

# Advanced Treescape Consulting Arboriculturist & Horticulturist

A.B.N 30 138 200 388

**Mobile: 0408 439 186**

**Office: 43 402 964**

**Fax: 43 405 089**

**P.O. Box 7192,**

**KARIONG NSW 2250**

**Email: [advancedtreescape@bigpond.com](mailto:advancedtreescape@bigpond.com)**



FOUNDING MEMBER OF  
INSTITUTE OF AUSTRALIAN  
**IAACA**  
CONSULTING ARBORICULTURISTS

## **Arboricultural Impact Assessment**

Lot 1 in DP654433 & Lot C in DP38865  
#392 Galston Road  
GALSTON

Requested by Treysten  
C/- SDH & Associates Pty Ltd

Prepared by Russell Kingdom

13<sup>th</sup> May, 2011.

Principal: Russell Kingdom MIACA MAIH MNAAA

Fully Insured: Public Liability 10M, Prof. Indemnity 2M & Personal Accident

**Advanced Treescape Consulting is committed to providing a safe working environment for its employees in accordance with The Occupational Health & Safety Act NSW 2000.**

## **Table of Contents**

Table of Contents .....	2
Table of Figures .....	2
1.0 Proposal .....	3
2.0 Site Inspection.....	3
3.0 Method of Assessment.....	3
4.0 Tree Schedule .....	4
4.1 Assessment of VTA, Recommendations of Impact & Tree Protection Measures required by Proposed Plans .....	4
4.2 Discussion .....	17
4.2.1. Raised Footpaths Through STIF Remnant .....	18
4.3 Tree Significance (Appendix 5).....	19
4.4 Identify Additional Impacts on Trees by Proposed Plans .....	19
4.5 Tree Protection Zones using AS4970:2009 .....	19
5.0 Tree Protection Works .....	21
5.1 Tree Works.....	21
5.2 Works Prior to Demolition .....	21
5.3 Bulk Earthworks .....	21
5.4 Construction Works.....	21
5.5 Landscaping Phase.....	22
6.0 Conclusions.....	22
7.0 Recommendations .....	22
Disclaimer.....	23
Appendix 1a Site Plan with Trees .....	25
Appendix 1b Site Plan with Trees, Proposed Development and TPZs .....	26
Appendix 2 Tree Schedule.....	27
Appendix 3 Digital Images .....	31
Appendix 4 Notes on Tree Assessment.....	37
Appendix 5 Rating System for Tree Significance .....	39
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) ..	41
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) .....	42
Appendix 8 Tree Protection Zones – Standard Procedure .....	44
Appendix 9 Tree Protection on Construction Sites .....	47
Appendix 10 Glossary .....	55
Appendix 11 SULE.....	56
Appendix 12 Curriculum Vitae .....	57

## **Table of Figures**

Figure 1 Showing the existing access road from Mid Dural Road and Trees 40-51 .....	31
Figure 2 Showing Tree 25 and associated weeds .....	31
Figure 3 Showing Tree 31 on unretained cut for driveway to house.....	32
Figure 4 Showing Trees 28 and 29 and unretained cut on Mid Dural Rd .....	32
Figure 5 Another view of remnant vegetation and cut on Mid Dural Rd.....	33
Figure 6 Showing Trees 18 and 19 .....	33
Figure 7 Showing Tree 20 .....	34
Figure 8 Showing Trees 13 and 14 .....	34
Figure 9 Showing Group 11 viewed from near Trees 13 and 14 .....	35
Figure 10 Showing Trees 2 and 7 .....	35
Figure 11 Showing Tree 9 .....	36
Figure 12 Showing trees referred to as Tree 12 (Group of 40) .....	36

## **1.0 Proposal**

Treysten C/- SDH & Associates Pty Ltd have commissioned Advanced Treescape Consulting to prepare an Arboricultural Impact Assessment at Lot 1 in DP 654433 and Lot 3 in DP38865, #392 Galston Road, Galston. This site is located in the Hornsby Local Government Area where there is a Tree Preservation Order in force.

It is proposed to build ~~7~~<sup>6</sup> new dwellings on the site.

The subject site was inspected on 11/05/2010 and again on 20/05/2010. The plans supplied are from taylor brammer LS01 Issue E dated 27.08.2010. The site plan in Appendix 1a illustrates the location of all surveyed 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 property fronts onto Galston Road and Mid Dural Road. The site is a large area of land in an 'L' shape. This site was previously a farm producing various horticultural products and there are a large number of *Prunus* spp. (Peach trees), fruit trees, glass houses and some planted trees located on the site. There is a heavy growth of weeds towards the eastern and northern boundaries. These weeds will negatively impact the retained trees. On the Mid Dural Road boundary is a Sydney Turpentine Ironbark Forest which is an Endangered Ecological Community. On the edge of this group of tree is a significant cut which is not retained.

The soil type is predominantly clay-based Glenorie Soils. Glenorie soil limitations are: high soil erosion hazard, localised impermeable highly plastic soil and moderately reactive.

## **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 2) 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.
- 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 3)
- Trees were numbered with aluminium tags

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 2 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 Zone Measures (TPZ)**

**Tree 1** is a *Syzygium paniculatum* (Magenta Cherry). This tree is mature, in good health and very poor structural condition. Where the tree has been lopped there are multiple branch attachments. There is also decay and surface roots visible. Hazard rating is 6. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It lies within the proposed building footprint. Removal is recommended.**
- 3. Not Applicable (N/A)**

**Tree 2** is a *Pinus patula* (Mexican Weeping Pine). This tree is mature, in good health and structural condition. The crown has been raised and there is small deadwood present. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located 6 metres to the driveway.**
- 3. A TPZ fence is required.**

**Tree 3** is a *Liquidambar styraciflua* (Sweet Gum). This tree is mature, in good health and structural condition. The crown has been raised and there is small deadwood present. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located within the proposed building footprint. This species is listed in Hornsby Shire Council's Landscape Code for Development Applications (HSC LCDA) Appendix 4 as an Undesirable Species. Removal is recommended.**
- 3. N/A**

**Tree 4** is a *Photinia robusta* (Fire Bush). This is normally a shrub. It is very mature, multi stemmed, in good health and fair structural condition. There are multiple branch attachments. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located on edge of the existing driveway. It is not impacted by the proposed development**
- 3. A TPZ fence is required.**

**Tree 5** is a *P. robusta* (Fire Bush). This is normally a shrub. It is very mature, multi stemmed, in good health and fair structural condition. There are multiple branch attachments. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention.
2. It is not impacted by the proposed development.
3. A TPZ fence is required.

**Tree 6** is a group of 20 x *Cinnamomum camphora* (Camphor Laurel). These trees are mature, in good health and poor structural condition. SULE is N/A.

1. The trees fail the VTA. They are not suitable to be considered for retention.
2. This species is listed in HSC LCDA Appendix 5 as a Noxious Weed. Removal is recommended.
3. N/A.

**Tree 7** is a *L. styraciflua* (Sweet Gum). This tree is mature, in good health and structural condition. The tree has been power line trimmed. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention.
2. It is located on the edge of the driveway (<2m). Inadequate space for future growth. This species is listed in HSC LCDA Appendix 4 as an Undesirable Species. There is *Ligustrum* spp. (Privet) at its base. Removal is recommended.
3. N/A

**Tree 8** is a *L. styraciflua* (Sweet Gum). This tree is mature, in good health and structural condition. The crown has been raised. Hazard rating is 5. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention.
2. It is located in the centre of the driveway. This species is listed in HSC LCDA Appendix 4 as an Undesirable Species. Removal is recommended.
3. N/A

**Tree 9** is a *Cedrus atlantica* (Atlas Cedar). This tree is mature, in good health and structural condition. There is small deadwood present. Hazard rating is 3. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention.
2. It is not impacted by the proposed development.
3. A 5 metre radius TPZ fence is required.

**Tree 10** is a *Prunus* spp. (Peach). This tree is very mature, multi trunked, in good health and fair structural condition. It has been lopped. Hazard rating is 3. SULE is 3A.

- 1. The tree fails the VTA but is suitably located to be retained.**
- 2. It is not impacted by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 11** is a group of 29 x *Eucalyptus microcorys* (Tallow-wood). These trees are young mature, in good health and fair to good structural condition. They have all been lopped and as a result have inclusive fork unions and multiple branch attachments. There is small deadwood present. The trees are located on the bank. Hazard rating is 4. SULE is 2B.

