacement or upgrading, which is located within the TPZ of a tree appropriate for retention should be identified at the design stage.

10.16 Additional excavation/trenching within TPZs

10.16.1 In the event additional excavation is required within the TPZs of retained trees identified within this report, or any other site trees, arborist involvement will be required to ensure works are undertaken in accordance with the Australian Standard *AS4970:2009 Protection of Trees on Development Sites.*

10.17 Project Arborist

10.17.1 An official "Project Arborist" should be commissioned to oversee the tree protection, any works within the TPZ's and complete regular monitoring compliance certification.

10.17.2 The project arborist should have minimum five (5) years industry experience in the field of consulting arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and Diploma level qualifications in arboriculture - AQF Level 5.

10.17.3 Inspections should be conducted by the Project Arborist at several key points during the construction works in order to ensure that protection measures are being adhered to during specific construction stages and any decline in tree health, or additional remediation measures can be identified.

10.18 Project Milestones

10.18.1 The following actions or project milestones were recommended as to when on-site tree inspection by the Project Arborist and subsequent compliance reporting is required:

- Following the installation of the TPZ fencing.
- During any earthworks or demolition within the TPZ of trees marked for retention.
- Every three months during the project.
- At the practical completion of the project.

10.19 Condition Reporting

10.19.1 Following each inspection, the Project Arborist shall prepare a condition report detailing the condition of the trees. These reports should certify whether the works have been completed in compliance with the 'conditions of consent' relating to tree protection.

10.19.2 These reports should contain photographic evidence where required to demonstrate that the work has been carried out as specified.

10.19.3 Matters to be monitored and included in these reports should include tree condition, tree protection measures and impact of site works which may arise from changes to the approved plans.

10.19.4 The condition reports shall be submitted to the Project Manager (as well as the clients' nominated representative) following each inspection.

10.19.5 Any non-compliance must be identified and detailed within the condition reports which shall be submitted to the Project Manager (as well as the clients' nominated representative) if tree protection conditions have been breached. Condition reports should contain clear remedial action specifications to minimise any adverse impact on the affected subject tree/s.

10.20 Offset Tree Planting

10.20.1 Offset planting should reflect the number of trees removed and the initial loss of amenity and biomass. New trees should be of long term potential and sourced from a reputable supplier.

10.20.2 Replacement tree species must suit their location on the site in terms of their potential physical size and their tolerance(s) to the surrounding environmental conditions.

10.20.3 To avoid unethical or unprofessional tree selection and/or their placement within the landscape, replacement tree species must be selected in consultation with a consulting arborist, who can also assist in implementing successful tree establishment techniques.

11 References

- Standards Australia, 2009, *AS:4970-2009 Protection of Trees on Development Sites*, Standards Australia, G.P.O. Box 476, Sydney, New South Wales, 2001.
- Register of Significant Trees, 2016, City of Sydney
- NSW Government Office of Environment and Heritage, 2015, Website

12 Appendices

12.1 Appendix A – Arboricultural Reporting Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownership of any property are assumed to be good. No responsibility is assumed for matters legal in character.
2. It is assumed that any property/project is not in violation of any applicable codes, ordinances, statutes or other government regulations.
3. Care has been taken to obtain all information from reliable sources. All data has been verified in so far as possible, however, the consultant can neither guarantee nor be responsible for the accuracy of the information provided by others.
4. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.
5. Loss or alteration of any part of this report invalidates the entire report.
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone but the person to whom it is addressed, without the prior written consent of the consultant.
7. Neither all nor any part of the contents of this report, nor any copy thereof, shall be used for any purpose by anyone but the person to whom it is addressed, without the written consent of the consultant. Nor shall it be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the written consent of the consultant.
8. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
9. Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys unless expressed otherwise.
10. Information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection.
11. Inspection is limited to visual examination of accessible components without dissection, excavation or probing. There is no warranty or guarantee expressed or implied that the problems or deficiencies of the plants or property in question may not arise in the future.

12.2 Appendix B – Explanation of Tree Assessment Terms

Tree name: Provides the botanic name, (genus, species, sub-species, variety and cultivar where applicable) in accordance with the International Code of Botanical Nomenclature (ICBN), and an accepted common name.

Age: Refers to the life cycle of the tree.

Category	Description
Young	Tree is small in terms of its potential physical size and has not reached its full reproductive ability, may have been recently planted.
Semi-mature	Tree in active growth phase of life cycle and not yet attained an expected maximum physical size for its species and/or its location.
Mature	Tree has reached an expected maximum physical size for the species and/or location and is showing a reduction in the rate of seasonal extension growth.
Senescent	Tree is approaching the end of its life cycle and is exhibiting a reduction in vigour often evidenced by natural deterioration in health and structure.

Health: Summarises the health and vigour of the tree.

Category	Description
Excellent	Canopy full with even foliage density throughout, leaves are entire and are of an excellent size and colour for the species with no visible pathogen damage. Excellent growth indicators, e.g. seasonal extension growth. Exceptional specimen.
Good	Canopy full with minor variations in foliage density throughout, leaves are entire and are of good size and colour for the species with minimal or no visible pathogen damage. Good growth indicators, none or minimal deadwood.
Fair	Canopy with moderate variations in foliage density throughout, leaves not entire with reduced size and/or atypical in colour, moderate pathogen damage. Reduced growth indicators, visible amounts of deadwood, may contain epicormic growth.
Poor	Canopy density significantly reduced throughout, leaves are not entire, are significantly reduced in size and/or are discoloured, significant pathogen damage. Significant amounts of deadwood and/or epicormic growth, noticeable dieback of branch tips, possibly extensive.
Dead	No live plant material observed throughout the canopy, bark may be visibly delaminating from the trunk and/or branches.

