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Client	University of New South Wales
Location	Building B22 – Student Academic Administration Building
Document Type	Arboricultural Impact Assessment, Tree Protection Plan & Tree Protection Specification
Date	13 September 2019

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The Ents Tree Consultancy

Development Reports | Hazard Assessments | Tree Management

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Contents

1 Executive Summary

This report has been produced to support the State Significant Development Application (SSDA) Number SSD 9673 on behalf of The University of NSW (UNSW), for the proposed B22 Building. This report provides an Arboricultural Impact Assessment, Tree Protection Plan and Tree Protection Specification for the proposed works site. The design constraints were outlined in a report by The Ents Tree Consultancy 21 August 2018. The design has been reviewed based on available information provided considering the Australian Standard for The Protection of Trees on Development Sites AS4970.

2. Detailed Description of Works

2.1 This SSDA seeks approval for the redevelopment of the existing Chancellery building for the purposes of a new mixed-use Building (B22) at UNSW's Kensington Campus.

2.2 The site comprises an area of 9,430 sqm and includes the existing four-to-five storey building known as The Chancellery, which houses the administrative offices and functions of the University, the Chancellery carpark, substation C21 and utility room B21.

2.3 UNSW has undertaken a voluntary international design competition, together with a significant program of consultation with the NSW Government Architect in arriving at the proposed scheme. B22 is proposed to be the ceremonial and civic heart of the University, delivering a renewed public realm experience that integrates student and academic life.

2.4 The development will involve the construction of a 59.88 metre building over a five-storey podium, comprising approximately 18,392 sqm of GFA and accommodating the following functions:

- Centralised teaching and learning facilities referred to as Learning Environments (or CATS).
- Common student facilities referred to as Student Led Space.
- Event and Exhibition Space.
- Workplace accommodating the university's core administrative functions and a modern chancellery.
- Retail space servicing the building and broader Campus (in the form of small-scale food and beverage tenancy options distributed throughout the ground plane); and
- Supporting and ancillary facilities.

2.5 The building is designed to readily adapt to the changing demands of an evolving and growing university campus, with floor plates providing flexibility for different uses into the future.

2.6 Site establishment works such as building demolition, services augmentation and associated tree removal, together with the Gate 9 forecourt landscape works have been addressed via separate approval processes.

3. Sears Requirements

3 This report considers the following requirements of the State Significant Development Application (SSDA) Number SSD 9673, as contained within the SEARs issued by the NSW Department of Planning and Environment on 8 November 2018; under the planning and documents line.

4. Methodology

4.1 The trees were assessed using the standard Visual Tree Assessment technique (VTA). The trees were assessed from the ground for this report.

4.2 A Lufkin 6.5m diameter tape was used to obtain the Diameter at breast height (DBH) as recommended at 1.4 metres unless otherwise stated due to variations in the trees form.

4.3 The height of the trees were estimated and the spread of the trees canopy was paced out.

4.4 A Canon 5D Digital camera with a 11-24mm lens or a 24-105mm lens was used to take all photographs in this report.

4.5 A Bosch hand held laser has been used to estimate distances during field assessments.

4.6 The ULE rating system has been used as a guide to assist in determining the Useful Life Expectancy of the trees surveyed. Refer to Appendices 1.

4.7 IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © (Refer to Appendix 5).

5. Introduction

5.1 This report will assess the impacts on the trees that are within the State Significant development, (SSD 9673) B22 Building, University of NSW Kensington Campus. The report will discuss which trees are nominated to be retained and which trees are to be removed for the purpose of the development. Tree Protection Measures will be discussed for the demolition and construction phases. A site-specific tree protection plan will also be provided. Consultation was sought with the client about the number and position of trees to be inspected prior to a survey being completed.

5.2 Site inspections of the trees for the initial survey were completed in May 2018. Ongoing assessments of the trees on site were completed as required to obtain information for the report. The trees will be assessed using the internationally recognised VTA assessment method for above ground parts only. The surveys completed detailed the condition of the nominated trees, their sizes and the setbacks required for the proposed works. The survey also details the trees significance rating and Useful Life Expectancy Rating, (ULE Rating). A detailed list of the trees surveyed will be provided in Appendix 2 of the report with the existing UNSW numerical system used to identify the trees. The existing numerical system used for this report will co-ordinate works on this job and will be used future reference for ongoing tree management at the UNSW.

5.3 Recommendations for removal or retention will be based on the proposed works and compatibility of the trees with the works. The potential impacts for trees nominated to be retained and attempt to remove or minimise them where possible. The Ents Tree Consultancy recommends no disturbances to the structural root zone of any tree and less than 25% disturbance to the tree protection zone of any tree, refer to tree table Appendix 2 for setbacks. If this advice is not adhered to by the UNSW planning team in the design of the building or landscape, The Ents Tree Consultancy will not be liable for any decline in tree health and a loss of tree stability as a result of the works. Recommended tree protection measures as set out in the Australian Standard AS4970 Protection of Trees on development sites will be nominated as required.

5.4 The trees nominated to be assessed are located on and adjoining the property at the proposed B22 Building Site, University of NSW Kensington Campus. Some of the trees are significant in the immediate landscape and some are likely to be considered important in the local areas landscape in terms of amenity and function. The trees are located on partially sheltered site with some protection from surrounding structures, trees and topography from most aspects. The soil on site appears to be a sandy loam that has been disturbed previously when the existing building and hardscapes were built and the site was cleared.

5.5 Based on the information provided by the client, the works involve the demolition of the existing buildings, the construction of new buildings and landscape works. To achieve the works, some of the trees on site are proposed to be removed and replaced. The most significant trees on the site are proposed to be retained and protected for the duration of the works. It is envisaged that the canopy cover lost in the removal of the trees will be replaced one for one in the case of large trees or one large tree will replace many small trees to make up the canopy percentages. The trees nominated to be retained, will be retained using sympathetic building activities to allow the works to proceed. Options for the managing the trees nominated to be retained adjoining the proposed works site will be provided.

5.6 Any tree that is nominated to be retained on or adjoining site will be kept in good condition for the duration of the works using the Australian Standard AS4970 2009 Protection of trees on development sites for the basis of all tree management practices. To keep the trees nominated to be retained in good condition, preparation works (improved cultural practices) by the site arborist or UNSW staff will need to occur. This may include the addition of mycorrhizal inoculants, application of fertilizer and watering programs. The supervision and management of the trees by the AQF level 5 site Arborist will be required throughout the demolition and construction phases of the project.

6. Discussion

6.1 **Tree 309** is a semi - mature tree that is located close to the gate 9 entry on the High Street frontage at the edge of the site. This small tree is not compatible with the works and is proposed to be removed and replaced within a new landscape plan.

6.2 **Tree 310** is a semi - mature tree that is located close to the gate 9 entry on the High Street frontage at the edge of the UNSW site boundary to the north. This tree is compatible with the works and is proposed to be retained within the scope of the development. **Structural Root Zone.** The proposed seating structure 1m to the north of the tree will bridge the trees projected structural root zone or there will be minor excavations completed by hand for the installation of the discontinuous pier and beam footing. The renewal of the path to the north of the trees will be completed within the existing subgrade level or higher to renew the paving surface. No excavation of soil under the sub-grade is permitted in the structural root zone and no pruning of roots 50mm + in diameter is permitted. No excavation of soil or pruning of roots should be permitted for any activity other than the installation of piers.

