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## REPORT

# ARBORICULTURAL IMPACT ASSESSMENT

1 Painters  
Parade, Dee  
Why, NSW

**Prepared 9 December 2021**

Our Ref: 1/2021

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2010)© Appendix C Glossary of terminology

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## PREFACE

Sustainable Natives has prepared this report for Mike and Kirsty Skelding, Dee Why NSW (*the applicants*).

Ms. Olga Blacha (*the author*) attended lot 24/-/DP8062 -1 Painters Parade, Dee Why, NSW 2099 (*the site*), on 9 December 2021, all the trees and their growing environment were examined. The site is subject to a Development Application and this report and any works recommended herein, that require approval from the consenting authority, forms part of that development application.

## INTRODUCTION

The land is located in the Northern Beaches Council (*the Council*) Local Government Area (LGA) and the trees are not protected, however the site itself is not listed on LEP Conservation Area – General (Heritage Map)

The Council is the consenting authority for development works on the site.

State Environmental Planning Policies which apply to this property include;

*State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004: Land Application (pub. 25-6-2004) ·*

*State Environmental Planning Policy (Concurrences and Consents) 2018: Land Application (pub. 21-12-2018) ·*

*State Environmental Planning Policy (Educational Establishments and Child Care Facilities) 2017: Land Application (pub. 1-9-2017) ·*

*State Environmental Planning Policy (Exempt and Complying Development Codes) 2008: Land Application (pub. 12-12-2008) ·*

*State Environmental Planning Policy (Housing) 2021: Land Application (pub. 26-11-2021) ·*

*State Environmental Planning Policy (Infrastructure) 2007: Land Application (pub. 21-12-2007) ·*

*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007: Land Application (pub. 16-2-2007) ·*

*State Environmental Planning Policy (Primary Production and Rural Development) 2019: Land Application (pub. 28-2-2019) ·*

*State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Excluded (pub. 17-9-2021) ·*

*State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land (pub. 25-8-2017)*

*State Environmental Planning Policy No 19—Bushland in Urban Areas: Land Application (pub. 24-10-1986)*

*State Environmental Planning Policy No 33—Hazardous and Offensive Development: Land Application (pub. 13-3-1992) ·*

*State Environmental Planning Policy No 50—Canal Estate Development: Land Application (pub. 10-11-1997)*

*State Environmental Planning Policy No 55—Remediation of Land: Land Application (pub. 28-8-1998)*

This report involves 15 trees (*the trees*), as indicated on Tree Plan - Survey of Subject Trees (Appendix D).

The site is comprised of one parcel of land where the main existing dwelling is to be demolished and are to be replaced with a proposed 2 storey dwelling development, requiring fifteen (15) existing trees within the site to be retained. As part of the Landscape Plan where appropriate, the tree cover on the site will be enhanced by appropriate planting with specimens/s of appropriate tree/shrub species for the space available above and below ground being soil volumes available and to enhance the Tree Canopy.

The proposed building design and its configuration and infrastructure were arrived at following the undertaking of an arboricultural assessment of the trees on the site to determine their significance by Sustainable Natives.

The Summary lists the general condition of trees and a summary of works in Table 1.0. In section 5.0 each individual tree is described in greater detail including protective or remedial works. Tree maintenance works including pruning, removal or transplantation are detailed in section 4.0.

The Site



Figure 1. Location 1 Painters Parade, Dee Why (Source: [ePlanning Spatial Viewer \(nsw.gov.au\)](https://www.nsw.gov.au/eplanning-spatial-viewer))

SUMMARY

This report considers 15 trees, predominantly plantings made approximately 1980 (see Figure 2). The age of the trees are approximately 20-30 years, 15 trees within and around the site and recommends for the trees to be retained for the proposed development.

CURRENT POSITION OF TREES ON SITE

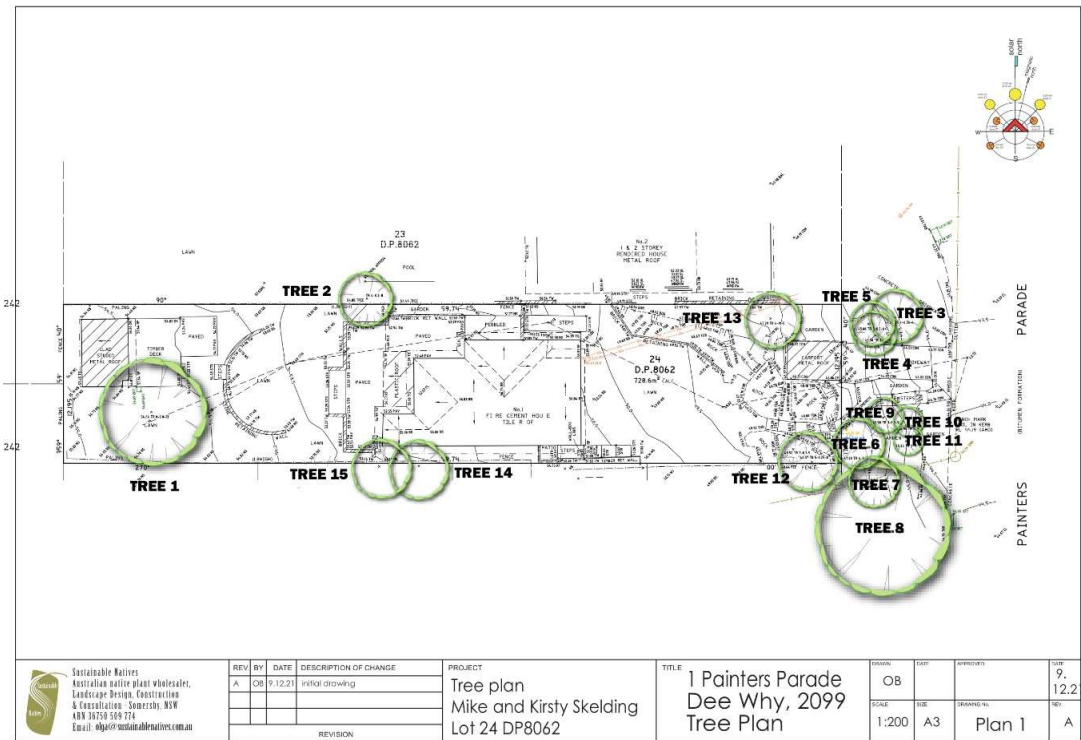


Figure 2. Location 1 Painters Parade, Dee Why (Existing Trees 9/12/2021)

## 1.0 AIMS

- 1.1 Detail the condition of the trees on the site, adjoining properties or adjacent road reserve where such trees may be affected by the proposed works, by assessment of individual trees or stands of trees, and indicate protection measures or remedial works for their retention and protection pre, during and post construction. Consider the location and condition of the trees in relation to the proposed building works and recommend retention and protection or removal and replacement where appropriate. The retained specimens are to remain in a safe and healthy condition, not less than at the time of initial inspection for this report, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures recommended to be applied.
- 1.2 Provide as an outcome of the assessment, the following: a description of the trees, observations made, discussion of the effects the location of the proposed building works may have on the trees, and make recommendations required for remedial or other works to the trees, if and where appropriate. *(See section 5 - Tree Assessment.)*
- 1.3 Determine from the assessment as detailed in 1.2 a description of the works or measures required to ameliorate the impact upon the trees to be retained, by the proposed building works or future impacts the trees may have upon the new building works if and where appropriate, or the benefits of removal and replacement if appropriate for the medium to long term safety and amenity of the site.

## 2.0 OBJECTIVES

- 2.1 Assess the condition of the subject trees.
- 2.2 Determine impact of development on the subject trees.
- 2.3 Provide recommendations for retention or removal of the subject trees.

