



Consulting & Project Arborists

Dedicated to Urban Forest Management since 1988

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## Arboricultural Impact Assessment

ALDI Distribution Centre  
10 Burando Road  
Prestons NSW 2170

Prepared 26 April 2019  
Our Ref: 1907.3

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## **1.0 Background:**

1.0 Mr Ben Miller, Town Planner with Barker, Ryan & Stewart on behalf of Brendan Smith, Property Director, ALDI Stores commissioned this Arboricultural Impact Assessment report. The report consists of a survey of the existing trees in the vicinity of proposed car parking additions at the Prestons Distribution Centre; and includes species identification, age class, vigour, structural condition, life expectancy, dimensions, pest & disease, included branch or stem attachments, form, significance scale rating and retention value rating.

1.1 Recommendations are made regarding the retention, removal, pruning or remediation of site trees.

1.2 The purpose of the report is to assess the existing trees and recommend which individuals may require removal and which may be retained should the proposal gain consent.

1.3 Craig Martin carried out a survey of the site's trees on the 18<sup>th</sup> April 2019. The results of this assessment using VTA methodology after (Mattheck & Breloer, 1994) are tabulated below.

## **2.0 The Site:**

2.1 The portion of the site under assessment extends from the southern entrance where lane is two way along elevated road with retaining wall to east (below which truck and container parking exists) to the pedestrian crossing and start of existing car parking spaces for visitors and staff of administration building.

2.2 A row of trees exists on eastern side of lane way bordering current truck and container parking and consists of trees 1- 19.

Another row of trees exists on western side of lane at same level as existing lane and consists of trees 20-51. Another four trees 52-55 exists in landscape bed to south east of lane way.

2.3 The trees under assessment have been planted and range in age class from young to mature, with the majority of trees in the semi-mature age class. The majority of the trees are locally and non- locally indigenous species with a few exotic specimens either end of the pedestrian crossing.

### **3.0 Tree Survey:**

Tree No.	Genus species Common Name	Age Y = Young S = Semi Mature M = Mature O = Over- mature	Vigour G = Good L = Low	Condition G = Good F = Fair P = Poor D = Dead	Life Expectancy 1 Long 2 Medium 3 Short	Ht. Est (m)	Crown Spread (M)				DBH DAR B	Roots Visible root damage	Pest & Disease N NO Y YES	Branch bark include d	For m Goo d Fair Poor	Significanc e Value 1 High 2 Med 3 Low	Retention value 1 High 2 Med 3 Low 4 Remove
							N	S	E	W							
1	<i>Eucalyptus tereticornis</i>	S	L	F	2	15	2	5	5	2	280	N	Y	N	F	3	2/3
	Forest Red Gum	Comment: Moderate volume epicormics															
2	<i>Eucalyptus tereticornis</i>	S	L	P	P	9	3	3	3	2	250	N	Y	N	F	3	3
	Forest Red Gum	Comment: High volume epicormics, declining															
3	<i>Eucalyptus tereticornis</i>	S	L	F	3	10	3	4	4	2	260	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, declining, tip dieback															
4	<i>Eucalyptus tereticornis</i>	Y	G	F	2	6	1	2	2	1	140	N	Y	N	F	3	2/3
	Forest Red Gum	Comment: Tip dieback															
5	<i>Eucalyptus tereticornis</i>	S	G	F	2	12	3	3	4	2	280	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, declining, tip dieback															
6	<i>Eucalyptus tereticornis</i>	S	G	F	1	12	3	3	4	2	280	N	Y	N	G	3	2/3
	Forest Red Gum	Comment: Medium volume epicormics, declining, tip dieback															
7	<i>Eucalyptus tereticornis</i>	S	G	F	2	10	2	1	1	1	180	N	Y	N	P	3	3
	Forest Red Gum	Comment: Medium volume epicormics, declining, tip dieback															
8	<i>Eucalyptus tereticornis</i>	S	G	F	1	7	2	2	2	1	200	N	Y	N	G	3	2/3
	Forest Red Gum	Comment: Low volume epicormics, tip dieback															
9	<i>Eucalyptus tereticornis</i>	S	G	F	2	13	2	5	4	3	260	N	Y	N	F	3	3
	Forest Red Gum	Comment: Medium volume epicormics, tip dieback															
10	<i>Eucalyptus tereticornis</i>	S	L	F	3	13	3	2	4	2	240	N	Y	N	P	3	3
	Forest Red Gum	Comment: High volume epicormics, declining, tip dieback.															

