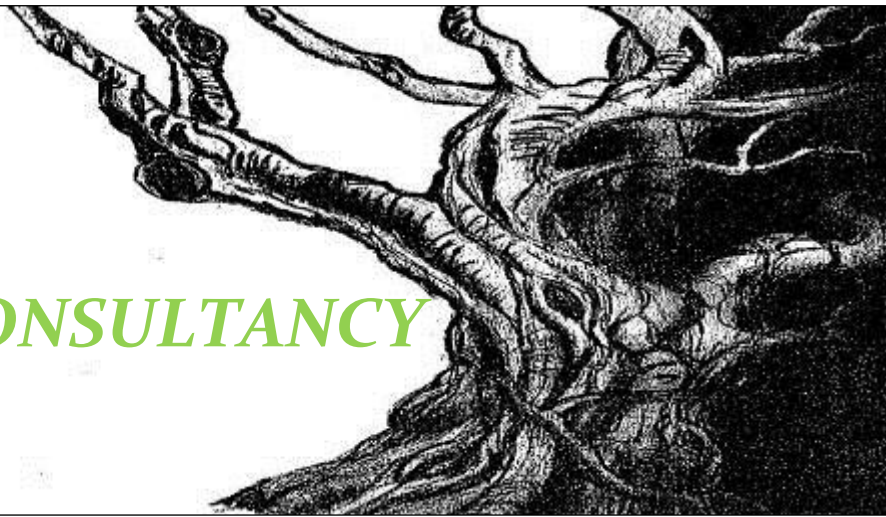


Client	The University of New South Wales
Location	Materials Science and Engineering Building UNSW Kensington Campus
Document Type	Arboriculture Report for Development Application.
Date/Time	20th October 2012.



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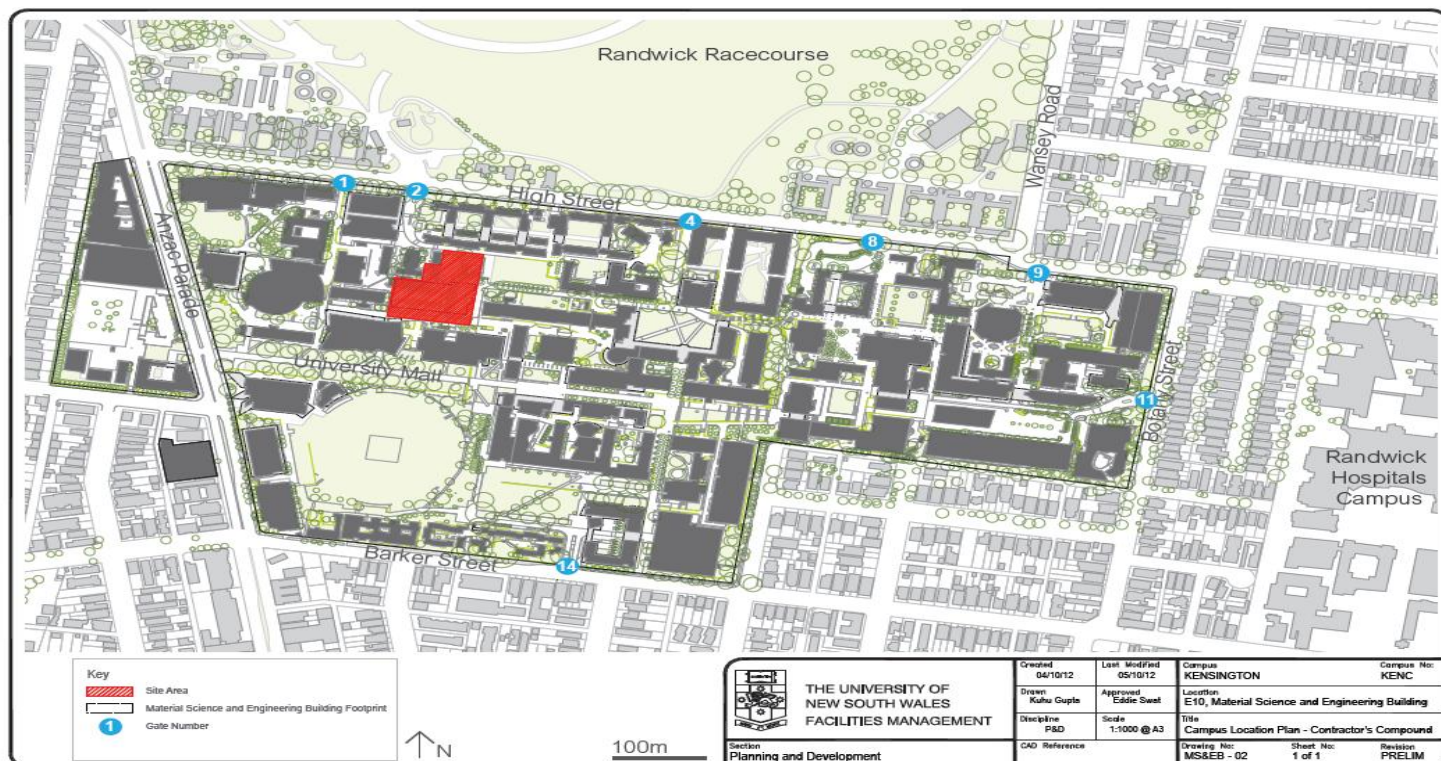
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2 Introduction

