Arboricultural Assessment and Report

1221-1249 Centre Road, Oakleigh South

Prepared for Sterling Global Pty Ltd.

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Tree Logic Pty. Ltd.

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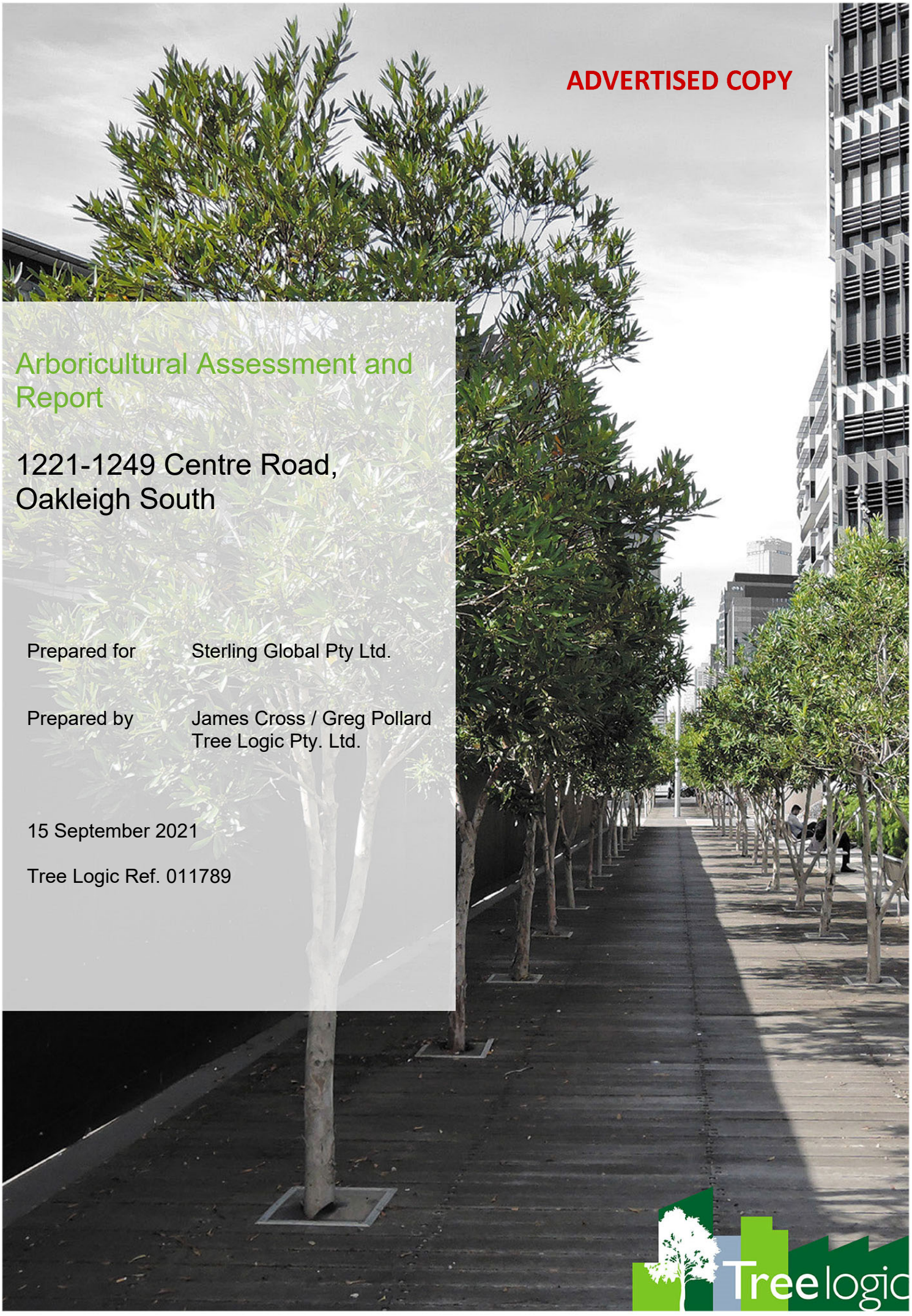

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1 Executive Summary

Objectives

Tree Logic was engaged by Sterling Global Pty Ltd to undertake an arboricultural assessment and prepare a report on the more significant trees at 1221-1249 Centre Road, Oakleigh South.

The primary objectives of the arboricultural report include;

- Inspect larger trees (nominally >10m tall) and ascertain their species and provide information including dimensions, health, structural condition and useful life-expectancy.
- Assign the trees an arboricultural value.
- Determine appropriate tree protection zone dimensions compliant with Australian Standard AS4970-2009 'Protection of trees on development sites'.
- Offer relevant recommendations regarding the management of trees.

Summary

Seventy two (72) individual trees were assessed on site.

A further nine (9) tree groups comprising in excess of an additional 150 trees were also observed on site with some attributes recorded.

The site also contained many smaller established trees, self-sown saplings and woody weed species which were not considered arboriculturally significant in the broader context of the site and were, therefore, not included in the assessment.

Twenty-one (21) different species were recorded including;

- Twenty-four (24) individual (and three groups) of *Eucalyptus botryoides* (Southern Mahogany), the most prevalent species at the site.
- Forty seven (47) Victorian native trees.
- Twenty four (24) Australian native trees.
- One (1) exotic deciduous tree. Refer to Section 4.

Each tree feature was attributed an arboricultural rating which reflects its retention value from an arboricultural perspective.

- One tree (Tree 22), located just outside the south-eastern corner of the site was attributed an arboricultural rating of High. It was a prominent tree in good to fair condition, with long useful life expectancy (ULE).
- Forty four (43) trees were attributed a Moderate arboricultural rating including,
    - Three (3) trees attributed an arboricultural rating of Moderate A, being prominent trees in Fair or better condition and with a moderate to long useful life expectancy (ULE).

- Nineteen (19) tree features rated Moderate B, being middle of the range and typical of the species worthy of retention where possible.
- Twenty one (21) tree features rated Moderate C, being of either small size or displaying accumulated deficiencies that are tending towards becoming of Low arboricultural value.
- Twenty three (23) tree features were attributed an arboricultural rating of Low, displaying symptoms of decline and / or structural deficiencies.
- Five (5) trees were attributed a rating of Very Low due to being dead or becoming hazardous.

Refer to Section 4 for trees sorted by arboricultural rating.

The site falls within the City of Monash local government area and includes both General Residential and Special Use Zoning. The site is covered by an Environmental Audit Overlay (EAO) although it does not include any tree-related permit requirements.

Naturally occurring trees native to Victoria may be subject to permit requirements under Clause 52.17 - Native Vegetation, if they were proposed to be removed, destroyed or lopped.

Almost all of the trees at the site were Australian in origin, with the majority being Victorian native species. Most, however, appeared to have been planted or were self-sown from planted specimens and are likely to be exempt from Clause 52.17. It is understood a separate Flora and Fauna assessment is being undertaken which it is expected will identify any native vegetation subject to permit requirements.

2 Method

2.1 A site inspection was carried out on Monday, August 16th, 2021, during overcast conditions by Tree Logic Arborists; Greg Pollard and James Cross.

2.2 Observations were made of the assessed trees to determine the species, age category, and condition with measurements taken to establish tree crown height (measured with a height meter) and crown width (paced) and trunk dimensions (measured 1.4 metres above ground level with a diameter tape unless otherwise stated).

2.3 Approximate tree locations were recorded on a field computer using a combination of observation and aerial imagery.

2.4 Assessment details of individual trees are listed in Appendix 1 and a copy of the tree location plan can be seen in Appendix 2. Descriptors used in the assessment can be seen in Appendix 3.