Tree No.	Genus species Common Name	Age Y = Young S = Semi Mature M = Mature O =Over- mature	Vigour G = Good L = Low	Condition G = Good F = Fair P = Poor D = Dead	Life Expectancy 1 Long 2 Medium 3 Short	Ht. Est (m)	Crown Spread				DBH DAR B	Roots Visible root damage	Pest & Disea se	Branch bark included	For m  Goo d Fair Poor	Significanc e Value 1 High 2 Med 3 Low	Retention value 1 High 2 Med 3 Low 4 Remove
							N	S	E	W							
11	<i>Eucalyptus tereticornis</i>	S	L	F	3	12	3	4	3	2	220	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, declining, tip dieback															
12	<i>Eucalyptus tereticornis</i>	S	L	F	3	11	2	3	3	1	200	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, declining, tip dieback															
13	<i>Eucalyptus tereticornis</i>	S	L	F	3	12	2	2	3	1	220	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, declining, tip dieback															
14	<i>Eucalyptus tereticornis</i>	S	L	F	3	14	2	2	4	2	260	N	Y	N	G	3	2/3
	Forest Red Gum	Comment: Medium volume epicormics, tip dieback															
15	<i>Eucalyptus tereticornis</i>	S	L	F	3	12	3	2	3	1	220	N	Y	N	G	3	3
	Forest Red Gum	Comment: Medium volume epicormics, tip dieback															
16	<i>Eucalyptus tereticornis</i>	S	L	P	3	8	3	3	1	1	280	N	Y	N	G	3	4
	Forest Red Gum	Comment: High volume epicormics, extensive tip dieback															
17	<i>Eucalyptus tereticornis</i>	S	L	F	3	11	1	3	2	1	280	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, extensive tip dieback															
18	<i>Eucalyptus tereticornis</i>	S	L	F	3	12	2	2	4	1	240	N	Y	N	G	3	3
	Forest Red Gum	Comment: High volume epicormics, extensive tip dieback															
19	<i>Jacaranda mimosifolia</i>	S	G	F	2	4. 5	3	1	2	2	140	N	N	Y	P	3	3
	Jacaranda	Comment: Located eastern side of pedestrian crossing, poor form															
20	<i>Jacaranda mimosifolia</i>	Y	G	F	2	3	1	1	2	2	100	N	N	N	G	2	2
	Jacaranda	Comment:															

Tree No.	Genus species Common Name	Age Y = Young S = Semi Mature M = Mature O =Over- mature	Vigour G = Good L = Low	Condition G = Good F = Fair P = Poor D = Dead	Life Expectancy 1 Long 2 Medium 3 Short	Ht. Est (m)	Crown Spread				DBH DAR B	Roots Visible root damage	Pest & Disease	Branch bark include d	For m	Significanc e Value 1 High 2 Med 3 Low	Retention value 1 High 2 Med 3 Low 4 Remove
							N	S	E	W							
21	<i>Corymbia maculata</i>	M	G	F	2	15	3	3	3	2	400	N	N	Y	F	2	2
	Spotted Gum	Comment: Co-dominant stems @ 3m, located N of T20.															
22	<i>Eucalyptus baueriana</i>	Y	G	F	2	6	2	1	2	2	150	N	N	N	F	2	2
	Blue Box	Comment: Located W side of existing access road to visitor carpark.															
23	<i>Casuarina glauca</i>	Y	G	F	2	7.5	1	1	1	1	100	N	N	N	F	2	2
	Swamp Oak	Comment:															
24	<i>Acacia fimbriata</i>	M	G	F	2	4.5	2	2	1	3	300	N	N	N	F	2	3
	Fringe Wattle	Comment:															
25	<i>Acacia fimbriata</i>	M	G	F	2	4	2	2	2	2	450	N	N	N	F	2	3
	Fringe Wattle	Comment:															
26	<i>Acacia fimbriata</i>	M	G	F	2	3.5	1	1	1	2	450	N	N	N	F	2	3
	Fringe Wattle	Comment:															
27	<i>Allocasuarina torulosa</i>	S	G	F	2	5	1	1	1	1	200	N	N	N	F	2	2
	Forest She Oak	Comment:															
28	<i>Allocasuarina torulosa</i>	S	G	F	2	7	2	2	1	1	280	N	N	N	F	2	2
	Forest She Oak	Comment:															
29	<i>Casuarina glauca</i>	S	G	F	1	11	3	3	2	2	260	N	N	N	G	2	2
	Swamp Oak	Comment:															
30	<i>Casuarina glauca</i>	S	G	F	1	9	3	3	2	3	280	N	N	N	G	2	2
	Swamp Oak	Comment:															

Tree No.	Genus species Common Name	Age Y = Young S = Semi Mature M = Mature O =Over- mature	Vigour G = Good L = Low	Condition G = Good F = Fair P = Poor D = Dead	Life Expectancy 1 Long 2 Medium 3 Short	Ht. Est (m)	Crown Spread (M)				DBH DAR B (MM)	Roots Visible root damage	Pest & Disease	Branch bark include d	For m	Significanc e Value 1 High 2 Med 3 Low	Retention value 1 High 2 Med 3 Low 4 Remove
							N	S	E	W							
31	<i>Casuarina glauca</i> Swamp Oak	S	G	F	2	12	2	2	2	3	280	N	N	N	G	2	2
		Comment: 120mm diameter branch failure mid-crown.															
32	<i>Casuarina glauca</i> Swamp Oak	S	G	F	2	11	3	2	1	3	240	N	N	N	G	2	2
		Comment:															
33	<i>Eucalyptus saligna</i> Sydney Blue Gum	S	L	F	2	14	3	3	2	4	260	N	N	N	G	2	2/3
		Comment:															
34	<i>Eucalyptus tereticornis</i> Forest Red Gum	S	L	P	3	9	2	2	1	2	160	N	N	Y	F	2	4
		Comment: Weak union @ 2.5m.															
35	<i>Casuarina glauca</i> Swamp Oak	Y	G	G	2	6	1	1	1	1	100	N	N	Y	F	2	2
		Comment:															
36	<i>Eucalyptus tereticornis</i> Forest Red Gum	Y	L	P	3	4	0	1	0	0	100	N	N	Y	P	2	4
									5	5							
		Comment: Poor form, dead top.															
37	<i>Allocasuarina torulosa</i> Forest She Oak	S	G	F	2	5	3	2	1	2	280	N	N	Y	F	2	2
		Comment:															
38	<i>Casuarina glauca</i> Swamp Oak	Y	G	F	2	6	1	1	1	1	100	N	N	Y	F	2	2
		Comment:															
39	<i>Allocasuarina torulosa</i> Forest She Oak	S	G	F	2	5	2	1	2	1	250	N	N	Y	F	2	2
		Comment:															
40	<i>Allocasuarina torulosa</i> Forest She Oak	S	G	F	2	7	2	2	1	2	240	N	N	Y	F	2	2
		Comment:															