Structure: Summarises the structure of the tree from root to crown.

Category	Description
Good	Sound branch attachments with no visible structural defects e.g. included bark or acute angled unions. No visible wounds to the trunk and/or root plate. No fungal pathogens present.
Fair	Minor structural defects present e.g. apical leaders sharing common union(s). Minor damage to structural roots. Small wounds present where decay could begin. No fungal pathogens present.
Poor	Moderate structural defects present, including bifurcations with included bark with union failure likely within 0-5 years. Wounding evident with cavities and/or decay present Damage to structural roots.
Hazardous	Significant structural defects with failure imminent (3-6 months). Defects may include active splits and/or partial branch or root plate failures. Tree requires immediate arboricultural works to alleviate the associated risk.

Useful Life Expectancy (ULE): Useful life expectancy refers to an expected period of time the tree can be retained within the landscape before its amenity value declines to a point where it may detract from the appearance of the landscape and/or becomes potentially hazardous to people and/or property. ULE values consider tree species, current age, health, structure and location. ULE values are based on the tree at the time of assessment and do not consider future changes to the tree's location and environment which may influence the ULE value.

Category:
0-5 Years
5-10 Years
10-20 Years
20-30 Years
30-50 Years
>50 Years

Retention Value: Refers to a combination of tree attributes including health, structure and form and also considers suitability of the tree in the context of the landscape.

Category	Description
High	Tree displays good or better health and structure characteristics, is ideally suited to its location, provides a significant level of amenity and has the potential to become a long term component of the landscape. Design modifications will be required to ensure the successful retention of the tree.
Moderate	Tree displays fair or better health and structure characteristics, is well suited to its location, provides a moderate level of amenity and has the potential to become a medium to long term component of the landscape. Reasonable efforts should be made to ensure the successful retention of the tree.
Low	Tree displays poor health and structure characteristics and/or is a young and easily replaceable specimen and/or is inappropriate for its location and/or provides a low level of amenity. Design modifications will not be required.
None	A dead tree and/or a tree with severe structural defects that cannot be corrected through modern arboricultural practices and/or a recognised weed species.

