Irrawang HS

ARBORICULTURE IMPACT ASSESSMENT

Aaron Bath
ASSURANCE TREES | PO BOX 852, MAITLAND, NSW, 2320

19 DECEMBER 2022

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1. Executive Summary

1.1. A total of 268 trees have been assessed for this development proposal, including inside the boundaries of the property and in neighbouring properties.

1.2. 19 Trees will require removal under the proposed design. Detail of retention values for trees that will be removed are as follows:

1.2.1. High Retention Value Trees (A Grade) – 4

1.2.2. Moderate Retention Value Trees (B Grade) – 10

1.2.3. Low Retention Value Trees (C Grade) – 5

1.3. Trees will require Tree Protection to be implemented during construction. See Map in Appendix B, Tree Protection Plan.

1.4. Total Canopy loss due to required removals is calculated at approximately 1,400 Square Metres. The proposed landscape plan should compensate for this area in terms of replacement plantings.

2. Overview

2.1. **Consultant Details**

Company: Assurance Trees Pty Ltd

ABN: 87 158 399 350 ACN: 158 399 350

Office Phone: 1300 859 510 Office Email: sales@assurancetrees.com.au

Consulting Arborist: Aaron Bath

Mobile: (+61) 434523566

Email: aaron@assurancetrees.com.au

2.2. **Client Details**

Entity: State of NSW, Department of Education

ABN: 40300 173 822

2.3. **Client Representative**

Company: APP Corporation Pty Limited

ABN: 29 003 764 770 ACN: 003 764 770

Office Phone: 02 9957 6211

Contact: Simon Davies

Mobile: (+61) 418485649

Email: simon.davies@app.com.au

2.4. **Site Details**

Site Name: Irrawang High School

Site Address: 80 Mount Hall Road, Raymond Terrace, NSW 2324

Deposited Plan: Lot 2, DP584122

Map of Site: Appendix B

2.5. **Scope of Report**

Assurance Trees have been engaged by the client and directed by the client representative to investigate the impacts of the planned development on existing trees at the above site address. We have been engaged to produce an Arboricultural Impact Assessment (AIA) to the standard required by local government legislation (Port Stephens Council) for lodgement with a Development Application. The AIA will include:

- Verify existing tree data and recalculate Tree Protection Zones (TPZ) and Structural Root Zones (SRZ).
- Plot tree locations and assess impacts of the proposed development.
- Specify retention or removal for all trees onsite.
- Calculate the Tree Retention Value (TRV) for all trees impacted by the development.
- Specify the method of tree protection that will be required for any trees that can be retained.
- Produce a clear map of trees to be removed.
- Produce a clear map of trees to be retained with tree protection specifications.

3. Documentation and Legislation

3.1. **Client Provided Documents**

The client representative has provided the following documentation that has been used in the preparation of this report:

- *Architectural Plans by EJE (08/08/2022)*
- *Engineering Plans by Stantec (08/08/2022)*
- *Preliminary Arboriculture Report by ArborSafe (11/06/2020)*

- *Ecology Report by Firebird ecoSultants Pty Ltd (2020)*

3.2. **Applicable Legislation**

- *Port Stephens Local Environmental Plan 2013 (LEP)*
- *Port Stephens Development Control Plan 2014 (DCP)*
  - *B1 Tree Management*
  - *Tree Technical Specification*
- *State Environmental Planning Policy 2017*
- *Biodiversity Conservation Act 2016*

4. Methodology

4.1. **Site Inspection**

4.1.1. Site inspection was completed on 25th of August 2022 by Aaron Bath to spot check and verify integrity of data from ArborSafe Report dated 11th June 2020.

4.1.2. Original tree data has been imported from ArborSafe Report completed for the project 11 June 2020. Therefore, all site measurements have been captured and recorded by Consulting Arborist Andrew Clark (AQFLevel5).

4.1.3. All trees (as defined by Port Stephens Council) onsite have been recorded. Relevant data has been captured for all trees such as species, height, Diameter at Breast Height (DBH), stem diameter at ground level, canopy spread, condition, landscape significance, sustainability, retention value, images, and any relevant comments.

4.1.4. Tree locations have been collected on a mobile device with GIS capacity.

4.1.5. Every tree has had a tree number assigned to it and this has been assigned a small yellow tag. This tag is normally located at about 2m from ground level on the South side of the tree.

4.1.6. DBH and stem diameter have been estimated with reference to a diameter tape if required. Heights and canopy spread have also been estimated and referenced with a clinometer and laser distance device.

4.1.7. Critical distances have been measured onsite with a tape measure or laser measure.

4.1.8. Visual inspection only conducted on all trees. No aerial inspections have been conducted.

5. Site Assessment

5.1. **Tree Species**

5.1.1. Tree species onsite are dominated by native species such as Tallowwood (*Eucalyptus microcorys*), Forest Red Gum (*Eucalyptus tereticornis*), Swamp Mahogany (*Eucalyptus robusta*), Spotted Gum (*Corymbia maculata*), Brushbox (*Lophostemon confertus*). A range of other native and non-native trees also occur in clusters or as individual trees scatted around the site.

5.1.2. 268 trees have been assessed onsite and data recorded in Appendix A.

5.1.3.Some trees (#274, 276 and 277) are in neighbouring backyards but have been recorded as they are hanging over the school boundary.

5.2. **Soil Conditions**

5.2.1. Soil conditions onsite are highly disturbed. Large amounts of fill, gravel and compacted natural soil exist in and around the trees. Trees have in most cases adapted to this disturbed soil; however, some areas are showing obvious signs of soil-based problems. Trees have adapted to many areas being covered by hardscapes.

5.3. **Tree Health Issues**

5.3.1. Issues noted on site are as follows:

5.3.1.1. Tip dieback was noted on many of the large Eucalyptus trees around the site. This is a good reflection of the soil profile that results in less than ideal growing conditions for the trees.

5.4. **Ecology, Hollows and Koala**

5.4.1. A full ecological report has been completed for the proposal by Firebird ecoSultants Pty Ltd (22 Oct 2020). The below is the Impact Assessment by the ecologist:

5.4.1.1. "The proposal will not require any vegetation removal for the upgrades to school infrastructure and would only require the selective removal of a few trees to ensure bushfire safety measures are met by the proposal to comply with the provisions of Planning for Bushfire Protection 2019. The canopy trees were mostly uniform in age class (30-40 years) and don't support any hollows. Known Koala feed tree species occur within the site such as Eucalyptus tereticornis, Eucalyptus robusta and Eucalyptus punctata, however these trees can all be retained as part of

the selective tree removal process. In any case, Koalas don't have access to the school grounds due the security fencing that surrounds the school."

5.4.2. 8 x Koala Feed Tree species will require removal for this development. Refer to Ecology advice of any requirements for offset planting.

5.5. **Heritage Links**

5.5.1. At 15:15 on 25th August 2022 Aaron Bath conducted a search on the State Heritage Inventory to check for any heritage links to trees. Based on this search, no heritage items are listed on the subject property. Here is the link used for the search: https://www.hms.heritage.nsw.gov.au/App/Item/SearchHeritageItems

5.6. **Significant Trees**

5.6.1. At 15:20 on 25th August 2022 Aaron Bath conducted a check on the Significant Tree Register available online at Port Stephens Council website. No significant trees are located on the subject site, or adjoining property. Here is the link to the Register Online: http://www.portstephens.nsw.gov.au/trim/other?RecordNumber=PSC2015-03576%2F043

5.7. **Canopy Loss**

5.7.1. The total approximate canopy cover in the school is just under 12,000 square metres. Of this there will be approximately 1,400 square metres of canopy to be removed due to the development.

6. Tree Retention and Removal

6.1. **Retention**

6.1.1. Trees to be retained and their retention values have been listed in Appendix A.

6.1.2. Tree Retention and Protection Map shows locations of all trees that can be retained under the proposed design.

6.1.3. Protection of trees will need to be completed prior to earthworks commencing onsite (not including tree removal).

6.1.4. Appropriate Exclusion zones have been calculated and listed in Appendix A as a radius from the centre of the trunk of each tree. This will assist in calculating locations of Exclusion fencing and for the project arborist to calculate any incursions into the TPZ that may require the supervision of a project arborist. For specific instructions on when this is to occur see Appendix F and Appendix E.

6.1.5. Locations of Exclusion Fencing have been shown on a separate Tree Retention and Protection Plan (see separate PDF and preview in Appendix B). Modifications to this plan must be approved by an appointed AQF5 arborist as per *AS4970*.

6.2. **Retain with Management**

6.2.1. There are 6 trees that may be able to be retained with close management by a Project Arborist during construction. These trees are indicated on the Tree Retention Map and listed in Appendix A as “Refer Project Arborist”.

6.2.2. Appropriate management will be the responsibility of the Project Arborist appointed by the Principal Contractor.

6.3. **Removals**

6.3.1. Out of the 268 trees onsite (including 1 x group of 10) there are 19 trees in total that require removal due to the proposal.

6.3.2. A breakdown of the Retention Value of trees requiring removal below:

6.3.2.1. 4 High Retention Value (A Grade)

6.3.2.2. 10 Moderate Retention Value (B Grade)

6.3.2.3. 5 Low Retention Value (C Grade)

6.3.3.Tree removals are all listed in Appendix A.

6.3.4. 8 Koala Feed Tree species will be removed for the development.

6.3.5. Standards for the contractor that is engaged to conduct the tree removals are listed in Appendix G.

References

Bond, J., 2012. *Urban Tree Health.* s.l.:Urban Forest Analytics LLC.

Draper, D. & Richards, P., 2009. *Dictionary for Managing Trees in Urban Environments.* s.l.:CSIRO.

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Trowbridge, P. & Bassuk, N., 2004. *Trees in the Urban Landscape.* Hoboken: John Wiley & Sons.

Watson, G. & Neely, D., 1995. *Trees and Building Sites.* Champaign: International Society of Arboriculture.

Port Stephens Local Environmental Plan 2013 (LEP)

Port Stephens Development Control Plan 2014 (DCP)

