# Arboricultural Impact Assessment



Prepared 1<sup>st</sup> November 2021

# Site Location

1-20 Railway Road Meadowbank NSW 2114

# <u>Client</u>

Sasco Developments

## DISCLAIMER

The author and Tree & Landscape Consultants 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.

Peter Richards
Tree & Landscape Consultants

# Contents

		Page
1.	Introduction	4
2.	Aims & Objectives	5
3.	Methodology	6
4.	Tree Assessments	7
5.	Recommendations	9
<u>Tabl</u>	les	
	1. Tree Assessments	7

# <u>Appendices</u>

Appendix A	Sustainable Retention Index Value (S.R.I.V.)© Version 4 (IACA 20010)
Appendix B	Definitions & Terminology
Appendix C	Survey Plan/ Tree Locations/Level Changes Trees 10-20
Appendix D	Tree Protection Plan
Appendix E	Extract from Australian Standard AS4970 2009 Protection of trees on development sites "Determining TPZs"
Appendix F	Extract from Australian StandardAS4970 2009 Protection of trees on development sites "Determining SRZs"
Appendix G	IACA Rating System for Tree Significance (IACA) 2009 ©
Appendix H	References



# TREE & LANDSCAPE CONSULTANTS

Site Analysis, Arboricultural Assessments

#### INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS



Peter A RichardsDip. Hort. (Arboriculture)Assoc. Dip.Hort. (Park Management)Hort. Cert.Member IACA No-3, Member LGTRA, Member ISAP.O Box 50Padstow 2211 N.S.W.Mobile0418 277 379Emailtalc2@optusnet.com.au

1<sup>st</sup> November 2021

Sasco Developments

1-20 Railway Road Meadowbank NSW 2114

Our reference: 4924B

### Arboricultural Impact Assessment:

1-20 Railway Road Meadowbank NSW 2114

## **1. INTRODUCTION**

This report has been prepared by Tree & Landscape Consultants for Sasco Developments. The site was inspected by the author and the subject trees and their general growing environment evaluated on the 16<sup>th</sup> January 2020, 1<sup>st</sup> & 26th October 2021.

*The site* is subject to a Development Application and this report and any works recommended herein, that require approval from the consenting authority are provided to form part of that development application and its consent conditions. The Tree Locations (Appendix C) and Tree Protection Plan (Appendix D) are to be included into and used in conjunction with the approval for *the site*.

The aims and objectives of this report are to detail and comply with the tree protection requirements specified in AS4970 (2009) *Protection of trees on development sites* to identify and assesses the condition of the subject tree/s; determine the impact of development on the subject tree/s; provide recommendations for retention or removal of the subject tree/s; provide specifications for protection of tree/s to be retained. The information in this report is intended to provided tree management and protection through all stages of development

# 2.0 AIMS & OBJECTIVES

#### <u>Aims</u>

Detail the condition of the tree/s on the site or on adjoining sites where such tree/s may be affected by the proposed works, by assessment of individual specimens or stands, and indicate remedial works or protection measures for their retention in a safe and healthy condition, or a condition not less than that 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 able to be applied, and will consider the location and condition of the trees in relation to the proposed building works, or recommend removal and replacement where appropriate.

Provide as an outcome of the assessment, the following: a description of the tree/s, observations made, discussion of the effects the location of the proposed building works may have on the tree/s, and make recommendations required for remedial or other works to the trees, if and where appropriate.

Determine from the assessment a description of the works or measures required to ameliorate the impact upon the tree/s 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.

#### **Objectives**

Assess the condition of the subject trees.

Determine impact of development on the subject trees.

Provide recommendations for management of the subject trees.

