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# **ARBORICULTURAL REPORT** **CONSTRUCTION IMPACT** **ASSESSMENT**

Lam Consulting Engineers  
22 Victoria Parade,  
MANLY

Report Reference: CIA - LAM 06/15

23<sup>rd</sup> June, 2015

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## **1.0 Introduction**

- I. This Arboricultural Report - Construction Impact Assessment has been commissioned by Lam Consulting Engineers on behalf of proprietors of 22 Victoria Ave, Manly.
- II. This report is with respect to trees impacted upon by the proposal for the demolition of existing structure and construction of new three storey building with basement car park.
- III. The Arboricultural Assessment takes into account a total of four (4) trees requiring assessment to further support the Development Application to Manly Council as requested in Pre - Lodgement Advice (Ref; MC/15/50305).
- IV. The Report will assess three trees identified on site, proposed to be removed, as well as the Victoria Ave street tree that is to be retained, with direct reference to guidelines as stipulated in the Australian Standard – *Protection of trees on development sites* (AS 4970-2009). This includes a Construction Impacts Assessment table, which calculates Tree Protection Zones (TPZ) and Structural Root Zones (SRZ), and appraises the potential degree of impacts sustained by trees by the proposal.

## **2.0 Methodology**

- I. A Visual Tree Assessment (VTA) was conducted on all trees on 19th June, 2015 at ground level only.
- II. No aerial inspections were carried out nor were a subterranean investigation undertaken.
- III. All dimensions are estimated by diameter tape or by eye sight.
- IV. Weather conditions on the day of assessment were overcast however data was collated with no interference.
- V. A Site Map (Appendix A), using plans provided by the client and overlaid by the Arborist is included in this report.
- VI. Trees physical characteristics are noted by the Arborist, including age, vigour and crown characteristics, general health and condition, defects and the presence of pest and disease. Findings are tabled in Table 1 - Tree Assessment. This is to be read in conjunction with Appendix B- Table 3.2 Definitions and Descriptors.
- VII. Table 3.2 also details a Hazard Rating that quantifies any risks associated with the trees, an appraisal of trees with reference to Tree AZ; determination of the

worthiness of trees in the planning process, and a Tree Retention Value (STARS Matrix) that assesses the trees significance and value for retention on the site where development occurs. (Refer to [Appendix C, D, & E](#) for further clarification of all scales and values)

- VIII. A Glossary of terms is provided ([Appendix F](#)) for clarification of arboricultural terms and meanings
- IX. The following documentation was referred to when assessing this site;

Document	Drawn/Provided By	Reference	Date
Pre Lodgement Advice	Manly Council	MC/15/50305	-
Statement of Heritage Advice (DRAFT)	Graham Brooks & Associates	-	June 2015
Survey	Survcorp	Ref:2676 Sheet A1	13.05.2015
Existing Ground Floor Plan	Morson Group	EX 01	January 2015
Proposed Ground Floor & Basement Plan	Morson Group	DA 02 Issue 2P	25.05.2015

- X. Pentax Binoculars were used to gain a closer observation of the upper canopies from ground level

### 3.0 Site Observations

- I. The site is known as Lot 3 DP 86034 of Manly Council.
- II. Although not a heritage item, the site is adjacent to Manly Town Centre Conservation Area, and the Statement of Heritage Advice notes that the site is within close proximity to Heritage Items, including Manly Public School, individual dwellings and more importantly the Norfolk Island pine trees planted in the carriageway of Victoria Pde (T1 of this report)
- III. The site currently accommodates the Manly Lodge, a temporary accommodation facility.
- IV. The site orientates to the northwest with a relatively flat terrain
- V. Although the soil was not formally assessed given that the site is proximal to the coastline, it is presumably of sand influence.
- VI. There are in excess of 20 trees on site, but are not reported on given that they are species exempt for local Tree Preservation Order

