AUSTRALIS
Tree Management

Arboricultural Impact Assessment

BWC2/25
Blacktown Workers Sports Club
170 Reservoir Road, Arndell Park

Proposed Seniors Living Village

Client:	**Paynter Dixon Constructions Pty Limited** **Level 2, 2 Richardson Place** **NORTH RYDE NSW 2113**
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2	For Client Review	19th January 2016
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Summary

Australis Tree Management has been commissioned by Paynter Dixon Constructions Pty Limited to complete an arboricultural impact assessment. This report aims to identify the health and condition of the trees, potential impacts from proposed works and to provide recommendations regarding tree retention, protection and removals.

On the 11th December 2015, I attended the Blacktown Workers Sports Club site at 170 Reservoir Road, Arndell Park and inspected sixty two (62) trees, which are located within the selected area 'B' within the sports club grounds.

I completed a modified Tree Survey Form (Matheny & Clark, 1994), applied 'STARS' ratings (AICA, 2010) as well as taking supporting photographs of the trees.

Thirty eight (38) trees onsite are selected for retention and twenty four (24) onsite trees are selected for removal.

The development proposed is for the removal of the selected trees for the construction of a seniors living complex.

The tree defects and symptoms that were encountered have been discussed in section 5 and a detailed tree schedule is included in appendix a.

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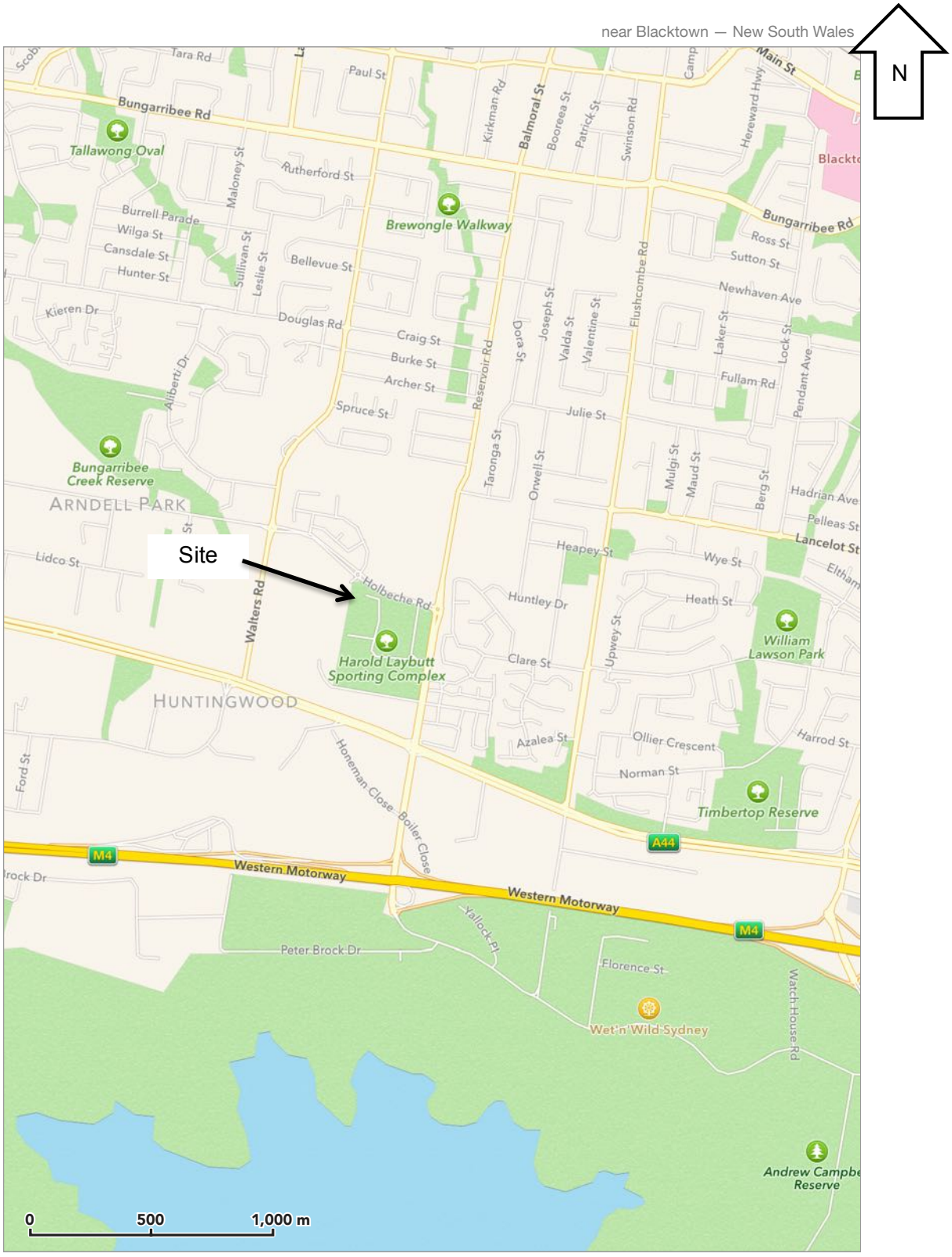
Abbreviations

EPBC Act……Environment Protection & Biodiversity Act 1999
LGA……Local Government Authority
NPWS……National Parks & Wildlife Service
NPW Act……National Parks & Wildlife Act 1974
TSC Act……..Threatened Species and Conservation Act, 1995
NW Act……Noxious Weeds Act, 1993
SRZ……Structural Root Zone
TPO……Tree Preservation Order
TPZ……Tree Protection Zone

Location Map

170 Reservoir Road, Arndell Park



1 of 1

Source – Apple Maps

Figure 1 Location Map

Site Map

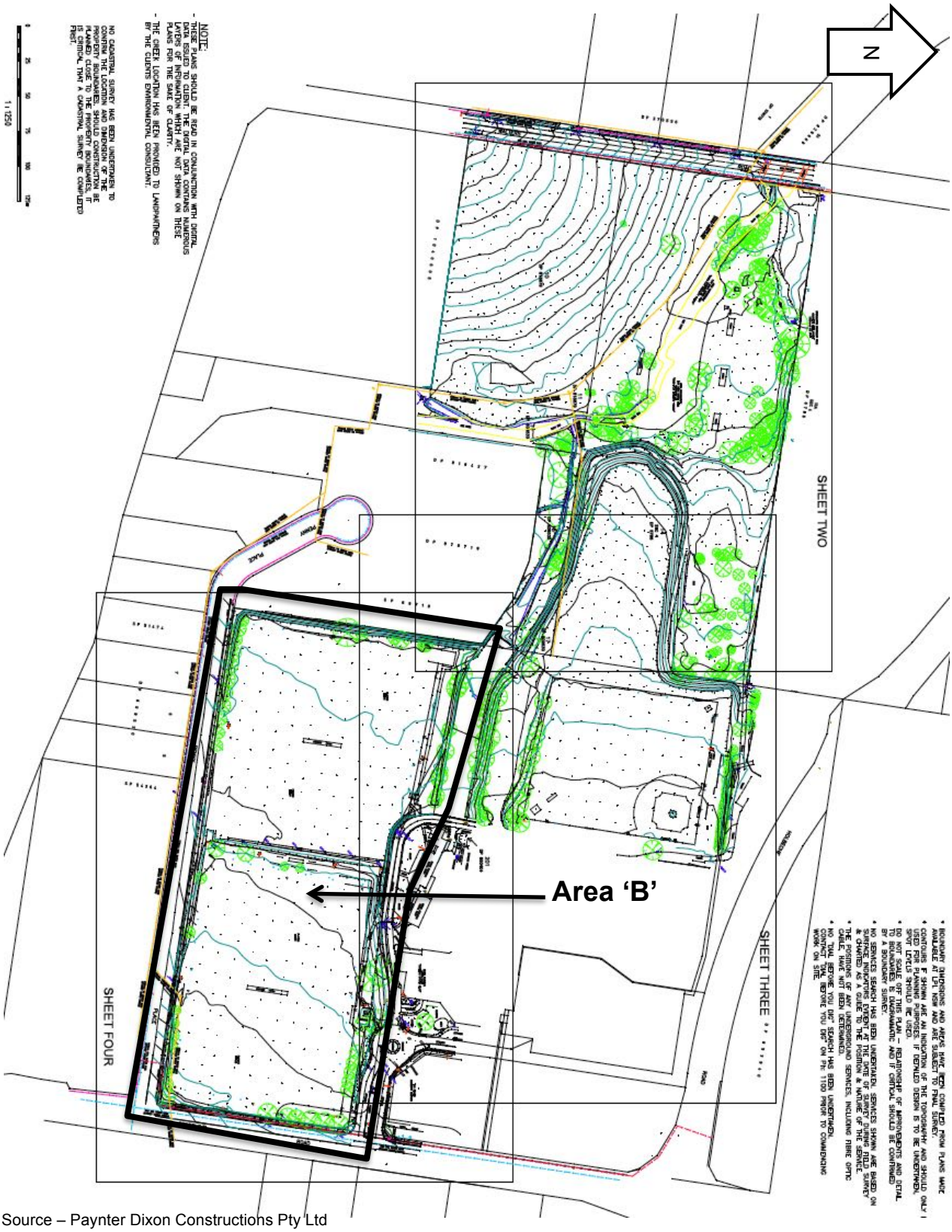
170 Reservoir Road, Arndell Park

Source – Paynter Dixon Constructions Pty Ltd

Figure 2 Site Map

Surveyed Site Map

170 Reservoir Road, Arndell Park



Source – Paynter Dixon Constructions Pty Ltd

Figure 3 Surveyed Site Map

Tree Numbering

170 Reservoir Road, Arndell Park

1 Introduction

1.1 Brief

Paynter Dixon Constructions Pty Limited has given instruction to inspect the selected trees at Blacktown Workers Sports Club site at 170 Reservoir Road, Arndell Park and preparation of an arboricultural impact assessment on the health and condition of the subject trees. The report will provide recommendations regarding its protection during the development process.

