

LET'S TALK ABOUT TREES
Managing the Urban Forest



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Arboricultural Assessment for:
**Kardinia International College,
Junior School Development**

29 -31 Kardinea Drive,
Bell Post Hill, 3215

This report has been commissioned by:

Coffey Projects (Australia) Pty Ltd

In reference to

**Tree Health, Condition, Retention,
Protection of retained trees using AS4970 – 2009
Calculations during Development**

January 2021

**INCLUDES TREE IMPACT ASSESSMENT AND TREE
MANAGEMENT PLAN FOR THE SITE**



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1.0 Key Objectives

This report has been commissioned by Coffey Projects (Australia) Pty Ltd for the undertaking of a visual tree assessment of trees growing in the grounds of the Kardinia International College throughout an area proposed for development.

The key purpose for this report is to assist in establishing the useful safe retention value of trees proposed for retention, show planning of trees proposed for removal, and provide a tree impact assessment and management plan for the site during development.

2.0 Methodology

The inspection for this report was undertaken on the 11th of January 2021, by Matthew Branagh, level 5 Consulting Arborist, from Let's Talk About Trees.

A ground-based Visual Tree Assessment was performed on the above-ground section of the tree, in line with modern Arboricultural Practices and Principles, AS 4970 – 2009 – Protection of Trees on Development Sites and AS 4373 – 2007 – Pruning of Amenity Trees.

3.0 Observations / Discussion

The tree assets of the site are formed by an eclectic mix of native and exotic species.

Many trees have received past pruning and management works, and some were identified as having been impacted by past site developments.

In summary no trees within the scope of this report are considered as significant specimens, with the exception of a large Eucalyptus camaldulensis proposed for retention and located just outside the development area.

This report outlines tree protection zones by which site development can be planned avoiding impact to the trees.

All trees are considered in a high use area, where students, employees and public move around under the trees on a regular basis.

The following filed data, combined with the site map in the appendix of this report is intended as a working list for the undertaking of required maintenance, protection planning and removal of the tree assets of the site.

The tree numbers in the table reference the site map for tree location and

No.	Identification	Est. Age Yrs	ULE	Health	Native / Exotic	52/17 Exempt	DBH (cm) *multi stemmed	This copied document to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose other than the one for which it was prepared. Copyright	
								PPZ Radius (m) PPR Radius (m)	Comment
1	<i>Paulownia tomentosa</i> - Paulownia	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
2	<i>Acer negundo</i> - Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
3	<i>Malus ioensis</i> - Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
4	<i>Prunus cerasifera</i> - Flowering Plumb	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
5	<i>Olea europaea</i> - Black Olive	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
6	<i>Olea europaea</i> - Black Olive	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
7	<i>Olea europaea</i> - Black Olive	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
8	<i>Olea europaea</i> - Black Olive	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
9	<i>Prunus cerasifera</i> - Flowering Plumb	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
10	<i>Prunus cerasifera</i> - Flowering Plumb	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
11	<i>Malus ioensis</i> - Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
12	<i>Malus ioensis</i> - Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
13	<i>Platanus orientalis</i> - Plane Tree	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
14	<i>Eucalyptus camaldulensis</i> - Red Gum	M	L	G	IN	Y	152	15 SRZ 3.9	To be protected and retained - Outside scope of works. Planted Indigenous species. Does not trigger 52.17 protections.
15	<i>Melaleuca styphelioides</i> - Prickly Paper Bark	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
16	<i>Syzygium smithii</i> - Lilly Pilly	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
17	<i>Melaleuca lanceolata</i> - Moonah	M	L	G	IN	Y	N/A	N/A	Impacted by development to be removed. Planted indigenous tree with poor pruned structure. Does not trigger 52.17 protections.

No.	Identification	Est. Age Yrs	ULE	Health	Native / Exotic	52/17 Exempt	DBH (cm) *multi stemmed	TPZ Radius (m) SRZ Radius (m)	Comment
18	<i>Metrosiderous excelsior</i> – NZ Christmas Tree	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
19	<i>Metrosiderous excelsior</i> – NZ Christmas Tree	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
20	<i>Metrosiderous excelsior</i> – NZ Christmas Tree	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
21	<i>Acer negundo variegatum</i> – Variegated Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
22	<i>Acer negundo</i> - Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
23	<i>Acer negundo</i> - Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
24	<i>Betula pendula</i> – Silver Birch	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
25	<i>Betula pendula</i> – Silver Birch	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
26	<i>Acer negundo</i> - Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
27	<i>Acer negundo variegatum</i> – Variegated Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
28	<i>Acer negundo variegatum</i> – Variegated Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
29	<i>Acer negundo variegatum</i> – Variegated Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
30	<i>Acer negundo variegatum</i> – Variegated Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
31	<i>Acer negundo variegatum</i> – Variegated Elder	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
32	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
33	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.

