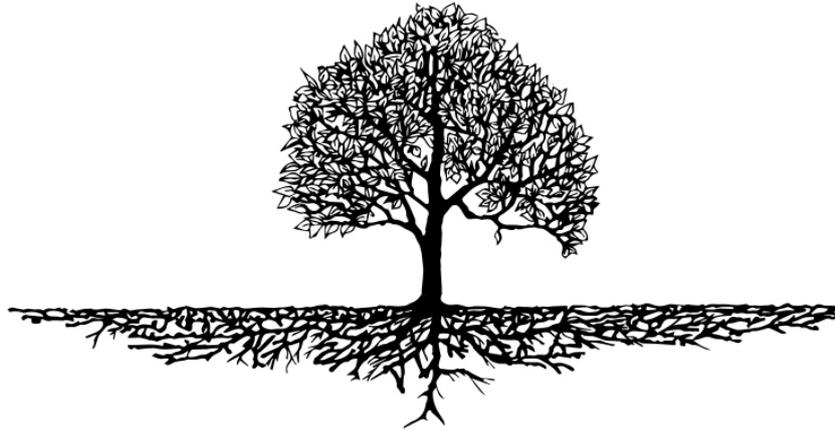


Client	Lend Lease
Location	UNSW D14 Precinct, UNSW Kensington Campus
Document Type	Arboricultural Impact Assessment, Tree Protection Plan & Tree Protection Specification
Date	5 th November 2018



The Ents **Tree Consultancy**

Development Reports | Hazard Assessments | Tree Management





Client	Lend Lease
Location	UNSW D14 Precinct, UNSW Kensington Campus
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2. Introduction

2.1 On the 3rd October 2018 the Lend Lease engaged The Ents Tree Consultancy to complete an Arboricultural Impact Assessment for the proposed development at the D14 precinct, UNSW Kensington Campus. The objectives of the report are to nominate the trees that are to be removed and those that are to be retained. The trees nominated for retention will be retained in good condition for the duration of the works. To achieve this there are to be no disturbances within the structural root zones of any tree and less than 25% disturbance to the tree protection zone of any tree. This report will assess the nominated trees that are within the design envelope which may be impacted upon by the works or the associated activities. Consultation was sought with the client about the number and position of trees to be inspected prior to a survey being completed.

2.2 The site inspection of the nominated trees occurred on the 5th and 6th October 2018. This tree report will detail the condition of the nominated trees, observe the condition, longevity and significance of each tree. The report will then recommend removal or retention of the trees or the required setbacks to ensure the viability of trees to be retained. Recommendations for removal or retention will be based on the trees significance, the requirements of the proposed works and compatibility of the trees with the works. The report will also assess any potential impacts for trees nominated to be retained and attempt to remove or minimise them where possible. Recommended tree protection measures as set out in the Australian Standard AS4970 Protection of Trees on development sites will be nominated as required.

2.3 The purpose of this report is to assess the area of the proposed works envelope as well as the health and suitability of the trees nominated at the time of the inspection. The report will also provide tree management options for trees on the site in regard to the planning of the proposed works. The Tree Protection Guidelines will be discussed for all trees nominated to be retained. The information in this report will be based on the information presented by the client at the time of the inspection as well as the site inspection. The Australian Standard AS4970 Protection of Trees on development sites will be used as a guide to manage the site. Additional Tree Protection measures are included in appendix 8.

2.4 To achieve the objectives of the report, the trees will be assessed noting the species, size, general condition. The trees will be assessed using the internationally recognised VTA assessment method for above ground parts only. The trees characteristics and eventual size will be taken into consideration as will the trees position in relation to structures and hard scapes. Recommendations will be outlined in section 5 of the report. A detailed list of the trees surveyed will be provided in Appendix 2 of the report and an existing numerical system has been used to identify them for this report and future reference on this job site.