## 4.0 Tree Observations

Tree Assessment															
ID	Genus & Species  Common Name	DBH (mm)	H (m)	S (m)	Age	Vigour	Condition	Crown Form	Crown Cover Symmetry Orientation	Defects	Pest & Disease	TREES AZ	Hazard	Significant scale Life Expectancy	Retention Value
1	<i>Araucaria heterophylla</i> <b>Norfolk Island Pine</b>	650	25	8	M	F	F	D	80%	DW	NO	A2	5	H 1	H
		Tree resides on the street enveloped by sandstone rocks and asphalt .Trunk is crooked at 4metres above but to a minor degree													
2	<i>Trachycarpus fortunei</i> <b>Chusan Palm</b>	350	7	4	M	G	G	S	Normal	NO	NO	Z2	5	L 2	R
		Locates to the rear of the site approx. 500mm from pillars the secondary building. Tre is conflicting with the eves.													
3	<i>Cupressus x leylandii</i> <b>Leyland cypress</b>	300	12	7	M	G	F	C	70 A NE	NO	NO	Z10	5	L 2	R
		Locates on the northwest boundary contained within an elevated masonry garden bed. Basal absent .Trunk leans north east and canopy follows suite													
4	<i>Cupressus x leylandii</i> <b>Leyland cypress</b>	250	11	4	M	F	F	C	70	NO	NO	Z10	5	L 2	R
		Locates on the northwest boundary contained within a elevated masonry garden bed .Basal absent													

## 5.0 Construction Impact Assessment

### 5.1 Direct Impacts

Tree	Construction Impacts											
	TPZ (m)	SRZ (m)	Distance to Works (m)	TPZ Encroachment (% and aspect)	SRZ Encroachment (% and aspect)	Total Root Mass Incursion of TPZ (%)	Incursion area of TPZ (m <sup>2</sup> )	Loss of crown (% , Aspect and Branch Order)			Tolerance to construction L= Low M=Moderate H=High	
1	7.8	2.93	9	Nil	Nil			Nil			M	
	Technically not affected. Privy to indirect impact											
2	3.0	NA									M	
	Total loss											
3	3.6	2.08									L	
	Total loss											
4	2.4	1.7									L	
	Total loss											

#### Calculating TPZ and SRZ of trees

- ❖ The Australian Standards provides a formula for calculating both the TPZ and SRZ. The TPZ is a combination of both root and crown area requiring protection for viable tree retention. Basically it is the area isolated from construction disturbances. The TPZ incorporates the SRZ, the area required for tree stability.
- ❖ The TPZ and SRZ is the radius measured from the centre of the tree trunk.
- ❖ AS 4970-2009 stipulates a minor encroachment of the TPZ as being less than 10%, whilst more than 10% is considered a major encroachment. Such encroachment may be deemed acceptable as long as the tree still remains viable. This is based on many other variables, including the characteristics of the tree and the use of viable construction methods conducive to the tree.
- ❖ It should be noted that the TPZs have been calculated with the following in mind; tree characteristics, typography of the site and the TPZ reconfiguration allowance as stated in AS 4970-2009. (Refer to Appendix E for calculation methods of TPZ.) The Standards allow 10% of the radii from one edge of the TPZ to be offset and added to another edge whilst still maintaining total surface area required for TPZ
- ❖ T2 is a palm and as stipulated in AS 4970/2009, their TPZ is calculated at no less than 1m greater than their radial canopy span, and they have no SRZ..

## 5.2 Indirect Impacts

The following are indirect impacts that trees may succumb to during construction related activities. It is imperative that these be taken into consideration and all attempts made to minimise indirect impacts, as they can occur over the duration of construction and indeed accumulate to have significant effect on trees longevity.