No.	Identification	Est. Age Yrs	ULE	Health	Native / Exotic	52/17 Exempt	DBH (cm) *multi stemmed	TPZ Radius (m) SRZ Radius (m)	Comment
34	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
35	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
36	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
37	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
38	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
39	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
40	<i>Malus ioensis</i> – Ornamental pear	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
41	<i>Betula pendula</i> – Silver Birch	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed. Cops of young trees 15 + no significant value in current or future landscape.
42	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	L	G	N	Y	N/A	N/A	Impacted by development to be removed.
43	<i>Corymbia maculata</i> – Spotted Gum	M	L	G	N	Y	N/A	N/A	Impacted by development to be removed.
44	<i>Corymbia maculata</i> – Spotted Gum	M	L	G	N	Y	N/A	N/A	Impacted by development to be removed.
45	<i>Corymbia maculata</i> – Spotted Gum	M	L	G	N	Y	N/A	N/A	Impacted by development to be removed.
46	<i>Corymbia maculata</i> – Spotted Gum	M	L	G	N	Y	N/A	N/A	Impacted by development to be removed.
47	<i>Corymbia maculata</i> – Spotted Gum	M	L	G	N	Y	N/A	N/A	Impacted by development to be removed.
48	<i>Prunus cerasifera</i> – Flowering Plumb	M	L	G	E	Y	N/A	N/A	Impacted by development to be removed.
49	<i>Callistemon viminalis</i> - Bottlebrush	M	L	G	N	Y	25	3.0 SRZ 1.8	To be protected and retained – Outside scope of works.

No.	Identification	Est. Age Yrs	ULE	Health	Native / Exotic	52/17 Exempt	DBH (cm) *multi stemmed	TPZ Radius (m) SRZ Radius (m)	Comment
50	<i>Callistemon viminalis</i> - Bottlebrush	M	L	G	N	Y	21	2.5 SRZ 1.7	Group of 3 trees - To be protected and retained – Outside scope of works. To be retained off site and protected
51	<i>Eucalyptus sideroxylon</i> – Iron Bark	M	L	G	N	Y	46	5.5 SRZ 2.4	To be protected and retained – Outside scope of works.
52	<i>Lagunaria pattersonii</i> – Itchy Tree	M	L	G	E	Y	52	6.2 SRZ 2.5	To be protected and retained – Outside scope of works.
53	<i>Eucalyptus cladocalyx</i> – Sugar Gum	M	L	G	N	Y	33*	4.0 SRZ 2.1	To be Removed – Outside scope of works, but impacted by development.
54	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	40	4.8 SEZ 2.3	To be Removed – Outside scope of works, but impacted by development.
55	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	33	4.0 SRZ 2.1	To be Removed – Outside scope of works, but impacted by development.
56	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	28*	3.4 SRZ 1.9	To be Removed – Outside scope of works, but impacted by development.
57	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	32	3.8 SRZ 2.1	To be Removed – Outside scope of works, but impacted by development.
58	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	52	6.2 SRZ 2.5	To be Removed – Outside scope of works, but impacted by development.
59	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	24	2.9 SRZ 1.8	To be Removed – Outside scope of works, but impacted by development.
60	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	26	3.1 SRZ 1.9	To be Removed – Outside scope of works, but impacted by development.
61	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	34	4.1 SRZ 2.1	To be Removed – Outside scope of works, but impacted by development.
62	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	43	5.2 SRZ 2.3	To be Removed – Outside scope of works, but impacted by development.
63	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	45	5.4 SRZ 2.4	To be Removed – Outside scope of works, but impacted by development.
64	<i>Eucalyptus gomphocephala</i> – Tuart Gum	M	S	F	N	Y	45	5.4 SRZ 2.4	To be Removed – Outside scope of works, but impacted by development.
65	<i>Pittosporum James Stirling</i>	M	L	G	E	Y	23	2.8 SEZ 1.8	To be protected and retained – Outside scope of works

No.	Identification	Est. Age Yrs	ULE	Health	Native / Exotic	52/17 Exempt	DBH (cm) *multi stemmed	TPZ Radius (m) SRZ Radius (m)	Comment
66	<i>Pittosporum James Stirling</i>	M	L	G	E	Y	24	2.9 SRZ 1.8	To be protected and retained – Outside scope of works
67	<i>Gleditsia triacanthos – Golden Rain</i>	M	L	G	E	Y	27	3.2 SRZ 1.9	To be protected and retained – Outside scope of works
68	<i>Malus ioensis – Ornamental pear</i>	M	L	G	E	Y	23	2.8 SRZ 1.8	To be protected and retained – Outside scope of works
69	<i>Fraxinus raywoodii – Desert Ash</i>	M	L	G	E	Y	36	4.3 SRZ 2.2	To be protected and retained – Outside scope of works

Table 1 Tree data of the site.

3.1 Reading the data of table 1

Trees numbered in Red.

The majority of the trees on site are common not native planted landscape vegetation which holds no significance, will be impacted by development, and is not worthy of retention moving forward due to its short useful life expectancy post development or its current condition, form and use in the current landscape. This vegetation is represented in the table has its number marked in red and its comment in red. These will be considered the losses to the site.

Trees numbered in Green.

Trees numbered in green are not within the scope of works (not in the work site). These trees are located in close proximity around the outer edges of the site. The trees are not proposed as losses, and they are not proposed as impacted by site works. They have tree protection zones and structural root zone calculations presented so as protection can be designed and works can avoid impacts.

A tree impact assessment and management plan of this report, should be commissioned post final design of the site. This should include all trenches and pits required to service the site, in electrical works and drainage.

Tree 14

Tree 14 is a mature planted specimen of an indigenous native. The tree is significant to the site, outside the scope of works but has a root plate guided by AS4970-2009 Protection of trees on development sites of 15m radius from its trunk. In fact AS4970-2009 sees the largest root plate of any tree in impact as 15m. The true root plate of this tree is 12 x its circumference and

more 18.5m radius from its trunk. As such planning for retention of this tree although outside the scope / build area must make consideration for impacting this tree.

Tree 17

An indigenous native to the region the tree is planted and exempt from 52.17.