1.2 Aims

- Undertake field surveys for tree health and condition.
- Conduct a literature review on the tree defects and symptoms.
- Search databases for relevant tree species information including Tree Preservation Orders.

1.3 Qualifications and Experience

This report has been based upon site observations and the assessment of the subject trees and conclusions have been reached from experience and follow up research. Qualification details are included in the appendix.

1.4 Documents Provided

The following information was supplied by Paynter Dixon Constructions Pty Ltd on the following dates.

- 16th October 2015
  - 101015 Tree location plan.pdf
  - 26102015105718-0001.pdf
  - Masterplan Concept.pdf
- 18th November 2015
  - SY073782_Detail_17-11-15
- 4th December 2015
  - 04122015111925-0001.pdf
- 28th March 2018
  - 180222 SCC Final.pdf

1.5 Scope

This report is only concerned with the health and condition of the subject trees and the potential impacts from the proposed development. Root mapping, invasive structural strength of the trees or soils assessments or aerial inspections were performed. This report has been prepared in accordance with Blacktown City Council. It includes a detailed assessment based on the site visit and the documents provided. Recommendations may be provided regarding alterations to the proposed design or construction methods to minimize detrimental impacts on the subject trees.

1.6 Proposed Works

The proposed works involve the removal of the trees within the subject area to construct a seniors living development.

2 Methodology

2.1 Methods

The following relevant information was compiled for consideration of the proposed works. Details are located in the appendices.

- Pruning Of Amenity Trees AS 4373 - 2007
- Tree Survey Form (Matheny & Clark, 1994) modified, which includes species identification, age, condition etc.
- Priority Matrix of the IACA Significance of a Tree, Assessment Rating System (STARS)© (IACA, 2010)
- Visual Tree Assessment (Mattheck & Breloer, 1994)

2.2 Information Collected

- Tree Species (botanical and common name)
- Trunk diameter measured at 1.4m, basal diameter, height, canopy
- Age, crown class & crown condition
- Canopy health and vigour (density, deadwood etc.)
- Tree condition (wounds etc.)
- Landscape significance
- Signs of wildlife (scratches, nests, hollows etc.)
- Tree Significance (STARS)
- Tree Protection Zone
- Tree Protection Zone Encroachments

2.3 AS 4970 - 2009 Protection of Trees on Development Sites

- Determining tree protection and structural root zone distances.
- Encroachment considerations and percentages.
- Tree protection measures.

2.4 Species Identification

- Brooker & Kleinig (1999), Field Guide to Eucalyptus, Volume 1, South-Eastern Australia.
- Fairley & Moore (1989) Native Plants of the Sydney District.
- Wrigley & Fagg (1993) Bottlebrushes, Paperbarks and Tea Trees.

2.5 Tree Measurements

In accordance with AS 4970-2009 tree trunk diameters were measured with a diameter tape at 1.4m high to formulate Tree Protection Zones (TPZ) and at the base of the tree to formulate Structural Root Zones (SRZ) where applicable. Tree heights are measured with a clinometer and canopy spreads estimated accordingly.

2.6 Photography

A Nikon D5000 SLR camera was used. In low light levels photographs maybe altered to improve visual quality. This involves adjustments to exposure, contrast, reduction of shadows and increased sharpness. No adjustments to vibrancy that alter colour were performed.

2.7 Tree Preservation Order

The subject trees are protected under Blacktown City Council *Local Environmental Plan* (1988). A tree; *means a perennial plant not less than 1 metre high with at least one self-supporting woody stem which is a plant of a species, variety or cultivar, any of the members of which, if permitted to grow to maturity, would generally have a height in excess of 3 metres*.

2.8 Legislation

The following were searched.

- Environment Protection and Biodiversity Conservation Act (1999)
- National Parks & Wildlife Act (1975)
- Noxious Weeds Act (1993)
- Threatened Species Conservation Act (1995)

3 Site Visit and Observations

3.1 Field Visit

The unaccompanied site visit was conducted on 11th December 2015 taking approximately 3 hours. All observations were from ground level without detailed investigations. The weather at the time of the inspection was cloudy, still and damp with average visibility.

3.2 Brief Site Description

Blacktown Workers Sports Club is located in the suburb of Arndell Park. Number 170 Reservoir Road is on the western side of the road. The property consists of various sports facilities through out.

3.3 Location of the Trees

The trees in question are located predominately around the outside of the sports fields. The trees have been located on the supplied site plan and numbered accordingly. These plans are illustrative purposes only and should not be used directly for scaling measurements.

3.4 Undesirable Species

The subject tree species are not listed in the NW Act 1993 or in councils' list of undesirable species.

3.5 Collection of Data

From inspecting the trees information was collected on species, maturity, life expectancy, STARS (IACA, 2010) and significant defects and other relevant facts, which are recorded in the tree schedule (appendix A). The inspection was of a preliminary nature and did not involve any climbing or detailed investigation beyond what was visible from accessible points at ground level.

4 Results

A complete tree schedule is located in appendix a.

4.1 Tree Significance and Retention Value

Determined by using the Tree Significance - Assessment Criteria of the *IACA Significance of a Tree, Assessment Rating System* (STARS)© (IACA, 2010).

	Significance		
Retention Value	Low	Medium	High
Low	6	21	0
Medium	0	9	17
High	0	1	8

Table 1 Tree Species and Retention Value

4.2 Tree Species and Life Expectancy

	Life Expectancy				
Species	Dead	<5 years	5-15 years	15-40 years	40+ years
Casuarina cunninghamiana (River Oak)	0	0	2	4	13
Corymbia sp (Gum)	0	0	0	0	9
Eucalyptus sp's. (Gum Tree)	0	0	0	3	20
Grevillea robusta (Silky Oak)	0	0	0	2	0
Lophostemon confertus (Queensland Brush Box)	0	0	0	0	5
Pinus radiata (Monterey Pine)	0	0	0	2	0

Table 2 Tree Species and Life Expectancy

4.3 Tree Proposed For Retention

Tree no.	**Species**	**Retention Priority**
3, 5, 18, 19	*Casuarina cunninghamiana* (River Oak)	Low
4, 6, 7, 54	*Casuarina cunninghamiana* (River Oak)	Medium
12, 13	*Pinus radiata* (Monterey Pine)	Low
14, 20	*Grevillea robusta* (Silky Oak)	Medium
21	*Eucalyptus sp.* (Gum Tree)	Medium
22, 31	*Corymbia citriodora* (Lemon-scented Gum)	Medium
23	*Eucalyptus robusta* (Swamp Mahogany)	Low
24	*Eucalyptus sclerophylla* (Scribbly Gum)	High
25, 62	*Eucalyptus microcorys* (Tallowwood)	High
33, 34, 37, 38, 44, 46, 47, 49, 50, 51	*Eucalyptus microcorys* (Tallowwood)	Low
26	*Corymbia maculata* (Spotted Gum)	High
35, 39, 42, 45, 48	*Lophostemon confertus* (Queensland Brush Box)	Low
36	*Eucalyptus sideroxylon* (Mugga Ironbark)	Medium
43	*Eucalyptus sideroxylon* (Mugga Ironbark)	Medium
55	*Eucalyptus moluccana* (Grey Box)	High

Table 3 Trees Proposed For Retention

4.4 Tree Proposed For Removal

Tree no.	Species	Retention Priority
1	*Casuarina cunninghamiana* (River Oak)	Medium
2	*Casuarina cunninghamiana* (River Oak)	Medium
8	*Casuarina cunninghamiana* (River Oak)	Medium
9	*Casuarina cunninghamiana* (River Oak)	Medium
10	*Casuarina cunninghamiana* (River Oak)	Medium
11	*Casuarina cunninghamiana* (River Oak)	Medium
15	*Casuarina cunninghamiana* (River Oak)	Low
16	*Casuarina cunninghamiana* (River Oak)	Low
17	*Casuarina cunninghamiana* (River Oak)	Medium
27	*Corymbia citriodora* (Lemon-scented Gum)	Medium
28	*Corymbia citriodora* (Lemon-scented Gum)	Medium
29	*Corymbia citriodora* (Lemon-scented Gum)	Medium
30	*Corymbia citriodora* (Lemon-scented Gum)	Medium
32	*Eucalyptus fibrosa* (Broad-leaved Ironbark)	Medium
40	*Eucalyptus microcorys* (Tallowwood)	Low
41	*Eucalyptus microcorys* (Tallowwood)	Low
52	*Corymbia citriodora* (Lemon-scented Gum)	High
53	*Eucalyptus microcorys* (Tallowwood)	Medium
56	*Casuarina cunninghamiana* (River Oak)	Medium
57	*Casuarina cunninghamiana* (River Oak)	Medium
58	*Casuarina cunninghamiana* (River Oak)	Medium
59	*Eucalyptus microcorys* (Tallowwood)	High
60	*Eucalyptus fibrosa* (Broad-leaved Ironbark)	High
61	*Corymbia citriodora* (Lemon-scented Gum)	High

Table 4 Trees Proposed For Removal

5 Discussion

5.1 Proposed Encroachment Impacts

5.1.1 Trees with <10% proposed encroachment are considered to have a minor encroachment in accordance with AS4970-2009 or low level impact. These trees can be retained and protected during the development processes.

