REDGUM Horticultural
Arboriculture & Horticulture Consultants
MEMBER OF INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS

Arboricultural Impact Assessment Report

Prepared for
Skylake Group Pty Ltd

Site
5 Whiteside Street & 14 – 16 David Avenue
North Ryde

Date
22nd December 2014

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1 Introduction

1.1 The following report was commissioned by Skylake Group Pty Ltd. The report is an arboricultural impact assessment report upon trees located within 5 Whiteside Street and 14 -16 David Street, North Ryde.

1.2 The aim of the assessment is to determine the condition, vigour, including landscape significance and identify the potential impacts the proposed development upon the trees located within and on adjoining properties. The report will to take into consideration Ryde City Councils Tree Management Controls.

1.3 The proposal entails the demolition of the existing dwelling, outbuildings and sheds and construction of a multi storey residential complex.

1.4 The inspection and development impact assessment report are based upon a site inspection on 18th December 2014. Forty one trees over 5m in height were assessed.

2 Methodology

2.1 The trees were visually inspected from ground level to determine the crown condition, class, structural defects, decay, signs of stress, epicormic growth and dieback (refer Appendix A & B)

2.2 A Significance of a Tree Assessment Rating System (STARS) was determined. A STARS rating establishes the contribution a tree has to the overall landscape, amenity qualities or importance due to species, size, historical/cultural planting or significance to the site (refer Appendix C).

2.3 Useful Life Expectancy (ULE) was determined. A ULE rating provides an estimate of a tree's expected remaining life span and takes into account the age, life span of the species and considers the current condition, vigour and major defects (refer Appendix D).

2.4 No root exploration, internal probing or aerial inspection was performed.

2.5 Where access was available tree height was measured with a Nikon Forestry Pro. Canopy spread and age were estimated and Diameter at Breast Height (DBH) and Diameter Above Root Buttress (DRB) was measured.

2.6 The comments and recommendations in this report are based on findings from a site inspection on 18th and 22nd December 2014

2.7 The photographs included in this report were taken at the time of the inspection.

2.8 A list of literature used in the preparation of this report is provided in the bibliography section.

2.9 Plans sighted in preparation of the report include:

Preliminary Drawing Nos DA.0.00 – DA.0.04, DA.1.01 – DA.1.15, DA.2.01, DA.3.01, DA.4.02, DA.4.02, DA.5.01, DA.6.01, DA.7.01- DA.7.03 Revision A by Marchese Partners dated 18/12/14 and the Survey Plan by Watson Buchan Pty Ltd dated 14/2/2008.

2.10 No hydraulic plans have been reviewed in the preparation of this report.

2.11 The subject trees are indicated on a marked up extract of the Survey by Watson Buchan Pty Ltd dated 14/2/2008 (refer Appendix H)

3 Observations

3.1 The Site

3.1.1 The subject site is a residential property identified 5 Whiteside and 14 & 16 David Ave, North Ryde. The property is located on the eastern side of Whiteside Street and is bordered by Epping Road to the north and residential properties to the south and east.

3.2 The Trees

3.2.1 Forty one trees were assessed in preparing the report. Details of the trees, their dimensions, condition, Useful Life Expectancy (ULE) and landscape significance (STARS) are attached in Appendix A.

3.3 Continuing Assessment

3.3.1 The tree assessment and recommendations are based upon the condition of the trees at the time of inspection. As trees continue to age and decline additional assessments may be necessary in the future.

3.3.2 As part of a responsible tree management and hazard assessment program, it is advised that an Australian Qualification Framework (AQF) Level 5 Arborist conduct a follow up assessment of the trees 2 years following completion of construction works.

4 Discussion

4.1 Tree Protection, Ecological and Heritage Significance

4.1.1 Tree Management Controls for Ryde City Council applies under LEP 2010 Clause 5.9 and DCP 2010 part 9.6 and generally protects any tree with a height greater than 5m **and** with a stem circumference of 450mm at a height of 1.4m above ground level. Some exemptions apply including *Syagrus romanzoffianum, Cinnamomum camphora, Salix Spp.* and all edible fruit and nut trees except *Acmena spp., Syzygium spp., Elaeocarpus spp*. or *Macadamia spp*.

4.1.2 However exemptions **do not apply** to trees listed within the following;

- Council's Significant tree Register,
- trees located within a site with vegetation classified as vulnerable, threatened or forms part of an endangered ecological community,
- within a heritage site or a heritage conservation area.

4.1.3 The subject property is not listed as a heritage item nor does the property fall within a heritage conservation area. Additionally no trees assessed are listed as significant within Council's Significant Tree Register, nor does the property fall within Councils Threatened Vegetation Map dated 11/9/2012.

4.1.4 Taking the above into consideration Trees 2, 5, 14, 15, 16, 18, 19, 34 & 35 **are exempt species** under Ryde City Council's Tree Management Controls.

4.2 Tree Retention Value and Landscape Significance

4.2.1 It is possible to determine a tree's significance and retention value based upon several factors including size, condition and maturity coupled with the methodologies STARS and ULE.

4.2.2 Generally trees identified as having a medium to long ULE and of high landscape value are given a high priority for retention in the design process.

Trees 1, 3, 4 25, 27 & 28 were assessed with a high landscape value and a long ULE.

4.2.3 Trees of high landscape significance with a short ULE should not be given importance for preservation, as these trees are considered to be short term prospects only and are best replaced with advanced good quality stock.

Tree 33 & 36 fulfil this criterion.

4.2.4 Trees identified with a medium landscape value together with a medium ULE are considered less critical and may be marked for retention where possible.

Trees 6, 7, 8, 9 10, 11, 12, 17, 21, 22, 23, 32, 37, 38, 39 & 40 fulfil this criterion.

4.2.5 While trees assessed with a short ULE and a medium to low STARS value are unsuitable for retention and should be removed.

Trees 2, 5, 10A, 13, 14, 15, 16, 18, 19, 20, 24, 25, 29, 30, 31, 34 & 35 with a short ULE and low STARS value or are exempt species.

4.3 AS4970-2009 Protection of trees on development sites

4.3.1 Australian Standard 4970-2009, Protection of trees on development sites, was established to provide appropriate guidelines to ensure the long term viability and stability of trees to be retained on development sites.

4.3.2 Tree Protection Zones (TPZ) are based on the diameter of the tree measured at 1.4 metres above ground level x 12 (refer Table 1 for calculated TPZ's). The TPZ is measured from the centre of the tree's trunk to the proposed edge of excavation/development works. The recommended setback is declared a TPZ where construction, trenching, soil level changes and use of machinery should be excluded.