Tree No.	Genus species Common Name	Age Y = Young S = Semi Mature M = Mature O =Over- mature	Vigour G = Good L = Low	Condition G = Good F = Fair P = Poor D = Dead	Life Expectancy 1 Long 2 Medium 3 Short	Ht. Est (m)	Crown Spread (M)				DBH DAR B (MM)	Roots Visible root damage	Pest & Disease	Branch bark include d	For m Goo d Fair Poor	Significanc e Value 1 High 2 Med 3 Low	Retention value 1 High 2 Med 3 Low 4 Remove	
							N	S	E	W								
41	<i>Allocasuarina torulosa</i>	S	G	F	2	4	1 .5	1	1	1	1	240	N	N	Y	F	2	2
	Forest She Oak	Comment:																
42	<i>Eucalyptus tereticornis</i>	S	L	F	2	14	3	4	2	4	280	N	N	Y	F	2	3	
	Forest Red Gum	Comment:																
43	<i>Casuarina glauca</i>	S	G	G	2	8	1	1	1	1	140	N	N	N	G	2	2	
	Swamp Oak	Comment:																
44	<i>Casuarina glauca</i>	S	G	G	2	9	1	1	1	1	120	N	N	Y	G	2	2	
	Swamp Oak	Comment:																
45	<i>Allocasuarina torulosa</i>	S	G	F	2	4	1	1	1	1	150	N	N	N	G	2	2	
	Forest She Oak	Comment:																
46	<i>Allocasuarina torulosa</i>	S	G	F	2	4	1 .5	1	1	1	200	N	N	Y	G	2	2	
	Forest She Oak	Comment:																
47	<i>Eucalyptus tereticornis</i>	Y	G	F	2	2	0 .3	0 .3	0 .3	0 .3	20	N	N	Y	F	2	2	
	Forest Red Gum	Comment:																
48	<i>Acacia fimbriata</i>	M	G	F	2	3.5	1	1	1	1	200	N	N	Y	F	2	3	
	Fringe Wattle	Comment:																
49	<i>Acacia fimbriata</i>	M	G	F	2	4	1 .5	1 .5	1 .5	1 .5	500	N	N	Y	F	2	3	
	Fringe Wattle	Comment:																
50	<i>Casuarina glauca</i>	M	G	F	2	9	3	3	2	3	300	N	N	Y	F	2	2	
	Swamp Oak	Comment:																
51	<i>Casuarina glauca</i>	M	G	F	2	9	3	3	3	3	280	N	N	Y	F	2	2	
52	<i>Populus yunnanensis</i>	S	G	F	2	8	2	2	2	2	150	N	N	N	F	2	2	
53	<i>Populus yunnanensis</i>	S	G	F	2	8	2	2	2	2	150	N	N	N	F	2	2	
54	<i>Populus yunnanensis</i>	S	G	F	2	8	2	2	2	2	150	N	N	N	F	2	2	

55	<i>Populus yunnanensis</i>	S	G	F	2	8	2	2	2	2	150	N	N	N	F	2	2
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#### 4.0 The Proposal and Impacts on Site Trees:

4.1 The proposal consists of an extension of the width of the current two-way lane way to the east by construction of an additional retaining wall and back fill to create car parking spaces on eastern side of lane way. This would require the removal of trees 1-18 which are currently located within the footprint of proposed widening. Trees 1-18 are semi-mature specimens of *Eucalyptus tereticornis* (Forest Red Gum) and whilst they are a species that would have grown locally prior to development of the site, these specimens are in only fair to poor health and already entering a state of decline as evidenced by extensive epicormic growth, psyllid infestation (a sap sucking insect that depletes the tree's starch reserves) and crown dieback. The reasons for this decline are likely a combination of the following factors: a) drought stress, b) restricted deep soil availability between retaining wall and compacted truck parking stand area, c) possible poor root stock of plants when first planted and d) high levels of heat stress from albedo effect of surrounding hardstand. Accordingly, the trees have only received a retention rating of low to medium.

4.2 The area to west of lane way will also undergo changes with upgrade of retaining wall on western boundary and an extension beyond current kerb to enable creation of car parking spaces to west of existing laneway. This will have major impacts on existing vegetation.

4.3 The removal of this vegetation on the western side of existing lane way will be necessary as the proposed works encroaches into the tree's TPZ and SRZ.

4.4 Tree 19 Jacaranda would also be likely affected by proposed works and has poor crown form and therefore recommended for removal.

4.5 Trees 52-55 inclusive will require removal as they cannot be retained within footprint of proposed works.

4.6 Plans assessed for this project:

Civic Works package by Barker Ryan Stewart, dated 11/6/19, *Project 190015 Revision A*.

