

Abel Ecology

Arborist assessment report

For

**Pacific Brook Christian School
Maitland Street, Muswellbrook
Lot 100 DP 1261496**

Proposed early works clearing

**Prepared for: Pacific Brook Christian School Ltd
Report No: AE20-2145-REP-ISS 1
Prepared by: Abel Ecology
Date: 3 September 2020**



Disclaimer

No tree is entirely without hazard potential. No responsibility is accepted for any damage or injury that may be caused by any trees on the site. All measures outlined should minimise damage inflicted on the trees if carefully implemented.

This report does not provide an assessment of risk of harm posed from tree hazards. Information may be provided about the structure, function, defects or tree pests and/or diseases, vitality, condition and life expectancy. However, no assessment of targets, frequency of use by potential targets or guidance of risk of harm is included in this report.

This report is an arboricultural assessment; it is not a risk assessment.

No internal examination of any kind has been undertaken on any tree described in this report, unless expressly stated. On occasions, a mallet may be used as an auditory guide to assist in determining the presence of internal hollows.

Document History

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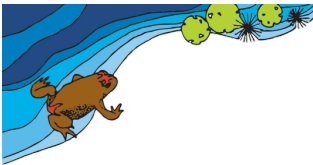


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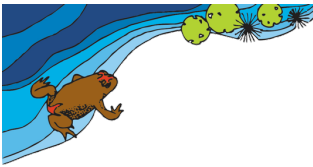
List of Abbreviations

d.b.h.	Diameter at breast height (~1.4 metres)
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment
LGA	Local Government Area

Note regarding maps in this report

The diagrams/site maps used in this report have been supplied by and are used with the permission of the client.

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Glossary

Explanation of Tree assessment terminology and rationale:

Amenity - Trees with recreational, functional, environmental, ecological, social, health or aesthetic value rather than for production purposes (Standards Australia 2007).

A desirable or useful feature or facility of a building or place; the pleasantness or attractiveness of a place (Google Dictionary 2017). An assessment of amenity value is to some extent subjective and qualitative, however it also includes Arboricultural assessments of structure and health of the tree.

Arborist - A person with training to AQF Level 3 in Arboriculture, or above, or equivalent recognized and relevant experience that enables the person to perform the tasks required by the Australian Standards for Arboricultural practice (AS4373-2007 Pruning of amenity trees and AS4970-2009 Protection of trees on development sites).

Australian Qualification Framework (AQF) - A national framework for all educational and training purposes in Australia.

Codominant stems - Stems or trunks of about the same size originating from the same position from the main stem.

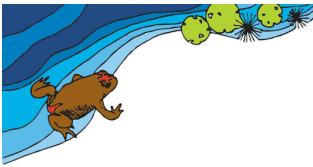
Condition - An evaluation of the structural status of the tree including defects that may affect the useful life of an otherwise healthy specimen. Such influencing factors include cavities and decay, weak unions between scaffolds (major branches) or trunks and faults of form or habit.

Coppiced - Cutting a trunk close to ground level in order to stimulate the production of multiple new stems (epicormic shoots).

DBH (Diameter at breast height) –A standard Arboricultural measurement used to calculate the Tree Protection Zone (TPZ), taken at 1.4 m from the ground.

Epicormic Growth - The production of epicormic growth from dormant buds is a response to stress, fire and damage, including poor pruning methods. 'Epi's' can occur on branches, stems and from the rhizome base of the tree. Arising from the cambium (actively growing bark region) they are often weakly attached. Epicormic shoots arising from rhizomes is an adaptive strategy in many Australian native plants including Eucalypts and plants in the Proteacea family, occurring commonly after fire, damage or drought.

Mycorrhizae/Rhizosphere - Mycorrhizae are fungi that grow in symbiotic association with tree roots (especially the fine root hairs) and are attributed with increasing the uptake of nutrients, particularly phosphorus, and reducing infection from soil borne pathogens. They greatly increase the surface area of a tree's root system. Mycorrhizae require aerobic soil conditions and are reduced in number by compaction, waterlogging and overuse of soil fertilisers.



Forest litter or similar mulch provides ideal conditions for the proliferation of Mycorrhizae. Rhizosphere is a term describing the peripheral area of a tree's root system where this symbiotic association most commonly occurs.

Remedial (restorative) pruning - Removing damaged, diseased or lopped branches, taking the cut back to undamaged tissue, in order to induce the production of shoots from latent or adventitious buds, from which a new crown will be established.

Stem - Organ supporting the branches, leaves, flowers and fruit, and connecting the upper parts of the tree to the root system; may also be referred to as 'the trunk'.

Visual Tree Assessment (VTA) - using external characteristics as indicators of the internal conditions and structural stability of a tree. It is described by Mattheck and Breloer (1994), the first step of the method is to visually examine a tree to find external symptoms of internal defects. It is generally used in some form by Arborists in Australia for tree assessment.

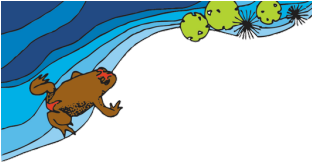
A full VTA is comprised of three steps. This report does not undertake a full VTA. Only the first step, a visual inspection is described in this report. No internal examination was undertaken. On occasions, a mallet may be used as an auditory guide for the presence of internal hollows. The assessment described in this report is ground based assessment. No climbing of any tree was done as part of an assessment.

Vitality - Indicates the energy reserves of the tree and is determined by the observed crown colour and density, the percentage of dead/dying branches and epicormic growth, and the tree's response to wounding, disease and decay pathogens. Poor vitality compromises the tree's ability to initiate internal defence systems (including compartmentalisation of damage or decay) is reduced and it can also become predisposed to attack by insects and pathogens. Often used synonymously in Arboricultural writing with 'vigour' or 'health'.

Tree Hazard Potential - An assessment of the risks associated with retaining a tree in its existing or proposed surroundings. Factors to consider are the growth characteristics of the species, tree vitality, condition and the frequency and type of potential targets. The impact the proposed works can have on any individual tree can only be assumed from general principals about trees.

This report does not provide an assessment of risk of harm posed from tree hazards. Information may be provided about the structure, function, defects or tree pests and/or diseases, vitality, condition and life expectancy. However, no assessment of targets, frequency of use by potential targets or guidance of risk of harm is included in this report.

Tree Protection Zone (TPZ) – Based on the DBH measurement of the tree. It specifies an area around the tree to protect the upper parts as well as the underground root system from impacts of development works. Specifications for TPZ may include maintenance actions such as application of mulch and irrigation.



Executive summary

A survey of the proposed development site at Maitland Street Muswellbrook ('the site' – Figure 1) was undertaken on 9-12 June 2020.

The proposal is to develop the site for use as a school. Trees may be used for educational purposes and privacy screening as well as a safety screen from the adjacent golf course.

When a detailed design is developed the data in this report may be used for preparing an arboricultural impact statement.

The vitality and condition of 240 trees is generally poor and variable.

Being an arboretum planted to display a range of trees produced by the nursery on site, few of the trees are in conditions that match their natural habitat.

Consequently, trees have grown with many defects of structure and low vitality. The great majority of the trees appear to have been planted in the 1960s and 1970s so those trees that have performed reasonably well are now dying or senescent.

The following recommendations apply:

- a) Remove trees that are structurally unsound
- b) Make provision for fencing around senescent and declining trees to minimise the safety hazard posed by those trees.
- c) Apply mulch 100-150mm deep with a radius of at least 2m, (or to the edge of the calculated tree protection zone where possible) around retained trees to stimulate growth of absorbing roots. For trees that will be located beneath fill, apply mulch on top of fill soils.
- d) Show tree locations and protective fencing on all construction plans used on site.
- e) Engage a qualified ecologist to inspect hollow-bearing trees before they are removed. The ecologist will provide further advice as applicable.
- f) All site activity must be excluded from tree protection zones during any future demolition and construction phases (see 'Tree protection guidelines' in Appendix 2).
- g) Route all trenching for underground services outside the TPZs of retained trees. If any underground service installation or underground boring will occur within TPZs, engage an arborist to supervise the activity.
- h) Crown pruning must comply with the appropriate class of pruning described in AS4373-2007 Pruning of amenity trees and be undertaken by a qualified arborist practising modern arboricultural methods.
- i) Advanced stock (>300 mm pot size) must not be planted within nominated tree protection areas so as to avoid disrupting the critical root zone of protected trees.



1. Introduction

A survey of the proposed development site at Maitland Street Muswellbrook ('the site' – Figure 1) was undertaken on 9-12 June 2020.