## 3. METHODOLOGY

- 3.1 The method of assessment of tree/s is applied from the ongoing knowledge and development of the author and considers but is not confined to:
  - Tree health and subsequent stability, both long and short term
  - Sustainable Retention Index Value (S.R.I.V.)© IACA 2009)
  - Amenity values
  - Significance
- 3.2 This assessment is undertaken using a 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.
- 3.3 In this report the dimensions of the tree recorded by the author for the trunk *diameter at breast height* (DBH) measurement is calculated at 1.4m above ground from the base of the tree. Where a tree is trunkless or branches at or near ground such as a mallee formed tree, an average diameter is determined by recording the radial extent of the stem mass at its narrowest and widest dimensions, adding the two dimensions together and dividing them by 2 to record an average.
- 3.4 Crown spreads are expressed as length by breadth measurements to accurately record their dimensions. Where appropriate, *crown spread orientation* is described along the length of the crown spread e.g. North/South, or as *radial* if the crown is distributed at an approximately even radius from the trunk e.g. 6x6m.
- 3.5 The Australian Standard AS 4970-2009 "Protection of trees on development sites, where applicable is applied to trees to be retained in this report as a point of reference and guide for the recommended minimum clearances from the centre of tree trunks to development works and is applied as a generalised benchmark and the distances may be increased or decreased by the author as a result of other factors providing mitigating circumstances or constraints as indicated by but not restricted to the following:
  - Tolerance of individual species to disturbance,
  - Geology e.g. physical barriers in soil, floaters, bedrock to surface
  - Topography e.g. slope, drainage,
  - Soil e.g. depth, drainage, fertility, structure,
  - Microclimate e.g. due to landform, exposure to dominant wind,
  - Engineering e.g. techniques to ameliorate impact on trees such as structural soil, lateral boring,
  - Construction e.g. techniques to ameliorate impact on trees such as pier and beam, bridge footings, suspended slabs
  - Arboriculture e.g. exploration trenches to map location of roots,
  - Physical limitations existing modifications to the environment and any impact to tree/s by development e.g. property boundaries, road reserves, previous impact by excavation in other directions, soil level changes by cutting or filling, existing landscaping works within close proximity, modified drainage patterns.

# 4. TREE ASSESSMENTS

# 4.1 Table 1

Tree No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Condition G = Good F = Fair P = Poor D = Dead	Pest & Diseases	Branch Bark Included	Canopy Orientation Sy = Symmetrical N.S.E.W = North South East West	Trunk Diameter (1.4m above ground in mm)	Height (m)	Spread (m)	<b>Tree Vigour</b> L = Low G = Good A= Abnormal	Trunk Lean X = Straight or Slightly Leaning A = Acaulescent M = Moderate	SRIV (Age, Vigour, Condition, Index Rating)
1	Cinnamomum camphora	0	Р	No	No	Sy	400	8	8	L	Х	OLVP0
	Camphor laurel	Comments:	Extensive d	lieback	evident				-	-		
2	Camphor laurel	M Comments:	P Dieback of	No lower or	No der lea	A/E ders evident.	800	12	g	G	М	MGVP6
~	Dead Tree											
3		Comments:	The tree su	pported	l no act	ive foliage at th	ne time of the	e inspe	ection.	-		
4	Cinnamomum camphora	0	Р	No	No	Sy	700	14	12	L	Х	OLVP0
	Camphor laurel	Comments:	Extensive d	lieback	evident		700	40	40	_		
5	Jacaranda mimositolia	M Commonts:	F Tree anne:	NO aring fre	NO e of ins	Sy sect predation of	700 or disease	18	12	G	A	MGVF9
	Ailanthus altissima	M	F	No	No	Sv	300	6	3	G	А	MGVF9
6	Tree of Heaven	Comments:	Urban weed	d specie	s most	likely self seed	ed.	-	-	-		
7	Ailanthus altissima	М	F	No	No	Sy	300	6	3	G	А	MGVF9
'	Tree of Heaven	Comments:	Urban weed	d specie	s most	likely self seed	ed.					
8	Ailanthus altissima	М	F	No	No	Sy	200	5	3	G	A	MGVF9
	Tree of Heaven	Comments:	Urban weed	d specie	s most	likely self seed	ed.		0		X	101/50
9		M	F Dieback of	No lower or	NO der lea	Sy ders evident	400	14	9	G	X	MGVF9
	Melaleuca bracteata	Comments.	Dieback of			ders evident.						
10	"Revolution Gold"	М	F	No	No	Sy	200	6	3	G	A	MGVF9
	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease		•		
	Melaleuca bracteata	м	F	No	No	Sy	200	6	3	G	А	MGVF9
11	"Revolution Gold"	Comments:	Tree gener	ally app	eared f	ree of insect or	edation or d	isease				
	Melaleuca bracteata	NA NA	r	Ne	Ne	Cu	200	6		0	٨	
12	"Revolution Gold"	IVI	F	INO	INO	Sy	200	6	3	G	А	MGVF9
	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease				
13	"Revolution Gold"	м	F	No	No	Sy	200	6	3	G	A	MGVF9
	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease		•		
	Melaleuca bracteata	м	F	No	No	Sy	100	6	3	G	А	MGVF9
14	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease		l		
4.5	Eucalyptus scoparia	М	P	No	No	Sy	450	12	5	G	Х	MGVP6
15	Wallangarra White Gum	Comments:	Dieback of	crown e	vident.		•			•		
16	Cinnamomum camphora	М	F	No	No	Sy	500	8	5	G	Х	MGVF9
	Camphor laurel	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease				
17	"Revolution Gold"	м	F	No	No	Sy	150	6	3	G	А	MGVF9
	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease		1		
18	Melaleuca bracteata "Revolution Gold"	м	F	No	No	Sy	170	6	3	G	А	MGVF9
	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease		•		
40	Melaleuca bracteata	м	F	No	No	Sy	170	6	3	G	А	MGVF9
19	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease				
	Melaleuca bracteata	м	-	No	No	с.,	200	e	2	C	٨	
20	"Revolution Gold"	IVI	Г	INU	INU	Sy	300	0	3	9	A	MGVF9
21 22	Melaleuca	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease		6		101/20
	raxinus griffithii	M	F Tree concr	No ally app	No eared f	A/W	/0 redation or d	4	2	G	A	MGVF9
	Fraxinus griffithii	M	F	No No	No	A/W	70	4	. 2	G	А	MGVF9
	Ash	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease				
22	Fraxinus griffithii	М	F	No	No	A/W	120	4	2	G	Α	MGVF9
23	Ash	Comments:	Tree genera	ally app	eared f	ree of insect pr	edation or d	isease				
24	Fraxinus griffithii	М	F	No	No	Sy	60	3	2	G	А	MGVF9
	Ash	Comments:	Tree generation	ally app	eared f	ree of insect pr	edation or d	isease				