- I. Mechanical damage from plant/machinery; Direct wounding and damage of stems and branches by large plant & machinery, including excavator, bob cat, crane, etc., during construction activities will have some impact in the form of cambium damage/abrasion to tree trunks and branch tearing well into collar attachments in turn exposing live woody tissue and predisposing the tree to pest and disease. Similarly plant/machinery is also responsible for soil compaction within the trees TPZ.
- II. Indirect root injury from soil compaction; When soil is compacted either via building materials/debris stockpiled on the TPZ or TPZ is utilised as a thoroughfare for heavy plant and machinery, the soil inevitable becomes compacted and impacts on the air and moisture uptake and ultimately affecting the gaseous exchange within the drip line that is vital for the trees health and longevity.
- III. Soil contamination; where chemicals, cement, and paint products etc., get washed or spilled into the soil and the tree absorbs the soluble content through its roots. In addition limes from cement wash off can alter the soil PH
- IV. Soil grade changes; when the top soil cover down to a depth of approximately 150mm is striped it can illuminate vital feeder roots and can temporarily shock the tree. This process is common particularly during the landscape process. In addition these fine roots if exposed can prematurely dehydrate and die
- V. Landscaping Impact; Side paths and driveways comprised of concrete and non-porous materials can deprive roots of air and water and affect gaseous exchange. This is particularly true when there has been lack of consideration for trees located on adjacent properties and within close proximity to building envelope. In addition masonry fence lines require sub grade footings and usually at the expense of root loss of nearby trees. Furthermore there can be an increase in reflected heat to the remaining trees as a result from surrounding hard surfaces.

## 6.0 Conclusion & Recommendations

- I. The Arborist concludes that the *majority* of trees onsite are either exempt from Tree Preservation Order or are exotic species. In addition, the majority of these trees are also obscured from street level, and although contribute to the *existing* landscape are *not worthy* of retention and should not be design constraints in the way of the proposal and recommends their removal. Such tree removal would not have any adverse effects on the immediate environment or character of the site.
- II. The Arborist has assessed a total of four (4) trees for this report, given that they are not exempt. The trees were assessed based on individual merit *and* in relation to the proposed works at 22 Victoria Pde, with the following conclusions and recommendations;
  - a. T1 is a Norfolk pine, synonymous within the Manly LGA, particularly along the coastlines. Such plantings can date back to the late 19<sup>th</sup> Century, contributing to the streetscape amenity and cultural/ heritage significance of the area.
  - b. T1 is not located within the bounds of the site and is adequately setback from the proposed development, therefore not *directly* affected by way of TPZ encroachment from the proposed works. However its frontal location, adjacent to the site, still highlights its vulnerability to the proposed works from indirect construction impacts, as stated in 5.2 of this report.
  - c. The Arborist notes the significance of T1 as it forms part of an avenue of Norfolk Island pines defining Victoria Pde, and given this it will require protection to the highest degree. **It is imperative that the client obtain a Tree Protection Plan (TPP), stipulating guidelines for the retention of T1, in accordance with AS 4970-2009 and to include detailed measures to minimise *any* construction impacts for this tree.**
  - d. **Furthermore it is recommended that a Project Arborist (PA) AQF Level 5 be instated as part of the proposal to oversee critical stages of the development with respect to the retention of T1.**
  - e. T2 although in reasonable health, in contrast, its crown shaft has conformed to the proximal building hence its crooked crown, i.e. tree is poorly formed. Given this, the tree should be removed and replaced in the new landscape plan.
  - f. T3 and T4 are totally consumed by the proposed landscape. Currently they are growing in an elevated manner and restricted to linear root plates conforming to this contained growing environment. Their presence is deemed as poor planting practice and as part of good tree management they are recommended to be removed and not be a design constraint in the way of the proposal.

- g. Removal of trees shall be mitigated by replanting trees that would predominantly consist of trees that are either native or endemic tree species and or contribute to the cultural significance of the landscape