3 Methodology

- 3.1 The trees were assessed using the standard Visual Tree Assessment technique (VTA). The trees were assessed from the ground for this report.
- 3.2 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.
- 3.3 The height of the trees was estimated and the spread of the trees canopy was paced out.
- 3.4 A Canon 5D Digital camera with a 24-105mm lens was used to take all photographs in this report.
- 3.5 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. Discussion

4.1 The trees nominated to be assessed are located on and adjoining the proposed works site from Fig Tree Lane to the East, College Walk to the South, Alumni Park to the West and the UNSW Village/ White House to the North, on the UNSW Kensington Campus. Some of the trees are significant in the immediate landscape and some are 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 sandy loam that has been disturbed previously when the existing building and hardscapes were built and the site was cleared.

4.2 Based on the information provided by the client, there is a preliminary design for the proposed development, however a design is yet to be finalised. This report will list the tree proposed to be removed based on the information provided by the client and the site plan provided by the client. The report will list discuss the trees nominated to be retained, the required setback for each tree's structural root zone and tree protection zone. To achieve stability of the tree in relation to the soil, no excavations, (strip footings or level changes) are recommended within the trees projected structural root zone (SRZ). Please refer to the tree table Appendix 2 for each trees Structural Root Zone (SRZ) and Tree Protection Zone (TPZ).

4.3 It should be noted that the majority of the significant trees on site and all the trees adjoining the site are proposed to be retained and protected for the duration of the works. To allow the proposed works to proceed trees NR1, NR4-NR9, trees 409b, 465-479 and trees 1119-1228 are proposed to be removed. These trees should be replaced within a new landscape plan with appropriately sized specimens capable of thriving in the area that they are proposed to be planted. Requirements of the trees soil volume, canopy space and general biological function and species characteristics should be considered prior to selection for the site.

4.4 The trees nominated to be retained, will need to be retained using sympathetic building activities to allow the works to proceed. Options for managing the trees nominated to be retained on and adjoining the proposed works site should be based on the Australian Standard AS4970 2009 Protection of trees on development sites. It should be noted that heavy pruning of the trees crown will not be permissible. Any proposed pruning works should be planned to adhere to the Australian Standard for the Pruning of Amenity Trees AS4373 2007. There are several palm trees on the site that are desirable specimens that could be reused on this site or transplanted to another position on the site if deemed appropriate by the UNSW. Tree 403 represents a group of 5 semi mature to mature native palm trees. Trees NR2 and NR3 represent 6-7 semi mature palm trees that have the potential to be reused on site or transplanted to another position on the campus grounds.

4.5 There are several trees rated as high retention to the east and north of the proposed works site. These are **trees 404 – 408 and tree 411**. To the south there are **Trees 480 – 483**. The proposed disturbances for the installation of services should be moved as far away from these trees as possible. At present it is estimated that the service trench passing trees 404 - 406 at 12m will impact on the trees tree protection zone by 10%. This level of disturbance is acceptable for this species at this age. All trenching works within 15m of the trees will need to be supervised by the AQF level 5 site Arborist to ensure that any roots 50mm+ are recorded and are cut cleanly. No disturbances are anticipated for trees 407, 408 and 411 according to the proposed demolition plans. Trees 480-484 will have the new service trench installed at 11m to the north. This is an acceptable distance from the trees and minimal impacts are anticipated. Excavations and landscape works to the S & SW of tree 404 need to be reviewed by AQF level 5 site Arborist. No excavations permitted within 5m of any tree and less than 20% disturbance to TPZ. Placement of services around all trees to be verified and abide by the Australian Standard AS4970 2009 Protection of trees on development sites.

4.6 **Tree Protection Trees 404 - 408, 411 and trees 480-483**. All of these trees will require tree protection measures to be installed to retain the trees in good condition for the duration of the works. It is anticipated that the existing hardscapes will remain in place for the duration of the works protection the trees root zones, limiting any root disturbance. If the hardscapes are removed, ground protection will need to be installed. To protect the trees vascular tissue and rootzones in exposed garden areas, 1.8m tree protection fencing will be required to be installed prior to the works commencing. Trees 404-408 and tree 411 will have the fences installed at the edge of their garden beds, separating the trees from the works. Trees 480-483 will have a smaller area fenced off to protect the trees trunks from impacts. Custom made trunk wraps can be installed for trees 480-483 by the AQF level 5 site Arborist if required. Refer to Appendix 4a.

