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FOUNDING MEMBER OF

Arboricultural Impact Assessment

Gosford Hospital
Ward Street Carpark Civil Works

Requested by Dean Birkett
Coffey Projects

Prepared by Russell Kingdom

11th February, 2011.

Principal: Russell Kingdom MIACA MAIH MAAL

Fully Insured: Public Liability 5M, Prof. Indemnity 5M & Personal Accident
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1.0 Proposal

Dean Birkett of Coffey Projects has commissioned Advanced Treescape Consulting to prepare an Arboricultural Impact Assessment at Ward Street Carpark Civil Works. This site is located in the Gosford Local Government Area where there is a Tree Preservation Order in force.

It is proposed to build a 20 space carpark.

The subject site was inspected on 09/02/2011. The plans supplied are from SKM Project No. NB11302 Drawing No. SK-C19. The site plan in Appendix 1 illustrates the location of all surveyed trees. Appendix 2 provides digital images of these trees.

This assessment has been carried out by:

Russell Kingdom, Grad. Dip. Hort, Dip. Hort, Dip. Hort/Arb. (Appendix 12)

2.0 Site Inspection

The site is currently an unused residential block which slopes from the south to the north. A third of the way down the block is a large area of exposed sandstone and a formalised small cut which is approximately less than 400mm. Most of the vegetation lies towards the southern end of the site above the proposed area of construction. The site is predominantly clay-based Erina Hills soils. Erina Hills Soils limitations are: mass movement (localised), high soil erosion hazard, foundation hazard (localised), localised high run-on, seasonal waterlogging of footslopes and strongly acid soils of low fertility. It is exposed to winds with a northerly orientation.

3.0 Method of Assessment

Health and condition of the trees were assessed visually from ground level based upon the *Visual Tree Assessment* (VTA) technique described by Mattheck (2004). A *Tree Schedule* (provided in Appendix 3) was based upon:

- Estimation of tree heights by Silva Clinomaster/Heightmeter™ plus visual estimates of canopy spreads.
- Assessment of soil compaction by an 8mm x 400mm steel spike pushed by hand vertically into the ground.
- Sampling and testing of soils using a pH Meter, with confirmation by a Manutec pH Soil Kit.
- Distances of trees, etc. are measured using a Leica Disto™ D2 Laser Distance Meter.
- Calculation of Tree Protection Zones using Australian Standards 4970:2009 Protection of trees on development sites.

- Glossary Refer to Appendix 10.
- All digital images which appear in this report are unaltered originals which were taken during site inspection. (Appendix 2)

Please note that this assessment and related VTA assessments are based upon health and condition that were observed at the time of inspection.

Recommendations by this report regarding retention, works or removal are based upon Safe & Useful Life Expectancy (SULE – Appendix 11) and hazard ratings being applied to the proposed plans.

This information guided conclusions.

4.0 Tree Schedule

See Appendix 3 which summarises existing trees upon the site in terms of species, height and canopy spread, structural condition, health, hazard rating and SULE.

See Appendix 4 which provides explanations of abbreviations and assessment criteria.

The trees contained within the Tree Schedule (Appendix 3) range from having short to long SULEs. These trees also have a broad range of hazard ratings which limits the retention of such trees within development sites.

4.1 Assessment of VTA, Recommendations of Impact & Tree Protection Measures required by Proposed Plans

Please note that this assessment and related VTA assessments are based upon health and condition that were observed at the time of inspection.

Accepted tree management practices recommend removal of trees where SULE ratings are 3 or 4, and/or where hazard ratings are high (where ratings adapted from Matheny and Clark range from low=1 to dangerous=12). A detailed explanation of SULE ratings is provided in Appendix 11. Height/Diameter Ratio should not exceed 1:30 (Mattheck 2004)

1. **VTA Assessment**
2. **Impact of proposed plan**
3. **Tree Protection Measures (TPZ)**

Tree 1 is a *Cedrus deodara* (Himalayan Cedar). This tree is mature, in good health and structural condition. The crown has been reduced to the east over the proposed carpark. Hazard rating is 5. SULE is 2B.

1. **The tree passes the VTA.**
2. **It is 860mm to the fence. It is suitable to be considered for retention.**
3. **A TPZ fence is required.**

Tree 2 is a *Jacaranda mimosifolia* (Jacaranda). This tree is mature, in good health and structural condition. There is a basal trunk wound and the crown has been reduced. Hazard rating is 5. SULE is 2B.

1. **The tree passes the VTA.**
2. **It is 600mm to the fence. It is suitable to be considered for retention.**
3. **A TPZ fence is required.**

Tree 3 is a *J. mimosifolia* (Jacaranda). This tree is mature, co-dominant, in good health and structural condition. There are epicormics and the crown has been reduced. Hazard rating is 5. SULE is 2B.

1. **The tree passes the VTA.**
2. **It is 500mm to the fence. It is suitable to be considered for retention.**
3. **A TPZ fence is required.**

Tree 4 is a *J. mimosifolia* (Jacaranda). This tree is mature, co-dominant, in good health and fair structural condition. There is decay in the trunk. Hazard rating is 5. SULE is 2B.

1. **The tree passes the VTA.**
2. **It is 900mm to the fence. It is suitable to be considered for retention.**
3. **A TPZ fence is required.**

Tree 5 is a *Brachychiton acerifolius* (Illawarra Flame Tree). This tree is mature, in good health and structural condition. Hazard rating is 5. SULE is 2B.

1. **The tree passes the VTA.**
2. **It is 400mm to the fence. It is suitable to be considered for retention.**
3. **A TPZ fence is required.**

Tree 6 is a *Glochidion ferdinandi* (Cheese Tree). This tree is mature, in good health and fair structural condition. Hazard rating is 4. SULE is 2B.

1. **The tree passes the VTA.**
2. **It is above the cut across from the site. Removal is recommended.**
3. **No TPZ fence is required.**

Tree 7 is an *Angophora floribunda* (Rough-barked Apple). This is an old regrowth of a stump. There is decay in the coppice. Hazard rating is 6. SULE is 4B.

1. **The tree fails the VTA.**
2. **Removal is recommended.**
3. **No TPZ fence is required.**

Tree 8 is an *A. floribunda* (Rough-barked Apple). This tree is very mature, in poor health and very poor structural condition. There is a bad inclusive main fork union, small deadwood, epicormics and a sparse canopy. Hazard rating is 8. SULE is 4D.

1. **The tree fails the VTA.**
2. **It is dangerous. Removal is recommended.**
3. **No TPZ fence is required.**

Tree 9 is a *G. ferdinandi* (Cheese Tree). This tree is mature, in good health and poor structural condition. It is being suppressed and growing horizontally. Hazard rating is 3B. SULE is 3B.

1. **The tree fails the V TA.**
2. **Removal is recommended.**
3. **No TPZ fence is required.**

Tree 10 is a group of 10 x *G. ferdinandi* (Cheese Tree). This tree is a group of understorey trees in good health and fair structural condition. Hazard rating is 4. SULE is 3B.

1. **These trees pass the VTA.**
2. **They may be either retained or removed.**
3. **If retained a TPZ fence is required.**

Tree 11 is a *C. camphora* (Camphor Laurel). This tree is very mature, in good health and poor structural condition. It has been subjected to power line clearance. Hazard rating is 4. SULE is N/A.

1. **The tree is a weed.**
2. **It is located on the bank and is a council managed tree. Removal is recommended.**
3. **No TPZ fence is required.**

Tree 12 is *Eucalyptus pilularis* (Blackbutt). This tree is very mature, in good health and poor structural condition. It has been subjected to power line clearance. There is a trunk lean 20° over the road, small deadwood, epicormics, tip dieback, a trunk wound and canker. Hazard rating is 10. SULE is 3B.