Arboricultural Impact Assessment - 1-20 Railway Road Meadowbank NSW 2114

#### 4.2 - Setback for Tree Protection Zones

This table only applies to trees being retained. Tree Protection Zone fencing locations as measured from the centre of each tree and the recommended distances for the side closest to the building construction works e.g. excavation [See explanation] See explanation of the sector of the side closest to the building construction works e.g. excavation [See explanation] See explanation of the sector of the sec

 

 Tree No.
 (1.4m above root (above root buttress)
 I runk Diameter (above root buttress)
 C= Good (above root buttress)
 M = Mature (above root buttress)
 Calculated Structural (above root buttress)
 in meters Australian Standard AS 4970-2009 (above root buttress)

 The radius of the DBH = trunk diameter measured at 1.4 m above ground. Radius in meters being stem at ground level. A TPZ should not be less than 2m nor greater.
 The radius of the stem at ground level. A TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 m outside the crown projection.

Tree No.	Trunk Diameter (1.4m above root buttress in mm)	Trunk Diameter (above root buttress)	<b>Tree Vigour</b> L = Low G= Good A= Abnormal	Age of Tree Y = Young M = Mature O = Over-Mature (Senescent)	Calculated Structural Root Zone (SRZ) (radius in meters- Calculated Structural Root Zone (SRZ) in metres being Radius=(Dx50)0.42 x0.64)	Distance of Tree Protection Zone (TPZ) (radius in meters Australian Standard AS 4970-2009 "Protection of trees on development sites" TPZ=DBH x 12)
21	70	250	G	М	1.85	1.5
22	70	200	G	М	1.68	1.5
23	120	240	G	М	1.82	1.5
24	60	170	G	М	1.57	1.5

#### 4.3 Discussion

Most trees internal to the site are either dead, poor in condition or are undesirable tree species. Tree 5 is fair in condition being a species type commonly found growing in the Sydney Urban environment and is screened to the broader by other trees and the surrounding built environment. All trees internal to the site will require removal so as to accommodate the proposed changes to the land.