*Demolition Plan by Bell Architecture, dated 2/7/19, drawing PRE-SKA-1100-1 Rev 1*

## 5.0 Structural Root Zone & Tree Protection Zone Calculations

Tree #	Genus species	Diameter at breast height (DBH) mm	Structural Root Zone (SRZ) m	Tree Protection Zone (TPZ)
20	<i>Jacaranda mimosifolia</i>	100	1.5	2.0
21	<i>Corymbia maculata</i>	400	2.3	4.8
22	<i>Eucalyptus baueriana</i>	150	1.5	2.0
23	<i>Casuarina glauca</i>	100	1.5	2.0
24	<i>Acacia fimbriata</i>	300	2.0	3.6
25	<i>Acacia fimbriata</i>	450	2.4	5.4
26	<i>Acacia fimbriata</i>	450	2.4	5.4
27	<i>Allocasuarina torulosa</i>	200	1.7	2.4
28	<i>Allocasuarina torulosa</i>	280	1.9	3.4
29	<i>Casuarina glauca</i>	260	1.9	3.1
30	<i>Casuarina glauca</i>	280	1.9	3.4
31	<i>Casuarina glauca</i>	280	1.9	3.4
32	<i>Casuarina glauca</i>	240	1.8	2.9
33	<i>Eucalyptus tereticornis</i>	260	1.9	3.1
35	<i>Casuarina glauca</i>	100	1.5	2.0
37	<i>Allocasuarina torulosa</i>	280	1.9	3.4
38	<i>Casuarina glauca</i>	100	1.5	2.0
39	<i>Allocasuarina torulosa</i>	250	2.6	6.6
40	<i>Allocasuarina torulosa</i>	240	1.8	2.9
41	<i>Allocasuarina torulosa</i>	240	1.8	2.9
42	<i>Eucalyptus tereticornis</i>	280	1.9	3.4
43	<i>Casuarina glauca</i>	140	1.5	2.0
44	<i>Casuarina glauca</i>	120	1.5	2.0
45	<i>Allocasuarina torulosa</i>	150	1.5	2.0
46	<i>Allocasuarina torulosa</i>	200	1.7	2.4
47	<i>Eucalyptus tereticornis</i>	20	1.5	2.0
48	<i>Acacia fimbriata</i>	200	1.7	2.4
49	<i>Acacia fimbriata</i>	500	2.5	6.0
50	<i>Casuarina glauca</i>	300	2.0	3.6
51	<i>Casuarina glauca</i>	280	1.9	3.4
52	<i>Populus yunnanensis</i>	150	1.5	2.0
53	<i>Populus yunnanensis</i>	150	1.5	2.0
54	<i>Populus yunnanensis</i>	150	1.5	2.0
55	<i>Populus yunnanensis</i>	150	1.5	2.0

Small DBH smaller root systems

High tolerance to impact species

Moderate tolerance to impact species

Low tolerance to impact species

## 6.0 Recommendations:

6.1 In light of the discussion in points 4.2 and 4.3 above, and considering the results of table 5.0 the following trees are recommended for removal as they are unlikely to survive the proposed works in their vicinity (in addition to trees 1-19 recommended for removal as per 4.1 & 4.4):

Trees 24, 25, 26, 33, 42, 48 & 49.

6.2 The following trees are also recommended for removal given the major encroachment into tree's TPZ and SRZ by proposed works.

Trees 20, 21, 22, 23, 27, 28, 29, 30, 31, 32, 35, 37, 38, 39, 40, 41, 43, 44, 45, 50, 51, 52, 53, 54 and 55.

## 7.0 Conclusions:

The proposal will require the removal of the site trees which are located within the footprint of the works, trees 1-19. The majority of these trees are semi-mature planted specimens which are in decline. The trees located on the western edge of the proposal will also require removal. This is due to major encroachment from proposed works within TPZ and SRZ of trees 20 - 51 inclusive. Trees 52-55 inclusive will also require removal as they are within foot print of proposed works.



Craig Martin  
Diploma of Horticulture (Arboriculture)  
Graduate Certificate Wildlife Management (Habitat)  
Certificate of Horticulture (Distinction)

This assessment was carried out from the ground, and covers what was reasonably able to be assessed, and available to this assessor at the time of inspection. No aerial or subterranean inspections were carried out.

### LIMITATIONS ON THE USE OF THIS REPORT

This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.

### ASSUMPTIONS

Care has been taken to obtain information from reliable resources. All data has been verified insofar as possible; however, Tree Consult can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

- Information contained in this report covers only the tree that was examined and reflects the condition of the tree at the time of inspection: and
- The inspection was limited to visual examination of the subject tree without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

## 9.0 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. Standards Australia 2009, *Australian Standard 4970 Protection of trees on development sites*, Standards Australia, Sydney, Australia.