- 1. They pass the VTA. They are suitable to be considered for retention.**
- 2. They are 15 metres to the proposed building. There will be an acceptable amount of impact by the proposed development.**
- 3. A 5 metre TPZ fence is required.**

**Tree 12** is a group of 40+ various species. These trees are mature, in fair health and structural condition. They are located on the adjoining site. Hazard rating is 4. SULE is 2B.

- 1. They pass the VTA. There are many weeds – *L. vulgare* (Common Privet) and *L. lucidum* (Glossy Privet) which are listed in HSC LCDA Appendix 5 as Noxious Weeds. They are suitable to be considered for retention.**
- 2. They are 15 metres to the proposed building. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 13** is a *E. microcorys* (Tallow-wood). This tree is very mature, in good health and structural condition. There are epicormics and large deadwood present. The bark in the root buttress has been eaten by goats. Hazard rating is 6. SULE is 3D.

- 1. The tree fails the VTA. It is not suitable to be considered for retention.**
- 2. It is located within the proposed building footprint. Removal is recommended.**
- 3. N/A**

**Tree 14** is *Unknown species*. This tree is mature, in good health and fair structural condition. There is small deadwood and epicormics present. Hazard rating is 5. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located within the proposed building footprint. Removal is recommended.**
- 3. N/A**

**Tree 15** is an *Acacia longifolia* (Sydney Golden Wattle). This tree is mature, in poor health and fair structural condition. There are galls, small deadwood and a sparse canopy. Hazard rating is 4. SULE is 4A.

- 1. The tree fails the VTA but is suitably located on the eastern boundary to be retained (15 metres to edge of building). It is a member of the Sydney Turpentine Ironbark Forest community (STIF).**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 16** is an *A. longifolia* (Sydney Golden Wattle). This tree is mature, in poor health and fair structural condition. There are galls, small deadwood and a sparse canopy. Hazard rating is 4. SULE is 4A.

- 1. The tree fails the VTA but is suitably located on the eastern boundary to be retained (15 metres to edge of building). It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 17** is a *S. paniculatum* (Magenta Cherry). This tree is mature, co-dominant, in good health and structural condition. There are inclusive fork union, small deadwood and privet at the base. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located within the proposed building footprint. Removal is recommended.**
- 3. N/A**

**Tree 18** is a *S. paniculatum* (Magenta Cherry). This tree is mature, co-dominant, in good health and structural condition. It has an inclusive main fork union, small deadwood and girdling roots. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located within the proposed building footprint. Removal is recommended.**
- 3. N/A**



**Tree 19** is a *C. camphora* (Camphor Laurel). This tree is mature, multi trunked, in good health and poor structural condition. SULE is N/A.

1. The tree fails the VTA. It is not suitable to be considered for retention.
2. This species is listed in HSC LCDA Appendix 5 as a Noxious Weed. It is located within the proposed building footprint. Removal is recommended.
3. N/A

**Tree 20** is a *Chionanthus ramiflora* (Native Olive). This tree is mature, tri-dominant, in good health and fair structural condition. It has an inclusive fork union. Hazard rating is 3. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention.
2. It is located within the proposed building footprint. Removal is recommended.
3. N/A

**Tree 21** is a *Pittosporum undulatum* (Australian Daphne). This tree is mature, multi trunked, in good health and fair structural condition. There is scale, psyllids and small deadwood present. Hazard rating is 3. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. It is a member of STIF. This species is exempt from HSC Tree Preservation Order (TPO).
2. It is located within the proposed driveway. Removal is recommended.
3. N/A

**Tree 22** is a *Jacaranda mimosifolia* (Jacaranda). This tree is a coppice regrowth. It is young mature, multi trunked, in good health and fair structural condition. The tree passes the VTA. Hazard rating is 3. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. Consideration should be given to remove this tree as it is an exotic tree and is a coppice regrowth. It is located within the remnant STIF forest and if removed it could be replaced with a STIF forest community member giving the remnant more continuity.
2. It is located on the edge of the driveway 4 metres to the proposed driveway. There will be an acceptable impact by the proposed development.
3. A TPZ fence is required.

**Tree 23** is a *P. robusta* (Fire Bush). This is normally a shrub. It is very mature, multi stemmed, in good health and poor structural condition. The shrub has been lopped and there is decay present. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. Consideration should be given to remove this exotic shrub and if removed it could be replaced with a STIF forest community member giving the remnant more continuity. .
2. It is located within the proposed driveway. Removal is recommended.
3. N/A

**Tree 24** is a *Malus* spp. (Apple). This tree is very mature, in good health and poor structural condition. There are epicormics, decay in the trunk and an unbalanced canopy. Hazard rating is 4. SULE is 3A.

1. The tree passes the VTA. It is suitable to be considered for retention.
2. It is located within the proposed driveway. Removal is recommended.
3. N/A

**Tree 25** is a *P. undulatum* (Australian Daphne). This tree is mature, in good health and fair structural condition. The tree is amongst *Ligustrum* spp. (Privet) and *Cotoneaster* spp. (Cotoneaster). Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. It is a member of STIF. This species is exempt from HSC TPO. ). It would be difficult to remove the *Cotoneaster* spp. (Cotoneaster) and *Ligustrum* spp. (Privet) without damaging the *P. undulatum* (Australian Daphne). This tree is just on the edge of the driveway and again it would have its Structural Root Zone (SRZ) compromised. Retaining this tree is probably not the best option. It could be retained but compromised. Again another replacement Sydney Turpentine Ironbark Forest understorey (same species) could be replanted.
2. It is located within the proposed building footprint. Removal is recommended.
3. N/A

**Tree 26** is a *Corymbia* 'variegata' (Spotted Gum). This tree is very mature, multi trunked, in fair health and poor structural condition. There is large deadwood, decay in the trunk and epicormics present. Hazard rating is 7. SULE is 3D.

1. The tree fails the VTA but is suitably located in the 12 metre buffer on Mid Dural Road side.
2. There will be minimal impact by the proposed development.
3. A TPZ fence is required.

**Tree 27** is a *Pinus radiata* (Radiata Pine). This tree is very mature, in fair health and good structural condition. There is large deadwood and a sparse canopy. Hazard rating is 6. SULE is 3A.

- 1. The tree fails the VTA. It is located in the STIF remnant 12 metre buffer on Mid Dural Road side. This species is listed in HSC LCDA Appendix 4 as an Undesirable Species. It is not suitable to be considered for retention.**
- 2. Removal is recommended.**
- 3. N/A**

**Tree 28** is a *E. acmenoides* (White Mahogany). This tree is mature, in good health and poor structural condition. There is a trunk wound at 1.5 metres, small deadwood and 1 metre to a 4 metre cut. Hazard rating is 5. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 29** is a *E. acmenoides* (White Mahogany). This tree is mature, in good health and structural condition. It is 1.5 metres to a cut. The tree passes the VTA. Hazard rating is 5. SULE is 2B.

- 1. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 30** is a *Macadamia tetraphylla* (Rough-shelled Macadamia). This tree is mature, quad-dominant, in good health and structural condition. It has been lopped and there is small deadwood. Hazard rating is 3. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention.**
- 2. It is located in the grassed area more than 15 metres to the proposed building. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 31** is a *S. paniculatum* (Magenta Cherry). This tree is mature, in good health and structural condition. The tree is on the cut for the drive. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 32** is a *S. paniculatum* (Magenta Cherry). This tree is mature, multi trunked, in good health and structural condition. It is 1.5 metres to the cut for the drive. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 33** is a *P. undulatum* (Australian Daphne). This tree is mature, co-dominant, in good health and structural condition. There is possible decay in the crown. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. This species is exempt from HSC TPO. It is a member of STIF.**
- 2. It is located in the grassed area more than 15 metres to the proposed building. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 34** is a *E. paniculata* (Grey Ironbark). This tree is mature, in fair health and poor condition. There is small deadwood, epicormics and canker in the trunk. Hazard rating is 6. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 35** is a *P. radiata* (Radiata Pine). This tree is mature, in fair health and good structural condition. There is small deadwood and a sparse canopy. Hazard rating is 5. SULE is 2B.