State Environmental Planning Policy 2017

Biodiversity Conservation Act 2016

ArborSafe Report, Andrew Clark, 2020

Architectural Plans, EJE, 2022

Structural Engineering Plans, Stantec, 2022

Ecology Report, Firebird ecoSultants Pty Ltd, 2020

Appendix A - Tree Data

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area (m^2)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
1	*Eucalyptus microcorys*	Tallowwood	1	600	660	7.2	162.86	2.8	15-20	20-30	Good	Fair	Mature	25-50	Retain	A
2	*Eucalyptus microcorys*	Tallowwood	1	550	605	6.6	136.85	2.7	15-20	15-20	Good	Fair	Mature	25-50	Retain	B
3	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
4	*Eucalyptus camaldulensis*	River Red Gum	1	550	605	6.6	136.85	2.7	20-30	10-15	Pm	Hazardous	Mature	<5	Retain	U
5	*Callistemon citrinus*	Crimson Bottlebrush	1	150	165	1.8	10.18	1.6	<5	<5	Fair	Fair	Juvenile	5-10	Retain	C
6	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
7	*Eucalyptus microcorys*	Tallowwood	1	650	715	7.8	191.13	2.9	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
8	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
9	*Eucalyptus microcorys*	Tallowwood	1	600	660	7.2	162.86	2.8	20-30	10-15	Good	Fair	Mature	15-25	Retain	A
10	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
11	*Livistona australis*	Cabbage Fan Palm	1	250	275	3.0	28.27	1.9	<5	<5	Good	Good	Juvenile	25-50	Retain	C
12	*Livistona australis*	Cabbage Fan Palm	1	250	275	3.0	28.27	1.9	<5	<5	Good	Good	Juvenile	25-50	Retain	C
13	*Livistona australis*	Cabbage Fan Palm	1	250	275	3.0	28.27	1.9	<5	<5	Good	Good	Juvenile	25-50	Retain	C
14	*Jacaranda mimosifolia*	Jacaranda	1	300	330	3.6	40.72	2.1	<5	5-10	Good	Fair	Semi Mature	15-25	Retain	B
15	*Livistona australis*	Cabbage Fan Palm	1	250	275	3.0	28.27	1.9	<5	<5	Good	Good	Juvenile	25-50	Retain	C
16	*Livistona australis*	Cabbage Fan Palm	1	250	275	3.0	28.27	1.9	<5	<5	Good	Good	Juvenile	25-50	Retain	C
17	*Eucalyptus tereticornis*	Forest Red Gum	1	600	660	7.2	162.86	2.8	20-30	15-20	Good	Good	Mature	25-50	Retain	A
18	*Eucalyptus microcorys*	Tallowwood	1	700	770	8.4	221.67	3.0	20-30	10-15	Good	Fair	Mature	25-50	Retain	A
19	*Callistemon citrinus*	Crimson Bottlebrush	1	150	165	1.8	10.18	1.6	<5	<5	Fair	Fair	Juvenile	5-10	Retain	C
20	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
21	*Eucalyptus microcorys*	Tallowwood	1	550	605	6.6	136.85	2.7	15-20	10-15	Good	Pm	Mature	<5	Retain	C
22	*Eucalyptus tereticornis*	Forest Red Gum	1	750	825	9.0	254.47	3.1	15-20	15-20	Good	Fair	Mature	15-25	Retain	B
23	*Eucalyptus microcorys*	Tallowwood	1	800	880	9.6	289.53	3.1	20-30	15-20	Good	Good	Mature	25-50	Retain	A
24	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	20-30	5-10	Good	Fair	Semi Mature	15-25	Retain	B
25	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	20-30	5-10	Good	Fair	Semi Mature	15-25	Retain	B
26	*Eucalyptus microcorys*	Tallowwood	1	450	495	5.4	91.61	2.5	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
27	*Eucalyptus microcorys*	Tallowwood	1	200	220	2.4	18.10	1.8	10-15	<5	Fair	Fair	Juvenile	10-15	Retain	C
28	*Eucalyptus microcorys*	Tallowwood	1	550	605	6.6	136.85	2.7	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
29	*Eucalyptus microcorys*	Tallowwood	1	250	275	3.0	28.27	1.9	15-20	<5	Fair	Fair	Semi Mature	10-15	Retain	C
30	*Eucalyptus microcorys*	Tallowwood	1	600	660	7.2	162.86	2.8	20-30	10-15	Good	Fair	Mature	10-15	Retain	B
31	*Eucalyptus microcorys*	Tallowwood	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
32	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
33	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	15-20	10-15	Good	Good	Mature	25-50	Retain	A
34	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	20-30	15-20	Good	Good	Mature	25-50	Retain	A
35	*Corymbia maculata*	Spotted Gum	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Fair	Mature	25-50	Retain	A
36	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	20-30	15-20	Good	Good	Mature	25-50	Retain	A
37	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Good	Mature	25-50	Retain	B
38	*Eucalyptus microcorys*	Tallowwood	1	650	715	7.8	191.13	2.9	20-30	15-20	Good	Fair	Mature	25-50	Retain	A
39	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Good	Mature	25-50	Retain	A
40	*Lophostemon confertus*	Queensland Box	1	350	385	4.2	55.42	2.2	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	B
41	*Lophostemon confertus*	Queensland Box	1	300	330	3.6	40.72	2.1	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	B
42	*Lophostemon confertus*	Queensland Box	1	250	275	3.0	28.27	1.9	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	B
43	*Lophostemon confertus*	Queensland Box	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	C

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area (m^2)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
44	*Lophostemon confertus*	Queensland Box	1	250	275	3.0	28.27	1.9	5-10	<5	Good	Fair	Juvenile	15-25	Retain	C
45	*Lophostemon confertus*	Queensland Box	1	300	330	3.6	40.72	2.1	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	C
46	*Lophostemon confertus*	Queensland Box	1	350	385	4.2	55.42	2.2	5-10	5-10	Good	Fair	Semi Mature	15-25	Retain	B
47	*Lophostemon confertus*	Queensland Box	1	350	385	4.2	55.42	2.2	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	B
48	*Lophostemon confertus*	Queensland Box	1	400	440	4.8	72.38	2.3	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	B
49	*Lophostemon confertus*	Queensland Box	1	150	165	1.8	10.18	1.6	<5	<5	Good	Fair	Juvenile	15-25	Retain	C
50	*Lophostemon confertus*	Queensland Box	1	250	275	3.0	28.27	1.9	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	C
51	*Lophostemon confertus*	Queensland Box	1	250	275	3.0	28.27	1.9	5-10	<5	Good	Fair	Semi Mature	15-25	Refer Project Arborist	C
52	*Lophostemon confertus*	Queensland Box	1	300	330	3.6	40.72	2.1	5-10	<5	Fair	Fair	Semi Mature	15-25	Refer Project Arborist	C
53	*Eucalyptus microcorys*	Tallowwood	1	750	825	9.0	254.47	3.1	20-30	15-20	Good	Fair	Mature	15-25	Retain	B
54	*Eucalyptus microcorys*	Tallowwood	1	450	495	5.4	91.61	2.5	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
55	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
~~56~~	~~*Acacia sp.*~~	~~Wattle~~	~~1~~	~~100~~	~~110~~	~~1.2~~	~~4.52~~	~~1.3~~	~~<5~~	~~<5~~	~~Good~~	~~Fair~~	~~Young~~	~~5-10~~	~~Remove~~	~~C~~
57	*Brachychiton acerifolius*	Illawarra Flame Tree	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Good	Juvenile	15-25	Retain	C
58	*Diploglottis australis*	Native Tamarind	1	200	220	2.4	18.10	1.8	10-15	<5	Good	Fair	Semi Mature	15-25	Retain	C
59	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	20-30	5-10	Good	Fair	Mature	15-25	Refer Project Arborist	B
60	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
61	*Eucalyptus microcorys*	Tallowwood	1	200	220	2.4	18.10	1.8	10-15	<5	Good	Fair	Juvenile	10-15	Retain	C
62	*Eucalyptus microcorys*	Tallowwood	1	300	330	3.6	40.72	2.1	15-20	5-10	Fair	Fair	Semi Mature	10-15	Retain	C
63	*Eucalyptus microcorys*	Tallowwood	1	450	495	5.4	91.61	2.5	20-30	10-15	Good	Fair	Mature	15-25	Retain	B
64	*Eucalyptus microcorys*	Tallowwood	1	300	330	3.6	40.72	2.1	20-30	5-10	Good	Fair	Semi Mature	15-25	Retain	B
65	*Eucalyptus microcorys*	Tallowwood	1	200	220	2.4	18.10	1.8	15-20	<5	Good	Fair	Semi Mature	15-25	Retain	C
66	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	20-30	5-10	Good	Fair	Semi Mature	15-25	Retain	B
67	*Eucalyptus microcorys*	Tallowwood	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	10 - 15	Retain	C
68	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	20-30	10-15	Good	Fair	Semi Mature	15-25	Retain	B
~~69~~	~~*Eucalyptus tereticomis*~~	~~Forest Red Gum~~	~~1~~	~~400~~	~~440~~	~~4.8~~	~~72.38~~	~~2.3~~	~~20-30~~	~~5-10~~	~~Poor~~	~~Poor~~	~~Semi Mature~~	~~<5~~	~~Retain~~	~~U~~
70	*Eucalyptus microcorys*	Tallowwood	1	250	275	3.0	28.27	1.9	20-30	5-10	Good	Fair	Semi Mature	15-25	Retain	B
71	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
72	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	15-20	10--15	Good	Fair	Semi Mature	15-25	Retain	B
73	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	20-30	5-10	Good	Fair	Semi Mature	15-25	Retain	B
74	*Eucalyptus microcorys*	Tallowwood	1	700	770	8.4	221.67	3.0	20-30	15-20	Good	Fair	Mature	15 - 25	Retain	A
75	*Eucalyptus paniculata*	Grey Iron Bark	1	500	550	6.0	113.10	2.6	15-20	15-20	Good	Fair	Mature	15 25	Retain	B
76	*Eucalyptus microcorys*	Tallowwood	1	200	220	2.4	18.10	1.8	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	C
77	*Eucalyptus paniculata*	Grey Iron Bark	1	250	275	3.0	28.27	1.9	10-15	<5	Good	Fair	Semi Mature	15-25	Retain	C
78	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20--30	10--15	Good	Fair	Mature	15-25	Retain	B
79	*Angophora costata*	Smooth-barked Apple Myrtle	1	350	385	4.2	55.42	2.2	10--15	5-10	Good	Fair	Semi Mature	15-25	Retain	B