4.7 **Tree 402** is a large and significant standalone tree that is of high value. No disturbances to the trees root zone for machinery operations will be permitted within 5m of the tree to ensure its stability and to protect the trees structural roots. Calculations in regard to the impact of the building works on the tree are estimated to be 10% at an 8.5m setback to the west of the tree. The present services to be installed around the tree are not acceptable. These services should be moved to the west of the tree at the existing building line, 8m away. The service trench should also be moved to 5m to the south of the tree to ensure that large roots are not damaged and to minimise any disturbance to the trees projected tree protection zone. The disturbance to the trees root zone for the service installation is 10% to the south with 15% to the west. This is at the upper limit of what this tree will tolerate, confirmation that the service trench has been moved in writing will need to be produced prior to the works commencing.

4.8 The excavations / level changes to West of tree at 2m are not acceptable as they are within the trees SRZ. The disturbances present a 35% disturbance to the TPZ alone and will cut structural roots in SRZ potentially destabilising the tree. The proposed hardscapes surrounding the tree are not acceptable unless constructed on pier and beam footings or in a manner that does not result in any continuous footings or level changes. To retain the tree the disturbances to the TPZ will need to be reduced to 20% and a 5m setback required to achieve stability. Clarification of landscape works are required to achieve an acceptable disturbance to the SRZ and TPZ. This tree will not survive the proposed works if amendments are not made. Placement of services around all trees to be verified and excavations to achieve the final landscape plan are to be reviewed by the AQF level 5 site Arborist.



4.9 Tree Protection Tree 402. It is anticipated that the existing hardscapes will remain in place for the duration of the works protection the root zone, limiting any root disturbance to the north, east and south. All other areas will require protection by the installation of 1.8m chainmesh fencing. The fencing will be installed at the edge of the garden bed and at .5m off the existing building. If the 1.8m chain mesh fencing cannot be installed in the positions indicated, ground protection will be required. The ground protection will consist of a layer of geo-textile fabric, a 100mm layer of mulch and 150mm x 250mm rumble boards strapped together. This ground protection will cover the garden bed within the tree protection zone, no machinery operations within 5m of the tree.

4.9 During the demolition phase trunk wraps may be required to be installed. The trunk wraps should consist of a layer of padded material to protect the trees vascular tissue from damage. Vertical timber slats will be fastened to the padding using an adjustable strap or tightening mechanism. The timber slats must be approximately 1.8m in height for the trunk and if required, custom made for branches. The 1.8m timber slats will be approximately 50mm x 70mm and cover the trunk with a maximum spacing of 25mm. At no time should the timber slats or wire come in contact with the tree and no fixtures are permitted on the tree. At no time should the tree protection material be removed during the works period without the written consent of the AQF level 5 site Arborist.

4.10 Care during demolition works will be required when removing the existing building, the adjoining hardscapes and for the installation of the proposed services. All works within 5m of the tree will be required to be supervised by the AQF level 5 site Arborist. All service trenches within 5m of the tree will need to be excavated by hand under the supervision of the AQF level 5 Arborist. Any roots 50mm+ will need to be retained if possible, if the roots are to be severed they are to be cleanly cut and recorded by the AQF level 5 Arborist.

4.11 Trees 409, 409a & 410. This is a stand of four small trees to the north and east of the works site. One tree to the south-east of the group is proposed to be removed. The trees have a moderate retention value and one of the trees, (409a) is close to the proposed works demolition works. Trees 409 & 409a have a service trench proposed to run in between the two trees. It is recommended that the service trench is moved to the south of tree 409a to the edge of the building line or to as far to the south as possible, retaining a minimum of 2.5m clearance for the centre of the trees trunk. If it is not possible to relocate the trench direction drilling will need to occur or hand digging with not roots severed and pipes threaded under the trees root system. All the services work and demolition works will need to be supervised by the AQF level 5 site Arborist when the northern building façade is demolished. Confirmation of the position of the service trench will need to be produced prior to the works commencing. Placement of services around all trees to be verified by the AQF level 5 Arborist.

