REDGUM Horticultural
Arboriculture & Horticulture Consultants

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IACA
CONSULTING ARBORICULTURISTS ®

REPORT:

ARBORICULTURAL IMPACT ASSESSMENT

(ST PATRICK'S GREEN – KOGARAH)

38-48 Chapel Street & 143-155 Princes Highway, Kogarah, NSW

PRELIMINARY

Prepared 24th January 2013
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PREFACE

Redgum Horticultural has prepared this report for and on behalf of Greengate Group Pty Ltd (*the client)* Level 1, 156 Gloucester Street, Sydney NSW.

Mr. Neville Shields (*the author*) attended 38-48 Chapel Street & 143-155 Princes Highway, Kogarah, NSW (*the site*), on 16 January 2013, all the trees and their growing environment were examined. The site is subject to a Development Application and this report and any works recommended herein, that require approval from the consenting authority, forms part of that development application.

INTRODUCTION

The land is located in the Kogarah City Council (*the Council)* Local Government Area (*LGA*) and the trees are protected under Councils Tree Preservation Order. The Council is the consenting authority for development works on the site. This report involves fifty one (51) trees (*the trees*) in two (2) stands of trees identified as Tree No. /Stand No. 1-47, as indicated on Site Plan A - Survey of Subject Trees (Appendix E) and considers the removal of twenty eight (28) trees and the retention of seven (7) trees within the property, neighbouring properties and adjacent on the road reserve. The trees will be considered as 2 stands to encompass all trees within and immediately adjacent to the site, where appropriate, as marked on Appendix E, Site Plan a – Survey of Subject Trees. ***Tree Protection Zone*** fencing or works are marked on the Appendix F, Site Plan B - Trees to be Retained and Tree Protection Zones.

The site is comprised of a previous school site where the existing buildings are to be demolished and are to be replaced with a proposed Integrated Oncology Centre, requiring the removal of forty four (44) existing trees within the site. As part of the Landscape Plan where appropriate, the tree cover on the site will be enhanced by planting with advanced specimens/s of appropriate tree species for the space available above and below ground being soil volumes available and to prevent future conflict between trees and built structures.

Setbacks for the new works and associated infrastructure should provide sufficient space to protect the existing growing environments both above and below ground for trees to be retained, and so that trees within the property and on adjoining properties will not be adversely affected.

The proposed design has considered the spatial requirements for the trees to be retained based on the information available or provided at the time of compiling this report, and those areas to be protected will be discussed further. Plans provided do not show the location of sewer, water or electricity supply to the proposed development. The Summary lists the general condition of trees and a summary of works in Table 1.0. In section 5.0 each individual tree is described in greater detail including protective or remedial works. Tree maintenance works including pruning, removal or transplantation are detailed in section 4.0.

SUMMARY

This report considers 51 trees, 43 trees within the site, 7 trees on a neighbouring property and 1 on the adjacent road reserve. The trees to be retained are Trees 1, 2, 3, 29(x5), 40, 44 & 45 and to be removed are trees 4, 5, 6, 7, 8, 9, 10-17, 18, 19, 20, 21, 22-26, 27, 28, 30-39, 42, 41, 43, 46 & 47. For Tree 1, 2, 3; the alignment of the building is sufficiently setback to not affect these specimens. Tree 29(x5); these specimens are sufficiently setback from the development to not be affected. Tree 40; the alignment of the driveway to this specimen will be a major encroachment. The installation of the driveway is to be undertaken using pier and beam construction with a suspended slab. This will reduce impact on the structural root zone (SRZ) as this specimen has an asymmetrical root crown due to the proximity of the existing building within six metres off the trunk. Tree 44; the alignment of the basement to this specimen will be a major encroachment. The excavation within the tree protection zone is to be undertaken using a vertical cut for the basement. This will reduce impact on the structural root zone (SRZ) as this specimen has an asymmetrical root crown due to the proximity of the existing building within six metres off the trunk. Tree 45; this specimen is sufficiently setback from the development to not be affected.

Additionally, for trees 40, 44 & 45; hoardings are to be installed after demolition to protect these specimens from prevailing winds to the east until the new development has been constructed within this area. The impact will be that of minor encroachment for trees 1, 2, 3, 29 & 45 and Trees 40 & 44 will be subject to major encroachment as per AS 4970 (2009) Section 3, 3.3.3 *Major Encroachments* from development works within >10% of the area of the Tree Protection Zone. These excavations must be supervised and certified by the Project Arborist in accordance with AS4970 (2009). Plans provided do not show the location of sewer, water or electricity supply to the proposed development.

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

Tree No. Stand No.	*Genus and species*	Common name	Condition G = Good, F = Fair P = Poor, D = Dead	Description of work to be done
1	*Angophora floribunda*	Rough Barked Apple	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
2	*Elaeocarpus reticulatus*	Blueberry Ash	F	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
3	*Melaleuca quinquinervia*	Broad Leafed Paperbark	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
4	*Pittosporum undulatum*	Native Daphne	F	Remove and replace with by new plantings as per Landscape Plan
5	*Pittosporum undulatum*	Native Daphne	F	Remove and replace with by new plantings as per Landscape Plan
6	*Lophostemon confertus*	Queensland Brush Box	F	Remove and replace with by new plantings as per Landscape Plan
7	*Grevillea robusta*	Silky Oak	G	Remove and replace with by new plantings as per Landscape Plan
8	*Banksia marginata*	Silver Banksia	G	Remove and replace with by new plantings as per Landscape Plan
9	*Lophostemon confertus*	Queensland Brush Box	F	Remove and replace with by new plantings as per Landscape Plan
10	*Melaleuca armillaris*	Bracelet Honey Myrtle	P	Remove and replace with by new plantings as per Landscape Plan
11	*Pinus patula*	Mexican Weeping Pine	F	Remove and replace with by new plantings as per Landscape Plan
12	*Ulmus glabra 'Lutescens'*	Scotch Elm	G	Remove and replace with by new plantings as per Landscape Plan
13	*Banksia marginata*	Silver Banksia	G	Remove and replace with by new plantings as per Landscape Plan
14	*Callistemon viminalis 'Dawson River'*	Dawson River Weeper	F	Remove and replace with by new plantings as per Landscape Plan
15	*Ulmus parvifolia*	Chinese Elm	G	Remove and replace with by new plantings as per Landscape Plan
16	*Syzygium sp.*	Lily Pilly	G	Remove and replace with by new plantings as per Landscape Plan
17	*Lophostemon confertus*	Queensland Brush Box	F	Remove and replace with by new plantings as per Landscape Plan
18	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush	F	Remove and replace with by new plantings as per Landscape Plan
19	*Lophostemon confertus*	Queensland Brush Box	G	Remove and replace with by new plantings as per Landscape Plan

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Tree No. Stand No.	*Genus and species*	Common name	Condition G = Good, F = Fair P = Poor, D = Dead	Description of work to be done
20	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush	G	Remove and replace with by new plantings as per Landscape Plan
21	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush	G	Remove and replace with by new plantings as per Landscape Plan
22	*Tristaniopsis laurina*	Water Gum	P	Remove and replace with by new plantings as per Landscape Plan
23	*Callistemon viminalis 'Dawson River'*	Dawson River Weeper	G	Remove and replace with by new plantings as per Landscape Plan
24	*Eucalyptus sp.*	Eucalypt	G	Remove and replace with by new plantings as per Landscape Plan
25	*Agonis flexuosa*	Weeping Myrtle	F	Remove and replace with by new plantings as per Landscape Plan
26	*Thuja orientalis*	Bookleaf Conifer	F	Remove and replace with by new plantings as per Landscape Plan
27	*Eucalyptus sp.*	Eucalypt	F	Remove and replace with by new plantings as per Landscape Plan – *Neighbouring Property Specimen*
28	*Eucalyptus scoparia*	Wallangarra White Gum	F	Remove and replace with by new plantings as per Landscape Plan – *Street Tree Specimen*
29/2	*Melaleuca quinquinervia x 5*	Broad Leafed Paperbark	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan. – *Neighbouring Property Specimens*
30	*Melaleuca bracteata 'Revolution Gold'*	Golden Honey Myrtle	F	Remove and replace with by new plantings as per Landscape Plan
31	*Melaleuca bracteata 'Revolution Gold'*	Golden Honey Myrtle	F	Remove and replace with by new plantings as per Landscape Plan
32	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush	F	Remove and replace with by new plantings as per Landscape Plan
33	*Acmena smithii*	Lilly Pilly	G	Remove and replace with by new plantings as per Landscape Plan
34	*Tristaniopsis laurina*	Water Gum	F	Remove and replace with by new plantings as per Landscape Plan
35	*Callistemon viminalis 'Dawson River'*	Dawson River Weeper	F	Remove and replace with by new plantings as per Landscape Plan
36	*Pittosporum undulatum*	Native Daphne	G	Remove and replace with by new plantings as per Landscape Plan
37	*Jacaranda mimosifolia*	Jacaranda	F	Remove and replace with by new plantings as per Landscape Plan
38	*Acacia glaucescens*	Coastal Myall	F	Remove and replace with by new plantings as per Landscape Plan
39	*Platanus x hispanica*	London Plane Tree	G	Remove and replace with by new plantings as per Landscape Plan
40	*Eucalyptus ?saligna*	Sydney Blue Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.