12.3 Appendix C - Tree Assessment Data

Tree No.	Botanical Name	Common Name	Health	Structure	Age	TLE	Defects	Significance	Action	Current Risk	Height (m)	DRC (cm)	DBH (cm)	Crown North (m)	Crown South (m)	Crown East (m)	Crown West (m)	Significance	Arborist comments	TPZ (m)	SRZ (m)	Retention Value	TPZ Encroachment	Impact	Recommendation
21	*Ficus rubiginosa*	Port Jackson Fig	Fair	Fair	Semi-Mature	>50	Co-dominant stems; Dieback; Wound(s)	Attractive landscape feature; Amenity value/shade; Unique location	Formative pruning; Plant health care; Uplift for pedestrian access	Low	5-10	55	52	8	8	8	7	Moderate		6.2	2.6	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
22	*Ficus rubiginosa*	Port Jackson Fig	Good	Good	Semi-Mature	>50		Attractive landscape feature; Amenity value/shade; Unique location	Formative pruning	Very Low	5-10	46	44	8	8	8	4	Moderate		5.3	2.4	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
24	*Ficus obliqua*	Small-leaved Fig	Fair	Fair	Mature	25-50	Included bark; Pests/Insects; Co-dominant stems; Dieback; Epicormic growth; Previous failures; Wound(s)	Attractive landscape feature; Amenity value/shade; Unique location	Monitor; Plant health care	Low	10-15	120	120	10	11	3	9	Moderate	Rework lopped branches. Remove crossed branches. Quarterly treatments with Seasol recommended. Monitor growth response to treatments.	14.4	3.6	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
25	*Ficus rubiginosa*	Port Jackson Fig	Good	Good	Mature	>50	Wound(s); Epicormic growth; Previous failures	Amenity value/shade; Attractive landscape feature; Unique location		Low	15-20	102	84	10	9	6	8	High	Rework lopped branches. Remove crossed branches. Quarterly treatments with Seasol recommended. Monitor growth response to treatments.	10.1	3.3	High	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
26	*Ficus obliqua*	Small-leaved Fig	Good	Fair	Mature	>50	Wound(s); Epicormic growth; Previous failures	Attractive landscape feature; Amenity value/shade; Unique location		Low	10-15	115	108	10	8	7	7	High		13.0	3.5	High	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
27	*Ficus obliqua*	Small-leaved Fig	Good	Fair	Semi-Mature	>50	Dead wood in canopy; Suppressed; Wound(s)	Amenity value/shade	Remove deadwood/stubs	Medium	10-15	56	42	7	8	5	1	Moderate	Good wound wood development surrounding basal wound.	5.0	2.6	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
29	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	>50	Dead wood in canopy; Epicormic growth; Co-dominant stems; Wound(s)	Attractive landscape feature; Amenity value/shade; Unique location	Uplift for pedestrian access; Remove deadwood/stubs	Medium	10-15	130	118	10	11	9	8	Moderate	Medium deadwood remains.	14.2	3.7	High	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ.
30	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	>50	Wound(s);Co-dominant stems; Dead wood in canopy; Epicormic growth; Poor pruning; Previous failures	Attractive landscape feature; Amenity value/shade; Unique location	Crown uplift; Remove deadwood/stubs	Low	10-15	67	70	12	10	5	8	Moderate	Remove crossed branches. Minor beetle damage observed. Lift to 2.5m over lawn.	8.4	2.8	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
31	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	25-50	Previous failures; Dead wood in canopy; Wound(s)	Attractive landscape feature; Amenity value/shade	Remove deadwood/stubs; Uplift for pedestrian access	Medium	10-15	89	65	9	9	5	7	Moderate	Uplift over lawn to 2.5m Minor beetle damage observed. Remove branch south side with crack/split.	7.8	3.2	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
32	*Ficus obliqua*	Small-leaved Fig	Fair	Poor	Semi-Mature	15-25	Suppressed; Epicormic growth	Amenity value/shade		Very Low	<5	24	17	4	6	3	6	Low		2.0	1.8	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
33	*Ficus rubiginosa*	Port Jackson Fig	Fair	Fair	Mature	25-50	Dead wood in canopy; Dieback; Previous failures; Excessive end weight; Wound(s)	Attractive landscape feature; Amenity value/shade	End weight reduction; Remove deadwood/stubs; Crown uplift	Medium	15-20	94	84	10	7	8	6	High	Uplift over lawn to 2.5m. Reduce large low branch over #32 back to first sub branch over lawn. Health - minor dieback. Quarterly treatments with Seasol recommended. Monitor growth response to treatments and tree health.	10.1	3.2	High	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
34	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	>50	Dead wood in canopy; Epicormic growth; Wound(s)	Attractive landscape feature; Amenity value/shade	Remove selective branches; Remove deadwood/stubs; Uplift for pedestrian accessMonitor; Plant health care	Medium	15-20	100	96	9	7	7	6	High	Remove rubbing branches smaller than 50mm diameter.	11.5	3.3	High	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
35	*Ficus rubiginosa*	Port Jackson Fig	Fair	Fair	Mature	25-50	Dieback; Wound(s); Co-dominant stems; Epicormic growth; Previous failures	Attractive landscape feature; Amenity value/shade; Unique location	Monitor; Plant health care	Medium	10-15	112	110	11	8	7	11	High	Health - minor dieback. Quarterly treatments with Seasol recommended. Monitor growth response to treatments and tree health.	13.2	3.5	High	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
37	*Tristaniopsis laurina*	Kanooka	Good	Good	Semi-Mature	>50		Amenity value/shade		Very Low	<5	21	19	2	2	2	2	Low		2.3	1.7	Low	Within foot print	Remove	Remove tree to facilitate development
38	*Tristaniopsis laurina*	Kanooka	Good	Good	Mature	25-50	Epicormic growth; Co-dominant stems; Dieback	Amenity value/shade		Very Low	5-10	56	60	5	5	5	5	Moderate		7.2	2.6	Moderate	Within foot print	Remove	Remove tree to facilitate development
39	*Tristaniopsis laurina*	Kanooka	Fair	Fair	Mature	10-15	Dieback; Dead wood in canopy; Epicormic growth	Amenity value/shade	Plant health care; Remove deadwood/stubs; Monitor	Low	5-10	37	35	5	5	5	5	Low	Deadwood has built up.Quarterly treatments with Seasol recommended. Monitor growth response to treatments.	4.2	2.2	Low	Within foot print	Remove	Remove tree to facilitate development
40	*Tristaniopsis laurina*	Kanooka	Fair	Good	Mature	25-50	Co-dominant stems; Wound(s)	Amenity value/shade		Low	5-10	47	23, 25, 18	5	5	5	5	Moderate		4.7	2.4	Moderate	Within foot print	Remove	Remove tree to facilitate development
41	*Tristaniopsis laurina*	Kanooka	Good	Good	Semi-Mature	>50				Negligible	<5	19	14	1	1	1	1	Low		1.7	1.6	Low	Within foot print	Remove	Remove tree to facilitate development
42	*Tristaniopsis laurina*	Kanooka	Good	Fair	Semi-Mature	25-50	Co-dominant stems	Amenity value/shade	Shape from infrastructure	Low	10-15	40	42	4	4	4	4	Moderate	Clear from light.	5.0	2.3	Moderate	Within foot print	Remove	Remove tree to facilitate development
43	*Lophostemon confertus*	Queensland Box	Good	Fair	Semi-Mature	>50	Suppressed; Wound(s)	Amenity value/shade		Low	5-10	52	50	5	6	1	6	Moderate		6.0	2.5	Moderate	Major TPZ encroachment	Remove	Remove tree to facilitate development
44	*Quercus ilex*	Holm Oak	Good	Good	Mature	25-50	Wound(s); Previous failures; Dieback; Epicormic growth	Significant due to age/size; Attractive landscape feature; Particularly old/venerable; Amenity value/shade	Sucker treatment	Medium	15-20	99	87	11	8	8	6	High	Area near tree is being used as a short cut and soil compaction is occurring. Stop people from using the area near the tree as a short cut. Remove select epicormic shoots - leave at least 25%. Proposed landscape design accounts for an encroachment into the TPZ of 56.1%. Tree may be retained with landscape design modification such as pier and beam to minimise disturbance within the TPZ.	10.4	3.3	High	Major TPZ encroachment	Retain with landscape design modification.	Supervision of works and building techniques sensitive to roots required in TPZ. Protect via tree protective fencing and restriction of works activities within the TPZ.