- 1. The tree passes the VTA. It is located in the STIF remnant 12 metre buffer on Mid Dural Road side. This species is listed in HSC LCDA Appendix 4 as an Undesirable Species. It is not suitable to be considered for retention.**
- 2. Removal is recommended.**
- 3. N/A**

**Tree 36** is a *Unknown species*. This tree is young mature, in good health and structural condition. Hazard rating is 3. SULE is 2B.

1. **The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
2. **There will be minimal impact by the proposed development.**
3. **A TPZ fence is required.**

**Tree 37** is a *Unknown species*. This tree is young mature, in good health and structural condition. There is small deadwood present. No flowers or fruits were present for identification. Hazard rating is 3. SULE is 2B.

1. **The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
2. **There will be minimal impact by the proposed development.**
3. **A TPZ fence is required.**

**Tree 38** is a *E. acmenoides* (White Mahogany). This tree is young mature, in good health and structural condition. There is small deadwood present and bark ripped off from 2-6 metres. Hazard rating is 3. SULE is 2B.

1. **The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
2. **There will be minimal impact by the proposed development.**
3. **A TPZ fence is required.**

**Tree 39** is a *E. acmenoides* (White Mahogany). This tree is young mature, in good health and structural condition. There is small deadwood present. Hazard rating is 4. SULE is 2B.

1. **The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
2. **There will be minimal impact by the proposed development.**
3. **A TPZ fence is required.**

**Tree 40** is a *Unknown species*. This tree is young mature, in fair health and good structural condition. There is small deadwood present. No flowers or fruits were present for identification. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 41** is a *E. paniculata* (Grey Ironbark). This tree is mature, in good health and structural condition. There is small deadwood present. Hazard rating is 5. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 42** is a *Unknown species*. This tree is mature, in good health and structural condition. There is small deadwood present. No flowers or fruits were present for identification. Hazard rating is 6. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 43** is a *E. paniculata* (Grey Ironbark). This tree is mature, in good health and structural condition. There is small deadwood present. Hazard rating is 6. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 44** is a *E. acmenoides* (White Mahogany). This tree is young mature, co-dominant, in good health and fair structural condition. One leader has been removed. Hazard rating is 4. SULE is 2D.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. It is suitable to be considered for retention.**
- 3. A TPZ fence is required.**

**Tree 45** is a *E. acmenoides* (White Mahogany). This tree is mature, co-dominant, in good health and structural condition. There is an inclusive main fork union and small deadwood present. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 46** is a *Unknown species*. This tree is very mature, in good health and structural condition. There is small deadwood present. No flowers or fruits present for identification. Hazard rating is 5. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 47** is a *E. acmenoides* (White Mahogany). This tree is mature, in good health and structural condition. There is small deadwood present. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 48** is a *E. acmenoides* (White Mahogany). This tree is mature, in good health and structural condition. There is small deadwood present. Hazard rating is 4. SULE is 2B.

- 1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.**
- 2. There will be minimal impact by the proposed development.**
- 3. A TPZ fence is required.**

**Tree 49** is a *Syncarpia glomulifera* (Turpentine). This tree is mature, co-dominant, in good health and structural condition. The tree passes the VTA. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.
2. It is suitable to be considered for retention.
3. A TPZ fence is required.

**Tree 50** is a *E. eugenioides* (Thin-leaved Stringybark). This tree is young mature, in good health and structural condition. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.
2. There will be minimal impact by the proposed development.
3. A TPZ fence is required.

**Tree 51** is a *E. eugenioides* (Thin-leaved Stringybark). This tree is mature, in good health and structural condition. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side.
2. There will be minimal impact by the proposed development. Intrusion by detention area less than 10% of TPZ. Consultant Arboriculturist to be on site when detention area is excavated
3. A TPZ fence is required.

**Tree 52** is a *E. acmenoides* (White Mahogany). This tree is mature, in good health and structural condition. There is a trunk wound at 6 metres. Hazard rating is 4. SULE is 2B.

1. The tree passes the VTA. It is suitable to be considered for retention. It is located in the 12 metre buffer on Mid Dural Road side. It is a member of STIF.
2. There will be minimal impact by the proposed development.
3. A TPZ fence is required.



## 4.2 Discussion

The majority of trees are being retained on the site (103 of 139 trees).

Trees to be removed:

- 2 trees on the Galston Road entry (Trees 7 and 8 are both Undesirable Species).
- 8 trees located in the proposed building footprint (Trees 1, 3, 13, 14, 17, 18, 19 and 20). Tree 3 is an Undesirable Species. Tree 19 is a Noxious Weed.
- 4 trees located in the proposed driveway (Trees 21, 23, 24, 25). They are in poor condition.
- Tree 6 is a group of 20 x *C. camphora* (Camphor Laurel). They fail the VTA, are listed as Exempt Species in Hornsby Shire Council's Tree Preservation Order and are Noxious Weeds Class 4.
- Trees 27 and 35 are an Undesirable Species which seeds readily and could seriously impact the remnant STIF.(2 trees)

These trees fail the VTA:

- SULE 4 – Trees 15 and 16
- SULE 3 – Trees 10, 13, 24, 26, 27
- Noxious Weeds – Trees 6 (group) and 19

All of the retained trees have been well accommodated with the proposed plans. All trees on the Galston Road side of the site are good, especially the row of *E. microcorys* (Tallow-wood) – Group 11 – on the southern boundary have more than adequate above and below ground space and they won't be impacted. They will need to have TPZ placed around them. There will now be no swales adjacent to the Galston Road block side boundaries as previously drawn thereby leaving the row of trees undisturbed.

The drive from Mid Dural Road will require excavation. These works are beyond the TPZ of Tree 26 and pose an acceptable impact. Any tree roots encountered during excavation will need to be cleanly terminated with a saw or tree branch loppers.

The attached plan LS01E dated 27/08/10 (Appendix 1b) shows the 5 metre Tree Protection Zone fencing for Trees 9 and 11.

The remnant Sydney Turpentine Ironbark Forest adjacent to Mid Dural Road will require a fence to be erected as close as is possible to the proposed entry road. There is a 3 metre cut on the Mid Dural Road side of remnant vegetation. Fencing may not be necessary along this boundary. The TPZ fence must be constructed as specified in AS4970:2009 *Protection of trees on development sites*. These TPZ Barriers are to be maintained during construction and until the Landscaping phase for Trees 9 and 11. The TPZ fence around the Sydney

Turpentine Ironbark Forest should only be removed when the Bush Regeneration Company is in agreeance to its removal.

The cut on the Mid Dural Road end of the site is not currently retained. It is recommended that the earth wall be retained. This will ensure the remnant Endangered Ecological Community of Sydney Turpentine-Ironbark Forest is not impacted by the possibility of erosion.

The intrusion into the TPZ of Tree 51 by the detention area will be less than 10% of the TPZ. A Consultant Arboriculturist will be required on site when the detention area is excavated.

The retained remnant Sydney Turpentine-Ironbark Forest on Mid Dural Road is currently impacted by dense weed growth. It is recommended that works in this area are guided by a Bush Regeneration Plan. Weed removal in Endangered Ecological Communities can impact the trees if not correctly managed. A qualified Bush Regeneration Company should be engaged to develop a plan and conduct works in this area.

#### **4.2.1. Raised Footpaths Through STIF Remnant**

The remnant Sydney Turpentine Ironbark Forest area is shown to have a pathway constructed. It is proposed to construct a raised wooden path. This method of access is embraced by the National Parks and Wildlife Service through critically endangered Ecological Communities. A remnant of a Endangered Ecological Community should have a defined access through it as it will educate people about what a Sydney Turpentine Ironbark Forest comprises of.

A raised wooden footpath will have an acceptably low level of impact on these remnants. Pier holes are not to impact roots >30mm. If a root of this size or larger are encountered the pier hole must be moved to miss the root. The use of concrete to secure the piers will not negatively impact any tree roots in the immediate area.

The wooden walkway should have a product Lanotec™ used to prevent termite damage. This is the product used by National Parks and Wildlife Services on timber structures within parks. It is a lanolin based product with no negative environmental effects.

It may be helpful that a suitably qualified Arborist (AQF5) could supervise the works through the Sydney Turpentine Ironbark Forest. This shouldn't be necessary.