*Yours Faithfully,*



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# Appendix A

## Site Plan



# Appendix B

**Table 3.2 Definitions & Descriptors**

DBH	Diameter at Breast Height (estimated circumference of tree at approximately 1400mm)				
H	Height of tree (estimated)				
S	Spread of tree (estimated)				
Age	Y = Young	J= Juvenile	M= Mature	O=Over mature	S=Senescent
Vigour	G= Good	F=Fair	L= Low	D=Dormant	
Condition	G= Good	F=Fair	P= Poor	D= Dead	
Crown Form	D=Dominant E=Emergent	C=Co-dominant	I=Intermediate	S=Suppressed	F=Forest
Crown Cover	Percentage of crown foliage present on tree				
Symmetry	A = Asymmetric    S = Symmetric				
Orientation	N=North    E=East    S=South    W=West				
Defects	<b>BI</b> = Bark Inclusion (defect fork) <b>BC</b> = Basal cavity <b>BD</b> = Basal decay <b>C</b> =Cavity or hollow <b>CC</b> = Cable conflict <b>CT</b> - Crooked Trunk <b>DB</b> = Dieback <b>DC</b> = Declining canopy <b>DW</b> = Deadwood <b>H</b> = Hangers <b>L</b> = Lopped <b>PBA</b> = Poor Branch Attachment <b>R</b> =Root exposure/decay <b>RD</b> = Root Decline <b>SBD</b> = Summer Branch Drop <b>SC</b> = Stem cavity <b>SF</b> = Stem Failure <b>SFW</b> = Stem failure Wound <b>SW</b> =Stem Wound <b>TO</b> = Tear out				
Pest and Disease	B=Borers NO = Nothing Obvious	F=Fungal	T= Termites	M = Mistletoe O= other	
HAZARD Rating	Low=3-5	Medium=6-9	High=10-12 Refer to <a href="#">Appendix D- Hazard Rating</a>		
TREES AZ	Categorisation of trees with regards to development Refer to <a href="#">Appendix E-Tree AZ</a>				
Significant Scale	H=High    M=Medium    L=Low				
Life Expectancy	1=High    2=Medium    3=Short    4=Dead (Refer to <a href="#">Appendix C- Significance of a Tree, Assessment Rating System (STARS)</a> )©				
Retention Value	H=High    M=Medium    L=Low    R=Removal (Refer to <a href="#">Appendix C- Significance of a Tree, Assessment Rating System (STARS)</a> )©				

# Appendix C

## **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. An example of its use in an Arboricultural report is shown as Appendix A.

### **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

## Table 1.0 Tree Retention Value - Priority Matrix

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, [www.iaca.org.au](http://www.iaca.org.au)

		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 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.				

# Appendix D

## Hazard Rating Scale

### Failure Potential (4 points):

Identifies the most likely failure and rates the likeliness of failure of structural defect(s)

Rating	Likelihood of failure
1	Low (Minor defects)
2	Medium (defects are present and obvious)
3	High (Numerous/significant defects present)
4	Severe (Defects are severe)

### Size of defective part (4 points):

Rates the size of the part of the tree most likely to fail, where the larger the part that fails the greater the potential for damage:

Rating	Size of part
1	< 6 inches (15cm) in diameter
2	6-18 inches (15-45cm) in diameter
3	18-30 inches (45-75cm) in diameter
4	> 30 inches (75cm) in diameter

### Target rating (4 points)

Rates the use and occupancy of area affected by defective part

Rating	Use/ occupancy of area
1	Occasional (jogging, cycling track)
2	Intermittent (picnic area, daily parking)
3	Frequent (seasonal activities)
4	Constant (daily basis, year round, residence)

$$\text{HAZARD RATING} = \text{Failure Potential} + \text{Size of Part} + \text{Target Rating}$$

### Hazard Evaluation Rating Scale

Total Score	Hazard rating
3 - 5	Low Risk
6 - 9	Medium Risk
10 - 12	High Risk

The assessment process is undertaken with the following considerations;

- Length of evaluation cycle
- Level of resolution as identified by goals of Tree management program
- Past history and previous ratings of tree

If the above information is not made available and therefore not used in current evaluation process this rating can only affect the **current status of the tree**, rather than long-term development.