2.5 Each of the assessed trees was attributed an 'Arboricultural Rating'. The arboricultural rating correlates the combination of tree condition factors (health and structure) with tree amenity value. Definitions of arboricultural ratings can be seen in Appendix 3.

2.6 The assessed trees have been allocated tree protection zones (TPZ). The Australian Standard, AS 4970-2009, has been used as a guide in the allocation of TPZs for the assessed trees. This method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius, from the centre of the trunk at (or near) ground level. All TPZ measurements for are provided in Appendix 1.

Documents reviewed:

- Planning Property report for 1221-1249 CENTRE ROAD OAKLEIGH SOUTH 3167 from www.planning.vic.gov.au, 2021
- Detail Survey Plan, Ref.1808/S, 20/05/2013, Taylors Development Strategists

3 Tree Permit Requirements

3.1 The site is covered by the City of Monash Planning Scheme. It is partly zoned General Residential (GRZ3) and partly for Special Use (SUZ2).

3.2 The site is covered by an environmental audit overlay (EAO), however, there does not appear to be any overlays applying to the site that contain specific tree controls.

3.3 Naturally occurring trees native to Victoria may be subject to permit and offset requirements under Clause 52.17 - Native Vegetation. The majority of trees at the site appeared to have been deliberately planted or were self-sown from planted trees. It is likely that the Flora and Fauna Assessment being undertaken separately for the site will determine exemptions from permit are available for the vast majority of Victorian species at the site as they are not naturally occurring species that originate from the local area.

4 Observations

4.1 The study area at 1221-1249 Centre Road, Oakleigh South is a disturbed site as a result of its former use as a quarry. It has a small driveway frontage to Centre Road, is mostly bounded to the west by Huntingdale Road and has various residential and public open space abutting other sections of its boundaries.

4.2 The majority of the centre of the site was devoid of trees with a relatively small palette of Australian native species occurring around the perimeter of the property as indicated in the image at Figure 1, below.

***Figure 1**. Aerial view of the subject site at 1221-1249 Centre Road, Oakleigh South showing arrangement of trees.*

4.3 The terrain on site alters in level with a dam deeply depressed in the south-west corner of the property. Other areas have been graded with access roads for travelling around site. A stand of trees, many being on the steep western bank of the dam and mostly comprising *Eucalyptus botryoides* (Southern Mahogany) have been recorded as Tree Group 9 and were not assessed individually.

4.4 **Tree population**

Seventy two (72) individual trees were inspected. A further nine (9) tree groups with in excess of 150 additional trees were also observed on site with some attributes recorded.

Twenty one (21) different species were identified during the tree survey.
Refer to Table 1 for the seven most prevalent species and origins.

Table 1: Most prevalent tree species

Table 1: Botanic name	Common Name	Origin	No of trees
Eucalyptus botryoides	Southern Mahogany	Victorian native	24 (+Grps1,2,3,6,9)
Eucalyptus camaldulensis	River Red Gum	Victorian native	14 (Inc. GR8)
Eucalyptus bicostata	Victorian Blue Gum	Victorian native	7
Eucalyptus pryoriana	Gippsland Manna Gum	Victorian native	5
Eucalyptus globulus	Southern Blue Gum	Australian native	5
Angophora costata	Smooth-Barked Apple	Australian native	4
Melaleuca armillaris	Bracelet Honey-Myrtle	Victorian native	19+ in Grps4,5)

4.5 **Tree health** was assessed based on foliage colour, size and density as well as shoot initiation and elongation where possible. Of the individually assessed trees;

- Five (5) trees displayed Good health considered better than typical for the species growing in this location under current conditions.
- Forty-eight (48) trees displayed Fair or better health considered typical for the species growing in this location under current conditions.
- Fifteen (15) trees displayed symptoms of Fair to Poor health such as reduced foliage size and density, minor dieback, competition from adjacent trees, vine infestation, waterlogging or drought stress.
- Two (2) tree features displayed Poor health with declining or dead main leaders
- Two (2) tree features were dead.

4.6 **Tree structure** was assessed for structural defects and deficiencies, likelihood of failures and risk to potential targets.

- One (1) tree displayed Good structural characteristics for the species and age of tree.

- Twenty one (21) trees displayed Fair and acceptable structural characteristics for the species and age of the trees.
- Thirty two (32) trees displayed Fair to Poor structure with dieback, deadwood, crown asymmetry, over-extended limbs, crossing / crowded branches, trunk or limb wounds, vine infestation, or previous lopping.
- Seventeen (17) trees displayed Poor or Very Poor structure due to factors including fungal trunk or limb decay, poor limb attachment, major asymmetry, past major limb failure or being dead / brittle.

4.7 Arboricultural Rating

The assessed trees were attributed an arboricultural rating. This rating relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value.

It should be noted that the arboricultural rating is different to the conservation / ecological values placed on trees by other professions. Refer to Table 2 for tree numbers sorted by Arboricultural rating

Table 2: Arboricultural Rating Breakdown

Arboricultural rating	Total (Indiv. trees only)	Tree Numbers
High	1	22
Moderate A	3	16,17,50
Moderate B	19	1,2,5,11,15,21,23,24,36,37,39,52,53,56,58,59,60,65,68 +Group 3 (3), Group 8 (6)
Moderate C	21	3,18,19,28.32,38,42,43,44,45,48,51,54,55,62,63,64,66, 67,70,71 +Group 1 (20), Group 2 (14), Group 5 (9), Group 6 (10)
Low	23	4,6,8,9,10,14,20,25,26,27,29,30,31,33,34,35,40,41,46,4 9,57,61,72 +Group 4 (10), Group 7 (5), Group 9 (75+)
Very Low	5	7,12,13,47,69
Total	**72**	

- Trees rated Moderate A are generally prominent trees that display fair and typical condition with medium to long useful life expectancy.
- Trees rated Moderate B are generally typical of the species growing in this area under prevailing conditions and are deemed suitable to retain in conjunction with development where possible.

- Trees rated Moderate C are either established smaller trees of Fair condition or maturing trees that might be accumulating deficiencies and trending towards becoming of Low arboricultural value.
- Trees attributed an arboricultural rating of Low are generally not considered worthy of being a constraint on reasonable design intent and outcome delivery due to either health and / or structural deficiencies, being a suckering specimen or being woody weed species.
- Trees attributed an arboricultural rating of Very Low are generally unsuitable to retain in conjunction with site redevelopment.

5 Tree Management and Protection

5.1 It is understood planning for significant remediation and redevelopment of the subject site is underway. Although design plans were not reviewed in conjunction with this report, it is believed the opportunities for tree retention will be limited in light of existing conditions and the intentions for the property.

5.2 The Arboricultural Ratings along with the Tree Protection Zones (TPZs) can be used to guide decisions for areas of the site where tree retention can be considered. Larger trees generally provide greater landscape benefits, however, if they are not in sound condition or cannot be provided with sufficient space, they may not be the most suitable trees to retain.

5.3 The TPZs provided for each tree in the Tree Assessment Table in Appendix 1 are calculated using the formula provided in the Australian Standard AS4970 where the Radial TPZ = Trunk diameter (DBH) measured at 1.4m above grade and multiplied by 12. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The method for calculating, applying and managing the tree protection zone is described in Appendix 4.

The TPZ forms an area around a tree or group of trees that addresses both the stability and growing requirements of a tree in which excavation or filling vehicle movements, installation of underground services and other construction activities are either excluded or controlled.

5.4 Minor encroachment, up to 10% of the TPZ area, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Encroachment greater than 10% is considered major encroachment under AS4970 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable. Refer to Figure 2A and 2B.