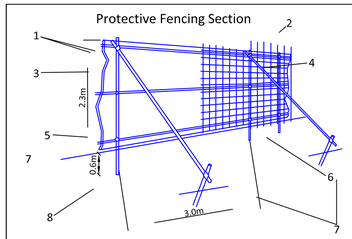
Tree No.	Botanical Name	Common Name	Health	Structure	Age	TLE	Defects	Significance	Action	Current Risk	Height (m)	DRC (cm)	DBH (cm)	Crown North (m)	Crown South (m)	Crown East (m)	Crown West (m)	Significance	Arborist comments	TPZ (m)	SRZ (m)	Retention Value	TPZ Encroachment	Impact	Recommendation
45	*Pinus radiata*	Monterey Pine	Fair	Fair	Mature	15-25	Cavity(s); Poor pruning; Pests/Insects; Wound(s); Bleeding/sap flow; Decay	Significant habitat - nests/hollows; Amenity value/shade	Monitor	Medium	15-20	60	54	5	5	5	5	High	Multiple pruning wounds along trunk. Picus tested November 2015. Results of tests indicated a sound to compromised wood ratio of: Site 1 - 89% sound wood, 10% of altering wood i.e. wood being altered by the fungus and 1% of active fungus and decay. Site 2 - 69% sound wood, 27% consists of altering wood i.e. wood being altered by the fungus and 4% of active fungus and decay. Retesting at the same locations should be carried out no later than November 2018.	6.5	2.7	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
46	*Eucalyptus microcorys*	Tallowwood	Good	Good	Mature	>50	Dead wood in canopy	Significant due to age/size; Amenity value/shade	Remove deadwood/stubs	Low	15-20	92	68	9	4	3	6	Moderate		8.2	3.2	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
47	*Lophostemon confertus*	Queensland Box	Good	Good	Semi-Mature	>50		Amenity value/shade		Very Low	10-15	57	47	4	4	4	4	Moderate		5.6	2.6	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
48	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Semi-Mature	>50	Suppressed; Wound(s); Epicormic growth	Amenity value/shade		Low	10-15	55	41	7	6	4	6	Low	Suppressed specimen growing on bank	4.9	2.6	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
49	*Lophostemon confertus*	Queensland Box	Good	Fair	Semi-Mature	>50	Wound(s); Co-dominant stems; Dead wood in canopy; Previous failures	Amenity value/shade	Remove deadwood/stubs	Low	15-20	50	43	8	4	3	7	Moderate		5.2	2.5	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
50	*Lophostemon confertus*	Queensland Box	Good	Good	Mature	>50	Wound(s); Dead wood in canopy	Amenity value/shade	Remove deadwood/stubs	Low	15-20	62	46	8	5	5	6	Moderate		5.5	2.7	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
51	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	15-25	Co-dominant stems; Epicormic growth; Poor pruning; Previous failures; Included bark; Wound(s); Damaging infrastructure; Excessive end weight	Significant due to age/size; Attractive landscape feature; Amenity value/shade; Particularly old/venerable	Shape from infrastructure; Remove deadwood/stubs; Monitor; End weight reduction	High	15-20	180	172, 120	10	12	10	11	High	Damaging clubhouse. Prune off previous failure stubs. Major unions were inspected and found to be structurally sound. Remove basal suckers. Reduce endweight by 30% on large branch over #53. Encroachment into southern portion of TPZ accounts for 9.3% of total area.	15.0	4.2	High	Minor TPZ encroachment	Retain with specific protection measures.	Supervision of works and building techniques sensitive to roots required in TPZ. Protect via tree protective fencing and restriction of works activities within the TPZ.
52	*Ficus macrophylla*	Moreton Bay Fig	Good	Good	Semi-Mature	>50	Suppressed	Amenity value/shade		Very Low	5-10	35	32	8	2	7	4	Low	Suppressed specimen growing on bank	3.8	2.1	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
53	*Lophostemon confertus*	Queensland Box	Good	Fair	Mature	>50	Suppressed; Wound(s);Co-dominant stems; Dead wood in canopy	Amenity value/shade	Remove deadwood/stubs	Low	15-20	72	69	8	5	8	4	Moderate		8.3	2.9	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
54	*Olea africana*	African Olive	Good	Fair	Mature	25-50	Previous failures; Epicormic growth; Co-dominant stems; Wound(s)	Particularly old/venerable; Amenity value/shade	Remove epicormic growth	Low	10-15	96	39, 37, 35, 32	7	7	7	7	Low	Remove internal epicormic growth.	9.6	3.3	Low	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ.
55	*Ficus macrophylla*	Moreton Bay Fig	Good	Fair	Semi-Mature	>50	Co-dominant stems; Wound(s)	Amenity value/shade	Remove selective branches	Medium	10-15	68	38	8	5	6	6	Low	Suppressed specimen growing on bank. Remove rubbing branch over speed camera.	4.6	2.8	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
56	*Lophostemon confertus*	Queensland Box	Good	Fair	Mature	>50	Wound(s); Co-dominant stems; Dead wood in canopy	Amenity value/shade	Remove deadwood/stubs	Medium	10-15	99	47, 44, 30, 30	8	6	8	8	Moderate		9.9	3.3	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
57	*Pinus halepensis*	Aleppo Pine	Good	Fair	Mature	25-50	Suppressed; Bleeding/sap flow; Dieback	Amenity value/shade		Low	15-20	58	54	6	6	6	6	Moderate		6.5	2.6	Moderate	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ. Proposed landscaping works within TPZ to be above existing grade and of permeable design.
58	*Eucalyptus bicostata*	Victorian Blue Gum	Good	Fair	Mature	15-25	Suppressed; Wound(s); Dead wood in canopy	Amenity value/shade	Remove deadwood/stubs	Medium	10-15	76	63	12	1	4	8	Moderate	Suppressed specimen growing on bank.	7.6	2.9	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
59	*Lophostemon confertus*	Queensland Box	Good	Good	Mature	>50	Wound(s)	Amenity value/shade		Low	15-20	67	53	7	5	6	6	Moderate		6.4	2.8	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
60	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	>50	Co-dominant stems; Epicormic growth; Soil compaction; Wound(s); Suckers	Amenity value/shade	Remove deadwood/stubs; Uplift for pedestrian access	Medium	15-20	94	57, 31	2	11	2	9	Moderate	Remove suckers and epicormic growth to 4m height. Stop pedestrian traffic north side.	9.4	3.2	Moderate	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ. Proposed landscaping works within TPZ to be above existing grade and of permeable design.
61	*Ficus macrophylla*	Moreton Bay Fig	Good	Fair	Semi-Mature	>50	Hanger(s); Co-dominant stems; Suppressed; Wound(s)	Amenity value/shade	Remove hanging limb	Low	5-10	53	38	7	1	7	5	Low	Suppressed specimen growing on bank. Small hanger in lower crown over garden bed.	4.6	2.5	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
62	*Lophostemon confertus*	Queensland Box	Good	Fair	Mature	>50	Poor pruning; Co-dominant stems; Dead wood in canopy; Soil compaction	Amenity value/shade	Remove deadwood/stubs; Mulching	Medium	15-20	79	34, 40	6	6	5	5	Moderate	Stop pedestrian traffic from using near the tree as a short cut. Deadwood over path. Mulch short cut through garden.	7.9	3.0	Moderate	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ. Proposed landscaping works within TPZ to be above existing grade and of permeable design.
63	*Corymbia citriodora*	Lemon-scented Gum	Fair	Fair	Mature	15-25	Dead wood in canopy; Poor pruning; Previous failures; Excessive end weight; Wound(s)	Significant due to age/size; Attractive landscape feature; Amenity value/shade	Remove deadwood/stubs; Remove selective branches	Medium	20-30	88	73	12	4	5	10	Moderate	Remove lowest horizontal branch (100mm dia.) with poor taper extending over road.	8.8	3.1	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
64	*Lophostemon confertus*	Queensland Box	Good	Good	Mature	>50	Wound(s); Dead wood in canopy	Amenity value/shade	Remove deadwood/stubs	Medium	15-20	69	54	5	5	5	5	Moderate	Deadwood over path.	6.5	2.8	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.