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Tree No. Stand No.	*Genus and species*	Common name	Condition G = Good, F = Fair P = Poor, D = Dead	Description of work to be done
41	*Eucalyptus ?saligna*	Sydney Blue Gum	G	Remove and replace with by new plantings as per Landscape Plan
42	*Eucalyptus ?saligna*	Sydney Blue Gum	G	Remove and replace with by new plantings as per Landscape Plan
43	*Eucalyptus ?saligna*	Sydney Blue Gum	G	Remove and replace with by new plantings as per Landscape Plan
44	*Eucalyptus ?saligna*	Sydney Blue Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
45	*Syzygium luehmannii*	Small Leafed Lilly Pilly	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan. – *Neighbouring Property Specimen*
46	*Jacaranda mimosifolia*	Jacaranda	G	Remove and replace with by new plantings as per Landscape Plan
47	*Archontophoenix cunninghamiana*	Bangalow Palm	G	Remove and replace with by new plantings as per Landscape Plan

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Table 2.0 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 explanatory notes below). Tree Protection Zone fences and setbacks where applicable are indicated in Appendix F and are to be measured on site.

1. Redgum Tree No. / Redgum Stand No.	2. **T**runk **D**iameter at **B**reast **H**eight **DBH** 1.4m above ground, AS4970 2009, or mm or m above ground where indicated. # = average. g = ground	3. **S**tructural **R**oot **Z**one **SRZ (DARB)** From centre of trunk (COT) **D**iameter **A**bove **R**oot **B**uttress AS4970 2009 Section 3, 3.3.5 (see Appendix C) where applicable (Minimum 1.5 metres)	4. **T**ree **P**rotection **Z**one (**TPZ**) = **12 x DBH** From centre of trunk (COT) in metres AS4970 2009Section 3 (see Appendix C) (Minimum 2.0 metres)	5. Distance of fence with TPZ setback **(reduced by 10% of area of TPZ)** in metres as per AS4970 2009 Section 3, 3.3 (Minimum 2.0 metres)	6. Proposed distance of tree protection fence/works on the side closest to building construction[2], in metres by Redgum Horticultural.
1	260	2.0m DARB 310)	3.1	2.8	2.8 [1, 2,]
2	270 @ g	1.9m	3.2	2.9	2.9 [1, 2,]
3	450 @ 900	2.4m	5.4	4.9	4.9 [1, 2,]
29/2 (x5)	370#	2.3m (DARB 420#)	4.4	4.0	4.0 [1, 2,]
40	520	3.0m (DARB 800)	6.2	5.6	5.6 [1, 2, 7, 8, 17, 18]
44	560	3.0m (DARB 790)	6.7	6.0	6.0 [1, 2, 7, 8, 17]
45	370	2.3m (DARB 400)	4.4	4.0	4.0 [1, 2, 8, 17]

Descriptors for modified setbacks in Column 6.

1 Special conditions apply to protect the roots of trees generally, see discussion points.
2 Additional protective fencing information is detailed in discussion points.
3 Acceptable due to the good relative tolerance of the species to development impacts.
4 Range of setbacks for the trees at each end of a linear stand, see discussion points.
5 Acceptable as fence located at a substantial distance beyond dripline, or may also include the location of a smaller tree in proximity to a larger tree to be retained and the smaller tree being protected well within the protective fencing for that larger tree.
6 Acceptable due to additional special protection works, see Section 5.0 for this tree.
7 Acceptable as pre-existing site conditions were conducive to having restricted the development of root growth in this direction.
8 Street tree with protective fencing of minimal width to allow for pedestrian access along road reserve.
9 Acceptable as tree transplanted reducing the area of the root zone.
10 Acceptable as not effected by development works.
11 Young tree not expected to have established a substantially expansive root system and able to re-establish or modify growth to be sustainable due to age and good vigour.
12 Set back prescribed by the consent authority.
13 Acceptable as tree growing on a lean and encroachment on compression wood side where root growth is of reduced structural importance.
14 Acceptable as root mapping has indicated extent of structural woody roots with a diameter of 20 mm or more.
15 Acceptable as a specimen of palm taxa tolerant of encroachment.
16 Acceptable as excavation on down slope or across slope side of tree.
17 Acceptable as encroachment into growing area below ground minor, with one corner of building or excavation works extending to within the radius of the dripline.
18 Acceptable as encroachment by pier, including screw piles, with minimal disturbance.
19 Acceptable as encroachment above grade without excavation or sub-base compaction.
20 Acceptable as located within 0.5 m from edge of dripline.
21 Acceptable as encroachment with gap graded fill that can accommodate gaseous exchange between roots/soil and the atmosphere and ongoing root growth.
22 Minimum setback 2 m, AS4970 (2009) section 3, 3.2.
23 Maximum setback 15 m, AS4970 (2009) section 3, 3.2.
24 Tree is a palm, other monocot, cycad or tree fern TPZ is to be 1 m outside crown projection AS4970 (2009) section 3, 3.2.
25 Minimum Structural Root Zone (SRZ) for trees less than 0.15 m diameter is 1.5 m, AS4970 (2009) section 3, 3.5.

Explanatory notes for Table 2.0.
This table is based upon Australian Standard AS4970 2009 *Protection of trees on development sites*, Section 3 Determining the protection zone of the selected trees (see Appendix B), where the approved building works should be no closer, including excavation, than the dimensions stated above.

"3.3 Variations to the TPZ
3.3.2 Minor Encroachment
If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

3.3.3 Major Encroachment - *If the proposed encroachment is greater than 10% of the area of the TPZ or inside the SRZ the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ."*

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1.0 AIMS

1.1 Detail the condition of the trees on the site, adjoining properties or adjacent road reserve where such trees may be affected by the proposed works, by assessment of individual trees or stands of trees, and indicate protection measures or remedial works for their retention and protection pre, during and post construction. Consider the location and condition of the trees in relation to the proposed building works and recommend retention and protection or removal and replacement where appropriate. The retained specimens are to remain in a safe and healthy condition, not less than at the time of initial inspection for this report, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures recommended to be applied.

1.2 Provide as an outcome of the assessment, the following: a description of the trees, observations made, discussion of the effects the location of the proposed building works may have on the trees, and make recommendations required for remedial or other works to the trees, if and where appropriate. *(See section 5 - Tree Assessment.)*

1.3 Determine from the assessment as detailed in 1.2 a description of the works or measures required to ameliorate the impact upon the trees to be retained, by the proposed building works or future impacts the trees may have upon the new building works if and where appropriate, or the benefits of removal and replacement if appropriate for the medium to long term safety and amenity of the site.

2.0 OBJECTIVES

2.1 Assess the condition of the subject trees.

2.2 Determine impact of development on the subject trees.

2.3 Provide recommendations for retention or removal of the subject trees.

3.0 METHODOLOGY
Note: Individual methodologies applied as applicable.

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

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

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

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

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

3.4 Trees in groups may be referred to as stands and a stand may exclusively contain specimens to be either retained or removed or a combination of both. A stand may be used to discuss all the trees on a given site to expedite their assessment, or refer to trees growing proximate to one another or within a defined space. Stands may be comprised by mass boundary or screen plantings, to form a group of the same or a mixture of taxa. Each stand is considered as a single unit with each component tree assessed and expressed in tabular form, or indicated by a given percentage as a population sample of each stand. Where it is appropriate for a stand of trees to be retained in full or part, the location and setback of Tree Protection Zone fences or works, are prescribed to provide for the preservation of the stand or selected component trees, in a condition not less than that at the time of initial inspection for its incorporation into the landscape works for the site, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures.

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

4.0 PRUNING STANDARDS

4.1 Any pruning recommended in this report is to be to the Australian Standard® AS4373 *Pruning of amenity trees*, and conducted in accordance with the NSW Work Cover Authority Code of Practice, Tree Work, 2007.

4.2 All pruning or removal works are to be in accordance with the appropriate Tree Management Policy where applicable, or Tree Management Order (TMO), or Tree Preservation Order (TPO).

4.3 Tree maintenance work is specialised and in order to be undertaken safely to ensure the works carried out are not detrimental to the survival of a tree being retained, and to assist in the safe removal of any tree, should be undertaken by a qualified arboriculturist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of 5 years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.