4.3.3 The Structural Root Zone (SRZ) is the area required for stability, a far larger area is necessary to maintain a viable tree. Therefore **no** excavation or construction shall encroach within the SRZ (refer Table No 1 for calculated SRZ's). The SRZ is determined adopting the formula from AS4970-2009 where the SRZ radius = $(D \times 50)^{0.42} \times 0.64$. Where D = trunk diameter, in m, measured above the root buttress.

4.3.4 Under AS4970 the appropriate Tree Protection Zone (TPZ) for a monocotyledon, including palms, cycads and tree ferns should be 1m outside the crown projection. Structural Root Zones (SRZ) cannot be applied to monocots (p13 AS4970-2009).

4.3.5 Under AS4970-2009 a minor encroachment of 10% of the area is allowable, provided this is compensated for elsewhere and contiguous to the TPZ. Should more than a 10% encroachment occur then the Project Arborist must demonstrate the tree/palm can be protected and remain in a viable state.

TREE No	*DBH 1 (cm)*	*DBH 2 (cm)*	*DBH 3 (cm)*	*Total DBH (cm)*	*DRB (cm)*	*Palm radius to dripline (m)*	*TPZ radius (m)*	*10% Reduced TPZ (m) Limited to one side only*	*SRZ radius (m)*
1	34	-	-	34	45	-	4.1	2.9	2.4
3	63	36	25	77	86	-	9.2	6.3	3.2
4	37	46	-	60	76	-	7.2	5.0	3.0
6	-	-	-	-	-	2.0	3.0	-	Nil to apply
7	-	-	-	-	-	2.0	3.0	-	Nil to apply
8	-	-	-	-	-	2.0	3.0	-	Nil to apply
9	15	19	20	32	49	-	3.8	2.6	2.5
10	9	15	-	18	22	-	2.2	1.8	1.8
11	15	23	-	28	30	-	3.4	2.4	2.0
12	53	-	-	53	61	-	6.4	4.4	2.7
17	-	-	-	-	-	2.0	3.0	-	Nil to apply
24	26	-	-	26	33	-	3.1	2.2	2.1
26	48	-	-	48	55	-	5.8	4.0	2.6
27	60	-	-	60	65	-	7.2	5.0	2.8
28	70	-	-	70	80	-	8.4	5.8	3.1
32	75	-	-	75	85	-	9.0	6.2	3.1
36	90	-	-	90	110	-	10.8	7.5	3.5
37	38	-	-	38	41	-	4.6	3.2	2.3
38	57	21	19	64	70	-	7.7	5.3	2.9
39	28	-	-	28	30	-	3.4	2.4	2.0
40	34	-	-	34	35	-	4.1	2.9	2.2

Table No 1 Calculated Tree Protection & Structural Root Zones.

4.3.6 When determining the impacts of an encroachment into the TPZ, some consideration may be given to the following;

- The potential loss of root mass resulting from the encroachment determined by root mapping (number, size and percentage)
- Species tolerance to root disturbance
- Age and vigour of the trees
- The presence of existing or past structures (with solid footings) or obstacles which may affect root growth.

4.3.7 Tree sensitive construction techniques such as pier and beam, suspended slab systems or discontinuous footings can minimise the impact upon a tree's root system **and must be adopted** should a major encroachment into the TPZ be contemplated. A major encroachment is considered between 15 - 35% of the root zone impacted. Greater than a 50% impact upon the root zone of the trees will be difficult to support even adopting tree sensitive techniques.

4.4 Proposed Tree Removal

4.4.1 Nine (9) trees are exempt under Ryde City Councils Tree Management Controls and identified as Trees 2, 5, 14, 15, 16, 18, 19, 34 & 35.

4.4.2 In addition large tickets and individual *Ligustrum lucidum* (Large Leafed Privet) are located within and on the adjoining properties. The species are an environmental weed species and are exempt under Ryde City Council. These trees were not assessed but are identified within Appendix H.

4.4.2 Eighteen (18) trees fall within the footprint of the proposal and require removal to facilitate the proposal and are identified as Trees 4, 5, 6, 7, 8, 9, 10, 10a, 11, 12, 13, 17, 20, 21, 22, 23, 24, 25. Of these trees, Tree 4 is identified as having a high retention value.

4.5 Proposed Development Impacts

4.5.1 **Tree 1** identified as a *Corymbia citriodora*, has a calculated TPZ of 4.1m and SRZ of 2.4m. The existing unmade road into the property is proposed to be formalised with new vehicular crossover and driveway. **Tree 1** is a Council street tree. No detailed plans were sighted in relation to the footpath. In order to retain the street tree is will be necessary to maintain a minimum 2.9m (10% minor encroachment) for any proposed upgrade of the footpath and vehicular crossover.

4.5.2 **Tree 3** identified as a *Corymbia maculata,* is indicated within the preliminary plans for retention. The specimen is offset approximately 2m to the entry/exit for the proposed southern carpark to building B. The proposal is a major encroachment of > 33% of the TPZ and falls within the 3.2m SRZ. Tree 3 cannot be retained in a viable state and will require removal under the proposal.

4.5.3 **Tree 26** identified as a *Grevillea robusta*, is located on the adjoining property 166 Epping Rd and assessed with a high retention value. Preliminary view Plans DA8.02 and DA8.07 indicate the soil levels will be raised and retaining walls constructed along the boundary of 166 Epping Rd and 16 David Ave. The tree is offset < 1.0m of the boundary, with a 5.8m TPZ and 2.6m SRZ the works are a major encroachment of > 40%. To ensure the tree is retained in a viable state is will be necessary to amend the design to ensure no change in grade including excavation and construction occurs within the minimum 4.0m 10% minor TPZ encroachment.

4.5.4 **Trees 27 & 28** identified as *Corymbia maculata*, are located on the adjoining property 166 Epping Rd with a high retention value. Preliminary view Plans DA8.02 and DA8.07 indicate the soil levels will be raised and retaining walls constructed along the boundary of 166 Epping Rd and 16 David Ave. The trees are offset < 1.0m of the boundary. With a 7.2m & 8.4m TPZ and 2.6m and 3.1m SRZ the works are a major encroachment of > 40%. To ensure the trees are retained in a viable state is will be necessary to amend the design to ensure no grade changes or construction occurs within the 5.0m (Tree 27) and 5.8m (Tree 28) the acceptable and 10% minor TPZ encroachment.

4.5.5 **Trees 29-30** are identified as young to semi mature self-sown *Grevillea robusta*, of low amenity. Their location was not plotted within the survey plan and their positions are roughly indicated within Appendix H. Although unlikely to be impacted by the proposal it is recommended the trees be removed in order to facilitate the open space area to the north of Building A.