The tree has no amenity value and grows in a failing raised garden bed.

The tree will not be viable for retention post development, and planned for removal.

This species should be considered in final landscape of the site as it performs well in the environment provided.

No trees within the scope were noted as being protected by overlays. Indigenous vegetation was considered as all planted.

Trees 53 – 64 (Sugar Gums)

Trees 53 – 64 are outside the scope of the works however in close proximity. The trees are in poor condition, most in declining health and all grow as a low value tree row which will edge the new development. The trees will be encroached by works in achieving final land levels required for development. This will significantly impact the trees, cause further decline and leave the trees in a worse more dangerous state than they are at present. The removal of these trees should be presented and supported during development.

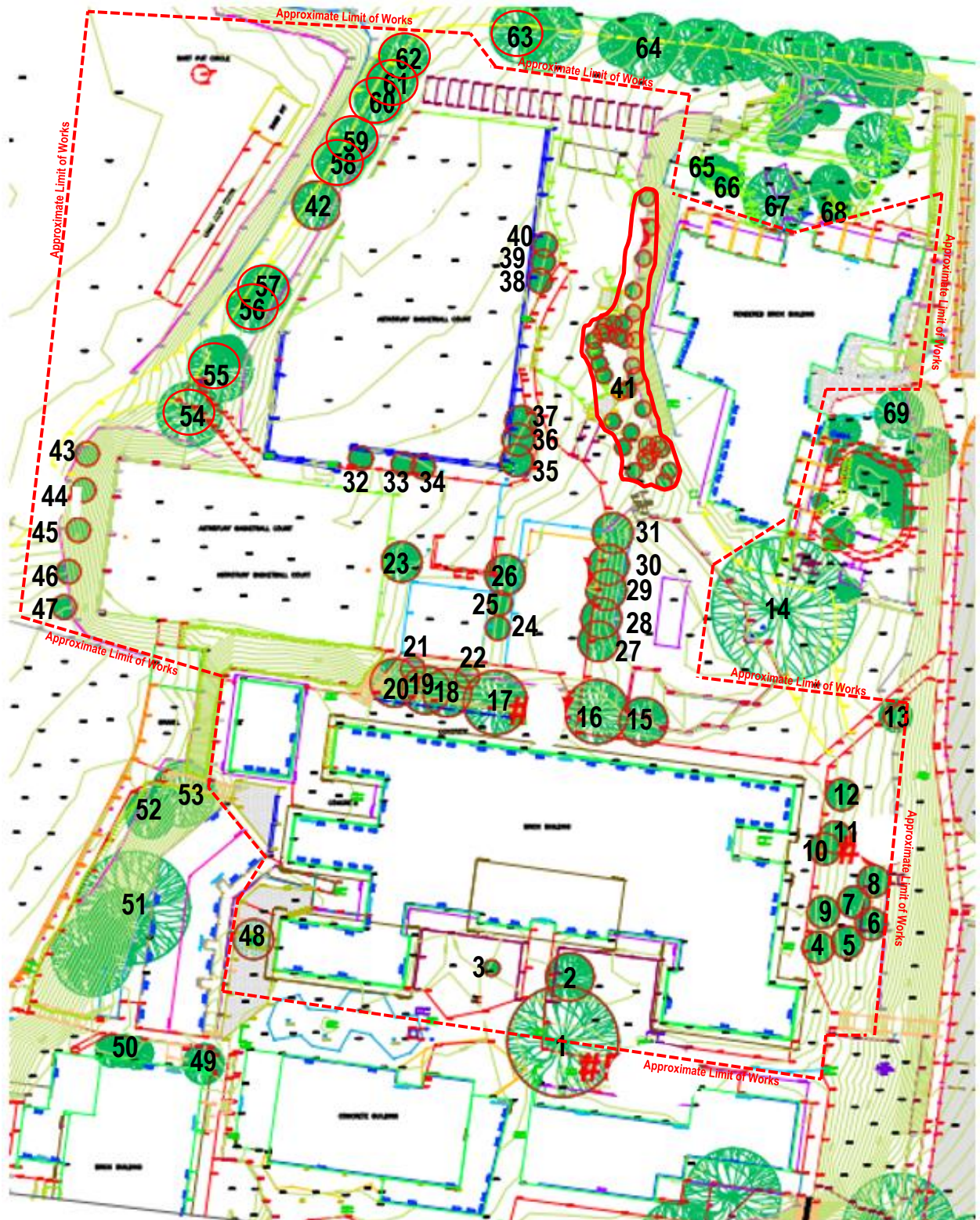
TREE IMPACT ASSESSMENT

4.0 Trees proposed for removal

Trees impacted by development are to be removed from site.

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Trees for removal impacted by development (Red)

5.0 Trees retained on site to be protected during development

Trees, 14, 49, 50, 51, 52, 65, 66, 67, 68 and 69.



All retained trees with the exception of tree 14, fall outside the scope of works. The calculated tree protection zones presented in table 1 present these trees as not impacted by development. These trees will be protected from site works by the erected boundary fence of the work site.

In order to double as a tree protection fence, the fence which delineates works from the school grounds surrounding the development site should be of a rigid construction and maintained in place for the entire development of the project.

With the exception of tree 14, all trees retained on site surrounding the development site will protected without impact.