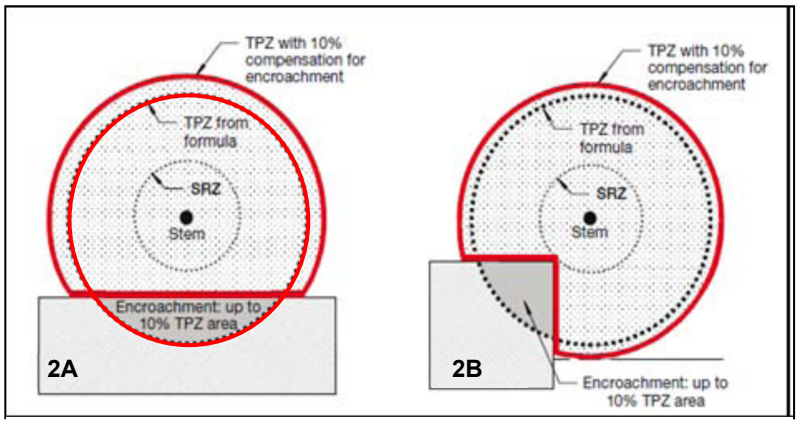

Figure 2: 2A & 2B - Examples of minor encroachment into a TPZ.

Extract from: AS4970-2009, Appendix D, pg. 30 of 32

5.5 The Structural Root Zone (SRZ) provided for each tree has been calculated using the method provided in AS4970. The SRZ is the area in which the larger woody roots required for tree stability are found close to the trunk and which then generally taper rapidly. This is the minimum area recommended to maintain tree stability but does not reflect the area required to sustain tree health. No works should occur within the SRZ radius as tree stability could be compromised.

5.6 It is strongly recommended that theTPZs for any trees being considered for retention at the site be transferred and overlaid on all design plans. All TPZ measurements are provided in the tree assessment data in Appendix 1 and displayed on the tree location plan in Appendix 2.

6 Conclusion.

6.1 Seventy-two (72) of the largest individual trees and nine (9) tree groups were inspected at the site at 1221-1229 Centre Road, Oakleigh South.

6.2 The trees are almost entirely Victorian or Australian native species which have been planted towards the site's boundaries or are the progeny of such planted trees.

6.3 The site also contained numerous less significant trees below ten metres tall along with woody weeds and saplings that have sprouted since use of the site as a quarry ceased.

6.4 Tree health and structure varied considerably through the population. Each tree feature was attributed an arboricultural rating which reflects the retention value of the trees.

- One (1) tree, No.22 adjacent to the site has been attributed a High arboricultural rating.
- Forty three (43) trees were attributed either one of three Moderate arboricultural ratings.
- Twenty three (23) trees were attributed an arboricultural rating of Low, displaying symptoms of decline and structural deficiencies.
- Five (5) trees were attributed a rating of Very Low due to being either in irreversible decline, dead or woody weed species.

6.5 The preliminary tree assessment report provides information on the site's tree population including arboricultural value and the appropriate tree protection zones required to preserve trees in conjunction with future site redevelopment.

6.6 Ultimately, tree retention suitability will be dependent on the landscape setting in which trees are intended to be retained.

- On the basis of future site safety and potential amenity, the TPZs of retained trees should be catered for and preference should be given to retaining trees of High or Moderate arboricultural value over lower rated trees. Trees attributed an arboricultural rating of Moderate A or B would also be more appropriate to retain over trees attributed a rating of Moderate C.
- Trees of Low arboricultural value are generally not worthy of being a constraint on reasonable design intent and outcomes. Tree condition can change quickly in response to environmental conditions or altered landscape conditions. Retained trees should be re-inspected on a 3-5 year basis or following any locally damaging weather events and appropriate remedial works undertaken as required.

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References and bibliography:

Australian Standard (4970-2009) Protection of Trees on development sites. Standards Australia, Sydney NSW Australia

Harris, R.W, Clark, J.R. & Matheny, N.P. (2004), *Arboriculture: Integrated Management of Landscape trees, shrubs and vines*, Prentice Hall, New Jersey.

Clark, J.R. & Matheny, N.P (1998), Trees and Development: A technical guide to preservation of trees during land development. ISA, Champaign, Illinois.

Standards Australia (2007), Australian Standard (4373-2007) - Pruning of Amenity trees, Standards Australia, Homebush.

Appendix 1: Tree Assessment Data: 1221-1249 Centre Road, Oakleigh South

Refer to following 4 pages

Key: DBH = Diameter measured in centimetres at breast height (1.4m up trunk) unless otherwise indicated.

Arb. Rating = Arboricultural Rating. ULE = Useful Life Expectancy.

TPZ = Tree protection zone in radial metres. TPZ radius applies from centre of trunk.

SRZ = Structural root zone in radial metres. SRZ can be supplied on request

ULE = Useful Life Expectancy (Estimated)

Definition of the descriptor categories used in the assessment can be seen in Appendix 3.

Tree ID	Species	Common Name	Age	Origin	DBH (cm)	Basal (cm)	Height x Width (m)	Health	Structure	Arb. Rating	ULE (years)	Comments	TPZ (m radius)	SRZ (m radius)
1	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian nat	65	75	16x13	Fair	Fair	Mod.B	21-40 y	Pruned away from private land	7.8	2.9
2	*Corymbia ficifolia*	Red-flowering Gum	Maturing	Australian na	55	65	8x7	Fair	Fair to Poor	Mod.B	21-40 y	Pruned away from private land;Lopped	6.6	2.8
3	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian nat	123	135	18x17	Fair	Fair to Poor	Mod.C	6-10 y		14.8	3.8
4	*Corymbia citriodora*	Lemon-scented Gum	Semi-matur	Australian na	24	30	8x4	Fair to Poo	Poor	Low	6-10 y	Lopped	2.9	2
5	*Eucalyptus saligna*	Sydney Blue Gum	Maturing	Australian na	64	72	20x12	Fair to Poo	Fair	Mod.B	11-20 y	Crown partially suppressed by E.botryoides to east.	7.7	2.9
6	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	76	80	21x9	Fair	Poor	Low	1-5 y	Column of decay north side lower trunk ~ 3m length. Top heavy. Remove tree.	9.1	3
7	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	60	66	6x3	Dead	Poor	Very Low	<1 y	Main leader lost, covered with ivy. Remove tree.	7.2	2.8
8	*Melaleuca armillaris*	Bracelet Honey Myrtle	Maturing	Victorian native	38	44	7x10	Fair	Fair to Poor	Low	6-10 y		4.6	2.3
9	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Victorian native	21	28	6x5	Fair	Fair to Poor	Low	21-40 y	Suppressed	2.5	1.9
10	*Eucalyptus pryoriana*	Gippsland Manna Gum	Semi-mature	Victorian native	20	25	5x6	Fair	Fair to Poor	Low	6-10 y	Stem against fence, partially failed	2.4	1.8
11	*Eucalyptus pryoriana*	Gippsland Manna Gum	Maturing	Victorian native	54	62	14x12	Fair	Fair	Mod.B	21-40 y	aff. E.pryoriana	6.5	2.7
12	*Eucalyptus botryoides*	Southern Mahogany	Over-mature	Victorian native	70	74	9x9	Dead	Fair to Poor	Very Low	<1 y		8.4	2.9
13	*Eucalyptus botryoides*	Southern Mahogany	Over-mature	Victorian native	70	78	8x15	Poor	Very Poor	Very Low	<1 y	Failed, collasped	8.4	3
14	*Acacia elata*	Cedar Wattle	Maturing	Australian native	75	90	14x14	Fair to Poor	Fair to Poor	Low	6-10 y	Leaning towards private land;Weed species, prostrate lower stem.	9	3.2
15	*Melaleuca styphelioides*	Prickly-leaved Paperbark	Maturing	Australian native	34,26,26	80	8x7	Fair	Fair	Mod.B	21-40 y		6	3
16	*Eucalyptus pryoriana*	Gippsland Manna Gum	Maturing	Victorian native	68	80	16x16	Good	Fair to Poor	Mod.A	21-40 y	Multiple past limb/branch failures.	8.2	3
17	*Angophora costata*	Smooth-barked Apple	Maturing	Australian native	69	82	15x14	Fair	Fair	Mod.A	>40 y		8.3	3
18	*Eucalyptus pryoriana*	Gippsland Manna Gum	Maturing	Victorian native	66,34,33	81	12x12	Fair to Poor	Fair to Poor	Mod.C	6-10 y	Dead secondary leader	9.7	3
19	*Eucalyptus globulus*	Southern Blue Gum	Maturing	Australian native	47	63	12x12	Fair	Fair to Poor	Mod.C	11-20 y		5.6	2.7
20	*Acacia floribunda*	Gossamer Wattle	Maturing	Victorian native	35,23,20,18	55	7x10	Fair	Fair	Low	1-5 y		6	2.6
21	*Jacaranda mimosifolia*	Jacaranda	Maturing	Exotic deciduous	35,30	52	8x8	Fair	Fair	Mod.B	21-40 y	Ivy infested	5.5	2.5
22	*Angophora costata*	Smooth-barked Apple	Maturing	Australian native	87	105	19x20	Good	Good	High	>40 y		10.4	3.4
23	*Eucalyptus sideroxylon*	Red Ironbark	Maturing	Australian native	56	61	13x9	Fair	Fair	Mod.B	11-20 y		6.7	2.7
24	*Eucalyptus saligna*	Sydney Blue Gum	Maturing	Australian native	57	65	16x13	Fair	Fair to Poor	Mod.B	11-20 y		6.8	2.8
25	*Corymbia citriodora*	Lemon-scented Gum	Semi-mature	Australian native	24	27	11x5	Fair to Poor	Fair	Low	11-20 y		2.9	1.9
26	*Angophora costata*	Smooth-barked Apple	Semi-mature	Australian native	37,36,21	79	16x9	Fair	Poor	Low	6-10 y	Multi-stemmed at base. Remove lesser codominant if retained.	6.7	3