4.12 Tree Protection Trees 409, 409b and tree 410. All of these trees will require tree protection measures to be installed to retain the trees in good condition for the duration of the works. It is anticipated that the existing hardscapes will remain in place surrounding the trees for the duration of the works protecting the trees root zones, limiting any root disturbance. To protect the trees vascular tissue and root zones in exposed garden areas, 1.8m tree protection fencing will be required to be installed prior to the works commencing. The trees will have the fences installed at the edge of their garden beds or at .5m off the edge of the proposed building to be demolished, separating the trees from the works. Refer to Appendix 4a.

4.13 Trees 457-464. These trees form a stand from east to west on the southern edge of Alumni Park. Most of these trees are away from the works, however due to the limited space within the campus and the requirement for access the trees projected tree protection zones be exposed to vehicular movements to the north. A minimum of 4m is required from the trees, however the largest distance to the north of the trees is desirable to minimise any potential impacts. The 4m setback will account for a 20% disturbance to the trees projected tree protection zone. Minimal pruning will be permitted to raise the trees crowns if required and all existing hardstands to the south should remain in place to minimise stress to the trees. This should be considered when placing temporary buildings as pruning for building clearance will not be permitted.

4.14 The proposed service installation to the north & east of tree 462- 464 is not compatible with trees retention. The new service installation will need to move as far away from this tree as possible with a minimum of 5m from the tree permissible. Confirmation that the service trench has been moved in writing will need to be produced prior to the works commencing. Level changes to the north and east of these trees not compatible with retention, revision of the levels is required.

4.15 Tree Protection Trees 457-464. All of these trees will require tree protection measures to be installed to retain the trees in good condition for the duration of the works. It is anticipated that the existing hardscapes to the south will remain in place for the duration of the works, protecting the trees root zones and limiting any root disturbances. To protect the trees vascular tissue and root zones in exposed garden / lawn areas, 1.8m tree protection fencing will be required to be installed prior to the works commencing. The fences are to be installed at the edge of their garden beds to the south and at a minimum of 4m to the north separating the trees from the works. Custom made trunk wraps can be installed for trees 480-483 by the AQF level 5 site Arborist if required. Refer to Appendix 4a.

4.16 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.



5. Recommendations

- 5.1 After reviewing the site and the information provided by the client, the design works are proposed to proceed with the following planning actions, trees NR1-NR9, trees 403, 409b, 465-479 and trees 1119-1228 are proposed to be removed. These trees should be replaced within a new landscape plan with appropriately sized specimens capable of thriving in the area that they are proposed to be planted. Requirements of the trees soil volume, canopy space and general biological function and species characteristics should be considered prior to selection for the site. In garden areas soil volume calculations should be made to ensure the new plantings will have enough space to mature.
- 5.2 Consideration should be given to transplanting tree groups NR2, NR3 and tree group 403. These semi mature palm trees could be reused in this design or in another position on the site,
- 5.3 Trees 402, 404-411, 457-464 and trees 480-483 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. The AQF level 5 site Arborist will need to sign off on the tree protection measures prior to demolition works commencing.
- 5.4 All demolition works, proposed enabling works and constructions works within or at the edge of any structural root zone or the distance from the trunk nominated by the AQF level 5 site Arborist of any tree will need to be supervised and recorded by the AQF level 5 site Arborist. All root pruning will be completed and recorded by the AQF level 5 Arborist. It is the client's responsibility to arrange site inspections and co-ordinate the works with the AQF level 5 site Arborist.
- 5.5 Monthly 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 trees have 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, the UNSW and council will be contacted for further advice.
- 5.6 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



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.