2.1 On the 30th August 2012 The University of New South Wales contacted The Ents Tree Consultancy in regards to obtaining a tree report for the trees located on the proposed work site for the Materials Science and Engineering Building at the UNSW Kensington Campus. The client stated that the trees have been nominated to be inspected in relation to a development application. 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 28th September 2012. The client's representative was not present for the site inspection, however a verbal brief providing background information in regards to the trees on site was issued. This tree report will detail the condition of the nominated trees, assess the proposed works and recommend removal or retention based on the plans provided by the UNSW. Tree Protection and recommendations for site management will also be discussed in this report.

2.3 Recommendations for removal or retention will be based on the proposed works and compatibility of the trees for the site as well as the trees hazard potential or SULE Rating. The report will also assess any potential impacts for trees nominated to be retained and attempt to remove or minimise any recognised construction impacts 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.

2.4 The purpose of this report is to provide tree management options for the site based on the proposed works and the site configuration. The report will also assess the suitability of the trees nominated at the time of the inspection. The Tree Protection Guidelines will be discussed for all trees nominated to be retained. The tree protection guidelines must be adhered to during all phases of the building works. Monthly site inspection by an AQF level 5 Arborist is required to manage the site in accordance with the Australian Standard for managing trees on development sites, AS4970. 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 managing the site. Additional Tree Protection measures are included in appendix 7.

2.5 To achieve the objectives of the report, the trees will be assessed noting the species, size, general condition with any defects discussed. 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 the purpose of this report.
- 3.2 A Lufkin 6.5m diameter tape was used to obtain the Diameter at breast height (DBH) as recommended at 1.3 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 5Dii Digital camera with a 17-40mm lens was used to take all photographs in this report.
- 3.5 The SULE rating system has been used as a guide to assist in determining the Safe Useful Life Expectancy of the trees surveyed. Refer to Appendices 1.

4 Discussion

4.1 The trees nominated to be inspected are located on the proposed Materials Science and Engineering Building works site at the UNSW Kensington Campus. Some of the trees are significant in the immediate landscape and some may be considered important in the local areas landscape in terms of amenity and function. The trees are located on a partially exposed site with some protection from surrounding structures and topography. The soil on site is a sandy loam that has been disturbed previously.

4.2 Based on the information provided by the client, the majority of the existing trees (44 of 95 trees originally surveyed in this precinct) will be retained and protected for the duration of the works. Of the 95 trees in the original survey, 4 trees have failed and have already been removed by UNSW. Ten (10) trees are being removed as a result of other works in this area. A total of 37 trees are to be removed and replaced in relation to future building and landscape improvements for the Materials Science and Engineering Building. All trees that are nominated to be retained on 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.

4.3 **Trees 1, 2, 71- 74** are mature trees located close to the proposed work site. The trees have average health and average form for the species. Based on the plan provided by the client, these trees are away from the proposed building works and will not suffer from any significant impacts. Tree Protection for these trees will not be required as they are outside of the tree protection area. The existing automatic irrigation system must remain activated or temporary irrigation will need to be installed and approved by the AQF level 5 site arborist. If any flow on affects, access or potential impacts arises from the proposed works tree protection fencing will need to be installed.

4.4 **Trees 29 – 32** are a group of mature and significant trees located within the proposed works site. These trees are proposed to be retained and protected for the duration of the works. To adequately protect these trees the Tree Protection Zone should extend to the outer edges of the existing garden bed, isolating the trees from the works zone as a group. The Tree Protection Zone should be made of 1.8m chainmesh fence. No excavations, works or storage of materials are permitted in the tree protection areas. The existing automatic irrigation system must remain activated or temporary irrigation will need to be installed and approved by the AQF level 5 site arborist.