TREE MANAGEMENT PLAN

6.0 Tree protection measures - Managing tree 14 in development.



AS4970-2009 Protection of trees on development sites allows a 10% impact to the root structure of a tree before impact becomes major in nature. Works propose encroachment in final landscape into the TPZ of this tree to a greater distance than 10% of TPZ. Tree protection fencing as such is to be established at a distance of 11m from the trees trunk, for the main project works, and works outside the protection fence must be undertaken in the presence of the site arborist.

7.0 Tree protection measures

Key management measures for this site.

1. Site arborist is to be on site for works undertaken inside the tree protection fence of tree 14. (within 11m of the trees trunk).
2. Hand excavation only within the tree protection zone of tree 14, to be undertaken at all times.

3. Placement of tree protection fencing as outlined in section 5.0 boundary fence of site, and sectional insert in section 6.0 of this Report must be undertaken before the commencement of works.

8.0 Placement of protection fencing.

Tree protection fencing may be long term on this site, and needs to offer protection as the works progress. As such the fence construction needs to comply with section 4.4 of AS4970-2009 Protection of trees on development sites and this report.

Fence construction should be of steel mesh panels or similar for this site.

9.0 Trees on neighbouring allotments.

Trees 14, 49, 50, 51, 52, 65, 66, 67, 68 and 69 are considered trees on neighbouring allotments for this site.

10.0 Trees for practical retention.

No trees for practical retention on this site.

11.0 Trees for retention

No trees for retention on this site.

12.0 Encroachments

12.0.1 Minor

- Minor encroachments are allowable without impact to trees (10% incursion area). These are calculated into the calculated fence placements for this site.
- AS – 4970-2009 supports this as not impacting trees in a significant way.
- This report protects trees to avoid any impacts greater than minor.
- As such the workings of this report should form the basis on which development is undertaken.

12.0.2 Major

- Major encroachments are proposed for this development.
- Major encroachments should be allowed into the TPZ's of trees protected by this report. This affects tree 14 only, and the processes for encroachment are out lined in this report. Variation of this access must be in the guidance of the site arborist, and the responsible authority.

13.0 Pre-construction

- The placement and signage of TPZ fencing as guided by this report must be undertaken before site works are under taken this includes demolition.
- No clearance pruning required for this site.
- Should clearance pruning be determined as required must be carried out with permission of the responsible authority, and by a reasonably experienced contractor in line with Australian Standard AS4373-2007, Pruning of Amenity Trees, 2007. Clearance pruning should never exceed to more than 10% loss of a trees canopy without further guidance from the site arborist.

14.0 During construction

All construction must adhere to the following specifications; Section 14.0.1 – 14.0.4

14.0.1 Activities excluded from the TPZ include;

- machine excavation
- trenching
- 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 or soil level changes.

14.0.2 Limitations of activities carried out within the TPZ include:

- All excavation and construction of or within the encroached area of T.P.Z should be carried out via hand tools.
- Manual excavation should be carried out under the supervision of the project arborist to identify roots location and disturbance.
- Manual excavation may include the use of pneumatic and hydraulic tools used at non-destructive pressure.
- No wheeled or tracked equipment to be used within the encroached area of T.P.Z to avoid or reduce soil compaction.
- Severance of any roots greater than 20 mm in diameter is not permitted, without the prior approval of the project arborist.

14.0.3 Trees to be retained post development.

- All trees on site to be retained without impact.
- Minor impact to tree 3 on an adjoin allotment to be managed as per this report. - Municipal Naturestrip Tree.

14.0.4 Other works – Potential and unforeseen impacts.

- Severance of any roots greater than 100mm in diameter is not permitted, without the prior approval of the project arborist or the responsible authority.
- Installation of below ground services must be installed via boring methods within the TPZ of any trees. Boring must be at a depth greater than 600mm with entry and exit pits, not being within a T.P.Z. of any trees unless included and guided by this impact assessment. The project arborist should assess the likely impacts of boring, and bore pits on any trees where impacts are determined or probable within the tree protection zone of retained trees.
- Manual excavation may include the use of pneumatic and hydraulic tools. (An excavator or bobcat is not deemed a 'tool' for this purpose).

15.0 Post Construction

Post construction all protection fences can be decommissioned and removed.

16.0 Schedule of site visits

Stage Required	Reason Required
Pre-construction	Arborist on site for the management of tree 14, if works pre construction are to encroach within the fenced tree protection zone of this tree. (ie: within 11m of its trunk)
Intermittent stages	Arborist on site for the management of tree 14, if works pre construction are to encroach within the fenced tree protection zone of this tree. (ie: within 11m of its trunk)
Post construction	Nil

17.0 Defendable Space

No trees require management to accommodate defendable space.

18.0 Conclusion

In conclusion, all trees in the scope of planned works can be removed from site.

Trees 14, 49, 50, 51, 52, 65, 66, 67, 68 and 69 should be protected by tree protection fencing. In the case of this report this is achieved by means of work zone boundary fencing. The fencing around tree number 14 is specific in placement, and should conform to section 6.0, 7.0 and 8.0 of this report.

Special consideration to the very large root plate of tree 14 should be considered at all times and during final site ameliorations.

19.0 Recommendations

It is the recommendation of this report that;

The development plan be supported by this report. All trees within the scope of the site should be removed. Trees surrounding the site should be protected guided by AS4970-2009 Protection of Trees on Development Sites, and guided by this reports tree impact assessment and tree management plan.