Tree ID	Species	Common Name	Age	Origin	DBH (cm)	Basal (cm)	Height x Width (m)	Health	Structure	Arb. Rating	ULE (years)	Comments	TPZ (m radius)	SRZ (m radius)
27	*Angophora costata*	Smooth-barked Apple	Semi-mature	Australian native	31	38	16x7	Fair to Poor	Fair to Poor	Low	11-20 y	Over-extended limbs.	3.7	2.2
28	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	Victorian native	38	40	10x8	Fair	Fair to Poor	Mod.C	21-40 y	Past powerline clearance	4.6	2.3
29	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	Victorian native	30	36	10x6	Fair	Poor	Low	11-20 y	Past powerline clearance	3.6	2.2
30	*Acacia elata*	Cedar Wattle	Maturing	Australian native	52	60	8x8	Fair to Poor	Fair to Poor	Low	1-5 y	Main leader dead	6.2	2.7
31	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	Victorian native	34	38	8x7	Fair	Poor	Low	6-10 y	Past powerline clearance	4.1	2.2
32	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	Victorian native	30,17	37	9x7	Fair	Fair to Poor	Mod.C	11-20 y	Past powerline clearance	4.1	2.2
33	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	Victorian native	30,25	46	8x9	Fair	Fair to Poor	Low	11-20 y	Past powerline clearance	4.7	2.4
34	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	Victorian native	59	70	14x9	Fair	Poor	Low	6-10 y	Past powerline clearance, Past limb failure	7.1	2.8
35	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	Victorian native	40,24,14	70	10x7	Fair to Poor	Poor	Low	1-5 y	Main leader dead	5.8	2.8
36	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Victorian native	37	44	15x8	Fair	Fair	Mod.B	>40 y		4.4	2.3
37	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Victorian native	41	47	15x8	Fair	Fair	Mod.B	>40 y	Past powerline clearance	4.9	2.4
38	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	88	94	20x14	Fair	Poor	Mod.C	6-10 y	Past powerline clearance, Bracket fungi	10.6	3.2
39	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	80,48	98	20x15	Good	Fair	Mod.B	21-40 y	Past powerline clearance	11.2	3.3
40	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	87	94	12x8	Fair	Poor	Low	6-10 y	Past powerline clearance	10.4	3.2
41	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian native	112	122	20x15	Fair	Fair to Poor	Low	1-5 y	Past powerline clearance. Bracket fungi north side trunk. Remove	13.4	3.6
42	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian native	91	104	20x14	Fair	Fair to Poor	Mod.C	11-20 y	Past powerline clearance. Bracket fungi	10.9	3.4
43	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian native	55	60	17x12	Fair	Fair to Poor	Mod.C	11-20 y	Past powerline clearance	6.6	2.7
44	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian native	105	113	18x15	Fair	Fair to Poor	Mod.C	11-20 y	Past powerline clearance	12.6	3.5
45	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian native	90	102	18x15	Fair	Fair to Poor	Mod.C	11-20 y	Past powerline clearance	10.8	3.3
46	*Eucalyptus bicostata*	Victorian Blue Gum	Maturing	Victorian native	73	85	16x14	Fair to Poor	Poor	Low	6-10 y	Past powerline clearance	8.8	3.1
47	*Eucalyptus cladocalyx 'Nana'*	Bushy Sugar Gum	Maturing	Australian native	40	54	12x10	Fair	Very Poor	Very Low	1-5 y	Past powerline clearance.Remove	4.8	2.6
48	*Eucalyptus cladocalyx 'Nana'*	Bushy Sugar Gum	Early-mature	Australian native	30	38	7x7	Fair	Fair to Poor	Mod.C	11-20 y	Past powerline clearance	3.6	2.2
49	*Eucalyptus cladocalyx 'Nana'*	Bushy Sugar Gum	Semi-mature	Australian native	28,19	38	8x7	Fair	Poor	Low	6-10 y	Past branch failure;Past limb failure	4.1	2.2
50	*Corymbia maculata*	Spotted Gum	Maturing	Victorian native	64	69	16x12	Good	Fair	Mod.A	>40 y		7.7	2.8
51	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	60,42	100	13x15	Fair to Poor	Fair to Poor	Mod.C	11-20 y	Bracket fungi;Reduced foliage density	8.8	3.3
52	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	127@<= 0.5	127	22x19	Good	Fair	Mod.B	21-40 y	Past limb failure	15	3.7