(Source: Mathany, N.P. and Clark, J.R. 1994)

# Appendix E

## Tree AZ Categories (Version 10.10 ANZ)

### Category Z: Unimportant trees not worthy of being a material constraint

**Local policy exemptions:** Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

<b>Z1</b>	Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
<b>Z2</b>	Too close to a building, i.e. exempt from legal protection because of proximity, etc
<b>Z3</b>	Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc
<b>High risk of death or failure:</b> Trees that are likely to be removed within 10 years because of acute health issues or severe	
<b>Z4</b>	Dead, dying, diseased or declining
<b>Z5</b>	Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
<b>Z6</b>	Instability, i.e. poor anchorage, increased exposure, etc
<b>Excessive nuisance:</b> Trees that are likely to be removed within 10 years because of unacceptable impact on people	
<b>Z7</b>	Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
<b>Z8</b>	Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc
<b>Good management:</b> Trees that are likely to be removed within 10 years through responsible management of the tree population	
<b>Z9</b>	Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
<b>Z10</b>	Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
<b>Z11</b>	Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
<b>Z12</b>	Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc
<b>NOTE:</b> Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.	

### Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

<b>A1</b>	No significant defects and could be retained with minimal remedial care
<b>A2</b>	Minor defects that could be addressed by remedial care and/or work to adjacent trees
<b>A3</b>	Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
<b>A4</b>	Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)
<b>NOTE:</b> Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.	

TreeAZ is designed by Barrell Tree Consultancy ([www.barrelltreecare.co.uk](http://www.barrelltreecare.co.uk)) and is reproduced with their permission

# Appendix F

## Glossary of Terms

Taken from: Draper, D. B and Richards, P.A. (2009) Dictionary for Managing Trees in Urban Environments, CSIRO Publishing, Victoria, Australia

**Adventitious** A bud arising from points other than terminals or axils, e.g. from a root or at an *internodal* region (Harris et al. 2004, p. 15)

**Apex** The tip or furthest point, or the highest point, or the distal end of a leaf, stem or wound.

**Arborist** An individual with competence to cultivate, care and maintain trees from amenity or utility purposes.

**Basal** Proximal end of the trunk or branch, e.g. trunk wound extending to the ground is a basal wound, or as epicormic shoots arising from lignotuber

**Branch failure** The structural collapse of a branch that is physically weakened by wounding or from the actions of pests and diseases or overcome by loading forces in excess of its load – bearing capacity.

**Buttress** A flange of adaptive wood occurring at a junction of a trunk and root or trunk and branch in response to addition loading.

**Callus wood** Undifferentiated and unligified wood that forms initially after wounding around the margins of a wound separating damaged existing wood from the later forming lignified wood or wound wood.

**Canker** A wound created by repeated localized killing of the vascular cambium and bark by wood decay fungi and bacteria usually marked by concentric disfiguration. The wound may appear as a depression as each successive growth increment develops around the lesion forming a wound margin (Shigo 1991, p. 140)

**Canopy cover** The amount of area of land covered by the lateral spread of the tree canopy, when viewed from above that land.

**Codominant stem** Two or more first order structural branches or lower order branches of similar dimensions arising from about the same position from a trunk or stem.

**Cork cambium** in bark a single layer of thin walled cells that gives rise to the phellem to the outside and phelloderm to the inside (Rudall 1992, p. 29)

**Critical Root Zone (CRZ)** A method that considers a minimum radial distance from the trunk that disturbance to structural roots may occur for a tree to remain stable.

**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 fruits; or the total amount of foliage supported by the branches.

**Crown Protection Zone (CPZ)** A specified area above ground and at a given distance from trunk, set aside for the protection of tree branches and foliage to provide for the viability and stability of a tree to be retained where it is potentially subject to disturbance by development.

**Decline** The response of the tree to a reduction of energy levels resulting from stress. Recovery from a decline is difficult and slow, and decline is usually irreversible.

**Diameter at Breast Height (DBH)** Measurement of a trunk width calculated at a given distance from above ground from the base of the tree often measured at 1.4m.

**Dominance** A tendency in a leading shoot to maintain a faster rate of apical elongation and expansion other than other nearby lateral shoots, and the tendency also for a tree to maintain a taller crown than its neighbours (Lonsdale 1999, p.313)

**Dormancy** A state of reduced cellular activity (Capon 1990, p. 209)

**Dripline** A line formed around the edge of a tree by the lateral extent of the crown.

**Dynamic Load** Loading force that is moving and changes over time, e.g. from wind movement (James 2003, p. 166)

**Endemic** A native plant usually with a restricted occurrence limited to a particular country, geographic region or area and often further confined to a specific habitat.