This method of access to the Sydney Turpentine Ironbark Forest remnant will benefit residents of the site and surrounding community.

#### **4.3 Tree Significance (Appendix 5)**

The trees that have a high level of significance are those located on the Mid Dural Road northern end of the site. These are remnant trees that are representative of the Sydney Turpentine-Ironbark Forest which is an Endangered Ecological Community under the Threatened Species Conservation Act 1995. There is more than adequate space to protect them in the future.

#### **4.4 Identify Additional 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.
- All trees nominated to be retained have adequate above and below ground space for future growth.
- 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.
- None of the retained trees will require crown management to accommodate the proposed building.

#### **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
2	870	1050	10.5 metres	3.4 metres
4	200	500	2.4 metres	2.5 metres

5	200	500	2.4 metres	2.5 metres
9	350	400	3.6 metres	2.3 metres
10	100	300	2.0 metres*	2.0 metres
11	440	560	5.3 metres	2.6 metres
Group of 29				
12	200	350	2.4 metres	2.1 metres
In adj. site				
Group of 40+				
15	200	300	2.4 metres	2.0 metres
16	200	300	2.4 metres	2.0 metres
22	100	350	2.0 metres*	2.1 metres
26	400	1100	4.8 metres	3.4 metres
28	350	450	4.2 metres	2.4 metres
29	420	540	5.0 metres	2.6 metres
30	100	300	2.0 metres*	2.0 metres
31	300	520	3.6 metres	2.5 metres
32	200	500	2.4 metres	2.5 metres
33	530	420	6.4 metres	2.3 metres
34	320	340	3.9 metres	2.1 metres
36	210	400	2.5 metres	2.3 metres
37	180	300	2.2 metres	2.0 metres
38	300	450	3.6 metres	2.4 metres
39	260	430	3.2 metres	2.4 metres
40	200	300	2.4 metres	2.0 metres
41	450	700	5.4 metres	2.8 metres
42	620	1100	7.5 metres	3.4 metres
43	440	640	5.3 metres	2.8 metres
45	570	700	6.9 metres	2.8 metres
46	540	840	6.5 metres	3.1 metres
47	450	800	5.4 metres	3.0 metres
48	500	800	6.0 metres	3.0 metres
50	300	430	3.6 metres	2.4 metres
51	350	460	4.2 metres	2.4 metres
52	320	500	3.9 metres	2.5 metres

\* Minimum TPZ is 2 metres – Maximum TPZ is 15 metres

# Minimum SRZ 1.5 metres  
Source: AS4970:2009

## **5.0 Tree Protection Works**

TPZ Barriers are to be maintained during construction and until the Landscaping phase for Trees 9 and 11. The TPZ fence around the Sydney Turpentine Ironbark Forest should only be removed when the Bush Regeneration Company agrees to its removal.

TPZs are to be erected around the retained trees before construction commences. The TPZ is to be constructed of 2 metres high temporary chain wire fencing. This is preferable to star pickets as it would require them to be hammered into the ground which could damage roots.

A sign as per AS4970:2009 is required warning of the Tree Protection Zone.

This action will greatly reduce the stress on the trees. The TPZ 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)

## **5.2 Works Prior to Demolition**

The existing structures on the site will have to be removed. None of the retained trees will be impacted by these demolition works.

## **5.3 Bulk Earthworks**

There will be bulk earthworks to gain access from Mid Dural Road to the site as the site level is considerably higher. TPZ fencing must be installed before excavation. No soil is to be stored in any TPZ.

## **5.4 Construction Works**

There will be no impact on the retained trees by construction works as they will be located with TPZs.

## **5.5 Landscaping Phase**

- At the landscaping phase none of the retained trees will be impacted.
- Weed management in the area on the Mid Dural Road section should be implemented at this stage of the development.
- Suitable replacement trees are to be planted at the Landscaping Phase of the development.

## **6.0 Conclusions**

The proposed plans have accommodated the majority of trees on the site. There are only 36 trees that are impacted by the proposed plans out of 139. The 36 trees that are being removed are an insignificant number compared to those that are being retained (103 trees).

With suitable TPZs in place the retained trees on the site will have a long SULE and provide long term amenity and wildlife resources. The retained trees on the Mid Dural Road are a recognisable remnant of an Endangered Ecological Community and will not be impacted by the proposed development. These trees will benefit greatly when the Bush Regeneration works are completed.

## **7.0 Recommendations**

Implement all recommendations contained in 4.1, 4.2, 4.2.1, 4.4, 4.5, 5.0, 5.1, 5.5

*R. Kingdom*

R. J. Kingdom MIACA MAIH MAAL  
Grad. Dip. Hort.  
Dip. Hort  
Dip. Hort/Arboriculture (RTF50203-6522-6/12/2005)  
Arboriculturist & Horticulturist  
Advanced Treescape Consulting

## Disclaimer

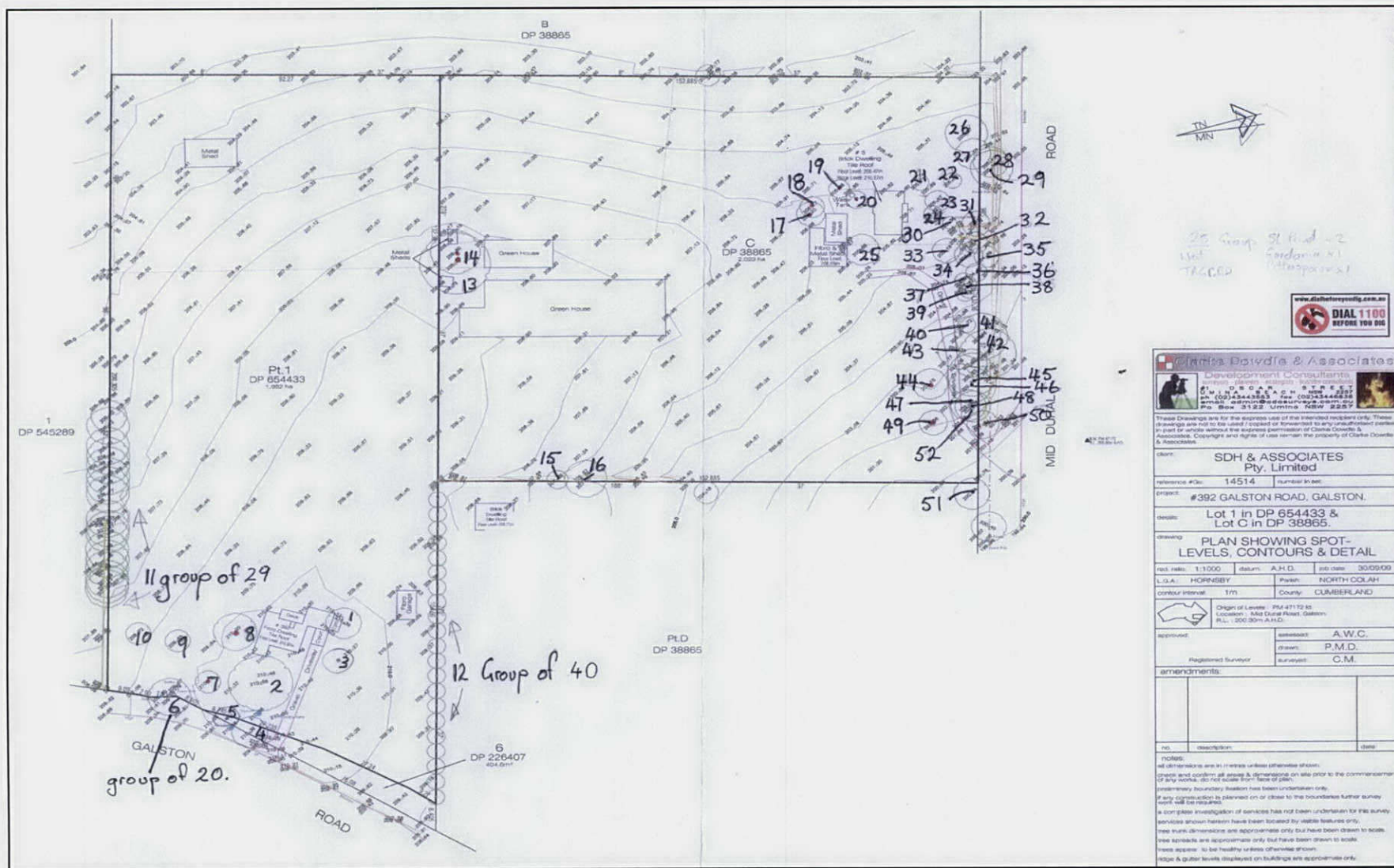
The author and Advanced Treescape Consulting take no responsibility for actions taken and their consequence if contrary to those expert and professional instructions given as recommendations pertaining to safety. The conclusions and recommendations contained in this report refer to the tree(s) condition on the inspection day. All care has been taken using the most up-to-date Arboricultural information in the preparation of this report. The report is based on a visual inspection only. Tree health and environmental conditions can change irreversibly at any time due to unforeseen circumstances or events. Due to *Myrtaceae* family hybridisation some tree species are difficult to accurately identify. Unless trees are in full flower identification is only probable.