4.5 **Tree 33** is a mature tree that is located within the proposed building site. This tree is proposed to be removed. Other trees that are proposed to be removed are **trees 4-7, 9-16, 22-28, 33 and 48-64**. These trees are in the position of the proposed works and are not able to be retained.

4.6 **Tree 34** is a semi mature tree nominated to be retained. This tree is proposed to be retained and protected for the duration of the works. This tree is located close to an existing road and building. If the road surface and building remain undisturbed the Tree Protection will consist of Trunk Wraps. The trunk wraps covering the trunk should consist of a layer of padded material to protect the trees tissue from vascular damage. Vertical timber slats will be fastened to the padding using an adjustable strap or tightening mechanism. The timber slats must be 2m in height, approximately 50mm x 70mm and cover the trunk with a maximum spacing of 25mm. At no time should the tree protection material be removed or damage the tree. If the road or the building is removed, Tree Protection Fencing will be required as set out in Appendix 2.

4.7 **Trees 35-38 and Trees 40-45** are a group of semi mature to mature trees located close to the proposed building works. These trees do not have any works planned to occur within their projected Structural Root Zones or Tree Protection Zones. Tree protection may be required for these trees due to flow on effects from the works site. The Tree Protection Fencing should be installed within the existing garden bed to allow for continued pedestrian and vehicular access.

4.8 **Tree 46** is a mature and significant tree located close to the building works. The tree will have demolition works and construction works occurring within its projected Tree Protection Zone. The proposed works are to the south and south east of the tree which is the area of the root plate that is under tension. No machinery works or root pruning are to occur within 3.5m of this tree. Roots 50mm+ are not to be severed unless it is for the footing of the building at approximately 5m. To accommodate the proposed building works crown pruning to the SE may be required for tree 46.

4.9 **Trees 65 & 66** are mature trees located to the west of the proposed building. The Structural Root Zone for trees 65 & 66 is 2.25 from the centre of each tree. The proposed excavation is on the edge of the SRZ for both of these trees. The AQF level 5 site arborist will need to supervise and document the initial excavation works in this area. Canopy pruning for these trees may also be required, the pruning for building clearance is essential. Pruning for scaffolding must be limited with no primary branches cut and the total crown mass removed less than 10%..

4.10 **Trees 67-70** are close to the proposed building, however it is not anticipated that there will be any disturbance to the trees in this garden bed. Tree Protection will be required to prevent damage to their vascular tissue often associated with flow on effects on from the construction site. These trees will need 1.8m chainmesh fencing installed at the perimeter of the garden bed.

4.11 **Trees 75- 80** are a group of mature trees located to the East of the proposed works site. This stand of trees is away from the proposed works and there are no impacts anticipated for the construction of the proposed building. These trees will require tree protection fencing if deliveries or storage of materials occurs in association with the works site. If increased traffic is anticipated or manoeuvring of vehicles, Tree Protection Fencing can be installed and limited to the garden bed or can consist of trunk wraps.

4.12 **Trees 81 & 82** are located close to the proposed works site. The trees are co-dominant with tree 81 located further from the works than tree 82. Tree 82 will have an excavation within its Tree Protection Zone impacting upon up to 15% of its biological root function. Some minor root pruning may be required. Tree Protection fencing can be installed around the perimeter of the garden bed as there will be no disturbance to the road surface. Limited pruning may be required for tree 82. The pruning must be limited to 10% affecting no significant branches. Scaffolding will need to be installed to work around this tree.

4.13 **Trees 88-93** are semi mature trees located in a garden bed close to the works. There are no disturbances anticipated for these trees. Tree Protection can be installed around the perimeter of the garden beds to isolate these trees as a group if flow on affects or any other impacts are anticipated.

4.14 **Tree 95** is a semi mature tree located in a small garden bed to the South East of the proposed building. The tree has limited requirements for tree protection but it is close to the works. This tree will not require tree protection fencing as it is away from the works in a pedestrian area that will remain open to the public. If the area usage around the tree changes, Tree Protection fencing will need to be installed.

4.15 All trees nominated to be retained are to be retained in accordance with the Australian Standard for the Protection of trees on developments sites AS4970. Additional Tree protection measures are listed in appendix 7 of the report. If at any time any building activity conflicts with the Australian Standard or the authors instructions as described above it is the contractor's responsibility to initiate contact with the site arborist to attempt to resolve the issues. Any breaches of AS4970 or the consulting arborist's instructions will render the builder / owner liable for any damages.