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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	10-20 Years	Low
4	0 Years	Dead



Appendix 2 Assessment of Trees

UNSW Tree #	Species	Height (m)	DBH* & DAC**	Canopy Spread (m)	TPZ ***	Health #	Structure #	ULE Rating ****	Landscape Rating +	Stars Rating +	Observations and comments
408	<i>Ficus macrophylla</i> Moreton Bay Fig	24	1.82 DAC 1.95	26	15 SRZ 4.4	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the Fig Tree Lane stand. This tree has a broad crown and extensive root system. A heritage item that requires minimal disturbances to its tree protection zone and crown.
407	<i>Ficus macrophylla</i> Moreton Bay Fig	24	2.1 DAC 2.2	26	15 SRZ 4.6	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the Fig Tree Lane stand. This tree has a broad crown and extensive root system. A heritage item that requires minimal disturbances to its tree protection zone and crown.
406	<i>Ficus macrophylla</i> Moreton Bay Fig	24	2.05 DAC 2.15	24	15 SRZ 4.55	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the Fig Tree Lane stand. This tree has a broad crown and extensive root system. A heritage item that requires minimal disturbances to its tree protection zone and crown.
405	<i>Ficus macrophylla</i> Moreton Bay Fig	20	1.57 DAC 1.75	22	15 SRZ 4.2	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the Fig Tree Lane stand. This tree has a broad crown and extensive root system. A heritage item that requires minimal disturbances to its tree protection zone and crown.
404	<i>Ficus macrophylla</i> Moreton Bay Fig	16	1.2 DAC 1.25	16	15 SRZ 3.65	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the Fig Tree Lane stand. This tree has a broad crown and extensive root system. A heritage item that requires minimal disturbances to its tree protection zone and crown.
411	<i>Ficus macrophylla</i> Moreton Bay Fig	16	1.2 DAC 1.4	16	15 SRZ 3.9	A	A	1	H	H	A mature and significant tree that is co-dominant forms part of the Fig Tree Lane stand. This tree has a broad crown and extensive root system. A heritage item that requires minimal disturbances to its tree protection zone and crown.



UNSW Tree #	Species	Height (m)	DBH* & DAC**	Canopy Spread (m)	TPZ ***	Health #	Structure #	ULE Rating ****	Landscape Rating +	Stars Rating +	Observations and comments
410	<i>Acer negundo</i> Box Elder	7	.25 DAC .35	6	3 SRZ 2.15	A	Ba	2	L	L	
409	<i>Acer negundo</i> Box Elder	9	.25 DAC .35	6	3 SRZ 2.15	A	Ba	2	L	L	
409a	<i>Acer negundo</i> Box Elder	10	.35 DAC .45	7	4.25 SRZ 2.35	A	Ba	2	L	L	
402	<i>Eucalyptus grandis</i> Flooded Gum	19	1.07 DAC 1.2	14	13.25 SRZ 3.6	A	A	1	H	H	A mature and significant tree located close to the existing building and hardscapes. All works within 4m are to be completed by hand for demolition. Proposed works should remain in the existing building footprints with no services, excavations or level changes within 4m of tree disturb less than 20% of trees projected TPZ.
480	<i>Ficus microcarpa</i> "hillii" Hills Fig	15	.65 DAC .75	16	8 SRZ 3	A	A	1	H	H	A mature tree that forms part of the quadrangle lawn. Originally four trees intended to be hedged, allowed to mature. Some pavement lifting around trees, SRZ extends into College Walk.
481	<i>Ficus microcarpa</i> "hillii" Hills Fig	15	.77 DAC .85	16	8 SRZ 3	A	A	1	H	H	A mature tree that forms part of the quadrangle lawn. Originally four trees intended to be hedged, allowed to mature. Some pavement lifting around trees, SRZ extends into College Walk.
482	<i>Ficus microcarpa</i> "hillii" Hills Fig	16	.77 DAC .85	16	9 SRZ 3.2	A	A	1	H	H	SRZ extends into College Walk.
483	<i>Ficus microcarpa</i> "hillii" Hills Fig	16	2 x .40 DAC .65	16	8 SRZ 2.75	A	A	1	H	H	SRZ extends into College Walk.