The main aim of this survey was to assess the trees on the site and prepare a report that addresses issues pertaining to the proposal and tree protection.

This report will provide a description of individual trees and assess the condition and prospects for future growth. The data will be the basis for future impact assessments.

1.1 Site description

For the purpose of this report the site is defined as Lot 100 DP1261496, with a frontage to Maitland Street Muswellbrook (Figure 1).

The site is approximately 2.3 ha in size and the elevation is approximately 170 m above sea level.

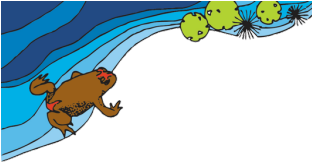
Existing features include buildings that were infrastructure for a Forestry Commission plant nursery.

There is a golf course to the north, residential area to the south east and commercial development on the other side of Maitland Street (New England Highway).

1.2 The proposal

The proposal is to develop the site for use as a school. Trees may be used for educational purposes and privacy screening as well as a safety screen from the adjacent golf course.

When a detailed design is developed the data in this report may be used for preparing an arboricultural impact statement.



2. Method

Tree assessments were undertaken on 9-12 June 2020.

Muswellbrook Shire Council has no definition of a tree in any environmental planning instrument.

The definition of a tree is taken as indicated in the *Trees (Disputes Between Neighbours) Act 2006 No 126*.

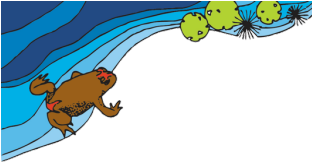
Section 3(1) **tree** includes any woody perennial plant, any plant resembling a tree in form and size, and any other plant prescribed by the regulations.

Trees (Disputes Between Neighbours) Regulation 2019 refers to section 3(1) of the Act for definition of a tree.

The vitality and condition of trees were assessed from ground level using the VTA (Visual Tree Assessment) method (Mattheck & Breleor, 1994). Tree heights were determined by visual estimation, using a 5m measuring pole for reference. Trees were marked using nails and numbered aluminium tags, which correspond with the tree identification numbers used in this report.

The Tree Protection Zone (TPZ) of each tree was determined using the formula "TPZ = d.b.h. X 12", and Structural Root Zone (SRZ) was calculated using the formula "SRZ radius = (Base Diameter X 50)^{0.42} X 0.64". Formulae used to calculate TPZs and SRZs are provided in the Australian Standard for Protection of Trees On Development Sites AS4970-2009 (Standards Australia, 2010).

Tree locations are shown in Figure 3. Trees are individually described in Appendix 2.



3. Survey Results

3.1 Condition and vitality of trees on site

The vitality and condition of 240 trees is generally poor and variable.

Being an arboretum planted to display a range of trees produced by the nursery on site, few of the trees are in conditions that match their natural habitat.

Consequently, trees have grown with many defects of structure and low vitality.

The great majority of the trees appear to have been planted in the 1960s and 1970s so those trees that have performed reasonably well are now dying or senescent.

Trees of low vitality and/or poor structural integrity include the following (Table 1):



Table 1: Trees recommended for removal.

Tree no.	Species	Comments	Action	Reason	Age Class	Vitality	Condition	Health	Structure	Defect 1	Defect 2	Defect 3
3	<i>Allocasuarina littoralis</i>	Dead	Remove	Dead	Dead							
6	Dead	Dead	Remove	Dead	Dead							
7	<i>Casuarina cristata</i>	Lost leader, suppressed canopy, poorly pruned for canopy lift	Remove	Defects	Mature	Fair	Poor	Fair	Good	Decay	Cavity	tip die back
10	<i>Casuarina cristata</i>	Dead	Remove	Dead								
11	<i>Casuarina cristata</i>	Dead	Remove	Dead								
14	<i>Casuarina cristata</i>	Dead	Remove	Dead	Dead							
16	<i>Casuarina cristata</i>	Dead	Remove	Dead	Dead							
17	<i>Casuarina cristata</i>	Nearly dead	Remove	Defects	Senescent	Poor	Poor	Poor	Poor			
18	<i>Casuarina cristata</i>	Codom trunk at 6m	Remove	Defects	Mature	Poor	Poor	Poor	Fair	Included bark - stem junction;		
23	<i>Casuarina cristata</i>	Dead	Remove	Dead	Dead							
29	Dead	Dead	Remove	Dead	Dead							



Tree no.	Species	Comments	Action	Reason	Age Class	Vitality	Condition	Health	Structure	Defect 1	Defect 2	Defect 3
31	Casuarina cunninghamiana	Dying	Remove	Defects	Juvenile	Poor	Poor	Poor	Poor			
34	Dead	Dead	Remove	Dead	Dead							
35	Dead	Dead	Remove	Dead	Dead							
46	Dead	Dead	Remove	Dead	Dead							
47	Eucalyptus seeana	Structurally unsound	Remove	Diseased	Mature	Fair	Poor	Poor	Poor	failed branch/es;	tip die back	epicormic shoots
50	Ironbark	Structurally unsound	Remove	Diseased	Semi-mature	Poor	Poor	Poor	Poor	tip die back	failed branch/es;	epicormic shoots
51	Acacia pendula	Structurally unsound	Remove	Diseased	Mature	Poor	Poor	Poor	Fair	failed branch/es;	tip die back	
52	Eucalyptus melanophloia	Declining	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	tip die back	epicormic shoots
58	Dead	Structurally unsound	Remove	Dead	Dead							
66	Eucalyptus	Crossed trunks, split bark, dying	Remove	Defects	Mature	Fair	Poor	Fair	Poor	failed branch/es;	tip die back	Included bark - stem junction;
67	Eucalyptus sp.	Split bark, dying, major limb shed, very sparse canopy	Remove	Defects	Mature	Poor	Poor	Poor	Poor	failed branch/es;	epicormic shoots	



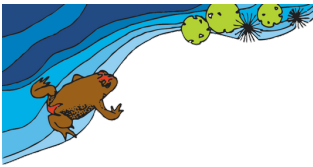
Tree no.	Species	Comments	Action	Reason	Age Class	Vitality	Condition	Health	Structure	Defect 1	Defect 2	Defect 3
84	<i>Eucalyptus albens</i>	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	tip die back	epicormic shoots
85	Dead	Dead	Remove	Dead	Dead							
93	<i>Eucalyptus sp.</i>	Structurally unsound	Remove	Diseased	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	tip die back	epicormic shoots
113	<i>Callistemon viminalis</i>	Structurally unsound	Remove	Defects	Senescent	Fair	Fair	Fair	Poor	failed branch/es;		
114	<i>Callistemon viminalis</i>	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	tip die back	epicormic shoots
129	<i>Casuarina cristata</i>	Dangerous overweight on highway side	Remove	Defects	Mature	Good	Good	Good	Poor	Stem wound	Included bark - stem junction;	Included bark - branch stem attachment;
146	Dead	Structurally unsound	Remove	Dead	Dead							
148	<i>Casuarina cunninghamiana</i>	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	epicormic shoots	failed branch/es;	tip die back
167	<i>Casuarina cristata</i>	Weak branch attachment	Remove	Defects	Over-mature	Fair	Poor	Fair	Poor			
173	<i>Eucalyptus viridis</i>	Structurally unsound, bracket fungus	Remove	Defects	Mature	Poor	Poor	Poor	Poor	Stem wound	epicormic shoots	Included bark - stem junction;
176	Dead	Structurally	Remove	Dead	Dead							



Tree no.	Species	Comments	Action	Reason	Age Class	Vitality	Condition	Health	Structure	Defect 1	Defect 2	Defect 3
		unsound										
181	Dead	Structurally unsound	Remove	Dead	Dead							
189	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	Decay	tip die back	epicormic shoots
195	Melaleuca decussata	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor			
203	Dead	Structurally unsound	Remove	Dead	Dead							
204	Dead	Structurally unsound	Remove	Dead	Dead							
205	Populus deltoides	Structurally unsound	Remove	Defects	Mature	Poor	Poor	Fair	Poor			
206	Populus deltoides	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;		
207	Dead	Structurally unsound	Remove	Dead	Dead							
220	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Poor	Poor	Poor	Poor	failed branch/es;	epicormic shoots	tip die back
221	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Fair	Fair	Good	Good	failed branch/es;	tip die back	
222	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Fair	Fair	Fair	Good	failed branch/es;	tip die back	poor pruning
224	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	epicormic shoots	poor pruning