6.3 **Tree Protection Zone.** The root disturbance for this tree is limited to the north of the tree. The disturbance has been calculated as 30% by area, however, all of the proposed works is within an existing footpath sub-grade which reduces the disturbance to below 10%, a minor disturbance under the the Australian Standard for the protection of trees on development sites. The proposed seating structure to the north of this tree will need to be constructed using a discontinuous footing to minimise any root disturbances. The renewal of the paving will have minimal impact on the trees root system due to the fact that the proposed works will be limited to within the existing subgrade for the renewal of the path with no excavations. It is anticipated that the ground under the path has already been compacted with root growth in the area from this semi-mature tree is limited.

6.4 **Tree Protection for Tree 310.** A 1.8m chain mesh tree protection fence will need to be installed to protect the trees root zone. It is envisaged that the tree protection zone will be encapsulated inside the larger tree protection zone of trees 311 & 312. This area will separate the trees from the works. This will protect the trees whilst allowing for the works to be completed. No machinery access is permitted within the tree protection zone. The tree protection fencing must be installed prior to the works and signed off by the AQF level 5 Arborist. All works within the trees structural root zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a.

6.5 **Tree 311** is a large and significant mature tree, located close to the gate 9 entry on the High Street frontage and the existing Chancellery building at the edge of the UNSW site boundary to the north. The existing building is proposed to be demolished with the new building moving further from the tree. The wall structure closest to the tree will be left in place to reduce damage to the tree as will a section of the floor. Holes or cracks will be made in the wall / floor slab to allow for roots to enter the new soil area between the building and the tree. This tree is compatible with the works and is proposed to be retained within the scope of the development.

6.6 **Structural Root Zone 311.** The proposed seating structure is within the structural root zone to the north of the tree. The requirements of the structural root zone have been considered in the design and will bridge the trees projected structural root zone or there will be minor excavations completed by hand for the installation of the discontinuous pier and beam footing. The proposed footings must be adjustable to prevent severing of roots 50mm+ in diameter. The renewal of the path to the north of the trees will be completed within the existing subgrade level or higher to renew the paving surface. No excavation of soil under or adjoining the sub-grade is permitted in the structural root zone or tree protection zone and no pruning of roots 50mm + in diameter is permitted. No excavation of soil or pruning of roots should be permitted for any activity other than the installation of piers.

6.7 **Tree Protection Zone 311.** The root disturbance for this tree is limited to the south of the tree. The disturbance to the north of the tree within the existing path sub-grade has been discounted as it will not impact the trees health if it is completed as described in section 6.3. The proposed seating structure to the north of this tree will need to be constructed using a discontinuous pier and beam footing to minimise any root disturbances and prevent root pruning of roots 50mm+ in diameter. The disturbance to the south for the demolition of the building has been calculated as 30% by area, however, the disturbance is to remove the existing building and replace it at 9.5m from the tree. This movement of the built structure further from the tree enlarges the trees root zone by 20% and reduces the impact to approximately 10% a minor disturbance under the Australian Standard for the protection of trees on development sites AS4970.

6.8 To minimise the disturbance to the large buttress roots surrounding the trees trunk and the large adventitious roots that are anticipated to be in contact with the existing building structure or sub-grade-built structures, the built structures on the northern underground façade of the building will remain in place. The building will be demolished with the most northern underground wall to the tree or the northern façade at or below ground level left in place to minimise damage or wounding of the trees root system. It is envisaged that the wall structure can be cracked or perforated to allow roots to enter the new area of soil. The construction of the new building at approximately 9.5m to the north of the tree will have a minimal impact on the tree's roots zone. The temporary installation of cables to secure the new wall of the building must be installed at the maximum span width and at steepest angle to minimise cable numbers and proximity to the tree. All works involving the demolition and construction works on the northern section of the building within the trees tree protection zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a.

6.9 **Tree Protection for Tree 311.** A 1.8m chain mesh tree protection fence will need to be installed to protect the trees root zone. It is envisaged that the tree protection zone will encapsulate tree 310. The tree protection zone of trees 311 & 312 will be linked to form one large tree protection area. The area will be .5m off the existing northern wall of the Chancellery Building to the south, at the edge of the garden to the north, west and east. The tree protection area will increase once the hardscapes and building are demolished. The tree protection zone will separate the trees from the works and will protect the trees whilst allowing for the works to be completed. No access or works activities are permitted in this area. No machinery access is permitted within the tree protection zone.

6.10 The tree protection fencing must be installed prior to the works and signed off by the AQF level 5 Arborist. All works within the trees structural root zone must be supervised by the AQF level 5 site arborist who will record all activities. Refer to the tree protection plan in appendix 4a. The irrigation of this area must remain operational. If no irrigation is installed a temporary irrigation system must be installed to irrigate the tree during the demolition and works phase to ensure that water stress is not an issue. This is of particular importance if excavations are planned for the tree protection zone. All exposed soil cuts must be covered in hessian and kept moist while exposed. This tree should have mycorrhizal root innocent applied prior to the works and a biological soil stimulant to increase the trees ability to survive the stresses of the proposed works.

6.11 **Pruning Works, Tree 311.** No pruning for scaffolding will be permitted. The installation of piles for the northern side of the building must be completed with a small piling rig to prevent pruning of the branches to the south of the tree. The rig must be the height of or smaller than the existing building. All pruning works must be completed by an approved UNSW contracting Arborist who has qualified staff. All pruning works must be completed by an AQF level 3 Arborist in accordance with the Australian Standard for the Pruning of Amenity Trees AS4373.

6.12 **Tree 312** is a large and significant mature tree, located close to the High Street frontage and the existing Chancellery building at the edge of the UNSW site boundary to the north. The existing building is proposed to be demolished with the new building moving further from the tree. The wall structure closest to the tree will be left in place to reduce damage to the tree as will a section of the floor. Holes or cracks will be made in the wall / floor slab to allow for roots to enter the new soil area between the building and the tree. The hardscapes to the west / south-west are to be demolished with an excavation proposed further from the tree. This tree is compatible with the works and is proposed to be retained within the scope of the development. This tree is compatible with the works and is proposed to be retained within the scope of the development.

6.13 **Structural Root Zone.** The proposed seating structure is within the structural root zone to the north of the tree. The requirements of the structural root zone have been considered in the design and will bridge the trees projected structural root zone or there will be minor excavations completed by hand for the installation of the discontinuous pier and beam footing. The footing will be adjustable to prevent severing of roots 50mm+ in diameter. The renewal of the path to the north of the trees will be completed within the existing subgrade level or higher to renew the paving surface. No excavation of soil under or adjoining the sub-grade is permitted in the structural root zone or tree protection zone and no pruning of roots 50mm + in diameter is permitted. No excavation of soil or pruning of roots should be permitted for any activity other than the installation of piers.