Matt Braragh, C5 Arboriculture

20.0 Appendices

20.1 Location of trees on the site



20.1 Proposed Site Development

KIC - JUNIOR SCHOOL TREE REMOVAL PLAN PROPOSED PLAN 1:500 (A1) 04/12/20



20.2 Photographs - Appendix One.

Typical trees of the site



T14 to be protected and retained



T17 To be removed



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20.3 Location of Site



Location of the site.

20.4 Descriptor's

Definitions Descriptor's used for throughout this report.

AGE

Category	Description
Young	Juvenile or recently planted approximately 1-7 years.
Semi Mature	Tree actively growing.
Mature	Tree has reached expected size in situation.
Senescent	Tree is over mature and has started to decline.

HEALTH

Good	Foliage of tree is entire, with good colour, very little sign of pathogens and of good density. Growth indicators are good ie. Extension growth of twigs and wound wood development. Minimal or no canopy die back (deadwood).
Fair	Tree is showing one or more of the following symptoms; < 25% dead wood, minor canopy die back, foliage generally with good colour though some imperfections may be present. Minor pathogen damage present, with growth indicators such as leaf size, canopy density and twig extension growth typical for the species in this location.
Poor	Tree is showing one or more of the following symptoms of tree decline; > 25% deadwood, canopy die back is observable, discoloured or distorted leaves. Pathogens present, stress symptoms are observable as reduced leaf size, extension growth and canopy density.
Dead or dying	Tree is in severe decline; > 55% deadwood, very little foliage, possibly epicormic shoots, minimal extension growth.

Native / Exotic / Indigenous Native

N	Tree Native to the Australian Continent.
E	Tree not native to the Australian Continent.
IN	Tree indigenous to the Geelong Region and found in the vicinity of the project site,

52.17

Tree protected by the planning and environmental regulations Typically referred to as 52.17

USEFUL LIFE EXPEECTANCY – ULE

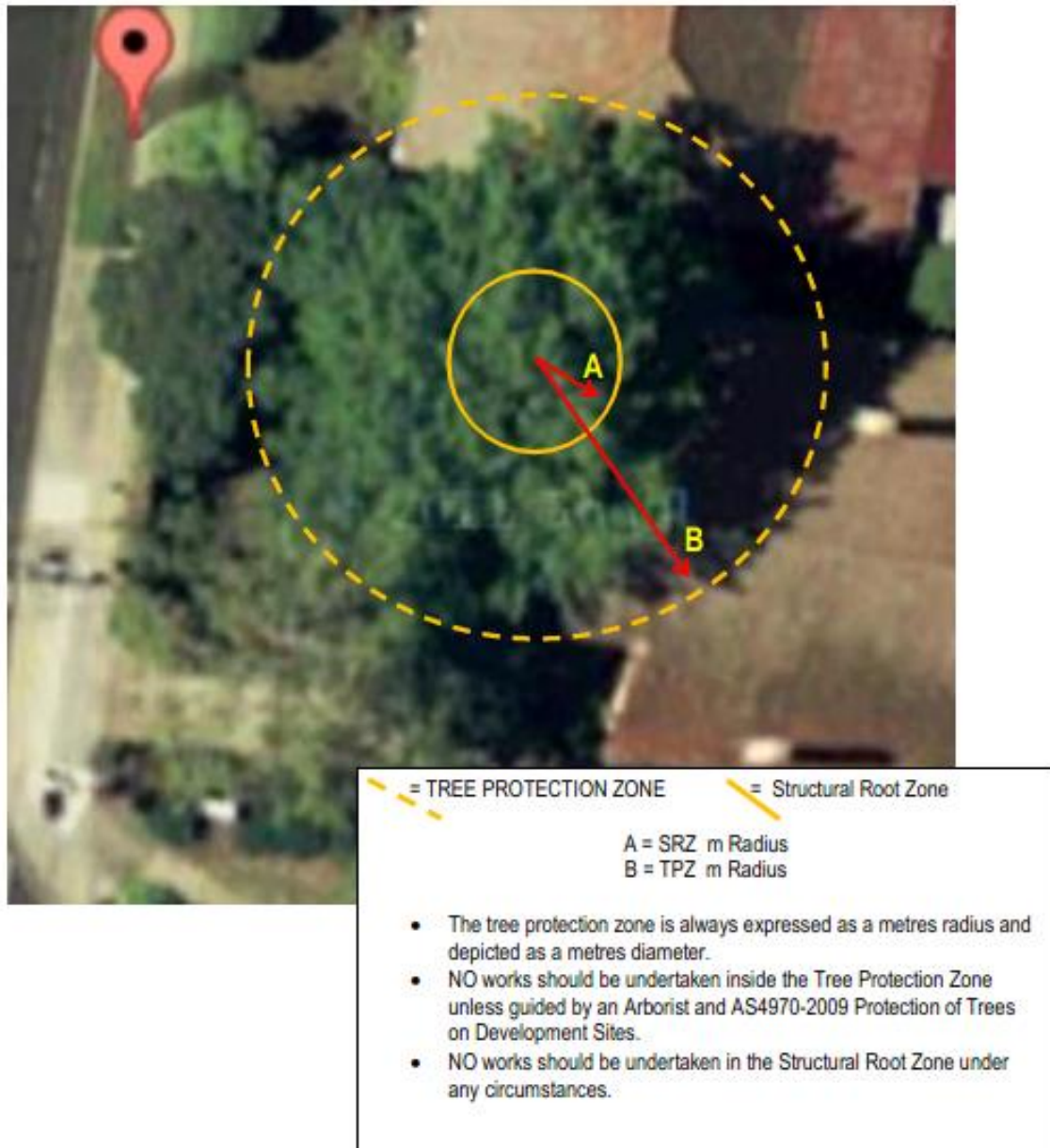
- LONG ULE;** Trees that appears to be retainable with an acceptable level of risk for more than 40 years.
1. Structurally sound trees located in positions that can accommodate future growth.
 2. Storm damaged or defective trees that could be made suitable for retention in the long term by remedial tree surgery.
 3. Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.
- MEDIUM ULE;** Trees that appear to be retainable with an acceptable level of risk for 15 to 40 years.
1. Trees that may only live between 15 and 40 years.
 2. Trees that may live for more than 40 years but would be removed to allow the safe development of more suitable individuals.
 3. Trees that may live for more than 40 years but would be removed during the course of normal management for safety and nuisance reasons.
 4. Storm damage or defective trees that can be made suitable for retention in the medium term by remedial work.
- SHORT ULE;** Trees that appear to be retainable with an acceptable level of risk for 5 to 15 years.
1. Trees that may live for 5 to 15 years.
 2. Trees that may live for more than 15 years but would be removed to allow the safe development of more suitable individuals.
 3. Trees that may live for more than 15 years but would be removed during the course of normal management for safety and nuisance reasons.
 4. Storm damaged or defective trees that require substantial remedial work to make safe and are only suitable for retention in the short term.
- REMOVE;** Trees with a high level of risk that would need removal within the next 5 years.
1. Dead trees.
 2. Dying or suppressed and declining trees through disease or inhospitable conditions.
 3. Dangerous trees through instability or recent loss of adjacent trees.
 4. Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.
 5. Damaged trees that are considered unsafe to retain.
 6. Trees that will become dangerous after removal of other trees for the above reasons.