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area (m^2)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
80	*Eucalyptus microcorys*	Tallowwood	1	550	605	6.6	136.85	2.7	20-30	15-20	Good	Fair	Mature	15-25	Retain	B
81	*Eucalyptus saligna*	Sydney Blue Gum	1	400	440	4.8	72.38	2.3	20-30	10--15	Good	Fair	Mature	25-50	Refer Project Arborist	B
82	*Eucalyptus saligna*	Sydney Blue Gum	1	700	770	8.4	221.67	3.0	20-30	15-20	Good	Good	Mature	25-50	Retain	A
83	*Eucalyptus saligna*	Sydney Blue Gum	1	600	660	7.2	162.86	2.8	20-30	15-20	Good	Fair	Mature	10-15	Remove	B
~~84~~	~~*Eucalyptus microcorys*~~	~~Tallowwood~~	~~1~~	~~250~~	~~275~~	~~3.0~~	~~28.27~~	~~1.9~~	~~10-15~~	~~5-10~~	~~Fair~~	~~Fair~~	~~Semi Mature~~	~~10^{-1}5~~	~~Remove~~	~~C~~
85	*Corymbia citriodora*	Lemon-scented Gum	1	450	495	5.4	91.61	2.5	15-20	10--15	Good	Fair	Semi Mature	15-25	Remove	B
86	*Eucalyptus saligna*	Sydney Blue Gum	1	600	660	7.2	162.86	2.8	20-30	15-20	Good	Fair	Mature	15-25	Remove	B
~~87~~	~~*Eucalyptus pilularis*~~	~~Blackbutt~~	~~1~~	~~400~~	~~440~~	~~4.8~~	~~72.38~~	~~2.3~~	~~10--15~~	~~10--15~~	~~Good~~	~~Fair~~	~~Semi Mature~~	~~15-25~~	~~Remove~~	~~B~~
~~88~~	~~*Eucalyptus microcorys*~~	~~Tallowwood~~	~~1~~	~~400~~	~~440~~	~~4.8~~	~~72.38~~	~~2.3~~	~~20-30~~	~~10-15~~	~~Fair~~	~~Fair~~	~~Mature~~	~~15-25~~	~~Remove~~	~~B~~
89	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10--15	Good	Fair	Mature	15-25	Remove	B
90	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10--15	Good	Fair	Mature	15-25	Remove	B
91	*Eucalyptus microcorys*	Tallowwood	1	650	715	7.8	191.13	2.9	20-30	10--15	Good	Fair	Mature	15-25	Refer Project Arborist	B
92	*Corymbia maculata*	Spotted Gum	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Fair	Mature	25-50	Remove	A
93	*Eucalyptus tereticornis*	Forest Red Gum	1	250	275	3.0	28.27	1.9	10-15	5-10	Fair	Fair	Semi Mature	10-15	Remove	C
94	*Corymbia maculata*	Spotted Gum	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Fair	Juvenile	15-25	Remove	C
95	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	20--30	10-15	Good	Fair	Mature	25-50	Remove	A
96	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Good	Mature	25-50	Remove	A
97	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	20--30	10--15	Good	Good	Mature	25-50	Remove	A
98	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	15-20	10-15	Good	Fair	Mature	25-50	Remove	B
99	*Eucalyptus microcorys*	Tallowwood	1	300	330	3.6	40.72	2.1	15-20	5-10	Fair	Fair	Semi Mature	15-25	Remove	B
100	*Eucalyptus resinifera*	Red Mahogany	1	350	385	4.2	55.42	2.2	15-20	5-10	Good	Fair	Semi Mature	15-25	Remove	B
101	*Eucalyptus resinifera*	Red Mahogany	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	25-50	Remove	B
~~102~~	~~*Eucalyptus punctata*~~	~~Grey Gum~~	~~1~~	~~600~~	~~660~~	~~7.2~~	~~162.86~~	~~2.8~~	~~15-20~~	~~10--15~~	~~Good~~	~~Fair~~	~~Mature~~	~~15-25~~	~~Remove~~	~~C~~
103	*Jacaranda mimosifolia*	Jacaranda	1	100	110	1.2	4.52	1.3	<5	<5	Good	Fair	Juvenile	5-10	Remove	C
104	*Syzygium sp*	LillyPilly	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Good	Semi Mature	15-25	Remove	C
105	*Callistemon citrinus*	Crimson Bottlebrush	1	150	165	1.8	10.18	1.6	<5	<5	Good	Fair	Juvenile	10-15	Remove	C
106	*Eucalyptus paniculata*	Grey Iron bark	1	350	385	4.2	55.42	2.2	15-20	10-15	Good	Fair	Semi Mature	25-50	Retain	B
107	*Eucalyptus paniculata*	Grey Iron bark	1	600	660	7.2	162.86	2.8	20--30	10-15	Good	Fair	Mature	15-25	Retain	B
108	*Eucalyptus robusta*	Swamp Mahogany	1	300	330	3.6	40.72	2.1	5-10	5-10	Good	Fair	Semi Mature	15-25	Retain	C
109	*Eucalyptus robusta*	Swamp Mahogany	1	650	715	7.8	191.13	2.9	15-20	10-15	Good	Fair	Mature	10-15	Retain	C
110	*Triadica sebifera*	Chinese Tallow Tree	1	200	220	2.4	18.10	1.8	5-10	<5	Fair	Fair	Mature	10-15	Retain	C
111	*Melaleuca quinquenervia*	Broad-leaved Paperbark	1	500	550	6.0	113.10	2.6	5-10	5-10	Good	Fair	Mature	15-25	Retain	B
112	*Triadica sebifera*	Chinese Tallow Tree	1	250	275	3.0	28.27	1.9	<5	<5	Fair	Fair	Mature	10^{-1}5	Retain	C
113	*Triadica sebifera*	Chinese Tallow Tree	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Semi Mature	10-15	Retain	C
114	*Triadica sebifera*	Chinese Tallow Tree	1	250	275	3.0	28.27	1.9	<5	<5	Good	Fair	Mature	10-15	Retain	C
115	*Triadica sebifera*	Chinese Tallow Tree	1	300	330	3.6	40.72	2.1	5-10	5-10	Fair	Fair	Mature	10-15	Retain	C
116	*Melia azedarach*	White Cedar	1	450	495	5.4	91.61	2.5	5-10	10-15	Fair	Fair	Mature	10-15	Retain	C
117	*UnkNwn sp*	UnkNwnsp	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Good	Juvenile	15-25	Retain	C

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area ($^{m}2$)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
118	*Paulownia tomentosa*	Royal Paulownia	1	500	550	6.0	113.10	2.6	5-10	5-10	Good	Poor	Mature	$10^{-1}5$	Retain	C
119	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	600	660	7.2	162.86	2.8	10-15	10-15	Fair	Fair	Mature	10-15	Retain	B
120	*Triadica sebifera*	Chinese Tallow Tree	1	300	330	3.6	40.72	2.1	5-10	5-10	Good	Fair	Mature	10-15	Retain	C
121	*Melia azedarach*	White Cedar	1	350	385	4.2	55.42	2.2	5-10	10-15	Good	Fair	Mature	$10^{-1}5$	Retain	C
122	*Triadica sebifera*	Chinese Tallow Tree	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Semi Mature	$10^{-1}5$	Retain	C
123	*Triadica sebifera*	Chinese Tallow Tree	1	250	275	3.0	28.27	1.9	5-10	5-10	Good	Fair	Semi• Mature	$10^{-1}5$	Retain	C
124	*Triadica sebifera*	Chinese Tallow Tree	1	200	220	2.4	18.10	1.8	<5	<5	Poor	Fair	Semi Mature	<5	Retain	C
125	*Jacaranda mimosifolia*	Jacaranda	1	100	110	1.2	4.52	1.3	<5	<5	Fair	Poor	Juvenile	$<_5$	Retain	C
126	*Jacaranda mimosifolia*	Jacaranda	1	100	110	1.2	4.52	1.3	<5	<5	Good	Fair	Juvenile	10-15	Retain	C
127	*Jacaranda mimosifolia*	Jacaranda	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Semi Mature	15-25	Retain	C
128	*Bauhinia hookeri*	Mountain Ebony	1	300	330	3.6	40.72	2.1	5-10	<5	Fair	Fair	Semi Mature	10-15	Retain	C
129	*Bauhinia hookeri*	Mountain Ebony	1	300	330	3.6	40.72	2.1	5-10	<5	Fair	Fair	Semi Mature	10-15	Retain	C
130	*Eucalyptus paniculata*	Grey Iron bark	1	500	550	6.0	113.10	2.6	15-20	15-20	Good	Good	Mature	>50	Retain	A
131	*Corymbia maculata*	Spotted Gum	1	250	275	3.0	28.27	1.9	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	C
132	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
133	*Corymbia maculata*	Spotted Gum	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Good	Semi Mature	25-50	Retain	A
134	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
135	*Corymbia maculata*	Spotted Gum	1	250	275	3.0	28.27	1.9	15-20	5-10	Good	Fair	Semi Mature	25-50	Retain	B
136	*Casuarina glauca*	Swamp she-oak	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Fair	Juvenile	10-15	Retain	C
137	*Eucalyptus microcorys*	Tallowwood	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	C
138	*Casuarina glauca*	Swamp she-oak	1	150	165	1.8	10.18	1.6	<5	<5	Poor	Poor	Juvenile	$<_5$	Retain	U
139	*Eucalyptus microcorys*	Tallowwood	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Poor	Semi- Mature	10-15	Retain	C
140	*Lophostemon confertus*	Queensland Box	1	350	385	4.2	55.42	2.2	10-15	10-15	Good	Fair	Semi Mature	25-50	Retain	B
141	*Casuarinag glauca*	Swamp she-oak	1	300	330	3.6	40.72	2.1	10-15	5-10	Good	Fair	Mature	15-25	Retain	B
142	*Lophostemon confertus*	Queensland Box	1	300	330	3.6	40.72	2.1	10-15	5-10	Fair	Fair	Semi Mature	10-15	Retain	C
143	*Eucalyptus microcorys*	Tallowwood	1	350	385	4.2	55.42	2.2	10-15	10-15	Good	Fair	Semi Mature	10-15	Retain	C
144	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	15-20	10-15	Good	Fair	Mature	15-25	Retain	B
145	*Casuarina glauca*	Swamp she-oak	1	250	275	3.0	28.27	1.9	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
146	*Eucalyptus microcorys*	Tallowwood	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
147	*Eucalyptus microcorys*	Tallowwood	1	750	825	9.0	254.47	3.1	15-20	10-15	Good	Good	Mature	25-50	Retain	A
148	*Casuarina glauca*	Swamp she-oak	1	350	385	4.2	55.42	2.2	5-10	<5	Good	Poor	Mature	5-10	Retain	C
149	*Corymbia eximia*	Yellow Bloodwood	1	300	330	3.6	40.72	2.1	5-10	5-10	Good	Fair	Semi Mature	15-25	Retain	B
150	*Corymbia eximia*	Yellow Bloodwood	1	150	165	1.8	10.18	1.6	<5	<5	Good	Fair	Juvenile	15-25	Retain	C
151	*Eucalyptus robusta*	Swamp Mahogany	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Fair	Juvenile	15-25	Retain	C

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area (m^2)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
152	*Eucalyptus botryoides*	Southern Mahogany	1	350	385	4.2	55.42	2.2	10-15	10-15	Fair	Fair	Semi Mature	10-15	Retain	C
153	*Corymbia eximia*	Yellow Bloodwood	1	250	275	3.0	28.27	1.9	<5	<5	Good	Fair	Juvenile	25-50	Retain	C
154	*Corymbia eximia*	Yellow Bloodwood	1	300	330	3.6	40.72	2.1	5·10	5·10	Good	Fair	Semi Mature	25·50	Retain	B
155	*Corymbia eximia*	Yellow Bloodwood	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Juvenile	15-25	Retain	C
156	*Eucalyptus haemastoma*	ScribblyGum	1	750	825	9.0	254.47	3.1	15-20	15-20	Good	Fair	Mature	15-25	Retain	B
157	*Corymbia eximia*	Yellow Bloodwood	1	20	22	0.2	0.18	0.7	<5	<5	Good	Fair	Juvenile	15-25	Retain	C
158	*Group of Trees*	Group of Trees	10	N/A	#VALUE!	#VALUE!	#VALUE!	#VALUE!	<5	<5	Good	Fair	Juvenile	5-10	Retain	C
159	*Eucalyptus botryoides*	Southern Mahogany	1	400	440	4.8	72.38	2.3	10-15	10-15	Good	Fair	Semi Mature	15-25	Retain	B
160	*Eucalyptus saligna*	Sydney Blue Gum	1	400	440	4.8	72.38	2.3	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
161	*Allocasuarina liltoralis*	Black She-oak	1	150	165	1.8	10.18	1.6	5-10	<5	Fair	Fair	Semi Mature	10-15	Retain	C
162	*Eucalyptus nicholii*	Narrow·leavedBlack Peppermint	1	500	550	6.0	113.10	2.6	5-10	10-15	Fair	Poor	Mature	5-10	Retain	C
163	*Allocasuarina liltoralis*	Black She-oak	1	300	330	3.6	40.72	2.1	<5	<5	Good	Fair	Semi Mature	10-15	Retain	C
164	*Casuarina glauca*	Swamp she-oak	1	300	330	3.6	40.72	2.1	5-10	5-10	Good	Good	Semi Mature	15-25	Retain	B
165	*Corymbia eximia*	Yellow Bloodwood	1	400	440	4.8	72.38	2.3	5-10	5-10	Good	Good	Semi Mature	25-50	Retain	B
166	*Eucalyptus paniculata*	Greylronbark	1	650	715	7.8	191.13	2.9	10-15	10-15	Good	Fair	Mature	25-50	Retain	B
167	*Corymbia maculata*	Spotted Gum	1	700	770	8.4	221.67	3.0	20-30	15-20	Good	Fair	Mature	25-50	Retain	A
168	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	15-20	10-15	Good	Fair	Mature	25-50	Retain	A
169	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi Mature	25-50	Retain	C
170	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	15-20	10-15	Good	Good	Mature	25·50	Retain	A
171	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	15-20	10-15	Fair	Fair	Mature	10-15	Retain	B
172	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	10-15	<5	Good	Fair	Semi Mature	15-25	Retain	C
173	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	15-20	<5	Good	Fair	Mature	15-25	Retain	B
174	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	15-20	10-15	Fair	Poor	Mature	10-15	Retain	C
175	*Corymbia maculata*	Spotted Gum	1	300	330	3.6	40.72	2.1	10-15	<5	Good	Fair	Semi Mature	15-25	Retain	B
176	*Eucalyptus tereticornis*	Forest Red Gum	1	850	935	10.2	326.85	3.2	15-20	15-20	Good	Fair	Mature	25·50	Retain	B
177	*Eucalyptus saligna*	Sydney Blue Gum	1	1000	1100	12.0	452.39	3.4	20-30	15-20	Good	Fair	Mature	15-25	Retain	B
178	*Corymbia maculata*	Spotted Gum	1	600	660	7.2	162.86	2.8	10-15	10-15	Good	Fair	Mature	25-50	Retain	B
179	*Eucalyptus sp.*	Eucalypt	1	800	880	9.6	289.53	3.1	20-30	15-20	Good	Fair	Mature	25.50	Retain	B
180	*Cinnamomum camphora*	Camphor Laurel	1	1000	1100	12.0	452.39	3.4	10-15	15-20	Fair	Fair	Mature	10-15	Retain	C
181	*Eucalyptus globulus*	Southern Blue Gum	1	300	330	3.6	40.72	2.1	5-10	5-10	Fair	Poor	Semi Mature	10-15	Retain	C
182	*Eucalyptus botryoides*	Southern Mahogany	1	650	715	7.8	191.13	2.9	15-20	15-20	Good	Fair	Mature	15-25	Retain	B
183	*Eucalyptus globulus*	Southern Blue Gum	1	650	715	7.8	191.13	2.9	10-15	10-15	Good	Fair	Semi Mature	10-15	Retain	B
184	*Eucalyptus botryoides*	Southern Mahogany	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Fair	Mature	25·50	Retain	B
185	*Eucalyptus botryoides*	Southern Mahogany	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
186	*Eucalyptus botryoides*	Southern Mahogany	1	200	220	2.4	18.10	1.8	10-15	<5	Fair	Fair	Juvenile	10-15	Retain	C