5 Recommendations

5.1 After reviewing the site and the information provided by the client it is my recommendation that the works proceed with the following recommendations

5.2 Trees 1, 2, 29-32, 34-38 40-46, 65-82, 87-93 & 95 are to be retained and should be kept in good condition for the duration of the works 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.

5.3 It is recommended that trees 4-7, 9-16, 22-28, 33 and 48-64 are removed. The UNSW has an active and ongoing tree management strategy that values the amenity and function that trees contribute to the campus. The UNSW has annual tree planting programs in addition to major works projects. An effort to replace the removed trees in the future major works for the Alumni Park / College Green landscape plan will be made where possible.

5.5 If any works are to be completed within the Structural Root Zones of any tree nominated to be retained the works will be reviewed by the site arborist prior to and at the time of the works. Documentation of the works including images will be recorded. All root pruning works will be completed by the site arborist if deemed appropriate. Areas that will need supervision of an AQF level 5 site Arborist include trees 46, 65, 66 and possibly tree 82.

5.6 Monthly inspections and reports will need to be completed by the AQF level 5 site Arborist. At the end of the works period the trees 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 council will be contacted for further advice. If required, all root pruning activities of structural roots 50mm+ are to be completed by the level 5 site arborist if encountered on site. It will be the clients responsibility to contact the site arborist and to co-ordinate the works.

5.7 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.

5.8 *Note: All tree works are to be conducted by suitably qualified persons and should comply with the Australian standard for the pruning of Amenity trees AS4373. This site is to be managed using the Australian Standard AS4970 2009 Protection of trees on development sites as a reference.*

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

Regards

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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.

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.

Appendix 1

S.U.L.E Categories (After Barrell) 1996 Updated 01/04/01.

1. **Long S.U.L.E-** the tree appeared retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance:
 - a. Structurally sound trees located in positions that can accommodate future growth.
 - b. Trees, which could be made suitable for long term retention by remedial care.
 - c. Trees of special significance which would warrant extraordinary efforts to secure their long term retention.
2. **Medium S.U.L.E-** the tree appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance:
 - a. Trees, which may only live from 15-40 years.
 - b. Trees that may live for more than 40 years but may be removed for safety or nuisance reasons.
 - c. Trees which may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new plantings.
 - d. Trees which could be made suitable for retention in the medium term with remedial care.
3. **Short S.U.L.E-** trees that appeared to be retainable at the time of assessment for 5-15 years with an acceptable degree of risk, assuming reasonable maintenance:
 - a. Trees which may only live from 5 to 15 years.
 - b. Trees that may live for more than 15 years but may be removed for safety or nuisance reasons.
 - c. Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new plantings.
 - d. Trees which require substantial remediation and are only suitable for retention in the short term.
4. **Removal-** Tree which should be removed within the next 5 years.
 - a. Dead, dying suppressed or declining trees
 - b. Dangerous trees through instability or recent loss of adjacent trees.
 - c. Dangerous trees because of structural defects including cavities, decay included bark, wounds or poor form.
 - d. Damaged trees that are clearly not safe to retain.
 - e. Trees which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new plantings.
 - f. Trees which are damaging or may cause damage to existing structures within the next 5 years.
 - g. Trees that will become dangerous after the removal of other trees for the reasons given in (A) to (F).
 - h. Trees in categories (A) to (G) that have a high wild life habitat value and with appropriate treatment could be retained subject to regular review.
5. **Small, young or regularly pruned-** Trees that can be reliably moved or replaced.
 - a. Small trees less than 5m in height.
 - b. Young trees less than 15 years old but over 5m in height.
 - c. Formal hedges and trees intended for regular pruning to artificially control growth.