4.5.6 **Tree 32** identified as a *Cupressus glabra,* is located along the western boundary of the adjoining property 6 David Ave. A minor and acceptable encroachment of 6.2m applies. The rear of the property and tree location is not indicated in relation to the excavation for the Basement – Building B Plan DA.1.08. Therefore it is challenging to discern the proposed impacts to Tree 32, however it is estimated the encroachment is major and exceeds the 10% acceptable 6.2m TPZ. It will be necessary to ensure a minimum 6.2m offset is provided. Should the proposal encroach within 6.2m of Tree 32, then it will be necessary to amend the design to ensure the neighbouring tree is retained.

4.5.7 **Tree 37** is a *Jacaranda mimosifolia* and is less critical for retention. The tree is directly impacted by the proposed vehicular cross over and driveway to the west of Building C. **Tree 37** will require removal to facilitate the proposed driveway.

4.5.8 **Tree 33** is identified as an over mature *Eucalyptus robusta* with a ULE of < 5 years. Although indicated for retention the tree is at best a short term prospect and is recommended for removal.

4.5.9 **Tree 36** is an over mature specimen, located on the adjoining property 63 Parklands Ave. The proposed Basement – Building B is sufficiently setback at > 12m to the north and the proposal does not encroach within the 10.8m TPZ.

4.5.10 **Tree 38** has a calculated TPZ of 7.7m and is assessed with a medium retention value as a result of overcrowding from the adjoining trees. Building D is offset approximately 5.0m to the south, while the Preliminary View Plans DA8.02 and DA8.07 indicate the soil levels will be raised throughout the site and retaining walls constructed along the boundary. The proposed works are a major encroachment of > 40% of the TPZ. The tree will require removal to facilitate the proposed design.

4.5.11 **Tree 40** is offset < 2.0m to the south of Building C. With a 4.1m TPZ and 2.2m SRZ, the proposal is a major encroachment of approximately 21% of the TPZ. The tree is assessed as less critical for retention and is recommended for removal.

5 Conclusions/Recommendations

5.1 Forty one (41) trees including five trees located on the adjoining properties were assessed as part of this report. The proposal seeks to demolish the existing dwelling, out buildings and sheds and construct a multi storey residential complex.

5.2 Nine (9) trees assessed are exempt species under Ryde City Council's Tree Management Controls.

5.3 Due to the proposed building envelope and basement car parking areas, twenty four (24) trees will require removal to facilitate the proposal.

5.4 A design change will be necessary in order to retain four (4) high amenity trees located within the adjoining properties, identified as Trees 1, 26, 27, 28 & 32. The TPZ's as provided within Table 1 of the report shall be utilised as a guideline for minimum development setbacks, where no excavation, underground utilities or grade changes occur.

5.5 Any design changes, in particular those influencing the trees on the adjoining properties will require arboricultural advice to ensure the design modifications protect the long term viability the neighbouring trees.

5.6 The trees to be retained shall be protected in accordance with the Tree Management Plan as provided within Section 6 of the report.

6 Tree Management Plan

Prior to demolition works, a Site Arborist shall be appointed to supervise all tree protection procedures detailed in this specification. The Site Arborist shall have a minimum level 5 AQF qualification in Arboriculture.

6.1 Pre-determined Arborist Supervision – Witness Points

The following pre-determined Site Arborist stages are witness points and will require the attendance of the Site Arborist who will document the works and provide their signature stating an inspection has taken place and all works are completed in accordance this Tree Protection Plan and AS4970-2009 Protection of Trees on Development Sites.

Witness Point	Action	Check Box
Tree Removal	Prior to tree felling, the Site Arborist will inspect that proposed tree removal complies with Council's Notice of Determination.	Inspected, documented & certified by Site Arborist **YES/NO**
Tree Protection Zones	The Site Arborist shall inspect the Tree Protection Fencing and any necessary Ground Protection complies with the nominated Tree Protection Zones and Appendix G.	Inspected, documented & certified by Site Arborist **YES/NO**
Machinery Access	An access route for machinery shall be determined prior to demolition and construction works. Any temporary ground protection within the Tree Protection Zones shall be undertaken as per Appendix G.	Inspected, documented & certified by Site Arborist **YES/NO**
Demolition Works	The Site Arborist shall be in attendance during the removal any existing structures within the TPZ those trees to be retained.	Inspected, documented & certified by Site Arborist **YES/NO**
Earth Works	The Site Arborist to monitor any earthworks within the TPZ's. **Note** these works must be undertaken with small hand held machinery.	Inspected, documented & certified by Site Arborist **YES/NO**
Practical Completion	The Site Arborist to inspect and assess the tree/palm condition and provide certification of tree protection at all the above mentioned Supervision Stages.	Inspected, documented & certified by Site Arborist **YES/NO**

Table No 2. Witness Points for Site Arborist Inspections

6.2 Agreement

The Site Arborist and the Site Foreman shall agree upon and designate storage, dumping and wash areas prior to demolition works.

Contractors and site workers shall be informed of these Tree Protection Specifications and the significance of the trees to be retained.

The Site Forman is responsible for all tree protection procedures on the site as per this document and whenever the arborist is not on site.

It is the responsibility of the Site Forman to provide **a minimum 3 days notice** to the Site Arborist for the pre-determined witness points.

Any breaches to the Tree Protection Plan shall be reported immediately.

6.3 List of Trees to be retained and protected

Pre-determined Witness Point. The Site Arborist shall inspect, document and certify Tree Fencing or Ground Protection & TPZ comply with Appendix F & G.

6.4 Tree Protection Fencing and Signage

Tree Protection must be achieved with a 1.8 metre high chain link erected at the TPZ distances nominated in Table No 1.

Tree Protection Fencing and shade cloth shall be erected prior to commencement of works and be maintained in a good condition during the construction processes.

Signage indicating the area is a Tree Protection Zone (TPZ) shall be displayed on the fence line at 5m intervals and as per Appendix F of the report.

Signage shall be a minimum of 500 x 500mm and shall state No Access – Tree Protection Zone and include the contact details of the Site Foreman and Site Arborist (refer Appendix F)

6.5 Mulch

Mulch shall be spread within the TPZ's of the retained trees or as instructed by the Site Arborist. The mulch shall consist of Eucalyptus leaf mulch as certified to AS4454:1997 Composts, Soil Conditioners and Mulches. Mulch shall be spread to a depth of 75mm and maintained at this depth for the duration of works.

Pre-determined witness point. The Site Arborist shall inspect, document and certify Tree Protection Zones and Fencing is in accordance with this Tree Management Plan and AS4970-2009.

6.6 Ground Protection

If works occur within the TPZ of the retained trees the Site Arborist shall determine if appropriate ground protection is required and the ground surface within the TPZ shall be protected with a geotextile overlaying the existing mulch. Thick recycled railway ballast shall be placed over the geotextile (Refer Appendix F).