UNSW Tree #	Species	Height (m)	DBH* & DAC**	Canopy Spread (m)	TPZ ***	Health #	Structure #	ULE Rating ****	Landscape Rating +	Stars Rating +	Observations and comments
464	<i>Eucalyptus microcorys</i> Tallowood	14	.64 DAC .75	10	7.8 SRZ 3	A	A	1	M	M	Located in the SE corner of Alumni Park.
463	<i>Eucalyptus microcorys</i> Tallowood	14	.50 DAC .60	8	6 SRZ 2.7	A	A	1	M	M	Located in the SE corner of Alumni Park.
462	<i>Eucalyptus microcorys</i> Tallowood	14	.64 DAC .75	10	7.8 SRZ 3	A	A	1	M	M	Located in the SE corner of Alumni Park.
461	<i>Eucalyptus microcorys</i> Tallowood	14	.50 DAC .60	8	6 SRZ 2.7	A	A	1	M	M	Located on the southern edge of Alumni Park.
460	<i>Eucalyptus microcorys</i> Tallowood	14	.64 DAC .75	10	7.8 SRZ 3	A	A	1	M	M	Located on the southern edge of Alumni Park.
459	<i>Eucalyptus microcorys</i> Tallowood	14	.50 DAC .60	8	6 SRZ 2.7	A	A	1	M	M	Located on the southern edge of Alumni Park.
458	<i>Eucalyptus microcorys</i> Tallowood	14	.64 DAC .75	10	7.8 SRZ 3	A	A	1	M	M	Located on the southern edge of Alumni Park.
457	<i>Eucalyptus microcorys</i> Tallowood	14	.50 DAC .60	8	6 SRZ 2.7	A	A	1	M	M	Located on the southern edge of Alumni Park.