Tree No.	Botanical Name	Common Name	Health	Structure	Age	TLE	Defects	Significance	Action	Current Risk	Height (m)	DRC (cm)	DBH (cm)	Crown North (m)	Crown South (m)	Crown East (m)	Crown West (m)	Significance	Arborist comments	TPZ (m)	SRZ (m)	Retention Value	TPZ Encroachment	Impact	Recommendation
65	*Eucalyptus robusta*	Swamp Mahogany	Good	Fair	Mature	25-50	Dieback; Epicormic growth; Wound(s);Poor pruning	Amenity value/shade		Medium	15-20	72	59	10	6	7	3	Moderate		7.1	2.9	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
66	*Lophostemon confertus*	Queensland Box	Good	Good	Semi-Mature	>50	Co-dominant stems; Dieback; Dead wood in canopy; Suppressed	Amenity value/shade	Remove deadwood/stubs	Low	5-10	36	27	7	3	4	4	Low	Suppressed specimen	3.2	2.2	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
67	*Lophostemon confertus*	Queensland Box	Good	Fair	Semi-Mature	>50	Suppressed; Epicormic growth; Wound(s)	Amenity value/shade		Low	10-15	50	42	9	6	1	4	Moderate		5.0	2.5	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
68	*Araucaria bidwillii*	Bunya	Good	Good	Mature	>50		Significant due to age/size; Attractive landscape feature; Amenity value/shade; Unique location	Aerial inspection	Medium	15-20	92	78	6	6	6	6	High	Seedlings observed beneath canopy indicating previous fruit drop. Species is unpredictable for fruit development. Species requires annual crown cleaning to prevent large cone drop. Suggest aerial inspection for cones each November.	9.4	3.2	High	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
69	*Eucalyptus camaldulensis*	River Red Gum	Good	Fair	Mature	15-25	Wound(s); Suppressed	Attractive landscape feature; Amenity value/shade		Medium	15-20	70	54	10	5	7	6	Moderate		6.5	2.8	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
70	*Ficus obliqua*	Small-leaved Fig	Good	Fair	Mature	>50	Epicormic growth; Wound(s); Co-dominant stems; Included bark	Outstanding example of species; Significant due to age/size; Attractive landscape feature; Significant habitat - nests/hollows; Amenity value/shade; Particularly old/venerable; Unique location	Monitor	Medium	15-20	248	66, 82, 120	12	11	11	9	High	Prominent tree. Monitor basal union for cracks or splits after strong winds or storm events. Encroachment into TPZ estimated to be minor and account for 6.8% of the toal TPZ area.	15.0	4.8	High	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ. Proposed landscaping works within TPZ to be above existing grade and of permeable design.
71	*Lophostemon confertus*	Queensland Box	Good	Fair	Mature	>50	Epicormic growth; Suppressed; Wound(s)	Amenity value/shade; Unique location		Low	15-20	72	52	9	5	9	5	Moderate	Minor supression.	6.2	2.9	Moderate	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
72	*Ficus obliqua*	Small-leaved Fig	Good	Good	Semi-Mature	>50	Wound(s)	Amenity value/shade	Formative pruning	Very Low	<5	37	31	5	5	5	5	Low		3.7	2.2	Low	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ.
73	*Brachychiton acerifolius*	Illawarra Flame Tree	Good	Good	Semi-Mature	>50		Amenity value/shade		Very Low	5-10	32	26	2	3	2	2	Low		3.1	2.1	Low	Within foot print	Remove	Remove tree to facilitate development
74	*Jacaranda mimosifolia*	Jacaranda	Good	Fair	Semi-Mature	25-50	Co-dominant stems; Suckers	Amenity value/shade	Sucker treatment	Very Low	5-10	32	27	5	4	3	4	Low	Remove basal suckers.	3.2	2.1	Low	Major TPZ encroachment	Remove	Remove tree to facilitate development
75	*Brachychiton acerifolius*	Illawarra Flame Tree	Fair	Good	Semi-Mature	25-50	Dieback	Amenity value/shade		Low	10-15	39	31	3	3	3	3	Low		3.7	2.2	Low	Within foot print	Remove	Remove tree to facilitate development
77	*Pinus halepensis*	Aleppo Pine	Fair	Fair	Mature	25-50	Bleeding/sap flow; Wound(s); Co-dominant stems; Dieback	Significant due to age/size; Amenity value/shade	Plant health care	Medium	15-20	76	52, 49	6	7	6	6	Moderate	Trees declining in health and TPZ encroachment will result in further decline and retetnion is not viable	7.6	2.9	Moderate	Major TPZ encroachment	Remove	Remove tree to facilitate development