## Reference List

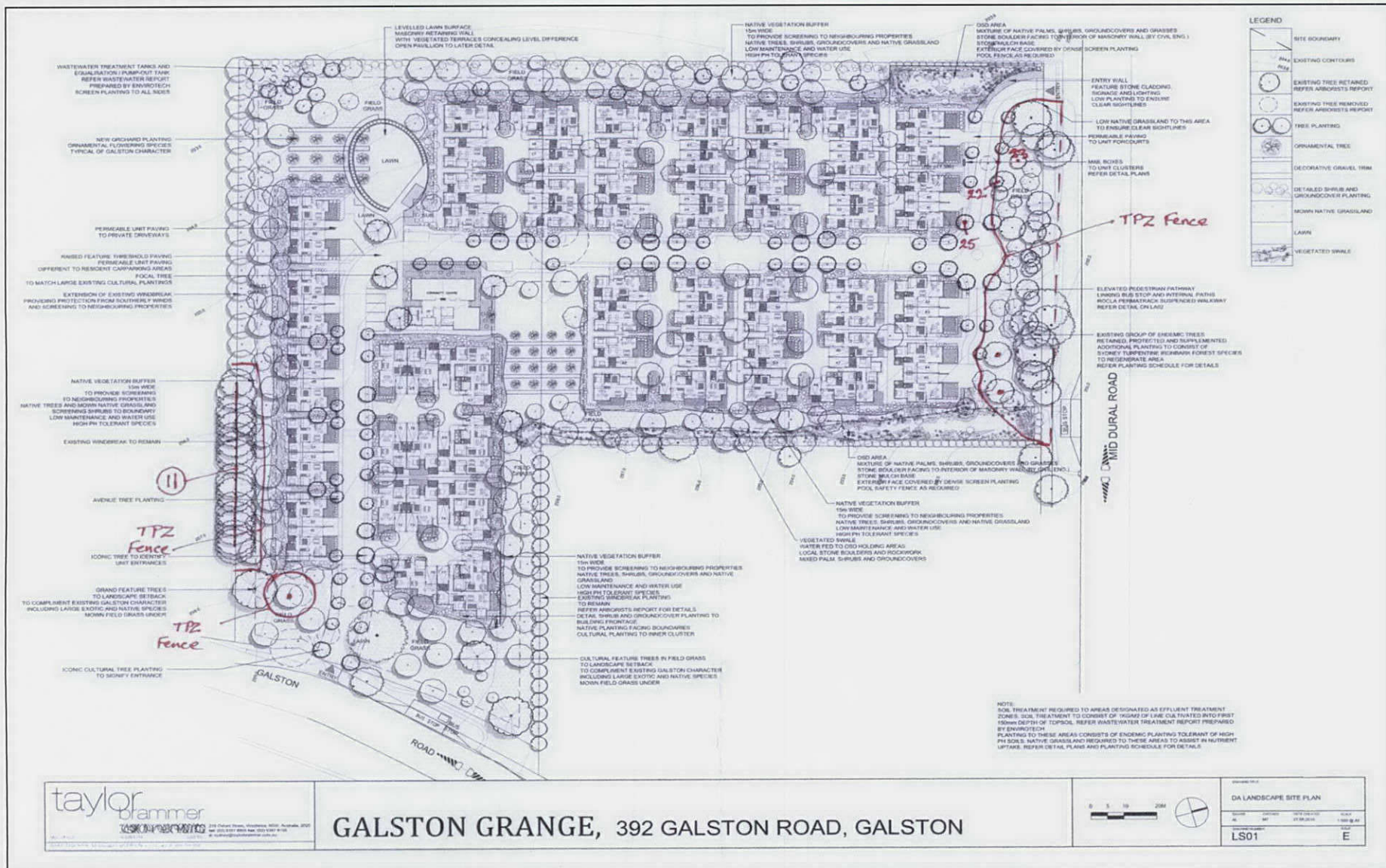
- Australian Standards 4373 (2007) *Pruning of amenity trees*  
Australian Standards 4970 (2009) *Protection of trees on development sites*  
Barrell, J. (1993-95) 'Pre-planning Tree Surveys: Safe Useful Life Expectancy (SULE) is the Natural Progression' *Arboricultural Journal* Vol. 17, PP 33-46, Academic Publishers, Great Britain.  
Chapman, G.A., and Murphy, C.L. (2002) Edition 2 *Soil Landscapes of the Sydney* 1:100 000 Sheet. Department of Land & Water Conservation  
Costermans L.F. (Leon F.) (1994). *Native Trees and Shrubs of South-eastern Australia* Rev. ed. Landsdowne Publishing Pty Ltd  
Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia  
Harris, R.W., Clark, J.R., Matheny, N.P., (2004) *Arboriculture – Integrated Management of Landscape Trees, Shrubs, and Vines*, Fourth Edition, Prentice Hall  
Mattheck C, Breloer, H (2004) *The Body Language of Trees. A Handbook for Failure Analysis*. Research for Amenity Trees No. 4, The Stationary Shop.  
[www.hornsby.nsw.gov.au](http://www.hornsby.nsw.gov.au)



## Appendix 1a Site Plan with Trees



## Appendix 1b Site Plan with Trees, Proposed Development and TPZs





## Appendix 2 Tree Schedule

**Abbreviations:** m-metres, DBH-trunk diameter @1.4m, DGL-trunk diameter at ground level, mm-millimetres, VP-very poor, P-poor, F-fair, G-good, VG-very good, CD-co-dominant trunk, TD-tri-dominant trunk, QD-4x trunk, TL-trunk lean, Insp-Inspect, TW-trunk wound, L-longicorns, E-Epicormics, FA-Forest Architecture, FR-Forest Remnant, H/D-Height/Diameter ratio test, 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, J-juvenile, YM-young mature, M-mature, VM-very mature, OM-over mature, D-dangerous, VD-very dangerous, X-no room to grow / unsuitable H-Habitat, HB-Habitat Box, Rec.-Recommendation, S-save, R-remove, W-work needed to be carried out, mon-monitor, N/A-not applicable, TPO-Tree Preservation Order, VTA-Visual Tree Assessment (P-pass, F-fail), RW-Reaction Wood, H/D- Height/Diameter Ratio should not exceed 1:30 (Mattheck 2004)

**Hazard Rating** – 1=low hazard, 12=dangerous

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	<i>Syzygium paniculatum</i> Magenta Cherry	10	630	1.1m	G	VP	5 3 5 5	M, lopped, decay, MBAs, surface roots, in proposed building footprint	P	6	2B	R
2	<i>Pinus patula</i> Mexican Weeping Pine	12	870	1.05 m	G	G	9 8 9 8	M, crown raised, dw, 6m to driveway	P	4	2B	S
3	<i>Liquidambar styraciflua</i> Sweet Gum	8	390	600	G	G	5 5 5 5	M, crown raised, dw, in proposed building footprint, Undesirable Species	P	4	2B	R
4	<i>Photinia robusta</i> Fire Bush	5	Multi 10x <200	500	G	F	4 4 3 4	VM, MBAs, normally a shrub, on edge of existing driveway	P	4	2B	S
5	<i>P. robusta</i> Fire Bush	5	Multi 10x <200	500	G	F	4 4 3 4	VM, MBAs, normally a shrub, in proposed driveway	P	4	2B	S
6	<i>Cinnamomum camphora</i> Camphor Laurel Group x 20	4	<400	500	G	P	4 4 4 4	M, suckering, noxious weed	F	-	N/A	R
7	<i>L. styraciflua</i> Sweet Gum	8	360	590	G	G	4 4 4 4	M, power line trimmed, privet at base, on edge of driveway, Undesirable Species	P	4	2B	R
8	<i>L. styraciflua</i> Sweet Gum	12	480	670	G	G	8 6 6 6	M, crown raised, in proposed driveway, Undesirable Species	P	5	2B	R
9	<i>Cedrus atlantica</i> Atlas Cedar	6	350	400	G	G	4 4 3 3	M, dw	P	3	2B	S
10	<i>Prunus</i> spp. Peach	6	Multi 7x <100	300	G	F	2 2 2 2	VM, lopped	F	3	3A	S