6.14 **Tree Protection Zone 312.** The root disturbance for this tree are limited to the south and west of the tree at approximately 9 & 9.5m, with minor disturbance to the west and the north closer to the tree. The disturbance to the north of the tree within the existing path sub-grade has been discounted as it will not impact the trees health if it is completed as described in section 6.3. The proposed seating structure to the north of this tree will need to be constructed using a discontinuous pier and beam footing to minimise any root disturbances and prevent pruning of roots 50mm+ in diameter. The disturbance to the west of the tree is for a pedestrian bridge. This bridge will be constructed on adjustable pier and beam footings so that no roots 50mm+ in diameter will be severed. If a pre-cast footing is required for the bridge, root mapping will be required based on the preliminary design to map out the proposed footings on site to ensure that the pre-cast structure can be installed without damaging roots.

6.15 The disturbance to the south for the demolition of the building and concreted area to the South – West of the tree has been calculated as 35% by area, however, the disturbance is to remove the existing building and replace it at 9.75m from the tree. This movement of the built structure further from the tree enlarges the trees root zone by 20% and reduces the impact to approximately 10% a minor disturbance under the Australian Standard for the protection of trees on development sites AS4970. The excavation at 9m to the west of the tree increases the disturbance to just under 20%. This is a major disturbance to the tree protection zone. It is envisaged that the on-site top soil will form the addition of fill behind the northern and western walls and will be delivered into place without compacting the new garden areas. Root mapping to at least 1m depth in the garden area to the west of the tree will be required at the point of excavation to cleanly sever roots 50mm + in diameter.

6.16 To minimise the disturbance to the large buttress roots surrounding the trees trunk and the large adventitious roots that are anticipated to be in contact with the existing building structure or sub-grade-built structures (to the south), the built structures on the northern underground façade of the building will remain in place. This may include the small retaining wall to the SW of the tree, but the concrete and bitumen surface can be removed using sympathetic techniques under the supervision of the AQF Level 5 Site Arborist. The building will be demolished with all structures to the northern façade at or below ground level left in place to minimise damage or wounding of the trees root system. It is envisaged that the wall structure can be cracked or perforated to allow roots to enter the new area of soil. The construction of the new building at approximately 9.5m to the north of the tree will have a minimal impact on the tree's roots zone. The temporary installation of cables to secure the new wall of the building must be installed at the maximum span width and at steepest angle to minimise cable numbers and proximity to the tree. All works involving the demolition and construction works on the northern section of the building within the trees tree protection zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a.

6.17 **Tree Protection for Tree 312.** A 1.8m chain mesh tree protection fence will need to be installed to protect the trees root zone. It is envisaged that the tree protection zone will encapsulate tree 310. The tree protection zone of trees 311 & 312 will be linked to form one large area. The area will be .5m off the existing northern wall of the Chancellery Building to the south, at the edge of the garden to the north, west and east. The tree protection area will increase once the hardscapes and building are demolished. This area will separate the trees from the works and will protect the trees whilst allowing for the works to be completed. The area of concrete to the SW of this tree may require ground protection to be installed after the hardscapes are removed. All works to remove the concrete must commence closest to the tree, working off the concrete and subgrade, away from the tree. No machinery is permitted to operate on the soil within the tree protection zone. The construction of the bridge to the west of tree 312 will require ground protection as well for the works.

6.18 To protect the tree's root zone tree ground protection will be required. The ground protection required to be installed prior to the commencement of any works activities will consist of a layer of geo-textile fabric covered in 100mm of mulch. The mulch will be covered by 100 x 50mm timber planks strapped together or 50mm thick sheets of plywood covering the required sections (as specified by the AQF level 5 site arborist) of the tree protection zone of this tree. At no time should the tree protection material be removed during the works period unless specified by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a.

6.19 No access or works activities are permitted in the tree protection area. No machinery access is permitted within the tree protection zone. The tree protection fencing must be installed prior to the works and signed off by the AQF level 5 Arborist. All works within the trees structural root zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a. The irrigation of this area must remain operational. If no irrigation is installed a temporary irrigation system must be installed to irrigate the tree during the demolition and works phase to ensure that water stress is not an issue. This is of particular importance if excavations are planned for the tree protection zone. All exposed soil cuts must be covered in hessian and kept moist while exposed. This tree should have mycorrhizal root innocent applied prior to the works and a biological soil stimulant to increase the trees ability to survive the stresses of the proposed works.

6.20 **Pruning Works, Tree 312.** No pruning for scaffolding will be permitted. The installation of piles for the northern side of the building must be completed with a small piling rig to prevent pruning of the branches to the south of the tree. The rig must be the size of or smaller than the existing building. All pruning works must be completed by an approved UNSW contracting Arborist who has qualified staff. All pruning works must be completed in accordance with the Australian Standard for the Pruning of Amenity Trees AS4373.

6.21 **Tree 319** is a semi - mature tree, located close to the High Street frontage at the edge of the UNSW site boundary to the north. This tree has been nominated to be retained within the scope of the development. **Structural Root Zone.** The proposed seating structure is within the structural root zone to the north of the tree. The requirements of the structural root zone have been considered in the design and will bridge the trees projected structural root zone or there will be minor excavations completed by hand for the installation of the discontinuous pier and beam footings. The footing will be adjustable to prevent severing of roots 50mm+ in diameter. The renewal of the path to the north of the trees will be completed within the existing subgrade level or higher to renew the paving surface. No excavation of soil under or adjoining the sub-grade is permitted in the structural root zone or tree protection zone and no pruning of roots 50mm + in diameter is permitted. No excavation of soil or pruning of roots should be permitted for any activity other than the installation of piers.

6.22 **Tree Protection Zone 319.** The root disturbance for this tree is to the west, south and east with minor disturbances to the north. The disturbance accounts for 25% of the tree protection zone. This disturbance is at the upper limit of what is possible in regard to ensuring the trees ongoing viability and good health. This tree may experience temporary physiological stress, however the tree has good vitality and long-term impacts are not anticipated. Trees of this size / species are root pruned and transplanted, however the works may result in a decline in the trees health in the short or long term. Improved cultural practices such as the application of mycorrhizal inoculant, an improved irrigation regime prior to the works in an attempt to prepare the tree for the proposed disturbances.

6.23 The disturbance to the north of the tree within the existing path sub-grade has been discounted as it will not impact the trees health if it is completed as described in section 6.3. The proposed seating structure to the north of this tree will need to be constructed using a discontinuous pier and beam footing to minimise any root disturbances. The disturbance to the west of the tree at 12m is for a pedestrian entry path. Root mapping at the proposed excavation depth is recommended prior to excavation to ensure that roots 50mm + in diameter are located and cut cleanly by the AQF level 5 site Arborist. The disturbance to the east at 8.5m is a large excavation for a sunken courtyard. Root mapping in the top metre of soil is recommended prior to excavation to ensure that roots 50mm + in diameter are located and cut cleanly by the AQF level 5 site Arborist. The AQF level 5 Arborist should be present during the cut for this area. The exposed soil will need to be covered in hessian and kept moist during until the wall is installed.