Tree ID	Species	Common Name	Age	Origin	DBH (cm)	Basal (cm)	Height x Width (m)	Health	Structure	Arb. Rating	ULE (years)	Comments	TPZ (m radius)	SRZ (m radius)
53	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	Victorian native	80	85	23x20	Fair	Fair	Mod.B	21-40 y		9.6	3.1
54	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	Victorian native	79	88	23x17	Fair	Fair to Poor	Mod.C	6-10 y		9.5	3.1
55	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	Victorian native	63,27,25	75	20x15	Fair	Fair to Poor	Mod.C	6-10 y		8.8	2.9
56	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Victorian native	48	53	11x7	Fair	Fair	Mod.B	21-40 y		5.8	2.5
57	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Victorian native	22	30	5x4	Fair	Fair to Poor	Low	6-10 y	Suppressed	2.6	2
58	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Victorian native	45	55	12x10	Fair	Fair	Mod.B	6-10 y	Leaning	5.4	2.6
59	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Victorian native	41	49	11x8	Fair	Fair	Mod.B	11-20 y		4.9	2.5
60	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Victorian native	36	44	9x6	Fair	Fair	Mod.B	11-20 y		4.3	2.3
61	*Eucalyptus pryoriana*	Gippsland Manna Gum	Semi-mature	Victorian native	25	32	6x9	Fair to Poor	Poor	Low	11-20 y	Leaning	3	2.1
62	*Eucalyptus globulus 'Compac*	Dwarf Blue Gum	Early-mature	Australian native	65	75	14x15	Fair	Fair to Poor	Mod.C	6-10 y		7.8	2.9
63	*Melaleuca sp.*	Paperbark	Early-mature	Australian native	48	53	7x7	Fair to Poor	Fair to Poor	Mod.C	6-10 y		5.8	2.5
64	*Eucalyptus globulus*	Southern Blue Gum	Early-mature	Australian native	66	72	17x13	Fair	Fair to Poor	Mod.C	6-10 y		7.9	2.9
65	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	150	150	20x20	Fair	Fair	Mod.B	11-20 y		15	3.9
66	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	Victorian native	44	50	15x12	Fair	Fair to Poor	Mod.C	6-10 y		5.3	2.5
67	*Eucalyptus cladocalyx*	Sugar Gum	Semi-mature	Australian native	49	55	11x9	Fair	Low	Mod.C	11-20 y		5.9	2.6
68	*Eucalyptus botryoides*	Southern Mahogany	Maturing	Victorian native	65	72	14x15	Fair	Fair	Mod.B	11-20 y		7.8	2.9
69	*Eucalyptus globulus*	Southern Blue Gum	Over-mature	Australian native	18,18,18,16	120	7x6	Fair to Poor	Very Poor	Very Low	1-5 y	Stump resprout	4.2	3.6
70	*Eucalyptus globulus*	Southern Blue Gum	Maturing	Australian native	68	77	18x15	Fair to Poor	Fair to Poor	Mod.C	6-10 y		8.2	3
71	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	Victorian native	63	68	15x14	Fair to Poor	Fair to Poor	Mod.C	6-10 y		7.6	2.8
72	*Eucalyptus globulus*	Southern Blue Gum	Early-mature	Australian native	67	79	7x3	Poor	Poor	Low	1-5 y		8	3

Tree ID	Species	Common Name	Age	Approx. No. of Stems	DBH	Basal (cm)	Height x Width (m)	Health	Structure	Arb. Rating	ULE (years)	Comments	TPZ (m radius)	SRZ (m radius)
G1	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	20	30	35	10x8	Fair to Poor	Fair to Poor	Mod.C	11-20y		3.6	2.1
G2	*botryoides;Melaleuca armillaris*	Mahogany;Bracelet Honey-myrtle	Semi-mature	14	25	35	9x8	Fair to Poor	Fair to Poor	Mod.C	6-10 y		3	2.1
G3	*Eucalyptus botryoides*	Southern Mahogany	Early-mature	3	50	60	14x12	Fair	Fair	Mod.B	21-40 y		6	2.7
G4	*Melaleuca armillaris*	Bracelet Honey-myrtle	Semi-mature	10	27	35	8x10	Fair to Poor	Poor	Low	6-10 y		3.2	2.1

Tree ID	Species	Common Name	Age	Origin	DBH (cm)	Basal (cm)	Height x Width (m)	Health	Structure	Arb. Rating	ULE (years)	Comments	TPZ (m radius)	SRZ (m radius)
G5	*Melaleuca armillaris*	Bracelet Honey-myrtle	Maturing	9	20	35	9x8	Fair to Poor	Fair to Poor	Mod.C	6-10 y		2.4	2.1
G6	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	10	26	30	11x9	Fair	Fair to Poor	Mod.C	11-20y		3.1	2
G7	*Acacia sp.*	Wattle Tree	Young	5	9	11	3x3	Fair to Poor	Poor	Low	1-5 y		2	1.5
G8	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	6	26	35	7x7	Fair	Fair	Mod.B	21-40 y		3.1	2.1
G9	*Eucalyptus botryoides*	Southern Mahogany	Semi-mature	75+	15-60	50	12x8	Fair to Poor	Poor	Low	21-40 y		2.4	1.8

TREE LOCATION PLAN - OVERVIEW

PROJECT
1221-1249 Centre Road, Oakleigh South

TL REF.
011789

MAP NO.
1 / 1

DATE
2021-09-15

CLIENT
Sterling Global

LEGEND

Trees (arb. rating)
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

TPZ

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55

0 20 40m

ABN: 95 080 021 610
TEL: 1300 656 926
TREELOGIC PTY LTD
4 / 21 Eugene Tce
Ringwood, VIC
Australia 3134

Treelogic
Plan, manage, protect

TREE LOCATION PLAN - MAPS

PROJECT
1221-1249 Centre Road, Oakleigh South

TL REF.
011789

MAP NO.
1 / 4

DATE
2021-09-15

CLIENT
Sterling Global

LEGEND

Trees (arb. rating)
- High
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

TPZ

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55

0 10 20m

ABN: 95 080 021 610
TEL: 1300 656 926
TREELOGIC PTY LTD
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Ringwood, VIC
Australia 3134

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TREE LOCATION PLAN - MAPS

PROJECT
1221-1249 Centre Road, Oakleigh South

TL REF.
011789

MAP NO.
2 / 4

DATE
2021-09-15

CLIENT
Sterling Global

LEGEND

Trees (arb. rating)

- High
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low
- TPZ

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55

0 10 20m

ABN: 95 080 021 610
TEL: 1300 656 926
TREELOGIC PTY LTD
4 / 21 Eugene Tce
Ringwood, VIC
Australia 3134

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TREE LOCATION PLAN - MAPS

PROJECT
1221-1249 Centre Road, Oakleigh South

TL REF.
011789

MAP NO.
3 / 4

DATE
2021-09-15

CLIENT
Sterling Global

LEGEND

Trees (arb. rating)
- High
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

TPZ

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55

0 10 20m

ABN: 95 080 021 610
TEL: 1300 656 926
TREELOGIC PTY LTD
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Ringwood, VIC
Australia 3134

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TREE LOCATION PLAN - MAPS

PROJECT
1221-1249 Centre Road, Oakleigh South

TL REF.
011789

MAP NO.
4 / 4

DATE
2021-09-15

CLIENT
Sterling Global

LEGEND

Trees (arb. rating)
- High
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

TPZ

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55

0 10 20m

ABN: 95 080 021 610
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Australia 3134

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Appendix 3: Arboricultural Descriptors (June 2018)

Note that not all of the described tree descriptors may be used in a tree assessment and report. The assessment is undertaken with regard to contemporary arboricultural practices and consists of a visual inspection of external and above-ground tree parts.

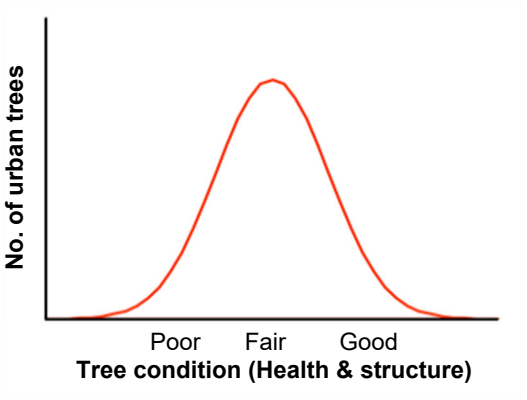


Diagram 1: Indicative normal distribution curve for tree condition

1. Tree Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen to what could be considered typical for that species growing in its location under current climatic conditions. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the assessor.