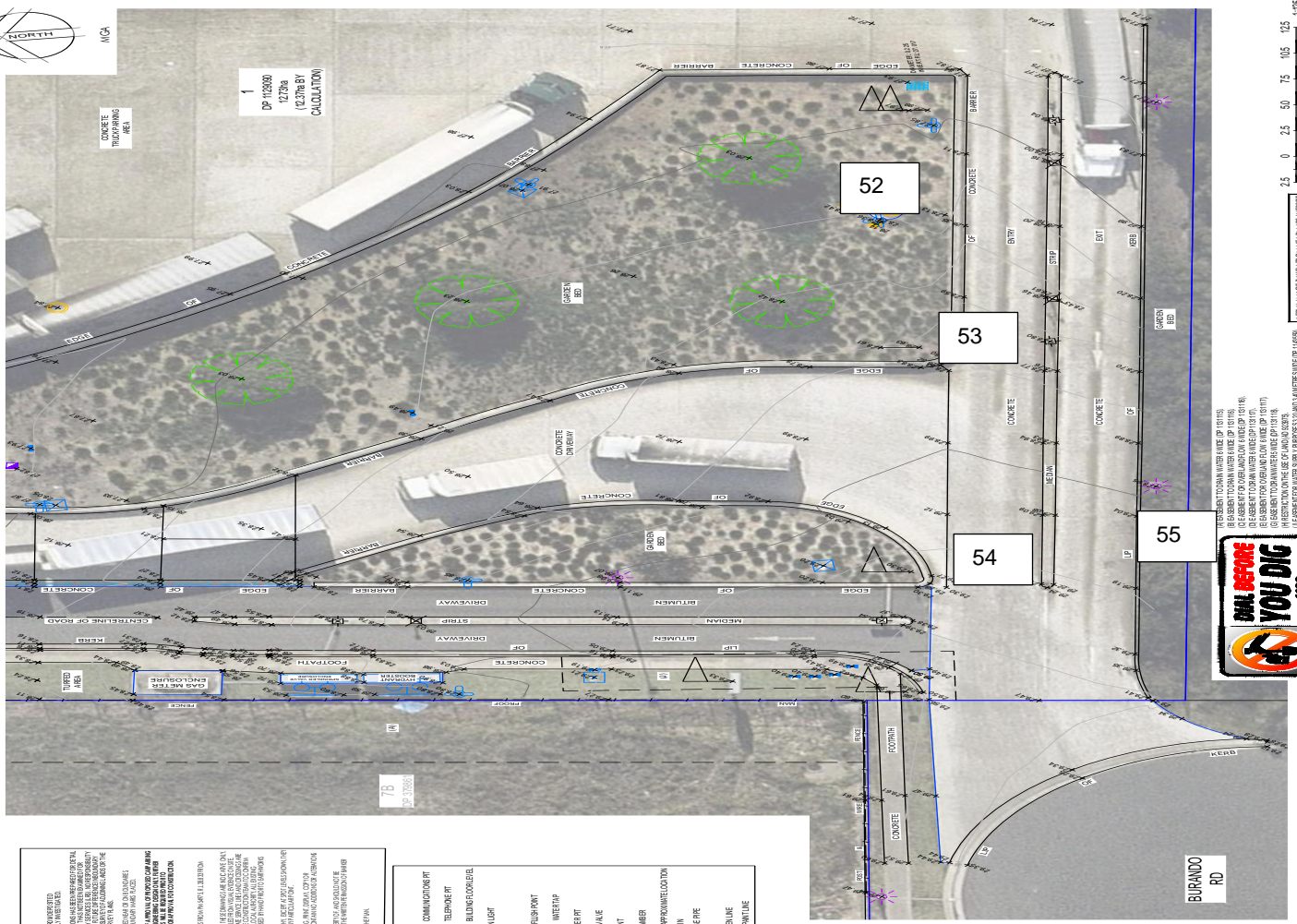
Appendix A: Tree Location  
Plan





A1

FOR CONTINUING SHEET 1



**NOTES**

1. BURANDO ROAD IS A CLASS 1 ROAD AS PER THE ROAD DESIGN ACT 2004. THE ROAD DESIGN ACT 2004 STATES THAT THE ROAD DESIGN ACT 2004 IS THE LEGISLATION THAT GOVERNS THE DESIGN AND CONSTRUCTION OF BURANDO ROAD. THE ROAD DESIGN ACT 2004 STATES THAT THE ROAD DESIGN ACT 2004 IS THE LEGISLATION THAT GOVERNS THE DESIGN AND CONSTRUCTION OF BURANDO ROAD. THE ROAD DESIGN ACT 2004 STATES THAT THE ROAD DESIGN ACT 2004 IS THE LEGISLATION THAT GOVERNS THE DESIGN AND CONSTRUCTION OF BURANDO ROAD.

**LEGEND**

BOUNDRARY	COMMUNICATIONS PIT
SKIDPAD	TELEPHONE PIT
BOLLARD	BUILDING CORNER
ELECTRICAL LAMPEN LIGHT	
LEAF POLE	
SUBSOIL DRAINAGE (SLOPE PAINT)	
GAS PIT (ID)	WATER PIP
GRADES (CONCRETE) PIT	
WATER IRRIGATION VALVE	
WATER SERVICE METER	
SEWER ACCESS CHAMBER	
CONCRETE (OR APPROXIMATE) LOCATION	
CHAMBER FOR SIGN	
CONCRETE FOUNDATION	
OUTLET LINE	
UNDERGROUND PIPELINE	
UNDERGROUND RAILLINE	



INSTRUCTIONS TO THE USER OF THIS PLAN:

(1) THIS PLAN IS A PRELIMINARY DESIGN AND IS NOT TO BE USED FOR CONSTRUCTION WITHOUT THE APPROVAL OF THE LOCAL GOVERNMENT.

(2) THE USER OF THIS PLAN IS ADVISED THAT THE DESIGNER HAS NOT BEEN ADVISED OF ANY UTILITIES OR SERVICES THAT MAY BE LOCATED AT THE SITE.