6.24 The disturbance to the south of the tree at 4.75m is for the excavation of a sunken courtyard. This area will require root mapping to identify roots 50mm+ in diameter that will need to be cleanly cut prior to excavation by the AQF level 5 site Arborist. The AQF level 5 Arborist will need to supervise the excavation works. The installation of hessian, (kept moist) to cover the exposed soil will be required until the wall is installed. If required, the temporary installation of cables to secure the new wall of the building must be installed at the maximum span width and at steepest angle to minimise cable numbers and proximity to the tree. All works involving the demolition and construction works on the northern section of the building within the trees tree protection zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a.

6.25 **Tree Protection for Tree 319.** A 1.8m chain mesh tree protection fence will need to be installed to protect the trees root zone. It is envisaged that the tree protection zone will link with the tree protection zone of trees 311 & 312 to the north. The tree protection zone will extend to the edge of the proposed works to the south, east and west as well as the site boundary to the north. This area will separate the trees from the works and will protect the trees whilst allowing for the works to be completed. No access or works activities are permitted in the tree protection area. No machinery access is permitted within the tree protection zone. The tree protection fencing must be installed prior to the works and signed off by the AQF level 5 Arborist. All works within the trees structural root zone must be supervised by the AQF level 5 site arborist. All excavation works within the tree protection zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a. The irrigation of this area must remain operational. If no irrigation is installed a temporary irrigation system must be installed to irrigate the tree during the demolition and works phase to ensure that water stress is not an issue. This is of particular importance if excavations are planned for the tree protection zone. This tree should have mycorrhizal root innocent applied prior to the works and a biological soil stimulant to increase the trees ability to survive the stresses of the proposed works.

6.26 **Pruning Works, Tree 319.** No pruning for scaffolding or piling rigs will be permitted. The installation of piles for the northern side of the building must be completed with a small piling rig to prevent pruning of the branches to the south of the tree. If required, all pruning works must be completed by an approved UNSW contracting Arborist who has qualified staff. All pruning works must be completed in accordance with the Australian Standard for the Pruning of Amenity Trees AS4373.

6.27 **Tree 321** is a mature tree located close to the gate 8 entry on the High Street frontage at the edge of the UNSW site boundary to the north. The works around this tree involve the removal of the existing hardscapes from around the tree. Renewal of the hardscapes within the existing levels to the north of the tree, with excavation, grading and a large entry path to the east of the tree at 5m from the trees centre. The additional garden area provided for this tree will allow for future growth and will increase the permeable area for root growth by approximately 6%. This tree is compatible with the works and is proposed to be retained within the scope of the development.

6.28 **Structural Root Zone.** The renewal of the path to the north of the tree will be completed within the existing subgrade level or higher to renew the paving surface. No excavation of soil under or adjoining the sub-grade is permitted in the structural root zone or tree protection zone and no pruning / shaving of roots 50mm + in diameter is permitted. No excavation of soil or pruning of roots should be permitted for any activity. All demolition / excavations within 5m of the tree must be completed by hand to minimise any damage to roots 50mm+. No roots 50mm+ will be permitted to be severed within 5m of the tree and the AQF Level 5 Arborist will prune roots 50mm+ at 5m or more from the tree.

6.29 **Tree Protection Zone 321.** The total area of the root disturbance has been calculated at 20% by area. The disturbance to the north of the tree within the existing path sub-grade has been discounted as it will not impact the trees health if it is completed as described in section 6.3. The proposed seating structure to the north - east of this tree will need to be constructed using a discontinuous footing to minimise any root disturbances. The root disturbance for this tree is limited to the south and east of the tree with a 20% root disturbance. This is a major disturbance but is within an acceptable range based on the species and the age of the tree. The expansion of the garden area will reduce the disturbance to approximately 14%, an acceptable disturbance for this species of tree disturbance under the Australian Standard for the Protection of Trees on Development Sites AS4970-2009.

6.30 **Tree Protection for Tree 321.** A 1.8m chain mesh tree protection fence will need to be installed to protect the trees root zone. It is envisaged that the areas to the west of the tree will be outside of the works zone and in normal use. This boundary should be protected by hoarding. The tree protection will also be limited to within the northern extent of the boundary. The 1.8m chain mesh fence will need to be established to separate the trees vascular tissue and root zone from the works. The tree protection area surrounding the tree is currently covered in bitumen and paving. The majority of the paving / bitumen is proposed to be renewed or removed. The tree protection fencing will need to be adjustable to accommodate this type of works. The fence will need to separate the trees vascular tissue from the works at all times. If bitumen or concrete is removed it is to be completed off the hardstand, working from close to the tree to the outer dripline. All works in the Tree Protection Zone are to be completed under the supervision of the by the AQF level 5 site Arborist. The area of concrete to the SE of this tree may require ground protection to be installed after the concrete is removed or the tree protection will need to be relocated to isolate the area from the works.

6.31 If ground protection is required, the ground protection required to be installed prior to the commencement of any works activities in the area and will consist of a layer of geo-textile fabric covered in 100mm of mulch. The mulch will be covered by 100 x 50mm timber planks strapped together or 50mm thick sheets of plywood covering the required sections (as specified by the AQF level 5 site arborist) of the tree protection zone of this tree. At no time should the tree protection material be removed during the works period unless specified by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a.

6.32 No access or works activities are permitted in the tree protection area. No machinery access is permitted within the tree protection zone. The tree protection fencing must be installed prior to the works and signed off by the AQF level 5 Arborist. All works within the trees structural root zone must be supervised by the AQF level 5 site arborist. Refer to the tree protection plan in appendix 4a. The irrigation of this area must remain operational. If no irrigation is installed a temporary irrigation system must be installed to irrigate the tree during the demolition and works phase to ensure that water stress is not an issue. This is of particular importance if excavations are planned for the tree protection zone. All exposed soil cuts must be covered in hessian and kept moist while exposed.

6.33 **Pruning Works, Tree 321.** No pruning works are anticipated for this tree. If required, all pruning works must be completed by an approved UNSW contracting Arborist who has qualified staff. All pruning works must be completed in accordance with the Australian Standard for the Pruning of Amenity Trees AS4373.

6.34 **Trees 007, 309, 320, 322 to 326** are not compatible with the proposed works. These trees will be removed and replaced with the same sized trees within the new landscape plan to cover the canopy cover lost. The 3 small trees and 5 large trees proposed to be removed will be replaced with 2 medium sized trees and 5 large canopy trees. The replacement planting results in a net gain of canopy cover.

7. Recommendations

7.1 After reviewing the site and the information provided by the client, the works are proposed to proceed with the following actions,

7.2 To allow the works to proceed, eight trees 007, 309, 320 and trees 322-326 are proposed to be removed. All of these trees are proposed to be replaced within a new landscape plan. There are five trees 310 to 312, tree 319 and 321 are proposed to be retained and protected for the duration of the works. The installation of the tree protection measures in section 4 of the report will assist in reducing the disturbance to the trees nominated to be retained.

7.3 It is recommended that all tree protection measures are in place as described in section 6 of the report prior to the commencement of any works. The AQF level 5 site Arborist will need to sign off on the tree protection measures prior to works commencing. It is recommended that cultural practices to improve tree health commence as soon as possible for trees 311, 312, 319 and 321.