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area ($^{(m}2^{)}$	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
187	*Eucalyptus microcorys*	Tallowwood	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
188	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Fair	Semi Mature	10-15	Retain	C
189	*Eucalyptus botryoides*	Southern Mahogany	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
190	*Eucalyptus botryoides*	Southern Mahogany	1	350	385	4.2	55.42	2.2	15-20	<5	Good	Fair	Semi Mature	10-15	Retain	C
191	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
192	*Eucalyptus botryoides*	Southern Mahogany	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Juvenile	10-15	Retain	C
193	*Eucalyptus botryoides*	Southern Mahogany	1	300	330	3.6	40.72	2.1	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
194	*Eucalyptus haemastoma*	ScribblyGum	1	350	385	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
195	*Melaleuca sp.*	Paperbark	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Semi Mature	15-25	Retain	C
196	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	200	220	2.4	18.10	1.8	5-10	<5	Fair	Fair	Semi Mature	5-10	Retain	C
197	*Corymbia maculata*	Spotted Gum	1	400	440	4.8	72.38	2.3	10-15	5-10	Good	Fair	Semi Mature	25-50	Retain	B
198	*Corymbia maculata*	Spotted Gum	1	450	495	5.4	91.61	2.5	10-15	10-15	Good	Fair	Semi Mature	15-25	Retain	B
199	*Eucalyptus resinifera*	Red Mahogany	1	300	330	3.6	40.72	2.1	15-20	5-10	Fair	Fair	Semi Mature	10-15	Retain	C
200	*Eucalyptus resinifera*	Red Mahogany	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
201	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	200	220	2.4	18.10	1.8	5-10	<5	Fair	Fair	Semi Mature	5-10	Retain	C
202	*Eucalyptus punctata*	GreyGum	1	300	330	3.6	40.72	2.1	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
203	*Eucalyptus paniculata*	Grey Iron bark	1	200	220	2.4	18.10	1.8	5-10	5-10	Good	Fair	Semi Mature	25-50	Retain	C
204	*Eucalyptus resinifera*	Red Mahogany	1	400	440	4.8	72.38	2.3	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
205	*Eucalyptus resinifera*	Red Mahogany	1	350	385	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
206	*Eucalyptus resinifera*	Red Mahogany	1	100	110	1.2	4.52	1.3	<5	<5	Good	Fair	Juvenile	5-10	Retain	C
207	*Eucalyptus resinifera*	Red Mahogany	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	C
208	*Eucalyptus resinifera*	Red Mahogany	1	350	385	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	C
209	*Eucalyptus microcorys*	Tallowwood	1	400	440	4.8	72.38	2.3	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
210	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	200	220	2.4	18.10	1.8	<5	<5	Good	Fair	Juvenile	5-10	Retain	C
211	*Eucalyptus resinifera*	Red Mahogany	1	400	440	4.8	72.38	2.3	10-15	5-10	Good	Fair	Semi Mature	15-25	Retain	B
212	*Acacia sp.*	Wattle	1	300	330	3.6	40.72	2.1	<5	5-10	Good	Fair	Mature	5-10	Retain	C
213	*Eucalyptus resinifera*	Red Mahogany	1	400	440	4.8	72.38	2.3	10-15	5-10	Fair	Fair	Semi Mature	15-25	Retain	B
214	*Eucalyptus botryoides*	Southern Mahogany	1	350	385	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi Mature	10-15	Retain	C
215	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	300	330	3.6	40.72	2.1	5-10	<5	Good	Fair	Semi Mature	15-25	Retain	C
216	*Corymbia maculata*	Spotted Gum	1	700	770	8.4	221.67	3.0	20-30	15-20	Good	Good	Mature	25-50	Retain	B

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area ($^{m}2$)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
217	*Eucalyptus paniculata*	Greylronbarll	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Fair	Semi Mature	25-50	Retain	B
218	*Eucalyptus paniculata*	Greylronbarll	1	300	330	3.6	40.72	2.1	5-10	5-10	Good	Fair	Semi Mature	10-15	Retain	C
219	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	15-20	10-15	Good	Fair	Semi Mature	15-25	Retain	B
220	*Eucalyptus tereticornis*	Forest Red Gum	1	700	770	8.4	221.67	3.0	20-30	15-20	Fair	Poor	Senescent	5-10	Retain	C
221	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	10-15	10-15	Good	Fair	Semi Mature	15-25	Retain	B
222	*Corymbia maculata*	Spotted Gum	1	450	495	5.4	91.61	2.5	20-30	5-10	Good	Fair	Semi Mature	25-50	Retain	B
223	*Eucalyptus paniculata*	Greylronbarll	1	300	330	3.6	40.72	2.1	15-20	<5	Good	Fair	Semi Mature	15-25	Retain	C
224	*Eucalyptus paniculata*	Greylronbarll	1	300	330	3.6	40.72	2.1	15-20	<5	Good	Fair	Semi Mature	15-25	Retain	C
225	*Corymbia maculata*	Spotted Gum	1	550	605	6.6	136.85	2.7	20-30	15-20	Good	Good	Mature	25-50	Retain	B
226	*Corymbia maculata*	Spotted Gum	1	600	660	7.2	162.86	2.8	20-30	15-20	Good	Pm	Mature	S.10	Retain	C
227	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Good	Mature	25-50	Retain	B
228	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	15-20	10-15	Good	Good	Mature	25-50	Retain	B
229	*Eucalyptus paniculata*	Greylronban(	1	550	605	6.6	136.85	2.7	20-30	10-15	Good	Fair	Mature	25-50	Retain	B
230	*Eucalyptus microcorys*	Tallowwood	1	550	605	6.6	136.85	2.7	20-30	15-20	Good	Fair	Mature	15-25	Remove	B
231	*Eucalyptus paniculata*	Greylronbark	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	25-50	Refer Project Arborist	B
232	*Eucalyptus paniculata*	Greylronbark	1	300	330	3.6	40.72	2.1	10-15	<5	Good	Fair	Semi Mature	15-25	Retain	C
233	*Eucalyptus paniculata*	Greylronbark	1	350	385	4.2	55.42	2.2	15-20	5-10	Good	Fair	Semi Mature	25-50	Retain	B
234	*Eucalyptus paniculata*	Greylronbark	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
235	*Eucalyptus tereticornis*	Forest Red Gum	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Fair	Mature	15-25	Retain	B
236	*Eucalyptus tereticornis*	Forest Red Gum	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Fair	Juvenile	15-25	Retain	C
237	*Eucalyptus pilularis*	Blackbutt	1	500	550	6.0	113.10	2.6	20-30	10-15	Fair	Fair	Mature	15-25	Retain	B
238	*Eucalyptus tereticornis*	Forest Red Gum	1	300	330	3.6	40.72	2.1	15-20	<5	Good	Fair	Semi Mature	25-50	Retain	B
239	*Eucalyptustereticornis*	Forest Red Gum	1	350	385	4.2	55.42	2.2	15-20	<5	Good	Fair	Semi Mature	25-50	Retain	B
240	*Eucalyptus microcorys*	Tallowwood	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Fair	Semi Mature	25-50	Retain	B
241	*Eucalyptus tereticornis*	Forest Red Gum	1	350	385	4.2	55.42	2.2	15-20	5-10	Good	Fair	Semi Mature	25-50	Retain	B
~~242~~	~~*Corymbia maculata*~~	~~Spotted Gum~~	~~1~~	~~450~~	~~495~~	~~5.4~~	~~91.61~~	~~2.5~~	~~15-20~~	~~10-15~~	~~Good~~	~~Fair~~	~~Semi Mature~~	~~25-50~~	~~Remove~~	~~B~~
~~243~~	~~*Grevillea robusta*~~	~~Silky Oak~~	~~1~~	~~300~~	~~330~~	~~3.6~~	~~40.72~~	~~2.1~~	~~10-15~~	~~5-10~~	~~Good~~	~~Good~~	~~Semi Mature~~	~~15-25~~	~~Remove~~	~~B~~
~~244~~	~~*Grevillea robusta*~~	~~Silky Oak~~	~~1~~	~~200~~	~~220~~	~~2.4~~	~~18.10~~	~~1.8~~	~~10-15~~	~~<5~~	~~Good~~	~~Good~~	~~Juvenile~~	~~15-25~~	~~Remove~~	~~C~~
245	*Eucalyptus tereticomis*	Forest Red Gum	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Poo,	Semi Mature	5-10	Retain	U
246	*Eucalyptus tereticornis*	Forest Red Gum	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Fair	Semi Mature	25-50	Retain	B
247	*Corymbia maculata*	Spotted Gum	1	300	330	3.6	40.72	2.1	5-10	5-10	Good	Good	Semi Mature	25-50	Retain	B
248	*Eucalyptus paniculata*	Grey Iron bark	1	800	880	9.6	289.53	3.1	20-30	20-30	Fair	Fair	Senescent	10-15	Retain	B
249	*Eucalyptus paniculata*	Grey Iron bark	1	250	275	3.0	28.27	1.9	5-10	5-10	Good	Fair	Semi Mature	15-25	Retain	C
250	*Eucalyptus paniculata*	Grey Iron bark	1	400	440	4.8	72.38	2.3	15-20	10-15	Good	Fair	Semi Mature	25-50	Retain	B
251	*Corymbia gummifera*	Red Bloodwood	1	400	440	4.8	72.38	2.3	15-20	10-15	Fair	Fair	Semi Mature	15-25	Retain	B