11	<i>Eucalyptus microcorys</i> Tallow-wood Group of 29	14-18	440	560	G	F-G	7 4 3 3	YM, all lopped, IFUs, dw, MBAs, on bank, 15m to proposed building	P	4	2B	S
12	Various species Group of 40+	5	<200	350	F	F	2 2 2 2	M, group in adjoining site, many weeds (Privet), 15m to the proposed building	P	4	2B	S
13	<i>E. microcorys</i> Tallow-wood	20	1.1m	1.5m	G	G	10 10 10 10	VM, E, DW, bark in root buttress eaten by goats, in proposed building footprint	F	6	3D	R
14	<i>Unknown species</i>	14	420	600	G	F	5 5 2 5	M, dw, E, in proposed building footprint	P	5	2B	R
15	<i>Acacia longifolia</i> Sydney Golden Wattle	6	200	300	P	F	1 2 1 1	M, galls, dw, sparse canopy, 15m to edge of building	F	4	4A	S
16	<i>A. longifolia</i> Sydney Golden Wattle	6	200	300	P	F	1 1 1 1	M, galls, dw, sparse canopy, 15m to edge of building	F	4	4A	S
17	<i>S. paniculatum</i> Magenta Cherry	12	CD 350/ 400	720	G	G	5 4 4 2	M, IFUs, dw, privet at base, in proposed building footprint	P	4	2B	R
18	<i>S. paniculatum</i> Magenta Cherry	12	CD 320/ 290	700	G	G	5 4 2 4	M, IMFU, dw, girdling roots, in proposed building footprint	P	4	2B	R
19	<i>C. camphora</i> Camphor Laurel	6	Multi 8x <100	200	G	P	2 1 1 2	M, noxious weed, in proposed building footprint	F	-	N/A	R
20	<i>Chionanthus ramiflora</i> Native Olive	5	TD <100	250	G	F	2 2 2 2	M, IFU, in proposed building footprint	P	3	2B	R
21	<i>Pittosporum undulatum</i> Australian Daphne	4	Multi X4 <150	250	G	F	2 2 2 2	M, scale, psyllids, dw, exempt from TPO, in proposed driveway	P	3	2B	R
22	<i>Jacaranda mimosifolia</i> Jacaranda	6	5x <100	350	G	F	3 2 2 2	YM, coppice regrowth, on edge of driveway 4m to proposed driveway	P	3	2B	S
23	<i>P. robusta</i> Fire Bush	7	Multi 6x <200	600	G	P	3 3 3 3	VM, lopped, decay, normally a shrub, in proposed driveway	P	4	2B	R
24	<i>Malus</i> spp. Apple	4	240	510	G	P	2 2 4 0	VM, E, decay in trunk, unbalanced canopy, in proposed driveway	F	4	3A	R
25	<i>P. undulatum</i> Australian Daphne	5	200	300	G	F	2 2 2 2	M, in group of privet & cotoneaster, exempt from TPO, in proposed driveway	P	4	2B	R

26	<i>Corymbia variegata</i> Spotted Gum	10	Multi 5x <400	1.1m	F	P	6 6 6 6	VM, DW, decay in trunk, E, in 12m buffer on Mid Dural Rd side	F	7	3D	S
27	<i>Pinus radiata</i> Radiata Pine	10	530	800	F	G	6 6 4 4	VM, DW, sparse canopy, Undesirable Species, in 12m buffer on Mid Dural Rd side	F	6	3A	R
28	<i>E. acmenoides</i> White Mahogany	8	350	450	G	P	4 2 2 4	M, TW @ 1.5m, dw, 1m to 4m cut, in 12m buffer on Mid Dural Rd side	P	5	2B	S
29	<i>E. acmenoides</i> White Mahogany	10	420	540	G	G	5 4 5 4	M, 1.5m to cut, in 12m buffer on Mid Dural Rd side	P	5	2B	S
30	<i>Macadamia tetraphylla</i> Rough-shelled Macadamia	5	QD <100	300	G	G	2 2 2 2	M, lopped, dw, in grassed area >15m to proposed development	P	3	2B	S
31	<i>S. paniculatum</i> Magenta Cherry	10	300	520	G	G	3 3 2 3	M, on cut for drive, in 12m buffer on Mid Dural Rd side	P	4	2B	S
32	<i>S. paniculatum</i> Magenta Cherry	10	Multi 4x <200	500	G	G	3 3 3 2	M, 1.5m to cut for drive, in 12m buffer on Mid Dural Rd side	P	4	2B	S
33	<i>P. undulatum</i> Australian Daphne	8	CD 330/ 200	420	G	G	3 3 3 3	M, possible decay in crown, Undesirable Species, exempt from TPO, in grassed area >15m to proposed building	P	4	2B	S
34	<i>E. paniculata</i> Grey Ironbark	8	320	340	F	P	2 3 2 1	M, dw, E, canker in trunk, in 12m buffer on Mid Dural Rd side	P	6	2B	S
35	<i>P. radiata</i> Radiata Pine	12	400	500	F	G	3 3 3 3	M, dw, sparse canopy, Undesirable Species, in 12m buffer on Mid Dural Rd side	P	5	2B	R
36	<i>Unknown species</i>	10	210	400	G	G	2 2 2 2	YM, in 12m buffer on Mid Dural Rd side	P	3	2B	S
37	<i>Unknown species</i>	10	180	300	G	G	2 2 2 2	YM, dw, in 12m buffer on Mid Dural Rd side	P	3	2B	S
38	<i>E. acmenoides</i> White Mahogany	14	300	450	G	G	3 3 3 2	YM, dw, bark ripped off @ 2-6m, in 12m buffer on Mid Dural Rd side	P	3	2B	S
39	<i>E. acmenoides</i> White Mahogany	12	260	430	G	G	2 2 2 2	YM, dw, in 12m buffer on Mid Dural Rd side	P	4	2B	S
40	<i>Unknown species</i>	14	200	300	F	G	4 2 4 4	YM, dw, in 12m buffer on Mid Dural Rd side	P	4	2B	S
41	<i>E. paniculata</i> Grey Ironbark	20	450	700	G	G	6 2 3 3	M, dw, in 12m buffer on Mid Dural Rd side	P	5	2B	S
42	<i>Unknown species</i>	20	620	1.1m	G	G	6 4 4 4	M, dw, in 12m buffer on Mid Dural Rd side	P	6	2B	S

43	<i>E. paniculata</i> Grey Ironbark	15	440	640	G	G	4 4 4 4	M, dw, in 12m buffer on Mid Dural Rd side	P	6	2B	S
44	<i>E. acmenoides</i> White Mahogany	9	CD 500/ 400	900	G	F	2 4 3 3	YM, 1 leader removed, in proposed driveway	P	4	2D	S
45	<i>E. acmenoides</i> White Mahogany	16	CD 240/ 330	700	G	G	4 3 4 4	M, IMFU, dw, in 12m buffer on Mid Dural Rd side	P	4	2B	S
46	<i>Unknown species</i>	21	540	840	G	G	8 6 6 6	VM, dw, in 12m buffer on Mid Dural Rd side	P	5	2B	S
47	<i>E. acmenoides</i> White Mahogany	16	450	800	G	G	6 8 6 6	M, dw, in 12m buffer on Mid Dural Rd side	P	4	2B	S
48	<i>E. acmenoides</i> White Mahogany	18	500	800	G	G	8 6 8 6	M, dw, in 12m buffer on Mid Dural Rd side	P	4	2B	S
49	<i>Syncarpia glomulifera</i> Turpentine	15	CD 320/ 380	560	G	G	4 3 3 2	M, in proposed driveway	P	4	2B	R
50	<i>E. eugenioides</i> Thin-leaved Stringybark	16	300	430	G	G	4 3 3 2	YM, in 12m buffer on Mid Dural Rd side	P	4	2B	S
51	<i>E. eugenioides</i> Thin-leaved Stringybark	16	350	460	G	G	4 5 3 2	M, in 12m buffer on Mid Dural Rd side	P	4	2B	S
52	<i>E. acmenoides</i> White Mahogany	18	320	500	G	G	6 1 6 6	M, TW @ 6m, in 12m buffer on Mid Dural Rd side	P	4	2B	S