Appendix 2 Assessment of Trees

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments.****
1	<i>Corymbia citriodora</i>	16	.35	7	Mature	4.2 SRZ 2.15	Medium	A mature tree with average health, vigour and below form. The tree is partially suppressed and has a slightly sparse crown. No significant defects were observed at the time of the inspection.
2	<i>Corymbia citriodora</i>	19	.67	12	Mature	8.5 SRZ 3	Medium	A mature tree with average health, vigour and form. The tree is dominant and has a lean to light to the W. No significant defects were observed at the time of the inspection.
4	<i>Eucalyptus microcorys</i>	18	.60	14	Semi mature	7.2 SRZ 2.7	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
5	<i>Eucalyptus microcorys</i>	18	.48	14	Semi mature	6 SRZ 2.5	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
6	<i>Eucalyptus microcorys</i>	18	.45	14	Semi mature	5.4 SRZ 2.37	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
7	<i>Eucalyptus microcorys</i>	18	.40 .30 x 2	14	Semi mature	7.2 SRZ 2.7	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
9	<i>Eucalyptus microcorys</i>	13	.33	10	Semi mature	3.6 SRZ 2	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
10	<i>Eucalyptus microcorys</i>	14	.30	10	Semi mature	3.5 SRZ 2.25	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
11	<i>Eucalyptus microcorys</i>	15	.40	12	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
12	<i>Eucalyptus microcorys</i>	12	.35	12	Semi mature	4.2 SRZ 2.15	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
13	<i>Eucalyptus microcorys</i>	16	.38	12	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
14	<i>Eucalyptus microcorys</i>	15	.40	12	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
15	<i>Eucalyptus microcorys</i>	15	.31	12	Semi mature	3.6 SRZ 2	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.
16	<i>Eucalyptus microcorys</i>	17	.56	12	Semi mature	6.6 SRZ 2.6	Medium	A semi mature tree with average health and average form. Part of a group planting noted as having a high retention priority.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
22	<i>Melaleuca quinquenervia</i>	9	.20	6	Semi mature	2.4 SRZ 1.85	Medium	A semi mature tree with below average health and form due to suppression.
23	<i>Melaleuca quinquenervia</i>	2	.22	6	Semi mature	2.4 SRZ 1.85	Medium	A semi mature tree with below average health and form due to suppression.
24	<i>Melaleuca quinquenervia</i>	9	.30	6	Semi mature	3.6 2m	Medium	A semi mature tree with below average health and form due to suppression.
25	<i>Ficus rubiginosa</i>	10	.65	10	Semi mature	7.8 SRZ 2.76	Long	A Semi mature tree average health and average form.
26	<i>Eucalyptus microcorys</i>	17	.41	12	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.
27	<i>Eucalyptus microcorys</i>	17	.41	12	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.
28	<i>Eucalyptus microcorys</i>	18	.43	12	Mature	5.4 SRZ 2.37	Medium	A semi mature tree with average health and average form.
29	<i>Melaleuca quinquenervia</i>	14	.49	9	Mature	6 SRZ 2.5	Medium	A mature tree with below average health and form due to suppression.
30	<i>Melaleuca quinquenervia</i>	14	.40	8	Mature	4.8 SRZ 2.25	Medium	A mature tree with below average health and form due to suppression.
31	<i>Melaleuca quinquenervia</i>	16	.85	10	Mature	10 SRZ 3.1	Medium	A mature tree with average health and form.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
32	<i>Melaleuca quinquenervia</i>	17	.95	14	Mature	11.5 3.25	Medium	A mature tree with average health and form. No significant defects observed.
33	<i>Eucalyptus microcorys</i>	17	.58	10	Mature	7.2 SRZ 2.7	Medium	A mature tree with average health and form for the species. No significant defects observed.
34	<i>Callistemon viminalis</i>	8	.15	4	Semi mature	1.5m	Long	A semi mature tree with average health and form.
35	<i>Melaleuca quinquenervia</i>	9	.20	5	Semi mature	2.4 SRZ 1.7	Medium	A semi mature tree with average health and form, no significant defects observed.
36	<i>Melaleuca quinquenervia</i>	13	.62	11	Mature	7.2 SRZ 2.7	Medium	A mature tree with average health and form, no significant defects observed.
37	<i>Melaleuca quinquenervia</i>	9	.20	5	Semi mature	2.4 SRZ 1.7	Medium	A semi mature tree with average health and form, no significant defects observed.
38	<i>Melaleuca quinquenervia</i>	9	.30	7	Semi mature	3.6 SRZ 2	Medium	A semi mature tree with average health and form, no significant defects observed.
40	<i>Melaleuca quinquenervia</i>	8	.45	6	Semi mature	5.4 SRZ 2.37	Medium	A semi mature tree with average health and form, no significant defects observed.
41	<i>Melaleuca quinquenervia</i>	4	.10	2	Young	1.5	Long	A young tree with average health and form, no significant defects observed.
42	<i>Melaleuca quinquenervia</i>	9	.35	7	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and form, no significant defects observed.
43	<i>Melia azederach</i>	9	.27	6	Semi mature	3.6 SRZ 2	Medium	A semi mature tree with below form and average health. Self sown tree.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
44	<i>Cupaniopsis anacardioides</i>	8	.45	9	Mature	5.3 SRZ 2.35	Medium	A mature tree with average health and below average form. Lean to light to the W