Abbreviations

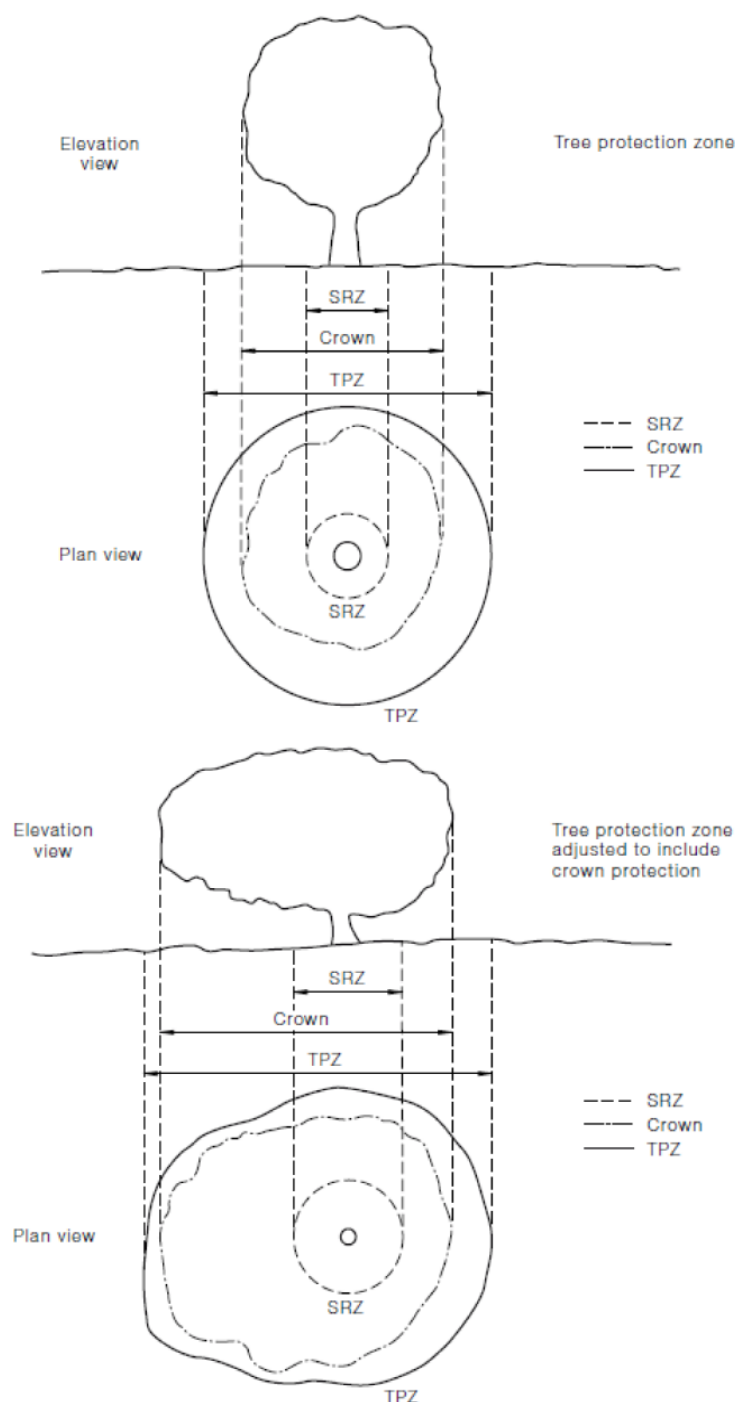
- DBH** Diameter at Breast Height Measured at 1.4m above ground level as guided by AS4970-2009 Protection of Trees on Development Sites.
- TPZ** Tree Protection Zone expressed as a radius from the centre of the tree.
- SRZ** Structural Root Zone expressed as a radius from the centre of the tree.