1. **This tree fails the VTA.**
2. **It is located on the bank and is a council managed tree. Removal is recommended.**
3. **No TPZ fence is required.**

Tree 13 is a group of 5 x *A. floribunda* (Rough-barked Apple) above the group (Tree 10), a couple *of C. camphora* (Camphor Laurel) and 1 x juvenile Ironbark on the southern eastern corner. All *A. floribunda* (Rough-barked Apple) are in fair health and poor structural condition.

4.2 Discussion

The trees that are on this block are not in very good condition. The *A. floribunda* (Rough-barked Apple) - Trees 7, 8, 13 - have extensive canker, tip dieback and deadwood. The *G. ferdinandi* (Cheese Tree) – Trees 6, 9, 10 - have been butchered in the past and many of them have a horizontal form and it would be clearly warranted if these trees were removed. The retention of them can also be achieved in that they do provide amenity from Faunce Street above and also provide wildlife resources.

The slope of the site is a concern as at the front of the site there will be approximately a 1 metre cut. This will have an impact on Trees 1, 2, 3, 4, 11 and 12. Tree 1 is located 860mm to the fence and there is a 2.1 metre gap between the edge of the carpark and the site so this is a total of 2.96 metres which is past the structural root zone (SRZ) and therefore I consider that the amount of impact on this tree would be approximately 25% but for the amenity that this tree provides it is recommended that this tree be retained.

Trees 2, 3, and 4 will have their SRZs accommodated. These are only small *J. mimosifolia* (Jacaranda) and the impact will be acceptable.

Tree 5 will have an acceptable impact from the proposed works.

Trees 11 and 12 are going to require some works as there is no indication on these plans of how entry to this site is going to be achieved. The trees are located on the verge. Both trees are situated on the top of a large cut. Tree 11 is an overmature tree and it will have its roots seriously impacted by this proposed development. Tree 12 is a mature tree but it has a serious tropism and lean over the road. These works will impact less than 10% of its root plate. Behind this tree is the carpark and I am concerned that the previous root damage and the extra root damage could destabilise this tree and if it were to fail it would fail across the road and take powerlines with it, causing a severe amount of disturbance to the hospital's efficient running. Based on this it would be justified to have Council consider that the tree needs to be removed.

4.3 Tree Significance (Appendix 5)

The *E. pilularis* (Blackbutt) would have a high level of significance being an endemic, native. The *C. camphora* (Camphor Laurel) is an exempt species in the Gosford City Council area. The group of trees to the southern end of the block would have a high level of significance.

4.4 Identify Further Potential Impacts on Trees by Proposed Plans

- It would be preferable that no fill soils be used in TPZ.
- Soil cuts should be kept to a minimum near TPZs.
- Services should not be located in or run through any TPZ.
- Site Office/Toilet, etc, are not to be located in any TPZ.
- Materials are to be stored away from TPZs.
- Aeration of the soil is managed by the TPZ.
- An area is to be set aside for tradespeople to wash down equipment away from any TPZ. The location of the wash down point should be approved by the Consultant Arboriculturist.

4.5 Tree Protection Zones using AS4970:2009

Tree Protection Zone (TPZ) = DBH (stem) x 12 (radius)
DBH – Diameter at Breast Height (1.4 metres)
DGL – Diameter at Ground Level

Refer to Appendix 6 and 7

Tree No.	DBH (mm)	DGL (mm)	Radius of full TPZ (x 12)	SRZ
1	470	650	5.64 metres	2.8 metres
2	280	400	3.36 metres	2.3 metres
3	395	700	4.74 metres	2.8 metres
4	430	650	5.16 metres	2.8 metres
5	320	450	3.84 metres	2.4 metres
6	400	600	4.8 metres	2.7 metres

10	100-200	200-400	2.4-4.8 metres	1.5-1.7 metres

* Minimum TPZ is 2 metres – Maximum TPZ is 15 metres
# Minimum SRZ is 1.5 metres
Source: AS4970:2009

4.6 Gradient of Impacts

0% of root zone impacted – no impact of significance
0 to 10% of root zone impacted – low level of impact
10 to 15% of root zone impacted – low to moderate level of impact
15 to 20% of root zone impacted – moderate level of impact
20 to 25% of root zone impacted – moderate to high level of impact
25 to 35% of root zone impacted – high level of impact
>35% of root zone impact ted – significant level of impact

Used with permission of Landscape Matrix

5.0 Tree Protection Works

A TPZ fence is to be erected across the southern end of the site to protect the trees (6, 7, 8, 9, 10) before construction commences. (Refer Appendix 8 and 9) The site fence will suffice as a TPZ fence for Trees 1-5. Should Trees 11 and 12 be retained they have limited space and due to the steepness of the site it would be dangerous to place a fence around them. I believe they will need to be removed and will not require any TPZ fencing. The TPZs should be left in place until the landscaping phase of construction.

5.1 Tree Works

Tree work is to be carried out by a suitably qualified, insured Arborist. (AQF 3) to AS4373:2007 Pruning of amenity trees.

5.2 Earthworks

There will be earthworks to level the site. Any tree roots encountered within the site need to be correctly terminated, which is cut by a hand saw and not smashed off with a backhoe bucket. Correctly terminating a root will ensure that the tree roots do not suffer from decay.

5.3 Construction Works

Site fencing and TPZs are to be erected prior to the commencement of construction works.

5.4 Landscaping Phase

TPZ fencing is to be removed at the landscaping phase.

6.0 Conclusions

The proposed carpark will not require the removal of any trees that are located on the block. Trees 7, 8, 9 and 10 may need to be removed as they fail the VTA. There will be an acceptable impact on Trees 1-5. Council will need to consider Trees 11 and 12 which are on their land. It would be justifiable to remove both of these trees due to previous impacts on their root plates, especially Tree 12 with its tropism. If these 2 x trees were removed then 2 x street trees should be replanted to ensure the streetscape amenity is maintained in the long term.

7.0 Recommendations

Implement all recommendations contained in 4.1, 4.2, 4.4, 4.5, 5.0, 5.1, 5.2, 5.3, 5.4.