**Epicormic Branch** derived from an epicormic shoot

**Epiphyte** A plant that utilizes another as a host for growth and support without adversely impacting upon the host, depending largely on nutrients from humus formed from leaf litter accumulated in a crotch or hollow, or nutrients washed down along branches or trunk of the host, e.g. some ferns and orchids.

**Exit Hole** A hole in the trunk, roots or branches as a result of borer insects living inside the tree, reaching maturity and exiting by boring to the outside of the tree usually to reproduce.

**Exotic** A plant introduced from another country or region to a place where it was not indigenous. Such plants may become naturalised.

**Frass** The granular wood particles produced from borer insects and can be categorized as fine frass, medium frass, and coarse frass with the different types being of different sizes and caused by different insects.

**Habitat tree** A tree providing a niche supporting the life processes of a plant or animal

**Hangar** Detached broken branch remaining within the crown by being tangled or supported by branches within the crown, or the crown of a nearby tree or built structure.

**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** The bark on the inner side of the branch union, or in 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

**Indigenous** A native plant usually with a broad distribution in a particular country, geographic region or area. See also Endemic, Locally indigenous and non-locally indigenous.

**Injury** Any immediate or ongoing process causing wounding of a tree.

**In situ** Occurring in its original place, e.g. soil level, remnant vegetation, the place from where a tree was transplanted, or where a tree is growing.

**Irreversible decline** The decline of a tree where it has progressively deteriorated to a point where no remedial works will be sufficient to prevent its demise, usually of poor form and low vigour.

**Isolated tree** A tree growing as a solitary specimen in an exposed location away from other trees as a result of natural or artificial causes and may be naturally occurring.

**Kino** The extractive polyphenols (tannins) formed in veins in a cambial zone as a defense in response to wounding in eucalypts. Often visible as an exudate when the kino veins rupture or are injured (Boland, *et al.* 2006, p. 691)

**Lichen** The symbiotic association between an alga and a fungus, often evident in a forest environment where it grows on trees without harming them. Lichen growth is in the forms of foliose, fruticose, and crustose (Minion 1991, p. 104)

**Lignotuber** A woody tuber developed in the axils of the cotyledons.

**Loading** Weight that is carried, e.g. as bending stress on a branch.

**Locally Indigenous** A native plant as remnant vegetation, self sown or planted in an area or region where it occurred originally.

**Longevity** Long lived, referring to a plant living for a long period of time.

**Mechanical wound** -Wound inflicted by abrasion, by mechanical device

**Mistletoe** Parasitic and epiphytic evergreen angiosperms that grow on the stems of trees by the use of cell structures called haustoria, consuming nutrients and water produced by the host but most produce their own sugars by photosynthesis.

**Naturalised** A plant introduced from another country or region to a place where it was not previously indigenous where it has escaped from agriculture or horticulture or as a garden escape and has sustained itself unassisted and given rise to successive generations of viable progeny.

**Necrotic** Dead area of tissue that may be localized e.g. on leaves, branches, bark or roots

**Negligence** With regard to trees , failure to take reasonable care to prevent hazardous situations from occurring which may result in injury to people or damage to property (Lonsdale 1999, p. 317)

**Noxious weed** A plant species of any taxa declared a weed by legislation. Treatment for the control or eradication of such weeds is usually prescribed by legislation.

**Parasite** An organism living on or in another living organism (host) and acquiring its food from the host often to the detriment of the latter.

**Photosynthesis** In most green plants the process that converts light energy into chemical energy , with the uptake of carbon dioxide and production of water as a bi-product.

**Predation** Temporary or prolonged attack by pests or diseases resulting in physical damage and disruption to life processes.

**Radial** The directions from the centre of a circular object to the outer edge, such as in a branch, trunk, root, root plane or crown.