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

Tree No. / Stand No.	***Genus & Species*** **Common Name**	**Age** Y = Young M = Mature O = Overmature	**Vigour** GV = Good Vigour LV = Low Vigour	**Condition** G = Good F = Fair P = Poor D = Dead	**1. SRIV** Age, Vigour, Condition / Index Rating www.iaca.org.au / **2. Estimated Life Expectancy** 1. Long 2. Medium 3. Short	**Crown Form** D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	**Ht.** Approx. metres	**Crown Spread** approx. metres / **Orientation** R = Radial, or other	**Crown Symmetry** 1 = symmetrical 2 = asymmetrical / **Orientation**	**Crown Cover** % / **Crown Density** % / D = dormant	**DBH** in mm @ 1.4m, or other, as indicated / **Trunk Orientation** other than R = radial, e.g. N/S g = ground	**Trunk Lean** 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / **Orientation** / ST = Static P = Progressive Sc = Self-correcting	**Roots Evident at Root Crown** 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	**Pests & Diseases** No or Yes If Yes see comments	**Branch Bark Included** No or Yes or N/A	**Form** G = Good Form P = Poor Form	**Significance scale** 1=High 2=Medium 3=Low / **Retention Value** 1=High 2=Medium 3=Low 4=Remove
1	*Angophora floribunda*	M	GV	G	MGVG – 10	C	12	6x4	2/N	60	260/R	1/R	1	No	No	G	2
					1			N/S		60	DARB 310	St					2
	Rough Barked Apple	Comment: Trunk to 7 metres, crown deliquescent, orientation N/S, asymmetrical bias to north. Buildup around base.															
2	*Elaeocarpus reticulatus*	M	GV	F	MGVF - 9	C	6	4x2	2/E	80	270 @ g	5/R	1	No	No	P	2
					2			N/S		80	R	St					2
	Blueberry Ash	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to east. Buildup around base.															
3	*Melaleuca quinquinervia*	M	GV	G	MGVG – 10	C	12	7x4	2/W	70	450 @ 900	1/R	1	No	No	G	2
					1			E/W		70	DABR 530	St					2
	Broad Leafed Paperbark	Comment: Trunk to 1 metre, crown deliquescent, orientation E/W, asymmetrical bias to west. Buildup around base.															
4	*Pittosporum undulatum*	M	GV	F	MGVF - 9	C	8	6x5	2/N	70	470 @ g	5/R	1	Yes	No	G	3
					3			N/S		70	R	St					4
	Native Daphne	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to north. Branch stubs, woodrot & dieback evident. Buildup around base.															
5	*Pittosporum undulatum*	M	GV	F	MGVF - 9	C	8	6x5	2/E	60	470 @ g	5/R	1	Yes	No	P	3
					3			E/W		60	R	St					4
	Native Daphne	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation E/W, asymmetrical bias to east. Major cavity at base – may have decay. Buildup around base.															
6	*Lophostemon confertus*	M	LV	F	MLVF - 4	C	9	5x5	1	40	970 @ g	5/R	1	No	No	P	2
					2			R		40	R	St					2
	Queensland Brush Box	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation radial, symmetrical. Buildup around base. Dead first order structural branch at centre. Buildup around base.															
7	*Grevillea robusta*	M	GV	G	MGVG – 10	D	12	7x7	1	70	340/R	1/R	1	No	No	G	2
					1			R		70	DARB 380	St					1
	Silky Oak	Comment: Trunk erect, straight, gradually tapering & continuous, crown excurrent. Buildup around base.															
8	*Banksia marginata*	M	GV	G	MGVG – 10	C	7	3x3	1	70	340/R	1/R	1	No	No	G	2
					1			R		70	DARB 380	St					1
	Silver Banksia	Comment: Trunk erect with slight lean correcting to upright in mid trunk, straight, gradually tapering & continuous, crown excurrent.															
9	*Lophostemon confertus*	M	GV	F	MGVF - 9	C	8	4x4	1	70	340/R	1/R	1	No	No	G	2
					1			R		70	DARB 380	St					2
	Queensland Brush Box	Comment: Trunk to 1.6 metres, crown deliquescent, orientation radial, symmetrical. Buildup around base.															
10	*Melaleuca armillaris*	M	LV	P	MLVP - 2	C	5	5x4	2/S	30	470 @ g	5/R	1	No	No	P	2
					3			N/S		30	R	St					2
	Bracelet Honey Myrtle	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to south. Buildup around base.															

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Tree No. / Stand No.	*Genus & Species* **Common Name**	**Age** Y = Young M = Mature O = Overmature	**Vigour** GV = Good Vigour LV = Low Vigour	**Condition** G = Good F = Fair P = Poor D = Dead	**1. SRIV** Age, Vigour, Condition / Index Rating www.iaca.org.au / **2. Estimated Life Expectancy** 1. Long 2. Medium 3. Short	**Crown Form** D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	**Ht.** Approx. metres	**Crown Spread** approx. metres / **Orientation** R = Radial, or other	**Crown Symmetry** 1 = symmetrical 2 = asymmetrical / **Orientation**	**Crown Cover** % / **Crown Density** % / D = dormant	**DBH** in mm @ 1.4m, or other, as indicated / **Trunk Orientation** other than R = radial, e.g. N/S g = ground	**Trunk Lean** 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / **Orientation** / ST = Static P = Progressive Sc = Self-correcting	**Roots Evident at Root Crown** 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	**Pests & Diseases** No or Yes If Yes see comments	**Branch Bark Included** No or Yes or N/A	**Form** G = Good Form P = Poor Form	**Significance scale** 1=High 2=Medium 3=Low / **Retention Value** 1=High 2=Medium 3=Low 4=Remove
11	*Pinus patula*	M	GV	F	MGVF - 9	C	7	7x5	2/E	70	310	2/E	1	No	No	P	2
					2			N/S		70	R	Sc					3
	Mexican Weeping Pine	Comment: Trunk to 1.6 metres, crown deliquescent, orientation N/S, asymmetrical bias to east.															
12	*Ulmus glabra 'Lutescens'*	M	GV	G	MGVG – 10	C	10	12x7	2/N	80	170 @ 300	5/R	1	No	No	G	2
					2			N/S		80	R	St					2
	Scotch Elm	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to north.															
13	*Banksia marginata*	M	GV	G	MGVG – 10	C	7	3x2	2/S	70	400 @ g	5/R	1	No	No	P	2
					2			N/S		70	R	St					3
	Silver Banksia	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to south. Girdle evident at base of trunk.															
14	*Callistemon viminalis 'Dawson River'*	M	GV	F	MGVF - 9	C	4	3x2	2/N	70	150	3/N	1	No	No	P	2
					1			E/W		70	R	St					2
	Dawson River Weeper	Comment: Trunk erect, straight, gradually tapering & continuous, orientation E/W, asymmetrical bias to north, crown excurrent.															
15	*Ulmus parvifolia*	M	GV	G	MGVG – 10	C	7	4x2	2/E	70	180	1/R	1	No	No	G	2
					1			E/W		70	R	St					2
	Chinese Elm	Comment: Trunk to 3 metres, crown deliquescent, orientation E/W, asymmetrical bias to east.															
16	*Syzygium sp.*	M	GV	G	MGVG – 10	E	7	2x2	1	80	240 @ 600	1/R	1	No	No	G	2
					1			R		80	R	St					3
	Lily Pilly	Comment: Trunk to 600mm, crown deliquescent, orientation radial, symmetrical.															
17	*Lophostemon confertus*	M	GV	F	MGVF - 9	C	8	9x9	1	50	600 @ 700	1/R	1	Yes	No	G	2
					1			R		60	R	St					1
	Queensland Brush Box	Comment: Trunk to 600mm, crown deliquescent, orientation radial, symmetrical. Bitumen at base to south covering 50% of buttress. Deadwood.															
18	*Callistemon viminalis 'Hanna Ray'*	M	GV	F	MGVF - 9	C	6	7x3	2/SW	60	470 @ g	5/R	1	No	No	P	2
					1			NE/SW		70	R	St					1
	Hanna Ray Bottlebrush	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation NE/SW, asymmetrical bias to south west.															
19	*Lophostemon confertus*	M	GV	G	MGVG – 10	C	7	9x6	2/W	70	440@1000	1/R	1	No	No	G	2
					1			N/S		70	R	St					1
	Queensland Brush Box	Comment: Trunk to 1 metre, crown deliquescent, orientation N/S, asymmetrical bias to west. *Lopped for service line clearance to east.*															
20	*Callistemon viminalis 'Hanna Ray'*	M	GV	G	MGVG – 10	C	5	6x4	2/W	80	390@g	5/R	1	No	No	G	2
					1			N/S		80	R	St					1
	Hanna Ray Bottlebrush	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to west.															