## 3.0 METHODOLOGY

A Visual Tree Assessment (VTA) was carried out at ground level on the subject trees.

- 3.1 The method of assessment of tree/s applied is adapted from the principles of visual tree assessment undertaken from the ground, which considers:

1. Tree health and subsequent stability, both long and short term
2. Sustainable Retention Index Value (SRIV) Version 4 (IACA 2010)©
3. Hazard potential to people and property
4. Amenity values
5. Habitat values
6. Significance

3.2 This assessment is undertaken using standard tree assessment criteria for each tree based on the values above and is implemented as a result of at least one comprehensive and detailed site inspection to undertake a visual tree assessment from the ground of each individual tree, or stand of trees, or a representative population sample. Any dimensions recorded as averages, or by approximation are noted accordingly.

3.3 This report adopts Australian Standard AS4970 2009 *Protection of trees on development sites* as a point of reference and guide for the recommended minimum setbacks from the centre of a tree's trunk to development works and the distances may be increased or decreased by the author in accordance with AS4970 – Section 3.3.4 as a result of other factors providing mitigating circumstances or constraints as indicated by but not restricted to the following:

1. Condition of individual trees,
2. Tolerance of individual species to disturbance,
3. Geology e.g. physical barriers in soil, rock floaters, bedrock to surface
4. Topography e.g. slope, drainage,
5. Soil e.g. depth, drainage, fertility, structure,
6. Microclimate e.g. due to landform, exposure to dominant wind,
7. Engineering e.g. techniques to ameliorate impact on trees such as structural soil, gap graded fill, lateral boring,
8. Construction e.g. techniques to ameliorate impact on trees such as pier and beam, bridge footings, suspended slabs,
9. Root mapping,
10. Physical limitations - existing modifications to the environment and any impact to tree/s by development e.g. property boundaries, built structures, houses, swimming pools, road reserves, utility services easements, previous impact by excavation, or construction in other directions, soil level changes by cutting or filling, existing landscaping works within close proximity, modified drainage patterns,
11. Extraneous factors e.g. potential future impacts from development on adjoining land when the tree is located on or near to a property boundary.

3.4 Trees in groups may be referred to as stands and a stand may exclusively contain specimens to be either retained or removed or a combination of both. A stand may be used to discuss all the trees on a given site to expedite their assessment, or refer to trees growing proximate to one another or within a defined space. Stands may be comprised by mass boundary or screen plantings, to form a group of the same or a mixture of taxa. Each stand is considered as a single unit with each component tree assessed and expressed in tabular form, or indicated by a given

percentage as a population sample of each stand. Where it is appropriate for a stand of trees to be retained in full or part, the location and setback of Tree Protection Zone fences or works, are prescribed to provide for the preservation of the stand or selected component trees, in a condition not less than that at the time of initial inspection for its incorporation into the landscape works for the site, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures.

- 3.5 The meanings for terminology used herein are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009. An extract from the IACA Dictionary forms a glossary of terms included as Appendix C.

## 4.0 PRUNING STANDARDS

- 4.1 Any pruning recommended in this report is to be to the Australian Standard® AS4373 *Pruning of amenity trees*, and conducted in accordance with the NSW Work Cover Authority Code of Practice, Tree Work, 2007.
- 4.2 All pruning or removal works are to be in accordance with the appropriate Tree Management Policy where applicable, or Tree Management Order (TMO), or Tree Preservation Order (TPO).
- 4.3 Tree maintenance work is specialised and in order to be undertaken safely to ensure the works carried out are not detrimental to the survival of a tree being retained, and to assist in the safe removal of any tree, should be undertaken by a qualified arboriculturist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of 5 years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.

**Table 1.0** General condition of trees and Schedule of works. Trees described in greater detail in section 5.0.

Tree No.	Genus & species	Common name	Condition G = Good, F = Fair P = Poor, D = Dead	Description of work to be done
1	<i>Eucalyptus piperita</i>	Sydney Peppermint	G	Retain
2	<i>Fraxinus excelsior</i>	Golden Ash	G	On boundary – should be replaced
3	<i>Glochidion ferdinndi</i>	Cheese tree	F	Retain and prune
4	<i>Ochna serrulata</i>	Mickey Mouse Plant	F	Remove and replace with <i>Waterhousia floribunda</i> 'Sweeper'
5	<i>Pittosporum undulatum</i>	native daphne	F	Retain
6	<i>Ochna serrulata</i>	Mickey Mouse Plant	F	Remove and replace with <i>Acmena smithii</i>
7	<i>Glochidion ferdinndi</i>	Cheese tree	D	Retain
8	<i>Eucalyptus gummiifera</i>	Red Bloodwood	F	Neighboring property
9	<i>Cinnamomum camphora</i>	Camphor laurel	D	Remove - weed
10	<i>Cinnamomum camphora</i>	Camphor laurel	F	Remove and replace with <i>Xanthostemon chrysanthus</i> (Golden Penda)
11	<i>Cinnamomum camphora</i>	Camphor laurel	G	Remove and replace with <i>Waterhousia floribunda</i>
12	<i>Ficus rubiginosa</i>	Port Jackson Fig	F	Retain
13	<i>Nerium oleander</i>	Pink Oleander	F	Remove and replace with <i>Waterhousia floribunda</i> 'Sweeper'
14	<i>Archontophoenix Cunninghamiana</i>	Bangalow palm	G	Neighboring property
15	<i>Archontophoenix Cunninghamiana</i>	Bangalow palm	G	Neighboring property