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Disclaimer

Reference List

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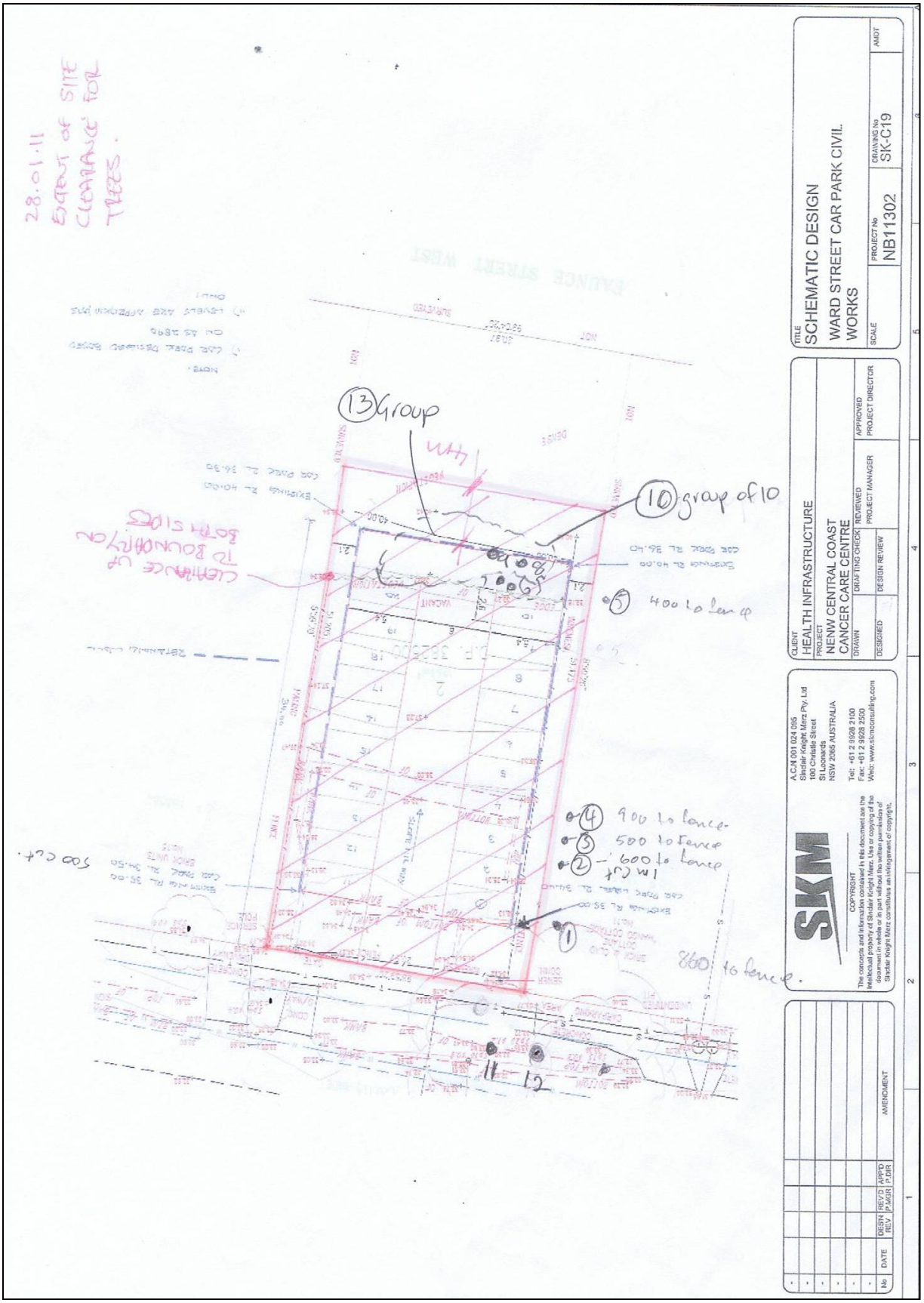
Appendix 1 Site Plan with Trees and Proposed Development



Appendix 2 Digital Images

Figure 1 Showing Trees 11 and 12 on council managed land

Figure 2 Showing Tree 1

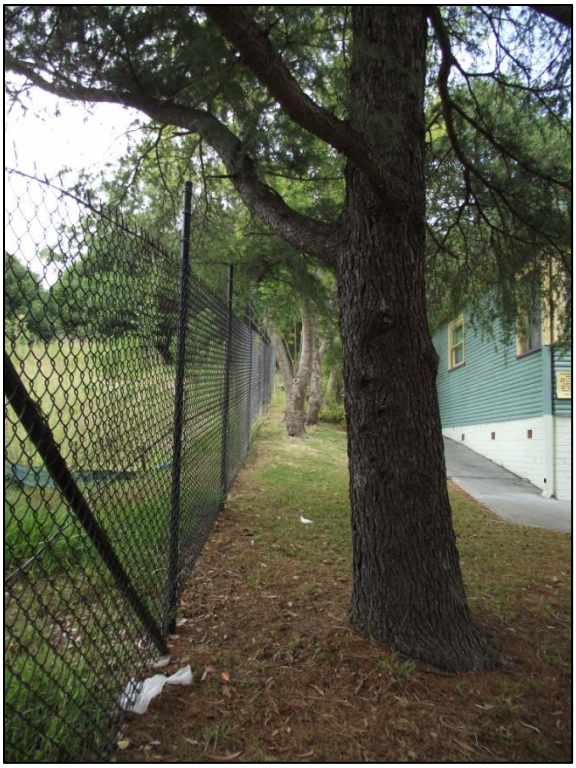


Figure 3 Showing the proximity of Tree 1 to the fence

Figure 4 Showing the site to be developed

Appendix 3 Tree Schedule

Abbreviations: **m**-metres, **DBH**-trunk diameter @1.4m, **DGL**-trunk diameter at ground level, **mm**-millimetres, **CD**-co-dominant trunk, **TD**-tri-dominant trunk, **QD**-4x trunk, **VP**-very poor, **P**-poor, **F**-fair, **G-**good, **VG-**very good, **J-**juvenile, **YM**-young mature, **M**-mature, **VM**-very mature, **OM**-over mature, **TL**-trunk lean, **TW**-trunk wound, **L**-longicorns, **E**-Epicormics, **FA-**Forest Architecture, **FR**-Forest Remnant, **RW**-Reaction Wood, **H/D-** Height/Diameter Ratio should not exceed 1:30 (Mattheck 2004), **dw**-deadwood small, **DW**-deadwood large, **TDB**-tip dieback, **PFS**-previous failure site, **RFS**-recent failure site, **BEW**-Branch end weight, **MTU**-Multi tree union, **MFU**-Main fork union**, IMFU**-Inclusive main fork union, **IMBU**-Inclusive main branch union, **IFU**-Inclusive fork union, **MBA**-Multiple branch attachments, **FB**-Fruiting Body, **BF**-Bracket Fungus, **U/C**-under canopy, **Decl**-declining, **bor**-borers**, PD**-Parrot Damage, **LD**-Leaf Damage, **CMP**-Chewing Mouth Piece, **TPO-**Tree Preservation Order, **D**-dangerous, **VD**-very dangerous, **X-**no room to grow / unsuitable, **H**-Habitat, **HB**-Habitat Box, **VTA**-Visual Tree Assessment (**P-**pass**, F**-fail), **Hazard Rating – 1**=low hazard, **12**=dangerous, **SULE**-See Appendix 11, **Rec**.-Recommendation, **S**-save, **R**-remove, **W**-work needed to be carried out, **mon**-monitor, **Insp**-Inspect, **N/A**-not applicable,

Tree No.	Type	Height m	DBH mm	DGL mm	Health Vigour	Structural Condition	Canopy Spread (m) N S E W	Comments	VTA	Hazard Rating 1-12	SULE	Rec
1	*Cedrus deodara* Himalayan Cedar	12	470	650	G	G	5 5 4 5	M, crown reduced to E over proposed Carpark, 860mm to fence	P	5	2B	S
2	*Jacaranda mimosifolia* Jacaranda	7	280	400	G	G	4 1 3 2	M, basal TW, crown reduced, 600mm to fence	P	5	2B	S
3	*J. mimosifolia* Jacaranda	8	CD 280/ 280	700	G	G	3 2 3 3	M, E, crown reduced, 500mm to fence	P	5	2B	S
4	*J. mimosifolia* Jacaranda	8	CD 380/ 200	650	G	F	4 radial	M, decay in trunk, 900mm to fence	P	5	2B	S
5	*Brachychiton acerifolius* Illawarra Flame Tree	10	320	450	G	G	3 radial	M, 400mm to fence	P	5	2B	S
6	*Glochidion ferdinandi* Cheese Tree	6	600	QD <100	G	F	4 radial	M, above cut across from site	P	4	2B	S
7	*Angophora floribunda* Rough-barked Apple	6	240	400	P	P	1 0 0 0	M, old regrowth of stump, decay in coppice	F	6	4B	R
8	*A. floribunda* Rough-barked Apple	12	400	650	P	VP	3 1 1 1	VM, IMFU (bad one), dw, E, sparse canopy, D	F	8	4D	R
9	*G. ferdinandi* Cheese Tree	4	9x <100	300	G	P	5 0 3 0	M, suppressed, horizontal growth	F	6	3B	R
10	*G. ferdinandi* Cheese Tree Group of 10	<6	100-200	200-400	G	F		Group of understorey cheese trees	P	4	3B	S/R
11	*Cinnamomum camphora* Camphor Laurel	12	650	900	G	P	4 radial	VM, power line clearance, on bank, council managed tree	F	4	N/A	R
12	*Eucalyptus pilularis* Blackbutt	25	1000	1300	G	P	12 4 6 8	VM, on bank, TL20°, over road, dw, E, TDB, TW, canker, power line clearance, council managed tree	F	10	3B	R

13	5 x *A. floribunda* above *G. ferdinandi* & a couple of C. *camphora* & 1 x Juvenile Ironbark on SE corner. All *A. floribunda* in fair health & poor condition.											