Tree no.	Species	Comments	Action	Reason	Age Class	Vitality	Condition	Health	Structure	Defect 1	Defect 2	Defect 3
226	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Fair	Fair	Fair	Good	poor pruning	Decay	poor occlusion
227	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Fair	Fair	Fair	Good	failed branch/es;	epicormic shoots	
228	Casuarina cunninghamiana	Dying, dangerous	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	Decay	
229	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Fair	Fair	Poor	Fair	Decay	Stem wound	epicormic shoots
230	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Over-mature	Fair	Fair	Fair	Good	failed branch/es;	Decay	tip die back
231	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Senescent	Poor	Poor	Poor	Poor	failed branch/es;	Cavity	Decay
232	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Senescent	Fair	Fair	Fair	Fair	failed branch/es;	Decay	poor pruning
234	Casuarina cunninghamiana	Bird nest, Structurally unsound	Remove	Defects	Over-mature	Poor	Fair	Fair	Fair	failed branch/es;	poor occlusion	
235	Casuarina cunninghamiana	Structurally unsound	Remove	Defects	Senescent	Fair	Fair	Fair	Poor	failed branch/es;	Cavity	Cavity
237	Casuarina cunninghamiana	Structurally unsound, borers	Remove	Defects	Over-mature	Fair	Fair	Fair	Poor	Stem wound	failed branch/es;	tip die back

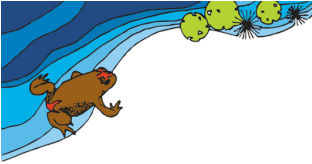


The trees on site are predominantly planted natives from across the ranges and inland of New South Wales.

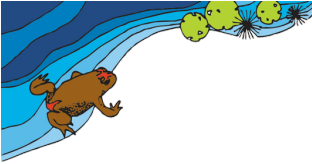
Species identified within the site include the following (Table 2):

Table 2 Tree species identified.

Species name	Common name	Count
<i>Acacia pendula</i>	Weeping myall	1
<i>Acacia</i> sp.	Wattle	3
<i>Acacia salicina</i>	Cooba	2
<i>Acacia williamsonii</i>	Whirrakee wattle	1
<i>Allocasuarina gymnanthera</i>	Mallee she-oak	1
<i>Allocasuarina littoralis</i>	Black She-oak	4
<i>Allocasuarina</i> sp.	She-oak	1
<i>Callistemon citrinus</i>	Crimson bottlebrush	2
<i>Callistemon viminalis</i>	Weeping bottlebrush	18
<i>Casuarina cunninghamiana</i>	River Sheoak	35
<i>Casuarina cristata</i>	Belah	68
<i>Chamaecyparis</i> sp.	Cypress	1
<i>Corymbia citriodora</i>	Lemon-scented Gum	1
<i>Corymbia eximia</i>	Yellow bloodwood	1
<i>Cupaniopsis anacardioides</i>	Cheese tree	1
<i>Eucalyptus albens</i>	White box	8
<i>Eucalyptus beyeriana</i>	Beyer's Ironbark	2
<i>Eucalyptus bosistoana</i>	Coast grey box	1
<i>Eucalyptus camaldulensis</i>	River red gum	2
<i>Eucalyptus conspicua</i>	Gum tree	1
<i>Eucalyptus crebra</i>	Narrow-leaved ironbark	7
<i>Eucalyptus dawsonii</i>	Slaty Gum	6
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum	4
<i>Eucalyptus largiflorens</i>	Black Box	1
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark	3
<i>Eucalyptus intertexta</i>	Gum Coolibah	5
<i>Eucalyptus propinqua</i>	Small-fruited grey gum	3
<i>Eucalyptus seeana</i>	Narrow-leaved Red Gum	1
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark	4
<i>Eucalyptus socialis</i>	Red Mallee	1
<i>Eucalyptus</i> sp.	Eucalpyts	7
<i>Eucalyptus tereticornis</i>	Forest red gum	1
<i>Eucalyptus viridis</i>	Green Mallee	2
<i>Fraxinus raywoodii</i>	Claret ash	1
<i>Fraxinus griffithii</i>	Evergreen Ash	1
<i>Grevillea robusta</i>	Silky oak	2
<i>Melaleuca bracteata</i>	Black tea-tree	3
<i>Melaleuca decussata</i>	Cross-leaf honey-myrtle	3
<i>Melaleuca halmaturorum</i>	kangaroo honey-myrtle	1



Species name	Common name	Count
Melaleuca stypheloides	Prickly paperbark	11
Melia azedarach	White cedar	1
Murraya sp.	Mock orange	1
Photinia robusta	Photinia	1
Populus deltoides	Poplar	2
Tamarix aphylla	Athel Pine, Tamarisk	1
Ulmus parvifolia	Chinese elm	1
Dead		12
	Total	240



4. Discussion

The trees on site are in general poor condition, with many declining or senescent. Some have structural faults that require removal for safety. Very few are in good condition.

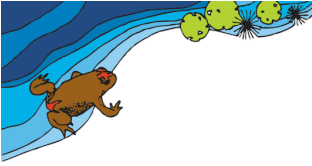
The long rows of trees along the boundaries have trees in variable condition. Many of them need to be removed but to do so would create breaks in the line of trees. Such breaks may dispose the remaining trees to wind throw. Numerous breaks also have an effect on the visual appearance of the row.

Levinsson (2015) suggests effective management may be more valuable to tree survival than beginning with a vigorous specimen. In the context of trees on or adjacent to development sites, effective management is simply a matter of adequate protection, mulching, and regular irrigation, as this satisfies the most commonly limiting factors for tree growth (Harris *et al.*, 2004; Mauseth, 2009). Additionally, wood chip and leaf litter mulches are effective and cost-efficient methods for stimulating new root growth and improving soil quality in compacted urban soils (Scharenbroch, & Watson, 2014

Mycorrhizae are fungi that grow in symbiotic association with tree roots (especially the fine root hairs) and are attributed with increasing the uptake of nutrients, particularly phosphorus, and reducing infection from soil borne pathogens. They greatly increase the surface area of a tree's root system. Mycorrhizae are reduced in number by compaction, waterlogging and overuse of soil fertilisers, as they require aerobic soil conditions, that is, they need oxygen. Forest litter or similar mulch provides ideal conditions for the proliferation of Mycorrhizae (Harris *et al.*, 2004).

Adequately insulated soils allow small absorbing roots to grow in the upper 150mm of soil, whereas exposed soils are prone to become hot enough that roots are restricted to greater depths because absorbing roots cannot survive in the upper layer of soil (Harris *et al.*, 2004).

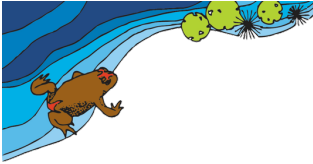
Roots cannot grow without oxygen, and they cannot survive in compacted soils. Any activity that buries or cuts roots such as a soil stockpile or service trench will result in death of a corresponding portion of the canopy (Perry, 1982). The vast majority of roots are found within the top metre of soil, though this is highly dependent on the soil type. Roots systems are shallow in poorly aerated clay soils, deep in well-aerated sandy soils, and widespread in desert environments, all according to the availability of oxygen, water, and soil nutrients (Dobson, 1995).



5. Recommendations

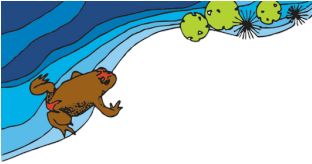
The following recommendations apply:

- a) Remove trees that are structurally unsound or hazardous
- b) Make provision for fencing around senescent and declining trees to minimise the safety hazard posed by those trees.
- c) Apply mulch 100-150mm deep with a radius of at least 2m, (or to the edge of the calculated tree protection zone where possible) around retained trees to stimulate growth of absorbing roots. For trees that will be located beneath fill, apply mulch on top of fill soils.
- d) Show tree locations and protective fencing on all construction plans used on site.
- e) Engage a qualified ecologist to inspect hollow-bearing trees before they are removed. The ecologist will provide further advice as applicable.
- f) All site activity must be excluded from tree protection zones during any future demolition and construction phases (see 'Tree protection guidelines' in Appendix 2).
- g) Route all trenching for underground services outside the TPZs of retained trees. If any underground service installation or underground boring will occur within TPZs, engage an arborist to supervise the activity.
- h) Crown pruning must comply with the appropriate class of pruning described in AS4373-2007 Pruning of amenity trees and be undertaken by a qualified arborist practising modern arboricultural methods.
- i) Advanced stock (>300 mm pot size) must not be planted within nominated tree protection areas so as to avoid disrupting the critical root zone of protected trees.