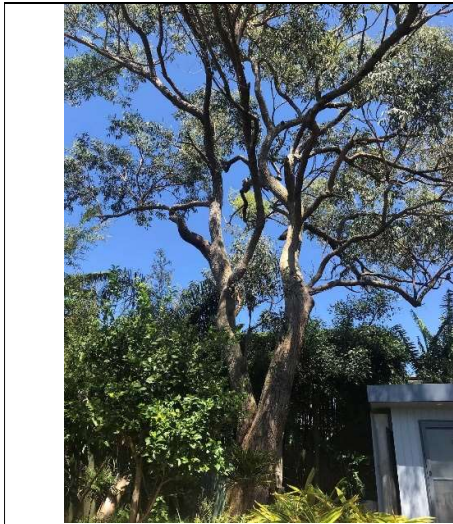


## 5.0 TREE ASSESSMENT – 5.1 - Assessment of a stand of Trees

Tree / Stand No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Vigour GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	SRIV Age, Vigour, Condition / Index Rating <a href="http://www.iaca.org.au">www.iaca.org.au</a> / Estimated Life Expectancy Long Medium Short	Crown Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres / Orientation R = Radial, or other	Crown Symmetry 1 = symmetrical 2 = asymmetrical / Orientation	Crown Cover % / Crown Density % / D = dormant	DBH in mm @ 1.4m, or other, as indicated / Trunk Orientation other than R = radial, e.g. N/S g = ground	Trunk Lean 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / Orientation / ST = Static P = Progressive Sc = Self-correcting	Roots Evident at Root Crown 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	Pests, Diseases & Damage No or Yes If Yes see comments	Branch Bark Included No or Yes or N/A	Form G = Good Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low / Retention Value 1=High 2=Medium 3=Low 4=Remove
1	<i>Eucalyptus piperita</i>	Y	GV	G	MGVF - 9 2	C	20	6x4 R	1/R	60 60	920av. @ g	5/R St	1	N	N	P	1 2
	Sydney Peppermint	Comment: Co-dominant leaders, gradually tapering and continuous, crown excurrent.															
2	<i>Fraxinus excelsior</i>	M	GV	F	MGVF - 9 2	C	15	6x4 E/W	2/W	70 70	2257 R	1/R St	1	N	N	G	1 1
	Golden Ash	Comment: Trunk erect, straight, gradually tapering and continuous, crown excurrent.															
3	<i>Glochidion ferdinndi</i>	M	GV	F	MGVF - 9 2	D	20	5x2 E/W	2/W	70 70	858 R	1/R St	1	N	N	G	1 1
	Cheese Tree	Comment: Trunk erect, straight, gradually tapering and continuous, crown excurrent.															
4	<i>Ochna serrulata</i>	O	GV	F	MGVF - 9 2	C	20	5x4 R	1/R	60 60	266 R	1/R St	1	Y	N	P	3 3
	Mockey Mouse Plant	Comment: Trunk erect, angled, gradually tapering and continuous, crown excurrent.															
5	<i>Pittosporum undulatum</i>	M	GV	F	MGVF - 9 2	C	21	5x4 R	1/R	60 60	1622 R	1/R St	1	Y	N	P	2 2
	native daphne	Comment: Co-dominant leaders, gradually tapering and continuous, crown excurrent.															
6	<i>Ochna serrulata</i>	M	GV	F	MGVF - 9 2	C	20	5x4 R	1/R	60 60	1224 R	1/R St	1	Y	N	P	2 2
	Mockey Mouse Plant	Comment: Co-dominant leaders															
7	<i>Glochidion ferdinndi</i>	M	LV	D	MGVF - 9 2	C	20	4x4 R	1/R	70 70	1520 @g	5/R St	1	Y	N	P	2 2
	Cheese Tree	Comment: Co-dominant leaders															
8	<i>Eucalyptus gummifera</i>	M	GV	F	MGVF - 9 2	D	18	4x4 R	1/R	70 70	1434 @g	5/R St	1	Y	N	P	2 2
	Red Bloodwood	Comment: deliquescent, crown deliquescent, orientation radial, symmetrical.															
9	<i>Cinnamomum camphora</i>	M	LV	D	MGVF - 9 2	C	15	4x4 R	1/R	70 70	1253 @g	5/R St	1	Y	N	P	2 2
	Camphor laurel	Comment: deliquescent, crown deliquescent, orientation radial, symmetrical.															
10	<i>Cinnamomum camphora</i>	M	GV	F	MGVF - 9 2	C	15	4x4 N/S	2/S	70 70	1262 R	1/R St	1	N	N	G	3 4
	Camphor laurel	Comment: Trunk to 1 metre, crown deliquescent, orientation N/S asymmetrical to south.															

Tree / Stand No.	Genus & Species Common Name	Age  Y = Young M = Mature O = Overmature	Vigour  GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	1. SRIV Age, Vigour, Condition / Index Rating  <a href="http://www.iaca.org.au">www.iaca.org.au</a>  /Estimated Life Expectancy	Crown Form  D = Dominant C = Co-dominant I = Intermediate S = Suppressed  F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres  / Orientation R = Radial, or other	Crown Symmetry  1 = symmetrical 2 = asymmetrical  / Orientation	Crown Cover  %/ Crown Density  /	DBH  in mm @ 1.4m, or other, as indicated/ Trunk Orientation other than R = radial,	Trunk Lean  1 = Upright-Slight  2 = Moderate  3 = Severe  4 = Critical.	Roots Evident at Root Crown  1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial,	Pests, Diseases & Damage No or Yes If Yes see comment s	Branch Bark Included No or Yes or N/A	Form  G = Good Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low/ Retention Value 1=High 2=Medium 3=Low
11	Cinnamomum	M	GV	G	MGVF – 9 2	D	20	4x3 R	1/R	70 70	2768 R	1/R St	1	N	N	G	2 3
	Camphor laurel	Comment: Co-dominant leaders															
12	Ficus rubiginosa	M	GV	G	MGVF – 9 2	D	18	4x3 R	1/R	70 70	2238 R	1/R St	1	N	N	G	2 3
	Port Jackson Fig	Comment: Trunk to 2 metres, crown deliquescent, orientation radial, symmetrical.															
13	Nerium oleander	M	GV	G	MGVF – 9 2	D	20	4x3 R	1/R	70 70	2768 R	1/R St	1	N	N	G	2 3
	Pink oleander	Comment: Co-dominant leaders															
14	Archontophoenix Cunninghamiana	M	GV	G	MGVF – 9 2	D	18	4x3 R	1/R	70 70	2238 R	1/R St	1	N	N	G	2 3
	Bangalow palm	Comment: Trunk erect, straight, gradually tapering and continuous, crown excurrent.															
15	Archontophoenix Cunninghamiana	M	GV	G	MGVF – 9 2	D	20	4x3 R	1/R	70 70	2768 R	1/R St	1	N	N	G	2 3
	Bangalow palm	Comment: Trunk erect, straight, gradually tapering and continuous, crown excurrent.															

Photographic records (dated 9<sup>th</sup> December 2021)



Tree 1 – *Eucalyptus resinifera*



Tree 2 – *Fraxinus excelsior*



Tree 3/4 – *Glochidion ferdinandi* with *Ochna serrulata*



Tree 4 *Ochna serrulata* (Mickey Mouse Plant)



Tree 5 – *Pittosporum undulatum*



Tree 6 – *Ochna serrulata*



Tree 7 – *Glochidion ferdinandi*



Tree 8 – *Eucalyptus gummifera*

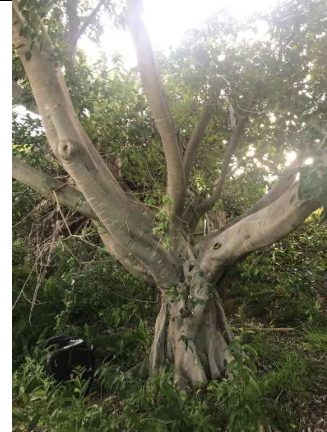




Tree 9 – Cinnamomum camphora



Trees 10/ 11– Cinnamomum camphora



Tree 12 – Ficus



Tree 13 – Nerium oleander



Tree 14 /15 – Archontophoenix Cunninghamiana



Tree 14/15 – Archontophoenix Cunninghamiana

- 5.2 The site has a stand predominantly of mature or senescent, planted non-locally indigenous trees within the site. The specimens located within the site and adjacent this lot were investigated and able to be retained. There are recommended trees for removal and replacement with appropriate specimens in 45litre size stock within more appropriate positions within the development. Replacement of these specimens needs to be mindful of their spatial requirements to allow them to grow to maturity and not be impeded by the built structure.

### Tree Significance

- 5.3 Significant Trees as established by the Rating System for Tree Significance – IACA Stars (2010), Appendix A.

#### Significance Scale

- 1 – High  
2 – Medium  
3 – Low

Significance Scale	1	2	3
Tree No.	1, 12	3, 5	2, 4, 6, 9, 10, 11, 13

**Note:** Trees 2, 7, 8, 14, 15 are not on the property and are to protected if required from site works.

### Tree Retention Value

- 5.4 See Appendix A for Retention Value Matrix.

#### Retention Value

- High** – Priority for Retention  
**Medium** – Consider for Retention  
**Low** – Consider for Removal  
**Remove** - Priority for Removal

Retention Value	High Priority for Retention	Medium Consider for Retention	Low Consider for Removal	Remove Priority for Removal
Tree No.	1, 12	3, 5	2	4, 6, 9, 10, 11, 13

### Demolition and Tree Removal/s

- 5.5 Trees 4, 6, 9, 10, 11 and 13 are to be removed as they are located within the site in a position where they cannot be retained due to the proposed building envelopes and associated infrastructure such as excavation of the basement where encroachment will have an adverse impact on its roots and crown for viability and stability, or they are weed species which can be removed at any time without Council consent. They are recommended for removal and replacement with super shrub specimens in 45litre size stock within more appropriate positions within the development. Replacement of these specimens needs to be mindful of their spatial requirements to allow them to grow to maturity and not be impeded by the built structure.