7.4 All works within or at the edge of any structural root zone of any tree will need to be supervised and recorded by the AQF level 5 site Arborist. Deep excavation works and demolition works within the tree protection zone will need to be supervised by the AQF level 5 site Arborist, refer to section 5 of report. The AQF level 5 Arborist is required to sever all roots 50mm+ in diameter and record the works for the UNSW tree database. It is the client's responsibility to arrange site inspections and co-ordinate the works with the AQF level 5 site Arborist.

7.5 Monthly site inspections and reporting is required to ensure the trees are adequately protected. At the end of the works period the tree will be inspected by an AQF 5 Arborist to determine if the tree has been maintained adequately. If this is done the compliance certificate will be issued. If trees have been damaged or breaches of the Australian Standards have occurred council will be contacted for further advice.

7.6 It is recommended that construction proceeds using the Australian Standard AS4970 2009 Protection of trees on development sites as a basis for tree protection on the site as well as the site-specific instructions listed in section 5 of this report. Additional Tree Protection measures are listed in Appendix 7 of the report to assist in the care of the trees on site.

Please do not hesitate to call 0422 265 128 if you have any questions regarding the contents of this report.

Regards

Hayden Coulter
AQF Level 5 Consulting Arborist
AQF Level 4 Advanced Certificate in Urban Horticulture

The Ents Tree Consultancy
Development Reports | Hazard Assessments | Tree Management

INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS
IACA
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Disclaimer

All trees have been assessed based on the information and facts of the site and as presented by the client or relevant parties at the time of inspection. No responsibility can be taken for incorrect or misleading information provided by the client or other parties. The nominated tree/s are assessed for biological requirements and hazard potential with reasonable care. The trees are assessed from the ground and by visual means only unless otherwise stated. All tree protection and tree preservation measures are designed to minimise the damage to the tree/s or to reduce the hazard potential of the tree/s. No responsibility can be taken by the author of this report for future damage to structures by the existing trees or planted trees. Trees are inherently dangerous, therefore will always have a hazard potential. Trees fail in ways that are not predictable or fully understood. There is no guarantee expressed or implied that failure or deficiencies may not arise of the subject trees in the future. No responsibility is accepted for damage to property or injury/death caused by the nominated tree/s.

The Ents Tree Consultancy. ABN: 95 598 933136 theents@bigpond.net.au

Appendix 1 ULE Rating

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 rating:	Category definition in years:	Category rating:
1	> 40 Years	High
2	15 to 40 Years	Medium
3	5-15 Years	Low
4	0-5 Years	Dead / dying

Appendix 2 Assessment of Trees

Tree No	Species	Height (m)	DBH* & DAC**	Canopy Spread (m)	TPZ ***	Health #	Structure #	ULE Rating ****	Landscape Rating +	Stars Rating +	Observations and comments
309	*Podocarpus elatus* Brown Pine	15	.45 DAC .55	7	5.5 SRZ 2.6	A	A	2	M	M	
310	*Podocarpus elatus* Brown Pine	9	.25 DAC .35	5	3 SRZ 2.15	A	A	2	M	M	
311	*Ficus macrophylla* Moreton Bay Fig	20	2.5 SRZ 2.75	25	15 DAC 4.85	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the High street frontage. This tree has approximately 11m clearance above the ground to the south and the tree extends 6m beyond the existing building line to the south. This tree requires 10m setback minimum to the East and no disturbances to the west. The root disturbance to the south of the tree should be set back to 10m.
312	*Ficus macrophylla* Moreton Bay Fig	20	2.5 SRZ 2.75	25	15 DAC 4.85	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the High street frontage. This tree has approximately 11m clearance above the ground to the south and the tree extends 6m beyond the existing building line to the south. This tree requires 10m setback minimum to the West and no disturbances to the East. The root disturbance to the south of the tree should be set back to 10m.
319	*Ficus macrophylla* Moreton Bay Fig	14	1.3 DAC 1.4	16	15 SRZ 3.9	A	A	1	H	H	A mature tree that is located on the High street frontage. This tree crown extends 9m to the south and 8m to the East & West.
320	*Eucalyptus microcorys* Tallowood	17	.35 DAC .45	9	4.2 SRZ 2.35	A	A	1	M	M	A semi-mature tree that forms part of the Anzac Parade street frontage.

Tree No	Species	Height (m)	DBH* & DAC**	Canopy Spread (m)	TPZ ***	Health #	Structure #	ULE Rating ****	Landscape Rating +	Stars Rating +	Observations and comments
321	*Ficus microcarpa "hillii"* Hills Fig	16	1.2 DAC 1.3	16	15 SRZ 3.75	A	A	1	H	H	A mature tree that forms part of the Anzac Parade street frontage.
322	*Eucalyptus microcorys* Tallowood	17	.75 DAC .85	15	9 SRZ 3	A	A	2	M	M	This tree is part of a group and requires an 8m setback to the east for the crown.
323	*Eucalyptus microcorys* Tallowood	15	.53 DAC .65	12	6.5 SRZ 2.75	A	Ba	2	M	M	This tree is partially suppressed and is part of a group planting. This tree requires an 8m setback to the east for the crown.
324	*Eucalyptus microcorys* Tallowood	14	.50 DAC .60	11	6 SRZ 2.7	Ba	Ba	2	M	M	This tree is suppressed and is part of a group planting. This tree requires an 9m setback to the east for the crown.
325	*Eucalyptus microcorys* Tallowood	20	.70 DAC .80	14	8.5 SRZ 3	A	A	2	M	M	This tree is part of a group planting. This tree requires an 9m setback to the east for the crown.
326	*Eucalyptus microcorys* Tallowood	20	.90 DAC 1.05	16	11 SRZ 3.5	A	A	2	M	M	This tree is part of a group planting. This tree requires an 9m setback to the east for the crown.
007	*Callistemon viminalis* Bottlebrush	5	5 x .08 DAC .20	4	2.4 SRZ 1.7	A	A	2	L	L	Partially suppressed semi-mature tree