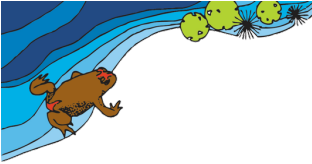


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Standards Australia (2010) *Protection of trees on development sites* (AS 4970-2009 – incorporating Amendment No. 1).



Appendix 1. Figures



Figure 1. Locality map for Maitland Street, Muswellbrook.

 Site location

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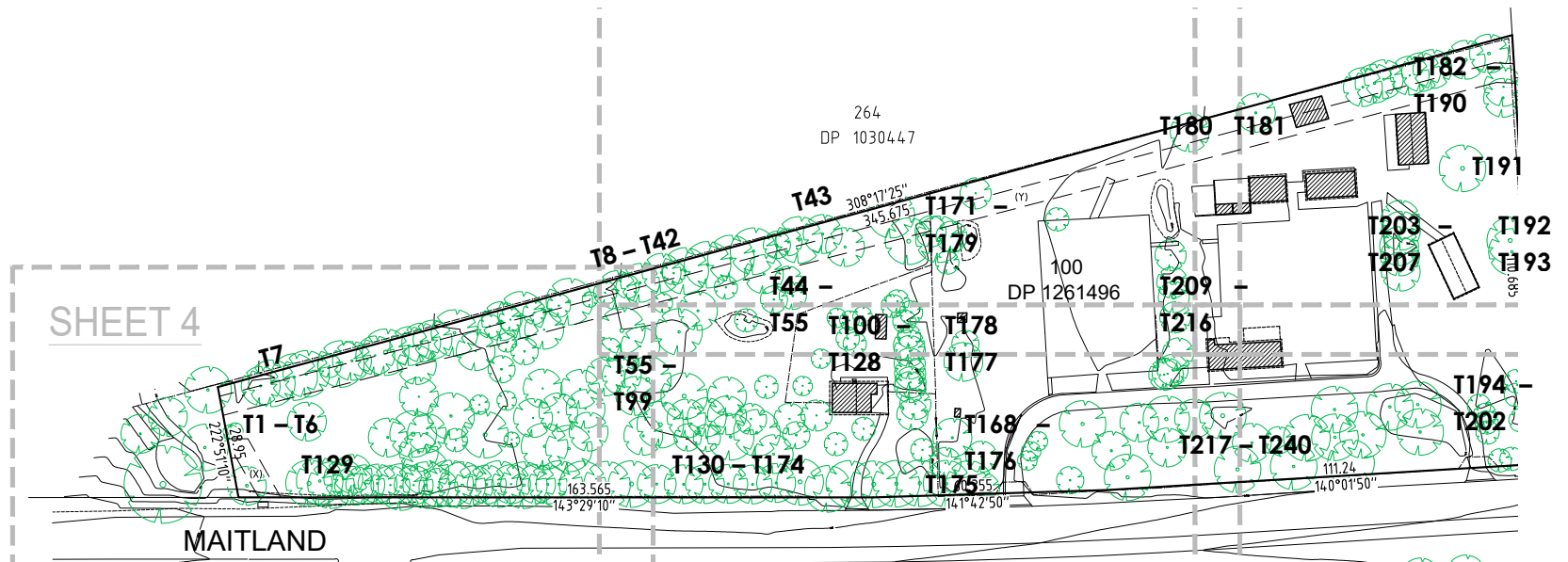


Figure 2. Plan of site (with numbered trees).

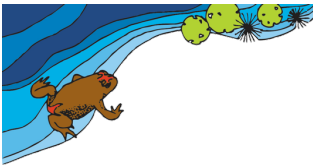
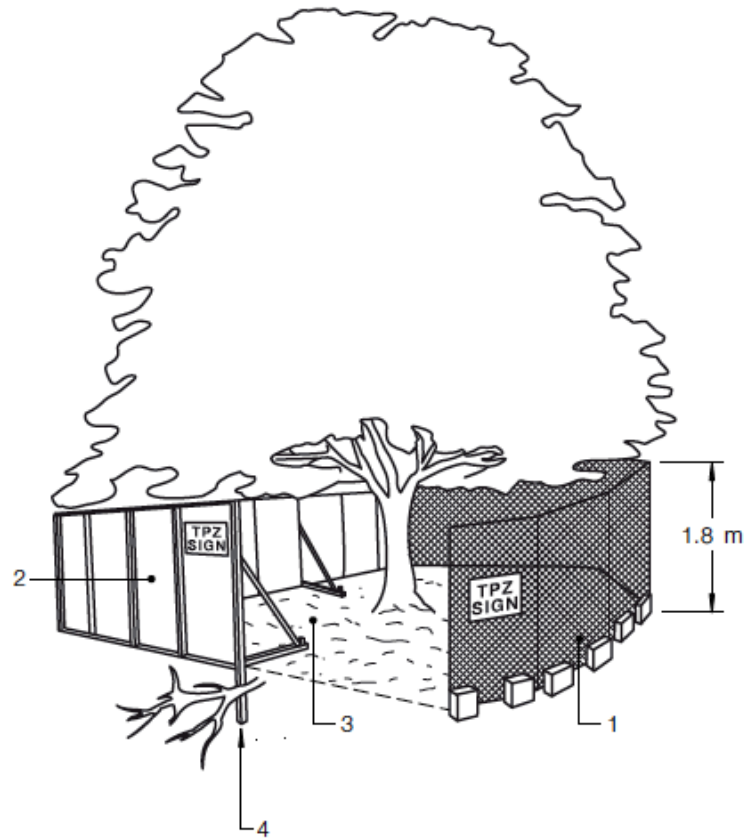
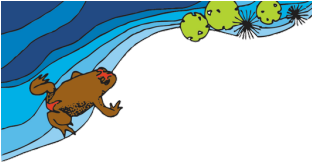


Figure 3. Site map showing school concept plan layout.

Source: Pacific Hills Christian School plans.

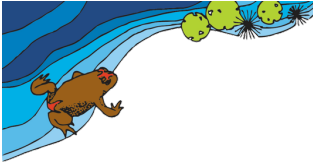


LEGEND:

- 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 4 Extract from Section 3 of AS 4970-2009: Protective fencing.

Standards Australia (2010) *Protection of trees on development sites* (AS 4970-2009 – incorporating Amendment No. 1).



Appendix 2. Tree data and condition tables

The following tree schedule (Table 3, Table 4) describes the numbered trees shown in (Figure 2).

KEY

J - juvenile	E - excellent	BI - bark inclusion	dw - small diameter deadwood	SW - stem wound
SM - semi-mature	G - good	CB - canopy bias	DW - large diameter deadwood	SC - trunk cavity
M - mature	F - fair	CD - codominant stems	EC - elevated crown	TL - trunk lean
OM - over-mature	P - poor	DBH - Trunk diameter at 1.4m	ep - epicormic growth	

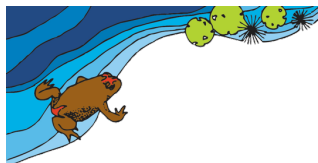


Table 3 Tree data.

Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
1	<i>Eucalyptus beyeriana</i>	7.80	5.36	3.00	5	North	11	5	10	9	20 - 25
2	<i>Allocasuarina littoralis</i>	2.00	1.07	1.61		None	2	2	2	2	5 - 10
3	<i>Allocasuarina littoralis</i>	0.00	0.00			None					-
4	<i>Eucalyptus beyeriana</i>	6.48	4.46	1.75		None	10	10	5	7	15 - 20
5	<i>Allocasuarina littoralis</i>	9.12	6.27	3.09		None	12	4	7	8	25 - 30
6	Dead	0.00	0.00			None					-
7	<i>Casuarina cristata</i>	4.56	3.14	2.45		None	4	4	4	5	10 - 15
8	<i>Casuarina cristata</i>	6.60	4.54	2.80		None	10	5	10	6	20 - 25
9	<i>Casuarina cristata</i>	7.25	4.99	2.83		None	7	4	7	9	15 - 20
10	<i>Casuarina cristata</i>	0.00	0.00			None					-
11	<i>Casuarina cristata</i>	0.00	0.00			None					-
12	<i>Casuarina cristata</i>	10.80	7.43	2.95	23	North	13	5	8	5	20 - 25