6.7 Restricted Activities

The area within the Tree Protection Zone shall exclude the following works:

- Parking of vehicles or plant
- Installation of temporary site offices or amenities.
- Wash down areas
- Excavation by large machinery
- Preparation of chemicals including paint, cement or mortar.
- Vehicular movement
- Pedestrian access
- Excavation, trenching or tunnelling.
- No excavation or trenching unless under the supervision of the Site Arborist.

6.8 Works within the TPZ

Pre-determined Witness Points. The Site Arborist shall be in attendance during any works within the nominated TPZ.

Any proposed works within the TPZ shall be undertaken by hand or with an air knife.

6.9 Completion of Works within Tree Protection Zone

At completion of works within the TPZ the fencing shall be restored as specified in point 6.4.

6.10 Soft and Hard Landscaping

Installation of soft or hard landscaping including paving, turf or plant material within the TPZ shall be undertaken by hand.

Planting holes are to be hand dug with a shovel or garden trowel.

6.11 Tree Damage

Any damage to a protected tree shall be reported to the Site Arborist immediately.

6.12 Post Construction

The Site Arborist shall make a final inspection to assess tree condition.

Any questions relating to this arborist report should be directed to Glenyss Laws.

Yours Sincerely

Glenyss Laws
Dip Arboriculture
Assoc Dip Landscape
Member I.A.C.A Member No 28
A.I.H, I.S.A & S.M.A.
Qualified and Practicing Arborist/Horticulturist.
Since 1996

Assumptions

Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible. However Glenyss Laws – Consulting Arborist can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

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

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AS4373-2007 Pruning of Amenity Trees. Standards Australia.

AS4970-2007 Protection of trees on development sites. Standards Australia.

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

APPENDIX A

Schedule of Tree Inventory

Tree No	Tree Species	Age Class	DBH (mm)	DRB (mm)	Tree Height (M)	Crown Width (M)	Crown Condition	Crown Class	STARS	ULE	Root Zone/ Defects/ Services	Comments
1	*Corymbia citriodora*	M	340	450	17	10	4	D	1	1A	Gr, Pa,K/-/-	Street tree
2	*Cinnamomum camphora*	M	Est 700	Est 800	12	9	4	C	3	2B	Gr/-/-	DBH & DRB measurements estimated due to site restrictions. Forms 5 x leaders between 1 – 1.5m from ground level. Exempt species under Ryde City Councils Tree Management Controls
3	*Corymbia maculata*	M	360, 250, 630	860	15	14	4	D	1	1A	Gr, Pa/-/Bu	Displays good condition and vigour.
4	*Cupressus macrocarpa*	M	370 & 460	760	13	7	4	C	1	1A	Gr/-/-	Forms two leaders at 0.5m from ground level – union appears sound. Within footprint of proposal.
5	*Syagrus romanzoffianum*	M	-	-	13	6	5	C	3	2B	Gr/-/-	Exempt species under Ryde City Councils Tree Management Controls
6	*Archontophoenix cunninghamiana*	M	-	-	10	4	5	C	2	2A	Gr/-/-	Located within footprint of proposal.
7	*Archontophoenix cunninghamiana*	M	-	-	11	4	5	C	2	2A	Gr/-/-	Located within footprint of proposal
8	*Archontophoenix cunninghamiana*	M	-	-	10	4	5	C	2	2A	Gr, Pa/-/Bu	Located within footprint of proposal
9	*Callistemon viminalis*	M	150, 190 & 200	490	8	7	3	C	2	2A	Ex, C/-/-	Specimen contained within horse paddock, compacted & exposed root system. Forms three leaders at ground level. Located within footprint of proposal.
10	*Callistemon viminalis*	M	90 & 150	220	8	7	3	C	2	2A	Ex, C/-/-	Specimen contained within horse paddock, compacted & exposed root system. Located within footprint of proposal
10A	*Macadamia integrifolia*	Y	140	180	5	3	3	S	3	5A	C/-/-	Specimen contained within horse paddock, compacted soils. Within footprint of proposal

Tree No	Tree Species	Age Class	DBH (mm)	DRB (mm)	Tree Height (M)	Crown Width (M)	Crown Condition	Crown Class	STARS	ULE	Root Zone/ Defects/ Services	Comments
11	*Syzygium paniculatum*	S	150 & 230	300	9	4	4	I	2	2A	C/W/-	Wounds measuring 35 x 5cm & 35 x 16cm within lower trunk due to horse grazing. Specimen contained within horse paddock. Located within footprint of proposal
12	*Eucalyptus camaldulensis*	M	530	610	13	12	3	D	2	2A	C/-/-	Located within footprint of proposal.
13	*Lagerstroemia indica*	M	130, 140, 160, 110, 90 & 170	310	7	8	3	C	3	4C	Gr/L,S/-	Forms multiple leaders at ground level. Lopped at 3m and large crack developing in lower trunk measuring 70cm extending into root crown. Located within footprint of proposal.
14	*Morus nigra*	M	Est 400	Est 440	9	13	3	C	3	3B	Gr/-/Bu	Restricted site access located in fenced off area adjoining stable. Exempt species under Council's Tree Management Controls - edible fruit tree. Self-sown specimen. Located within footprint of proposal.
15	*Syagrus romanzoffianum*	M	-	-	8.5	7	5	C	3	2B	Gr/-/Bu	Exempt species under Ryde City Councils Tree Management Controls
16	*Syagrus romanzoffianum*	M	-	-	8	6	5	C	3	2B	Gr/-/-	Exempt species under Ryde City Councils Tree Management Controls
17	*Washingtonia filifera*	M	-	-	6.5	4.5	5	C	2	1A	Gr/-/-	Located within footprint of proposal.
18	*Syagrus romanzoffianum*	M	-	-	12	7	5	C	3	2B	Gr/-/-	Exempt species under Ryde City Councils Tree Management Controls
19	*Salix species*	O	270	340	4	7	3	D	3	4C	Gr/D,F/-	Exempt species under Ryde City Councils Tree Management Controls. Decay encompassing > 50% of trunk circumference. Leader failure.
20	*Eucalyptus species*	Dead	-	-	15	-	0	D	3	4A	C/-/-	Dead specimen no perceivable habitat value.
21	*Eucalyptus species (Possibly Eucalyptus punctata)*	Y	210	270	12	5	4	D	2	5B	Gr/-/	Located within footprint of proposal.