PRELIMINARY

Tree No. / Stand No.	*Genus & Species* **Common Name**	**Age** Y = Young M = Mature O = Overmature	**Vigour** GV = Good Vigour LV = Low Vigour	**Condition** G = Good F = Fair P = Poor D = Dead	**1. SRIV** Age, Vigour, Condition / Index Rating www.iaca.org.au / **2. Estimated Life Expectancy** 1. Long 2. Medium 3. Short	**Crown Form** D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	**Ht.** Approx. metres	**Crown Spread** approx. metres / **Orientation** R = Radial, or other	**Crown Symmetry** 1 = symmetrical 2 = asymmetrical / **Orientation**	**Crown Cover** % / **Crown Density** % / D = dormant	**DBH** in mm @ 1.4m, or other, as indicated / **Trunk Orientation** other than R = radial, e.g. N/S g = ground	**Trunk Lean** 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / **Orientation** / ST = Static P = Progressive Sc = Self-correcting	**Roots Evident at Root Crown** 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	**Pests & Diseases** No or Yes If Yes see comments	**Branch Bark Included** No or Yes or N/A	**Form** G = Good Form P = Poor Form	**Significance scale** 1=High 2=Medium 3=Low / **Retention Value** 1=High 2=Medium 3=Low 4=Remove
21	*Callistemon viminalis 'Hanna Ray'*	M	GV	G	MGVG – 10 1	C	3.5	5x3 N/S	2/W	80 80	390 @ g R	5/R St	1	No	No	G	2 1
	Hanna Ray Bottlebrush	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to west.															
22	*Tristaniopsis laurina*	O	GV	P	OGVP - 4 2	C	7	4x3 E/W	2/E	50 70	450 @ g R	5/R St	1	Yes	No	P	3 4
	Water Gum	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation E/W, asymmetrical bias to east. Ivy to trunk.															
23	*Callistemon viminalis 'Dawson River'*	M	GV	G	MGVG – 10 1	D	7	8x8 R	1	80 80	570 @ g R	5/R St	1	No	No	G	2 3
	Dawson River Weeper	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation radial, symmetrical.															
24	*Eucalyptus sp.*	M	GV	G	MGVG – 10 1	D	8	9x9 R	1	70 70	420 @ g R	5/R St	1	No	No	G	2 2
	Eucalypt	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation radial, symmetrical.															
25	*Agonis flexuosa*	O	GV	F	OGVF - 5 3	C	6	6x4 E/W	2N	60 60	400 R	1/R St	1	Yes	Yes	P	3 4
	Weeping Myrtle	Comment: Trunk to 1.8 metres, crown deliquescent, orientation E/W, asymmetrical bias to north. *Lopped for building clearance to south.* Decay evident to wound face.															
26	*Thuja orientalis*	M	GV	F	MGVF - 9 2	C	9	5x3 E/W	2/E	70 70	330 @ 300 R	1/R St	1	No	Yes	G	3 4
	Bookleaf Conifer	Comment: Trunk to 300mm, crown deliquescent, orientation E/W, asymmetrical bias to east. Basal trunk wound to north at base. Minor pruning evident.															
27	*Eucalyptus sp.*	M	GV	F	MGVF - 9 2	C	12	12x9 E/W	2/W	60 70	500 R	1/R St	5 4-R	Yes	No	G	2 4
	Eucalypt	Comment: Trunk erect, straight, gradually tapering & continuous, orientation E/W, asymmetrical bias to west, crown excurrent. Major trunk wound at branch union at 6 metres to 70% of trunk circumference. - *Neighbouring Property Specimen*															
28	*Eucalyptus scoparia*	M	GV	F	MGVF - 9 2	C	12	6x6 R	1	50 70	580 R	2/E St	1	Yes	No	G	2 4
	Wallangarra White Gum	Comment: Trunk erect, straight, gradually tapering & continuous, crown excurrent. 30% deadwood. Major basal trunk wound to 50% of trunk from branch tear wound to east. - *Street Tree Specimen*															
29 /2	*Melaleuca quinquinervia x5*	M	GV	G	MGVG – 10 1	C	10	3x2 E/W	2/W	70 70	370 est. av. R	1/R St	1	No	No	G	2 2
	Broad Leafed Paperbark	Comment: Five specimens growing within the space of 5 metres, less than 500mm from boundary fence. Predominantly, Trunk erect, straight, gradually tapering & continuous, orientation E/W, symmetrical, crown excurrent. - *Neighbouring Property Specimen*															
30	*Melaleuca bracteata 'Revolution Gold'*	M	GV	F	MGVF - 9 1	C	10	7x5 N/S	2/E	50 70	420 @ 900 R	2/N Sc	1	No	No	G	2 3
	Golden Honey Myrtle	Comment: Trunk to 1.5 metres with slight lean to north self-correcting in mid crown, crown deliquescent, orientation N/S, asymmetrical bias to east.															

PRELIMINARY

Tree No. / Stand No.	*Genus & Species* **Common Name**	**Age** Y = Young M = Mature O = Overmature	**Vigour** GV = Good Vigour LV = Low Vigour	**Condition** G = Good F = Fair P = Poor D = Dead	**1. SRIV** Age, Vigour, Condition / Index Rating www.iaca.org.au / **2. Estimated Life Expectancy** 1. Long 2. Medium 3. Short	**Crown Form** D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	**Ht.** Approx. metres	**Crown Spread** approx. metres / **Orientation** R = Radial, or other	**Crown Symmetry** 1 = symmetrical 2 = asymmetrical / **Orientation**	**Crown Cover** % / **Crown Density** % / D = dormant	**DBH** in mm @ 1.4m, or other, as indicated / **Trunk Orientation** other than R = radial, e.g. N/S g = ground	**Trunk Lean** 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / **Orientation** / ST = Static P = Progressive Sc = Self-correcting	**Roots Evident at Root Crown** 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	**Pests & Diseases** No or Yes If Yes see comments	**Branch Bark Included** No or Yes or N/A	**Form** G = Good Form P = Poor Form	**Significance scale** 1=High 2=Medium 3=Low / **Retention Value** 1=High 2=Medium 3=Low 4=Remove
31	*Melaleuca bracteata 'Revolution Gold'*	M	GV	F	MGVF - 9	C	10	7x5	2/W	50	440 @ 900	2/N	5	No	No	G	2
					1			N/S		70	R	Sc	2-S				3
	Golden Honey Myrtle	Comment: Trunk to 1 metre, crown deliquescent, orientation NE/SW, asymmetrical bias to south west.															
32	*Callistemon viminalis 'Hanna Ray'*	M	GV	F	MGVF - 9	D	6	4x4	1	80	360 @ g	5/R	1	No	No	G	2
					1			R		80	R	St					2
	Hanna Ray Bottlebrush	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation radial, symmetrical.															
33	*Acmena smithii*	M	GV	G	MGVG – 10	D	12	7x7	1	80	520@1000	1/R	1	No	No	G	2
					1			R		80	DARB 550	St					2
	Lilly Pilly	Comment: Trunk to 1.3 metres, crown deliquescent, orientation radial, symmetrical. Crown raised – *Syzygium* under crown.															
34	*Tristaniopsis laurina*	M	GV	F	MGVF - 9	C	6	4x4	1	50	300 @ g	5/R	1	No	No	G	2
					2			R		60	R	St					3
	Water Gum	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation radial, symmetrical. Lopped for building clearance.															
35	*Callistemon viminalis 'Dawson River'*	M	GV	F	MGVF - 9	C	7	3x2	2/S	50	270 @ g	5/R	1	No	No	P	2
					2			N/S		70	R	St					4
	Dawson River Weeper	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to south. First order structural branch to north lopped at ground with epicormic regrowth due to crown raising.															
36	*Pittosporum undulatum*	M	GV	G	MGVG – 10	C	6	4x3	2/S	80	180 @ g	5/R	1	No	No	P	2
					2			E/W		80	R	St					4
	Native Daphne	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation E/W, asymmetrical bias to south.															
37	*Jacaranda mimosifolia*	M	GV	F	MGVF - 9	C	8	4x2	2/E	50	270 @ g	5/R	1	No	No	P	3
					2			N/S		70	R	St					3
	Jacaranda	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to east. Lopped for fence clearance with epicormic regrowth															
38	*Acacia glaucescens*	M	GV	F	MGVF - 9	C	12	10x7	2NW	50	470@1100	1/R	1	No	No	G	2
					1			NW/SE		70	R	St					2
	Coastal Myall	Comment: Trunk to 1 metre, crown deliquescent, orientation NW/SE, asymmetrical bias to north west. Understory planting.															
39	*Platanus x hispanica*	M	GV	G	MGVG – 10	C	15	9x7	2NW	60	560 @ g	5/R	1	Yes	No	P	2
					1			N/S		70	R	St					4
	London Plane Tree	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation N/S, asymmetrical bias to north west. Orchid wired to trunk.															
40	*Eucalyptus ?saligna*	M	GV	G	MGVG – 10	C	18	10x9	2/W	70	520/R	1/R	1	No	No	G	2
								N/S		70	DARB 880	St					1
	Sydney Blue Gum	Comment: Trunk to 10 metres, crown deliquescent, orientation N/S, asymmetrical bias to west. Lopped for building clearance to east.															