**Remnant** A plant /s of any taxa and their progeny as part of the floristics of the recognised endemic ecological community remaining in a given location after alteration of the site or its modification or fragmentation by activities on that land or on adjacent land

**Root Protection Zone (RPZ)** A specified area on and below the ground and at a given distance from the trunk set aside for the protection of tree roots to provide for the viability and stability of a tree to be retained where it is potentially subject to disturbance by development. Establishment of this area may include root mapping, root pruning and installation of root barriers or other remedial works at the edge of the RPZ to prevent conflict between roots and works.

**Safe Useful Life Expectancy (SULE)** A system used to determine the time a tree can be expected to be usefully retained

**Shedding** - Shedding of plant organs when it is mature or aged, by the formation of a corky layer across its base. This may be influenced by stress, drought, senescence, declining condition, reduced vigour and also occurs

**Stability** Resistance to change especially from loading forces or physical modifications to a trees growing environment

**Stress** A factor in a plants environment that can have adverse impacts on its life processes e.g. altered soil conditions, root damage, toxicity, drought or water logging. The impact t of stress may be reversible given good arboricultural practices that may lead to plant decline.

**Structural defect** A weak point in or on a tree causing its structural deterioration diminishing its stability in full or part

**Structural integrity** The ability of a load bearing part of a tree, and its resistance to loading forces

**Structural roots-** Roots supporting the infrastructure of the root plate providing strength and stability of the tree.

**Symbiotic** An association between different species usually but not always mutually beneficial.

**Target** People or property likely to be harmed or damaged, by being struck by a failed or collapsed tree in full or part. .

**Termite leads** Tunnels of mud on the stem and between the bark created by termites that may be active or inactive.

**Tree Preservation** Protection, conservation and maintenance of a population of trees

**Tree Protection Zone (TPZ)** A combination of RPZ and CPZ as an area around the tree set aside for the protection of a tree and a sufficient proportion of its growing environment above and below ground established prior to demolition or construction and maintained until the completion of works to allow for its viable retention including stability.

**Undesirable trees** Plants that have characteristics which may be harmful as a result of toxin production and potential poisoning , potential for weed infestation, brittle and dangerous wood, excessive spread of roots or bush land invasion.

**Visual Tree Assessment (VTA)** A visual inspection of a tree from the ground. Such assessment should only be undertaken by suitably competent practitioners.

**Wind exposure** The degree to which a tree or other object id exposed to wind, with regard to both duration and velocity..

## Disclaimer

This report has been compiled using knowledge & expertise relating to trees, and makes recommendations based on this. It should be noted that trees are affected by many elements, environmental and situational, some of which cannot be predicted or foreseen even by Qualified Arborists.

The client when reading this report should take the following factors into consideration;

- ❖ It is not feasible to assume that Arborists identify all hazards or risks associated with trees at the time of consultation or indeed in this report.
- ❖ This Assessment is valid for 3 months from the date stipulated on the report, and may need to be updated after this.
- ❖ Regular maintenance and monitoring by a Qualified Arborist will minimize the risks associated with tree and contribute to its longevity in its growing environment, however there is no guarantee that all risks are to be eliminated and that the tree is not privy to external factors that will impact on the tree after it has been assessed by our service.
- ❖ The report is compiled in good faith, where any information given to our service is correct and true, and where interested parties and /or stakeholders are notified. This includes title and ownership of property, orders as directed by relevant authorities, development application determinations and other matters that affect the tree/s in question.
- ❖ The Arborist shall not be required to give testimony or to attend court by reason of this report unless other arrangements are made prior.
- ❖ This Arborist Report does not issue permission for any recommendations made in this report, particularly where trees are to be removed. Permission must be sought and obtained from Council and owner/s of trees.
- ❖ Any treatments recommended by the Arborist cannot be guaranteed, due to the volatile environment in which trees are growing.
- ❖ Clients may choose to accept or disregard the recommendations of the Arborist, or to seek additional advice.
- ❖ This report is intended for the Recipient, no part of this report is to be copied or altered without the authors permission

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