20.5 Applying the Tree Protection Zone (TPZ)

The diagram below indicates how the dimensions of the Structural Root Zone and the Tree Protection Zone are applied.



20.6 Structural Root Zone & Tree Protection Zone.



NOTE: Refer to Clause 3.2 for calculation of TPZ.

FIGURE 2 INDICATIVE TREE PROTECTION ZONE

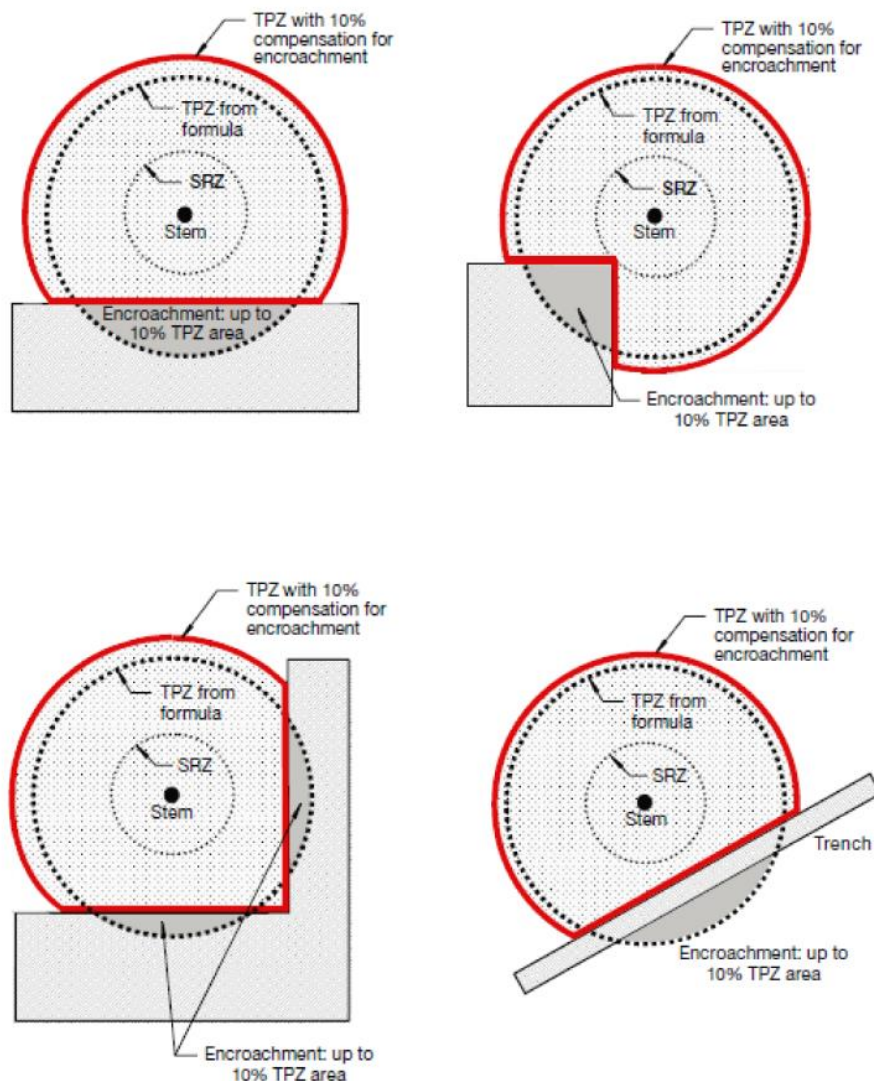
20.7 Tree Protection Zone Encroachment Examples

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APPENDIX D ENCROACHMENT INTO TREE PROTECTION ZONE (Informative)

Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D1 provides examples of TPZ encroachment by area, to assist in reducing the impact of such incursions.



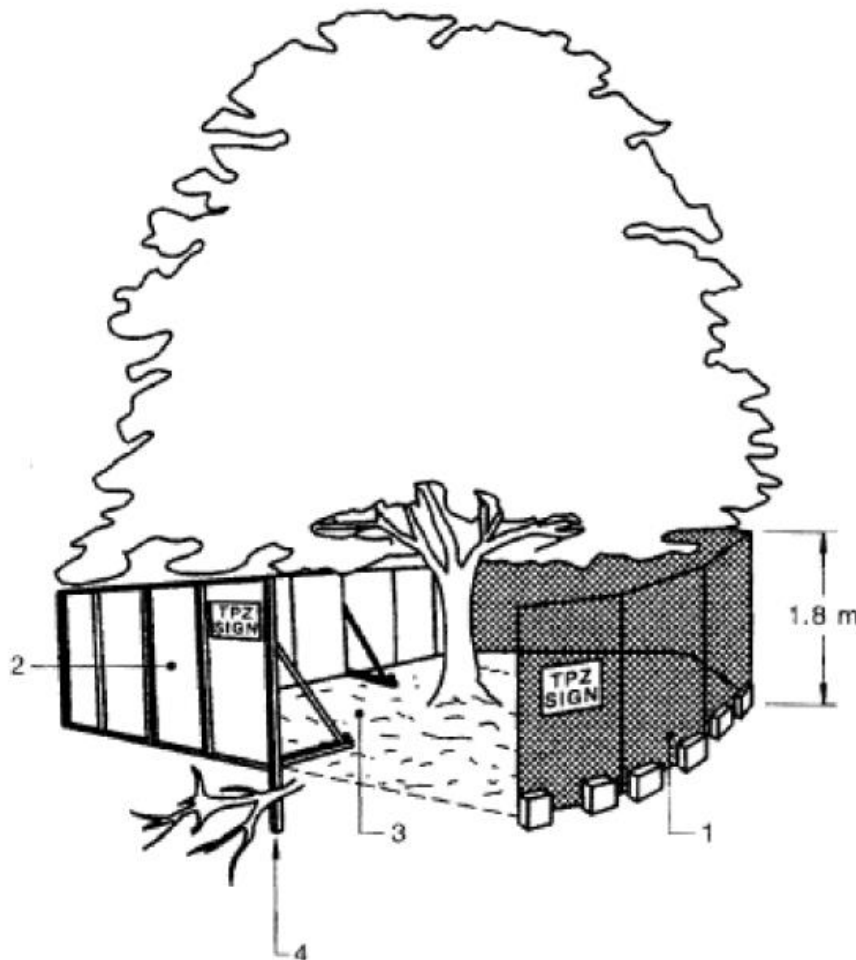
NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