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Tree No. / Stand No.	***Genus & Species*** **Common Name**	**Age** Y = Young M = Mature O = Overmature	**Vigour** GV = Good Vigour LV = Low Vigour	**Condition** G = Good F = Fair P = Poor D = Dead	**1. SRIV** Age, Vigour, Condition / Index Rating www.iaca.org.au / **2. Estimated Life Expectancy** 1. Long 2. Medium 3. Short	**Crown Form** D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	**Ht.** Approx. metres	**Crown Spread** approx. metres / **Orientation** R = Radial, or other	**Crown Symmetry** 1 = symmetrical 2 = asymmetrical / **Orientation**	**Crown Cover** % / **Crown Density** % / D = dormant	**DBH** in mm @ 1.4m, or other, as indicated / **Trunk Orientation** other than R = radial, e.g. N/S g = ground	**Trunk Lean** 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / **Orientation** / ST = Static P = Progressive Sc = Self-correcting	**Roots Evident at Root Crown** 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	**Pests & Diseases** No or Yes If Yes see comments	**Branch Bark Included** No or Yes or N/A	**Form** G = Good Form P = Poor Form	**Significance scale** 1=High 2=Medium 3=Low / **Retention Value** 1=High 2=Medium 3=Low 4=Remove
41	*Eucalyptus ?saligna*	M	GV	G	MGVG – 10	C	10	9x7	2/W	70	290/R	1/R	1	No	No	G	2
					1			E/W		70	DARB 380	St					1
	Sydney Blue Gum	Comment: Trunk to 4 metres, crown deliquescent, orientation E/W, asymmetrical bias to west. Lopped for building clearance to east.															
42	*Eucalyptus ?saligna*	M	GV	G	MGVG – 10	C	10	6x4	2/W	70	290/R	1/R	1	No	No	G	2
					1			N/S		70	DARB 380	St					1
	Sydney Blue Gum	Comment: Trunk to 3 metres, crown deliquescent, orientation NE/SW, asymmetrical bias to west. Lopped for building clearance to east. Murraya & Waterhousia understory.															
43	*Eucalyptus ?saligna*	St	GV	G	MGVG – 10	C	10	7x5	2/NW	70	360/R	1/R	1	No	No	G	2
					1			NW/SE		70	DARB 470	St					1
	Sydney Blue Gum	Comment: Trunk to 7 metres, crown deliquescent, orientation NE/SW, asymmetrical bias to north west. Lopped for building clearance to east. Murraya & Waterhousia understory.															
44	*Eucalyptus ?saligna*	M	GV	G	MGVG – 10	C	18	10x9	2/W	70	560/R	1/R	1	No	No	G	2
					1			N/S		70	DARB 790	St					1
	Sydney Blue Gum	Comment: Trunk to 6 metres, crown deliquescent, orientation NE/SW, asymmetrical bias to west. Lopped for building clearance to east. Murraya & Waterhousia understory. Branch collar wound at 4 metres to south west.															
45	*Syzygium luehmannii*	M	GV	G	MGVG – 10	C	9	7x5	2/N	80	370	1/R	1	No	No	G	2
					1			E/W		80	DARB 420	St					1
	Small Leafed Lilly Pilly	Comment: Trunk to 1 metre, crown deliquescent, orientation NE/SW, asymmetrical bias to north. – *Neighbouring Property Specimen*															
46	*Jacaranda mimosifolia*	M	GV	G	MGVG – 10	D	8	7x5	2/NW	80	570 @ g	5/R	1	No	No	G	2
					1			NW/SE		80	R	St					2
	Jacaranda	Comment: Acaulescent or short trunk @ or near ground, crown deliquescent, orientation NW/SE, asymmetrical bias to north west.															
47	*Archontophoenix cunninghamiana*	M	GV	G	MGVG – 10	D	9	3x3	1	70	370	1/R	1	No	No	G	2
					1			R		70	R	St					2
	Bangalow Palm	Comment: Trunk erect, straight, gradually tapering & continuous, orientation symmetrical, crown excurrent.															

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Observations

5.2 A stand of planted non-locally indigenous and exotic evergreen shrubs and trees.

5.3 The site has a combination of mature trees and oversized shrubs within the current proposal. There are a number of specimens considered significant for their contribution as landscape elements to the property. The retention of these twenty three (23) trees allows them as components of the current curtilage to be transferred to the new proposal, maintaining elements of a continuous landscape, providing a more harmonious integration and transition of the use of the land. The other specimens were within the proposed building envelope and are not able to be retained. They are to be replaced additionally to the landscaping component with advanced specimens of similar or same species.

Tree Significance

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

Significant Scale

1 – High
2 – Medium
3 – Low

Significance Scale	1	2	3
Redgum Tree No.		1, 2, 3, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47	4, 5, 22, 25, 26, 37

Tree Retention Value

5.5 See Appendix A for Retention Value Matrix.

Retention Value

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

Retention Value	High Priority for Retention	Medium Consider for Retention	Low Consider for Removal	Remove Priority for Removal
Redgum Tree No.	7, 8, 17, 18, 19, 20, 21, 40, 41, 42, 43, 44, 45*	1, 2, 3, 6, 9, 12, 14, 15, 24, 29*, 32, 33, 38, 46, 47	10, 11, 13, 16, 23, 30, 31, 34, 37	4, 5, 22, 25, 26, 27*, 28, 35, 36, 39

* Trees located within the neighbouring property and should be retained and protected. Consent required from owner if removal required.

Discussion

5.6 The proposed design requires the retention of twenty three (23) trees and the removal of twenty eight (28) trees within the proposed development and adjacent neighbouring properties.

5.7 AS4970 (2009) section 3 requires a Tree Protection Zone (TPZ) setback of 3.1 metres (m) for Tree (T) 1, 3.2m for T2, 5.4m for T3, 4.4m for T29 & T45, 6.2m for T40 & 6.7m for T44 respectively from centre of trunk (COT) but allows for a 10% reduction of area equal to a reduction of 30% of radius on one side only with the setbacks as shown in Table 3.0. AS4970 (2009) section 3, 3.3.3 requires the Project Arborist to demonstrate that where a retained tree is subject to a major encroachment (>10% of area of TPZ) it can be protected to remain viable

5.8 Tree 1, 2, 3 *Angophora floribunda* - Rough Barked Apple, Elaeocarpus reticulatus - Blueberry Ash & *Melaleuca quinquinervia* - Broad Leafed Paperbark, these specimens were found in fair to good health & good vigour at time of assessment and are sufficiently setback from this development to not be affected and it is a minor encroachment. **Build up at base area of specimens to be cleared.**

5.9 Tree 29 *Melaleuca quinquinervia* - Broad Leafed Paperbark x5, these specimens were found in good health & vigour at time of assessment and are sufficiently setback from this development to not be affected and it is a minor encroachment.

5.10 Tree 40 *Eucalyptus saligna* – Sydney Blue Gum, this specimen was found in good health & vigour at time of assessment and will be subject to major encroachment as per AS 4970 (2009) Section 3, 3.3.3 *Major Encroachments* from development works within >10% of the area of the Tree Protection Zone. This encroachment at this point is across and down slope to its current position, which in-turn will reduce any impact within the critical root zone as this specimen has an asymmetrical root crown due to the proximity of the existing building within six metres off the trunk. The alignment of the driveway to this specimen will be a major encroachment and installation is to be undertaken using pier and beam construction with a suspended slab. This will reduce impact on the structural root zone (SRZ).

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5.11 Tree 44 *Eucalyptus saligna* – Sydney Blue Gum, this specimen was found in good health & vigour at time of assessment and will be subject to major encroachment as per AS 4970 (2009) Section 3, 3.3.3 *Major Encroachments* from development works within >10% of the area of the Tree Protection Zone. This encroachment at this point is across and down slope to its current position, which in-turn will reduce any impact within the critical root zone as this specimen has an asymmetrical root crown due to the proximity of the existing building within six metres off the trunk. The alignment of the basement to this specimen will be a major encroachment. The excavation within the tree protection zone is to be undertaken using a vertical cut for the basement which will reduce impact on the structural root zone (SRZ) of this specimen.

5.12 Tree 45 *Syzygium luehmannii* - Small Leafed Lilly Pilly, this specimen was found in good health & vigour at time of assessment and are sufficiently setback from this development to not be affected and it is a minor encroachment.

Additionally, for trees 40, 44 & 45; hoardings are to be installed after demolition to protect these specimens from prevailing winds to the east until the new development has been constructed within this area. The impact will be that of minor encroachment for trees 1, 2, 3, 29 & 45 and Trees 40 & 44 will be subject to major encroachment as per AS 4970 (2009) Section 3, 3.3.3 *Major Encroachments* from development works within >10% of the area of the Tree Protection Zone.

These excavations must be supervised and certified by the Project Arborist in accordance with AS4970 (2009). Plans provided do not show the location of sewer, water or electricity supply to the proposed development.

General – Tree Protection works – Prior to Demolition and Tree Removal

5.13 The Tree Protection Zone for each tree/s is to be incorporated into the construction works for the site and the protection fencing or works to be located as indicated on the Appendix F – Tree Protection Plan. The setbacks from building works on the side closest to each tree are to be carried out as indicated in Table 2.0, and Tree Protection Zones be constructed as described here and detailed in Appendix C. The trees will be sustained within the constraints of the modifications to the site by the proposed development works.

5.14 Trees 1, 2, 3, 29(x5), 40, 44 & 45 are to be retained and protected and incorporated into the landscape works for the site, and Tree Protection Zone fencing to be marked accordingly on the Landscape Plan, where appropriate and installed prior to any demolition or construction.

5.15 Where applicable, any excavation for the establishment of a batter slope or benching for reasons of safety and to comply with Work Cover Authority safety regulations should be restricted as far as is safely possible near to trees to be retained to prevent root damage. If the excavations cannot be undertaken near to vertical the stability of these trees and their long-term viability may be compromised and their retention in a safe and healthy condition jeopardized and they may need to be revised and possibly removed.