Tree no.	Species	Recommendations
4	<i>Ochna serrulata</i>	Remove and replace with <i>Waterhousia floribunda</i> 'Sweeper'
6	<i>Ochna serrulata</i>	Remove and replace with <i>Acmena smithii</i>

9	<i>Cinnamomum camphora</i>	
10	<i>Cinnamomum camphora</i>	<i>Remove and replace with Xanthostemon chrysanthus</i>
11	<i>Cinnamomum camphora</i>	<i>Remove and replace with Waterhousia floribunda</i>
13	<i>Nerium oleander</i>	Remove and replace with Waterhousia floribunda 'Sweeper'

### Specific - Tree Protection works – Post Construction

- 5.6 Trees to be removed are to be replaced with appropriate shrub and smaller tree specimens being mindful of the space limitations of the new use of the site. The advanced trees should be located in areas along the boundaries of the site. The planting in these locations will provide the maximum benefit to the surrounding properties by screening views to and from the site and the plantings included in the proposed landscape plan. The replacement trees will be located in positions where they may grow to maturity unhindered and will not conflict with built structures or utility services and in greater numbers than the trees removed should provide a net increase in the local amenity.

## 6.0 CONCLUSION & RECOMMENDATIONS

Si (6) trees identified as 4, 6, 9, 10, 11 and 13, are to be removed which is to be undertaken in accordance with section 4.0, parts 4.1 - 4.3. As the trees are nominated for removal, replacement species in accordance with the associated Landscape documentation for the development is recommended. Each of the replacement are to be a vigorous specimen with a straight trunk, gradually tapering and continuous, crown excurrent, symmetrical, with roots established but not pot bound in a volume container or approved similar and be maintained by an appropriately qualified and experienced landscape contractor for up to one (1) year after planting, or as appropriate. Where appropriate, the Landscape Plan will include planting with new trees/shrubs and not including street tree/s.

It is often a consequence of redevelopment, and subject to the nature of the proposed land use that some or all of the trees present on the site prior to that redevelopment may be required to be removed and replaced with new tree plantings in different locations. This may be dependent upon the type of development and its design constraints and the requirements of the local planning instruments and any Landscape Design Codes if existing. Where tree removal is required for this development, it is considered that those trees identified within this report are not sustainable within the context of the proposed development. Where tree retention has been considered, those trees are expected to survive the redevelopment process and remain stable and viable. The retention and protection of existing trees on site is a significant aspect of the development process, allowing those trees as components of the current curtilage to be transferred to the new dwellings for incorporation into the landscaping works for the site. The retention of some or all of the existing trees contributes to: the preservation of local amenity, screening of views to and from the site, and a balance to the scale and bulk of buildings, while maintaining elements of a continuous landscape, providing a more harmonious integration and transition of the use of the land.

If all the recommendations and procedures detailed herein are adhered to, some or all of the trees the subject of this report will continue, or will be replaced with more appropriate plantings in suitable locations, or enhanced by additional new plantings, and will grow to develop as important landscape components providing elements of long term amenity for the property and its owners or occupants, and the local community.

The recommendations made in this report are subject to approval by the consent authority.

As a renewable and dynamic natural resource the urban tree and the growing environment essential for its survival must be understood and carefully managed to balance its needs with those of people. It is crucial that as required: this resource be planned for, planted, nurtured, protected, maintained and replaced, to ensure appropriateness and suitability of new plantings and trees retained, for safety and viability, so that it remains vital, and is sustainable in continuity.

**Olga Blacha** – (Director)

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Nursery & Garden Industry, NSW & ACT Ltd (NGINA) 2015

& Australian Institute of Landscape Architects (2016) (AILA)

#### DISCLAIMER

The author and Sustainable Natives take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent modification/s to its growing environment either above or below ground contrary to our advice.

#### REFERENCES

1. Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.
2. IACA 2005, Sustainable Retention Index Value, *Institute of Australian Consulting Arboriculturists*, Australia, [www.iaca.org.au](http://www.iaca.org.au).
3. Standards Australia 2007, *Australian Standard 4373 Pruning of amenity trees*, Standards Australia, Sydney, Australia.
4. Standards Australia 2009, *Australian Standard 4970 Protection of trees on development sites*, Standards Australia, Sydney, Australia.
5. Work Cover NSW 2007, *Code of Practice Tree Work*, New South Wales Government, Australia.



# Appendix A

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

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

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

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

### Tree Significance - Assessment Criteria



#### **1. High Significance in landscape**

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

#### **2. Medium Significance in landscape**

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

#### **3. Low Significance in landscape**

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

#### **Environmental Pest / Noxious Weed Species**

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

#### **Hazardous/ Irreversible Decline**

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


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

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

Table 1.0 Tree Retention Value - Priority Matrix.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					

Legend for Matrix Assessment		 <small>INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS</small>
	<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 prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.	
	<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.	

## REFERENCES

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

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

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, [www.footprintgreen.com.au](http://www.footprintgreen.com.au)

# Appendix B

## Matrix - Sustainable Retention Index Value (SRIV) ©

Version 4, 2010

Developed by IACA – Institute of Australian Consulting Arboriculturists [www.iaca.org.au](http://www.iaca.org.au)

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.

An index value is given to each category where ten (10) is the highest value.

Age Class	Vigour Class and Condition Class®					
	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth.  No remedial work or improvement to growing environment required. May be subject to high vigour.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term.  Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth.  Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with
Young	<b>YGVG - 9</b>  <b>Index Value 9</b> Retention potential - Long Term.  Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and	<b>YGVF - 8</b>  <b>Index Value 8</b> Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local	<b>YGVP - 5</b>  <b>Index Value 5</b> Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future	<b>YLVG - 4</b>  <b>Index Value 4</b> Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium potential for future growth and	<b>YLVF - 3</b>  <b>Index Value 3</b> Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for	<b>YLVP - 1</b>  <b>Index Value 1</b> Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height <5 m. Low potential for future growth and adaptability.
Mature	<b>MGVG - 10</b>  <b>Index Value 10</b> Retention potential - Medium - Long Term.	<b>MGVF - 9</b>  <b>Index Value 9</b> Retention potential - Medium Term. Potential for longer with improved growing conditions.	<b>MGVP - 6</b>  <b>Index Value 6</b> Retention potential - Short Term. Potential for longer with improved growing conditions.	<b>MLVG - 5</b>  <b>Index Value 5</b> Retention potential - Short Term. Potential for longer with improved growing conditions.	<b>MLVF - 4</b>  <b>Index Value 4</b> Retention potential - Short Term. Potential for longer with improved growing conditions.	<b>MLVP - 2</b>  <b>Index Value 2</b> Retention potential - Likely to be removed immediately or retained for Short Term.
Over-mature	<b>OGVG - 6</b>  <b>Index Value 6</b> Retention potential - Medium - Long Term.	<b>OGVF - 5</b>  <b>Index Value 5</b> Retention potential - Medium Term.	<b>OGVP - 4</b>  <b>Index Value 4</b> Retention potential - Short Term.	<b>OLVG - 3</b>  <b>Index Value 3</b> Retention potential - Short Term. Potential for longer with improved growing conditions.	<b>OLVF - 2</b>  <b>Index Value 2</b> Retention potential - Short Term.	<b>OLVP - 0</b>  <b>Index Value 0</b> Retention potential - Likely to be removed immediately or retained for Short Term.

# Appendix C

## Extract from Australian Standard 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)

"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

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

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

where

DBH = trunk diameter measured at 1.4 m above ground

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

#### 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.

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

where

$D$  = trunk diameter, in metres, measured above the root buttress.