5.1.2 Trees with between 10% and 20% proposed encroachment is considered to have a major encroachment in accordance with AS4970-2009 or moderate level of impact and require individual specifications for work within their TPZ's.

5.1.3 Trees with >20% proposed encroachment are considered to have a significant level of impact where roots and canopy may be significantly impacted on and are unlikely tolerate the proposed works.

5.2 Trees Proposed For Retention

5.2.1 Tree no. 3 *Casuarina cunninghamiana* (River Oak)

5.2.1.1 This tree is located on the southern boundary fence. It is mature in age and in average to poor health with a thin canopy.

5.2.1.2 The proposed building no. 7 is located approximately 5.4m from the trunk which is just inside its Tree Protection Zone (TPZ) by 4%. This is considered minor in accordance with AS4970-2009. The root system must be protected during the proposed excavation with any root measuring over 40mm in diametre must not be damaged or severed.

5.2.2 Tree no. 4 *Casuarina cunninghamiana* (River Oak)

5.2.2.1 This tree is located along the southern boundary fence. It is mature in age and in average health and condition.

5.2.2.2 The proposed building no. 7 is located approximately 4.5m from the trunk which is just inside its TPZ by 6%, which is also considered minor in accordance with AS4970-2009. Once again the root system must be protected during the proposed excavation with any root measuring over 40mm in diametre must not be damaged or severed.

5.2.3 Trees no. 5 - 7 *Casuarina cunninghamiana* (River Oak)

5.2.3.1 These trees are also located along the southern boundary fence. They are mature in age and in adequate health and condition.

5.2.3.2 The proposed building no. 7 is located between 8m and 10m from the trunks, which are outside their TPZ's.

5.2.4 Trees no. 8 to 11 *Casuarina cunninghamiana* (River Oak)

5.2.4.1 These trees are located on the southern boundary fence. They are mature in age and in average health and condition.

5.2.4.2 The proposed building no. 8 is located approximately 2m from the trunk of each tree which is inside the SRZ and encroaches the TPZ by 12% to 28%. This is considered major in accordance with AS4970-2009, therefore and proposed for removal.

5.2.5 Tree no. 12 *Pinus radiata* (Monterey Pine)

5.2.5.1 This tree is also located along the southern boundary fence. It is semi mature in age and in adequate health though the species they are not

expected to live beyond 40 years. This is an exotic tree species and given the species type have a low retention priority.

5.2.5.2 The proposed building no. 10 is located approximately 5m from the trunk which is just inside its TPZ by 2%. This is also considered minor in accordance with AS4970-2009. Once again the root system must be protected during the proposed excavation with any root measuring over 40mm in diametre must not be damaged or severed.

5.2.6 Tree no. 13 *Pinus radiata* (Monterey Pine)

5.2.6.1 This tree is also located along the southern boundary fence. It is semi mature in age and in good health and condition.

5.2.6.2 The proposed building no. 10 is located 8m from the trunk, which is outside the TPZ of 6.6m

5.2.7 Tree no. 14 *Grevillea robusta* (Silky Oak)

5.2.7.1 This tree is also located along the southern boundary fence in the south eastern corner. It is semi mature in age and in good health and condition, though it has included bark unions.

5.2.7.2 The proposed RACF 3 storey building is located approximately 4m from the trunk, which is just inside its TPZ by 4%. This is also considered minor in accordance with AS4970-2009. Once again the root system must be protected during the proposed excavation with any root measuring over 40mm in diametre must not be damaged or severed.

5.2.8 Tree no. 18 *Casuarina cunninghamiana* (River Oak)

5.2.8.1 This tree is also located along the southern boundary fence in the south eastern corner. It is semi mature in age and in declining health.

5.2.8.2 The proposed RACF 3 storey building is located approximately 5m from the trunk, which is outside the TPZ of 3.6m.

5.2.9 Tree no. 19 *Casuarina cunninghamiana* (River Oak)

5.2.9.1 This tree is also located along the southern boundary fence in the south eastern corner. It is semi mature in age and in declining health. *Decline is a general loss of vitality over the entire tree either caused by a systemic disease or by a series of events that disrupt essential life processes* (Shigo 1986).

5.2.9.2 The proposed RACF 3 storey building is located approximately 5m from the trunk, which is just inside its TPZ by 2%. This is also considered minor in accordance with AS4970-2009.

5.2.10 Tree no. 20 *Grevillea robusta* (Silky Oak)

5.2.10.1 This tree is also located in the south eastern corner. It is semi mature in age and in adequate health and condition, though it also has included bark unions.

5.2.10.2 The proposed RACF 3 storey building is located approximately 7m from the trunk, which is outside the TPZ of 5.4m.

5.2.11 Tree no. 21 *Eucalyptus sp.* (Gum Tree)

5.2.11.1 This tree is located near the western boundary. It is mature in age and in adequate health and condition. It has the typical amount of

epicormic growth for a tree on this age, though this is not an indication of reduced health in this situation but a reaction to suddenly failed or pruned branches. *Short twigs, and small leaves growing along the upper surface of one or more main branches are called epicormic shoots* (Harris, Clark & Matheny, 1999).

5.2.11.2 The proposed building no. 1 is located approximately 11m from the trunk, which is outside the TPZ of 6m.

5.2.12 Tree no. 22 *Corymbia citriodora* (Lemon-scented Gum)

5.2.12.1 This tree is located near the western boundary. It is semi mature in age and in adequate health and condition, though it has suffered from some pruning events.

5.2.12.2 The proposed building no. 1 is located approximately 8m from the trunk, which is outside the TPZ of 5.4m.

5.2.13 Tree no. 23 *Eucalyptus robusta* (Swamp Mahogany)

5.2.13.1 This tree is located near the western boundary. It is semi mature in age and in low to average health and has been severely lopped. *Lopping is an unacceptable practice in accordance with AS4373-2009 section 8.1. Lopping increases the rate of shoot production and elongation resulting in weakly attached branches that are prone to failure. It also reduced the lifespan of the tree and predisposes it to fungal and insect attack* (AS4373-2009). As a result the tree has produced excessive watersprout growth and epicormic shots. *Watersprouts are often forced into growth just below large pruning wounds, particularly when branches have been cut to stubs. Watersprouts are seldom firmly attached to the trunk or branch from which they arise* (Harris, Clark & Matheny, 1999).

5.2.13.2 The proposed building no. 1 is located approximately 10m from the trunk, which is outside the TPZ of 3.6m.

5.2.14 Tree no. 24 *Eucalyptus sclerophylla* (Scribbly Gum)

5.2.14.1 This tree is located near the western boundary. It is mature in age and in adequate health and condition. Though it has some deadwood stubs in the canopy.

5.2.14.2 The proposed building no. 1 is located approximately 10m from the trunk, which is outside the TPZ of 6m.

5.2.15 Tree no. 25 *Eucalyptus microcorys* (Tallowwood)

5.2.15.1 This tree is also located near the western boundary. It is mature in age and in adequate health and condition. Though once again there are some included bark branch unions throughout the canopy.

5.2.15.2 The proposed building no. 1 is located approximately 10m from the trunk, which is outside the TPZ of 7.2m.

5.2.16 Tree no. 26 *Corymbia maculata* (Spotted Gum)

5.2.16.1 Once again this tree is also located near the western boundary. It is mature in age and in adequate health and condition. Again there are some included bark branch unions throughout the canopy.

5.2.16.2 The proposed building no. 1 is located approximately 10m from the trunk, which is outside the TPZ of 7.2m.

5.2.17 Tree no. 31 *Corymbia citriodora* (Lemon-scented Gum)

5.2.17.1 This tree is located on the southern side of the driveway entrance. It is young in age and in adequate health and condition.

5.2.17.2 The proposed building no. 1 is located approximately 3m from the trunk, which is just inside its TPZ by 1%. This is also considered minor in accordance with AS4970-2009.

5.2.18 Trees no. 33, 34, 37, 38, 44, 46, 47, 49, 50, 51 *Eucalyptus microcorys* (Tallowwood)

5.2.18.1 These trees are located within an existing car parking area. They are generally young to semi mature in age and in adequate health though once again they have numerous included bark branch unions throughout their canopies.

5.2.18.2 The proposed works are located outside their individual TPZ's.

5.2.19 Trees no. 35, 39, 42, 45, 48 *Lophostemon confertus* (Queensland Brush Box)

5.2.19.1 These trees are located within an existing car parking area. They are generally young to semi mature in age and in adequate health though trees no 35, 42 and 48 have multiple trunk attachments that may have weak unions. These trees also have low significance rating and low retention priorities.

5.2.19.2 The proposed works are located outside their individual TPZ's.

5.2.20 Tree no. 36 & 43 *Eucalyptus sideroxylon* (Mugga Ironbark)

5.2.20.1 These trees are also located within the existing car parking area. They are semi mature in age and in adequate health though tree no 43 has included bark within the codominant trunk union. *Codominant stems are stems of about the same size originating from the same position on a stem. When the stem bark ridge turns upward, the stem will have a strong union. When the stem bark ridge turns inward, they will have a weak union* (Shigo 1991).