45	<i>Melaleuca quinquenervia</i>	9	.25	5	Semi mature	3 SRZ 1.85	Medium	A semi mature tree with average health and form, no significant defects observed.
46	<i>Eucalyptus saligna</i>	20	.75	12	Mature	9 SRZ 3	Medium	A mature tree with average health and form. This tree has a broad crown with no significant defects evident.
48	<i>Eucalyptus saligna</i>	18	.46	11	Semi mature	5.4 SRZ 2.37	Medium	A semi mature tree with average health and form. This trees crown extends to Nth, with no significant defects evident.
49	<i>Eucalyptus microcorys</i>	16	.37	8	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.
50	<i>Eucalyptus microcorys</i>	17	.38	9	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.
51	<i>Eucalyptus microcorys</i>	17	.39	8	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.
52	<i>Eucalyptus microcorys</i>	18	.36	9	Semi mature	4.2 SRZ 2.15	Medium	A semi mature tree with average health and average form.
53	<i>Eucalyptus microcorys</i>	16	.34	8	Semi mature	4.2 SRZ 2.15	Medium	A semi mature tree with average health and average form.
54	<i>Eucalyptus microcorys</i>	15	.39	8	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
55	<i>Eucalyptus microcorys</i>	16	.43	10	Semi mature	5.4 SRZ 2.37	Medium	A semi mature tree with average health and average form.
56	<i>Araucaria heterophylla</i>	14	.25	5	Semi mature	3 SRZ 1.85	Medium	A semi mature tree with below average health and average form. This tree is partially suppressed and has a thin crown.
57	<i>Eucalyptus microcorys</i>	14	.27	7	Semi mature	3.6 SRZ 2	Medium	A semi mature tree with average health and average form.
58	<i>Eucalyptus microcorys</i>	14	.37	8	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and average form.
59	<i>Araucaria heterophylla</i>	15	.35	6	Semi mature	4.2 SRZ 2.15	Long	A semi mature tree with average health and average form.
60	<i>Eucalyptus microcorys</i>	15	.36	6	Semi mature	4.2 SRZ 2.15	Medium	A semi mature tree with average health and average form.
61	<i>Eucalyptus microcorys</i>	15	.50	10	Semi mature	6 SRZ 2.5	Medium	A semi mature tree with average health and average form.
62	<i>Araucaria heterophylla</i>	16	.34	6	Semi mature	4.2 SRZ 2.15	Medium	A semi mature tree with below average health and form. This tree is partially suppressed.
63	<i>Araucaria heterophylla</i>	9	.24	3	Semi mature	2.4 SRZ 1.7	Medium	A semi mature tree with below average health and form. This tree is partially suppressed.
64	<i>Eucalyptus microcorys</i>	10	.27	8	Semi mature	3.6 SRZ 2m	Medium	A semi mature tree with average health and form.
65	<i>Eucalyptus microcorys</i>	18	.40	9	Mature	4.8 SRZ 2.25	Medium	A mature tree with average health and form.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
66	<i>Eucalyptus microcorys</i>	18	.40	9	Mature	4.8 SRZ 2.25	Medium	A mature tree with average health and form. This tree has a wound at the base from .3m to .7m.
67	<i>Corymbia maculata</i>	10	.14	4	Semi mature	1.5	Medium	A semi mature tree with average health and form.
68	<i>Corymbia maculata</i>	18	.30	5	Semi mature	3.6 SRZ 2	Medium	A semi mature tree with average health and form. This tree has no branches for 10m.
69	<i>Corymbia maculata</i>	15	.24	8	Semi mature	3 SRZ 1.85	Medium	A semi mature tree with average health and form.
70	<i>Corymbia maculata</i>	8	.10	4	Semi mature	1.5	Medium	A semi mature tree with average health and form.
71	<i>Eucalyptus microcorys</i>	16	.35	7	Semi mature	4.2 SRZ 2.15	Medium	A semi mature tree with average health and form for the species.
72	<i>Eucalyptus microcorys</i>	19	.41	7	Semi mature	4.8 SRZ 2.25	Medium	A semi mature tree with average health and form for the species.
73	<i>Corymbia citriodora</i>	12	.25	6	Semi mature	3.2 SRZ 2	Medium	A semi mature tree with average health and form.
74	<i>Corymbia citriodora</i>	18	.85	12	Mature	10.5 SRZ 3.5	Medium	A mature tree with average health and form.
75	<i>Eucalyptus microcorys</i>	16	.45	8	Mature	5.5 SRZ 2.5	Medium	A mature tree with average health and form.
76	<i>Eucalyptus microcorys</i>	16	.43	8	Mature	5.5 SRZ 2.5	Medium	A mature tree with average health and form.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
77	<i>Eucalyptus microcorys</i>	17	.45	7	Mature	5.5 SRZ 2.5	Medium	A mature tree with average health and form.
78	<i>Eucalyptus microcorys</i>	16	.37	7	Mature	4.75 SRZ 2.25	Medium	A mature tree with average health and form.
79	<i>Eucalyptus microcorys</i>	16	.36	7	Mature	4.75 SRZ 2.25	Medium	A mature tree with average health and form.
80	<i>Eucalyptus microcorys</i>	16	.40	8	Mature	4.75 SRZ 2.25	Medium	A mature tree with average health and form.
81	<i>Cedrus deodara</i>	18	.47	10	Mature	6 SRZ 2.5	Long	A mature tree with average health and form for the species. This tree is mature, slow growing and long lived.
82	<i>Cedrus deodara</i>	16	.50	9	Mature	6 SRZ 2.5	Long	A mature tree with average health and form for the species. This tree is mature, slow growing and long lived.
87	<i>Angophora costata</i>	6	.12	4	Young	1.5	Long	A semi young tree with average health and form.
88	<i>Corymbia maculata</i>	8	.10	4	Young	1.5	Long	A semi young tree with average health and form.