Trees numbered 10-20 located within the street reserve will require removal as extensive modification to the infrastructure including level changes is to occur and the trees are not retainable with the design in its current format. Smaller trees numbered 21,22,23 & 24 located within the street reserve are retainable and have been identified for retention within this report. Considering the size of the development the LGA may require removal of these trees subject to introduction of formal street scape as part of final landscape works in accordance with their Street Tree Masterplan.

It is considered that trees 21,22,23 & 24 can be retained subject to the following protection measures being introduced.

#### 4.4 Ground Protection within TPZs- (Trees – 21,22,23 & 24)

#### (Extract from AS4970-2009- 4.5.3 Ground protection).

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

**Response:** The existing concrete walkway provides ground protection and should be retained for the duration of site works. If to be removed and site movement is still required, then ground protection as per AS4970 section 4.5.3. will need to be installed. See also appendix D-Tree Protection Plan.

4.5 Trunk Protection (Trees- 21,22,23 & 24)

#### (Extract from AS4970-2009- 4.5.2 Trunk and branch protection)

Where necessary, install protection to the trunk and branches of the trees. The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2 m is recommended. Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

**Response:** Trunk protection will need to be established as per the AS4970-2009 for these trees. See also appendix D-Tree Protection Plan.

4.6 <u>Underground services within TPZs- (Trees- 21,22,23 & 24)</u> Extract of AS4970-2009 is as follows:

#### (Extract from AS4970-2009- 4.5.5 Installing Underground services).

All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches. The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees. For manual excavation of trenches the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

**Response:** Any services required within prescribed TPZs should be installed as per AS4970 section 4.5.5. through use of underground directional drilling.

### 5. **RECOMMENDATIONS**

- a. That trees 21,22,23 & 24 be retained.
- b. That protection for trees 21,22,23 & 24 be in accordance with sections 4.4,4.5 & 4.6 of this report.
- c. That trees 1-20 be removed and replaced as part of final works in accordance with landscape documentation for the development.

Peter Richards Tree & Landscape Consultants

# Appendix A

Matrix - Sustainable Retention Index Value (S.R.I.V.)© Developed by IACA – Institute of Australian Consulting Arboriculturists <u>www.iaca.org.au</u> Version 4, 2010

To be used with the values defined in the Glossary. An Index value as indicated where ten (10) is the highest value.

Class		INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS				
Age	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. Retention potential - Medium – Long Term.	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 remediation or favourable environmental conditions.
(X)	YGVG - 9	YGVF - 8	YGVP - 5	YLVG - 4	YLVF - 3	YLVP - 1
) buno	Index Value 9       Index Value 8         Retention potential - Long Term.       Retention potential - Short – Medium Term.         Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and adaptability.       Retention potential - Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height setain, move or replace.         model       model         model <td>Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height &lt;5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.</td> <td>Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height &lt;5 m. Medium potential for future growth and adaptability. Retain, move or replace.</td> <td>Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height &lt;5m. Low-medium potential for future growth and adaptability. Retain, move or replace.</td> <td>Index Value 1 Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height &lt;5 m. Low potential for future growth and adaptability.</td>		Index Value 5 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 growth and adaptability. Retain, move or replace.	Index Value 4 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 adaptability. Retain, move or replace.	Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace.	Index Value 1 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.
(M)	MGVG - 10	MGVF - 9	MGVP - 6	MLVG - 5	MLVF - 4	MLVP - 2
Mature	Index Value 10       Index Value 9         Retention potential -       Retention potential -         Medium - Long Term.       Medium Term.         Potential for longer       with improved growing conditions.		Index Value 6 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 2 Retention potential - Likely to be removed immediately or retained for Short Term.
(0)	OGVG - 6	OGVF - 5	OGVP - 4	OLVG - 3	OLVF - 2	OLVP - 0
Over-mature	Index Value 6         Index Value 5           Retention potential - Medium - Long Term.         Retention potential - Medium Term.		Index Value 4 Retention potential - Short Term.	Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 2 Retention potential - Short Term.	Index Value 0 Retention potential - Likely to be removed immediately or retained for Short Term.