Appendix 4 Notes on Tree Assessment

Key	Criteria	Comments
Tree No	Must relate to the number on your site diagram	
Species	Botanical name and common name of Tree	
Diameter of trunk	DBH – Diameter at Breast Height (1.4 metres) DGL – Diameter at Ground Level	
Height	In metres	
Spread	Average diameter of canopy in metres	
Crown Condition	Overall vigour and vitality 0 Dead 1 Severe decline (<20% canopy; major dead wood) 2 Declining (20-60% canopy density; twig and branch dieback) 3 Average/low vigour (60-90% canopy density; twig dieback) 4 Good (90-100% crown cover; little or no dieback or other problems) 5 Excellent (100% crown cover, no deadwood or other problems)	This requires knowledge of species.
Age class	Y Young = recently planted S Semi-mature (< 20% of life expectancy) M Mature (20-80% of life expectancy) O Over-mature (> 80% of life expectancy)	
Special Significance	A Aboriginal C Commemorative Ha Habitat Hi Historic M Memorial R Rare U Unique form O Other	This may require specialist knowledge.
Services/ adjacent structures	Bs Bus stop Bu Building within 3m HVo High voltage open-wire construction HVb High Voltage bundled (ABC) LVo Low Voltage open-wire construction LVb Low Voltage bundled (ABC) Na No services above Nb No services below ground Si Signage Sl Street light T Transmission lines (>33KV) U Underground services O Other	More than one of these may apply.
Defects	B Borers C Cavity D Decay dw Deadwood E Epicormics FA Forest Architecture H/D Height/Diameter ratio I Inclusions L Lopped LDCMP Leaf damage by chewing mouthpieced insects M Mistletoe/Parasites MBA Multiple Branch Attachments	More than one of these may apply. H/D if ratio is higher than 50:1 then tree is defective (Mattheck 2004)

	PD Parrot Damage PFS Previous Failure Sites S Splits/cracks T Termites TL Trunk Lean TW Trunk Wound O Other	
Root zone	C Compaction D Damaged/wounded roots (eg by mowers) E Exposed roots Ga Tree in garden bed Gi Girdled roots Gr Grass K kerb close to tree L+ Raised soil level L- Lowered soil level M Mulched Pa Paving/concrete/bitumen Pr Roots pruned O Other	More than one of these may apply.
Size of defective part	Rates the size of the part most likely to fail. The larger the part that fails, the greater the potential for damage. 1. most likely failure less than 150mm in diameter 2. Most likely failure 150-450mm in diameter 3. Most likely failure 450-750mm in diameter 4. Most likely failure more than 750mm in diameter	
Target Rating*	Rates the use and occupancy of the area that would be struck by the defective part 1. Occasional use (eg jogging/cycle track) 2. Intermittent use (eg picnic area, day use parking) 3. Frequent use, secondary structure (eg seasonal camping area, storage facilities) 4. Constant use, structures (eg year-round use for a number of hours each day, residences)	
Hazard rating*	Failure potential + size of part + target rating Add each of the above sections for a number out of 12	The final number identifies the degree of risk. The next step is to determine a management strategy. A rating in this column does not condemn a tree but may indicate the need for more investigation and a risk management strategy.

Appendix 5 Rating System for Tree Significance

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 tree significance 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. 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.

Once landscape significance of an individual tree has been defined, the retention value can then be determined. (Table 1.0 in this Appendix). The terms used in the Assessment Criteria and Tree Retention Value - Priority Matrix, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

Tree Significance - Assessment criteria

1. High Significance in landscape

- The tree is in good condition, or normal vigour and form typical of 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 grand age.
- The tree is listed as a Heritage Item, Threatened Species or part of a Threatened 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 by bulk and scale and makes a positive contribution to the local amenity.
- The tree has been influenced by historic figures, events or part of the heritage development of the place.
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values.
- The growing environment supports the tree to its full dimensions above and below ground without conflict or constraint.

2. Medium Significance in landscape

- The tree is in fair-good condition, or normal or low vigour and form typical or atypical of the species,
- The tree is a planted locally indigenous or a common species with its taxa readily 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 area,
- The tree is moderately constrained by above or below ground influences of the built environment to reach full dimensions.

3. Low Significance in landscape

- The tree is in fair-poor condition, or normal or low vigour and form typical or atypical of the species,
- The tree is not visible or is partly 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 area.
- The tree is severely constrained by above or below ground by influences of the built environment and therefore will not reach full dimensions; tree is inappropriate to the site conditions.
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order.
- The tree has a wound or defect that has potential to become structurally unsound.

4. 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.

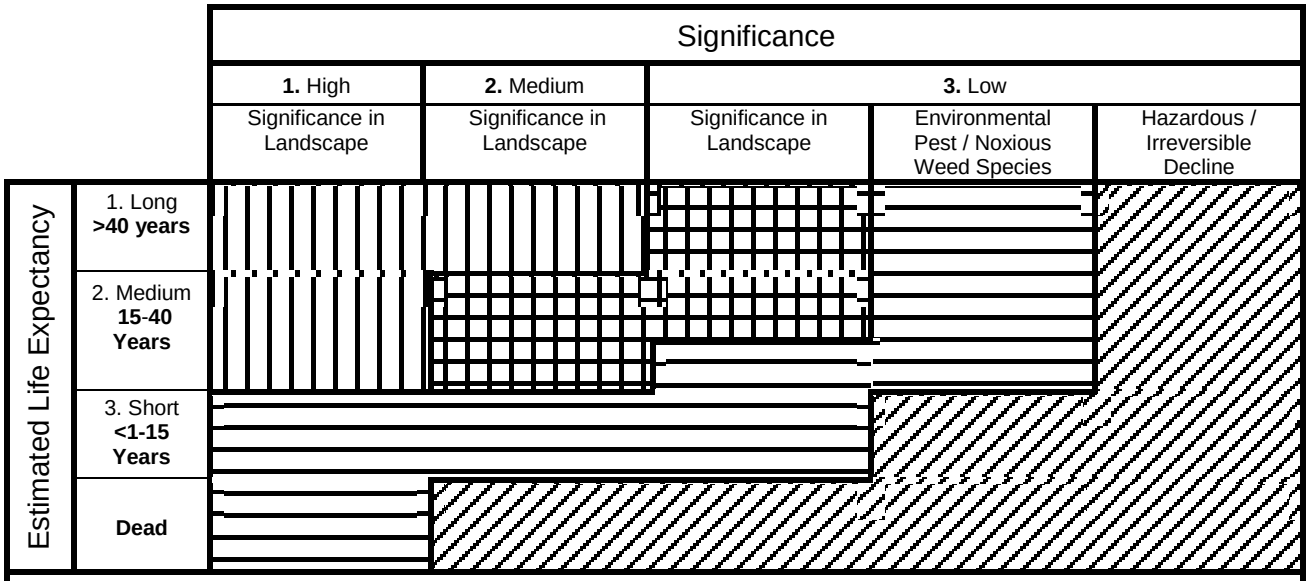
5. Hazardous/Irreversible Decline

- 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 correspond with at least three (3) of the criteria in categories 1, 2 and 3, and one (1) criteria only is required in categories 4 and 5 to be classified in that group.

Note: The assessment criteria are for individual trees only and are not to be applied to stands of trees.