Diagram 1, provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

2. Tree Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

3. Tree Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site. Remnant.
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous (component of EVC benchmark). Could be planted indigenous trees.
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

4. Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with previous height meter readings in conjunction with assessor's experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances the crown width can be measured on the four cardinal direction points (North, South, East and West).

Crown height, crown spread are generally recorded to the nearest half metre (crown spread would be rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m. Estimated dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered) shall be clearly identified in the assessment data.

5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment and an individual trees specific characteristics. DBH is the typical trunk diameter captured as it relates to the allocation of tree protection distances. The basal trunk diameter assists in the allocation of a structural root zone. Some municipalities require trunk diameters be captured at different heights, with 1.0 m above grade being a common requirement. The specific planning schemes will be checked to ascertain requirements.

Stem diameters shall be recorded in centimetres, rounded to the nearest 1 cm (0.01 m).

Diameter at Breast Height (DBH)

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m above the existing ground level or where otherwise indicated, multiple leaders are measured individually. Plants with multiple leader habit may be measured at the base. The range of methods to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of Australian Standard *AS 4970-2009 Protection of trees on development site*s. Measurements undertaken using foresters tape or builders tape.

Basal trunk diameter

The basal dimension is the trunk diameter measured at the base of the trunk or main stem(s) immediately above the root buttress. Used to ascertain the Structural Root Zone (SRZ) as outlined in AS4970.

6. Age class

Relates to the physiological stage of the tree's life cycle.

Category	Description
Young	Sapling tree and/or recently planted. Approximately 5 or less years in location.
Semi-mature	Tree increasing in size and yet to achieve expected size in situation. Primary developmental stage.
Early-mature	Tree established, generally growing vigorously. > 50% of attainable age/size.
Mature	Specimen approaching expected size in situation, with reduced incremental growth.
Over-mature	Mature full-size with a retrenching crown. Tree is senescent and in decline. Significant decay generally present.

7. Health

Assesses various attributes to describe the overall health and vigour of the tree.

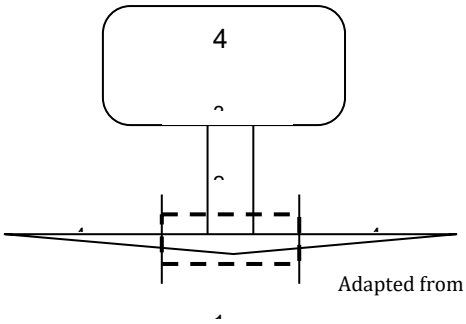
Health Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
Fair	Typical vigour. >80% canopy density	Minor or expected. Little or no dead wood	Typical. Minor deficiencies or defects could be present.	Minor, within damage thresholds
Fair to Poor	Below typical - low vigour	More than typical. Small sub-branch dieback	Exhibiting deficiencies. Could be thinning, or smaller	Exceeds damage thresholds
Poor	Minimal - declining	Excessive, large and/or prominent amount & size of dead wood	Exhibiting severe deficiencies. Thinning foliage, generally smaller or deformed	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

8. Structure

Assesses principal components of tree structure (Diagram 2).
Structure ratings will also take into account general branching architecture, stem taper, live crown ratio, crown symmetry (bias or lean) and crown position such as tree being suppressed amongst more dominant trees.

Diagram 2: Tree structure zones

1. Root plate & lower stem
2. Trunk
3. Primary branch support
4. Outer crown & roots



Adapted from Coder (1996)

The lowest or worst descriptor assigned to the tree in any column could generally be the overall rating assigned to the tree. The assessment for structure is limited to observations of external and above ground tree parts. It does not include any exploratory assessment of underground or internal tree parts unless this is requested as part of the investigation. Trees are assessed and then given a rating for a point in time. Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments.

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s). See table over page.

Structure Category	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No obvious damage, disease or decay; obvious basal flare / stable in ground	No obvious damage, disease or decay; well tapered	Well formed, attached, spaced and tapered. No history of failure.	No obvious damage, disease, decay or structural defect. No history of failure.
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Generally well attached, spaced and tapered branches. Minor structural deficiencies may be present or developing. No history of branch failure.	Minor damage, disease or decay; minor branch end-weight or over-extension. No history of branch failure.
Fair to Poor	Moderate damage or decay; minimal basal flare.	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence.	Moderate damage, disease or decay; moderate branch end-weight or over-extension. Minor branch failure evident.
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump re-sprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely. Evidence of major branch failure.	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension. Branch failure evident.
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump re-sprout	Decayed, cavities or branch attachments with active split; failure imminent. History of major branch failure.	Excessive damage, disease or decay; excessive branch end-weight or over-extension. History of branch failure.

Useful life expectancy

Assessment of useful life expectancy provides an indication of health and tree appropriateness and involves an estimate of how long a tree is likely to remain in the landscape based on species, stage of life (cycle), health, amenity, environmental services contribution, conflicts with adjacent infrastructure and risk to the community. It would enable tree managers to develop long-term plans for the eventual removal and replacement of existing trees in the public realm. It is not a measure of the biological life of the tree within the natural range of the species. It is more a measure of the health status and the trees positive contribution to the urban landscape.

Within an urban landscape context, particularly in relation to street trees, it could be considered a point where the costs to maintain the asset (tree) outweigh the benefits the tree is returning.

The assessment is based on the site conditions not being significantly altered and that any prescribed maintenance works are carried out (site conditions are presumed to remain relatively constant and the tree would be maintained under scheduled maintenance programs). See table over page.

Useful Life Expectancy category	Typical characteristics
<1 year (No remaining ULE)	Tree may be dead or mostly dead. Tree may exhibit major structural faults. Tree may be an imminent failure hazard. Excessive infrastructure damage with high risk potential that cannot be remedied.
1-5 years (Transitory, Brief)	Tree is exhibiting severe chronic decline. Crown is likely to be less than 50% typical density. Crown may be mostly epicormic growth. Dieback of large limbs is common (large deadwood may have been pruned out). Tree may be over-mature and senescing. Infrastructure conflicts with heightened risk potential. Tree has outgrown site constraints.
6-10 years (Short)	Tree is exhibiting chronic decline. Crown density will be less than typical and epicormic growth is likely to present. The crown may still be mostly entire, but some dieback is likely to be evident. Dieback may include large limbs. Over-mature and senescing or early decline symptoms in short-lived species. Early infrastructure conflicts with potential to increase regardless of management inputs.
11-20 years (Moderate)	Tree not showing symptoms of chronic decline, but growth characteristics are likely to be reduced (bud development, extension growth etc.). Tree may be over-mature and beginning to senesce. Potential for infrastructure conflicts regardless of management inputs.
21-40 years (Moderately long)	Trees displaying normal growth characteristics but vigour is likely to be reduced (bud development, extension growth etc.). Tree may be growing in restricted environment (e.g. streetscapes) or may be in late maturity. Semi-mature and mature trees exhibiting normal growth characteristics. Juvenile trees in streetscapes.
>40 years (Long)	Generally juvenile and semi-mature trees exhibiting normal growth characteristics within adequate spaces to sustain growth, such as in parks or open space. Could also pertain to maturing, long-lived trees. Tree well suited to the site with negligible potential for infrastructure conflicts.

Note that ULE may change for a tree dependent on the prevailing climatic conditions, which can either increase or decrease, or sudden changes to a tree's growing environment creating an acute stress.

The ULE may not be applicable for trees that are manipulated, such as topiary, or grown for specific horticultural purposes, such as fruit trees.