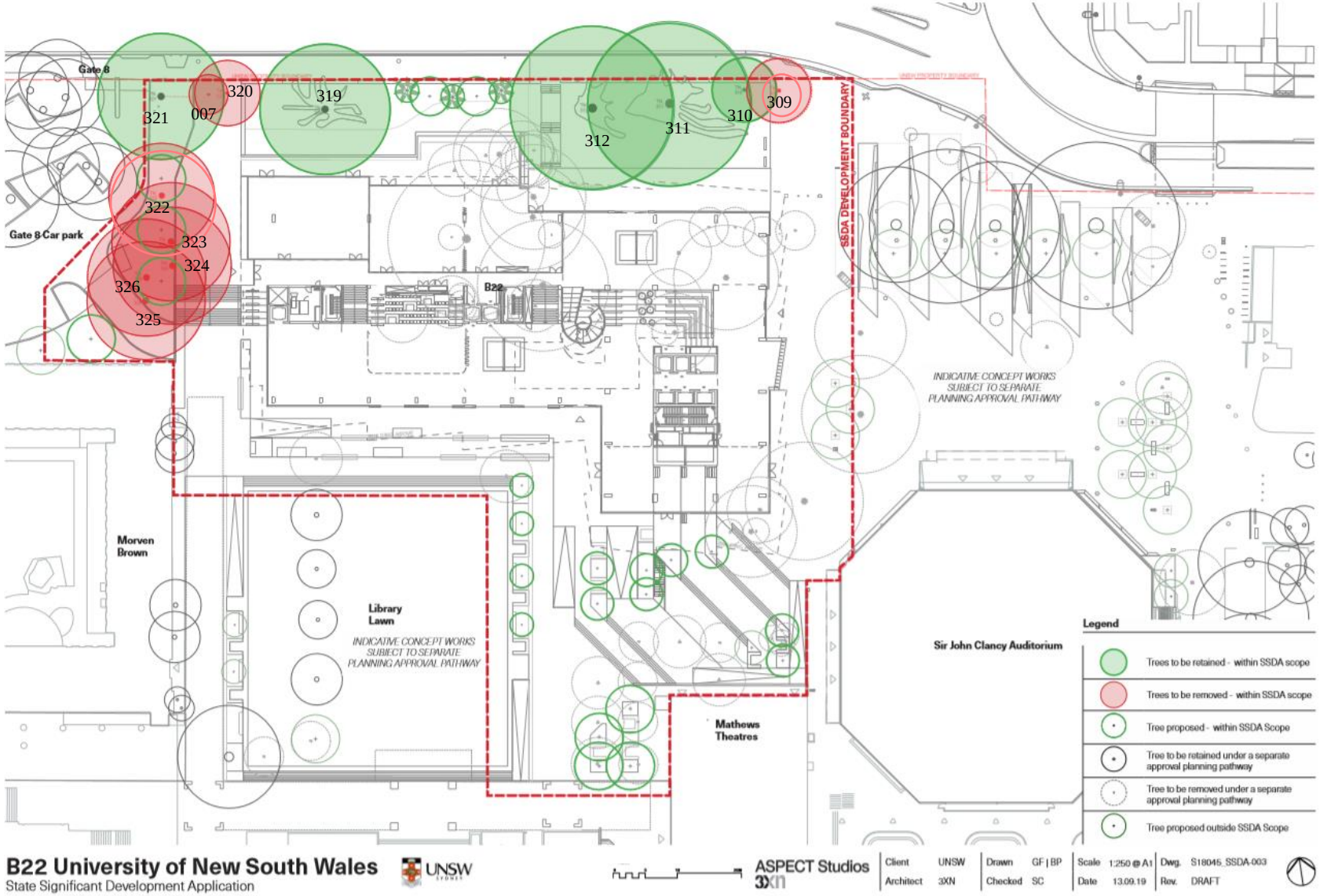
Explanatory Notes for Table

- *Dbh = Diameter of trunk at breast height.
- ** DAC = Diameter above the root collar used to measure the Structural Root Zone (SRZ).
- ***TPZ is the recommended TPZ 12x the DBH at 1.4m, SRZ is the trees structural root zone. Refer to AS4970 for details.
- **** ULE Explanation can be found in Appendix 1.
- + IACA Landscape value and S.T.A.R.S Rating system. Refer to Appendix 5
- # Health and Structure values represented above are P = poor, BA = Below Average, A = Average, G = Good

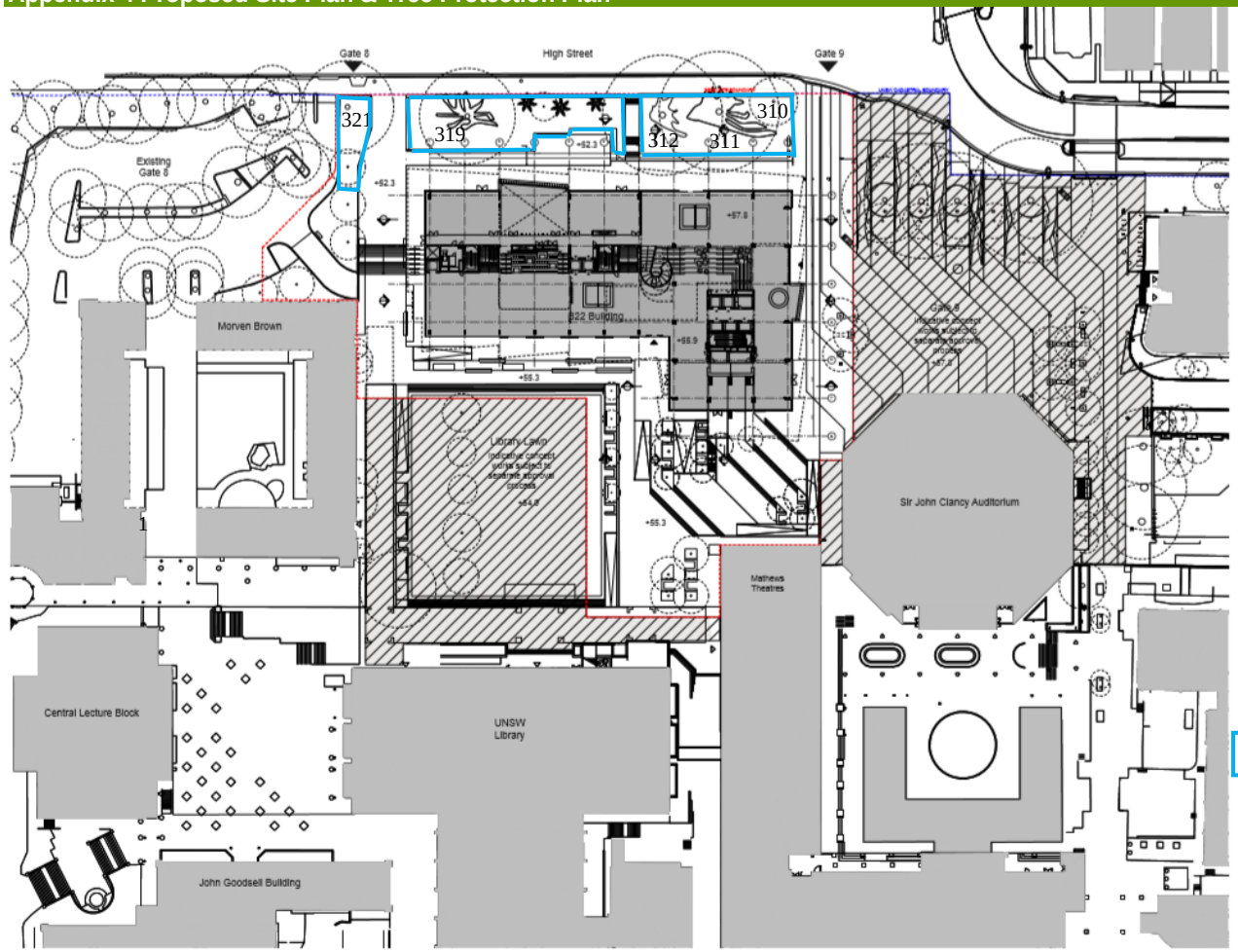
Appendix 3 Images of Tree

Image 1 shows trees trees 311 & 312 on the High Street Frontage. Image 2 above centre shows an example of trees roots present near tree 311 to the south. Image 3 above right shows tree 311 from the east and the canopy over the building. Image 4 below left shows tree 319 on the High street frontage. Image 5 shows trees 007 & 320 & 321 on the High Street frontage near gate 8. Image 6 below right shows trees 322-326 proposed to be removed.