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 detailed in Table 2. Special construction works 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.

Appendix 6 Extract from AS4970:2009 Protection of trees on development sites, Section 3, Determining the tree protection zones of the selected trees, 3.1 Tree protection zone (TPZ)

3.1 TREE PROTECTION ZONE (TPZ)

"The tree protection zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The TPZ incorporates the structural root zone (SRZ) (refer to Clause 3.3.5)."

3.2 DETERMINING THE TPZ

TPZ for Single Trunked Trees

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

TPZ = DBH x 12

TPZ for Multiple Trunked Trees

The radius of the TPZ for multiple trunked trees is calculated using the following formula:

$$\sqrt{(DBH_1)^2+(DBH_2)^2+(DBH_3)^2} = \text{total DBH x } 12$$

DBH = trunk diameter measured at 1.4 m above ground

Radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 metres nor greater than 15 metres (except where crown protection is required).

The TPZ of palms, other monocots, cycads and tree ferns should not b e less than 1 metre outside the crown projection.

Appendix 7 Extract from AS4970:2009 Protection of trees on development sites, Section 3, Determining the protection zones of the selected trees, 3.3.5 Structural root zone (SRZ)

3.3.5 Structural root zone (SRZ)

"The SRZ is the area required for street stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when a major encroachment into a TPZ is proposed. Root investigation may provide more information on the extent of these roots."

Determining the SRZ

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12 or for multiple trunked trees as per Appendix B 3.2

SRZ radius = $(D \times 50)^{0.42} \times 0.64$

where

D = trunk diameter, in metres, measured above the root buttress, referred to below as DGL (Diameter at Ground Level).

Note: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see Figure 1).

Table 2.0 TPZ and SRZ Table

DBH for TPZ (mm)	DGL for SRZ (mm)	TPZ (m)	SRZ (m)
100	100	2.0	1.5
125	125	2.0	1.5
150	150	2.0	1.5
175	175	2.1	1.6
200	200	2.4	1.7
225	225	2.7	1.8
250	250	3.0	1.8
275	275	3.3	1.9
300	300	3.6	2.0
325	325	3.9	2.1
350	350	4.2	2.1
375	375	4.5	2.2
400	400	4.8	2.3
425	425	5.1	2.3
450	450	5.4	2.4
475	475	5.7	2.4
500	500	6.0	2.5
525	525	6.3	2.5
550	550	6.6	2.6
575	575	6.9	2.6

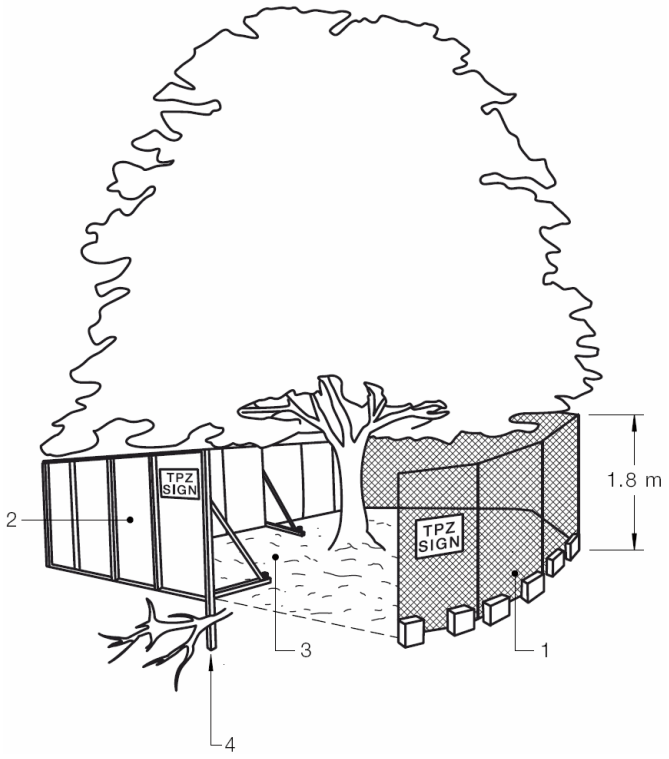
600	600	7.2	2.7
625	625	7.5	2.7
650	650	7.8	2.8
675	675	8.1	2.8
700	700	8.4	2.8
725	725	8.7	2.9
750	750	9.0	2.9
775	775	9.3	3.0
800	800	9.6	3.0
825	825	9.9	3.1
850	850	10.2	3.1
875	875	10.5	3.1
900	900	10.8	3.2
925	925	11.1	3.2
950	950	11.4	3.2
975	975	11.7	3.3
1000	1000	12.0	3.3
1025	1025	12.3	3.3
1050	1050	12.6	3.4
1075	1075	12.9	3.4
1100	1100	13.2	3.4
1125	1125	13.5	3.5
1150	1150	13.8	3.5
1175	1175	14.1	3.5
1200	1200	14.4	3.6
1225	1225	14.7	3.6
1250	1250	15.0	3.6
1275	1275	15.0	3.7
1300	1300	15.0	3.7

Appendix 8 Tree Protection Zones – Standard Procedure

1.0 TREE PROTECTION ZONES - STANDARD PROCEDURE

1.1 The Protective fencing where required may delineate the ***TPZ*** and should be located as determined by the project Arborist either in accordance with the specific Council's guidelines or if no guidelines given by the Council then using AS4970 *Protection of trees on development sites*, Section 4, 4.3. *"Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. The TPZ must be secured to restrict access. AS4687 Temporary fencing and hoardings specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area. Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots. Existing perimeter fencing and other structures may be suitable as part of the protective fencing."*

AS4970 Section 4, Tree protection measures, Figure 3 Protective fencing shows examples of such fencing.



"Legend:

1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. The fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project Arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots."

1.2 AS4970 Section 4, Tree protection measures, 4.2 Activities restricted within the TPZ

"Activities generally excluded from the TPZ included but are not limited to-

(a) Machine excavation including trenching;
(b) Excavation for silt fencing;
(c) cultivation;
(d) storage;
(e) preparation of chemicals, including preparation of cement products;
(f) parking of vehicles and plant;
(g) refuelling;
(h) dumping of waste;

(i) wash down and cleaning of equipment;
(j) placement of fill;
(k) lighting of fires;
(l) soil level changes;
(m) temporary or permanent installation of utilities and signs, and
(n) physical damage to the tree."

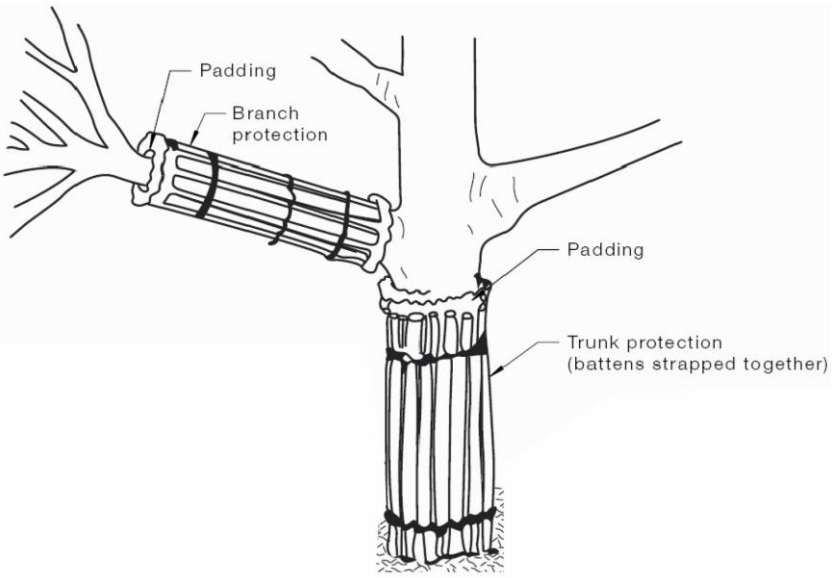
1.3 Tree Protection signage is to be attached to each ***Tree Protection Zone*** and displayed from within the development site in accordance with AS4970 2009 *Protection of trees on development sites*, Section 4.4 and example Appendix C1 (as shown) and lettering to comply with AS1319.