There may be instances where remedial tree maintenance could be extend a tree's ULE.

9. Arboricultural Rating

Relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics (Hitchmough 1994) within an urban landscape context. The presence of any serious disease or tree-related hazards that would impact risk potential are taken into account. See table over page.

Arboricultural rating Category	Description
High	Tree of high quality in good to fair condition; good vigour. Generally a prominent arboricultural/landscape feature. Particularly good example of the species; rare or uncommon. Tree may have significant conservation or other cultural value. These trees have the potential to be a medium- to long-term components of the landscape (moderately long to long ULE) if managed appropriately. Retention of these trees is highly desirable.
Moderate	*General -* Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond to arboricultural treatment. These trees have the potential to be a moderate- to long-term component of the landscape (moderate to long ULE) if managed appropriately. Retention of these trees is generally desirable. The following sub-categories relate predominately to age and size and amenity.
	A. Moderate to large, maturing tree. Contributes to the landscape character. Tree may have conservation or other cultural value.
	B. Moderate sized, established tree, > 50% of attainable age/size. Contributes to the landscape character. Maturing tree with amenity value but with identified deficiencies
	C. Small and/or semi-mature tree, established, >5 years in the location. May not be a dominant canopy. No special qualities. Maturing tree, accumulating deficiencies, trending towards being of Low arboricultural value.
Low	Unremarkable tree of low quality or little amenity value. Tree in either poor health or with poor structure or a combination. Short to transitory useful life expectancy. Tree is not significant because of either its size or age, such as young trees with a stem diameter below 15 cm. Trees regularly pruned to restrict size. These trees are easily replaceable. Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained. Retention of such trees may be considered if not requiring a disproportionate expenditure of resources for a tree in its condition and location.
Very Low	Trees of low quality with an estimated remaining life expectancy of less than 5 years. Tree has either a severe structural defect or health problem or combination that cannot be sustained with practical arboricultural techniques and the loss of the tree would be expected in the short term. Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline. Tree infected with pathogens of significance to either the health or safety of the tree or other adjacent trees. Tree whose retention would not be viable after the removal of adjacent trees (includes trees that have developed in close spaced groups and would not be expected to acclimatise to severe alterations to surrounding environment – removal of adjacent shelter trees). Tree has a detrimental effect on the environment, for example, the tree is a recognised environmental woody weed with potential to spread into waterways or natural areas. Unremarkable tree of no material landscape, conservation or other cultural value.

Trees have many values, not all of which are considered when an arboricultural assessment is undertaken. However, individual trees or tree group features may be considered important community resources because of unique or noteworthy characteristics or values other than their age, dimensions, health or structural condition. Recognition of one or more of the following criterion is designed to highlight other considerations that may influence the future management of such trees.

Significance	**Description**
Horticultural Value/ Rarity	Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure. Any tree of a species or variety that is rare.
Historic, Aboriginal Cultural or Heritage Value	Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic aboriginal activities, including scar trees. Tree commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.
Ecological Value	Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant Indigenous vegetation that contribute to biological diversity

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Appendix 4: Tree protection zones.

Introduction

In order to sustain trees on a development site consideration must be given to the establishment of tree protection zones.

The physical dimensions of tree protection zones can sometimes be difficult to define. The projection of a tree's crown can provide a guide but is by no means the definitive measure. The unpredictable nature of roots and their growth, differences between species and their tolerances, and observable and hidden changes to the trees growing environment, as a result of development, are variables that must be considered.

Most vigorous, broad canopied trees survive well if the area within the drip-line of the canopy is protected. Fine root density is usually greater beneath the canopy than beyond (Gilman, 1997). If few to no roots over 3cm in diameter are encountered and severed during excavation the tree will probably tolerate the impact and root loss. A healthy tree can sustain a loss of between 30% and 50% of absorbing roots (Harris, Clark, Matheny, 1999), however encroachment into the structural root system of a tree may be problematic.

The structural root system of a tree is responsible for ensuring the stability of the entire tree structure in the ground. A tree could not sustain loss of structural root system and be expected to survive let alone stand up to average annual wind loads upon the crown.

Allocation of tree protection zone (TPZ)

The method of allocating a TPZ to a particular tree will be influenced by site factors, the tree species, its age and developed form.

Once it has been established, through an arboricultural assessment, which trees and tree groups are to be retained, the next step will require careful management through the development process to minimise any impacts on the designated trees. The successful retention of trees on any particular site will require the commitment and understanding of all parties involved in the development process. The most important activity, after determining the trees that will be retained is the implementation of a TPZ.

The intention of tree protection zones is to:

- mitigate tree hazards;
- provide adequate root space to sustain the health and aesthetics of the tree into the future;
- minimise changes to the trees growing environment, which is particularly important for mature specimens;
- minimise physical damage to the root system, canopy and trunk; and
- define the physical alignment of the tree protection fencing

Tree protection

The most important consideration for the successful retention of trees is to allow appropriate above and below ground space for the trees to continue to grow. This requires the allocation of tree protection zones for retained trees.

The Australian Standard AS 4970-2009 Protection of trees on development sites has been used as a guide in the allocation of TPZs for the assessed trees.

The TPZ for individual trees is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the trees DBH by 12. The method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The minimum TPZ should be no less than 2m and the maximum no more than 15m radius. The TPZ of palms should be not less than 1.0m outside the crown projection.

Encroachment into the TPZ is permissible under certain circumstances though is dependent on both site conditions and tree characteristics. Minor encroachment, up to 10% of the TPZ, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Examples are provided in Diagram 1. Encroachment greater than 10% is considered major encroachment under AS4970-2009 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable.

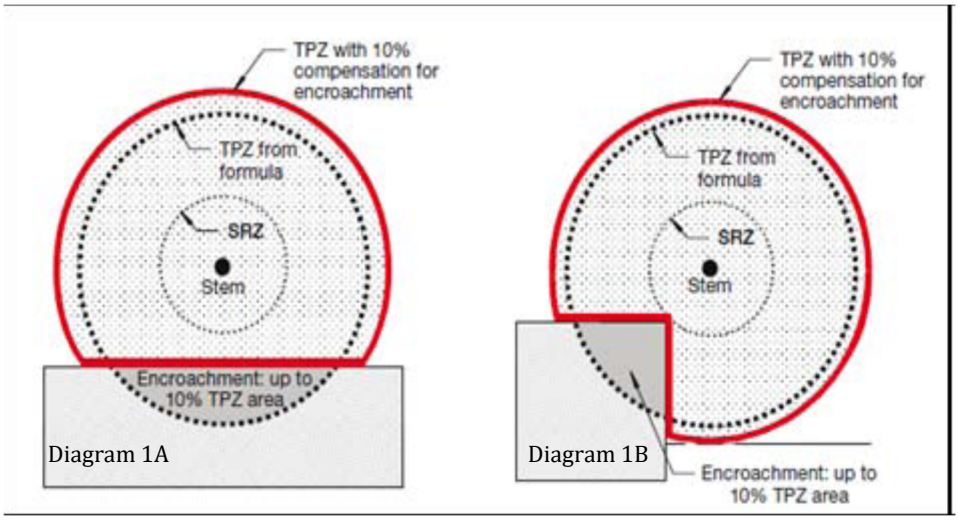


Diagram 1: Examples of minor encroachment into a TPZ.

(Extract from: AS4970-2009, Appendix D, p30 of 32)

The 10% encroachment on one side equates to approximately ⅓ radial distance. Tree root growth is opportunistic and occurs where the essentials to life (primarily air and water) are present. Heterogeneous soil conditions, existing barriers, hard surfaces and buildings may have inhibited the development of a symmetrically radiating root system.