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 Trees

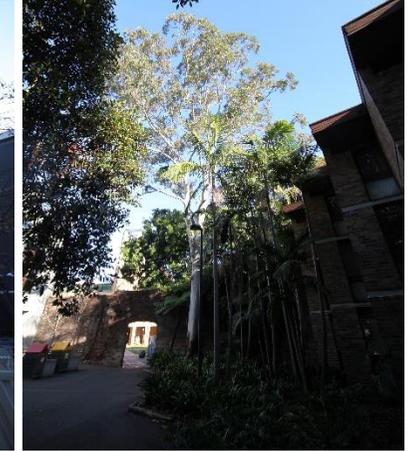
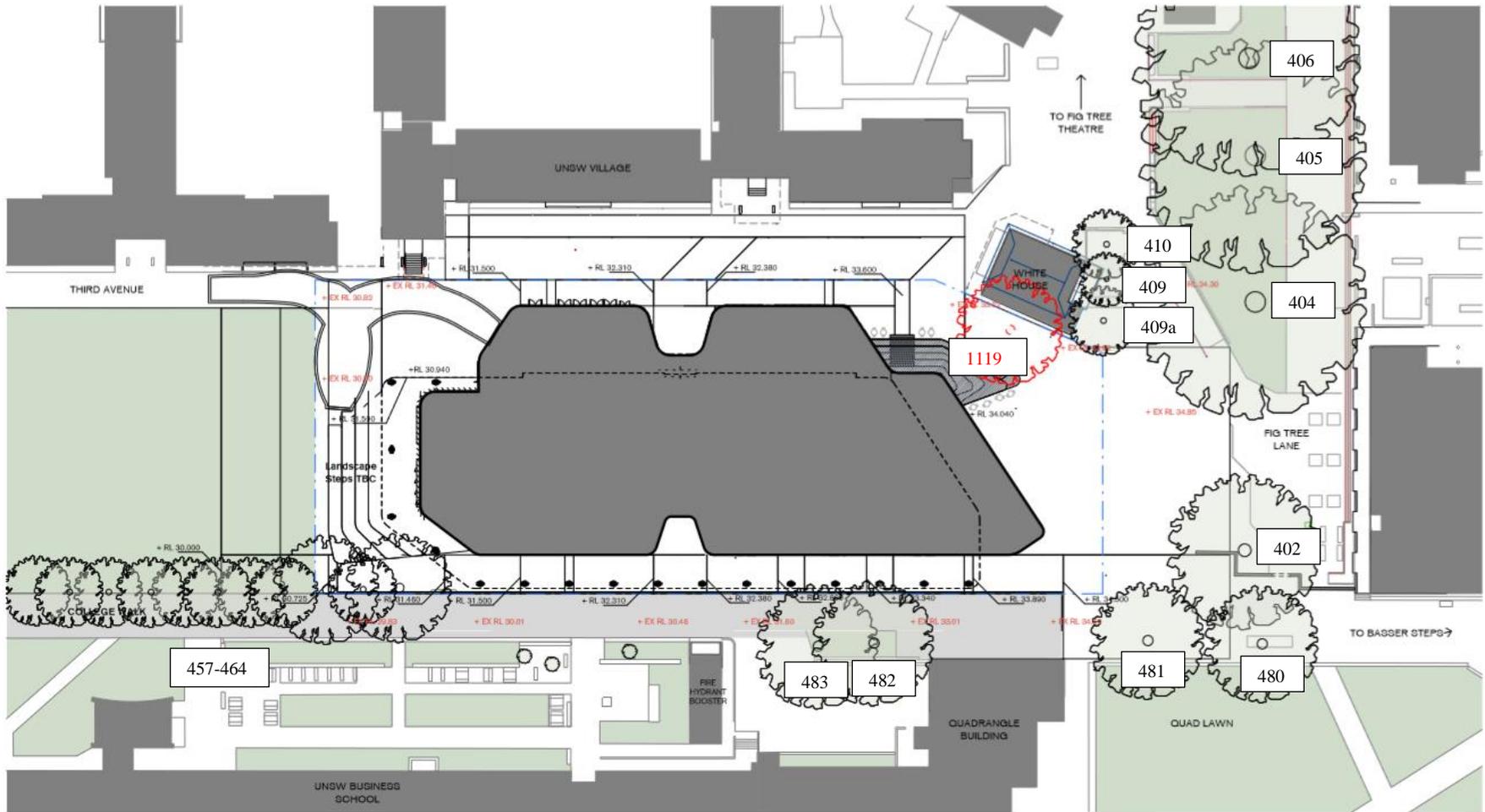


Image 1 above left shows the significant stand of trees along fig tree lane which should be retained with minimal disturbance. Image 2 above centre shows trees 1219, 1219a, 1219b & tree 1220. Image 3 above right shows the significant Gum tree 402. Image 4 below left shows trees 480 & 481. Image 5 below centre shows trees 464 to 461. Image 17 shows tree 411 to the north of the proposed works site. This tree should not be disturbed.