Tree	Botanical Name	Common Name	Trees in Group	Estimated DBH (mm	Estimated ORB (mm)	Radial TPZ (m)	TPZ area (m^2)	Radial SRZ (m)	Tree Height	Canopy (m)	Health	Structure	Age	ULE (Yrs.)	Outcome	Tree Quality Score
252	*Eucalyptus paniculata*	Grey Iron bark	1	400	440	4.8	72.38	2.3	15-20	5-10	Good	Fair	Semi Mature	25-50	Retain	B
253	*Eucalyptus tereticomis*	Forest Red Gum	1	450	495	5.4	91.61	2.5	15-20	10-15	Good	Fair	Semi Mature	25-50	Retain	B
254	*Angophora costata*	Smooth-barked Apple Myrtle	1	250	275	3.0	28.27	1.9	5-10	5-10	Fair	Fair	Semi Mature	S.10	Retain	C
255	*Angophora costata*	Smooth-barked Apple Myrtle	1	300	330	3.6	40.72	2.1	15-20	5-10	Good	Fair	Semi Mature	25-50	Retain	B
256	*Eucalyptus tereticornis*	Forest Red Gum	1	500	550	6.0	113.10	2.6	15-20	10-15	Good	Fair	Mature	25-50	Retain	B
257	*Eucalyptus paniculata*	Grey Iron bark	1	200	220	2.4	18.10	1.8	10-15	5-10	Fair	Fair	Juvenile	15-25	Retain	C
258	*Piltosporum undulatum*	Sweet Pittosporum	1	150	165	1.8	10.18	1.6	<5	<5	Good	Good	Juvenile	10-15	Retain	C
259	*Grevilea robusta*	Silky Oak	1	200	220	2.4	18.10	1.8	5-10	<5	Good	Good	Juvenile	15-25	Retain	C
260	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	20-30	10-15	Good	Fair	Semi Mature	25-50	Retain	B
261	*Corymbia maculata*	Spotted Gum	1	500	550	6.0	113.10	2.6	20-30	10-15	Good	Good	Mature	25-50	Retain	A
262	*Corymbia maculata*	Spotted Gum	1	350	385	4.2	55.42	2.2	15-20	5-10	Good	Fair	Semi Mature	25-50	Retain	C
263	*Melaleuca quinquenervia*	Broad-leaved Paperbark	1	900	990	10.8	366.44	3.3	10-15	10-15	Good	Fair	Mature	10-15	Retain	B
264	*Melaleuca quinquenervia*	Broad-leavedPaperbark	1	600	660	7.2	162.86	2.8	10-15	10-15	Good	Fair	Mature	10-15	Retain	B
265	*Eucalyptus paniculata*	Grey Iron bark	1	500	550	6.0	113.10	2.6	10-15	10-15	Good	Fair	Mature	25-50	Retain	C
266	*Eucalyptus paniculata*	Grey Iron bark	1	500	550	6.0	113.10	2.6	15-20	10-15	Good	Fair	Mature	25-50	Retain	B
267	*Eucalyptus tereticornis*	Forest Red Gum	1	950	1045	11.4	408.28	3.4	20-30	15-20	Fair	Fair	Mature	15-25	Retain	B
268	*Eucalyptus tereticornis*	Forest Red Gum	1	300	330	3.6	40.72	2.1	5-10	5-10	Fair	Fair	Juvenile	15-25	Retain	C
269	*Eucalyptus tereticornis*	Forest Red Gum	1	450	495	5.4	91.61	2.5	15-20	5-10	Good	Fair	Semi Mature	15-25	Retain	B
270	*Eucalyptus tereticornis*	Forest Red Gum	1	700	770	8.4	221.67	3.0	15-20	15-20	Good	Fair	Mature	25-50	Retain	A
271	*Eucalyptus tereticornis*	Forest Red Gum	1	600	660	7.2	162.86	2.8	15-20	15-20	Good	Fair	Mature	25-50	Retain	A
272	*Eucalyptus botryoides*	Southern Mahogany	1	400	440	4.8	72.38	2.3	5-10	5-10	Good	Fair	Semi Mature	15-25	Retain	B
273	*Eucalyptus tereticornis*	Forest Red Gum	1	500	550	6.0	113.10	2.6	15-20	5-10	Good	Poor	Mature	10-15	Retain	C
274	*Eucalyptus robusta*	Swamp Mahogany	1	750	825	9.0	254.47	3.1	20-30	15-20	Good	Good	Mature	25-50	Retain	A
275	*Cinnamomum camphora*	Camphor Laurel	1	1000	1100	12.0	452.39	3.4	10-15	15-20	Good	Good	Mature	25-50	Retain	B
276	*Eucalyptus saligna*	Sydney Blue Gum	1	1000	1100	12.0	452.39	3.4	20-30	20-30	Good	Fair	Mature	25-50	Retain	A
277	*Grevilea robusta*	Silky Oak	1	450	495	5.4	91.61	2.5	10-15	5-10	Good	Fair	Mature	15-25	Retain	B

Appendix B – Maps

Figure 1 - Site Overview with legal boundaries (Six Maps 2022)

Figure 2 - Tree Removal Plan (See separate PDF)

Figure 3 - Tree Retention and Protection Plan (See separate PDF)

Appendix C – Site Image

Figure 4 - Building to be demolished on West Side of Development

Figure 5 - Trees on West side of G Block to be removed

Figure 6 - Trees in centre of school will remain untouched

Figure 7 - Some trees between A and G block to be removed for new covered entrance

Figure 8 - Stand of Tallowwood trees, some will require close management by project arborist to allow for new pathways

Figure 9 - Trees 81 to 86

Appendix D – Determining Tree Retention Values

The following steps are a standardised approach for assessing the retention values of trees. This approach is based on the *British Standard BS5837-2012: Trees in Relation to Design, Demolition and Construction*. The below is taken from the ArborSafe report by Andrew Clark:

Age: Refers to the life cycle of the tree

Table 1 - Age

Category	Description
Young	Newly planted tree not fully established may be capable of being transplanted or easily replaced.
Juvenile	Tree is small in terms of its potential physical size and has not reached its full reproductive ability.
Semi-mature	Tree in active growth phase of life cycle and has not yet attained an expected maximum physical size for its species and/or its location.
Mature	Tree has reached an expected maximum physical size for the species and/or location and is showing a reduction in the rate of seasonal extension growth.
Senescent	Tree is approaching the end of its life cycle and is exhibiting a reduction in vigour often evidenced by natural deterioration in health and structure.

Health: Summarises the health and vigour of the tree

Table 2 - Health

Category	Description
Excellent	Canopy full with dense foliage coverage throughout, leaves are entire and are of an excellent size and colour for the species with no visible pathogen damage. Excellent growth indicators, e.g. seasonal extension growth.
Good	Canopy full with minor variations in foliage density throughout, leaves are entire and are of good size and colour for the species with minimal or no visible pathogen damage. Good growth indicators.
Fair	Canopy with moderate variations in foliage density throughout, leaves not entire with reduced size and/or atypical in colour, moderate pathogen damage. Reduced growth indicators, visible amounts of deadwood/dieback,and epicormic growth.
Poor	Canopy density significantly reduced throughout,leaves are not entire, are significantly reduced in size and/or are discoloured, significant pathogen damage. Significant amounts of deadwood and/or epicormic growth, noticeable dieback of branch tips, possibly extensive.
Dead	No live plant material observed throughout the canopy, bark may be visibly delaminating from the trunk and/or branches.

Structure: Summarises the structure of the tree from roots to crown

Table 3 - Structure

Category	Description
Good	Good form and branching habit. Minor structural defects that are insignificant and typical or common within the species. e.g. included bark, co-dominant stems. No fungal pathogens present. No visible wounds to the trunk and/or root plate.
Fair	Moderate structural defects present that impact longevity e.g. apical leaders sharing common union(s). Minor damage to structural roots. Small wounds present where decay could begin. No fungal pathogens present. A fair representation of the species.
Poor	Significant structural defects present that have a significant impact on longevity and result in a poor representation of the species e.g. Branch/stems with included bark with failure likely within 0-5 years. Wounding evident with cavities and/or decay present. Damage to structural roots.
Hazardous	Serious structural defects with failure determined to be imminent (<12 months). Defects may include active splits and/or partial branch or root plate failures. Tree requires immediate arboricultural works to alleviate the associated risk.

Useful Life Expectancy (ULE): Useful Life Expectancy refers to an expected period of time the tree can be retained within the landscape before its amenity value declines to a point where it may detract from the appearance of the landscape and/or becomes potentially hazardous to people and/or property. ULE values consider tree species, current age, health, structure, and location.

Table 4 - Useful Life Expectancy

Category:
0-5 Years
5-10 Years
10-20 Years
20-30 Years
30-50 Years
>50 Years

Table 5 - Tree Retention Values

	Category and definition	Criteria (including sub-categories where appropriate)		
	Category U			
	Trees in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than 5 years.	• Trees that have a severe structural defect that are not remediable such that their failure is expected within 12 months. • Trees that will become unviable after removal of other Category U trees (e.g. where for whatever reason the loss of companion shelter cannot be mitigated by pruning). • Trees that are dead or are showing signs of significant, immediate and irreversible overall decline. • Trees infected with pathogens of significance to the health and or safety of other trees nearby • Low quality trees suppressing adjacent trees of better quality. • Noxious weeds or species categorised as weeds within the local area. **Note:** Category U trees can have existing or potential conservation value* which might make it desirable to preserve.		
		1. Arboricultural Qualities	**2. Landscape qualities**	**3. Cultural and environmental values**
	Category A			
	Trees of High Quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years.	Trees that are particularly good examples of their species, especially if rare or unusual (in the wild or under cultivation); or those that are important components of groups or avenues.	Trees or groups of significant visual importance as arboricultural and/or landscape features. (e.g. feature and landmark trees).	Trees, groups or plant communities of significant conservation, historical, commemorative or other value (e.g. remnant trees, aboriginal scar trees, critically endangered plant communities, trees listed specifically within a Heritage statement of significance).
	Category B			
	Trees of Moderate Quality with an estimated remaining life expectancy of 15-25 years and of dimensions and prominence that cannot be readily replaced within 10 years.	Trees that might be included within Category A but are downgraded because of diminished condition such that they are unlikely to be suitable for retention beyond 25 years.	Trees that are visible from surrounding properties and/or the street but make little visual contribution to the wider locality.	Trees with conservation or other cultural value (trees within conservation areas or landscapes described within a statement of significance, locally indigenous species).
	Category C			
	Trees of Low Quality with an estimated remaining life expectancy of 5-15 years, or young trees that are easily replaceable.	Trees of very limited value or such impaired condition that they do not qualify in higher categories.	Trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.

Table 6 - Tree Quality (Tree Retention Value)

		Health			
		Excellent/ Good	Fair	Poor	Dead
Structure	Good	A	B	C	u
	Fair	B	B	C	u
	Poor	C	C	u	u
	Hazard*	u	u	u	u

Appendix F - Calculating TPZ and SRZ Values

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).

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

Variations to the TPZ

It may be possible to encroach into or make variations to the standard TPZ. Encroachment includes excavation, compacted fill, and machine trenching.

Minor Encroachments

If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. Variations must be made by the project arborist considering relevant factors.

Major Encroachments

If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable.
The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods and consideration of relevant factors.

Structural Root Zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.
The SRZ only needs to be calculated when 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. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula. Root investigation may provide more information on the extent of these roots.