5.2.20.2 The proposed works are located outside their individual TPZ's.

5.2.21 Tree no. 54 *Casuarina cunninghamiana* (River Oak)

5.2.21.1 This tree is also located near the western boundary of the site. It is mature in age and in adequate health and condition.

5.2.21.2 The proposed building no. 6 is located within 4m to the trunk and encroaching the TPZ by a minor 1%.

5.2.22 Tree no. 55 *Eucalyptus moluccana* (Grey Box)

5.2.22.1 This tree is also located near the western boundary of the site. It is mature in age and in good health and condition though it has a dead codominant stem.

5.2.22.2 The proposed building no. 6 is located approximately 10m from the trunk, which is outside the TPZ of 8.4m.

5.2.23 Tree no 61 62 *Eucalyptus microcorys* (Tallowwood)

5.2.23.1 This tree is located between the existing playing fields and a rear access road. It is also mature in age and in good health and condition.

5.2.23.2 The proposed building no. 3 is located approximately 14m from the trunk, which is outside the TPZ of 7.8m.

5.3 Trees Proposed For Removal

5.3.1 Tree no. 1 *Casuarina cunninghamiana* (River Oak)

5.3.1.1 This tree is located in the south western corner of the site. It is mature tree in adequate health and condition though it has some included bark branch unions.

5.3.1.2 A proposed access path/private road is located within 4m to the trunk with 21% encroachment, which is considered major in accordance with AS4970-2009 and proposed for removal.

5.3.2 Tree no. 2 *Casuarina cunninghamiana* (River Oak)

5.3.2.1 This tree is also located in the south western corner of the site. It is mature tree in adequate health and condition.

5.3.2.2 It is located within the envelope for a proposed access path/private and proposed for removal.

5.3.3 Trees no. 15, 16 & 17 *Casuarina cunninghamiana* (River Oak)

5.3.3.1 These trees are located along the southern boundary fence. They are young and semi mature and in age and in adequate health.

5.3.3.2 The trees are proposed to be restricted in a garden area. The sealed surface is located as close as .5m to the trunks inside their SRZ's and with TPZ encroachments of between 43% and 51%. These are considered to be major in accordance with AS4970-2009 and therefore they are proposed for removal.

5.3.4 Trees no. 27 - 29 *Corymbia citriodora* (Lemon-scented Gum)

5.3.4.1 Trees no 27-29 are located on the southern side of the driveway entrance. These trees are young and are medium in significance.

5.3.4.2 They are located with 1m - 2m to the proposed building no. 1. This is within their SRZ's and encroach their TPZ's by between 10% and 37%. Therefore they are proposed for removal.

5.3.5 Tree no. 32 *Eucalyptus fibrosa* (Broad-leaved Ironbark)

5.3.5.1 This tree is located south of the driveway entrance near the round-a-bout next to a covered spectator area. It is mature in age and in adequate health and condition though once again it has codominant trunks with a slight lean top the north east.

5.3.5.2 The proposed building no. 2 is located within 2m to the trunk, inside the SRZ and encroaching the TPZ by a major 26%.

5.3.6 Trees no. 40 & 41 *Eucalyptus microcorys* (Tallowwood)

5.3.6.1 These trees are located within an existing car parking area. They are young in age and in adequate health. Once again they have numerous included bark branch unions throughout their canopies.

5.3.6.2 The trees are located within the proposed 'pedestrian bridge link' and therefore will require removal.

5.3.7 Tree no. 52 *Corymbia citriodora* (Lemon-scented Gum)

5.3.7.1 This tree is located near the western boundary of the site. It is mature in age and in adequate health and condition though once again it has codominant trunks with a slight lean top the north east.

5.3.7.2 The proposed building no. 6 is located within 2.5m to the trunk, inside the SRZ and encroaching the TPZ by a major 37%. Therefore it is proposed for removal.

5.3.8 Tree no. 53 *Eucalyptus microcorys* (Tallowwood)

5.3.8.1 This tree is also located near the western boundary of the site. It is mature in age and in adequate health and condition though once again it has codominant trunks with a slight lean top the north east.

5.3.8.2 The proposed building no. 6 is located within 3.5m to the trunk, inside the SRZ and encroaching the TPZ by a major 21%. Therefore it is also proposed for removal.

5.3.9 Tree no. 56 *Casuarina cunninghamiana* (River Oak)

5.3.9.1 This tree is also located near the western boundary of the site. It is mature in age and in adequate health and condition.

5.3.9.2 The proposed building no. 6 is located within 1.5m to the trunk, inside the SRZ and encroaching the TPZ by a major 37%. Therefore it is also proposed for removal.

5.3.10 Trees no 57 & 58 *Casuarina cunninghamiana* (River Oak), no 59 *Eucalyptus microcorys* (Tallowwood) and no 60 *Eucalyptus fibrosa* (Broad-leaved Ironbark)

5.3.10.1 These trees are located in the centre of the playing fields. They are semi mature to mature in age and in adequate health and condition. They are also proposed for removal as they are located within the proposed building no.9 envelope.

5.3.11 Tree no 61 *Corymbia citriodora* (Lemon-scented Gum)

5.3.11.1 This tree is located between the existing playing fields and a rear access road. It is also mature in age and in good health and condition.

5.3.11.2 The proposed pedestrian bridge is located approximately 2.5m from the centre of the tree therefore it is proposed for removal.

6 Conclusion & Recommendations

After inspecting the selected trees at 170 Reservoir Road, Arndell Park and follow up research I came to the following conclusions.

6.1 Trees Proposed For Retention

6.1.1 There are thirty eight (38) trees that have been selected for retention. They are generally within the vicinity of proposed works and likely to require protection throughout the development works.

6.1.2 These are generally in adequate health and condition with four (4) considered to have a ‘High’ retention value, twelve (12) ‘Medium’ and twenty two (22) being ’Low’.

6.1.3 Individual TPZ distance have been supplied within the Tree Schedule (Appendix A) therefore proposed development encroachments can be determined when designs are available. As a result some trees may require removal depending on the percentage of encroachment and the likelihood of the tree tolerating the proposed works.

6.2 Trees Proposed For Removal

6.2.1 There are twenty four (24) trees located within or very close to proposed works at the site. These are generally in adequate health and condition with four (4) considered to have a ‘High’ retention value, sixteen (16) ‘Medium’ and four (4) being ’Low’.

Signed

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Australis Tree Management

7 Tree Protection Measures

These specifications are for the trees identified and selected for retention including any tree located on adjoining properties.

7.1 Arborist's Involvement During Construction Activities

Hold Point	Task	Timing	Certification
1	Install Tree Protection Fencing etc.	Prior to demolition of structures	Project Arborist
2	Supervise all work within any TPZ's	As required prior to works proceeding	
3	Tree Inspection	Monthly during construction	
4	Final Tree Inspection	Post construction	

Table 5 Arborist's Involvement During Construction Activities

7.2 Tree Protection

7.2.1 All tree parts must be protected. This includes roots, trunks and branches. Additional protection maybe required.

7.2.2 If working within TPZ trunk protection shall consist of two metre lengths of hardwood timbers (100 x 50mm) spaced at 100-150mm centres secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in any way) to avoid mechanical injury or damage.

7.2.3 *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* (AS4970-2009).

7.2.4 *The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when major encroachment into a TPZ is proposed. There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings* (AS4970-2009).

7.2.5 Stress reduction from construction impacts may include mulching and irrigating the TPZ's. This along with other relevant protection measures will help ensure the viability of trees post construction works.

7.2.6 Fencing - A 1.8m chain wire fence with concrete footings placed in accordance to tree protection zones and AS 4687. The TPZ distances are located within the tree schedule.

7.2.7 Signage - “Tree Protection Zone, No Entry”. To be attached to the protective fencing.

- AS4970-2009 - Activities generally excluded from the TPZ include but are not limited to;
- machine excavation including trenching;
- excavation for silt fencing;
- cultivation;
- storage;
- preparation of chemicals, including preparation of cement products;
- parking of vehicles and plant;
- refuelling;
- dumping of waste;
- wash down and cleaning of equipment;
- placement of fill;
- lighting of fires;
- soil level changes;
- temporary or permanent installation of utilities and signs, and
- physical damage to the tree.

7.2.8 Pruning - Any pruning required must be in accordance with AS 4373-2007. Pruning of Amenity Trees, Standards Australia, Standards Association of Australia, NSW, Australia and completed by level 3 qualified arborist.

7.2.9 Irrigation - All trees must be thoroughly watered regularly throughout the development process.

7.2.10 Mulch - With the TPZ fencing 75mm of organic mulch must be applied to help retain moisture levels, suppress weed growth and reduce tree stress.

7.2.11 Tree Damage - If any tree is damaged the project arborist should be notified and engaged to inspect and provide advice as well as written documentation to be supplied to the certifying authority.

7.2.12 Tree Monitoring Schedule

- During site occupation all TPZ’s and trees must be monitored, assessed and recorded by a suitably qualified arborist according to council’s requirements.
- Any work that must occur within a TPZ must be witnessed and directed by a suitably qualified arborist.
- In the event that any tree is declining in health the project arborist shall be engaged to supply written remedial applications that must be applied immediately.