Tree Protection Zone

NO ACCESS

Contact:

1.4 Where a tree is to be retained and a ***Tree Protection Zone*** cannot be adequately established due to restricted access e.g. tree located along side an access way, the trunk and branches in the lower crown will be protected by wrapping 2 layers of hessian or carpet underfelt around the trunk and branches for a minimum of 2 m or as lower branches permit, then wire or rope secures 75x50x2000



mm hardwood battens together around the trunk (do not nail or screw to the trunk or branches). The number of battens to be used is as required to encircle the trunk and the planks are to extend to the base of the tree (AS4970 2009 *Protection of trees on development sites*, Figure 4 Examples of Trunk, Branch and ground protection).

1.5 If a tree is growing down slope from an excavation, a silt fence located along the contours of the site in the area immediately above the ***Tree Protection Zone*** fencing may need to be installed and regularly maintained to prevent burial and asphyxiation of the roots of the tree. To allow for the maintenance of both fences, the silt fence must be constructed separately to the tree protection fence and the 2 fences must be constructed independently of each other and standalone. To reduce competition with the tree the area within the ***Tree Protection Zone*** is to be kept free of weeds. These are best removed by the application of foliar herbicide with Glyphosate as the active constituent. This is the preferred method rather than removal by cultivation of the soil within the dripline, to minimise root disturbance to the tree. The removal of woody weeds such as Privet should use the cut and paint method of herbicide application. Weeds are to be controlled within the ***Tree Protection Zone***, for the duration of the project.

1.6 The area of the Tree Protection Zone to be mulched to a depth of 50mm with organic material being 75% leaf litter and 25% wood, and this being composted material. The depth of mulch and type as indicated, to be maintained for the duration of the project. Where deep excavation will expose the soil profile to drying out the root plate is to be protected by pegging jute matting across the ground surface 2 m back from the edge of the profile and 2 m down the face of the profile and is to be in one continuous sheet or layers up to 5 mm thick and overlapped 300 mm and pegged. Pegs are to be a minimum length of 200 mm and spaced at 500 mm increments in a grid pattern. Once installed mulch is to be placed on top of the jute matting previously described.

1.7 No services either temporary or permanent are to be located within the ***Tree Protection Zone***. If services are to be located within the ***Tree Protection Zone***, special details will need to be provided by a qualified Consulting Arboriculturist for the protection of the tree regarding the location of the service/s. Works within the TPZ should be hand dug or tunnelled.

1.8 A tree will not be fertilised during its protection within the ***Tree Protection Zone***, as this may hasten its decline if it were to decline. If a tree is to be fertilised this should be in consultation with a qualified Consulting Arboriculturist.

1.9 In the event of prolonged dry periods, or where a tree has been transplanted, or where excavation nearby, especially up slope, leads to drying out of a soil profile, or modification to ground water flow, or flows across an existing ground surface to the tree and its growing environment; deep root watering thoroughly at least twice a week is to be undertaken to irrigate the tree. The need for such watering is determined readily by observing the dryness of the soil surface within the dripline of the tree by scraping back some mulch. Mulch is to be reinstated afterwards. In the event of disrupted ground or surface water flows to the tree due to excavation, filling or construction, a reticulated irrigation system may be required to be installed within the ***Tree Protection Zone***. If an irrigation system is to be installed, consideration must be given to volume, frequency, and drainage of water delivered, and this should be in consultation with a qualified Consulting Arboriculturist.

Appendix 9 Tree Protection on Construction Sites

1.0 TREE PROTECTION ON CONSTRUCTION SITES

Note: Individual protection measures to be applied where stated as applicable.

1.1.0 General notes
1.2.0 Cautionary notes for the protection of retained trees
1.3.0 Demolition of built structures - precautions to protect trees
1.4.0 Excavation and construction close to Tree Protection Zones

1.1.0 General notes

1.1.1 The application of any measures for the protection of trees on development sites is determined by the species characteristics of the subject tree, and the existing physical constraints of the growing environment on site both above and below ground.

1.1.2 This report considers where applicable, Australian Standard AS4970 2009 *Protection of trees on development sites*.

1.1.3 This report applies the ***Tree Protection Zone - Standard Procedure*** However, this does not restrict the author from applying additional or alternative conditions where it is deemed appropriate by the author for the protection of trees on development sites. Such additional or alternative conditions may be founded upon professional judgement based on:

- the experience of the Consulting Arboriculturist
- scientific research
- new technology
- industry best practice
- consideration of the individual tree species and its relative tolerance to development impacts
- the individual or cumulative factors present or proposed to impact upon the growing environment essential for the trees' survival

1.1.4 Where this report makes reference to the retention of subject trees it is for their incorporation into the landscaping works for the site, and they are to be documented on a Landscape Plan for the site.

1.2.0 Cautionary notes for the protection of retained trees

1.2.1 Installing underground services within TPZ

If an underground utility service is to be located within the area of the TPZ Australian Standard AS4970 2009 *Protection of trees on development sites*, Section 4, 4.5.5 Installing underground services within TPZ provides the following:

"All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches.

The directional drilling bore should be at least 600 mm deep. The project Arborist should assess the likely impacts of boring and bore pits on retained trees.

For manual excavation trenches the project Arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools. Refer Clause 4.5.3."

1.2.1.1

Location of services Option B (Driveway Construction)

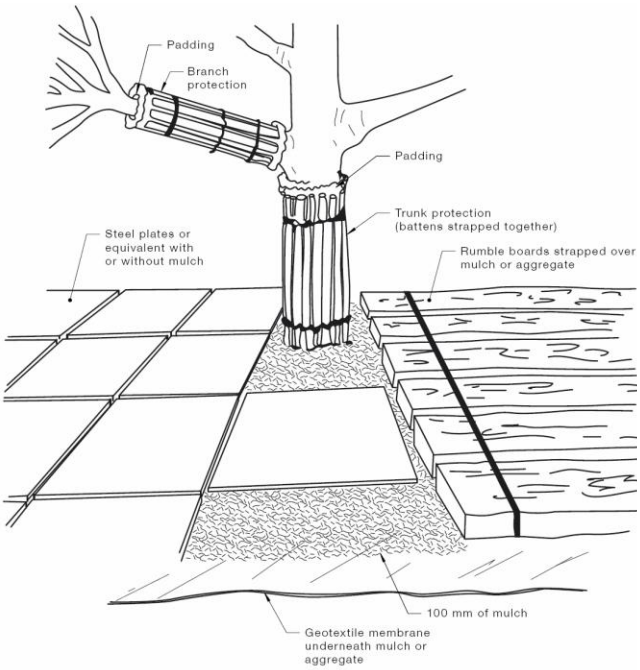
If a service is to be located within the area of the dripline of a protected tree or within the Tree Protection Zone, and site conditions such as shallow bed rock or if mass rooting has occurred from multiple trees growing in close proximity to each other, the service trench is to be elevated and positioned above natural ground level within the new driveway structure. The existing driveway surface is to be scabbled and a reinforced concrete topping is to be provided with down turned thickened edges constructed under the kerb edging to prevent lateral movement. A suitable sub grade material to manufacturers' recommendations is to be utilised if and where appropriate. Construction is to occur in a manner so as not to cause damage to the subject trees root system. All works to be in accordance with engineers' details.