Appendix 4 Proposed Site Plan and Tree Removal Plan



Appendix 4 Proposed Site Plan & Tree Protection Plan



1.8m Chainmesh Fencing

Appendix 5 Legend for S.T.A.R.S matrix assessment

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

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2001.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined.

Tree Significance - Assessment Criteria

1. High Significance in landscape

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

2. Medium Significance in landscape

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

3. Low Significance in landscape

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

Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

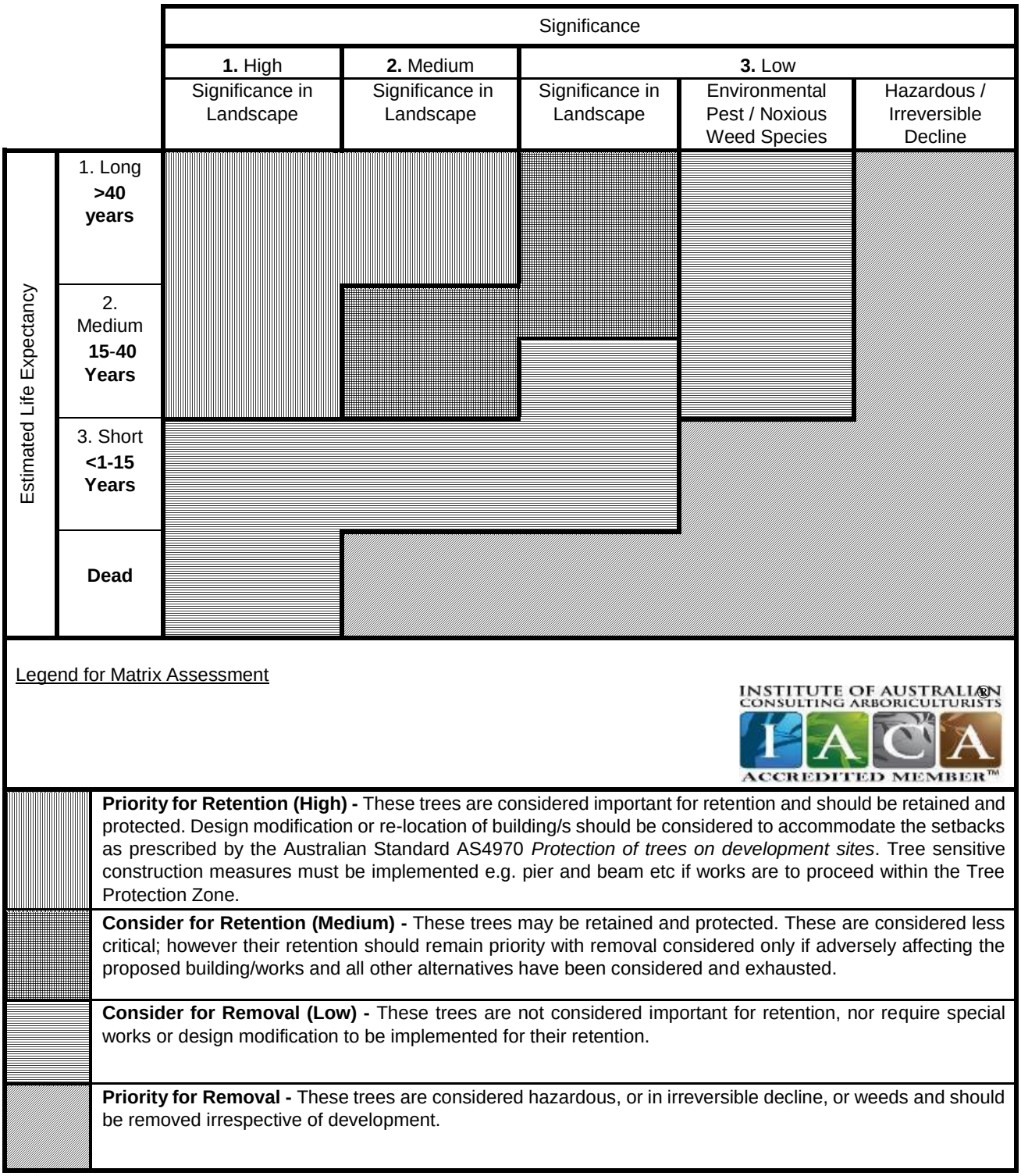
Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

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

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

Table 1.0 Tree Retention Value - Priority Matrix.



Legend for Matrix Assessment

	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

REFERENCES

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

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

Appendix 6 References

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

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

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Shigo, A.L. (1986). *A New Tree Biology*. Shigo & Trees, Associates, Durham, New Hampshire

Hadlington, P. & Johnston, J. (1988). *Australian Trees: Their Care & Repair. University of NSW Press, Kensington*

Lonsdale, D. (1999). *Principles of Tree Hazard Assessment & Management.* Forestry Commission, The Stationery Office, London

Mattheck, C. & Breloer, H. (1994). *The Body Language of Trees.* Research for Amenity Trees No.4. The Stationery Office, London

Appendix 7 Glossary of Terms

Abiotic	Nonliving
Anthracnose	a fungal disease-causing dead areas on the leaves, buds, stems.
Arboriculture	The science and art of caring for trees, shrubs and other woody plants in landscape settings.
Barrier Zone	Protective boundary formed in new wood in response to wounding or other injury.
Biotic	Alive, pertaining to living organisms.
Branch attachment	The structural union of a lateral branch.
Callus	Undifferentiated tissue produced in response to wounding.
Canker	A dead spot or necrotic lesion that is caused by a bark inhabiting organism/pathogen.
Cavity	an open wound characterized by the presence of decay resulting in a hollow.
Collar	the ring of tissue that surrounds the lateral branch at its point of attachment.
Compartmentalization	A physiological process that creates the chemical and physical boundaries that act to limit the spread of disease and decay organisms.
Compression wood	A type of reaction wood that forms on the underside of branches which tends to maintain a branch angle of growth.
Crown	The above ground parts of the tree, including the trunk.
DBH	The diameter of a tree's trunk measured at 1.4m.
Decay	Process of degradation of woody tissues by fungi and bacteria through the decomposition of cellulose and lignin.
Decline	Progressive decrease in health of organs or the entire plant usually caused by a series of interacting factors.
Drip line	The width of the crown, as measured by the lateral extent of the foliage.
Epicormic shoot	a shoot that arises from latent or adventitious buds that occur on stems, branches or the bases of trees.
Included bark	Pattern of development at branch junctions where bark is turned inward, rather than pushed out; contrast with the branch nark ridge.
Mortality Spiral	The sequence of events describing a change in the trees health from vigorous to declining to death.
Photosynthesis	The transformation in the presence of chlorophyll and light, of carbon dioxide from (the air) and water (primarily from soil) into a simple carbohydrate and oxygen.
Pruning	systematic removal of branches of a plant usually a woody perennial.
Reaction wood	Specialized secondary xylem that develops in response to a lean or similar mechanical stress to restore the stem to vertical.
Taper	The change in diameter over the length of trunks and branches. Important to mechanical support.
Tension wood	A type of reaction wood that trees form on the upper side of branches and stems and roots.
VTA	Visual Tree Assessment is a method of evaluating structural defects and stability in trees.
Wound	Any injury that induces a compartmentalization response.