Appendix A - Tree Schedule

Tree No.	1	2	3	4	5
Species	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)
DGL	70cm	60cm	55cm	60cm	65cm
DBH	70cm	50cm	45cm	50cm	50cm
Height	14m	13m	12m	10m	8m
Spread	19m	8m	7m	8m	8m
Location	On Site	On Site	On Site	On Site	On Site
Age	Mature	Mature	Mature	Mature	Mature
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Dominant	Codominant	Dominant	Dominant	Dominant
Crown Condition	3 Average / Low	3 Average / Low	2 Decline	3 Average / Low	2 Decline
Type	Native	Native	Native	Native	Native
Landscape Significance	High	High	Medium	High	Medium
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Fence	Fence	Fence	Fence
Health & Condition	BI		DL		DL BI SK
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.8m	2.7m	2.6m	2.7m	2.8m
Tree Protection Zone	8.4m	6.0m	5.4m	6.0m	6.0m
Distance To Proposed Development	4m	0m	5.4m	5.4m	8m
Total TPZ Area	221.6m^2	113.0m^2	91.6m^2	113.0m^2	113.0m^2
Proposed TPZ Encroachment	24.9m^2	113.0m^2	3.7m^2	7 m^2	0m^2
	21%	100%	4%	6%	0%
Retention Priority	Medium	Medium	Low	Medium	Low
Proposed Status	Remove	Remove	Retain	Retain	Retain
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	6	7	8	9	10
Species	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)
DGL	55cm	65cm	60cm	60cm	45cm
DBH	45cm	55cm	50cm	50cm	40cm
Height	8m	13m	14m	8m	7m
Spread	8m	9m	8m	8m	9m
Location	On Site	On Site	On Site	On Site	On Site
Age	Mature	Mature	Mature	Mature	Mature
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Dominant	Dominant	Dominant	Dominant	Dominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	4 Good
Type	Native	Native	Native	Native	Native
Landscape Significance	High	High	High	High	High
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Fence	Fence	Fence	Fence
Health & Condition	SI	PF		BI PE	PE
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.6m	2.8m	2.7m	2.7m	2.4m
Tree Protection Zone	5.4m	6.6m	6.0m	6.0m	4.8m
Distance To Proposed Development	10m	7m	2m	2m	2m
Total TPZ Area	91.6m^2	136.8m^2	113.0m^2	113.0m^2	72.3m^2
Proposed TPZ Encroachment	0m^2	0m^2	26.3m^2	32m^2	8.8m^2
	0%	0%	23%	28%	12%
Retention Priority	Medium	Medium	Medium	Medium	Medium
Proposed Status	Retain	Retain	Remove	Remove	Remove
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	11	12	13	14	15
Species	Casuarina cunninghamiana (River Oak)	Pinus radiata (Monterey Pine)	Pinus radiata (Monterey Pine)	Grevillea robusta (Silky Oak)	Casuarina cunninghamiana (River Oak)
DGL	60cm	55cm	55cm	45cm	40cm
DBH	50cm	55cm	55cm	40cm	30cm
Height	14m	8m	10m	8m	7m
Spread	10m	10m	10m	8m	5m
Location	On Site	On Site	On Site	On Site	On Site
Age	Mature	Semi Mature	Semi Mature	Semi Mature	Young
Life Expectancy	40+yrs	15-40yrs	15-40yrs	15-40yrs	15-40yrs
Crown Class	Dominant	Dominant	Dominant	Dominant	Dominant
Crown Condition	3 Average / Low	4 Good	4 Good	3 Average / Low	3 Average / Low
Type	Native	Exotic	Exotic	Native	Native
Ecological Value		None	None	Food Source	
Landscape Significance	High	Medium	Medium	Medium	Medium
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Fence	Fence	Fence	Fence
Health & Condition	PE	PE	SAP	SI BI	
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.7m	2.6m	2.6m	2.4m	2.3m
Tree Protection Zone	6.0m	6.6m	6.6m	4.8m	3.6m
Distance To Proposed Development	1.8m	5m	8m	4m	1m
Total TPZ Area	113.0m^2	136.8m^2	136.8m^2	72.3m^2	40.7m^2
Total TPZ Encroachment	12.6m^2	2.7m^2	0m^2	3.1m^2	20.7m^2
	23%	2%	0%	4%	51%
Retention Priority	Medium	Low	Low	Medium	Low
Proposed Status	Remove	Retain	Retain	Retain	Remove
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	16	17	18	19	20
Species	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Grevillea robusta (Silky Oak)
DGL	55cm	55cm	40cm	50cm	50cm
DBH	50cm	50cm	30cm	45cm	45cm
Height	9m	8m	8m	10m	14m
Spread	7m	10m	7m	8m	10m
Location	On Site	On Site	On Site	On Site	On Site
Age	Semi Mature	Semi Mature	Semi Mature	Semi Mature	Semi Mature
Life Expectancy	5-15yrs	15-40yrs	5-15yrs	15-40yrs	15-40yrs
Crown Class	Dominant	Dominant	Dominant	Dominant	Dominant
Crown Condition	2 Decline	3 Average / Low	2 Decline	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Native
Ecological Value					Food Source
Landscape Significance	Medium	Medium	Low	Medium	Medium
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Fence	Fence	Fence	Fence
Health & Condition	TwD BI SI	PF BI	BI	BI	BI
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.6m	2.6m	2.3m	2.5m	2.5m
Tree Protection Zone	6.0m	6.0m	3.6m	5.4m	5.4m
Distance To Proposed Development	.6m	.5m	5m	5m	7m
Total TPZ Area	113.0m^2	113.0m^2	40.7m^2	91.6m^2	91.6m^2
Proposed TPZ Encroachment	48.7m^2	50.9m^2	0m^2	1.4m^2	0m^2
	43%	45%	0%	2%	0%
Retention Priority	Low	Medium	Low	Low	Medium
Proposed Status	Remove	Remove	Retain	Retain	Retain
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	21	22	23	24	25
Species	Eucalyptus sp. (Gum Tree)	Corymbia citriodora (Lemon-scented Gum)	Eucalyptus robusta (Swamp Mahogany)	Eucalyptus sclerophylla (Scribbly Gum)	Eucalyptus microcorys (Tallowwood)
DGL	55cm	50cm	40cm	55cm	65cm
DBH	50cm	45cm	30cm	50cm	60cm
Height	15m	15m	6m	18m	14m
Spread	16m	12m	5m	12m	12m
Location	On Site	On Site	On Site	On Site	On Site
Age	Mature	Semi Mature	Semi Mature	Mature	Mature
Life Expectancy	15-40yrs	40+yrs	15-40yrs	40+yrs	40+yrs
Crown Class	Dominant	Dominant	Dominant	Dominant	Dominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Native
Ecological Value	Food Source	Food Source	Food Source	Food Source	Food Source
Landscape Significance	High	High	Low	High	High
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Fence	Fence	Fence	Fence
Health & Condition	EP PE TW-	PE CMP	LP+ EP+ WS+	dw ep pf	BI
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.6m	2.5m	2.3m	2.6m	2.8m
Tree Protection Zone	6.0m	5.4m	3.6m	6.0m	7.2m
Distance To Proposed Development	11m	8m	10m	10m	10m
Total TPZ Area	113.0m2	91.6m2	40.7m2	113.0m2	162.8m2
Proposed TPZ Encroachment	$0m^2$	$0m^2$	$0m^2$	$0m^2$	$0m^2$
	0%	0%	0%	0%	0%
Retention Priority	Medium	Medium	Low	High	High
Proposed Status	Retain	Retain	Retain	Retain	Retain
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	26	27	28	29	30
Species	Corymbia maculata (Spotted Gum)	Corymbia citriodora (Lemon-scented Gum)	Corymbia citriodora (Lemon-scented Gum)	Corymbia citriodora (Lemon-scented Gum)	Corymbia citriodora (Lemon-scented Gum)
DGL	70cm	40cm	50cm	45cm	40cm
DBH	60cm	30cm	40cm	30cm	35cm
Height	16m	14m	16m	15m	15m
Spread	20m	6m	8m	8m	8m
Location	On Site	On Site	On Site	On Site	On Site
Age	Mature	Young	Young	Young	Young
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Dominant	Codominant	Codominant	Codominant	Codominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Native
Ecological Value	Food Source	Food Source	Food Source	Food Source	Food Source
Landscape Significance	High	Medium	Medium	Medium	Medium
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Fence	Fence	Fence	Fence
Health & Condition	DW CMP				PE
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.8m	2.3m	2.5m	2.4m	2.3m
Tree Protection Zone	7.2m	3.6m	4.8m	3.6m	4.2m
Distance To Proposed Development	10m	2m	1m	1.5m	1.8m
Total TPZ Area	162.8m^2	40.7m^2	72.3m^2	40.7m^2	55.4m^2
Proposed TPZ Encroachment	0m^2	4.m^2	26.9m^2	10m^2	12.6m^2
	0%	10%	27%	25%	23%
Retention Priority	High	Medium	Medium	Medium	Medium
Proposed Status	Retain	Remove	Remove	Remove	Remove
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	31	32	33	34	35
Species	Corymbia citriodora (Lemon-scented Gum)	Eucalyptus fibrosa (Broad-leaved Ironbark)	Eucalyptus microcorys (Tallowwood)	Eucalyptus microcorys (Tallowwood)	Lophostemon confertus (Qld Brush Box)
DGL	40cm	50cm	45cm	55cm	50cm
DBH	30cm	45cm	40cm	50cm	34cm
Height	15m	10m	8m	7m	6m
Spread	7m	14m	8m	12m	4m
Location	On Site	On Site	On Site	On Site	On Site
Age	Young	Semi Mature	Semi Mature	Semi Mature	Young
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Codominant	Dominant	Codominant	Codominant	Codominant
Crown Condition	3 Average / Low	3 Average / Low	4 Good	4 Good	3 Average / Low
Type	Native	Indigenous	Native	Native	Native
Ecological Value	Food Source	Food Source	Food Source	Food Source	Food Source
Landscape Significance	Medium	High	Medium	Medium	Low
Root Zone	Grass	Grass	Garden	Garden	Garden
Structures	Fence	Driveway	Car Park	Car Park	Car Park
Health & Condition		BI SI	BI	BI	MA
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.3m	2.5m	2.4m	2.6m	2.5m
Tree Protection Zone	3.6m	5.4m	4.8m	6.0m	4.1m
Distance To Proposed Development	3m	2m	13m	13m	13m
Total TPZ Area	40.7m^2	91.6m^2	72.3m^2	113.0m^2	52.3m^2
Proposed TPZ Encroachment	0.5m^2	23.5m^2	0m^2	0m^2	0m^2
	1%	26%	0%	0%	0%
Retention Priority	Medium	Medium	Low	Low	Low
Proposed Status	Retain	Remove	Retain	Retain	Retain
dbh1					20cm
dbh2					20cm
dbh3					20cm
multi dbh					34.6cm