1.2.2 **Precautions in Respect of Temporary Work**

For Precautions in respect of temporary work, Australian Standard AS4970 2009 *Protection of trees on development sites*, Section 4, Tree protection measures, 4.5 Other tree protection measures, provides the following:

"4.5.3 Ground protection

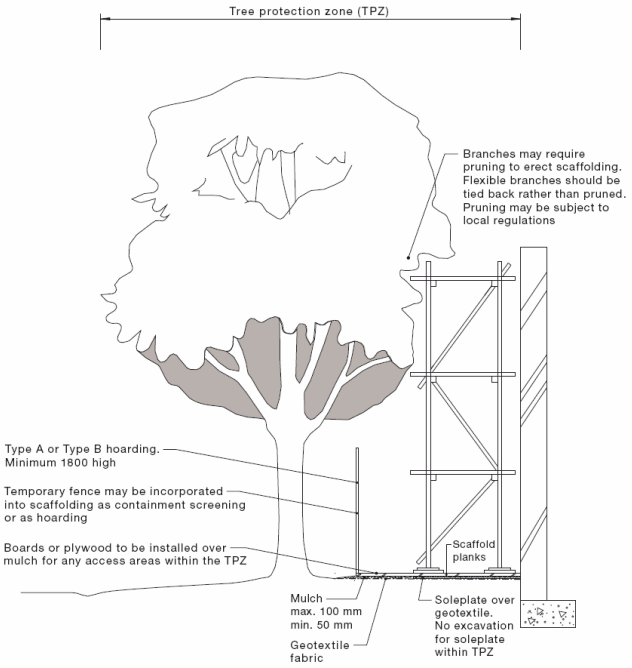
If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards as per Figure 4. These measures may be applied to root zones beyond the TPZ."



"4.5.6 Scaffolding

Where scaffolding is required it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches. Ground below the scaffolding should be protected by boarding (e.g. scaffolding board or plywood sheeting) as shown in Figure 5. Where access is required, a board walk or other surface material should be installed to minimise soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed."

"Notes:
1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2 Rumble boards should be a suitable thickness to prevent soil compaction and root damage."



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

1.3.0 Demolition of Built Structures - Precautions to Protect Trees

1.3.1 Demolition of Existing Buildings

The demolition of the buildings should be undertaken with access restricted to the driveway and the building platform for each of the existing buildings, or to areas of the land where no trees are growing within 6m of any tree to be retained. Where access or space for a safe working environment is restricted, or where the area of the 6m set back must be compromised, a 100 mm layer of Eucalyptus wood mulch must be laid over the area of encroachment. Where vehicular access is required across the mulch layer further root protection should be provided by laying a temporary pathway over the mulch. The temporary pathway should be constructed of a grated steel material capable of supporting the vehicles used during demolition e.g. similar to ramps used to load vehicles onto the backs of trucks. Trunks of trees are to be protected from vehicular damage as per section 1.2.2.

1.3.2 Demolition of Landscape Structures

The demolition of walls, driveways retaining walls, paths and pools etc. within 6 m of a tree to be retained should be undertaken manually using hand tools. Where a driveway is to be demolished being of concrete strip or slab type construction, it should be undertaken by working from the end of the driveway closest to the building back towards the street by utilising the driveway as a stable platform to prevent soil compaction. Where a concrete slab driveway passes less than 1 m from the base of a tree and the area beneath the driveway is to be undisturbed and incorporated into the landscape works for the site, the volume of space previously occupied by the driveway must be replaced with local top soil from the site or otherwise a loamy sand, to replace the mass of the concrete on the root plate which may be critical to the ballast and centre of mass for the stability of the tree. If the tree becomes unstable immediately contact the Consultant Arboriculturist.

1.3.3 Removal of Existing Trees near Trees to be Retained

Removal of a tree within 6 m of a tree to be retained should be undertaken only by cutting down such a tree without damaging the trees to be retained, and by grinding out its stump. Where possible the structural roots of 20 mm diameter or greater of the tree to be cut down should not be removed, to minimise soil disturbance and to reduce the impact on the roots of any tree to be retained nearby. Where structural roots are to be removed this should be undertaken manually by the use of non-motorized hand tools after the stump has been ground out when such roots are often easier to locate from the site of the stump from which they have been severed.

1.4.0 Excavation and Construction close to Tree Protection Zones

1.4.1 Excavation close to Tree Protection Zones

1.4.1.1

Where structural woody roots with a diameter of 20 mm or greater are to be pruned outside the area of the Tree Protection Zone, they are to be excavated manually first by using hand tools to determine their location. A Waterknife or Airknife can be used as a mechanised alternative to locate such structural woody roots. Once located those roots to be severed are to be cut cleanly with a final cut to undamaged woody tissue and this will prevent tearing damage to the roots from excavation equipment which can extend beyond the point of excavation back towards the tree.

1.4.1.2

Where a large vigorous tree is to be retained near to built structure, and dependent upon its taxa, age class and propensity for its roots system to regenerate, it may be prudent to install a root barrier immediately adjacent to the footing of the new building, or to deepen and strengthen the footings themselves to act as a root barrier, but for such structural advice an appropriately qualified chartered structural engineer should be consulted.

1.4.2 Root Location and Protection where Structures are to be Positioned near a Retained Tree

1.4.2.1

If walls or a driveway or other structures are to be constructed near a protected tree, careful excavation is to be undertaken manually by using non-motorized hand tools to determine the location of first order and lower order structural roots with a diameter of 20 mm (*structural woody roots*) or greater, without damaging them. Boundary walls or fences should use columns or posts with in fill panels, or a wall to be constructed with suspended sections 100 mm clear above or beside any structural woody root or further as required, or any new wall to be built only to the depth of that existing. Structural woody roots to be further protected by utilising the construction techniques of pier or bridge footings, or screw piles between or over them with a minimum clearance above or beside of 100 mm, or further as required to allow for future and ongoing growth.

1.4.2.2

Where a driveway or footpath is to pass by the tree a suspended slab is to be constructed or approved similar, to protect the roots that may be encountered at, near, or above ground, and may be constructed on gap graded fill. Where such a driveway or footpath is to be constructed the edge of the structure closest to the tree is to terminate no closer than 0.5 m from the closest edge of trunk, or further depending on the species and its likely further growth to allow for future development and expansion of the trunk, buttresses, and first order and lower order roots as may be advised by a Consultant Arboriculturist. The side of the driveway closest to a tree is to be edged with a concrete kerb of minimum dimensions of 150 x 150 mm, to prevent vehicular collision with the trunk. Here a *Waterknife* or an *Airknife* can be used as a mechanised alternative to locate first order and lower order structural woody roots.

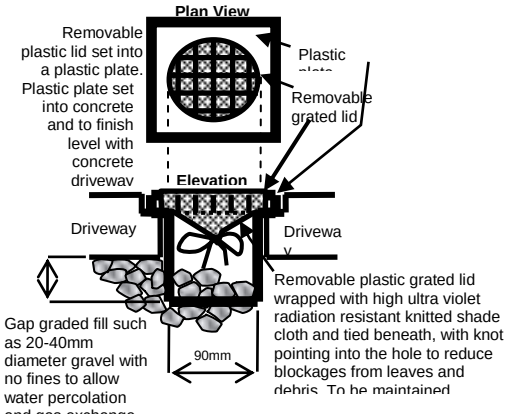
1.4.2.3

Alternatively a footpath or driveway may be constructed at ground level without any excavation, removing turf by raking, having sprayed with herbicide first if time permits. Here the path or driveway section is to extend for a distance past the tree equivalent to the lateral spread of the crown of that tree alongside the footpath, or driveway.

1.4.2.4

Watering / Gaseous exchange vents are to be installed in the area of the driveway that passes within the dripline of the tree or the prescribed ***Tree Protection Zone*** area and the number and location are to be determined by a Consultant Arboriculturist and the driveway design approved by a Certified Engineer. Exposed edges of the path are to be concealed with the finished level beside the path equivalent to the top of the path by minimal filling with a sandy soil and turf, or mulch, or a garden bed with minimal cultivation, or other landscape treatments as appropriate.