SRZ radius = (D × 50)0.42 × 0.64

Where D = trunk diameter, in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m

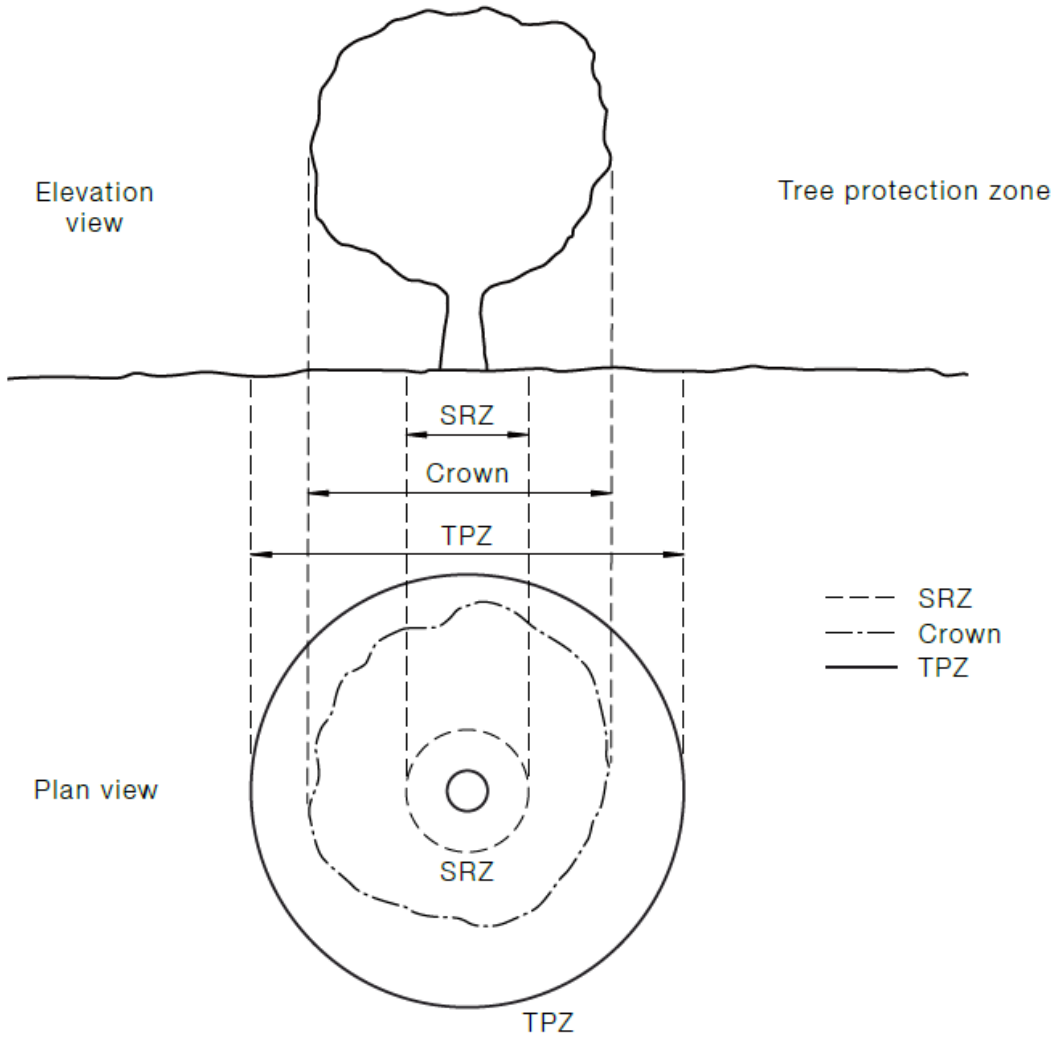

Figure 10 - TPZ and SRZ Diagram

Appendix E – Protection Measures

Below are the specifications for protection measures from *AS4970 Protection of Trees on Development Sites*.

Tree protection measures include a range of activities and structures. Structures are used to identify and isolate the TPZ.
The TPZ is a restricted area usually delineated by protective fencing (or use of an existing structure such as an existing fence or wall). It is installed prior to site establishment and retained intact until completion of the works.
Some works and activities within the TPZ may be authorized by the determining authority. These must be supervised by the project arborist. Any additional encroachment that becomes necessary as the site works progress must be reviewed by the project arborist and be acceptable to the determining authority before being carried out.
Approved tree removal and pruning should be carried out before the installation of tree protection measures.

Activities Restricted Within the TPZ
Activities generally excluded from the TPZ include but are not limited to—

7. machine excavation including trenching;
8. excavation for silt fencing;
9. cultivation;
10. storage;
11. preparation of chemicals, including preparation of cement products;
12. parking of vehicles and plant;
13. refuelling;
14. dumping of waste;
15. wash down and cleaning of equipment;
16. placement of fill;
17. lighting of fires;
18. soil level changes;
19. temporary or permanent installation of utilities and signs, and
20. physical damage to the tree.

Protective Fencing
Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. The TPZ should be secured to restrict access.

AS 4687 specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area.
Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots. Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

Signs
Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site (see image below).

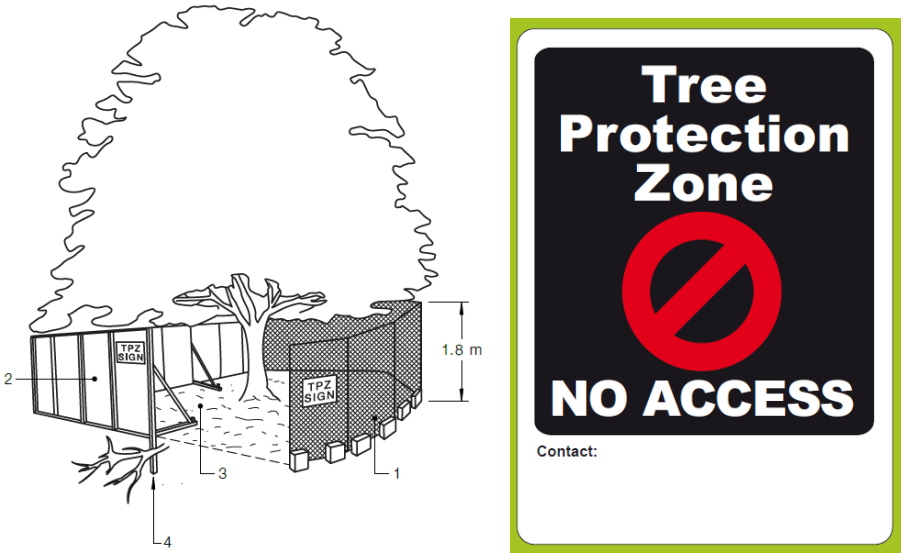

Figure 11 - Tree Protection Zone fencing example and example of a sign format

Other Protection Measures

When tree protection fencing cannot be installed or requires temporary removal, other tree protection measures should be used, including those set out below.

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

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

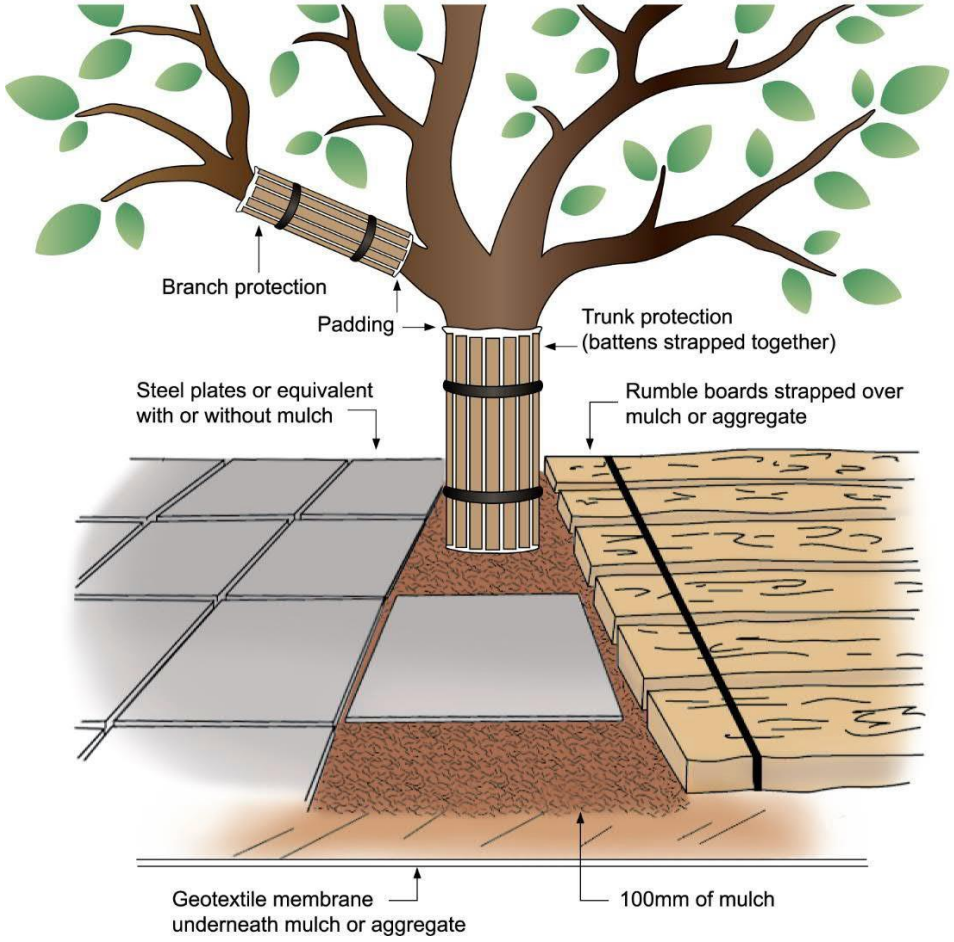

Figure 12 - Tree Protection Measures if fencing cannot be maintained or must be removed

Root protection during works within the TPZ

Some approved works within the TPZ, such as regrading, installation of piers or landscaping may have the potential to damage roots.

If the grade is to be raised the material should be coarser or more porous than the underlying material. Depth and compaction should be minimized.

Manual excavation should be carried out under the supervision of the project arborist to identify roots critical to tree stability. Relocation or redesign of works may be required.

Where the project arborist identifies roots to be pruned within or at the outer edge of the TPZ, they should be pruned with a final cut to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaws or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for large roots within the TPZ to be 'pruned' with machinery such as backhoes or excavators.

Where roots within the TPZ are exposed by excavation, temporary root protection should be installed to prevent them drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged in place and kept moist during the period that the root zone is exposed.

Other excavation works in proximity to trees, including landscape works such as paving, irrigation and planting can adversely affect root systems. Seek advice from the project arborist.

Installing underground services within TPZ

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

Scaffolding

Where scaffolding is required, it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable it must be specified by the project arborist in accordance with AS 4373. Ground below the scaffolding should be protected by boarding (e.g. scaffold board or plywood sheeting) as shown in Figure 5. Where access is required, a board walk, or other surface material should be installed to minimize soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed. Image below shows an example of appropriate scaffolding setup with a TPZ.

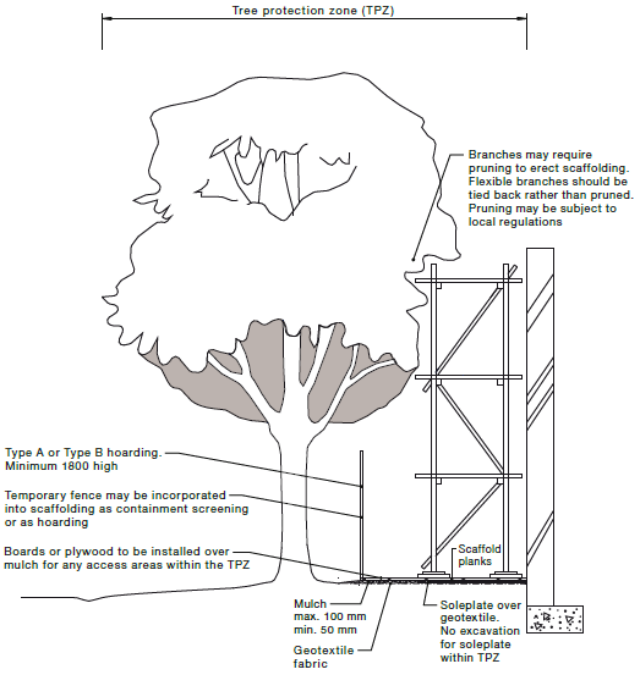

Figure 13 - Scaffolding Setup Example

Mulching

The area within the TPZ should be mulched. The mulch must be maintained to a depth of 50–100 mm using material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

Watering
Soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within the TPZ. An above-ground irrigation system should be installed and maintained by a competent individual.