Tree No.	36	37	38	39	40
Species	Eucalyptus sideroxylon (Mugga Ironbark)	Eucalyptus microcorys (Tallowwood)	Eucalyptus microcorys (Tallowwood)	Lophostemon confertus (Qld Brush Box)	Eucalyptus microcorys (Tallowwood)
DGL	40cm	60cm	45cm	50cm	50cm
DBH	30cm	55cm	40cm	34cm	40cm
Height	12m	8m	7m	6m	9m
Spread	8m	12m	12m	4m	12m
Location	On Site	On Site	On Site	On Site	On Site
Age	Semi Mature	Semi Mature	Young	Young	Young
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Codominant	Codominant	Codominant	Codominant	Codominant
Crown Condition	3 Average / Low	3 Average / Low	4 Good	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Native
Ecological Value	Food Source	Food Source	Food Source	Food Source	Food Source
Landscape Significance	Medium	Medium	Medium	Low	Medium
Root Zone	Garden	Garden	Garden	Garden	Garden
Structures	Car Park	Car Park	Car Park	Car Park	Car Park
Health & Condition		SI	SI BI	MA	BI
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.3m	2.7m	2.4m	2.5m	2.5m
Tree Protection Zone	3.6m	6.6m	4.8m	4.1m	4.8m
Distance To Proposed Development	13m	13m	12m	15m	0m
Total TPZ Area	40.7m^2	136.8m^2	72.3m^2	52.3m^2	72.3m^2
Proposed TPZ Encroachment	0m^2	0m^2	0m^2	0m^2	72.3m^2
	0%	0%	0%	0%	100%
Retention Priority	Medium	Low	Low	Low	Low
Proposed Status	Retain	Retain	Retain	Retain	Remove
dbh1				20cm	
dbh2				20cm	
dbh3				20cm	
multi dbh				34.6cm	

Tree No.	41	42	43	44	45
Species	Eucalyptus microcorys (Tallowwood)	Lophostemon confertus (Qld Brush Box)	Eucalyptus sideroxylon (Mugga Ironbark)	Eucalyptus microcorys (Tallowwood)	Lophostemon confertus (Qld Brush Box)
DGL	60cm	20cm	50cm	45cm	30cm
DBH	55cm	14cm	42cm	40cm	30cm
Height	9m	6m	16m	8m	7m
Spread	12m	4m	12m	12m	5m
Location	On Site	On Site	On Site	On Site	On Site
Age	Young	Young	Semi Mature	Young	Young
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Codominant	Codominant	Codominant	Codominant	Codominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Native
Ecological Value	Food Source	Food Source	Food Source	Food Source	Food Source
Landscape Significance	Medium	Low	Medium	Medium	Medium
Root Zone	Garden	Garden	Garden	Garden	Garden
Structures	Car Park	Car Park	Car Park	Car Park	Car Park
Health & Condition	BI	MA	SI	BI SI	
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.7m	1.7m	2.5m	2.4m	2.0m
Tree Protection Zone	6.6m	1.7m	5.0m	4.8m	3.6m
Distance To Proposed Development	4m	6m	15m	15m	15m
Total TPZ Area	136.8m^2	8.9m^2	79.8m^2	72.3m^2	40.7m^2
Proposed TPZ Encroachment	0m^2	0m^2	0m^2	0m^2	0m^2
	0%	0%	0%	0%	0%
Retention Priority	Low	Low	Low	Low	Low
Proposed Status	Remove	Retain	Retain	Retain	Retain
dbh1		10cm	30cm		
dbh2		10cm	30cm		
dbh3					
multi dbh		14.1cm	42.4cm		

Tree No.	46	47	48	49	50
Species	Eucalyptus microcorys (Tallowwood)	Eucalyptus microcorys (Tallowwood)	Lophostemon confertus (Qld Brush Box)	Eucalyptus microcorys (Tallowwood)	Eucalyptus microcorys (Tallowwood)
DGL	50cm	50cm	40cm	55cm	45cm
DBH	45cm	45cm	27cm	50cm	40cm
Height	8m	7m	8m	10m	10m
Spread	12m	10m	5m	12m	12m
Location	On Site	On Site	On Site	On Site	On Site
Age	Semi Mature	Semi Mature	Semi Mature	Semi Mature	Semi Mature
Life Expectancy	40+yrs	40+yrs	40+yrs	40+yrs	40+yrs
Crown Class	Codominant	Codominant	Codominant	Codominant	Codominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Native
Ecological Value	Food Source	Food Source	Food Source	Food Source	Food Source
Landscape Significance	Medium	Medium	Low	Medium	Medium
Root Zone	Garden	Garden	Garden	Garden	Garden
Structures	Car Park	Car Park	Car Park	Car Park	Car Park
Health & Condition	BI SI	SI	MA	DW BI	BI SI
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.5m	2.5m	2.3m	2.6m	2.4m
Tree Protection Zone	5.4m	5.4m	3.2m	6.0m	4.8m
Distance To Proposed Development	11m	10m	10m	10m	10m
Total TPZ Area	91.6m^2	91.6m^2	33.0m^2	113.0m^2	72.3m^2
Proposed TPZ Encroachment	0m^2	0m^2	0m^2	0m^2	0m^2
	0%	0%	0%	0%	0%
Retention Priority	Low	Low	Low	Low	Low
Proposed Status	Retain	Retain	Retain	Retain	Retain
dbh1			10cm		
dbh2			10cm		
dbh3			10cm		
multi dbh			17.3cm		

Tree No.	51	52	53	54	55
Species	Eucalyptus microcorys (Tallowwood)	Corymbia citriodora (Lemon-scented Gum)	Eucalyptus microcorys (Tallowwood)	Casuarina cunninghamiana (River Oak)	Eucalyptus moluccana (Grey Box)
DGL	45cm	80cm	65cm	65cm	70cm
DBH	40cm	84cm	60cm	55cm	70cm
Height	10m	15m	15m	12m	14m
Spread	12m	10m	10m	9m	114m
Location	On Site	On Site	On Site	On Site	On Site
Age	Semi Mature	Mature	Mature	Mature	Mature
Life Expectancy	40+yrs	40+yrs	40+yrs	15-40yrs	40+yrs
Crown Class	Codominant	Dominant	Dominant	Dominant	Dominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	4 Good
Type	Native	Native	Native	Native	Indigenous
Ecological Value	Food Source	Food Source	Food Source		Food Source
Landscape Significance	Medium	High	High	High	Medium
Root Zone	Garden	Grass	Grass	Grass	Grass
Structures	Car Park	Building	Building	Fence	Building
Health & Condition	BI WS	Codominant trunks	Branch Inclusions		Deadwood Codominant stub
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.4m	3.0m	2.8m	2.8m	2.8m
Tree Protection Zone	4.8m	10.1m	7.2m	6.6m	8.4m
Distance To Proposed Development	10m	2.5m	3.5m	10m	10m
Total TPZ Area	72.3m^2	319.0m^2	162.8m^2	136.8m^2	221.6m^2
Proposed TPZ Encroachment	0m^2	117.5m^2	33.4m^2	0m^2	0m^2
	0%	37%	21%	0%	0%
Retention Priority	Low	High	Medium	Medium	High
Proposed Status	Retain	Remove	Remove	Retain	Retain
dbh1		60cm			
dbh2		60cm			
dbh3					
multi dbh		84.9cm			

Tree No.	56	57	58	59	60
Species	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Casuarina cunninghamiana (River Oak)	Eucalyptus microcorys (Tallowwood)	Eucalyptus fibrosa (Broad-leaved Ironbark)
DGL	70cm	50cm	50cm	65cm	65cm
DBH	65cm	45cm	45cm	60cm	60cm
Height	13m	8m	8m	13m	13m
Spread	12m	7m	7m	15m	15m
Location	On Site	On Site	On Site	On Site	On Site
Age	Mature	Semi Mature	Semi Mature	Mature	Mature
Life Expectancy	15-40yrs	40+yrs	40+yrs	15-40yrs	40+yrs
Crown Class	Dominant	Dominant	Dominant	Dominant	Dominant
Crown Condition	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low	3 Average / Low
Type	Native	Native	Native	Native	Indigenous
Ecological Value				Food Source	Food Source
Landscape Significance	High	High	High	High	High
Root Zone	Grass	Grass	Grass	Grass	Grass
Structures	Fence	Building	Building	Fence	Fence
Health & Condition		BI	BI	Branch Inclusions	
TPO Protected	Yes	Yes	Yes	Yes	Yes
Structural Root Zone	2.8m	2.5m	2.5m	2.8m	2.8m
Tree Protection Zone	7.8m	5.4m	5.4m	7.2m	7.2m
Distance To Proposed Development	1.5m	Within	Within	Within	Within
Total TPZ Area	191.0m^2	91.6m^2	91.6m^2	162.8m^2	162.8m^2
Proposed TPZ Encroachment	70.8m^2	91.6m^2	91.6m^2	162.8m^2	162.8m^2
	37%	100%	100%	100%	100%
Retention Priority	Medium	Medium	Medium	High	High
Proposed Status	Remove	Remove	Remove	Remove	Remove
dbh1					
dbh2					
dbh3					
multi dbh					