Tree No	Species	Height (m)	Trunk Diameter (DBH*)	Canopy Spread (m)	Estimated Age Class	TPZ ** (M)	SULE ***	Observations and comments
89	<i>Corymbia maculata</i>	8	.10	4	Young	1.5	Long	A semi young tree with average health and form.
90	<i>Corymbia maculata</i>	7	.09	2	Young	1.5	Long	A semi young tree with average health and form.
91	<i>Corymbia maculata</i>	6	.06	2	Young	1.5	Long	A semi young tree with average health and form. Tree is stressed.
92	<i>Corymbia maculata</i>	6	.06	2	Young	1.5	Long	A semi young tree with average health and form.
93	<i>Corymbia maculata</i>	7	.10	4	Young	1.5	Long	A semi young tree with average health and form.
95	<i>Agathis robusta</i>	3	.06	2	Young	1.5	Long	A semi young tree with average health and form.

Explanatory Notes for Table

- *Dbh = Diameter of trunk at breast height (1.4m).
- **TPZ is the recommended TPZ 12x the DBH at 1.4m, SRZ is the trees structural root zone. Refer to AS4970 for details.
- ***SULE Explanation can be found in Appendix 1.
- **** All measurements given in metres and include 1m for scaffolding and future crown clearance of structure. N = North, W = West, S= South, E= East.

Appendix 3 Images of Trees



Picture above left shows trees 40, 35, 36. Picture above right shows trees 34, 38-35. Trees 29-32 below left. Tree 46 pictured below right.





Trees 67-70 pictured above left. Tree 33 pictured above centre. Trees 81 & 82 pictured above right. Trees 48,53 & 54 pictured below left. Trees 54-49 pictured below centre. Trees 55 – 64 pictured below right.