**Appendix 3 Digital Images**



**Figure 1 Showing the existing access road from Mid Dural Road and Trees 40-51**



**Figure 2 Showing Tree 25 and associated weeds**





**Figure 3 Showing Tree 31 on unretained cut for driveway to house**



**Figure 4 Showing Trees 28 and 29 and unretained cut on Mid Dural Rd**





**Figure 5 Another view of remnant vegetation and cut on Mid Dural Rd**



**Figure 6 Showing Trees 18 and 19**





**Figure 7 Showing Tree 20**



**Figure 8 Showing Trees 13 and 14**





**Figure 9 Showing Group 11 viewed from near Trees 13 and 14**



**Figure 10 Showing Trees 2 and 7**





**Figure 11 Showing Tree 9**



**Figure 12 Showing trees referred to as Tree 12 (Group of 40)**

#### Appendix 4 Notes on Tree Assessment

Key	Criteria	Comments
<b>Tree No</b>	Must relate to the number on your site diagram	
<b>Species</b>	Botanical name and common name of Tree	
<b>Diameter of trunk</b>	DBH – Diameter at Breast Height (1.4 metres) DGL – Diameter at Ground Level	
<b>Height</b>	In metres	
<b>Spread</b>	Average diameter of canopy in metres	
<b>Crown Condition</b>	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.
<b>Age class</b>	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)	
<b>Special Significance</b>	A Aboriginal C Commemorative Ha Habitat Hi Historic M Memorial R Rare U Unique form O Other	This may require specialist knowledge.
<b>Services/ adjacent structures</b>	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.
<b>Defects</b>	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 PD Parrot Damage PFS Previous Failure Sites S Splits/cracks T Termites TL Trunk Lean	More than one of these may apply.  H/D if ratio is higher than 50:1 then tree is defective (Mattheck 2004)

	TW O	Trunk Wound Other	
<b>Root zone</b>	C D E Ga Gi Gr K L+ L- M Pa Pr O	Compaction Damaged/wounded roots (eg by mowers) Exposed roots Tree in garden bed Girdled roots Grass kerb close to tree Raised soil level Lowered soil level Mulched Paving/concrete/bitumen Roots pruned Other	More than one of these may apply.
<b>Size of defective part</b>	<p>Rates the size of the part most likely to fail. The larger the part that fails, the greater the potential for damage.</p> <ol style="list-style-type: none"> <li>1. most likely failure less than 150mm in diameter</li> <li>2. Most likely failure 150-450mm in diameter</li> <li>3. Most likely failure 450-750mm in diameter</li> <li>4. Most likely failure more than 750mm in diameter</li> </ol>		
<b>Target Rating*</b>	<p>Rates the use and occupancy of the area that would be struck by the defective part</p> <ol style="list-style-type: none"> <li>1. Occasional use (eg jogging/cycle track)</li> <li>2. Intermittent use (eg picnic area, day use parking)</li> <li>3. Frequent use, secondary structure (eg seasonal camping area, storage facilities)</li> <li>4. Constant use, structures (eg year-round use for a number of hours each day, residences)</li> </ol>		
<b>Hazard rating*</b>	<p>Failure potential + size of part + target rating Add each of the above sections for a number out of 12</p>		<p>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.</p>

## **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.

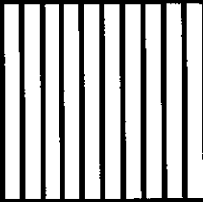
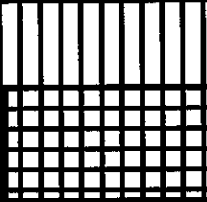
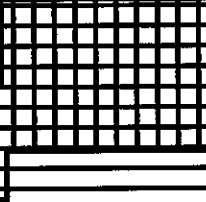
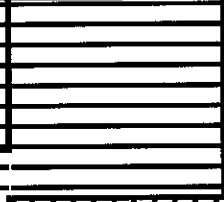
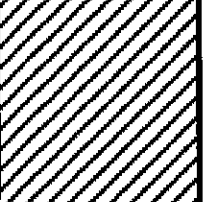
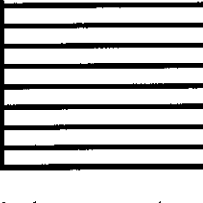
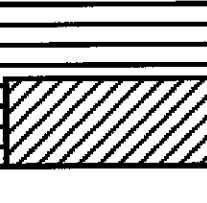
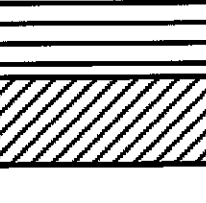
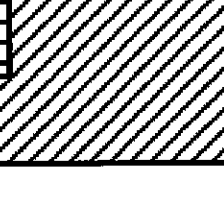
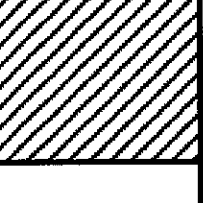
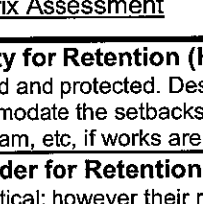
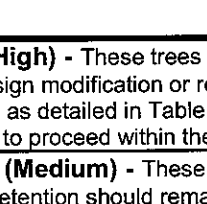
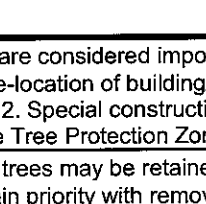
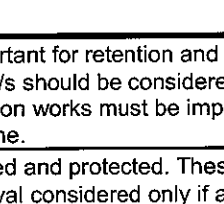
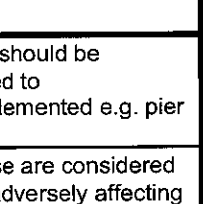
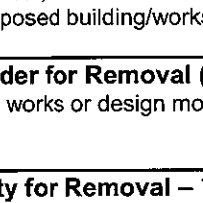
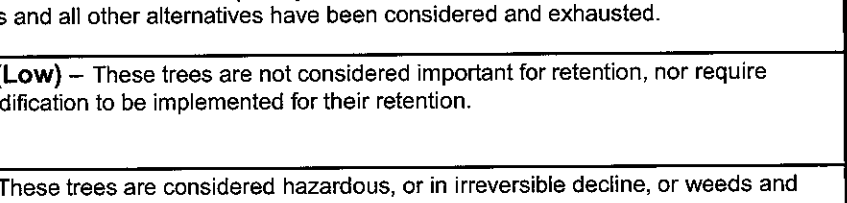

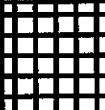


#### **5. Hazardous/Irreversible Decline**

- 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.**

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
Legend for Matrix Assessment						
	<b>Priority for Retention (High)</b> - 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.					
	<b>Consider for Retention (Medium)</b> - 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.					
	<b>Consider for Removal (Low)</b> – These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.					
	<b>Priority for Removal</b> – 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.

$$\text{TPZ} = \text{DBH} \times 12$$

TPZ for Multiple Trunked Trees

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

$$\sqrt{(\text{DBH}_1)^2 + (\text{DBH}_2)^2 + (\text{DBH}_3)^2} = \text{total DBH} \times 12$$

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 be 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