(3) THE USER OF THIS PLAN IS ADVISED THAT THE DESIGNER HAS NOT BEEN ADVISED OF ANY UTILITIES OR SERVICES THAT MAY BE LOCATED AT THE SITE.

(4) THE USER OF THIS PLAN IS ADVISED THAT THE DESIGNER HAS NOT BEEN ADVISED OF ANY UTILITIES OR SERVICES THAT MAY BE LOCATED AT THE SITE.

(5) THE USER OF THIS PLAN IS ADVISED THAT THE DESIGNER HAS NOT BEEN ADVISED OF ANY UTILITIES OR SERVICES THAT MAY BE LOCATED AT THE SITE.



ISSUED	DATE	BY	FOR
A	12/2016	DP	123000
B	12/2016	DP	123001

DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DATE: 12/2016

**CLIENT:**  
 AID STORES (LIMITED PARTNERSHIP)  
 ABN 801186350118

**PROJECT:**  
 PARTIAL DETAIL SURVEY OF LOT 1 DP 123000  
 No. 10 BURANDO ROAD PRESTONS  
 LG: LIVERPOOL

**DATE:** 12/2016  
**SCALE:** 1:250  
**PROJECT NO.:** CC190015-00-004  
**DATE:** 12/2016

## Appendix B: Glossary

Source: *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*

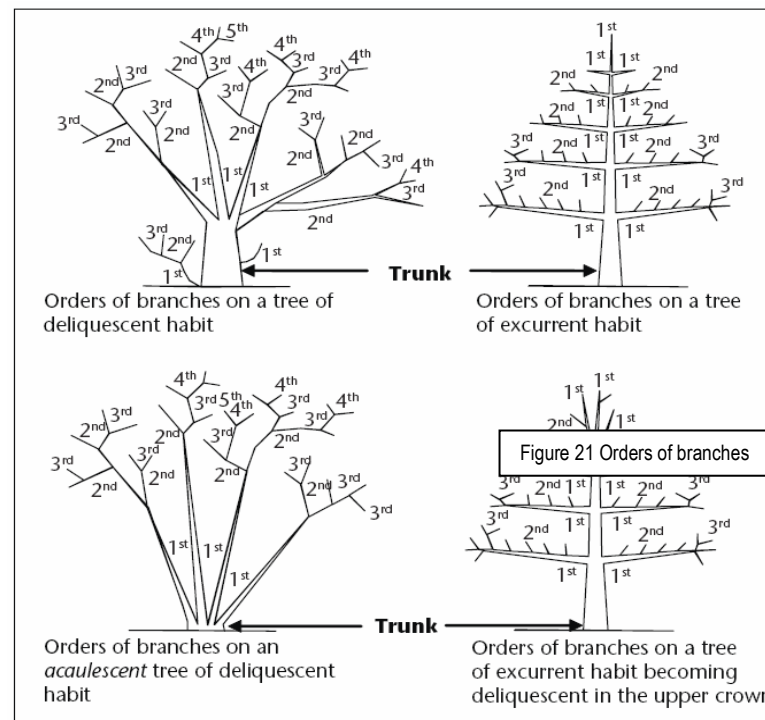
Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);  
 Osmosis (the ability of the root system to take up water);  
 Turgidity (the ability of the plant to sustain moisture pressure in its cells);  
 Epicormic shoots or *epicormic strands* in 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 from the trunk or from a branch. A branch successive *orders of branches* with the length the *crown*. These may develop initially as a division as in a *young tree* or a tree of terminates at or some distance from the *root* the *foliage crown*. In an *acaulescent tree*, may arise from a *sprout mass* from damaged

**Orders of branches** The marked divisions (James 2003, p. 168) commencing at the initial division where branches on an *excurrent tree*. Successive in branch diameters at each division, and numerically, e.g. first order, second order,



initially from the trunk to support leaves, flowers, fruit and may itself fork and continue to divide many times as and taper decreasing incrementally to the *outer extremity* of gradually tapering continuation of the *trunk* with minimal *excurrent habit*, or in a *sapling*, or may arise where the trunk *crown*, dividing into *first order branches* to form and support branches arise at or near the *root crown*. Similarly, branches *roots, branches or trunk*.

between successively smaller branches (James 2003, p. the trunk terminates on a *deliquescent tree* or from *lateral branching* is generally characterised by a gradual reduction each gradation from the trunk can be categorised third order etc. (See Figure 21.)

## 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).

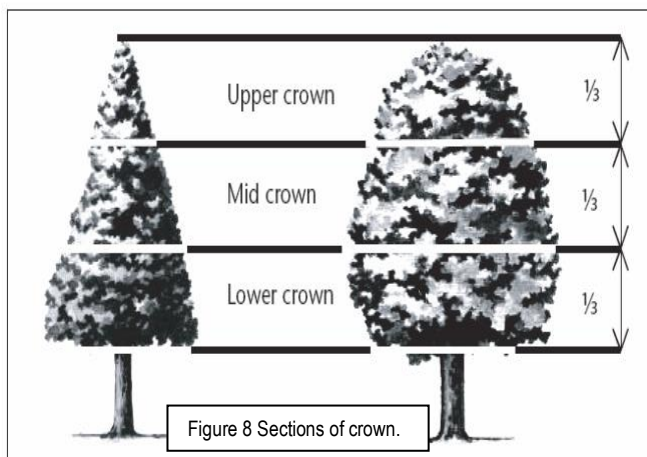
**Crown** Of an individual tree all the parts arising above branches, e.g. the branches, leaves, flowers and fruit; or crown of any tree can be divided vertically into three and *upper crown* (Figure 8). For a *leaning* tree these can be from *base* to *apex*. The volume of a crown can be categorised *crown*.