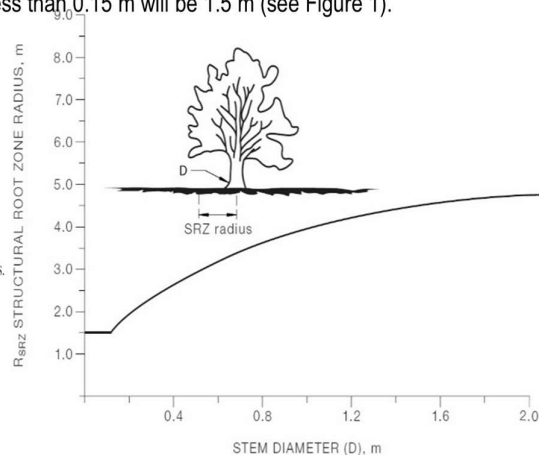
Note: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see Figure 1).

The curve can be expressed by the following formula:  
 $R_{\text{SRZ}} = (D \times 50)^{0.42} \times 0.64$

#### NOTES:

- 1  $R_{\text{SRZ}}$  is the structural root zone radius.
- 2  $D$  is the stem diameter measured immediately above root buttress.
- 3 The SRZ for trees less than 0.15 m diameter is 1.5 m.
- 4 The SRZ formula and graph do not apply to palms, other monocots, cycads and tree ferns.
- 5 This does not apply to trees with an asymmetrical root plate.

FIGURE 1 STRUCTURAL ROOT ZONE



# Appendix D

## Glossary

From

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

### Age of Trees

**Age** Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as *Young*, *Mature* and *Over-mature* (British Standards 1991, p. 13, Harris *et al*, 2004, p. 262).

**Young** Tree aged less than <20% of life expectancy, *in situ*.

**Mature** Tree aged 20-80% of life expectancy, *in situ*.

**Over-mature** Tree aged greater than >80% of life expectancy, *in situ*, or *senescent* with or without reduced *vigour*, and declining gradually or rapidly but irreversibly to death.

### Condition of Trees

**Condition** A tree's *crown form* and growth habit, as modified by its *environment* (aspect, suppression by other trees, soils), the *stability* and *viability* of the *root plate*, trunk and structural branches (first (1<sup>st</sup>) and possibly second (2<sup>nd</sup>) order branches), including structural defects such as wounds, cavities or hollows, *crooked* trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with *vigour* and it is possible for a tree to be of *normal vigour* but in *poor condition*. Condition can be categorized as *Good Condition*, *Fair Condition*, *Poor Condition* and *Dead*.

**Good Condition** Tree is of good habit, with *crown form* not severely restricted for space and light, physically free from the adverse effects of *predation* by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by *vigour*.

**Fair Condition** Tree is of good habit or *misshapen*, a form not severely restricted for space and light, has some physical indication of *decline* due to the early effects of *predation* by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the *environment* essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by *vigour*.

**Poor Condition** Tree is of good habit or *misshapen*, a form that may be severely restricted for space and light, exhibits symptoms of advanced and

*irreversible decline* such as fungal, or bacterial infestation, major die-back in the branch and *foliage crown*, *structural deterioration* from insect damage

e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local *environment* that would normally be sufficient to provide for its basic survival if in *good* to *fair* condition. Deterioration physically, often characterised by a gradual and continuous reduction in *vigour* but may be independent of a change in *vigour*, but characterised by a proportionate increase in susceptibility to, and *predation* by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by *vigour*.

**Senescent / Moribund** Advanced state of decline, dying or nearly dead.

**Dead** Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;

*Processes*

Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves); Osmosis (the ability of the root system to take up water);

Turgidity (the ability of the plant to sustain moisture pressure in its cells);

Epicormic shoots or *epicormic strands* in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a *lignotuber*);

*Symptoms*

Permanent leaf loss;

Permanent wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots); Abscission of the *epidermis* (bark desiccates and peels off to the beginning of the sapwood).

**Removed** No longer present, or tree not able to be located or having been cut down and retained on a site, or having been taken away from a site prior to site inspection.

## Branch

**Branch** An elongated woody structure arising initially from the trunk to support leaves, flowers, fruit and the development of other branches. A branch may itself fork and continue to divide many times as successive *orders of branches* with the length and taper decreasing incrementally to the *outer extremity* of the *crown*. These may develop initially as a gradually tapering continuation of the *trunk* with minimal division as in a *young tree* or a tree of *excurrent habit*, or in a *sapling*, or may arise where the trunk terminates at or some distance from the *root crown*, dividing into *first order branches* to form and support the *foliage crown*. In an *acaulescent tree*, branches arise at or near the *root crown*. Similarly branches may arise from a *sprout mass* from damaged *roots*, *branches* or *trunk*.

**Orders of branches** The marked divisions between successively smaller branches (James 2003, p. 168) commencing at the initial division where the trunk terminates on a *deliquescent tree* or from *lateral branches* on an *excurrent tree*. Successive branching is generally characterised by a gradual reduction in branch diameters at each division, and each gradation from the trunk can be categorised numerically, e.g. first order, second order, third order etc. (See Figure 21.)

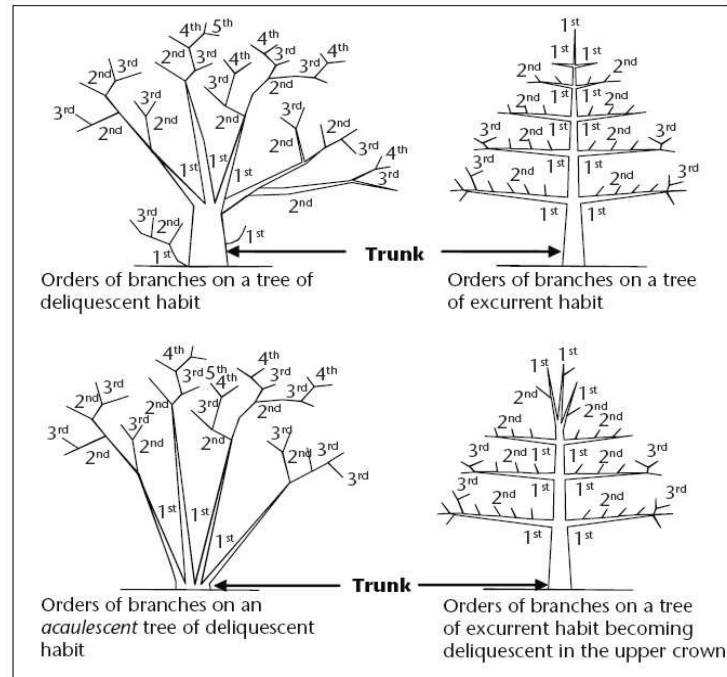


Figure 21 Orders of branches

## Crown

**Canopy** 1. Of multiple trees, the convergence, or merging in full or part, of the crowns of two or more trees due to their proximity, or where competition for light and space available in a forest environment is limited as each tree develops forming a continuous layer of foliage. 2. Used as a plural for crown. 3. Sometimes synonymously used for crown (USA).

**Crown** Of an individual tree all the parts arising above the trunk where it terminates by its division forming branches, e.g. the branches, leaves, flowers and fruit; or the total amount of foliage supported by the branches. The crown of any tree can be divided vertically into three sections and can be categorised as *lower crown*, *mid crown* and *upper crown* (Figure 8). For a *leaning tree* these can be divided evenly into crown sections of one-third from the *base* to *apex*. The volume of a crown can be categorised as the *inner crown*, *outer crown* and *outer extremity of crown*.

**Lower crown** The *proximal* or lowest section of a crown when divided vertically into one-third ( $\frac{1}{3}$ ) increments. See also *Crown*, *Mid crown* and *Upper crown*.

**Mid crown** The middle section of a crown when divided vertically into one-third ( $\frac{1}{3}$ ) increments. See also *Crown*, *Lower crown* and *Upper crown*.