78	*Pinus halepensis*	Aleppo Pine	Fair	Fair	Mature	15-25	Bleeding/sap flow; Wound(s)	Significant due to age/size; Amenity value/shade	Plant health care; Monitor	Low	15-20	68	54	4	9	6	6	Moderate	Quarterly treatments with Seasol recommended. Monitor growth response to treatments.	6.5	2.8	Moderate	Within foot print	Remove	Remove tree to facilitate development
79	*Pinus halepensis*	Aleppo Pine	Fair	Good	Mature	25-50	Bleeding/sap flow; Dieback	Significant due to age/size; Amenity value/shade		Low	15-20	70	58	6	5	6	6	Moderate		7.0	2.8	Moderate	Within foot print	Remove	Remove tree to facilitate development
80	*Quercus ilex*	Holm Oak	Good	Good	Semi-Mature	>50		Amenity value/shade		Very Low	10-15	42	37	5	5	5	5	Moderate		4.4	2.3	Moderate	Minor TPZ encroachment	Retain	Protect via tree protective fencing and restriction of works activities within the TPZ. Proposed landscaping works within TPZ to be above existing grade and of permeable design.
81	*Quercus ilex*	Holm Oak	Good	Fair	Mature	25-50	Cavity(s); Crack(s)/Split(s); Dead wood in canopy; Decay; Epicormic growth; Previous failures; Wound(s)	Amenity value/shade	Understory planting; Remove deadwood/stubs	Medium	10-15	49	45	4	5	5	5	Moderate	Multiple trunk and branch wounds result in possible probability of failure. Underplant fall zone with shrubs to restrict target occupancy and access.	5.4	2.5	low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
82	*Lophostemon confertus*	Queensland Box	Good	Good	Semi-Mature	25-50	Epicormic growth; Dead wood in canopy	Amenity value/shade	Remove deadwood/stubs	Low	10-15	44	35	5	5	5	5	Low	Deadwood over path.	4.2	2.3	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
83	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Mature	>50	Co-dominant stems; Epicormic growth; Wound(s);Dieback	Significant due to age/size; Attractive landscape feature; Amenity value/shade; Particularly old/venerable; Heritage listed	Monitor	Medium	20-30	160	92, 90	8	8	9	9	High	Monitor basal union for cracks or splits after strong winds or storm events. Proposed basement footprint within TPZ. Encroachments accounts for 23.5% of total TPZ area.	15.0	4.0	High	Major TPZ encroachment	Retain	Supervision of works and building techniques sensitive to roots required in TPZ. Protect via tree protective fencing and restriction of works activities within the TPZ.
84	*Callistemon viminalis*	Weeping Bottlebrush	Good	Fair	Mature	10-15	Co-dominant stems; Previous failures; Wound(s); Epicormic growth	Amenity value/shade		Low	5-10	44	37	5	5	5	5	Low		4.4	2.3	Low	Major TPZ encroachment	Remove	Remove tree to facilitate development
85	*Eucalyptus haemastoma*	Scribbly Gum	Good	Fair	Mature	>50	Epicormic growth; Wound(s); Bleeding/sap flow	Significant due to age/size; Attractive landscape feature; Amenity value/shade		Medium	20-30	90	70	9	9	9	9	High		8.4	3.2	High	Major TPZ encroachment	Remove	Remove tree to facilitate development
86	*Eucalyptus haemastoma*	Scribbly Gum	Good	Fair	Mature	>50	Bleeding/sap flow; Wound(s);Epicormic growth; Dead wood in canopy;wounds	Significant due to age/size; Attractive landscape feature; Amenity value/shade	Remove deadwood/stubs;Monitor	Medium	15-20	74	61	7	7	7	7	High	Replace mulch. Monitor central leader wound at 10m for occlusion, fungal fruiting bodies and indicators of decay.	7.3	2.9	High	Major TPZ encroachment	Remove	Remove tree to facilitate development
87	*Olea africana*	African Olive	Good	Fair	Mature	>50	Epicormic growth; Co-dominant stems; Wound(s);Suckers	Attractive landscape feature; Significant due to age/size; Amenity value/shade	Sucker treatment	Low	10-15	110	48, 80	8	8	8	8	Moderate	Remove basal suckers.	11.0	3.4	Moderate	None	Remove	Remove tree to facilitate development
484	*Ficus rubiginosa*	Port Jackson Fig	Good	Good	Semi-Mature	>50		Amenity value/shade		Very Low	5-10	37	32	6	6	6	6	Low	Minor leaf beetle damage. Transplanted to between tree 22 and 24.	3.8	2.2	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
1001	*Ficus obliqua*	Small-leaved Fig	Good	Good	Juvenile	>50			Formative pruning	Very Low	<5	23	15	2.5	2.5	2.5	2.5	Low	Small tree that is readily replaceable.	1.8	1.8	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.