Specific - Tree Protection Works - Prior to Demolition and Tree Removal

5.16 All other trees/shrubs; prior to demolition and tree removal works these tree/s are to be placed within a Tree Protection Zone with protective fencing and maintained and retained until the completion of all building works. Protective fencing is to be installed as shown in Appendix F - Tree Protection Plan.

- The Protective fencing where required may delineate the ***Tree Protection Zone*** **(TPZ)** and should be located as determined by the project arborist in accordance with AS4970 Protection of trees on development sites, Section 4, 4.3. "Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. The TPZ must be secured to restrict access. AS4687 Temporary fencing and hoardings specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area. Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots. Existing perimeter fencing and other structures may be suitable as part of the protective fencing" or similar.

- Tree Protection signage is to be attached to each ***TPZ*** and displayed from within the development site in accordance with AS4970 2009 *Protection of trees on development sites*

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- The area of the Tree Protection Zone to be mulched to a depth of 100 mm with organic material being 75% leaf litter and 25% wood, and this being composted material preferably from the same genus and species of tree as that to where the mulch is to be applied, i.e. species specific mulch. The depth of mulch and type as indicated, to be maintained for the duration of the project. Where deep excavation will expose the soil profile to drying out the root plate is to be protected by pegging jute matting across the ground surface 2 m back from the edge of the profile and 2 m down the face of the profile and is to be in one continuous sheet or layers up to 5 mm thick and overlapped 300 mm and pegged. Pegs are to be a minimum length of 200 mm and spaced at 500 mm increments in a grid pattern. Once installed mulch is to be placed on top of the jute matting previously described.

5.17 There is to be no storage of materials, rubbish, soil, equipment, structures or goods of any type to be kept or placed within 5 metres from the trunk or within the dripline of any tree for the duration of the development. This will ensure protection of the tree/s to be retained on or adjacent to site.

Demolition and Tree Removal/s

5.18 All other trees are to be removed as they are located within the site in a position where they cannot be retained due to the proposed building envelopes and its infrastructure such as excavation of the basement where encroachment will have an adverse impact on its roots and crown for viability and stability. **Consent will need to be sort from Council and a neighbouring property for the removal of trees 27 & 28 which are adjacent to the fenceline at the end of Princes Lane. These specimens were both found to be suffering considerable trunk damage either in the basal area of within the mid crown and form a structural / stability issue for all neighbouring properties as these specimens could collapse in part or full.**

5.19 Removal of a tree within 6 m of a tree to be retained should be undertaken only by cutting down such a tree without damaging the trees to be retained, and by grinding out its stump. Where possible the structural roots of 20 mm diameter or greater of the tree to be cut down should not be removed, to minimize soil disturbance and to reduce the impact on the roots of any tree to be retained nearby. Where structural roots are to be removed this should be undertaken manually by the use of non-motorized hand tools after the stump has been ground out when such roots are often easier to locate from the site of the stump from which they have been severed.

Specific - Tree Protection works – Post Demolition and Prior to Construction

5.20 Location of underground utilities within a Tree Protection Zone of a retained specimen.
Any utility services to be located underground within the TPZ are to be undertaken utilising excavation techniques that prevent or minimise damage to structural roots (roots greater than >20 mm diameter). Such works should be conducted with non-motorised hand tools of with an air knife or water knife and vacuum truck or with directional drilling to prevent soil compaction and root damage.

Specific - Tree Protection works – During Construction

5.21 Where any structural roots (roots with a diameter of greater than >20 mm) encountered by excavation are to be pruned and it is to be undertaken with clean sharp pruning tools, with a final cut to undamaged wood to prevent infestation by pathogens and assist continued root growth and undertaken in consultation with the Consulting Arboriculturist. Tree Protection Zone fences are to be maintained during these works.

5.22 Re-grading of site near retained trees – Grading &/or re-grading of sites/slopes within Tree Protection Zones or near retained specimens is to be undertaken **only** if at all, after consultation with the Project Arborist. This is to protect all structural roots systems from damage or compaction from machinery.

5.23 Footpaths near retained specimens are to be constructed at ground level without any excavation, removing turf by raking, having sprayed with herbicide first if time permits. Here the path or driveway section is to extend for a distance past the tree equivalent to the lateral spread of the crown of that tree alongside the footpath, or driveway.

5.24 Placement of relocatable buildings– As the buildings being placed on pier and beam or skids construction as they are to be positioned out of their driplines within the Tree Protection Zone (TPZ). If required due to spatial constraintshe area of the Tree Protection Zone under the buildings is to be mulched to a depth of 200 mm (*if installed on skids*) with organic material to further reduce compaction. The mulch is to be composted material, i.e. species specific mulch. Alternatively, if installed on a pier & beam construction, piers are to be undertaken manually by using non-motorized hand tools to determine the location of first order and lower order structural roots with a diameter of 20 mm (*structural woody roots*) or greater, without damaging them.

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5.25 All Tree Protection Zones of retained trees are to be monitored for the duration of the construction phase of the development. The three main areas requiring monitoring are; *mulching* - mulch must be maintained to a depth of 50–100 mm using material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required, *Watering* - soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within the TPZ. An above-ground irrigation system could be installed and maintained by a competent individual and *weeding* - weeds should be removed by hand without disturbing soil or should be controlled with weedicide.

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

6.0 CONCLUSION

Twenty eight (28) trees are nominated for removal and replacement with species in accordance with the associated Landscape documentation for the development. The twenty three (23) trees to be preserved will be retained and protected through the implementation of adequate measures for their integration into the development by the application of appropriate technology as detailed in this report. Where appropriate, the Landscape Plan will include planting with new trees including street tree/s.

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

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

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

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

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7.0 RECOMMENDATIONS

7.1 Trees 1, 2, 3, 29(x5), 40, 44 & 45 are to be retained in situ within the site and are to be protected as detailed in 5.6 - 5.16 & 5.19 – 5.25. Tree protection fences, or works, to be located in accordance with *Site Plan B - Trees To Be Retained And Tree Protection Zones* (Appendix F).

7.2 Where Tree Protection Zone fences are to be moved or relocated this must be undertaken in consultation with the Consultant Arboriculturist for the project to ensure that tree protection is maintained. If areas are impeding access is to be mulched in accordance with 5.21 of this report.

7.3 Tree Protection Zones are to be adhered to; to minimise damage to retained crowns. This must be undertaken in consultation with the Consultant Arboriculturist for the project to ensure that tree protection is maintained. Minor pruning may be required for trees 40 – 44 to clear building line, work to undertaken in accordance with section 4 of this report.

7.4 Trees 4, 5, 6, 7, 8, 9, 10-17, 18, 19, 20, 21, 22-26, 27, 28, 30-39, 42, 41, 43, 46 & 47 are to be removed which is to be undertaken in accordance with section 4.0, parts 4.1 - 4.3.

7.5 Tree removal near retained specimens is to be undertaken in accordance with 5.23 of this report.

7.6 Any work to be undertaken within Tree Protection Zones is to be undertaken in accordance with 7.2 of this report.

7.7 There is to be no storage of materials, rubbish, soil, equipment, structures or goods of any type to be kept or placed within 5 metres from the trunk or within the dripline of any tree for the duration of the development. This will ensure protection of the tree/s to be retained on or adjacent to site.

7.8 Each of the replacement are to be a vigorous specimen with a straight trunk, gradually tapering and continuous, crown excurrent, symmetrical, with roots established but not pot bound in a volume container or approved similar and be maintained by an appropriately qualified and experienced landscape contractor for up to one (1) year after planting, or as appropriate.

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

REFERENCES

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

PRELIMINARY

Appendix A

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

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

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

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

Tree Significance - Assessment Criteria

1. High Significance in landscape

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

2. Medium Significance in landscape

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

3. Low Significance in landscape

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

Environmental Pest / Noxious Weed Species

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

Hazardous/Irreversible Decline

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

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

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

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Table 1.0 Tree Retention Value - Priority Matrix.

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

Legend for Matrix Assessment

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	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

PRELIMINARY

REFERENCES

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

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

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

Appendix B

Matrix - Sustainable Retention Index Value (SRIV) ©

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.
An index value is given to each category where ten (10) is the highest value.

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

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Appendix C

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

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

3.1 Tree protection zone (TPZ)

"The tree protection zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The TPZ incorporates the structural root zone (SRZ) (refer to Clause 3.3.5)."

3.2 Determining the TPZ

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

TPZ = DBH x 12

where

DBH = trunk diameter measured at 1.4 m above ground

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

Section 3, Determining the protection zones of the selected trees

3.3.5 Structural root zone (SRZ)

"The SRZ is the area required for street stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when a major encroachment into a TPZ is proposed. Root investigation may provide more information on the extent of these roots."