**Lower crown** *proximal* or lowest section of a crown also *Crown*, *Mid crown* and *Upper crown*.

**Mid crown** middle section of a crown when divided *Lower crown* and *Upper crown*.

**Upper crown** *distal* or highest section of a crown when *Crown*, *Mid crown* and *Lower crown*.

**Crown Projection (CP)** Area within the *dripline* or beneath the and *Dripline*.



the trunk where it terminates by its division forming the total amount of foliage supported by the branches. The sections and can be categorised as *lower crown*, *mid crown* be divided evenly into crown sections of one-third from the as the *inner crown*, *outer crown* and *outer extremity of*

when divided vertically into one-third ( $\frac{1}{3}$ ) increments. See

vertically into one-third ( $\frac{1}{3}$ ) increments. See also *Crown*,

divided vertically into one-third ( $\frac{1}{3}$ ) increments. See also

lateral extent of the *crown* (Geiger 2004, p. 2). See also *Crown spread*

**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*.

### 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.

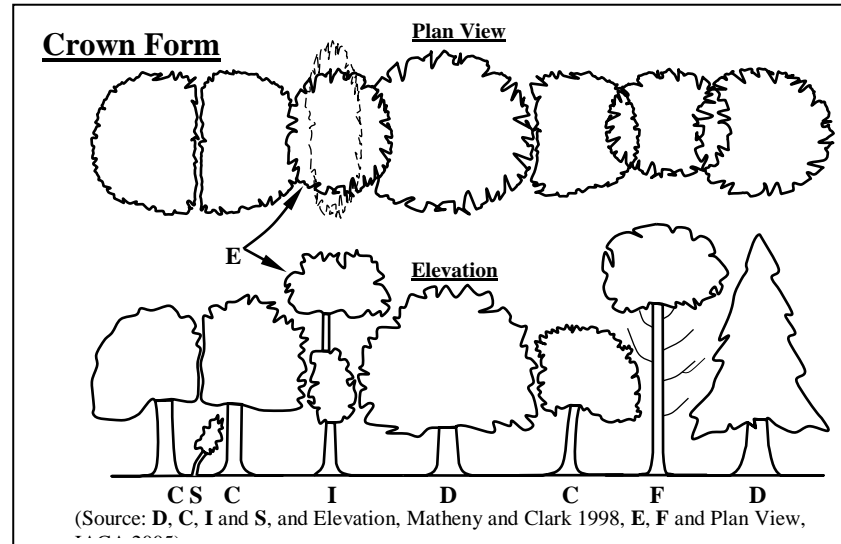
**Crown Form Emergent** Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form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

**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°-15° from upright.

**Moderately Leaning** A leaning tree where the trunk is growing at an angle within 15°-30° from upright.

**Severely Leaning** A leaning tree where the trunk is growing at an angle within 30°-45° from upright.

**Critically Leaning** A leaning tree where the trunk is growing at an angle greater than >45° from upright.

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

**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* structural support and *stability*. Woody roots may be buttressed and continuous or tapering rapidly at a short distance from the root crown. and not be evident at the root crown; or become buried by changes in 221), or more first order roots which may radiate from the trunk with a aspect, dependent upon physical characteristics e.g. leaning trunk, *environment* from topography e.g. slope, soil depth, rocky outcrops, *water table* etc.

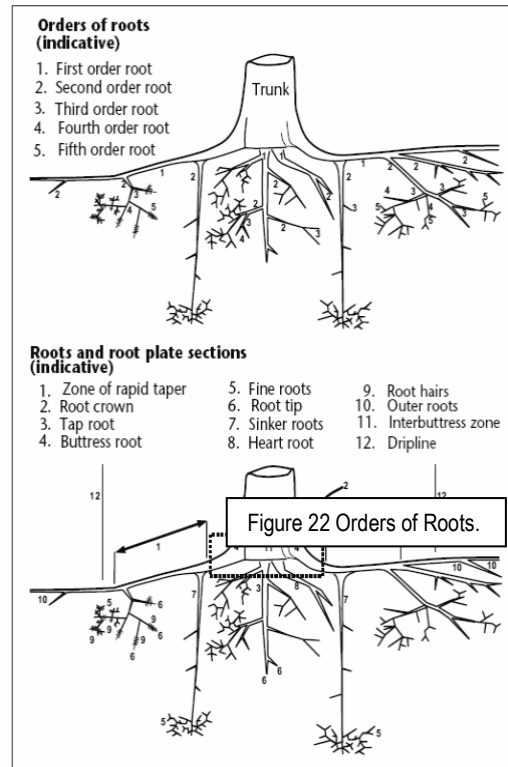
**Orders of Roots** The marked divisions between woody roots, trunk, at the *root crown* where successive branching is generally each gradation from the trunk and can be categorized numerically, e.g. Roots may not always be evident at the *root crown* and this may be environment. Palms at maturity may form an adventitious root mass.

**Root Plate** The entire root system of a tree generally occupying the top may extend laterally for distances exceeding twice the height of the tree dependent on water availability, soil type, *soil depth* and the physical

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

**Zone of Rapid Taper** The area in the *root plate* where the diameter of from the *trunk*. Considered to be the minimum radial distance to provide *Structural Root Zone (SRZ)*.