Irrigation / Gaseous



NOTE: Such vents can be installed in a grid pattern at 1 per 1 m^2 and their planning and construction utilised in consultation with an

1.4.3 **Root Protection where a Driveway close to a Tree is to be Demolished and a New Driveway Constructed in a Similar Location to a Previous Driveway.**

After demolition of an existing driveway as per 1.3.2, the level of the base for the new driveway should be located at the same existing level as that of the base of the previous driveway, and should extend for a distance past the tree equivalent to the lateral spread of the crown of that tree alongside the driveway. To prevent excavation from damaging the existing roots which may be located at, near or above the surface of the soil beneath the base of the previous driveway, the new driveway may need to be raised by constructing it on pier or bridge footings between or over them (see 1.4.2 for minimum clearances), or based on a gap graded fill and the driveway constructed with any exposed edges concealed to the top of the driveway by minimal filling with a sandy soil and turf, or mulch, or a garden bed with minimal cultivation, or other landscape treatments as appropriate. Where roots have grown to occupy the soil between the concrete strips of a concrete, stone or brick strip driveway, they and the soil may be excavated to the level of the base of the concrete strips, but where such roots have a diameter of 20 mm or greater, a Consulting Arboriculturist should be contacted prior to such works being undertaken. Where roots are to be severed, they are to be cut cleanly with a final cut to undamaged woody tissue.

1.4.4 **Root Protection where a Footpath is to be Constructed close to a Tree.**

1.4.4.1

A footpath may be constructed at ground level without any excavation, by first killing with herbicide the plants to be removed from the pathway area, and then removing that plant material by cutting the trunks of woody shrubs to ground level and by raking all other plant material to expose the top soil surface without organic matter. This will remove the need for physically disturbing the soil and the roots of the tree. The path section is to extend for a distance past each tree equivalent to the lateral spread of the crown of that tree where it extends alongside the footpath.

1.4.4.2

To prevent excavation from damaging the existing roots which may be located at, near, or above the surface of the soil, a gap graded fill as a fill material of a media as appropriate, to a depth of 100 mm above the soil surface, or above the top of the root of any tree to be retained, or above the soil surface may be utilised as a base treatment to construct the foot path. Any exposed edges to be concealed to the top of the edges of the footpath and tapering back to the base of the trunk of each tree by minimal filling at each trunk of no greater than 100 mm with a sandy soil and turf, or mulch, or a garden bed with minimal cultivation with ground covers, or other landscape treatments as appropriate. A Consultant

Arboriculturist should be contacted prior to such works being undertaken or if any structural roots are considered appropriate to be severed being those roots of 20 mm diameter or greater.

1.4.5 Structural Soil to Accommodate Load Bearing Conditions

A structural soil should only be considered as a new media into which the trees could be planted if the planting was into a new area where the area surrounding was to be load bearing such as a footpath, driveway or road.

1.4.6 Gap Graded Fill to Accommodate Compacted Sub Grade and Root Growth

To further protect woody roots with a diameter of 20 mm or greater, a gap graded fill with no fines such as gravel 40 mm diameter should only be considered as a fill media above existing grade when soil levels are to be increased near existing trees and the roots can utilise the new media to develop ongoing and future root growth and provide for gaseous exchange between the soil and the atmosphere.

Appendix 10 Glossary

Please refer to *Dictionary for Managing Trees in Urban Environments,* Institute of Australian Consulting Arboriculturists (IACA) 2009. (Draper & Richards)

Appendix 11 SULE

SULE (an acronym for **Safe & Useful Life Expectancy**). There are a number of SULE categories that indicate the safe useful life anticipated for each tree. Factors such as the location, age, condition and health of the tree are significant to determining this rating. Other influences such as the tree's effect on better specimens and the economics of managing the tree successfully in its location are also relevant to SULE (Barrell 1993, 1995).

SULE Categories and Subgroups

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1 = Long SULE OF > 40 years

A Structurally sound in suitable location	**B** Suitable to retain with some remedial care	**C** Significant status – requires special care to preserve

2 = Medium SULE of 15-40 years

A Lifespan limit	**B** Eventual removal for safety or nuisance	**C** Remove for adjacent trees or replanting	**D** Requires extensive remedial care

3 = Short SULE of 5-15 years

A Lifespan limit	**B** Eventual removal for safety or nuisance	**C** Remove for adjacent trees or replanting	**D** Requires extensive remedial care

4 = Remove tree within 5 years

A Dead, dying or disease	**B** Unstable or exposed by new clearing	**C** Structurally defective	**D** Damaged and unsafe	**E** Remove for adjacent trees or replanting	**F** Damaging existing structures	**G** Clearing will affect stability

5 = Trees suitable to transplant

A Less than 5m high	**B** Young trees over 5m high	**C** Height/width contained by pruning

The SULE rating given to any tree in this report assumes that reasonable maintenance will be provided by a qualified Arboriculturist using correct and acknowledged techniques. Retained trees are to be protected from root damage. Incorrect tree work practices can significantly accelerate tree decline and increase hazard potential.

Appendix 12 Curriculum Vitae

Graduate Diploma in Horticulture
U W S (Hawkesbury)

Diploma in Horticulture
U W S (Hawkesbury)

Diploma of Horticulture (Arboriculture) (RTF50203-6522-6/12/2005)
Hortus Australia

Tree Surgery
Ryde School of Horticulture

Arboriculture Techniques
Ryde School of Horticulture

Excel Module 1 and 2
Excel – Advanced
Central Coast Community College

OHS General Induction for Construction Work in NSW CGI00871464SEQ1
Workcover

St Johns Ambulance First Aid Certificate

Conference Attendance & Training

2010 Root Barrier Field Day
2009 Matheny & Clark: Arboriculture
2007 Quantified Tree Risk Assessment System
A Practitioners Guide to Visual Tree Assessment
2006 Barrell Tree A-Z 2 Day Workshop
IML Resistograph F500S Training Course
2005 Urban Tree Forum – Sydney City Council
Urban Tree Risk Management – Treelogic
DA Workshop Preparing Development Applications for Local Council –AIH
Urban Forest – The New Imperative – Parks and Leisure Australia
2004 Visual Tree Assessment Workshop – Professor Doctor Claus Mattheck
2003 Urban Trees - Our Urban Urgency – Parks and Leisure Australia
1999 Tree Hazard Assessment – Parramatta Park – NAAA
1990 Aero Advanced Climbers Seminar NSW

Business Achievement

Finalist in Central Coast Advocate Community Business Awards 2005 for Specialised Business category

Industry Background

20th June '01 to present	*Proprietor* ***Advanced Treescape Consulting*** *(formerly known as RJK Consulting)*
January '02 to January '05	*Part Time Horticulturist* **Acorn/Bushlands Nursery/Aquarium Centre, Erina Heights**
1997 to present	*Consultant* **Horticulturist**
1997 to present	*Public Speaker* **Horticulturist/Arboriculturist Topics**
November '97 to October '01	*Part Time Horticulturist* **Flower Power - Glenhaven**
January '94 to February '95	*Proprietor* **KAC Peninsula Firewood** Assembled team to clear backlog of firewood
June '90 to January '94	*Proprietor/Climber* **Kingdom's Arbor Care** till its sale.
January '86 to May '95	*Tree Worker* **Arbor 2000 Pro-Climb, Sydney**
1972 – present	*Bonsai enthusiast*

Memberships

Institute of Australian Consulting Arboriculturists

Australian Institute of Horticulture

Arboriculture Australia Limited

Gosford City Council Tree Protection Committee - Committee Member - August 1998 to June 2004.