Determining the SRZ

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

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

where

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

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

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

NOTES:

1 R_{SRZ} is the structural root zone radius.

2 D is the stem diameter measured immediately above root buttress.

3 The SRZ for trees less than 0.15 m diameter is 1.5 m.

4 The SRZ formula and graph do not apply to palms, other monocots, cycads and tree ferns.

5 This does not apply to trees with an asymmetrical root plate.

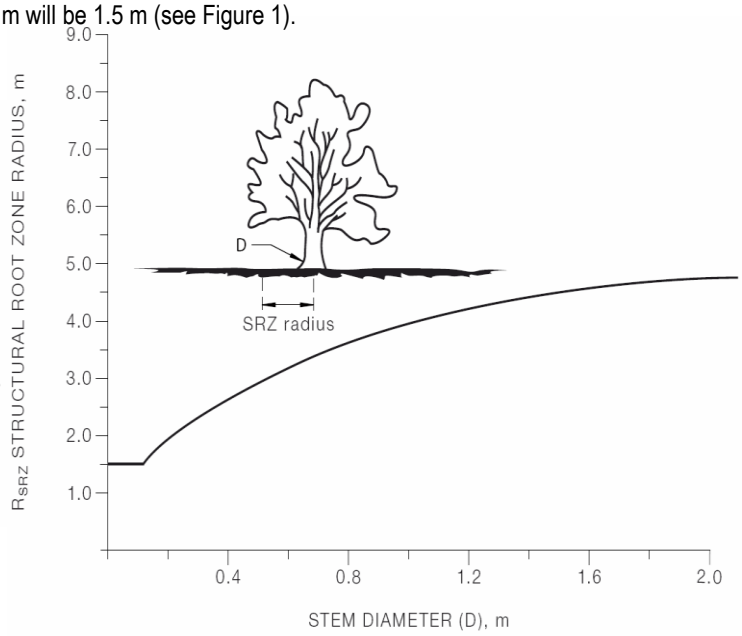

FIGURE 1 STRUCTURAL ROOT ZONE

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Appendix D

Glossary

From
Dictionary for Managing Trees in Urban Environments
Institute of Australian Consulting Arboriculturists (IACA) 2009.

Vigour

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

Good 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.*

Age of Trees

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

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

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

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

Periods of Time

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

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

Short Term A period of time less than <1 – 15 years.

Medium Term A period of time 15 – 40 years.

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

Trunk

Trunk A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

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

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

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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 (1st) and possibly second (2nd) 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.

Leaning Trees

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

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0°-15° from upright.

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

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

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

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

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

PRELIMINARY

Form of Trees

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

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

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

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

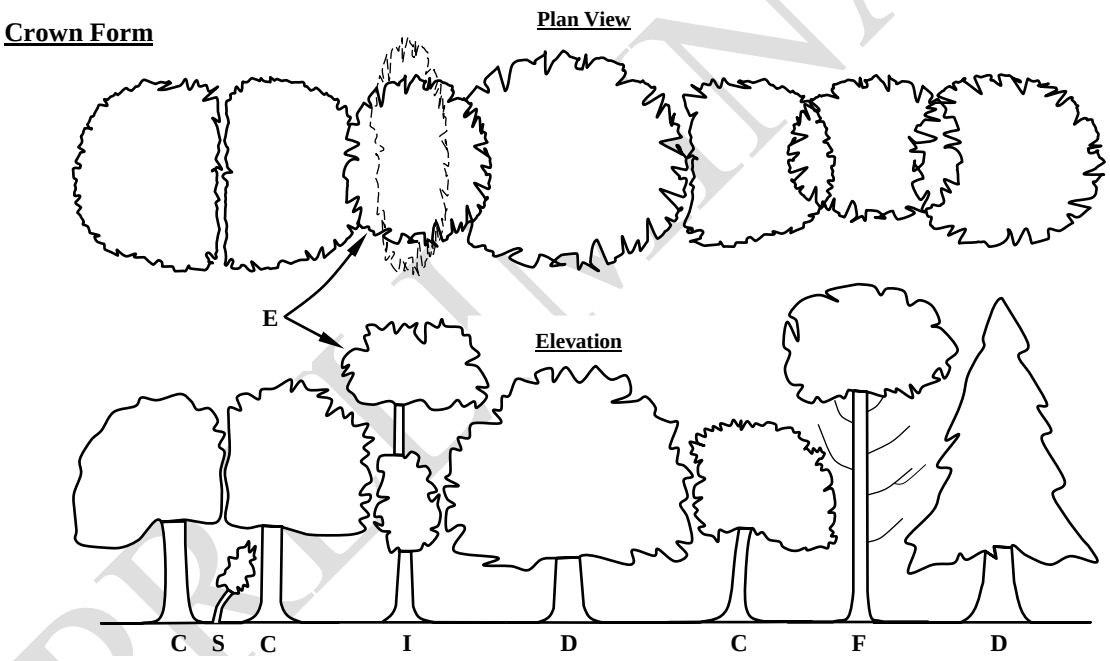
Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides.

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

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

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

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



(Source: **D**, **C**, **I** and **S**, and Elevation, Matheny and Clark 1998, **E**, **F** and Plan View, IACA 2005)

D. Dominant, **F.** Forest, **C.** Codominant, **E.** Emergent, **I.** Intermediate, **S.** Suppressed

PRELIMINARY

Symmetry

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

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

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

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

Crown Spread Orientation Non-radial Where the crown extent is longer than it is wide, e.g. east/west or E/W. Further examples, north/south or N/S, and may be *Crown Form Codominant*, e.g. **A** or **B**, *Crown Form Intermediate* e.g. **A**, or *Crown Form Suppressed* e.g. **B**, *and* crown symmetry is *symmetrical* e.g. **A**, or *asymmetrical* e.g. **B**.

Crown Spread Orientation Radial Where the *crown spread* is generally an even distance in all directions from the trunk and often where a tree has *Crown Form Dominant* and is *symmetrical.*

Significant Important, weighty or more than ordinary.

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

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

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

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.

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

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

PRELIMINARY

Deadwood

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

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

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

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

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

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

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

Dieback

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

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

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

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

Epicormic shoots

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

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

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

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

Roots

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

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

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

Root Crown Roots arising at the base of a trunk.

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

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

This report has relied upon the following plan/s and documents which have been reproduced from electronic transmission and further altered by scanning are no longer to original scale:

Ground Floor Plan, Drawing No. MA03, Revision A, Date 24.10.2012, Scale 1:200 @ A1 by Greengate Design Pty Ltd, Level 1, 156 Gloucester Street, Sydney NSW 2000. Tel: 02 9256 5615.

PRELIMINARY

Appendices E & F

Appendix E – Survey of Subject Tree/s

Appendix F – Tree Protection Plan

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

Redgum Tree No./Stand No.	*Genus and species*	Common name
1	*Angophora floribunda*	Rough Barked Apple
2	*Elaeocarpus reticulatus*	Blueberry Ash
3	*Melaleuca quinquinervia*	Broad Leafed Paperbark
4	*Pittosporum undulatum*	Native Daphne
5	*Pittosporum undulatum*	Native Daphne
6	*Lophostemon confertus*	Queensland Brush Box
7	*Grevillea robusta*	Silky Oak
8	*Banksia marginata*	Silver Banksia
9	*Lophostemon confertus*	Queensland Brush Box
10	*Melaleuca armillaris*	Bracelet Honey Myrtle
11	*Pinus patula*	Mexican Weeping Pine
12	*Ulmus glabra 'Lutescens'*	Scotch Elm
13	*Banksia marginata*	Silver Banksia
14	*Callistemon viminalis 'Dawson River'*	Dawson River Weeper
15	*Ulmus parvifolia*	Chinese Elm
16	*Syzygium sp.*	Lily Pilly
17	*Lophostemon confertus*	Queensland Brush Box
18	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush
19	*Lophostemon confertus*	Queensland Brush Box
20	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush
21	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush
22	*Tristaniopsis laurina*	Water Gum
23	*Callistemon viminalis 'Dawson River'*	Dawson River Weeper
24	*Eucalyptus sp.*	Eucalypt
25	*Agonis flexuosa*	Weeping Myrtle
26	*Thuja orientalis*	Bookleaf Conifer
27	*Eucalyptus sp.*	Eucalypt
28	*Eucalyptus scoparia*	Wallangarra White Gum
29/2	*Melaleuca quinquinervia x 5*	Broad Leafed Paperbark
30	*Melaleuca bracteata 'Revolution Gold'*	Golden Honey Myrtle
31	*Melaleuca bracteata 'Revolution Gold'*	Golden Honey Myrtle
32	*Callistemon viminalis 'Hanna Ray'*	Hanna Ray Bottlebrush
33	*Acmena smithii*	Lilly Pilly
34	*Tristaniopsis laurina*	Water Gum
35	*Callistemon viminalis 'Dawson River'*	Dawson River Weeper
36	*Pittosporum undulatum*	Native Daphne
37	*Jacaranda mimosifolia*	Jacaranda
38	*Acacia glaucescens*	Coastal Myall
39	*Platanus x hispanica*	London Plane Tree
40	*Eucalyptus saligna*	Sydney Blue Gum
41	*Eucalyptus saligna*	Sydney Blue Gum
42	*Eucalyptus saligna*	Sydney Blue Gum
43	*Eucalyptus saligna*	Sydney Blue Gum
44	*Eucalyptus saligna*	Sydney Blue Gum
45	*Syzygium luehmannii*	Small Leafed Lilly Pilly
46	*Jacaranda mimosifolia*	Jacaranda
47	*Archontophoenix cunninghamiana*	Bangalow Palm

PRELIMINARY

Appendix E - Site Plan A – Survey of Subject Trees

Plan has been reproduced from electronic transmission and further altered by scanning and is no longer to original scale.