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
13	<i>Allocasuarina littoralis</i>	4.32	2.97	2.45		None	3	4	8	5	20 - 25
14	<i>Casuarina cristata</i>	0.00	0.00	0.00		None					-
15	<i>Casuarina cristata</i>	8.16	5.61	2.97		None	8	5	8	7	20 - 25
16	<i>Casuarina cristata</i>	0.00	0.00	0.00		None					-
17	<i>Casuarina cristata</i>	6.00	4.13	2.59		None	0	0	2	0	15 - 20
18	<i>Casuarina cristata</i>	4.20	2.89	2.34		None	3	3	3	3	20 - 25
19	<i>Casuarina cristata</i>	4.56	3.14	2.49		None	4	6	5	4	-
20	<i>Casuarina cristata</i>	7.56	5.20	2.97		None	7	8	11	10	20 - 25
21	<i>Casuarina cristata</i>	2.00	1.07	1.61		None	2	2	2	2	5 - 10
22	<i>Casuarina cristata</i>	5.04	3.47	2.43		None	5	3	6	4	15 - 20
23	<i>Casuarina cristata</i>	0.00	0.00	0.00		None					-
24	<i>Casuarina cristata</i>	6.36	4.37	2.92		None	6	8	8	5	20 - 25
25	<i>Casuarina cunninghamiana</i>	2.40	1.65	1.85		None	1	4	3	3	3 - 5



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
26	Casuarina cunninghamiana	3.24	2.23	2.05		None	3	1	0	3	10 - 15
27	Casuarina cristata	7.08	4.87	2.97		None	7	6	8	8	20 - 25
28	Allocasuarina gymnanthera	2.00	1.16	1.65		None	3	3	3	2	10 - 15
29	Dead	0.00	0.00	0.00		None					-
30	Casuarina cristata	5.28	3.63	2.57		None	5	4	5	6	25 - 30
31	Casuarina cunninghamiana	2.40	1.65	1.85		None	2	0	3	0	5 - 10
32	Casuarina cristata	6.48	4.46	2.61		None	6	6	6	6	20 - 25
33	Casuarina cristata	6.24	4.29	2.81		None	8	4	8	7	20 - 25
34	Dead	0.00	0.00	0.00		None					-
35	Dead	0.00	0.00	0.00		None					-
36	Casuarina cristata	6.36	4.37	2.76	6	East	5	4	10	4	20 - 25
37	Casuarina cristata	5.76	3.96	2.61		None	4	6	6	5	15 - 20
38	Casuarina cristata	6.00	4.13	2.74		None	4	4	6	6	20 - 25
39	Casuarina cristata	4.92	3.38	2.49		None	3	3	3	4	20 - 25



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
40	Casuarina cristata	4.67	3.21	2.34		None	4	2	3	6	15 - 20
41	Casuarina cristata	5.88	4.04	2.74		None	4		7	6	20 - 25
42	Casuarina cristata	5.28	3.63	2.63		None	4	5	6	4	20 - 25
43	Casuarina cristata	8.16	5.61	2.88		None	2	5	7	4	20 - 25
44	Eucalyptus propinqua	7.56	5.20	2.93		None	4	5	6	7	20 - 25
45	Eucalyptus conspicua	5.64	3.88	2.47		None	1	4	4	4	15 - 20
46	Dead	0.00	0.00	0.00		None					-
47	Eucalyptus seeana	4.44	3.05	2.15		None	5	3	5	5	10 - 15
48	Eucalyptus melanophloia	4.56	3.14	2.41	6	North	8	4	6	4	15 - 20
49	Eucalyptus sideroxylon	5.52	3.80	2.53		None	5	6	4	8	15 - 20
50	Eucalyptus sp. Ironbark	2.76	1.90	1.91		None	0	0	4	1	5 - 10
51	Acacia pendula	4.80	3.30	2.28		None	7	5	5	5	5 - 10
52	Eucalyptus melanophloia	2.40	1.65	1.82		None	3	1	0.5	0.5	5 - 10
53	Corymbia citriodora	4.33	2.98	2.41		None	5	5	5	5	15 - 20



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
54	Acacia sp	3.38	2.33	2.13		None	1	4	2	4	10 - 15
55	Eucalyptus bosistoana	6.64	4.56	2.85		None	7	7	6	6	20 - 25
56	Eucalyptus intertexta	4.32	2.97	2.59		None	5	5	7	7	20 - 25
57	Eucalyptus intertexta	3.17	2.18	2.15		None	5	0	2	5	10 - 15
58	Dead	0.00	0.00	0.00		None					-
59	Eucalyptus intertexta	3.96	2.72	2.28		None	4	6	5	6	15 - 20
60	Eucalyptus intertexta	2.40	1.65	1.91		None	2	3	2	4	15 - 20
61	Eucalyptus intertexta	3.48	2.39	2.13		None	3	4	4	3	15 - 20
62	Eucalyptus tereticornis	3.24	2.23	2.13		None	4	5	6	4	15 - 20
63	Eucalyptus sideroxylon	4.52	3.11	2.23		None	2	8	5	5	15 - 20
64	Eucalyptus sideroxylon	0.00	0.00	0.00		None	2	2	2	2	15 - 20
65	Eucalyptus albens	5.52	3.80	2.59		None	7	3	3	7	20 - 25
66	Eucalyptus sp.	8.40	5.78	2.88		None	9	2	5	11	20 - 25
67	Eucalyptus sp.	5.52	3.80	2.51		None	2	0	5	0	15 - 20
68	Melaleuca stypheloides	4.22	2.90	2.30		None	4	3	5	2	5 - 10



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
69	<i>Eucalyptus sideroxylon</i>	11.76	8.09	3.31		None	4	4	8	4	20 - 25
70	<i>Eucalyptus dealbata</i>	5.16	3.55	2.57		None	3	6	7	3	15 - 20
71	<i>Eucalyptus dealbata</i>	7.14	4.91	2.63	6	East	7	7	10	5	15 - 20
72	<i>Allocasuarina</i> sp.	2.16	1.49	1.82		None	2	3	2	3	20 - 25
73	<i>Eucalyptus camaldulensis</i>	11.88	8.17	3.28		None	5	8	9	6	-
74	<i>Eucalyptus crebra</i>	3.36	2.31	2.18		None	4	4	4	2	15 - 20
75	<i>Eucalyptus crebra</i>	3.24	2.23	2.02		None	5	4	6	4	15 - 20
76	<i>Eucalyptus crebra</i>	2.00	1.24	1.72		None	2	1	1	1	5 - 10
77	<i>Eucalyptus dealbata</i>	3.34	2.29	1.97		None	3	2	5	2	10 - 15
78	<i>Eucalyptus dealbata</i>	3.72	2.56	2.18		None	3	3	5	2	10 - 15
79	<i>Eucalyptus dawsonii</i>	3.45	2.37	1.97		None	3	2	4	2	10 - 15
80	<i>Eucalyptus dawsonii</i>	5.76	3.96	2.63		None	8	7	8	6	20 - 25
81	<i>Eucalyptus dawsonii</i>	7.20	4.95	2.93		None	8	8	12	8	20 - 25



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
82	<i>Eucalyptus socialis</i>	3.50	2.41	2.51		None	0	6	7	0	5 - 10
83	<i>Eucalyptus albens</i>	3.24	2.23	2.18		None	5	6	5	0	10 - 15
84	<i>Eucalyptus albens</i>	2.64	1.82	1.94		None	1	1	2	0	15 - 20
85	Dead	0.00	0.00	0.00		None					-
86	<i>Eucalyptus melanophloia</i>	2.76	1.90	2.05		None	5	3	4	3	5 - 10
87	<i>Eucalyptus crebra</i>	4.20	2.89	2.23		None	8	6	5	6	15 - 20
88	<i>Eucalyptus largiflorens</i>	7.21	4.96	2.88		None	11	8	10	8	15 - 20
89	<i>Eucalyptus dawsonii</i>	8.40	5.78	2.92		None	12	9	10	8	20 - 25
90	<i>Eucalyptus propinqua</i>	3.66	2.52	2.37		None	4	5	2	6	10 - 15
91	<i>Eucalyptus</i> sp	6.12	4.21	2.67		None	8	6	8	6	20 - 25
92	<i>Eucalyptus</i> sp	5.37	3.69	2.74		None	3	6	2	3	15 - 20
93	<i>Eucalyptus</i> sp. (sim. to <i>E.gracilis</i>)	2.76	1.90	1.91		None	0	2	0	4	10 - 15
94	<i>Eucalyptus</i> (<i>fibrosa</i> OR <i>sideroxydon</i>)	2.04	1.40	1.72		None	2	1	2	2	10 - 15
95	<i>Eucalyptus</i>	3.00	2.06	2.41		None	2	4	6	5	10 - 15