Existing infrastructure around some trees may be within the TPZ or root plate radius. The roots of some trees may have grown in response to the site conditions and therefore if existing hard surfaces and building alignments are utilised in new designs the impacts on the trees should be minimal. The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998). Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build.

The TPZ should also give consideration to the canopy and overall form of the tree. If the canopy requires severe pruning in order to accommodate a building and in the process the form of the tree is diminished it may be worthwhile considering altering the design or removing the tree.

General tree protection guidelines

The most important factors are:

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is to mulch the zone with woodchip and erect tree protection fencing. This must be completed prior to any materials being brought on-site, erection of temporary site facilities or demolition/earth works. The protection fencing must be sturdy and withstand winds and construction impacts. The protection fence should only be moved with approval of the site supervisor. Other root zone protection methods can be incorporated if the TPZ area needs to be traversed.
- Appropriate signage is to be fixed to the fencing to alert people as to importance of the tree protection zone.
- The importance of tree preservation must be communicated to all relevant parties involved with the site.
- Inspection of trees during excavation works.

TPZ fencing

TPZ fencing must be in the form of either temporary fencing panels with concrete block feet and locked together or water filled barriers with locking pins installed. TPZ fencing must be sufficiently robust to withstand knocks and bumps from plant and machinery, delivery vehicles, storage of materials and dumping of spoil.

- Appropriate signage stating ‘Tree protection Zone- No access’ is to be fixed to the fencing to alert people as to importance of the tree protection zone.

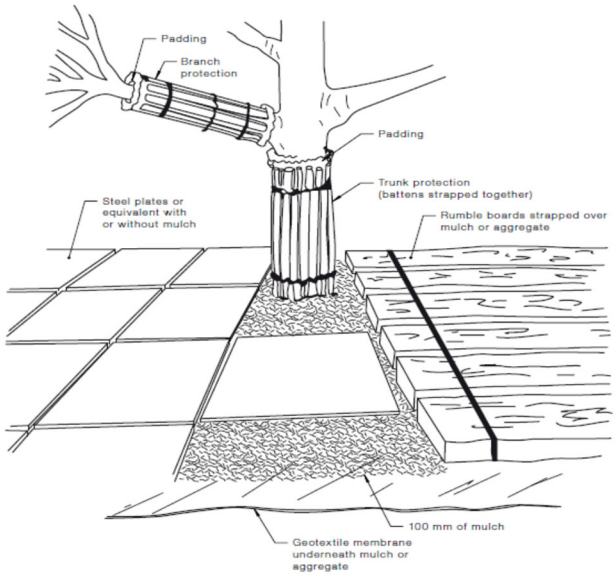
  Refer to Figure 1 for fencing example.

Figure 1. Above left - Example of TPZ fencing above right -Example of TPZ signage.

Ground buffering

Where works are required to be undertaken within the Tree root zone without penetration of the surface, ground buffering and trunk and limb protection must be provided to minimise the potential for soil to become compacted and avoid potential for impact wounds to occur to surface roots, trunk or limbs.
Refer to Diagram 2 below.

Diagram 2: Examples of ground buffering and trunk and limb protection.



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION

(Extract from: AS4970-2009, Appendix D, pg17)

Exploratory excavation

The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998).

Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build. This also allows management decisions to be made and allows time for redesign works if required.

Any exploratory excavation within the allocated TPZ is to be undertaken with due care of the roots. Minor exploration is possible with hand tools. More extensive exploration may require the use of high pressure water or air excavation techniques. Either hydraulic or pneumatic excavation techniques will safely expose tree roots; both have specific benefits dependent on the situation and soil type. An arborist is to be consulted on which system is best suited for the site conditions.

Substantial roots are to be exposed and left intact.

Once roots are exposed decisions can be made regarding the management of the tree. Decisions will be dependent on the tree species, its condition, its age, its relative tolerance to root loss, and the amount of root system exposed and requiring pruning.

Other alternative measures to encroaching the TPZ may include boring or tunnelling.

How to determine the diameter of a substantial root

The size of a substantial root will vary according to the distance of the exposed root to the trunk of the tree. The further away from the trunk of a tree that a root is, the less significant the root is likely to be to the tree's health and stability.

The determination of what is a substantial root is often difficult because the form, depth and spread of roots will vary between species and sites. However, because smaller roots are connected to larger roots in a framework, there can be no doubt that if larger roots are severed, the smaller roots attached to them will die. Therefore, the larger the root, the more significant it may be.

Gilman (1997) suggests that trees may contain 4-11 major lateral roots and that the five largest lateral roots account (act as a conduit) for 75% of the total root system.

These large lateral roots quickly taper within a distance to the tree, this distance is identified as the Structural Root Zone (SRZ). Within the SRZ distance, all roots and the soil surrounding the roots are deemed significant.

No root or soil disturbance is permitted within the SRZ.
In the area outside the SRZ the tree may tolerate the loss of one or a number of roots. The table below indicates the size of tree roots, outside the SRZ that would be deemed substantial for various tree heights. The assessment of combined root loss within the TPZ would need to be undertaken by an arborist on an individual basis because the location of the tree, its condition and environment would need to be assessed.

Table 1: Estimated significant root sizes outside SRZ

Height of tree	Diameter of root
Less than 5m	≥ 30mm
Between 5m - 15m	≥ 50mm
More than 15m	≥ 70mm

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Construction Guidelines

The following are guidelines that must be implemented to minimise the impact of the proposed construction works on the retained trees.

- The Tree Protection Zone (TPZ) is fenced and clearly marked at all times. The actual fence specifications should be a minimum of 1.2 - 1.5 metres of chain mesh or like fence with 1.8 meter posts (e.g. treated pine or star pickets) or like support every 3-4 metres and a top line of high visibility plastic hazard tape. The posts should be strong enough to sustain knocks from on site excavation equipment. This fence will deter the placement of building materials, entry of heavy equipment and vehicles and also the entry of workers and/or the public into the TPZ. Note: There are many different variations on the construction type and material used for TPZ fences, suffice to say that the fence should satisfy the responsible authority.
- Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Successful tree preservation occurs when there is a commitment from all relevant parties involved in designing, constructing and managing a development project. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The importance of tree preservation must be communicated to all relevant parties involved with the site.
- The consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- A layer of organic mulch (woodchips) to a depth of no more than 100mm should be placed over the root systems within the TPZ of trees, which are to be retained so as to assist with moisture retention and to reduce the impact of compaction.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Where machinery is required to operate inside the TPZ it must be a small skid drive machine (i.e Dingo or similar) operating only forwards and backwards in a radial direction facing the tree trunk and not altering direction whilst inside the TPZ to avoid damaging, compacting or scuffing the roots.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No fuel, oil dumps or chemicals shall be allowed in or stored on the TPZ and the servicing and re-fuelling of equipment and vehicles should be carried out away from the root zones.
- No storage of material, equipment or temporary building should take place over the root zone of any tree.
- Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing device.
- Supplementary watering should be provided to all trees through any dry periods during and after the construction process. Proper watering is the most important maintenance task in terms of successfully retaining the designated trees. The areas under the canopy drip lines should be mulched with woodchip to a depth of no more than 100mm. The mulch will help maintain soil moisture levels. Testing with a soil probe in a number of locations around the tree will help ascertain soil moisture levels and requirements to irrigate. Water needs to be applied slowly to avoid runoff. A daily watering with 5 litres of water for every 30 mm of trunk calliper may provide the most even soil moisture level for roots (Watson & Himelick, 1997), however light frequent irrigations should be avoided. Irrigation should wet the entire root zone and be allowed to dry out prior to another application. Watering should continue from October until April.

Disclaimer

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