Tree No	Tree Species	Age Class	DBH (mm)	DRB (mm)	Tree Height (M)	Crown Width (M)	Crown Condition	Crown Class	STARS	ULE	Root Zone/ Defects/ Services	Comments
22	*Eucalyptus punctata*	Y	140	260	8	4	4	C	3	5B	Gr/B/	Major borer infestation in basal region ringbarking to 50% trunk circumference. Located within footprint of proposal.
23	*Eucalyptus punctata*	Y	130	170	8	3	4	C	3	5B	Gr/-/	Located within footprint of proposal.
24	*Grevillea robusta*	S	260	330	13	7	4	C	2	5B	Gr/-/	Self-sown specimen. Located within footprint of proposal.
25	*Grevillea robusta*	Y	260	320	8	4	3	C	3	5B	Gr/-/	Self-sown specimen. Located within footprint of proposal.
26	*Grevillea robusta*	M	Est 480	Est 550	20	4	4	C	1	1B	Gr/-/	VTA limited tree on adjoining property 166 Epping Rd.
27	*Corymbia maculata*	M	Est 600	Est 650	22+	15	4	C	1	1B	Gr/F/-	VTA limited tree on adjoining property 166 Epping Rd.
28	*Corymbia maculata*	M	Est 700	Est 750	22+	16	4	C	1	1B	Gr/-/-	VTA limited tree on adjoining property 166 Epping Rd.
29	*Grevillea robusta*	Y	220	280	10	4	4	D	2	5B		Young, self-sown specimen
30	*Grevillea robusta*	Y	Est 300	Est 330	11	4	4	C	2	5B	Gr/-/-	Young, self-sown specimen
31	*Grevillea robusta*	S	Est 300	Est 350	11	4	4	E	2	5B	Gr/-/-	Self-sown specimen
32	*Cupressus glabra*	M	Est 750	Est 850	17	12	3	D	2	2A	No access	VTA limited, tree on adjoining property western boundary 6 David Ave. Dieback evident in eastern canopy, forms 4 x leaders at approx 1.8m from ground level.

Tree No	Tree Species	Age Class	DBH (mm)	DRB (mm)	Tree Height (M)	Crown Width (M)	Crown Condition	Crown Class	STARS	ULE	Root Zone/ Defects/ Services	Comments
33	*Eucalyptus robusta*	O	Est 600	Est 700	15	13	2	D	3	4A	O/-/-	Limited VTA due to dense thicket of woody weed species beneath canopy. Holds < 30% live foliage and major deadwood between 50 – 200mm in diameter. Forms multiple leaders decay visible within 2 x western leaders.
34	*Morus nigra*	M	230 & 160	-	7	10	4	D	3	3A	Gr/B,D,S/-	Exempt species under Council's Tree Management Controls - edible fruit tree. Self-sown specimen
35	*Cinnamomum camphora*	M	Multi Est 800	Est 850	12	14	4	D	3	2B	Gr/L/-	Exempt species. Limited VTA due to dense thicket of *Ligustrum lucidum* (Large Leafed Privet) growing beneath dripline of canopy. Forms numerous leaders at ground level, most likely felled in the past & allowed to regenerate.
36	*Eucalyptus species, likely Eucalyptus acmenoides*	O	Est 900	Est 1100	18+	12	2	D	2	4A	-/D,C/-	Limited Assessment, tree on adjoining property 63 Parklands Rd. Forms codominant leaders at approx 2m from ground level. Over mature with complete dieback of 2nd leader holding a large cavity and associated decay. Dieback of upper canopy of remaining leader.
37	*Jacaranda mimosifolia*	M	380	410	12	10	3	C	2	2A	Gr/-/	Located within footprint of vehicular access Building C

Tree No	Tree Species	Age Class	DBH (mm)	DRB (mm)	Tree Height (M)	Crown Width (M)	Crown Condition	Crown Class	STARS	ULE	Root Zone/ Defects/ Services	Comments
38	*Ficus microcarpa var. 'Hillii*	M	570, 210, 190	Est 700	15	16	4	S	1	2C	Gr/-/-	Epicormic growth arising from ground level. Originally formed 2 leaders near ground level, one leader since removed. On moderate lean to east due to overcrowding from Tree 28.
39	*Chamaecyparis obtusa*	M	280	300	8	4	4	C	2	1A	Gr, Pa/-/-	Located within footprint of Building D.
40	*Lagerstroemia indica*	M	multi		8	5	4	C	2	2A	Gr/-/Bu	Forms numerous leaders within 1.5m of existing dwelling. Major encroachment under AS4970.

LEGEND

Trees highlighted in Green are of high landscape and SULE and should be retained and protected.

Trees highlighted in Blue should be retained where possible.

Trees highlighted in Pink are recommended for removal due to decline, structural defects etc., or are environmental weed species.

Denotes trees proposed for removal to facilitate proposal

Denotes trees on adjoining properties or a street tree which will require a design change to accommodate neighbouring

APPENDIX B

Notes on tree inventory schedule

Tree No: Relates to number on site diagram.

Species: Coded to tree species schedule

Age Class:

Y	Young- recently planted
S	Semi mature- <20% of life expectancy
M	Mature- 20-80% of life expectancy
O	Over mature- >80% of life expectancy

Height: In metres

Crown Diameter: In metres

Crown Class:

D	Dominant	Crown extends above general canopy; not restricted by other trees.
C	Co-dominant	Crown forms the bulk of the general Canopy but crowded by other trees.
I	Intermediate	Crown extends into dominant/ codominant canopy but quite crowded on all sides.
S	Suppressed	Crown development restricted from Overgrowing trees.

Crown Condition: Overall vigour and vitality

0	Dead
1	Severe decline (<20% canopy density; major dead wood)
2	Declining (20-60% canopy density; twig and branch dieback)
3	Average/ low vigour (60-90% canopy density; twig dieback)
4	Good (90-100% canopy density; little or no dieback or other problems)
5	Excellent (100% canopy density; no deadwood or other problems)

Root Zone:

C	Compaction
D	Damaged/wounded roots
E	Exposed roots
Ga	Tree in garden bed
Gi	Girdled roots
Gr	Grass
K	Kerb close to tree
L+	Raised soil level
L-	Lowered soil level
M	Mulched
Pa	Paving/concrete/bitumen
Pr	Roots pruned
O	Other

Defects:

B	Borers
C	Cavity
D	Decay
F	Previous failures
I	Inclusions
L	Lopped
M	Mistletoe/parasites
S	Splits/Cracks
T	Termites
O	Other
W	Wounds

Services adjacent structures:	Bs	Bus stop
	Bu	Building within 3 metres
	Hvo	High voltage open wire construction
	Hvb	High voltage bundled (ABC)
	Lvo	Low voltage open wire construction
	Lvb	Low voltage bundled (ABC)
	Na	No services above
	Nb	No services below
	Si	Signage
	Sl	Street light
	T	Transmission lines
	U	Underground services
	O	Other