Tree No.	Botanical Name	Common Name	Health	Structure	Age	TLE	Defects	Significance	Action	Current Risk	Height (m)	DRC (cm)	DBH (cm)	Crown North (m)	Crown South (m)	Crown East (m)	Crown West (m)	Significance	Arborist comments	TPZ (m)	SRZ (m)	Retention Value	TPZ Encroachment	Impact	Recommendation
1002	*Ficus rubiginosa*	Port Jackson Fig	Fair	Fair	Semi-Mature	>50	Wound(s); Suppressed	Amenity value/shade		Low	5-10	70	28, 28	9	5	8	4	Low	Suppressed specimen growing on bank	7.0	2.8	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
1003	*Ficus rubiginosa*	Port Jackson Fig	Fair	Fair	Semi-Mature	>50	Epicormic growth; Wound(s); Suppressed	Amenity value/shade		Low	5-10	30	24	8	1	6	2	Low	Suppressed specimen growing on bank	2.9	2.0	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
1004	*Ficus rubiginosa*	Port Jackson Fig	Good	Fair	Semi-Mature	>50	Suppressed; Wound(s); Epicormic growth	Amenity value/shade		Very Low	5-10	27	21	6	4	6	2	Low	Suppressed specimen growing on bank	2.5	1.9	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
1005	*Ficus rubiginosa*	Port Jackson Fig	Good	Poor	Juvenile	25-50	Suckers; Weak unions		Removal	Very Low	5-10	45	40	4	4	4	4	Low	Suppressed specimen growing on bank. Suckers growing from stump of removed tree.	4.8	2.4	Remove	None	No forseeable impact	Remove tree irrespective of future development.
1006	*Tristaniopsis laurina*	Kanooka	Good	Good	Semi-Mature	25-50	Damaging infrastructure	Amenity value/shade	Shape from infrastructure	Low	5-10	32	22	3	3	3	3	Low	Clear from tennis court fence.	2.6	2.1	Low	Within foot print	Remove	Remove tree to facilitate development
1007	*Brachychiton acerifolius*	Illawarra Flame Tree	Good	Good	Semi-Mature	>50				Very Low	5-10	17	15	2	2	2	2	Low		1.8	1.6	Low	None	No forseeable impact	Protect via tree protective fencing and restriction of works activities within the TPZ.
1233	*Pinus halepensis*	Aleppo Pine	Good	Good	Juvenile	>50		Commemorative tree	Monitor	Negligible	<5	7	5	1	1	1	1	Moderate	Commemorative tree donated by The Glebe Society planted on 24.4.15.	1.5	1.5	Low	Within foot print	Transplant	Relocate tree to suitable position beyond building footprint.