# **Appendix B**

Definitions & Terminology

From

Dictionary for Managing Trees in Urban Environments

Institute of Australian Consulting Arboriculturists (IACA) 2009.

#### **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.

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.

#### **Description of Tree Dimensions**

**Height** The distance measured vertically between the horizontal plane at the lowest point at the base of a tree, which is immediately above ground, and the horizontal plane immediately above the uppermost point of a tree.

**Spread** The furthest expanse of the crown when measured horizontally from one side of the tree to the other, generally through the centre of the trunk. Where the crown is not circular a measurement should be an average of the narrowest and widest diameters and this is dependent upon crown form and to a lesser extent its symmetry.

**Crown Cover** Percent of the homogenous distribution of foliage across the entire crown based upon that expected for a specimen of that species in good condition and of normal vigour, depending on form in situ, e.g. this may be influenced by crown die-back, proximity to other trees or structures, moisture stress, or overshadowing.

#### <u>Vigour</u>

**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.

**Dormant Tree Vigour** Determined by existing turgidity in lowest order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown. **Poor Vigour** See low vigour

Good Vigour See Normal Vigour

#### Age of Trees

Age of Trees 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. These increments are Young, Mature and Overmature.

Young Tree aged less than 20% of life expectancy.

Mature Tree aged 20-80% of life expectancy.

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

Sapling A young tree, early in its development with small dimensions.

Senescent Advanced old age, over-mature.

#### General Terms

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, 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.

**Excurrent** Tree where the crown is comprised of one (1) dominant first order structural branch which is usually an extension of the trunk, erect, straight and continuous, tapering gradually, with the main *axis* clear from base to apex, e.g. *Araucaria heterophylla* - Norfolk Island Pine. Note: some tree species of *typical* excurrent habit may be altered to deliquescent by physical damage of the *apical meristem*, or from top lopping, or from the propagation of inferior quality stock. However, *formative pruning* may be able to correct a *crown* to excurrent if undertaken when a tree is *young*.

Sustainable Retention Index Value (SRIV) A visual method of rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria. SRIV© is for the professional manager of urban trees to consider the tree in situ with an assumed knowledge of the taxa and its growing environment and is based on the physical attributes of the tree and its response to its environment considering its age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property and the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. (IACA 2005)

**Crown Spread Orientation** Direction of the axis of crown spread which can be categorized as Orientation Radial and Orientation Non-radial.

**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.

Structural Root Zone (SRZ) The minimal area around the base of a tree, generally circular, required for its *stability* in the ground. The section of *root plate* within this area and subsequent soil cohesion necessary to hold the tree upright against *wind throw*, therefore the entire depth of the *root zone* must be included.

**Appendix C** Tree Locations/Level Changes *"Trees 10-20"* 



# **Street Level Changes**



# Appendix D

Tree Protection Plan

#### Pge 1 of 3 – Construction Constraints



#### Pge 2 of 3-





Drawing #2 - Branch, Trunk and Ground Protection



Page 3 of 3-

Drawing #3 - Example of TPZ Fencing



Drawing #4 - Example of TPZ Signage



# Appendix E

# 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.

#### $TPZ = DBH \times 12$

where

DBH = trunk diameter measured at 1.4 m above ground

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

# Appendix F

# Extract from Australian Standard AS4970 2009 Protection of trees on development sites

#### Section 3, Determining the protection zones of the selected trees

#### 3.3.5 Structural root zone (SRZ)

"The SRZ is the area required for tree 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.

SRZ radius expressed by the curve is calculated by the following formula,

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

where

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

### Appendix G References

## REFERENCES

- 1. IACA (2009), Sustainable Retention Index Value, Institute of Australian Consulting Arboriculturists, <u>www.iaca.org.au</u>.
- 2. Australian Standard® AS 4373 2007 Pruning of amenity Trees.
- 3. Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.
- 4. Work Cover NSW 2007, *Code of Practice Tree Work*, New South Wales Government, Australia.