STARS:	Significance of a Tree Assessment Rating System (copyright Institute of Australian Consulting Arborists 2010)
ULE:	Useful Life Expectancy after Barrell 2001

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

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

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

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

Tree Significance - Assessment Criteria

1. High Significance in landscape

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

2. Medium Significance in landscape

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

3. Low Significance in landscape

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

Environmental Pest / Noxious Weed Species

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

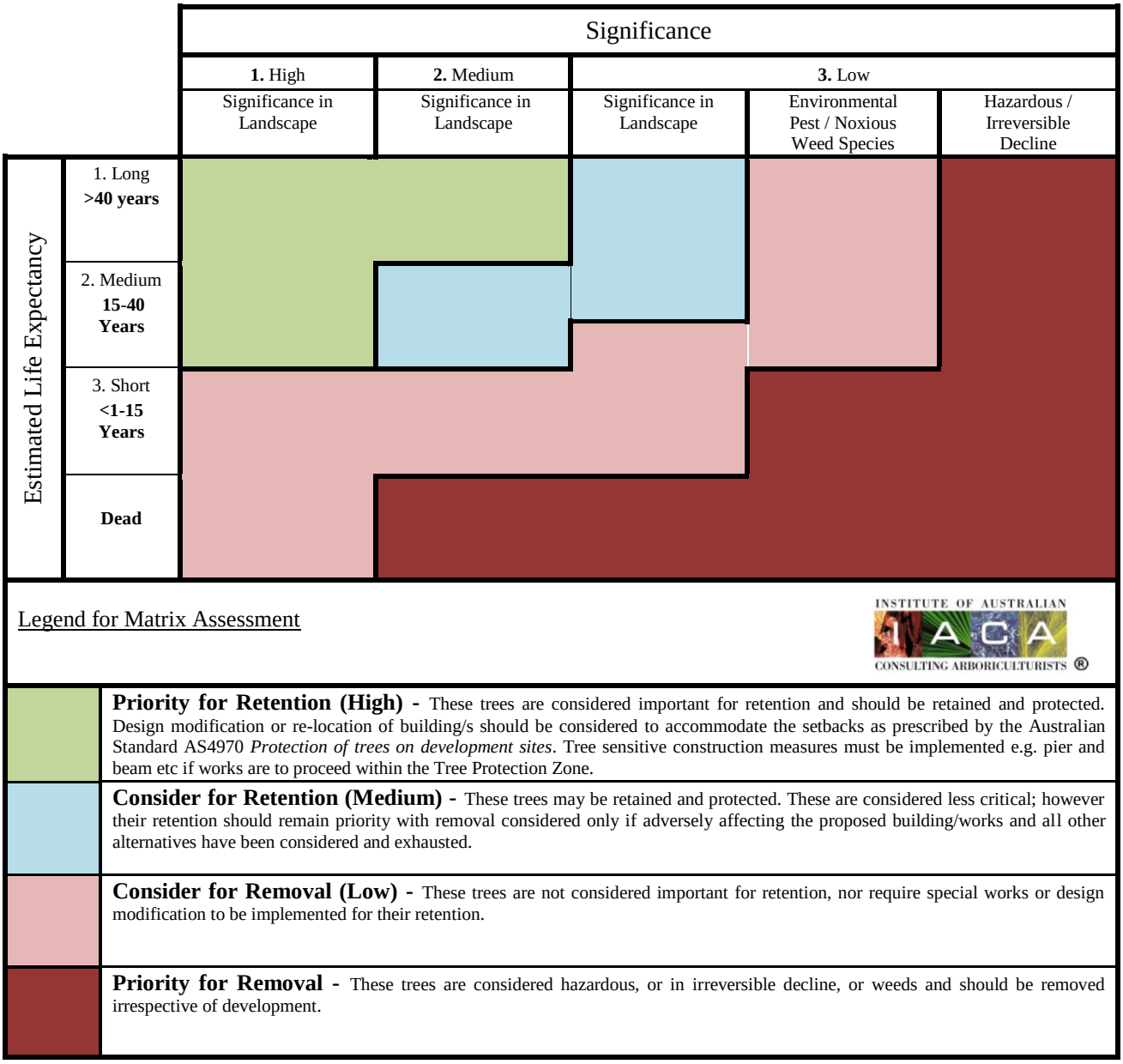
Hazardous/Irreversible Decline

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

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

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

Table 1.0 Tree Retention Value - Priority Matrix.



USE OF THIS DOCUMENT AND REFERENCING

The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

IACA, 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

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 D
ULE RATING (UPDATED 1/4/01) BARRELL

1.Long ULE: Trees that appear to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.	**2.Medium ULE:** Trees that appear to be retainable at the time of assessment for more than 15-40 years with an acceptable level of risk.	**3.Short ULE:** Trees that appear to be retainable at the time of assessment for more than 5-15 years with an acceptable level of risk.	**4.Remove:** Trees that should be removed within the next 5 years.	**5.Small, young or regularly pruned:** Trees that can be reliably moved or replaced.
(A) Structurally sound trees located in positions that can accommodate future growth	**(A)** Trees that may only live between 15 and 40 more years.	**(A)** Trees that may only live between 5 and 15 more years.	**(A)** Dead, dying, suppressed or declining trees because of disease or inhospitable conditions.	**(A)** Small trees less than 5 Metres in height.
(B) Trees that could be made suitable for retention in the long term by remedial tree care.	**(B)** Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.	**(B)** Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.	**(B)** Dangerous trees because of instability or recent loss of adjacent trees.	**(B)** Young trees less than 15 years old but over 5 metres in height.
(C) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.	**(C)** Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.	**(C)** Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.	**(C)** Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.	**(C)** Formal hedges and trees intended for regular pruning to artificially control growth.
	(D) Trees that could be made suitable for retention in the medium term by remedial tree care.	**(D)** Trees that require substantial remedial tree care and are only suitable for retention in the short term.	**(D)** Damaged trees that are clearly not safe to retain.	
			(E) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.	
			(F) Trees that are damaging or may cause damage to existing structures within 5 years.	
			(G) Trees that will become dangerous after removal of other trees for the reasons given in (A) to (F).	
			(H) Trees in categories (A) to (G) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.	

Appendix E
List of photographs

Figure 1. Trees 1 & 2 *Corymbia citriodora and Cinnamomum camphora*

Figure 2. Tree/Palms 5 – 8 mix of *Syagrus romanzoffianum and Archontophoenix cunninghamiana*

Figure 3. Trees 9 – 12 located towards the southern boundary.

Figure 4. Tree/Palms 15-18

Figure 5. Tree 19 *Salix babylonica*- exempt species.