Appendix 8, The Ents Tree Consultancy Tree Protection Guidelines

Definitions

a) **Tree Protection Zone (TPZ),** The TPZ is divided into 2 areas. 1 The Structural Root Zone delineated by an area nominated in table section 4 of the report and is assumed to contain most structural roots. The Tree Protection Zone that is twelve times the diameter of the tree trunk which is used to gauge the amount of feeder roots. No machinery works are permitted in these areas unless specified in this report or without written approval from the Council or the Arborist employed for this job site.

b) **Qualified Arborist**, for supervision of works and reports level 5. For carrying out tree works level 3 Levels are as recognised by the Australian training framework.

Standards, AS4970 2009, Protection of Trees on development sites. AS 4373: 1996, The pruning of amenity trees.

Tree Protection Generally

1. Prior to works commencing erect a 1800mm chain mesh fence to protect the trees trunk at 12x Dbh or as specified in this report. The Tree Protection Zones as nominated should be marked with line marking paint and observed as an area free from machinery for the duration of the works unless stated otherwise in the accompanying report. Do not remove, alter or relocate without the approval of the Council or the Arborist employed for this site.

2. Trees to be protected in the works contract are items entrusted to the Contractor /owner by the Council for carrying out the work under the Contract. The Contractor/owner has obligations to protect these trees as part of the care of the work in the contract conditions.

3. Prior to commencing work on Site confirm with the Council all trees to be protected for the duration of the Works. Confirm also all access and haulage routes, storage areas, tree protection measures and work procedures. Ensure that the protection measures are in place prior to commencing work.

4. Use suitably qualified Arborist (level 5) to supervise earthworks or activities within the Structural Root Zone of tree, Do not severe roots 50mm or greater, which may cause damage to or affect the health of trees. Pruning of trees by the contractor is not permitted. If pruning works are required a suitably qualified (Minimum level 3) arborist will complete all works in the crown. All root pruning must be completed and documented by the level 5 site arborist.

5. Ensure construction trailers, vehicles and equipment do not come in contact with any tree at any time. Do not locate storage areas within the nominated Tree Protection Zone. Do not deposit or store materials, spoil, contaminants, and waste or washout water within Tree Protection Zones.

6. Take all reasonable precautions to protect trees to be retained on site from damage and decline, maintaining their health during the Contract. Implement recognised best practice industry standards to satisfy horticultural requirements for tree care.

7. Assess and monitor water stress in relation to trees on site. This is of particular importance if earthworks have occurred. Apply sufficient water to the trees on site as required to keep the trees healthy. Immediately report to the Council and site arborist, any trees on site that are injured, damaged or are in decline.

NOTE: Failure to comply with any part of these tree protection guidelines or the Australian standard AS4970 or AS4373 will result in the party breaching the Tree Protection Guidelines taking responsibility for all associated consequences.

Appendix 9 Curriculum Vitae

Education and Qualifications

- 2018 Completing Graduate Certificate in Arboriculture Melbourne University (AQF Level 8).
- Arboriculture Australia 3 Day Tree Anatomy Workshop 2015
- QTRA basic certificate 2014, QTRA Advanced Certificate 2016
- TRAQ Qualification 2014
- 2005 Diploma of Arboriculture (AQF Cert 5), Ryde TAFE. Distinction Pass.
- Barrell Tree Care Workshop- Trees on Construction Sites (Brisbane 2005)
- Tree Logic seminar- Urban Tree Risk Management (Sydney 2005)
- Tree Pathology and Wood Decay Seminar Sydney (2004)
- Excelsior Training Claus Mattheck (Sydney 2001)
- 2000 Tree Climbing Course (AQF Cert 2), Ryde TAFE.
- 1999 Advanced Certificate in Urban Horticulture, (AQF Cert 4), Ryde TAFE. Distinction Pass.
- 1995 Greenkeepers Trade Certificate (AQF 3) Ryde TAFE. Credit Pass.
- 1991 Higher School Certificate.

Conference Attendance/presentation of Scientific Papers

- Barrell Tree Care Workshop- Trees on Construction Sites (Brisbane 2005)
- Tree Logic seminar- Urban Tree Risk Management (Sydney 2005)
- Tree Pathology and Wood Decay Seminar Sydney (2004)
- Excelsior Training Claus Mattheck (Sydney 2001)
- Managing Mature Trees NAAA (Sydney 2000), Presented a Paper “Habitat Value of Mature Trees”

Professional Membership Accreditation

- Institute of Australian Consulting Arborists ACM 0482014
- Arboriculture Australia Member number 2527

Presentation of Scientific Papers

- Managing Mature Trees NAAA (Sydney 2000), Presented a Paper “Habitat Value of Mature Trees”

Industry Experience

- **2004 to Date, Sole Trader, The Ents Tree Consultancy.** Writing of tree reports for development applications, master plans, hazard evaluations, tree management plans and expert witness reports. Hazard assessments, tree surveys and consultations. Clients include The Royal Botanic Gardens Sydney, UNSW Master Planning Works including SIRF building, Tyree Building, DP sports field redevelopment, Sydney University Mays Green Precinct, Taronga Zoo Coastline Precinct, Capital Insight, Campbelltown Hospital Redevelopment, Parramatta Park Trust multiple jobs, Woollahra Council multiple jobs and many other jobs.
- **2003 to 2008, Arborist University of New South Wales**. Survey all trees on site, developed a Tree Management Database. Minimise hazard potential of all trees on site through evaluation and works. Generate and prioritise works and tree assessment-based areas usage, tree conditions and staff required. Development of UNSW Tree Protection Guidelines for master planning works. Acting Supervisor December 2006 to May 2007.
- **2003 Tree management Officer Randwick Council**. Liaise with public to explain and enforce the councils Tree Preservation order. Management of internal staff and contractors. Project management and co-ordination of street tree planting and maintenance.
- **1999 to 2003 Animal Food Production Manager and Arborist.** Management of Koala Food Plantation, Management of animal food supply registry for herbivores/omnivores. Coordination of staff contractors and volunteers. Maintain and manage tree management database, complete tree works within zoo grounds and at zoo owned plantations. Acting supervisor 6-month period 2002 for grounds dept and asset management trade team.
- **1998 to 1999 Sole Trader Techniques Lawn & Garden Consultancy.** Lawn, garden and Tree care. Garden design and maintenance. Tree works and tree removal. Installation of irrigation equipment.
- **1997 to 1998 Greenkeeper / Horticulturist Muirfield Golf Course.** General grounds duties, machinery maintenance, horticultural works, tree works
- **1992 to 1997 Greenkeeper / Horticulturist Ashlar Golf Course.** General grounds duties, machinery maintenance, horticultural works, tree works