Appendix 4 Tree numbers, Site Plan

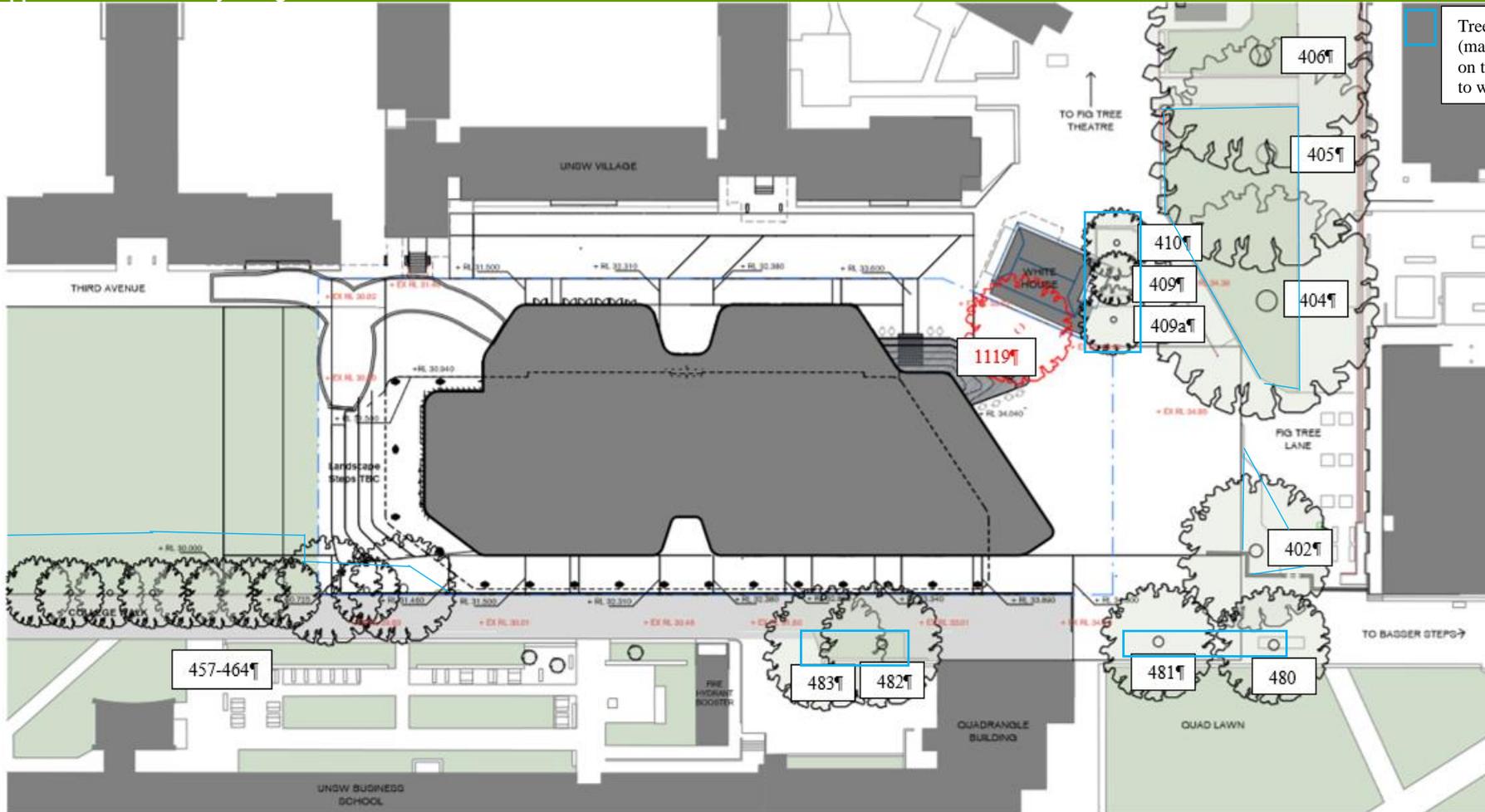


Tzannes

Project UNSW D14	Purpose of Issue For Information
Drawing Ground Levels	Sketch No. SK181029-03
	Scale @ 1:500 @ A3



Appendix 4a Preliminary Design



Tree Protection Fencing (may be required depending on trees position in relation to works / hoarding).

Tzannes

Project UNSW D14	Purpose of Issue For Information
Drawing Ground Levels	Sketch No. SK181029-03
	Scale @ 1:500 @ A3



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.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
<p><u>Legend for Matrix Assessment</u></p> <div style="text-align: right;"> </div>						
	<p>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 <i>Protection of trees on development sites</i>. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.</p>					
	<p>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.</p>					
	<p>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.</p>					
	<p>Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>					

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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
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Appendix 7 Glossary of Terms

Abiotic	Nonliving
Anthraxnose	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 trees 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 bark 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 sever 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

- Currently completing Graduate Certificate in Arboriculture (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.

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 department and asset management trade team.