Figure 6. Tree 20 – dead *Eucalyptus species*.

Figure 7. Trees 21 – 24 young to semi mature *Eucalyptus punctata*.

Figure 8. Trees 26 - 28 located on the southern boundary of the adjoining property 166 Epping Rd.

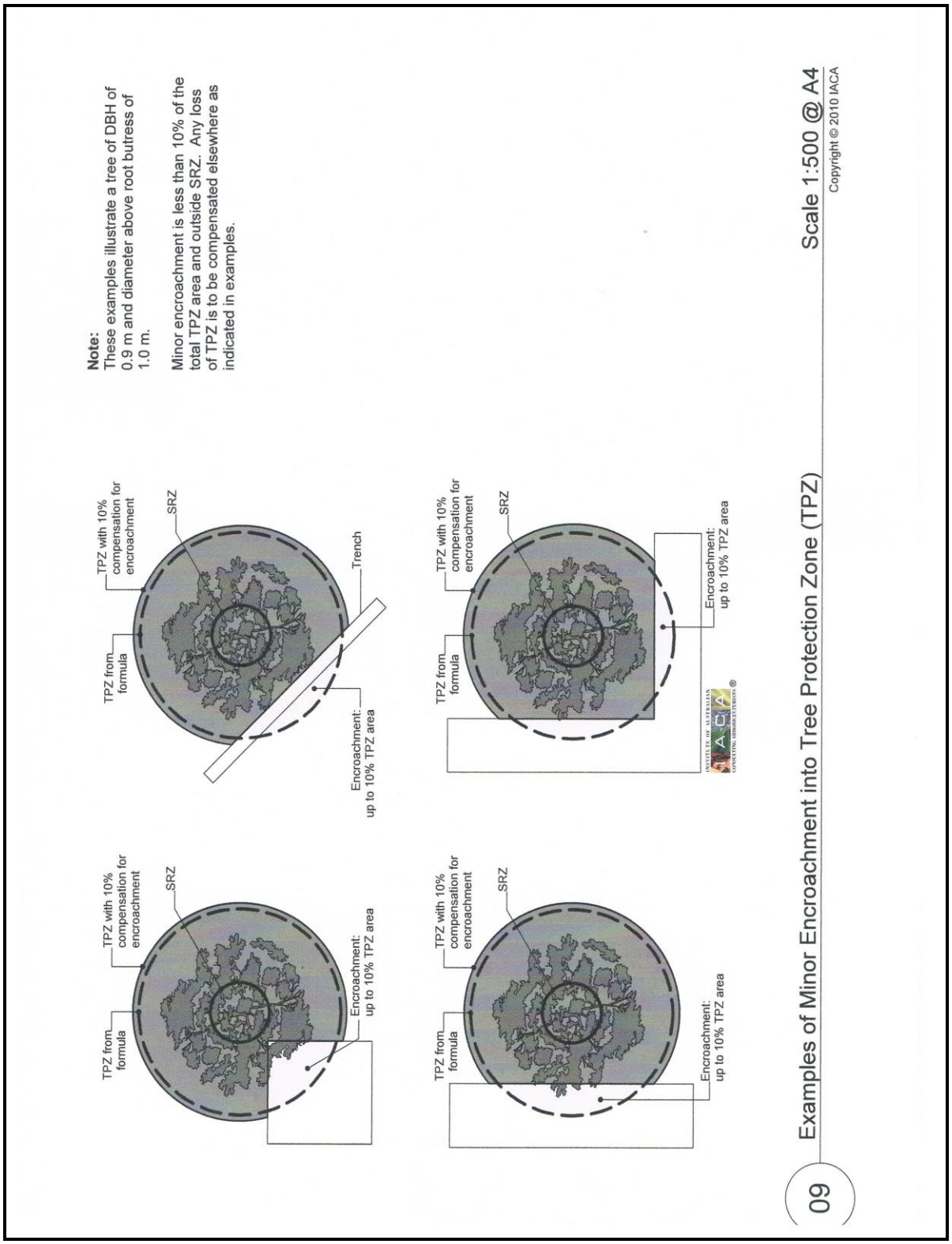
Figure 9. Trees 30 - 31 self-sown *Grevillea robusta* within thicket of *Ligustrum lucidum* near the northern boundary/dirt road access from Epping Rd.

Figure 10. Tree 32 located on adjoining property 6 David Ave requires a minimum 6.2m TPZ.

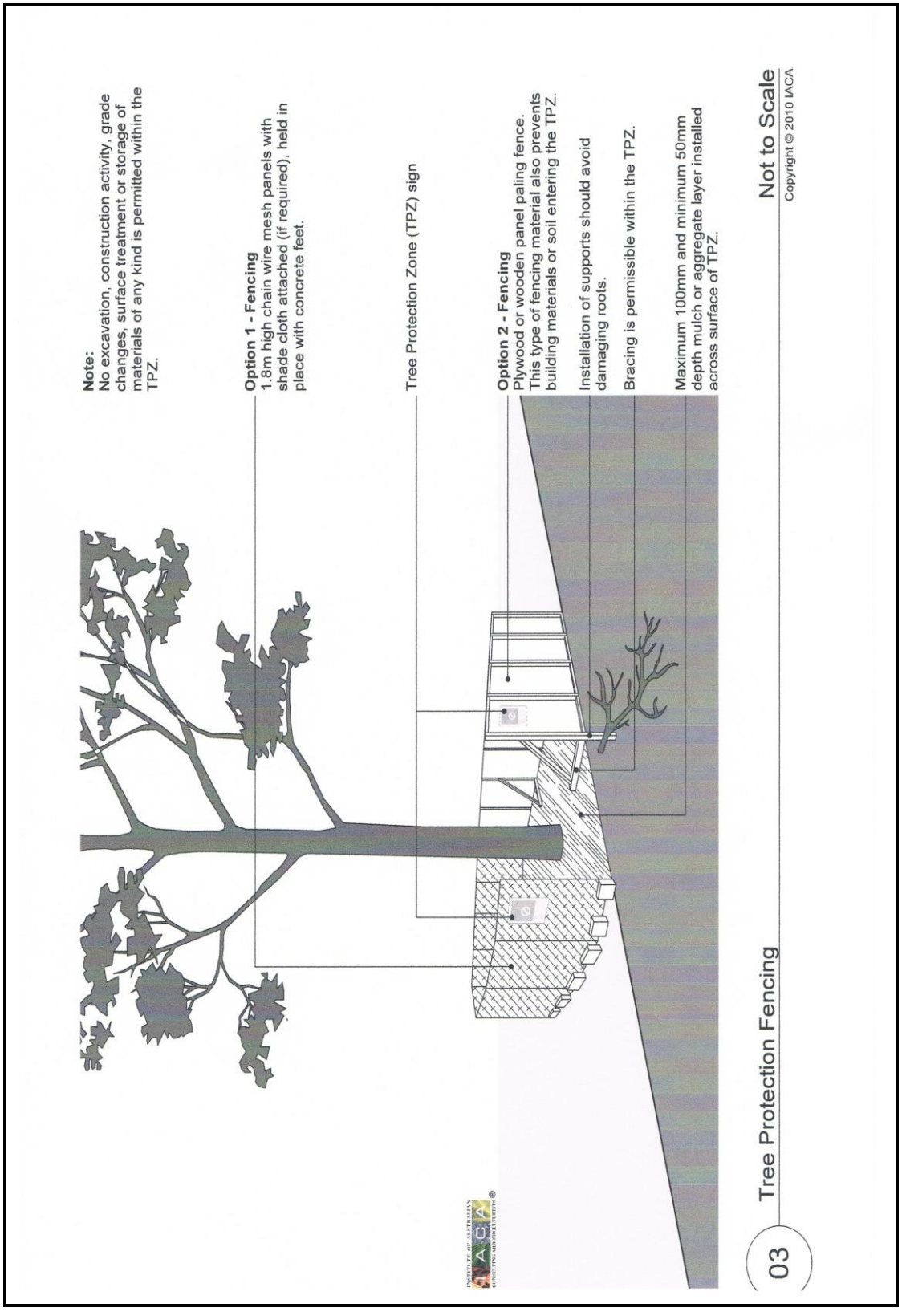
Figure 11. Tree 33 over mature *Eucalyptus robusta*