FIGURE D1 EXAMPLES OF MINOR ENCROACHMENT INTO TPZ

20.8 Tree Protection Zone (TPZ) Signs

4.4 SIGNS

Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site (refer Figure 3). The lettering on the sign should comply with AS 1319. Appendix C provides an example of a suitable TPZ sign.



LEGEND:

- 1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
- 2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
- 3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
- 4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

FIGURE 3 PROTECTIVE FENCING

(Extract from AS4970 – 2009 Protection of trees on Development sites)

20.9 Tree Protection Zone (TPZ) Example

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APPENDIX C TREE PROTECTION ZONE SIGN EXAMPLE (Informative)

A TPZ sign provides clear and readily accessible information to indicate that a TPZ has been established. Figure C1 provides an example of a suitable sign.



FIGURE C1 TREE PROTECTION ZONE SIGN

(Extract from AS4970 – 2009 Protection of trees on Development sites)

20.10 Indicative Stages in Development

Stage in Development	Tree Management Process	
	Matters for Consideration	Actions and Certificates
Planning (Sections 2 and 3)		
Site acquisition	Legal constraints	
Detail surveys	Council plans and policies Planning instruments and controls Heritage Threatened species	Existing trees accurately plotted on survey plan.
Preliminary tree assessment	Hazard/risks Tree retention value	Evaluate trees suitable for retention and mark on plan Provide preliminary arboricultural report and indicative TPZs to guide development layout.
Preliminary development design	Condition of trees Proximity to buildings Location of services Roads Level changes Building operations space Long-term management	Planning selection of trees for retention Design review by proponent Design modifications to minimise impact to trees.
Development submission	Identify trees for retention through comprehensive arboricultural impact assessment of proposed construction. Determine tree protection measures. Landscape design.	Provide arboricultural impact assessment including tree protection plan (drawing) and specification.
Development approval	Development controls Conditions of consent	Review consent conditions relating to trees.
Pre-construction (Sections 4 and 5)		
Initial site preparation	State based OHS requirements for tree work Approved retention/removal Refer to AS 4373 for the requirements on the pruning of amenity trees Specifications for tree protection measures.	Compliance with conditions of consent. Tree removal/tree retention/transplanting Tree pruning Certification of tree removal and pruning. Establish/delineate TPZ Install protective measures Certification of tree protection measures.

Stage in Development	Tree Management Process copyright	
	Matters for Consideration	Actions and Certificates
Construction (Sections 4 and 5)		
Site establishment	Temporary infrastructure Demolition, bulk earthworks, hydrology	Locate temporary infrastructure to minimise impact on related trees. Maintain protective measures Certification of tree protection measures.
Construction work	Liaison with site manager, compliance Deviation from approved plan	Maintain or amend protective measures Supervision and monitoring
Implement hard and soft landscape works	Installation of irrigation services Control of compaction work Installation of pavement and retaining walls	Remove selected protective measures as necessary Remedial tree works Supervision and monitoring
Practical completion	Tree vigour and structure	Remove all remaining tree protection measures Certification of tree protection
Post Construction (Section 5)		
Defects liability / maintenance period	Tree vigour and structure	Maintenance and monitoring Final remedial tree works Final certification of tree condition

NOTES:

1. Owing to variations in planning legislation, this Table is a general indication of the process only
2. Certification of tree protection and condition should be carried out by the project Arborist.

Extract from Australian Standard 4970 – 2009 – Protection of Trees on Development Sites.

The above Table shows clearly the process of tree protection on development sites as set out in the Australian Standard. It can also serve as a guide to the set up and management of new and replacement plantings.

This Table should be followed in the management of all trees on development sites.

Depending on the stage of the project you are undertaking, the type of project you are undertaking and specific other requirements of various planning departments, in some instances additional reports may be required.

The above Table serves as an indicative guide to the process of managing and protecting trees.

21.0 References

Australian Standard® **AS4970-2009, Protection of trees on development sites, 2009, Sydney**

Australian Standard® **AS4373-2007, Pruning of Amenity Trees, 2007, Sydney**

Further reading

Alex L. Shigo, **A New Tree Biology**. 1986. USA

Alex L. Shigo, **Modern Arboriculture**. 1991. USA



Writings within the report are of the author's personal knowledge and belief. The information and knowledge released in the report when referenced should be referenced to

Matt Branagh, Dip.App.Scl – Horticulture/Arboriculture – Let's Talk About Trees.

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