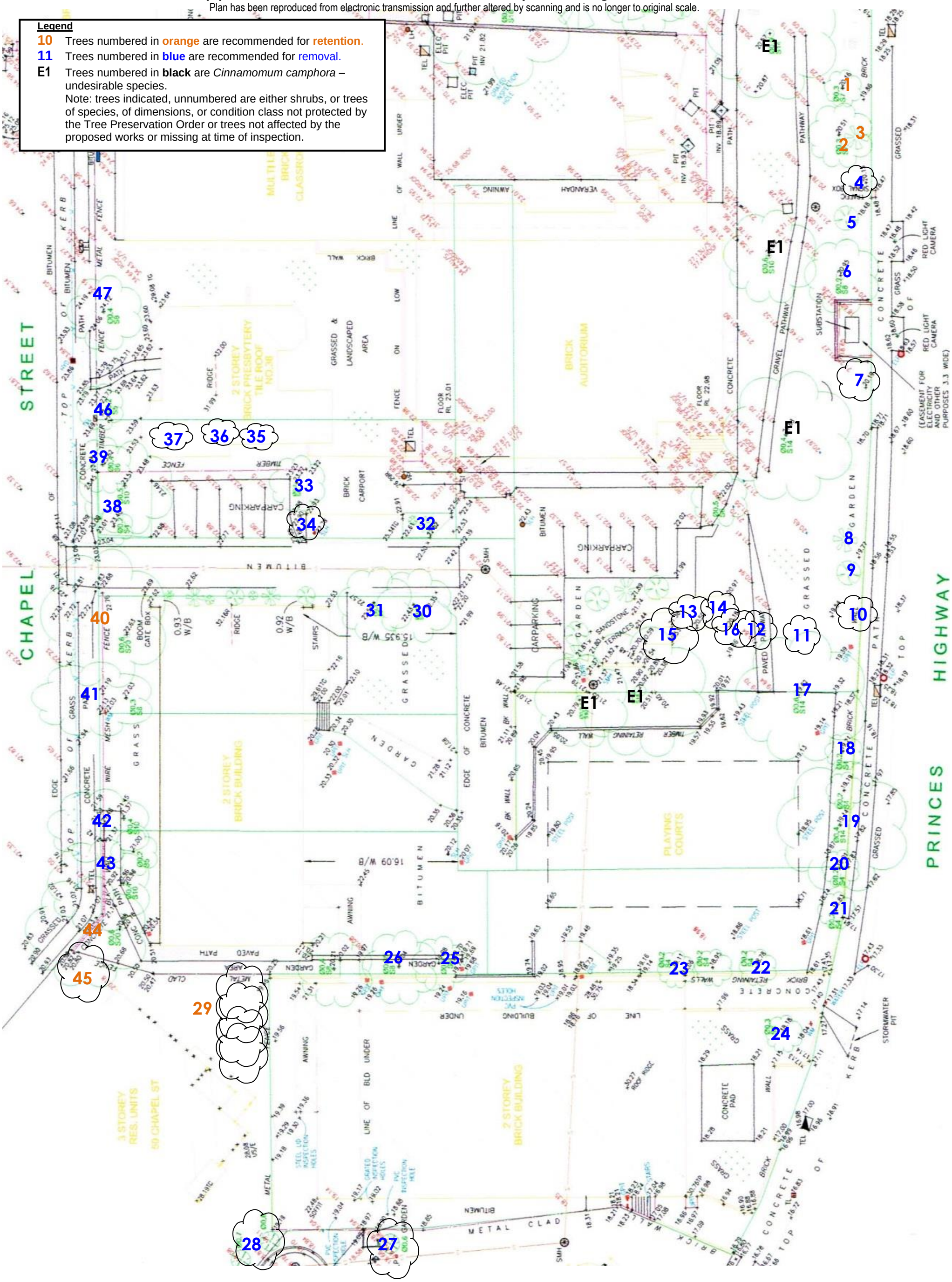
Legend

10 Trees numbered in **orange** are recommended for **retention**.

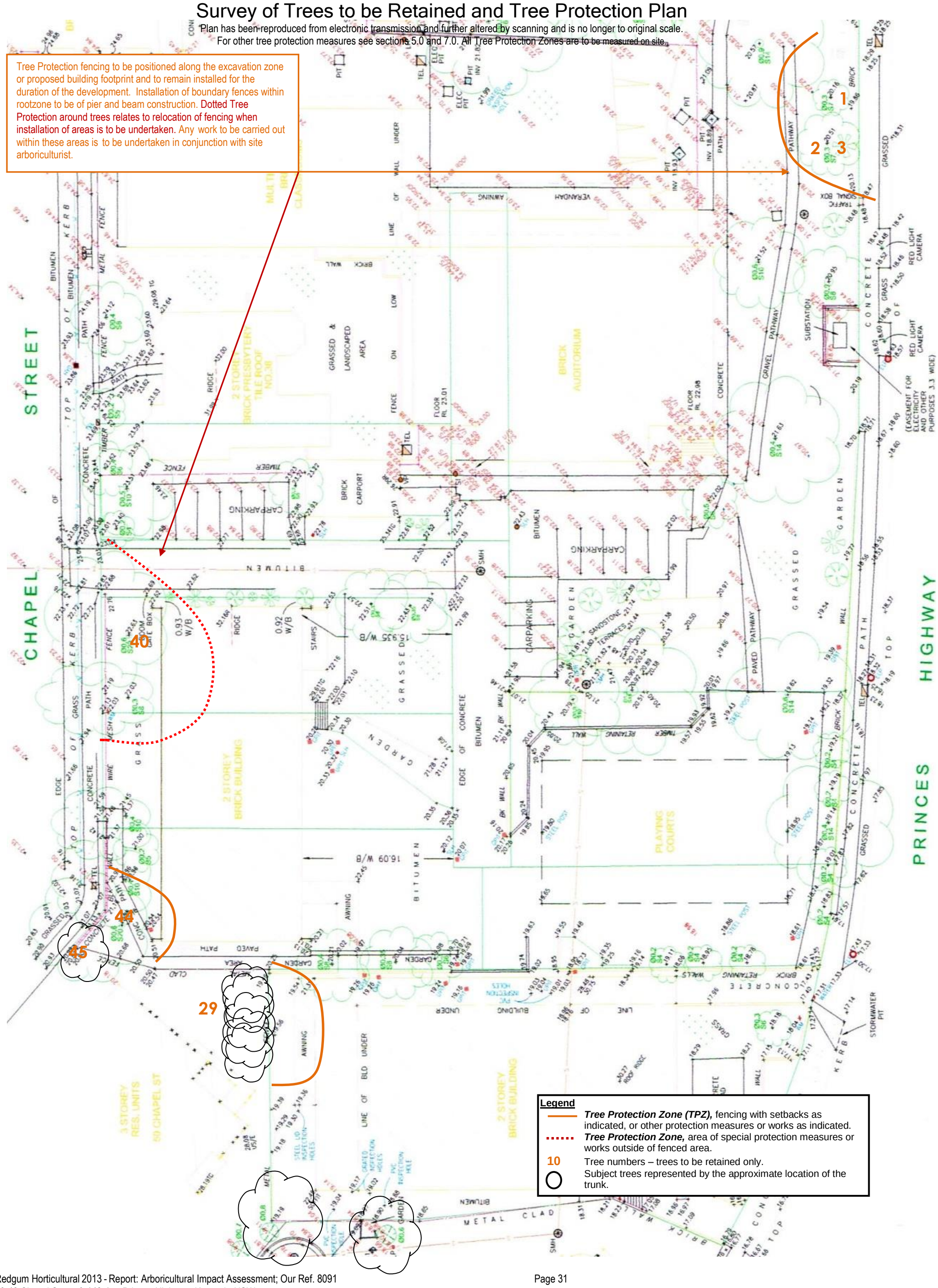
11 Trees numbered in **blue** are recommended for removal.

E1 Trees numbered in **black** are *Cinnamomum camphora* – undesirable species.

Note: trees indicated, unnumbered are either shrubs, or trees of species, of dimensions, or condition class not protected by the Tree Preservation Order or trees not affected by the proposed works or missing at time of inspection.



Appendix F - Site Plan B -
Survey of Trees to be Retained and Tree Protection Plan

Plan has been reproduced from electronic transmission and further altered by scanning and is no longer to original scale.
For other tree protection measures see sections 5.0 and 7.0. All Tree Protection Zones are to be measured on site.

Tree Protection fencing to be positioned along the excavation zone or proposed building footprint and to remain installed for the duration of the development. Installation of boundary fences within rootzone to be of pier and beam construction. Dotted Tree Protection around trees relates to relocation of fencing when installation of areas is to be undertaken. Any work to be carried out within these areas is to be undertaken in conjunction with site arboriculturist.