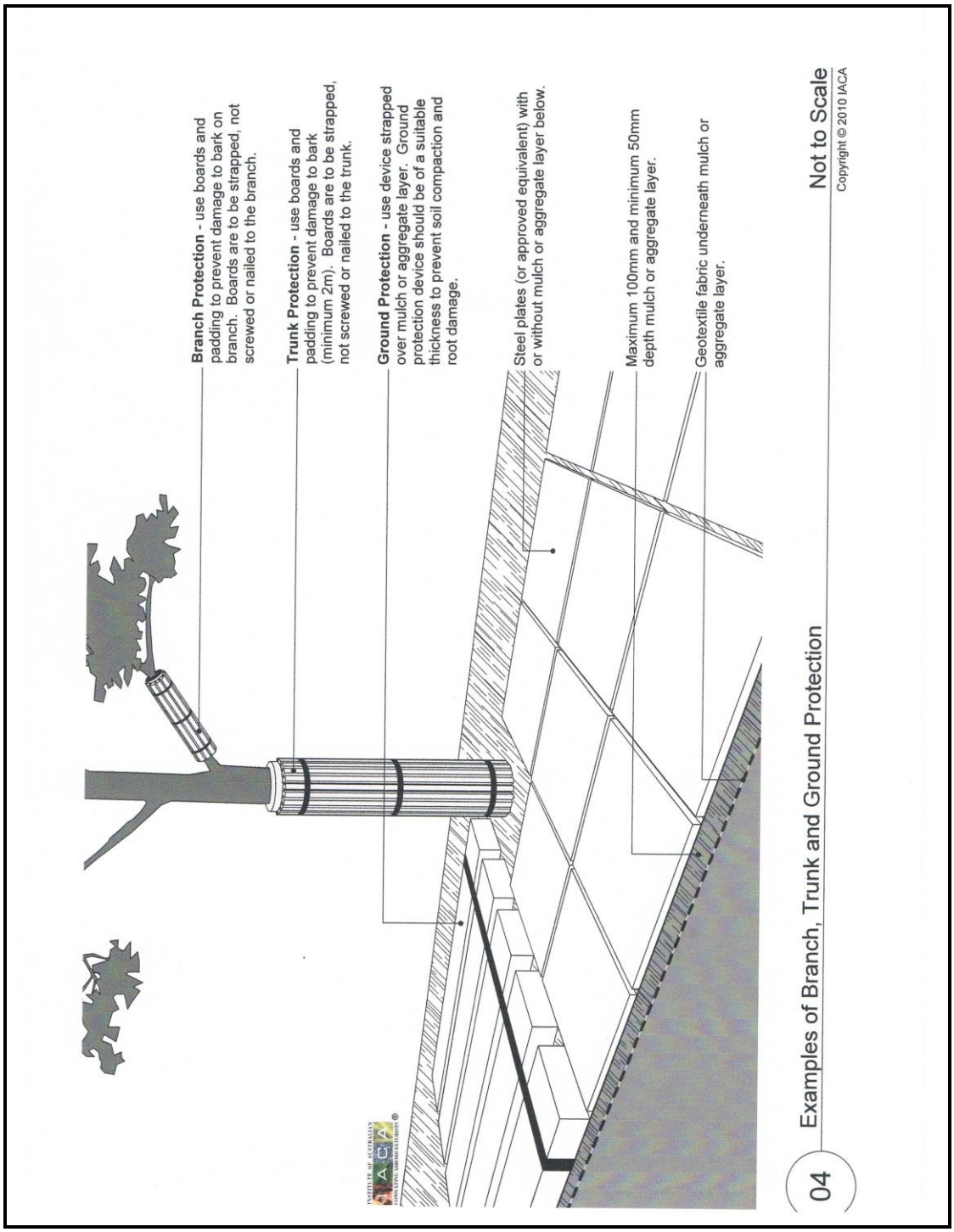
Figure 12. Tree 38 - *Ficus microcarpa var 'Hillii* on a moderate lean to the east due to suppression

APPENDIX F
Examples of Minor Encroachment into TPZ (IACA 2010) ©



APPENDIX G
Tree Protection Fencing and Signage (IACA 2010)©




Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.
Trunk Protection - use boards and padding to prevent damage to bark (minimum 2m). Boards are to be strapped, not screwed or nailed to the trunk.
Ground Protection - use device strapped over mulch or aggregate layer. Ground protection device should be of a suitable thickness to prevent soil compaction and root damage.
Steel plates (or approved equivalent) with or without mulch or aggregate layer below.
Maximum 100mm and minimum 50mm depth mulch or aggregate layer.
Geotextile fabric underneath mulch or aggregate layer.
04
Examples of Branch, Trunk and Ground Protection
Not to Scale
Copyright © 2010 IACA


TREE
PROTECTION
ZONE
NO ACCESS
CONTACTS
Project Arborist
Name:
Phone Number:
Site Superintendent
Name:
Phone Number:
08
Example of Tree Protection Zone (TPZ) Signage
Scale 1:5 @ A4
Copyright © 2010 IACA

APPENDIX H
Survey Plan