**Upper crown** The *distal* or highest section of a crown when divided vertically into one-third ( $\frac{1}{3}$ ) increments. See also *Crown*, *Mid crown* and *Lower crown*.

**Crown Projection (CP)** Area within the *dripline* or beneath the lateral extent of the *crown* (Geiger 2004, p. 2). See also *Crown spread* and *Dripline*.

**Dripline** A line formed around the edge of a tree by the lateral extent of the *crown*. Such a line may be evident on the ground with some trees when exposed soil is displaced by rain shed from the crown. See also *Crown Projection*.

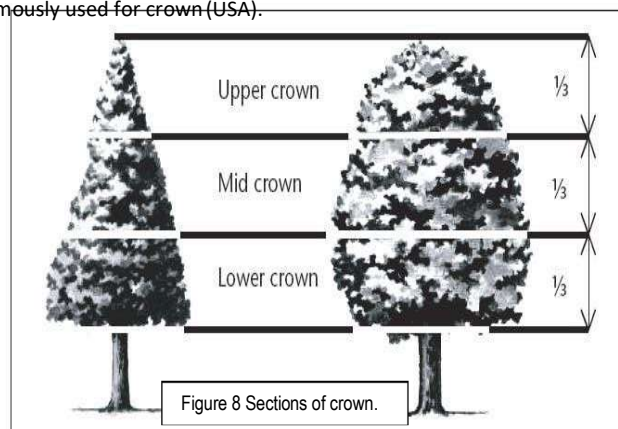


Figure 8 Sections of crown.



## Crown Form of Trees

**Crown Form** The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as *Dominant*, *Codominant*, *Intermediate*, *Emergent*, *Forest* and *Suppressed*. The habit and shape of a *crown* may also be considered qualitatively and can be categorized as *Good Form* or *Poor Form*.

**Good Form** Tree of *typical* crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic, but does not appear to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, or cultural practices such as lopping and competition for space and light.

**Poor Form** Tree of *atypical* crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be *misshapen* or disfigured by disease or vandalism.

**Crown Form Codominant** Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

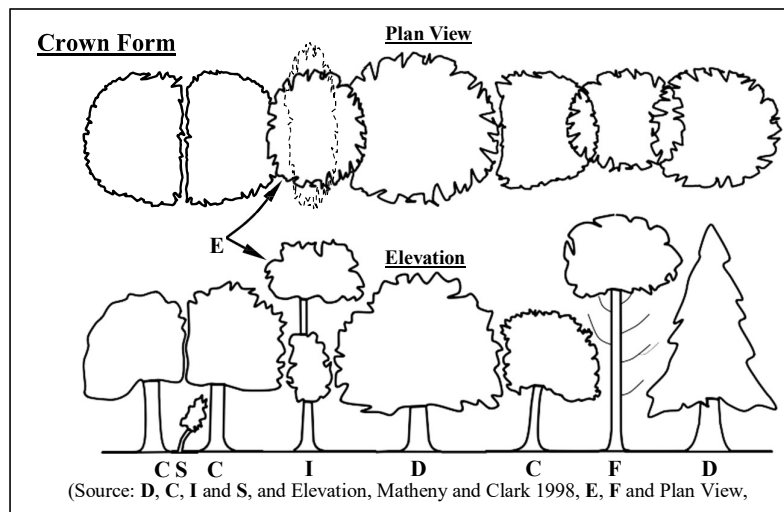
**Crown Form Dominant** Crowns of trees generally not restricted for space and light receiving light from above and all sides.

**Crown Form Emergent** Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form forest* asserting both *apical dominance* and *axillary dominance* once free of constraints for space and light.

**Crown Form Forest** Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each *inferior* and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the *lower crown*.

**Crown Form Intermediate** Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

**Crown Form Suppressed** Crowns of trees generally not restricted for space but restricted for light by being *overtopped* by other trees and occupying an understorey position in the canopy and growing slowly.



## Deadwood

**Deadwood** Dead branches within a tree's crown and considered quantitatively as separate to *crown cover* and can be categorised as *Small Deadwood* and *Large Deadwood* according to diameter, length and subsequent *risk* potential. The amount of dead branches on a tree can be categorized as *Low Volume Deadwood*, *Medium Volume Deadwood* and *High Volume Deadwood*. See also *Dieback*.

**Deadwooding** Removing of dead branches by *pruning*. Such pruning may assist in the prevention of the spread of *decay* from *dieback* or for reasons of safety near an identifiable target.



**Small Deadwood** A dead branch up to 10mm diameter and usually <2 metres long, generally considered of low *risk* potential.

**Large Deadwood** A dead branch >10mm diameter and usually >2 metres long, generally considered of high *risk* potential.

**High Volume Deadwood** Where >10 dead branches occur that may require *removal*.

**Medium Volume Deadwood** Where 5-10 dead branches occur that may require *removal*.

**Low Volume Deadwood** Where <5 dead branches occur that may require *removal*.

## Dieback

**Dieback** The death of some areas of the *crown*. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, *abrupt changes* in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced *resistance*, *stress* or *decline* which may be temporary. Dieback can be categorized as *Low Volume Dieback*, *Medium Volume Dieback* and *High Volume Dieback*.

**High Volume Dieback** Where >50% of the *crown cover* has died.

**Medium Volume Dieback** Where 10-50% of the *crown cover* has died.

**Low Volume Dieback** Where <10% of the *crown cover* has died. See also *Dieback*, *High Volume Dieback* and *Medium Volume Dieback*.

## Epicormic shoots

**Epicormic Shoots** Juvenile shoots produced at branches or trunk from *epicormic strands* in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of *stress* or *decline*. Epicormic shoots can be categorized as *Low Volume Epicormic Shoots*, *Medium Volume Epicormic Shoots* and *High Volume Epicormic Shoots*.

**High Volume Epicormic Shoots** Where >50% of the *crown cover* is comprised of live *epicormic shoots*.

**Medium Volume Epicormic Shoots** Where 10-50% of the *crown cover* is comprised of live *epicormic shoots*.

**Low Volume Epicormic Shoots** Where <10% of the *crown cover* is comprised of live *epicormic shoots*.

## General Terms

**Cavity** A usually shallow void often localized initiated by a *wound* and subsequent *decay* within the trunk, branches or roots, or beneath bark, and may be enclosed or have one or more opening.

**Decay** Process of degradation of wood by microorganisms (Australian Standard 2007, p. 6) and fungus.

**Hazard** The threat of danger to people or property from a tree or tree part resulting from changes in the physical condition, growing environment, or existing physical attributes of the tree, e.g. included bark, soil erosion, or thorns or poisonous parts, respectively.

**Included bark** 1. The bark on the inner side of the *branch union*, or is within a concave *crotch* that is unable to be lost from the tree and accumulates or is trapped by *acutely divergent* branches forming a *compression fork*. 2. Growth of bark at the interface of two or more branches on the inner side of a branch union or in the crotch where each branch forms a branch collar and the collars roll past one another without forming a graft where no one collar is able to subsume the other. Risk of failure is worsened in some taxa where branching is *acutely divergent* or *acutely convergent* and ascending or erect.

**Hollow** A large void initiated by a *wound* forming a *cavity* in the trunk, branches or roots and usually increased over time by *decay* or other contributing factors, e.g. fire, or fauna such as birds or insects e.g. ants or termites. A hollow can be categorized as an *Ascending Hollow* or a *Descending Hollow*.

**Risk** The random or potentially foreseeable possibility of an episode causing harm or damage.

**Significant** Important, weighty or more than ordinary.

**Significant Tree** A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or *in situ*, or contribution as a component of the overall landscape for *amenity* or aesthetic qualities, or *curtilage* to structures, or importance due to uniqueness of taxa for species, subspecies, variety, *crown form*, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as *remnant vegetation*, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of aboriginal cultural importance, or is a commemorative planting.