**Structural Roots** Roots supporting the infrastructure of the *root plate* may taper rapidly at short distances from the *root crown* or become dicotyledonous angiosperms and are usually 1<sup>st</sup> and 2<sup>nd</sup> order roots; or angiosperms (palms). Such roots may be crossed and grafted and are extend just beyond the *dripline*.



at the base of the *trunk*, or as an *adventitious root mass* for divided as a marked gradation, gradually tapering and Depending on soil type these roots may descend initially soil levels. Trees may develop 4-11 (Perry 1982, pp. 197- relatively even distribution, or be prominent on a particular *asymmetrical* crown; and constraints within the growing exposure to predominant wind, soil moisture, depth of

commencing at the initial division from the base of the characterised by a gradual reduction in root diameters and *first order roots*, second order roots, third order roots etc. dependent on species, age class and the growing

300-600mm of soil including roots at or above ground and (Perry 1982, pp. 197-221). Development and extent are characteristics of the surrounding landscape.

*structural roots* reduces substantially over a short distance structural support and *root plate* stability. See also

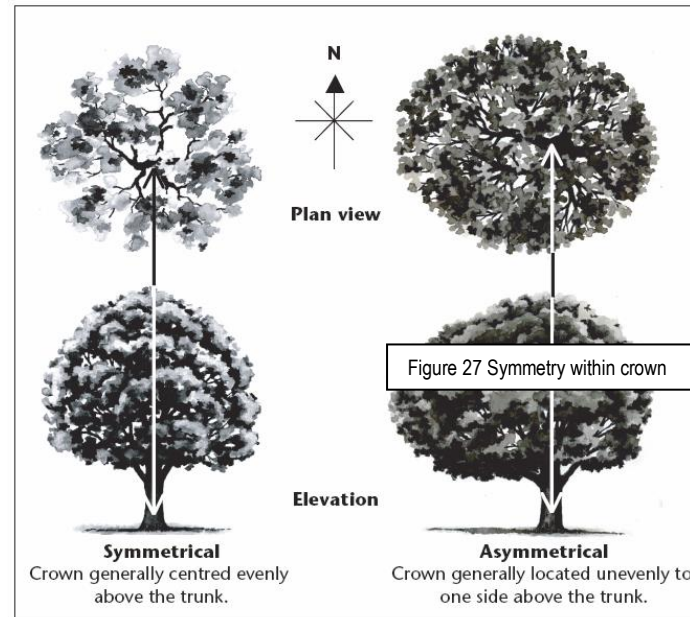
providing strength and *stability* to the tree. Such roots large and woody as with gymnosperms and form an *adventitious root mass* in monocotyledonous usually contained within the area of *crown projection* or

## 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 *crown* or *root plate* around the vertical *axis* of the *Form Suppressed* as a result of natural restrictions with other trees, or from exposure to wind, or or power lines. An example of an expression of this

**Symmetrical** Balance within a crown, where there around the vertical *axis* of the trunk. This usually *Forest*. An example of an expression of this may be



there is an uneven distribution of branches and the foliage trunk. This may be due to *Crown Form Codominant* or *Crown* e.g. from buildings, or from competition for space and light artificially caused by pruning for clearance of roads, buildings may be, crown asymmetrical, bias to west.

is an even distribution of branches and the *foliage crown* applies to trees of *Crown Form Dominant* or *Crown Form* crown symmetrical.

## Trunk

**Trunk** A single stem extending from the *root crown* into separate *stems* forming *first order branches*. A *acaulescent* trees of *deliquescent* habit; or may be *caulescent* tree can be divided vertically into three *Trunk* and *Upper Trunk*. For a *leaning* tree these trunk.

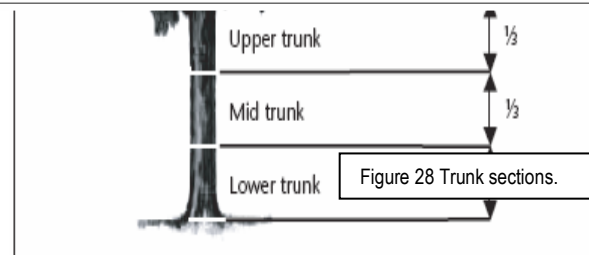
**Acaulescent** A *trunkless* tree or tree growth 21)

**Caulescent** Tree grows to form a *trunk*. See also

**Lower trunk** Lowest, or *proximal* section of a trunk when *Trunk*, *Mid trunk* and *Upper trunk*.

**Mid trunk** A middle section of a trunk when divided into one-*trunk* and *Upper trunk*.

**Upper trunk** Highest, or *distal* section of a trunk when divided *Lower trunk* and *Mid trunk*.



to support or elevate the *crown*, terminating where it divides trunk may be evident at or near ground or be absent in continuous in trees of *excurrent* habit. The trunk of any (3) sections and can be categorized as *Lower Trunk*, *Mid* may be divided evenly into sections of one third along the

forming a very short *trunk*. See also *Caulescent*. (See Fig.

*Acaulescent*. (See Fig. 21)

divided into one-third ( $\frac{1}{3}$ ) increments along its *axis*. See also

third ( $\frac{1}{3}$ ) increments along its *axis*. See also *Trunk*, *Lower*

into one-third ( $\frac{1}{3}$ ) increments along its *axis*. See also *Trunk*,

**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.