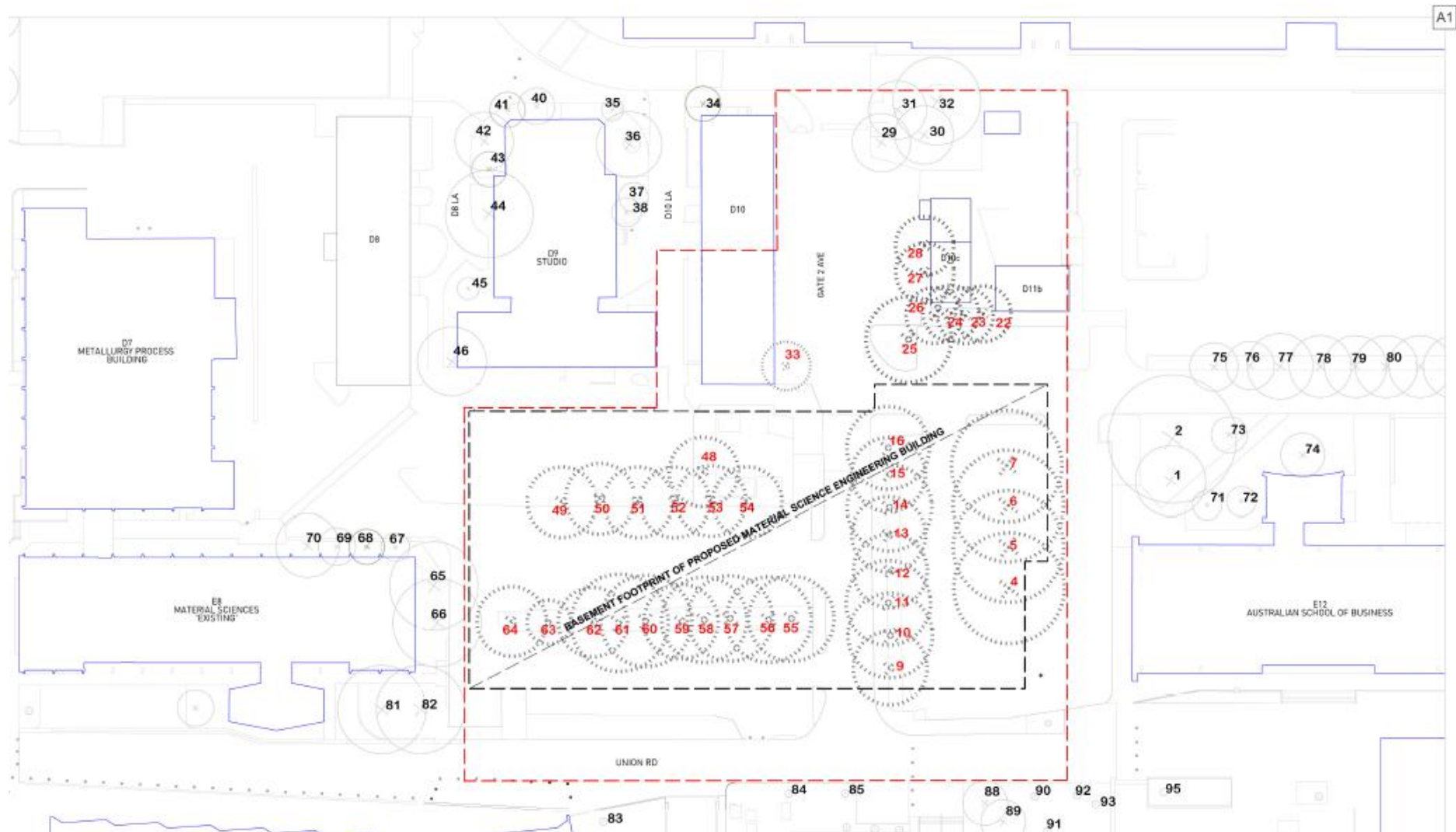
Trees 65 & 66 pictured above right. Trees 9-16 pictured above centre. Trees 4-7 pictured above right. Trees 22-25 pictured below left. Trees 75-80 pictured below centre. Trees 1, 2 and 71,72 pictured below right.





Trees 26-27 pictured above left. Trees 29-32 pictured above right.

Appendix 4 Site Plan



Appendix 5 References

Harris, R. W; Clark, J.R; & Matheny, N.P (2004). *Arboriculture: Integrated Management of Landscape Trees, Shrubs & Vines* 4th Edition, Prentice Hall, New Jersey

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

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

Appendix 6 Glossary Of Terms

Abiotic	Nonliving
Anthrachnose	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 7, 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 the purpose of 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 Zone.
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 8 Curriculum Vitae

Education and Qualifications

- 2005 Diploma of Arboriculture (AQF Cert 5), Ryde TAFE. Distinction.
- 2000 Tree Climbing Course (AQF Cert 2), Ryde TAFE.
- 1999 Advanced Certificate in Urban Horticulture, (AQF Cert 4), Ryde TAFE. Distinction.
- 1995 Greenkeepers Trade Certificate (AQF 3) Ryde TAFE. Credit.
- 1991 Higher School Certificate.
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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"**

Industry Experience

- **2004 to Date, Sole Trader The Ents Tree Consultancy.** Consultant for the Royal Botanic Gardens, Consultant Parramatta Park Trust, Consultant/ Expert Witness Woollahra Council. Master plan works for Sydney University, Taronga Zoo and University of NSW. Writing of tree reports for development applications for Energy Australia, Numerous Architectural Firms and builders. Provision of master plans, hazard evaluations, tree management plans and expert witness reports. Hazard assessments, tree surveys and consultations.
 - **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 (60 Staff).
 - **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