Tree No.	61	62
Species	Corymbia citriodora (Lemon-scented Gum)	Eucalyptus microcorys (Tallowwood)
DGL	80cm	70cm
DBH	70cm	65cm
Height	15m	15m
Spread	22m	24m
Location	On Site	On Site
Age	Mature	Mature
Life Expectancy	40+yrs	40+yrs
Crown Class	Dominant	Dominant
Crown Condition	3 Average / Low	4 Good
Type	Native	Native
Ecological Value	Food Source	Food Source
Landscape Significance	High	High
Root Zone	Garden	Garden
Structures	Driveway	Building
Health & Condition	Branch wound, Deadwood	Branch Inclusions
TPO Protected	Yes	Yes
Structural Root Zone	3.0m	2.8m
Tree Protection Zone	8.4m	7.8m
Distance To Proposed Development	2.5m	14m
Total TPZ Area	221.6m^2	191.0m^2
Proposed TPZ Encroachment	0m^2	0m^2
	0%	0%
Retention Priority	High	High
Proposed Status	Remove	Retain

Appendix B - Tree Schedule Definitions

Dimensions	Diameter at breast height (1.4m) (mm) **DBH** Diameter at ground level (mm) **DGL** Approximate height x canopy spread (m) **H x C**			
Age Class	Sapling **S** Mature **M**	Young **Y** Over mature **O**	Semi mature **SM** Senescent **SE**	
Life Expectancy	>5 years	5-15 years	15-40 years	40+ years
Crown Class	Dominant **DO** Co-dominant **CO** Intermediate **IN** Suppressed **SU** Dead **DE**	Crown extends above general canopy; not restricted by other trees. Crown forms the bulk of the general canopy but crowded by other trees. Crown extends into dominant/ co dominant canopy but quite crowded on all sides. Crown development restricted from overgrowing trees. Dead Tree		
Crown Condition / Vitality	1 Severe decline 2 Declining 3 Average / low vigour 4 Good 5 Excellent	<20% canopy density; major dead wood 20-60% canopy density; twig and branch dieback 60-90% canopy density; twig dieback 90-100% canopy density; little or no dieback or other problems 100% canopy density; no deadwood or other problems		
Location	Nature Strip **N**	On Site **O**	Adjoining Property **A**	
Tree Type	Endemic **E**	Species that occur naturally, and are restricted to a given area.		
	Exotic **X**	An introduced plant from outside Australia.		
	Indigenous **I**	Species that occur naturally to a given area, but may not be restricted to only that area.		
	Native **N**	A general term referring to any plant indigenous to Australia including cultivars.		
	Noxious weed **W**	Weeds are plants that are unwanted in a particular situation as they may threaten agricultural productivity, have detrimental effects on the natural environment or impact on human health.		
	Remnant **R**	It is defined as vegetation where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and dominated by species characteristic of the vegetation's undisturbed canopy.		
Ecological Value	Branch Hollow **BH** Nest / Drey **ND** Wildlife Sighted **WI**	Food Source **FO** Scats **SC** Endangered Ecological Community **EEC**	Markings **MA** Trunk Hollow **TH**	
Root Zone	Compaction **CO** Garden **GA** Kerb **KE** Mulched **MU**	Damaged roots **DR** Girdled roots **GI** Lifting Pavement **LP** Paving etc **PA**	Exposed roots **ER** Grass **GR** Lowered soil level **S-** Raised Soil level **S+**	
Structures	Fence **F** Garage **G**	Footpath **P** Verandah **V**	Dwelling **D** Seat **S**	

Health & Condition	Bark Subsidence	**BS**	Lean	**LN**
	Basal Inclusion	**BI**	Lifting Paving	**LP**
	Basal Wound	**BaW**	Lopped	**LO**
	Borers	**BO**	Longitudinal Rib	**LR**
	Branch Inclusions	**BI**	Multiple Attach's	**MA**
	Branch Wounds	**BrW**	Multi Trunks	**MT**
	Cambial Dieback	**CD**	Poor Growth Form	**PG**
	Cankers	**CK**	Previous Failures	**PF**
	Canopy Lifted	**CL**	Pruning Events	**PE**
	Climber	**CR**	Sap	**SA**
	Codom Trunk Inclusion	**CI**	Scaffold Inclusion	**SI**
	Decay	**DY**	Splits / Cracks	**SP**
	Decline	**DC**	Surface Roots	**SR**
	Deadwood	**DW**	Suckering growth	**SU**
	Dead stubs	**DS**	Termites	**TE**
	Epicormic Growth	**EP**	Thaumasticorid	**TH**
	Fungal Bodies	**FB**	Trunk Drilling	**TDr**
	Galls	**GA**	Trunk Wounds	**TW**
	Hardware	**HW**	Twig Dieback	**TDi**
	Inclusions	**IN**	Watersprouts	**WS**
	Kino	**KI**		

Appendix C – Proposed Plan

Appendix D - Photographs

Figure 4 Trees no. 6 to 11

Figure 5 Trees no. 21 to 32

Figure 6 Trees no. 33 to 36

Figure 7 Trees no. 37 to 51

Figure 8 Trees no. 52 & 53

Figure 9 Trees no. 54 to 56 & 1 to 3

Appendix E - Glossary

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*Docktor, D (2001) City of Palo Alto, Tree Technical Manual.

Bark*	All tissue outside the vascular cambium. Bark is usually divided into inner bark active phloem and aging and dead crushed phloem.
Basal	Lower trunk area of the tree.
Branch*	Organ which supports leaves, flowers and fruit.
Branch collar*	Trunk tissue that forms around the base of a branch between the main stem and the branch wood and trunk wood to meet. Formed by compaction or expansion as the girth of the branch and trunk increase.
Canopy	The part of the crown composed of the leaves and small twigs.
Cavity	An open wound, characterized by the presence of decay and resulting in a hollow (Matheny & Clarke, 1994).
Co dominant stems*	Stems or trunks of about the same size originating from the same position from the main stem.
Compaction	Compaction of soils causes roots to die due to lack of oxygen and water.
Compartmentalization*	Dynamic tree defense process involving protection features that resist the spread of pathogens.
Crown*	Portion of the tree consisting of branches and leaves and any part of the trunk from which branches arise.
Decay*	Degeneration and delignification of plant tissue, including wood, by pathogens or micro organisms.
Decline	Degeneration and delignification of plant tissue, including wood, by pathogens or micro organisms.
Dieback	Dieback is the reduction in the dynamic mass of a tree as twigs and branches die and are walled off by protection boundaries.
Epicormic shoots*	Shoots produced by dormant buds within the bark or stems of a tree as a result of stress, lopping or increase light. Epicormic shoots usually have a weaker form of branch attachment.
Hollows	Hollows from when wood-digesting micro-organisms digest wood within the boundaries set by the reaction zone or the barrier zone.
Included bark*	Inwardly formed bark at the junction of branches or codominant stems.
Kino	A dark red to brown resin-like substance produced by the trees in the genera Eucalyptus and other related genera. Kino forms when living cells are injured and infected.
Lopping*	Random cutting of branches or stems between branch union or at internodes on young trees.
Mycorrhiza	A symbiotic, non pathogenic, or weakly pathogenic association of fungi and non woody, absorbing roots of plants. The common belief is that the mycorrhiza help the tree with mineral absorption, especially phosphorus.
Microorganisms	An organism of microscopic size. Bacteria, the tree pathogens, may be as small as 3 microns wide by 5 microns long.
Pathogen	Any agent that causes disease.
Photosynthesis	A process where chlorophyll in plants traps the energy of the sun in a molecule of carbon dioxide and water that is called sugar.
Roots	An organ of a tree that serves to maintain mechanical support, to provide water and essential elements from the soil through absorption, and to store energy reserves.
Stem*	Organ which supports branches, leaves flowers and fruit.
Tree*	Long lived woody perennial plant greater than (or potentially greater than) 3m in height with one or relatively few stems.
Trunk*	The main stem.
Wound*	An opening that is created when the bark is cut, removed or injured.

Appendix F - Significance of a Tree, Assessment Rating System

(STARS) IACA, Australia

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.

Significance of a Tree, Assessment Rating System cont.