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

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

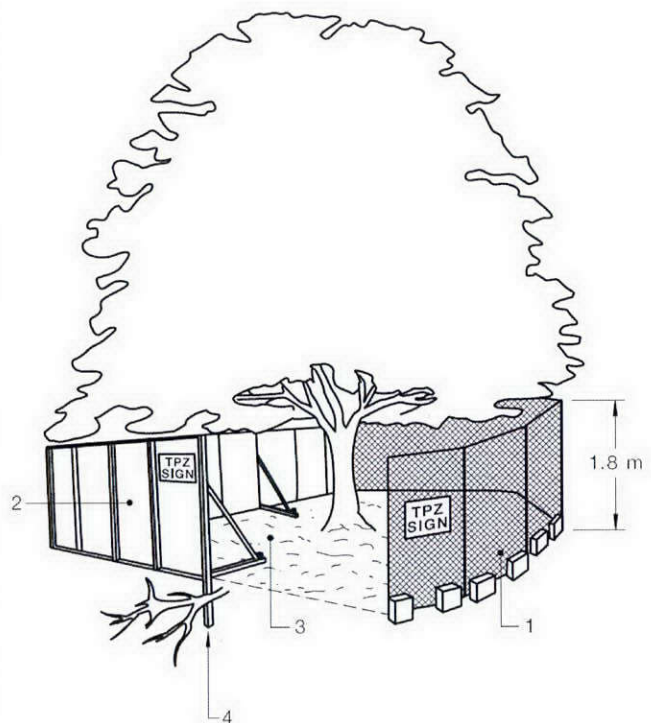
### 1.0 TREE PROTECTION ZONES - STANDARD PROCEDURE

- 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-

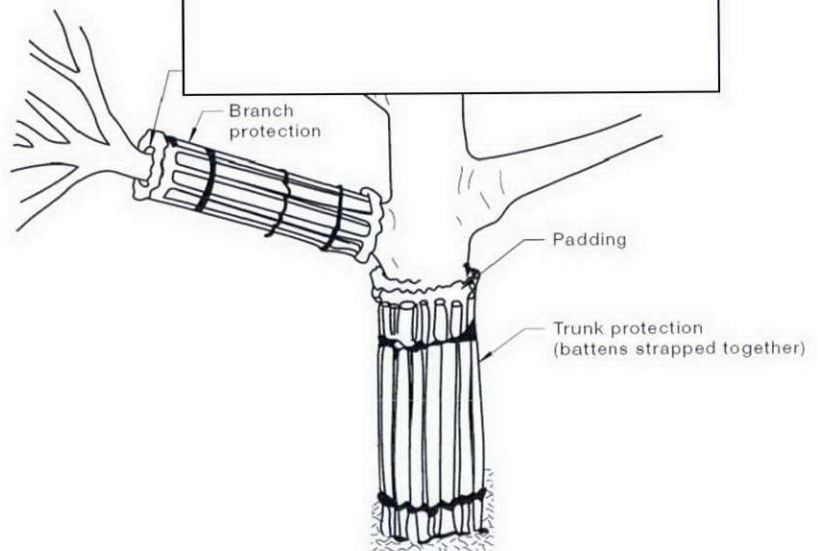
- (a) Machine excavation including trenching;
- (b) Excavation for silt fencing;
- (c) cultivation;
- (d) storage;
- (e) preparation of chemicals, including preparation of cement products;
- (f) parking of vehicles and plant;
- (g) refuelling;
- (h) dumping of waste;
- (i) wash down and cleaning of equipment;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



- 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.

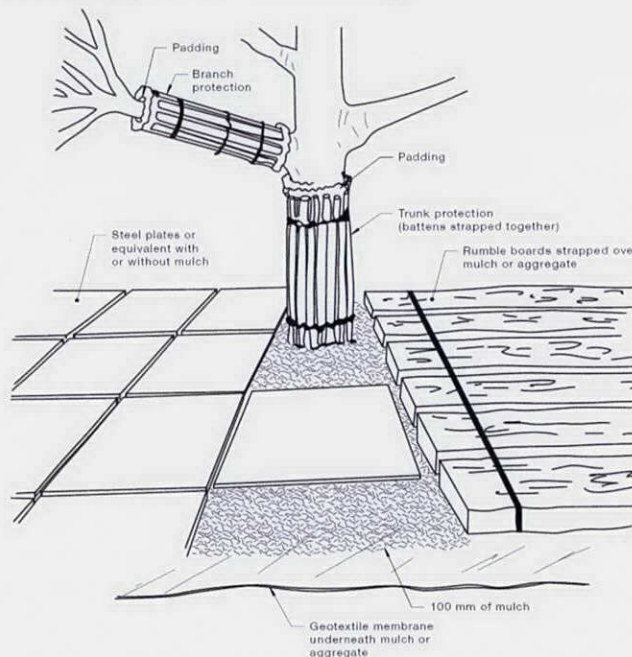


## 1.2.2 Precautions in Respect of Temporary Work

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.”

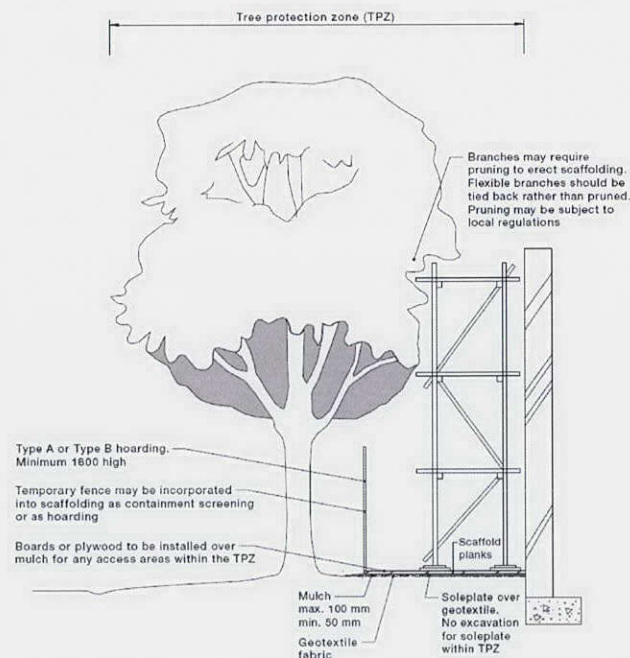


### “4.5.6 Scaffolding

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

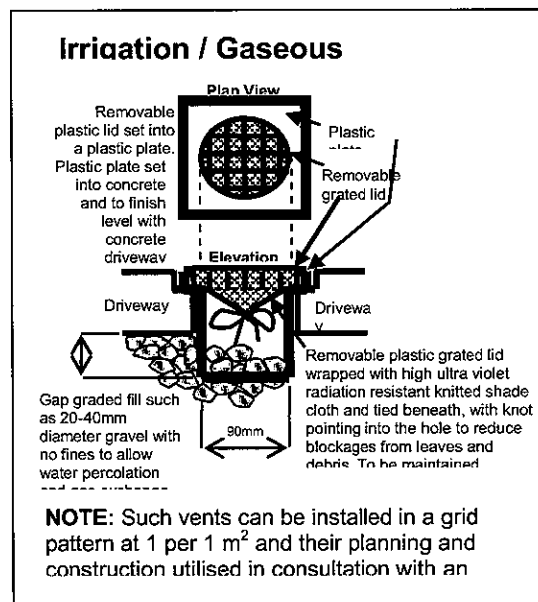
Where a driveway or footpath is to pass by the tree a suspended slab is to be constructed or approved similar, to protect the roots that may be encountered at, near, or above ground, and may be constructed on gap graded fill. Where such a driveway or footpath is to be constructed the edge of the structure 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.



#### **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 footpath. 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

---

#### 1 = Long SULE OF > 40 years

<b>A</b> Structurally sound in suitable location	<b>B</b> Suitable to retain with some remedial care	<b>C</b> Significant status – requires special care to preserve
---	--	--

#### 2 = Medium SULE of 15-40 years

<b>A</b> Lifespan limit	<b>B</b> Eventual removal for safety or nuisance	<b>C</b> Remove for adjacent trees or replanting	<b>D</b> Requires extensive remedial care
----------------------------	---	---	--

#### 3 = Short SULE of 5-15 years

<b>A</b> Lifespan limit	<b>B</b> Eventual removal for safety or nuisance	<b>C</b> Remove for adjacent trees or replanting	<b>D</b> Requires extensive remedial care
----------------------------	---	---	--

#### 4 = Remove tree within 5 years

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

#### 5 = Trees suitable to transplant

<b>A</b> Less than 5m high	<b>B</b> Young trees over 5m high	<b>C</b> 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

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

## 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.*