Weed removal
All weeds should be removed by hand without soil disturbance or should be controlled with appropriate use of herbicide.

Appendix G – Contractor Guidelines/Standards

Below is the recommended guidelines and standards for a Tree Service Provider that is engaged to conduct arboricultural works on a site, including tree removal, pruning, grinding and all other services relating to trees:

Supervisor Qualifications and Experience - All tree work must be supervised by a company/individual holding a minimum qualification level of AQF3 in Arboriculture. All work conducted on the site must be supervised by an individual holding this qualification, as a minimum, and they must remain onsite for the entire duration of the works.

Worker Qualifications – All tree pruning, and tree removal onsite must be conducted by workers holding a minimum qualification level of AQF2 in Arboriculture and supervised by the above supervisor. All workers feeding chippers, conducting stump grinding and operating machinery must be clearly competent to perform the task and supervised by the above supervisor.

SEQ Management System – The contractor must have a documented Safety Management Plan, Environmental Management Plan and it is recommended that they also have a Quality Management Plan.

Insurances – The contractor engaged should have public liability cover for a minimum value of $20 million and hold the appropriate workers compensation policy for any employees working on site, with WIC code 952520. Any company providing consulting services such as a project arborist, must have a Professional Indemnity Policy for over $2 million.

Minimum Industry Standards – The minimum Industry Standards published by Arboriculture Australia must be the minimum standards of the contractor in the way works are performed onsite and the safety procedures followed. The contractor must be able to demonstrate that they have access to these standards. These standards can be purchased at https://trees.org.au/education/minimum-industry-standards

Australian Standards – All pruning is to be in accordance with AS4373 *Pruning of Amenity Trees.*

Environmental Standards - Mulch from all native tree removal should be retained onsite for use within the school grounds if possible. If not possible, the mulch should be taken to an approved recycling facility to be solarised. This is a requirement under the *Mulch Order 2016* enforced by the EPA.

Appendix H – Common Management Activities

Pruning – Trees require pruning for a variety of reasons:

- Pruning of the lower limbs of a tree to allow for clearance for maintenance, pedestrians, buildings, services, line of sight for traffic and appearance.
- Reduction of the height of a tree can be achieved to a certain extent through pruning. The extent to which this can be done is determined by the species, age, shape, previous pruning and appearance requirements
- Thinning of branches to improve appearance, allow light penetration or reduce wind load
- Structural Pruning is completed when a tree is forming a defect such as a V shaped codominant branch union. Structural pruning is a critical maintenance activity for urban trees to achieve maximum safe useful life expectancy.
- Remedial Pruning is completed in response to an identified problem with the tree. This may be a pest, disease or root disturbance from a development.
- Deadwood Removal is one of the most common pruning activities undertaken during the life of a tree. It involves the cutting out of dead branches that are likely to fall.

All tree pruning should be carried out in accordance with *AS4373 Pruning of Amenity Trees* and the superior *MIS308 Tree Pruning.*

Tree Removal – trees can be removed in four ways. The method chosen will depend on the location and condition of the tree, contractor's equipment, experience, and the client's requirements. The four methods are:

- Cutting down from the ground. Also called felling or falling the tree. The tree is then processed through a machine called a mulcher or woodchipper that reduces the wood and leaves to a product called leaf mulch. Depending on the size of the machinery used, the larger wood may be removed off site in separate trucks or cut up and fed through the machine.
- Accessing and removing the tree in pieces, this can involve rigging the pieces so to allow them to be lowered to the ground in a controlled manner. The 2 most common access methods are climbing the tree or using an EWP (cherry picker) to move around the tree to conduct the work.
- Accessing the tree and removal of pieces with a crane or helicopter. This involves lifting the pieces up and out of the area.
- Using machinery to push the tree over and process with large machinery.

Stump Grinding – this is to remove the stump from the ground entirely or to reduce the height to a certain depth below the ground to allow for the intended use of the area. This task is earthmoving by nature and thus checking for underground services should always be conducted prior to undertaking this activity.

Mulching – this is one of the most beneficial activities that can be completed for the long-term health of the tree. Spreading of a locally sourced, native leaf mulch is the most beneficial type of mulch to be used for your trees. This mulch has a mix of wood and leaf material so breaks down more rapidly, returning nutrients and organic matter into the soil that will improve the health of the tree. Mulch helps retain moisture in the soil by more than

100%. It also improves soil conditions for beneficial fungi, bacteria and worms. It regulates ground temperatures and reduces compaction of soil in trafficable areas. It helps reduce the chances of mechanical damage to the root and trunk from lawn care activities and reduces competition of grasses below the canopy. Mulch should be spread to a thickness of approximately 100mm over the area directly below the canopy. The larger the mulched area, the more beneficial.

Fertilising – this should normally be in the form of organic nutrients such as manure. Adding nutrients to soils can improve the growth rates of trees and the resistance to pests and diseases. It can also increase flowing and fruit production if required.

Supporting – this is normally only undertaken for high value trees in areas of frequent or constant use. It involves the installation of a supporting structure such as a cable or a prop to provide support for a defect of a part of the tree that has partially failed. Tree Support Systems should be installed following the requirements in *MIS310 Tree Support Systems.*

Irrigation – Provision of regular water is critical for tree health, particularly with newly planted and establishing trees.

Root Pruning – Cutting of selected roots by first removing soil then cutting the roots with a sharp blade or tool that provides a clean cut on the root end. Large structural roots should always be cut under the supervision of a AQF5 arborist as these roots may be holding the tree upright.

Stem Injection – This is the practice of injection of a chemical or liquid into the stem of the tree to treat a particular issue. This can be for treatment of sap or leaf sucking bugs, fungi or even bacteria in the soil. This is done either by a high-pressure injection or low-pressure injection tool.

Habitat Creation – This involves the deliberate creation of hollows, cracks, and splits. Installation of artificial boxes, hollow logs and similar into the canopy of suitable trees to provide habitat for a wide range of arboreal dwelling creatures. These practices should follow the guidelines established in the *MIS312 Environmental Arboriculture*.

Appendix I – Limitations and Disclaimer

1. The conclusions and recommendations contained in this report, relate only to the trees that have been inspected, at the time of inspection.
2. The details of this report are specific to the site/tree(s) assessed and may not constitute general advice to be used in other applications.
3. This report and any attachments should be read in its entirety, and no individual part of the report or its attachments should be interpreted without reference to the entire report.
4. The consultant shall not be required to give testimony or attend court for matters pertaining to this report unless a separate contract is arranged to provide expert witness services or the like with a fee payable for these services.
5. Care has been taken when referencing supporting documents or the opinions of others in this report, however no responsibility can be taken for the accuracy or correctness of the information provided by others.
6. It is assumed that all legal information provided by the client pertaining to the ownership of property is correct. The consultant takes no responsibility for any legal matters.
7. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is not contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
8. Following significant weather events, the condition of a tree onsite may change.
9. Maps, images, and graphics are not necessarily to scale.

Appendix J – Glossary of Terms

Abatement - Reduction in hazard, either by remedial tree works and/or removal of target(s).

Abnormal Lean - Abnormal departure of trunk from the vertical or near vertical position.

Amenity Value - The environmental and landscape benefits of a tree as opposed to its commercial value for timber. Many of these benefits are intangible or difficult to measure.

Arboriculture - The care, cultivation and management of individual trees or groups of trees in the landscape primarily for their amenity value.

Arborist - A specialist in the cultivation and care of trees and shrubs, including tree surgery, tree identification, the diagnosis, treatment, and prevention of tree diseases, and the control of pests.

Basal Flare - The rapid increase in diameter that occurs at the confluence of the trunk and roots, associated with stem and root tissue.

Bifurcation - To divide or fork into two parts, usually equal in size and occurring at a narrow angle.

Bleeding/Sap flow - The exudation of sap/resin from wounds and/or other injuries, may be accompanied by a foul odour.

Bole - The central stem of the tree. Another meaning for trunk.

Bow - The gradual curve of a branch or stem.

Bracket Fungi/Fungal Fruiting Body - Fruiting of spore producing body of wood decay fungi, forming on the external surface of the stem or trunk.

Branch Attachment - The structural linkage of branch to stem.

Branch Collar Wood - which forms around branch attachments, frequently more pronounced below the branch.

Brash Wood Type - of reaction wood which is weaker than normal due to thin cell walls and decreased fibre content; presence increases the likelihood of failure.

Burl - More correctly identified as a Lignotuber (a mass of dormant, tightly arranged buds). It is a generally circular swelling on the main stem or branch; not considered a defect.

Buttress Support - of branch, stem or root; usually associated with exaggerated growth.

Buttress Root - A large woody root located at the base of the trunk (the root crown) which is important to the overall stability of the tree due to its contributions to basal flare.

Buttress Wood - Wood under tension, in a structurally critical portion of a trunk or branch.

Callus - Can be detected within weeks after cells on the edge of a wound die and is produced by the enlargement or increased division of cells adjacent to the edge of cell dieback. Often associated with wound wood development post pruning.

Cambium - A layer of delicate meristematic cells between the inner bark or phloem and the wood or xylem, which produces new phloem on the outside and new xylem on the inside in stems, roots,etc., originating all secondary growth in plants and forming the annual rings of wood.

Canker - A localised area of dead tissue on a stem or branch, caused by fungal or bacterial organisms, characterised by wound wood development on the periphery; may be perennial or annual.

Canopy - Parts of the tree above the trunk, including leaves, and lateral and scaffold branches.

Cavity - An open wound, often characterised by the presence of decay and resulting in a hollow.

CODIT - An acronym for Compartmentalisation of Decay in Trees, this scientific theory was developed by the late Dr. Alex Shigo which now forms the basis of our knowledge of how trees respond to wounding, infection and decay.

Co-dominant Stems - Equal in size and relative importance, usually associated with either the trunks/stems or scaffold limbs/branches in the crown. Not necessarily a structural defect.

Compartmentalisation - Physiological process which creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms within trees (see also CODIT).

Compression Wood - Type of reaction wood produced on the underside of branches and leaning trunks.

Coppice - To cut a tree to ground level to stimulate regenerative growth.

Core Drill - A technique involving creating a series of vertical cores within a tree's root zone which can be filled with a variety of materials to stimulate root initiation and growth. Often used on ageing and/or stressed trees.

Crack - Breakage in the stem, involving bark, cambium, and xylem.

Crown - Parts of the tree above the trunk, including leaves, and lateral and scaffold branches (see also Canopy).

Crown Uplift - Pruning technique where lower limbs are removed, thereby raising the overall crown above the ground.

DBH - Diameter of the trunk, measured at breast height i.e. 1.4m from ground level.

Deadwood - Branch or stem wood bearing no live tissues. (Small deadwood <2cm, medium deadwood 2-10cm, large deadwood >10cm).

Deadwooding - The act of removing deadwood from the canopy.

Decay - Process of degradation of woody tissues by fungi and bacteria through decomposition of cellulose and lignin.

Decorticate - To remove bark, rind, or husk.