12.4 Appendix D - Tree Protection Plan

Protective Fencing Section



1. Standard scaffold poles
2. Uprights to be driven into ground
3. Panels secured to uprights with wire and where necessary standard scaffold clamps
4. Weldmesh wired to the uprights and horizontals
5. Standard clamps
6. Wire twisted and secured on inside face of fencing to avoid easy dismantling
7. Ground level
8. Approximately 0.6m driven into the ground

Protective Fencing

To be erected prior to the commencement of all works on site, and retained in place throughout construction. To comprise either 2.4m wooden site hoarding; or a 2.1m high scaffolding framework, with uprights at maximum 3.5m spacings, every other one braced to the ground with 45 degree struts; supporting standard anti-climb 'Heras' welded mesh fence panels secured with anti-lift devices to concrete or plastic bases pinned to the ground by scaffold uprights sunk to a minimum depth of 500mm; individual panels fixed to each other with at least 2 clamps and to scaffolding with heavy-duty cable ties. "TREE PROTECTION ZONE - KEEP OUT" or similar notices to be attached to every fifth panel.

TPZ provided as indicative only. Existing structures are likely to have influenced root development and may have resulted in a asymmetrical TPZ. It is recommended exploratory excavation be undertaken along the edge of such structures to determine exact root size and location to assist in planning of the proposed design.

PARRAMATTA ROAD

Encroachment of 9.3% into TPZ of High Retention Value Tree 51. All excavation works within the TPZ of this tree are to be carried out with care to avoid unnecessary root severance and be completed under project arborist supervision. Landscaping works outside the building Footprint should be undertaken with care and installed at or above existing grade to minimise root disturbance.

Encroachment into the southwestern TPZs of Tree 83 determined to be major (23.5%) as greater than 10% of the total TPZ area. Root exploration within a portion of encroachment area identified insignificant roots only that would be impacted by development along this alignment. Landscaping works outside the significant structures should be undertaken with care and installed at or above existing grade to minimise root disturbance.

Tree 74 to be removed to facilitate installation of fibre optic cable and inspection pit.

UNIVERSITY AVENUE

Major encroachment of 56.1% into TPZ of High Retention Value Tree 44. Tree is only retainable with design modifications. Pier and beam (or similar) design may be used to reduce disturbance of root area to the north, west and south of TPZ. Building construction to the east is estimated to encompass 5.5% of TPZ and therefore determined to be minor if allowances for remaining TPZ encroachments can be made.

UNIVERSITY PLACE

Location of Trees 72, 106, 1007 and 1233 shown as indicative only.

Encroachments into the northern TPZs of Trees 29 & 35 determined to be minor and less than 10% of the total TPZ area. Root exploration within this area identified insignificant roots only that would be impacted by development along this alignment.

UNIVERSITY AVENUE

Encroachment into the northern TPZ of Tree 77 determined to be major (17.9%) as greater than 10% of the total TPZ area. Given the fair current health of this tree is is unlikely it would tolerate the extent of root severance required to facilitate this development.

Tree 87 requires removal as part of the Construction Management Plan. Tree to be removed to facilitate truck turning and material handing area.

PLACE

PLACE

LEGEND

Tree trunk, number & canopy :	22	Catagory A TPZ:	
Category Remove TPZ & No.:	[10]	Catagory B TPZ:	
SRZ:		Category C TPZ:	
Trees to be removed for devt.:		Protective fencing:	
Proposed ground/ Prec. level:		Arborist supervision:	
Proposed lower gnd. level:		Proposed basement extent:	
Transplant Tree:			

Tree Retention Value

Trees have been categorised to allow an accurate account of which shuold and should not be a constraint Tree categories are determined according to their health condition, quality and value.

Remove:- Trees to be removed irrespective of devt.
High:- Trees of high quality and value
Moderate:- Trees of moderate quality and value
Low:- Trees of low quality and value

High retention value trees should be retained, planned around and be protected from damage.

Moderate retention value trees should be retained if possible.

Low retention value trees will not be retained where they impose a significant constraint on development.

Tree Protection Zones (TPZs)

A model is used to assist in the prediction of the likely impact of development on retained trees. This model, based on the size of individual specimens.

It is recommended that an area around each retained tree should be protected from disturbance "in order to avoid (unacceptable) damage to the roots or rooting environment" (as a result of root severance or damage, or compaction or pollution of the soil).

These Tree Protection Zones ('TPZs') have been calculated for all retained trees and are shown as areas bordered in green, blue or grey according to tree category. These zones are normally portrayed as a circle of a fixed radius from the centre of the trunk.

Arborist Supervision

An Arborist experienced in tree protection on construction sites shall be engaged prior to the commencement of work on the site. The Arborists tasks will be to monitor and report regularly on the condition of the retained trees. The site Arborist shall be present to supervise any excavation, trenching or tunneling within the TPZ of any retained trees.

The schedule of works for the development shall acknowledge the role of the site Arborist and the need to protect the retained trees. Sufficient notice shall be given to the Arborist where his/her attendance is required. Should the proposed design change from that reviewed, additional arboricultural assessment will be required.

Areas on site where the supervision of a consulting arborist are:

1. Location of protective fencing and ground boarding.
2. Lifting/excavation of existing hard surfacing within TPZs
3. Construction of above-ground hard surfacing.

Excavation within TPZ

Within Tree Protection Zones the first 750mm depth of any excavation, whether for exploratory purposes, proposed foundations, hard surfacing, or underground services shall be undertaken by hand or using sensitive techniques (e.g. Air-spade of hyro-vac) under arboricultural supervision. Soil is to be cleared from roots with care not to cause damage. All damaged roots will be cut cleanly with a hand saw or secateurs. The edge of the excavation closest to the trees will be covered with hessian sacking to prevent drying out, and if necessary be shuttered with an appropriate material to prevent soil collapse. Where appropriate, the soil beneath this depth may be sheet piled; and deeper excavation may be undertaken by machine provided it works from outside the Tree Protection Zone edge.

PROJECT:	CCW Museum Arb. Impact Assessment
CLIENT:	University of Sydney
DRAWING:	Tree Protection Plan
DRAWING NO.:	ASTPP01 | Rev. 2 | 03.05.17
BASED ON:	Schematic Site Services Diagram, 24.01.2011, Campus Infrasrtucture Services
SCALE:	Do not scale
DRAWN BY:	LD

ArborSafe