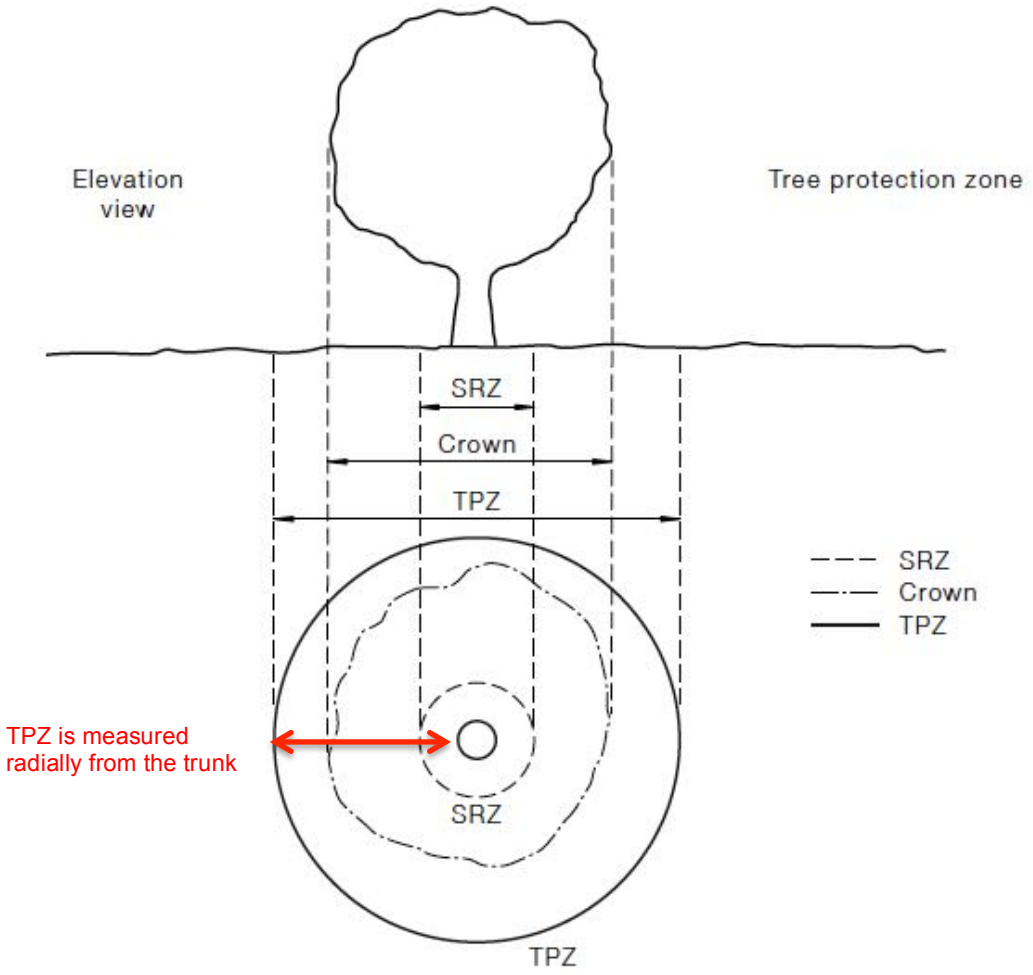
Landscape Significance						
		1. High	2. Medium	3. Low		
		Significance in landscape			Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 years					
	3. Short <1-15 years					
	Dead					

Legend For Matrix Assessment

	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 AS4980 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.

Appendix G - Tree Protection Zones AS4970-2009

Protection of Trees On Development Sites



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).

DETERMINING THE TPZ
The **radius** of the TPZ is calculated for each tree by multiplying its DBH × 12.

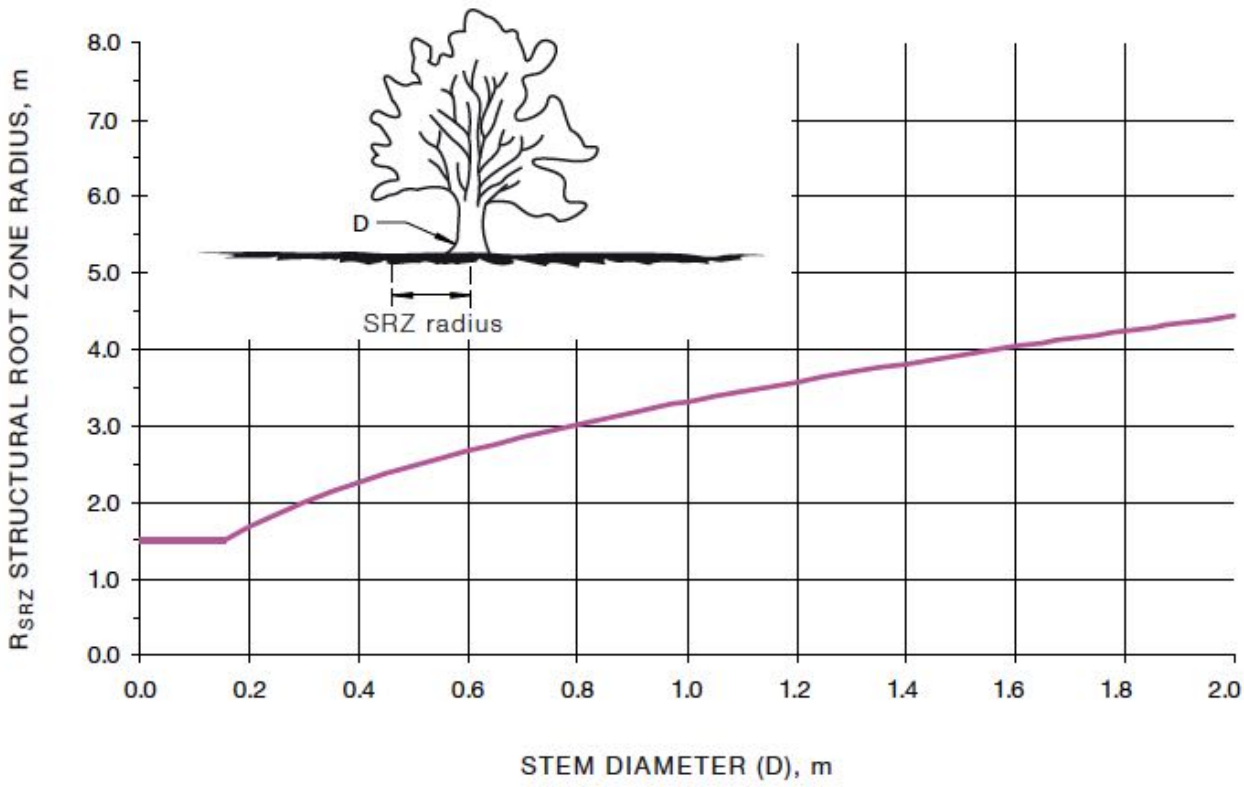
TPZ = DBH×12
where
DBH = trunk diameter measured at 1.4 m above ground

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

A TPZ should not be less than 2 m nor greater than 15 m (except where crown protection is required). Clause 3.3 covers variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 m outside the crown projection.

Appendix H - Structural Root Zones AS4970-2009 (amdt 2010)



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 calculated structural root zone radius (SRZ radius).
2 D is the stem diameter measured immediately above root buttress.
3 The R_{SRZ} for trees less than 0.15 m diameter is 1.5 m.
4 The R_{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.

Appendix I - Qualifications & Experience

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Meredith Gibbs	
Qualifications:	Advanced Certificate in Urban Horticulture, 1999 Horticulture Diploma (Arboriculture), Level 5, 2002, 2015 Collecting Catchment Data 2010 Quantified Tree Risk Assessment 2011, 2014 ISA Tree Risk Assessment Qualification (TRAQ) 2015
Currently studying:	Advanced Diploma in Applied Environmental Management Completed Collecting & Evaluate Catchment Data Interpreting Ecological Relationships Collect & Classify Native Plants Develop Bush Fire Management Plan
Practical experience:	Australis Tree Management, Consulting Arborist. (Owner/Operator) Jan 2000 Silver Springs Nursery. (Owner/Operator) Feb 1997 Neil Clayton Lawns & Gardens. (Horticulturist) Mar 1998 – Apr 2001 Davidson's Nurseries Pty Ltd. (Horticulturist) Feb 1996 – Mar 1998
Memberships and affiliations:	Arboricultural Association Arboriculture Australia Australian Institute of Horticulture International Society of Arboriculture Quantified Tree Risk Assessment Registered User
Insurance	Professional Indemnity Insurance Liberty International Underwriters $5,000,000.00 Policy No. HC-ME-SPC-01-104260 Public Liability Insurance Liberty International Underwriters $20,000,000.00 Policy No. 463763
Continuing professional development:	NAAA Conference, Mature Trees, 2001. Claus Mattheck Seminar 2001. ISAAC Conferences - Parramatta 2004, Brisbane 2008, Newcastle 2009, Adelaide 2010 AILA Tree Management Forum 2005. Jeremy Barrell Tree AZ & Report Writing Workshop 2006 A Practitioner's Guide to Visual Tree Assessment – Mike Ellison 2007 Quantified Tree Risk Assessment Workshop – Mike Ellison 2007 ISAAC Conference Workshop Dr. David Lonsdale 2008 ISAAC Conference Workshop Dr. Phillip Gibbons 2008 ISA International Conference Parramatta 2011 ISA International Conference Workshop Dr. Ken James 2011 Arboriculture Australia Annual Conference – Sunshine Coast 2014, Adelaide 2015

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Appendix K - Disclaimer

Australis Tree Management has no affiliation with any private contractors, associations or nurseries involved in the tree removal and pruning business. This ensures an impartial approach to all recommendations given regarding tree removals, tree hazard inspections and surveys. The Principal of the business, Meredith Gibbs, has a certificate level 5 in Arboriculture obtained from Northern Sydney Institute, Ryde TAFE College, NSW in 2003.

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