**Substantial** A tree with large dimensions or proportions in relation to its place in the landscape.

**Sustainable Retention Index Value (SRIV)** A visual tree assessment method to determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of *age*, *condition* and *vigour*. SRIV is for the professional manager of urban trees to consider the tree *in situ* with an assumed knowledge of the *taxon* and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA - Institute of Australian Consulting Arboriculturists 2005).

**Visual Tree Assessment (VTA)** A visual inspection of a tree from the ground based on the principle that, when a tree exhibits apparently superfluous material in its shape, this represents repair structures to rectify *defects* or to reinforce weak areas in accordance with the *Axiom of Uniform Stress* (Mattheck & Breloer 1994, pp. 12-13, 145). Such assessments should only be undertaken by suitably competent practitioners.

## Leaning Trees

**Leaning** A tree where the *trunk* grows or moves away from upright. A lean may occur anywhere along the *trunk* influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A *leaning* tree may maintain a *static lean* or display an increasingly *progressive lean* over time and may be hazardous and prone to *failure* and *collapse*. The degrees of leaning can be categorized as *Slightly Leaning*, *Moderately Leaning*, *Severely Leaning* and *Critically Leaning*.

**Slightly Leaning** A leaning tree where the trunk is growing at an angle within  $0^{\circ}$ - $15^{\circ}$  from upright.

**Moderately Leaning** A leaning tree where the trunk is growing at an angle within  $15^{\circ}$ - $30^{\circ}$  from upright.

**Severely Leaning** A leaning tree where the trunk is growing at an angle within  $30^{\circ}$ - $45^{\circ}$  from upright.

**Critically Leaning** A leaning tree where the trunk is growing at an angle greater than  $>45^{\circ}$  from upright.

**Progressively Leaning** A tree where the degree of *leaning* appears to be increasing overtime.

**Static Leaning** A leaning tree whose lean appears to have stabilized over time.

## Periods of Time

**Periods of Time** The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as *Immediate*, *Short Term*, *Medium Term* and *Long Term*.

**Immediate** An *episode* or occurrence, likely to happen within a twenty-four (24) hour period, e.g. tree failure or collapse in full or part posing an imminent danger.

**Short Term** A period of time less than  $<1 - 15$  years.

**Medium Term** A period of time  $15 - 40$  years.

**Long Term** A period of time greater than  $>40$  years.

## Roots

**First Order Roots (FOR)** Initial woody roots arising from the *root crown* at the base of the *trunk*, or as an *adventitious root mass* for structural support and *stability*. Woody roots may be buttressed and divided as a marked gradation, gradually tapering and continuous or tapering rapidly at a short distance from the root crown. Depending on soil type these roots may descend initially and not be evident at the root crown, or become buried by changes in soil levels. Trees may develop 4-11 (Perry 1982, pp. 197- 221), or more first order roots which may radiate from the trunk with a relatively even distribution, or be prominent on a particular aspect, dependent upon physical characteristics e.g. leaning trunk, *asymmetrical crown*; and constraints within the growing *environment* from topography e.g. slope, soil depth, rocky outcrops, exposure to predominant wind, soil moisture, depth of *water table* etc.

**Orders of Roots** The marked divisions between woody roots, commencing at the initial division from the base of the trunk, at the *root crown* where successive branching is generally characterised by a gradual reduction in root diameters and each gradation from the trunk and can be categorized numerically, e.g. *first order roots*, second order roots, third order roots etc. Roots may not always be evident at the *root crown* and this may be dependent on species, age class and the growing environment. Palms at maturity may form an adventitious root mass.

**Root Plate** The entire root system of a tree generally occupying the top 300-600mm of soil including roots at or above ground and may extend laterally for distances exceeding twice the height of the tree (Perry 1982, pp. 197-221). Development and extent is dependent on water availability, soil type, *soil depth* and the physical characteristics of the surrounding landscape.

**Root Crown** Roots arising at the base of a trunk.

**Zone of Rapid Taper** The area in the *root plate* where the diameter of *structural roots* reduces substantially over a short distance from the *trunk*. Considered to be the minimum radial distance to provide structural support and *root plate* stability. See also *Structural Root Zone (SRZ)*.

**Structural Roots** Roots supporting the infrastructure of the *root plate* providing strength and *stability* to the tree. Such roots may taper rapidly at short distances from the *root crown* or become large and woody as with gymnosperms and dicotyledonous angiosperms and are usually 1<sup>st</sup> and 2<sup>nd</sup> order roots, or form an *adventitious root mass* in monocotyledonous angiosperms (palms). Such roots may be crossed and grafted and are usually contained within the area of *crown projection* or extend just beyond the *dripline*.

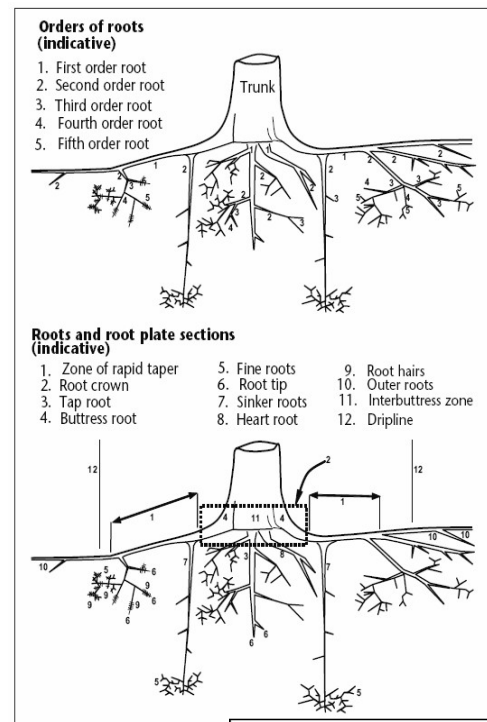


Figure 22 Orders of Roots.

## Symmetry

**Symmetry** Balance within a *crown*, or *root plate*, above or below the *axis* of the trunk of branch and foliage, and root distribution respectively and can be categorized as *Asymmetrical* and *Symmetrical*.

**Asymmetrical** Imbalance within a crown, where there is an uneven distribution of branches and the foliage *crown* or *root plate* around the vertical *axis* of the trunk. This may be due to *Crown Form Codominant* or *Crown Form Suppressed* as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to west.

**Symmetrical** Balance within a crown, where there is an even distribution of branches and the foliage *crown* around the vertical *axis* of the trunk. This usually applies to trees of *Crown Form Dominant* or *Crown Form Forest*. An example of an expression of this may be crown symmetrical.

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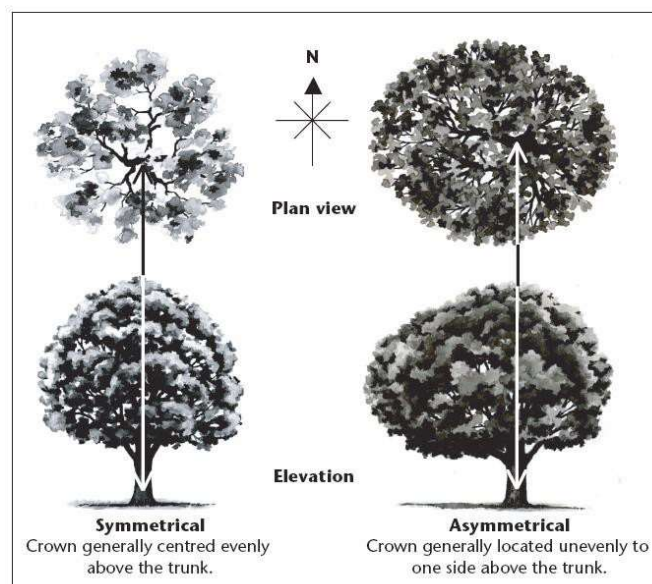


Figure 27 Symmetry within crown

## Trunk

**Trunk** A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically

into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

**Acaulescent** A *trunkless* tree or tree growth forming a very short *trunk*. See also *Caulescent*. (See Fig. 21)

**Caulescent** Tree grows to form a *trunk*. See also *Acaulescent*. (See Fig. 21)

**Lower trunk** Lowest, or *proximal* section of a trunk when divided into one-third ( $\frac{1}{3}$ ) increments along its *axis*. See also *Trunk*, *Mid trunk* and *Upper trunk*.