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
	albens										
96	Eucalyptus crebra	4.56	3.14	2.34		None	6	4	6	4	10 - 15
97	Eucalyptus crebra	3.74	2.57	2.37		None	9	5	7	6	10 - 15
98	Eucalyptus albens	5.76	3.96	2.55	9	West	6	6	6	8	15 - 20
99	Eucalyptus crebra / beyeriana	4.90	3.37	2.85		None	8	6	6	3	10 - 15
100	Eucalyptus albens	6.60	4.54	2.57		None	6	3	11	2	-
101	Ulmus parvifolia	2.00	1.32	1.68		None	3	3	3	3	3 - 5
102	Eucalyptus albens	5.04	3.47	2.61	6	North	8	3	5	9	15 - 20
103	Eucalyptus albens	4.08	2.81	2.47	10	North	5	3	5	2	10 - 15
104	Corymbia eximia	2.52	1.73	1.94		None	5	2	6	1	5 - 10
105	Fraxinus greywoodii	4.44	3.05	2.10		None	5	5	5	5	5 - 10
106	Callistemon viminalis	2.04	1.40	1.82		None	3	3	3	3	5 - 10
107	Callistemon viminalis	2.91	2.00	2.20		None	4	4	4	4	5 - 10
108	Grevillea robusta	2.04	1.40	1.94		None	2	2	2	2	5 - 10



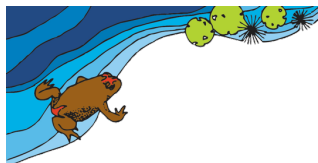
Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
109	<i>Grevillea robusta</i>	2.83	1.95	2.00		None	3	3	3	3	5 - 10
110	<i>Callistemon viminalis</i>	2.00	1.07	1.65	16	North	2	0	1	1	5 - 10
111	<i>Callistemon viminalis</i>	2.00	1.16	1.82		None	4	2	4	3	5 - 10
112	<i>Callistemon viminalis</i>	2.16	1.49	1.79		None	3	0	4	1	5 - 10
113	<i>Callistemon viminalis</i>	3.69	2.54	2.25		None	2	3	3	6	5 - 10
114	<i>Callistemon viminalis</i>	2.00	1.11	1.68		None	1	1	0	4	3 - 5
115	<i>Fraxinus griffithii</i>	2.31	1.58	1.94		None	3	1	2	4	5 - 10
116	<i>Photinia robusta</i>	2.00	1.29	2.47		None	4	4	4	2	5 - 10
117	<i>Melaleuca styphlioides</i>	4.43	3.04	2.41		None	5	5	5	2	5 - 10
118	<i>Melaleuca styphlioides</i>	2.81	1.93	2.08		None	5	5	1	1	5 - 10
119	<i>Melaleuca styphlioides</i>	3.78	2.60	2.32		None	5	5	1	1	5 - 10
120	<i>Melaleuca styphlioides</i>	4.83	3.32	2.67		None	5	5	1	1	5 - 10
121	<i>Melaleuca styphlioides</i>	2.31	1.58	1.72		None	5	5	1	1	5 - 10
122	<i>Melaleuca styphlioides</i>	3.57	2.45	2.15		None	5	5	1	1	5 - 10



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
123	Melaleuca styphlioides	5.88	4.04	2.43		None	5	5	1	2	10 - 15
124	Melaleuca styphlioides	4.80	3.30	2.45		None	5	5	2	2	5 - 10
125	Melaleuca styphlioides	3.30	2.27	2.10		None	5	5	2	5	5 - 10
126	Cupaniopsis anacardioides	1.08	0.74	1.50		None	5	1	4	2	3 - 5
127	Murraya sp.	0.60	0.41	1.68		None	2	2	2	2	< 3
128	Chamaecyparis sp. (or Cupressus sp.)	2.00	0.99	1.50		None	1	1	1	1	5 - 10
129	Casuarina cristata	8.40	5.78	3.11		None	6	6	6	6	20 - 25
130	Casuarina cunninghamiana	5.16	3.55	2.85		None	5	3	10	7	20 - 25
131	Casuarina cristata	5.14	3.54	2.53		None	5	3	5	9	20 - 25
132	Casuarina cunninghamiana	4.86	3.34	2.25		None	7	0	5	8	15 - 20
133	Casuarina cristata	6.48	4.46	2.78	6	West	6	8	8	8	15 - 20
134	Casuarina cunninghamiana	3.48	2.39	2.20		None	3	3	1	4	10 - 15



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
135	Casuarina cristata	4.92	3.38	2.55		None	5	4	9	6	20 - 25
136	Casuarina cunninghamiana	3.96	2.72	2.37		None	2	3	8	1	15 - 20
137	Casuarina cristata	6.12	4.21	2.83		None	7	5	3	8	20 - 25
138	Casuarina cunninghamiana	3.12	2.15	2.13		None	2	2	0	5	10 - 15
139	Casuarina cristata	8.64	5.94	2.88		None	5	8	10	3	20 - 25
140	Casuarina cunninghamiana	4.44	3.05	2.39		None	1	8	1	9	20 - 25
141	Casuarina cristata	6.19	4.26	2.87		None	5	3	8	8	20 - 25
142	Casuarina cristata	6.24	4.29	2.87		None	8	7	6	7	20 - 25
143	Casuarina cristata	4.32	2.97	2.32		None	2	5	3	8	20 - 25
144	Casuarina cristata	5.76	3.96	2.47		None	6	9	9	7	20 - 25
145	Casuarina cristata	6.24	4.29	2.88		None	5	5	4	10	20 - 25
146	Dead	0.00	0.00	0.00		None					-
147	Casuarina cristata	7.38	5.08	3.08		None	5	6	7	10	20 - 25



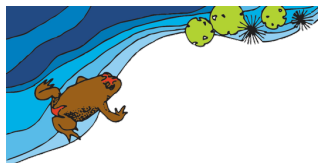
Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
148	Casuarina cunninghamiana	3.12	2.15	2.15		None	2	2	2	5	-
149	Casuarina cristata	6.48	4.46	2.61		None	5	6	4	9	20 - 25
150	Casuarina cristata	6.00	4.13	2.74		None	4	8	5	6	20 - 25
151	Casuarina cristata	7.68	5.28	2.97		None	9	12	9	12	20 - 25
152	Casuarina cristata	7.56	5.20	2.98		None	6	9	7	8	20 - 25
153	Casuarina cristata	8.40	5.78	3.04		None	8	10	6	10	20 - 25
154	Casuarina cristata	6.00	4.13	2.80		None	4	10	5	10	20 - 25
155	Casuarina cristata	5.88	4.04	2.71		None	5	7	7	7	20 - 25
156	Casuarina cristata	6.12	4.21	2.83		None	7	7	7	8	20 - 25
157	Casuarina cristata	6.36	4.37	2.92		None	5	7	3	6	20 - 25
158	Casuarina cristata	7.08	4.87	2.87		None	5	9	5	12	20 - 25
159	Casuarina cristata	5.64	3.88	2.61		None	3	7	4	4	20 - 25
160	Casuarina cristata	9.50	6.53	3.25		None	8	7	8	9	20 - 25



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
161	Casuarina cristata	7.44	5.12	3.04		None	7	7	6	9	20 - 25
162	Casuarina cristata	9.00	6.19	3.25		None	11	9	9	12	20 - 25
163	Casuarina cristata	9.00	6.19	3.20		None	8	12	9	12	20 - 25
164	Casuarina cristata	8.16	5.61	3.04		None	7	7	7	8	20 - 25
165	Casuarina cristata	9.48	6.52	3.32		None	8	7	7	8	20 - 25
166	Casuarina cristata	7.56	5.20	3.18		None	8	5	9	9	20 - 25
167	Casuarina cristata	8.88	6.11	3.08		None	6	7	10	10	20 - 25
168	Acacia williamsonii	2.16	1.49	1.72	20	South	1	4	2	1	3 - 5
169	Eucalyptus camaldulensis	3.48	2.39	2.20	20	East	1	8	9	4	5 - 10
170	Eucalyptus propinqua	3.48	2.39	2.18	7	East	9	2	6	2	15 - 20
171	Acacia sp. (sim. to A.macradenia)	4.80	3.30	2.49	5	South	5	8	7	6	10 - 15
172	Eucalyptus viridis	5.16	3.55	2.41	5	West	8	6	5	6	15 - 20
173	Eucalyptus viridis	4.08	2.81	2.23		None	4	6	5	3	-
174	Melia azedarach	2.40	1.65	1.88		None	5	5	3	5	3 - 5