Decurrent - Referring to crowns which are made up of a system of co-dominant scaffold branches, lacking a central leader.

Defect - Any structural weakness or deformity.

Dehisce - (of a pod or seed vessel, or a cut or wound) Gape or burst open.

Dieback - Death of shoots and branches, generally from tip to base.

Disease/Pathogens - A malfunction in, or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms.

Dominant - In crown class, trees whose crowns extend above the general stand canopy and are not restricted by adjacent trees.

DRC (Diameter at Root Crown) - The diameter of the very lowest part of the trunk where root buttressing begins and often used to calculate a tree's structural root zone (SRZ).

End Weight - The concentration of excessive foliage toward the branch extremity.

Epicormic Growth - Shoots which result from adventitious or latent buds, generally initiated in times of distress, and are generally poorly attached.

EWP - Elevated Work Platform.

Excessive Thinning - Having relatively little extent from one side of the canopy to the opposite. In relation to pruning; excessive pruning of lateral branches at their point of origin, usually associated with removal of large amounts of live tissue.

Exclude Site Use - Implement control measures to prevent people from entering an area that has the capacity to cause harm or damage i.e. due to hazardous trees.

Fasciation - (or Cresting) Abnormal twig proliferation.

Flush Cut - Pruning technique where both branch and trunk tissue are removed behind the branch collar; considered poor practice.

Frass Bore Dust - Excrement and other debris left by wood boring insects.

Fungal Fruiting Body - (see Bracket Fungi)

Gall - In branches and stems, an abnormal, localised growth, generally seen as a large knob of undifferentiated woody tissues.

Girdling Root - A root or roots which circles and constricts the stem or roots causing death of phloem and/or cambial tissue.

Habitat Prune - (or King Prune) Reducing or removing the crown of a tree and retaining its trunk as a habitat for wildlife.

Hanger - A partially attached (but clearly broken) or unattached branch which remains lodged in the crown.

Hazard - A hazard is an action or item that has the capacity to cause harm or damage, which may be serious.

Hydrophobic - Used to describe a soil profile that is difficult to rehydrate as water either pools on it or runs off it. Generally associated with very dry, nutrient-poor soils.

Ilex - A tree or shrub of a genus that includes holly and its relatives.

Inappropriate Location - The tree's present growing environment is not suitable due to its surroundings, such as buildings, car parks etc. in relation to the inherent characteristics of the tree species.

Included Bark - Pattern of development at branch junctions where bark is turned inward rather than pushed out; contrasting with branch bark ridge. Also referred to as Embedded bark. Such a formation generally results in weakened attachment.

Infection - The establishment of parasitic micro-organism in the tissues of a tree.

Irrigation - The watering of land by artificial means to foster plant growth.

Kino - The resin which flows from Eucalypts and its relatives such as Corymbia sp. and

Angophora sp.

Leader - The primary terminal shoot or trunk of a tree.

Lean/Leaning - Departure of trunk from the vertical or near vertical position.

Lerp - A type of Psyllid that commonly predates on many species of Eucalypts and its relatives.

Loading - Refers to the mechanical stresses imposed by the weight, orientation etc. of trees and branches in relation to the site, the architecture of the tree and the weather. The amount of loading upon a tree can be directly influenced by its level of exposure to the prevailing winds.

Lopping - The removal of the crown of a tree, or a major proportion of it. Incorrect pruning method of removing branches to stubs, resulting in poor form and weak branch unions.

Mycorrhiza - A mutual association between certain fungi and the roots of vascular plants often resulting in an increased efficiency in the absorption of mineral nutrients.

Mulch - Material laid down over the rooting area to help conserve soil moisture, supress weeds and regulate soil temperature.

Nutrition - The elements and compounds required to support healthy plant growth, of which at least 17 are known.

Parasitic and semi parasitic plants - Vascular plants such as Mistletoes which infect host plants via the penetration of specialised roots called haustorium to gain access to the host's vascular system for water and mineral nutrients.

Pathogen - (See Disease/Pathogens).

Pests/Pest Insects - Pests such as Wood Borers, Termites, Leaf Beetles, Gumleaf Skeletoniser, Leafblister Sawfly, Lerps or Elm Leaf Beetle that cause tree decline. There are various methods of treatment to remove pests as well as prevent their return.

Phellinus sp. - A genus of bracket forming, wood decaying fungi which occurs in native and exotic species. Whilst the decay associated with this fungus is often localised it has a reputation for being quite destructive.

Phytotoxic - A substance which is toxic to plants.

Phloem - The part of a vascular bundle consisting of sieve tubes, companion cells, parenchyma, and fibres and forming the food-conducting tissue of a plant.

PICUS Sonic Tomograph - A specialised piece of diagnostic equipment generally used to determine the level of internal decay within a branch or trunk using sound waves.

Pollard - The removal of the tree canopy, back to the stem or primary branches. Pollarding may involve the removal of the entire canopy in one year, or may be phased over several years.

Poor Pruning - Pruning techniques (such as lopping) which are undertaken without regard for the tree's natural biology and which can cause decline, decay and potentially lead to part or whole tree failure.

Potenz Hydrogenous (pH) - The measure of soluble Hydrogen ions in a solution which is used to measure its acidity or alkalinity. Affects nutrient availability to plants.

Previous Failures - Denotes a tree has previously had a leader or branches fail. Previous failures can result in wounding if a required action is not attended to (see Wound).

Propagate/Propagation - To reproduce a plant, sexually by means of seed or asexually by cuttings, grafting or divisions, so that it is genetically identical to the parent (true to type).

Pruning - The removal or cutting back of twigs or branches.

Psyllid - A common and diverse group of sap-sucking insects related to whiteflies, aphids, and scales. They are regularly associated with native plants and most species appear to be host specific or confined to a group of closely related plants. Sustained infestations can lead to tree decline if untreated.

Reactive Growth/Reaction Wood - Production of woody tissue in response to altered mechanical loading, often in response to internal defect or decay and loss of strength.

Risk - The likelihood that a hazard will cause harm within a variable period of lime.

Root Collar/Root Crown - The transitional area between the stem/sand roots.

Saprophyte - An organism which obtains its nutrition from dead or decaying organic matter. This term is often associated with fungi and with some groups of vascular plants such as Orchids.

Scaffold Limb - Primary structural branch of the crown.

Senescence - The stage of a tree's life cycle between maturity and death, whereby a tree will naturally decline over several years.

Softfall - An impact absorbing layer that is laid beneath a finished surface

Soil Compaction - Area of compacted soil covering the root system. Affected soil becomes less able to absorb rainfall and water, thus increasing runoff and erosion. Trees have difficulty growing in compacted soil because soil particles are pressed together leaving little space for oxygen and water, which are essential for root growth.

Soil Problems - Soil problems such as compaction, salinity,erosion can cause tree decline and potentially lead to tree failure.

Split - Breakage in stem, affecting bark, cambium and xylem.

SRZ - Structural Root Zone.

Stress - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, e.g. A lack of soil moisture, inadequate nutrition or extremes of temperature.

Structural Defect - Internal or external points of weakness which reduce the structural integrity of branches and/or stems or roots. Defects in roots may impact upon tree stability.

Structural Roots - Contribute significantly to the structural support, anchorage and stability of a tree, often found close to the base.

Sucker - A shoot which appears from an underground root.

Suppressed - In crown class, trees which have been heavily shaded by others from above or the side and whose crown development is wholly or partially restricted.

Symbiosis - A mutual association between two organisms whereby the presence of one is beneficial to the other.

Target - Persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it.

Terminally Reduce - Cutting back/reducing branches from their extremity.

Thinning/Excessive Thinning - Having relatively little extent from one side of the canopy to the other. In relation to pruning; excessive pruning of lateral branches at their point of origin, usually associated with removal of large amounts of live tissue.

TLE - Tree Life Expectancy (see Useful Life Expectancy).

Topping - Synonymous with lopping it is the indiscriminate removal of the crown of a tree, or a major proportion of it. Incorrect pruning method of removing branches to stubs, resulting in poor form and weak branch unions.

TPZ - Tree Protection Zone.

ULE - Useful Life Expectancy refers to an expected period of years that a tree can be retained before its amenity values decline to a point where it may detract from the appearance of the landscape and/or becomes potentially hazardous to people and/or property.

Understorey - Vegetation beneath the main canopy.

VTA - An acronym for Visual Tree Assessment which is the process undertaken when systematically assessing trees for attributes such as their species, health, age, defects and pest or disease infestations.

Wall 4 - A chemical and anatomical barrier formed by the cambium present at the time of wounding, which inhibits the spread of decay into xylem tissue formed after the time

of wounding.

Weak Unions - A stem or branch union which is exhibiting signs of a potential structural weakness through its growth habit and/oras a result of pest and/or disease infestation.

Weed - A plant that is not valued where it is growing and is usually of vigorous growth; especially one that tends to overgrow or suppress desirable plants.

Whorl - The arrangement of foliage or flower parts around a stem whereby they radiate from a single point.

Windthrow - The blowing over of a tree at its roots.

Wound - Any injury which induces a compartmentalisation response.

Wound Wood - Develops from callus tissue or from uninjured vascular cambium at the margins of injuries/wounds that have damaged or exposed the phloem, vascular cambium, or sapwood.

Xylem - A compound tissue in vascular plants that helps provide support and that conducts water and nutrients upward from the roots, consisting of tracheids, vessels, parenchyma cells and woody fibres.

Appendix J – Qualifications and Experience

Between 2006 and 2012 Aaron completed a Carpentry apprenticeship, Certificate 3 in Joinery, Certificate 4 in Building and Construction and obtained a builder's licence in 2010 and started working as a contractor. Working full time in the construction industry on high end residential projects as a contracting site supervisor Aaron was managing teams up to 10 people onsite daily. In 2012 Aaron began training and going to TAFE to complete a Certificate 3 in Arboriculture after being exposed to the industry through Rope Access Work and recreational rock climbing. In 2012 Aaron established Assurance Trees Pty Ltd and continued to work across the Construction Industry and Arboricultural industry simultaneously. In 2016 Aaron completed a Diploma of Arboriculture allowing him to start to complete consulting arborist services to expand his growing company. Over the next few years Aaron continued to build Assurance Trees Pty Ltd and establish himself as a respected and knowledgeable arborist both practically and academically. Aaron led Assurance Trees Pty Ltd to obtain ISO triple certification for Quality (ISO9001), Environment (ISO14001) and Safety (AS4801) in 2018 and continues to improve and generate value.

Since 2016 Aaron has developed his consulting arborist skill set to become a leading provider in the industry throughout the Hunter Region. In combination with his practical experience and understanding of the construction industry Aaron has a reputation of providing excellent solutions for design and construction projects in the field of Arboriculture.

Qualifications:

- Diploma in Arboriculture (2016)
- ISA Tree Risk Assessment Qualification (2016)
- Certificate in Arboriculture (2014)
- NSW Builders Licence (2011) (Supervisor Cert #69092S)
- Certificate 4 in Building and Construction (2010)
- Certificate 3 in Joinery and Carpentry (2009)
- Many other certificates including Cert 3 in Chemical Application, Occupational First Aid, Powerlines Training, Rescue Training, Rail Corridor certificates, EWP tickets, Truck Licences and many other courses and training events.

Experience

- Consulting arborist – Arboriculture impact assessments, risk assessments, expert witness, project arborist, pruning specifications, planting specifications, health reports and many other specialised consulting jobs.
- Trade Arborist – 1000's of tree dismantles, crane work, pruning, shaping, large scale clearing, root investigations, cabling and bracing, injections, and treatments and many other specialised tree work operations.
- Building and Construction – Site supervisor, Carpentry and many other building skills and disciplines.

End of Report