**Mid trunk** A middle section of a trunk when divided into one-third ( $\frac{1}{3}$ ) increments along its *axis*. See also *Trunk*, *Lower trunk* and *Upper trunk*.

**Upper trunk** Highest, or *distal* section of a trunk when divided into one-third ( $\frac{1}{3}$ ) increments along its *axis*. See also *Trunk*, *Lower trunk* and *Mid trunk*.

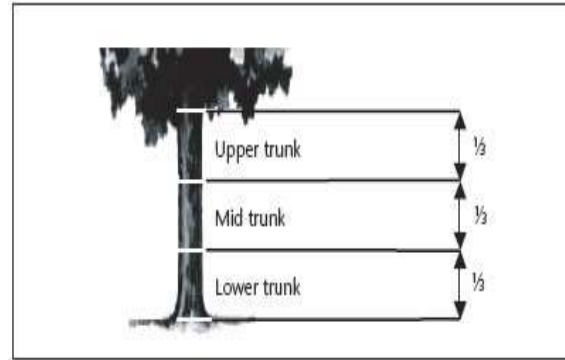


Figure 28 Trunk sections.

**Diameter at Breast Height (DBH)** Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a *leaning* trunk is *crooked* a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the *trunk* from the point immediately below the base of the flange of the *branch collar* extending the furthest down the trunk, and the distance of this point above ground recorded as *trunk* length. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is *acaulescent* or *trunkless* branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near ground and noting where the measurement was recorded e.g. at ground.

## Vigour

**Vigour** Ability of a tree to sustain its life processes. This is independent of the *condition* of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g. *dormant*, deciduous or semi-deciduous trees. Vigour can be categorized as *Normal Vigour*, *High Vigour*, *Low Vigour* and *Dormant Tree Vigour*.

**Normal Vigour** Ability of a tree to maintain and sustain its life processes. This may be evident by the *typical* growth of leaves, *crown cover* and *crown density*, branches, roots and trunk and *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.

**High Vigour** *Accelerated growth* of a tree due to incidental or deliberate artificial changes to its growing *environment* that are seemingly beneficial, but may result in *premature aging* or failure if the favourable conditions cease, or promote *prolonged senescence* if the favourable conditions remain,

e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard; a tree subject to a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous *pollarding* practices over the life of the tree.

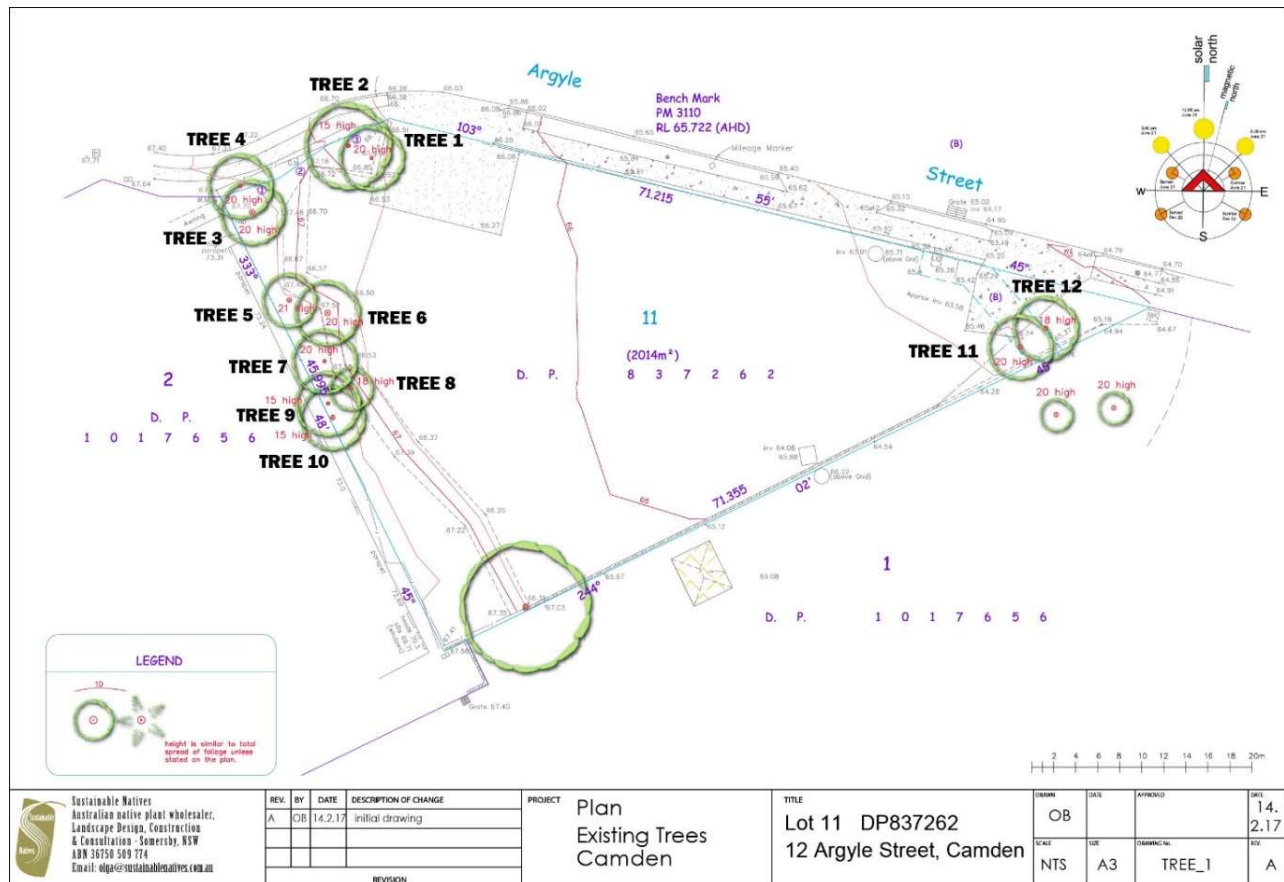
**Low Vigour** Reduced ability of a tree to sustain its life processes. This may be evident by the *atypical* growth of leaves, reduced *crown cover* and reduced *crown density*, branches, roots and trunk, and a deterioration of their functions with reduced *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.

# Appendices D

## Appendix D– Survey of Subject Tree/s

Trees the subject of this report are marked on the plans in the following appendices and are numbered as listed below.

Redgum Tree / Stand No.	Genus and species	Common name	Recommendation
1	<i>Eucalyptus maculata</i>	Spotted Gum	Remove and replace
2	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
3	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
4	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
5	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
6	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
7	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
8	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
9	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
10	<i>Ulmus parvifolia</i>	Chinese Elm	Remove and replace
11	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace
12	<i>Eucalyptus microcorys</i>	Tallowood	Remove and replace



**Plan Details**

Survey Plan provided by GV Hull & Associates on 29 September 2016, scale 1:200 @ A2 over Lot 11 in DP 837262



# Appendix D - Site Plan – Survey

Plan has been reproduced from electronic transmission and is no longer to original scale.