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
175	Acacia salicina	3.96	2.72	2.23	8	South	4	8	6	2	15 - 20
176	Dead	0.00	0.00	0.00		None					-
177	Casuarina cristata	2.40	1.65	1.85		None	2	2	2	2	10 - 15
178	Acacia salicina	3.72	2.56	2.15	8	South	4	4	4	4	5 - 10
179	Eucalyptus dawsonii	4.92	3.38	2.45		None	7	7	7	7	15 - 20
180	Eucalyptus dawsonii	6.12	4.21	2.63		None	7	8	7	7	15 - 20
181	Dead	0.00	0.00	0.00		None					-
182	Casuarina cunninghamiana	6.36	4.37	2.93		None	10	4	10	10	15 - 20
183	Acacia sp. (sim. to A.macradenia)	3.60	2.48	2.05	30	East	0	10	5	1	10 - 15
184	Casuarina cunninghamiana	4.08	2.81	2.25		None	4	4	4	4	5 - 10
185	Casuarina cristata	6.36	4.37	2.87		None	8	9	8	7	20 - 25
186	Casuarina cunninghamiana	4.92	3.38	2.30		None	4	4	5	3	10 - 15
187	Casuarina cristata	8.28	5.69	3.12		None	10	9	10	9	20 - 25
188	Casuarina cristata	6.96	4.79	3.01	7	North	10	7	10	7	20 - 25



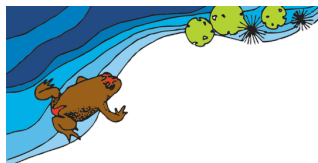
Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
189	Casuarina cunninghamiana	3.84	2.64	2.20	4	North	4	2	6	1	5 - 10
190	Casuarina cunninghamiana	5.64	3.88	2.73		None	6	7		5	15 - 20
191	Tamarix aphylla	4.64	3.19	1.85		None	8	8	8	8	5 - 10
192	Casuarina cristata	10.92	7.51	3.61		None	8	9	9	6	20 - 25
193	Casuarina cristata	8.16	5.61	3.03	6	West	8	12	2	10	20 - 25
194	Melaleuca sp. (sim to M.decussata)	3.53	2.42	2.34		None	5	5	5	5	3 - 5
195	Melaleuca decussata	2.42	1.67	2.47		None	3	3	3	3	3 - 5
196	Melaleuca halmaturorum	0.00	0.00	0.00		None	4	4	4	4	3 - 5
197	Callistemon citrinus	3.66	2.51	2.51		None	1	2	3	1	3 - 5
198	Callistemon citrinus	2.81	1.93	2.13		None	3	2	2	2	3 - 5
199	Melaleuca bracteata	3.12	2.14	2.41		None	4	4	1	4	3 - 5
200	Melaleuca bracteata	2.55	1.75	2.15		None	4	4	1	1	3 - 5
201	Melaleuca bracteata	3.22	2.21	2.67		None	5	5	1	1	3 - 5



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
202	Melaleuca bracteata	2.60	1.79	2.20		None	4	4	5	1	3 - 5
203	Dead	0.00	0.00	0.00		None					-
204	Dead	0.00	0.00	0.00		None					-
205	Populus deltoides	3.12	2.15	1.91		None	3	4	2	2	10 - 15
206	Populus deltoides	2.76	1.90	1.88		None	3	3	2	2	10 - 15
207	Dead	0.00	0.00	0.00		None					-
208	Casuarina cristata	2.00	0.99	1.68		None	3	3	3	3	5 - 10
209	Callistemon sp	3.60	2.48	2.47		None	3	3	3	3	5 - 10
210	Callistemon sp	4.02	2.77	2.47		None	4	4	4	4	5 - 10
211	Callistemon sp	3.87	2.66	2.85		None	4	4	4	4	5 - 10
212	Callistemon sp	5.29	3.64	3.31		None	5	5	5	5	5 - 10
213	Callistemon sp	4.02	2.77	2.85		None	4	4	2	1	5 - 10
214	Callistemon viminalis hannah ray	4.06	2.79	2.34		None	5	5	4	1	5 - 10
215	Callistemon viminalis hannah ray	3.75	2.58	2.15		None	5	5	1	4	5 - 10
216	Callistemon viminalis hannah ray	4.69	3.22	2.47		None	5	5	1	5	5 - 10
217	Callistemon viminalis	2.00	1.11	1.61		None	3	3	3	1	3 - 5



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
218	Callistemon viminalis	2.00	1.12	1.85		None	3	2	4	1	3 - 5
219	Callistemon viminalis	2.08	1.43	1.85		None	3	3	2	3	3 - 5
220	Casuarina cunninghamiana	4.20	2.89	2.39		None	2	2	4	2	5 - 10
221	Casuarina cunninghamiana	8.16	5.61	3.17		None	7	7	7	3	20 - 25
222	Casuarina cunninghamiana	5.88	4.04	2.80		None	4	5	5	4	15 - 20
223	Casuarina cunninghamiana	6.12	4.21	2.80		None	5	5	6	7	15 - 20
224	Casuarina cunninghamiana	5.64	3.88	2.67		None	5	4	5	6	20 - 25
225	Casuarina cunninghamiana	8.52	5.86	2.98		None	10	4	8	7	15 - 20
226	Casuarina cunninghamiana	5.52	3.80	2.63		None	5	9	4	9	10 - 15
227	Casuarina cunninghamiana	5.88	4.04	2.73		None	7	3	6	7	15 - 20
228	Casuarina cunninghamiana	9.24	6.35	3.08		None	5	9	0	9	15 - 20
229	Casuarina cunninghamiana	7.56	5.20	2.85		None	8	5	4	6	15 - 20
230	Casuarina cunninghamiana	4.80	3.30	2.51		None	4	3	8	3	10 - 15



Tree #	Species	TPZ (m)	Reduced TPZ (m)	SRZ (m)	Stem lean (degrees)	Direction of lean	Canopy width (m) N	Canopy width (m) S	Canopy width (m) E	Canopy width (m) W	Tree height range (m)
231	Casuarina cunninghamiana	4.44	3.05	2.37		None	9	1	1	3	15 - 20
232	Casuarina cunninghamiana	5.64	3.88	2.67		None	5	4	1	6	15 - 20
233	Casuarina cristata	11.64	8.00	3.57		None	13	7	10	10	20 - 25
234	Casuarina cunninghamiana	5.28	3.63	2.57		None	5	7	7	5	15 - 20
235	Casuarina cunninghamiana	5.64	3.88	2.67		None	5	7	7	3	15 - 20
236	Casuarina cunninghamiana	6.72	4.62	3.03		None	5	5	8	6	15 - 20
237	Casuarina cunninghamiana	4.32	2.97	2.34		None	2	5	3	4	15 - 20
238	Casuarina cunninghamiana	6.60	4.54	2.83		None	10	8	8	6	15 - 20
239	Casuarina cunninghamiana	6.48	4.46	2.78		None	8	5	6	4	15 - 20
240	Casuarina cunninghamiana	7.32	5.03	3.12		None	8	6	5	7	20 - 25

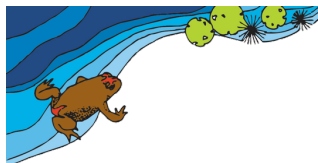
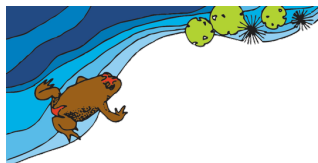
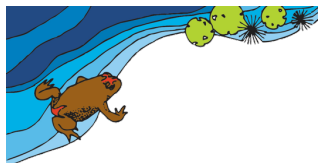


Table 4: Tree Condition.

Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
1	Eucalyptus beyeriana	5 - 10	5 - 10	Mature	Good	Good	Good	Fair	
2	Allocasuarina littoralis	-	-	Juvenile	Good	Good		Good	
3	Allocasuarina littoralis	-	-	Dead					Dead
4	Eucalyptus beyeriana	5 - 10	< 5%	Mature	Good	Fair	Good	Poor	Two trunks, stem wound base
5	Allocasuarina littoralis	5 - 10	5 - 10	Mature	Good	Fair	Good	Fair	Twin trunks, tip die back
6	Dead	-	-	Dead					Dead
7	Casuarina cristata	5 - 10	5 - 10	Mature	Fair	Poor	Fair	Good	Decay, cavity, tip die back. Lost leader, suppressed canopy, poorly pruned for canopy lift
8	Casuarina cristata	10 - 15	5 - 10	Mature	Fair	Good	Good	Good	failed branch/es;
9	Casuarina cristata	5 - 10	5 - 10	Mature	Fair	Fair	Poor	Poor	Stem wound, failed branches, tip die back, included bark stem junction
10	Casuarina cristata	-	-	Dead					Dead



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
11	Casuarina cristata	-	-	Dead					Dead
12	Casuarina cristata	5 - 10	< 5%	Mature	Good	Fair	Fair	Fair	
13	Allocasuarina littoralis	5 - 10	< 5%	Mature	Fair	Fair	Fair	Poor	overextended branch
14	Casuarina cristata	-	-	Dead					Dead
15	Casuarina cristata	5 - 10	< 5%	Mature	Good	Fair	Good	Poor	Include bark - several junction types; Three codom trunks at 3m
16	Casuarina cristata	-	-	Dead					Dead
17	Casuarina cristata	20 - 25	> 90	Senescent	Poor	Poor	Poor	Poor	Nearly dead
18	Casuarina cristata	< 5	40 - 50	Mature	Poor	Poor	Poor	Fair	Included bark - stem junction; Codom trunk at 6m
19	Casuarina cristata	< 5	5 - 10	Mature	Good	Fair	Fair	Fair	Id sample, codom at 6m, failed branch/es; tip die back



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
20	Casuarina cristata	5 - 10	< 5%	Mature	Good	Fair	Good	Poor	Codom trunk at 4m and 5m, failed branch/es; Include bark - several junction types;
21	Casuarina cristata	< 5	< 5%	Juvenile	Excellent	Good	Excellent	Fair	Lost leader 4m
22	Casuarina cristata	< 5	< 5%	Mature	Fair	Fair	Good	Poor	Codom at 4m
23	Casuarina cristata	-	-	Dead					Dead
24	Casuarina cristata	< 5	< 5%	Mature	Good	Fair	Good	Fair	Codomat 3m
25	Casuarina cunninghamiana	5 - 10	5 - 10	Juvenile	Fair	Poor	Fair	Poor	Stem wound, tip die back
26	Casuarina cunninghamiana	5 - 10	30 - 40	Juvenile	Poor	Poor	Poor	Poor	Stem wound, tip die back, stem wound
27	Casuarina cristata	5 - 10	< 5%	Mature	Excellent	Good	Good	Fair	Stem wound
28	Allocasuarina gymnanthera	< 5	10 - 20	Semi-mature	Good	Good	Good	Fair	Codom at 3m
29	Dead	-	-	Dead					Dead
30	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Good	
31	Casuarina cunninghamiana	10 - 15	> 90	Juvenile	Poor	Poor	Poor	Poor	Dying



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
32	Casuarina cristata	5 - 10	< 5%	Mature	Good	Fair	Good	Fair	Included bark - stem junction; Codom at 1.5m
33	Casuarina cristata	5 - 10	10 - 20	Mature	Fair	Fair	Fair	Poor	Codom at 3m, suppressed canopy, failed branch/es; tip die back
34	Dead	-	-	Dead					Dead
35	Dead	-	-	Dead					Dead
36	Casuarina cristata	5 - 10	5 - 10	Mature	Good	Fair	Good	Poor	Broken by fallen T35
37	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	Codom at 2m
38	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	Codom at 4m
39	Casuarina cristata	< 5	5 - 10	Mature	Good	Good	Fair	Fair	Suppressed canopy south
40	Casuarina cristata	< 5	5 - 10	Mature	Good	Fair	Fair	Fair	Suppressed north and east, codom at 1.5m
41	Casuarina cristata	< 5	5 - 10	Mature	Good	Fair	Fair	Fair	Codom at 4m
42	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	
43	Casuarina cristata	10 - 15	< 5%	Mature	Good	Poor	Fair	Poor	Borers. Codom broken off at 2m



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
44	Eucalyptus propinqua	5 - 10	< 5%	Mature	Good	Good	Good	Fair	7-flowered form
45	Eucalyptus conspicua	20 - 25	30 - 40	Mature	Poor	Poor	Poor	Poor	epicormic shoots, tip die back, failed branches
46	Dead	-	-	Dead					Dead
47	Eucalyptus seeana	5 - 10	30 - 40	Mature	Fair	Poor	Poor	Poor	epicormic shoots, tip die back, failed branches
48	Eucalyptus melanophloia	< 5	< 5%	Mature	Fair	Fair	Fair	Good	
49	Eucalyptus sideroxylon	< 5	< 5%	Mature	Fair	Good	Fair	Select...	
50	Eucalyptus sp. Ironbark	5 - 10	5 - 10	Semi-mature	Poor	Poor	Poor	Poor	epicormic shoots, failed branches
51	Acacia pendula	< 5	10 - 20	Mature	Poor	Poor	Poor	Fair	failed branch/es; tip die back
52	Eucalyptus melanophloia	10 - 15	50 - 60	Senescent	Poor	Poor	Poor	Poor	Declining, failed branch/es; tip die back, epicormic shoots
53	Corymbia citriodora	< 5	5 - 10	Mature	Good	Good	Poor	Poor	
54	Acacia sp	5 - 10	20 - 30	Mature	Poor	Poor	Fair	Fair	Four trunks, one dead
55	Eucalyptus bosistoana	< 5	< 5%	Mature	Good	Good	Good	Fair	



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
56	Eucalyptus intertexta	< 5	< 5%	Mature	Fair	Fair	Good	Good	
57	Eucalyptus intertexta	< 5	< 5%	Mature	Fair	Fair	Fair	Good	epicormic shoots
58	Dead	-	-	Dead					
59	Eucalyptus intertexta	< 5	< 5%	Mature	Fair	Fair	Fair	Good	epicormic shoots
60	Eucalyptus intertexta	< 5	< 5%	Mature	Fair	Fair	Fair	Good	Borer
61	Eucalyptus intertexta	5 - 10	< 5%	Mature	Good	Good	Good	Good	
62	Eucalyptus tereticornis	< 5	< 5%	Mature	Good	Good	Good	Fair	
63	Eucalyptus sideroxylon	5 - 10	5 - 10	Mature	Fair	Fair	Fair	Fair	Suppressed
64	Eucalyptus sideroxylon	< 5	< 5%	Mature	Fair	Fair	Fair	Fair	
65	Eucalyptus albens	5 - 10	< 5%	Mature	Good	Good	Good	Fair	epicormic shoots
66	Eucalyptus sp.	5 - 10	< 5%	Mature	Fair	Poor	Fair	Poor	Crossed trunks, split bark, dying, failed branch/es; tip die back, included bark stem junction, rubbing branch



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
67	Eucalyptus sp.	20 - 25	5 - 10	Mature	Poor	Poor	Poor	Poor	Split bark, dying, major limb shed, very sparse canopy, failed branch/es; epicormic shoots
68	Melaleuca stypheloides	< 5	< 5%	Mature	Good	Good	Good	Good	
69	Eucalyptus sideroxylon	5 - 10	< 5%	Mature	Fair	Fair	Fair	Poor	Four trunks joined, at one metre, sparse canopy, failed branch/es; tip die back, epicormic shoots, included bark, several junction types
70	Eucalyptus dealbata	5 - 10	< 5%	Mature	Fair	Fair	Fair	Fair	
71	Eucalyptus dealbata	< 5	5 - 10	Mature	Good	Good	Good	Good	tip die back, epicormic shoots
72	Allocasuarina sp.	< 5	5 - 10	Semi-mature	Poor	Poor	Poor	Poor	tip die back
73	Eucalyptus camaldulensis	10 - 15	5 - 10	Mature	Good	Good	Good	Good	
74	Eucalyptus crebra	5 - 10	5 - 10	Mature	Fair	Fair	Fair	Good	
75	Eucalyptus crebra	< 5	< 5%	Mature	Good	Good	Good	Good	



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
76	Eucalyptus crebra	< 5	< 5%	Juvenile	Poor	Poor	Poor	Fair	Lost leader, epicormic shoots, tip die back
77	Eucalyptus dealbata	5 - 10	< 5%	Semi-mature	Fair	Fair	Fair	Fair	failed branch/es; tip die back, epicormic shoots
78	Eucalyptus dealbata	< 5	< 5%	Mature	Good	Fair	Fair	Good	epicormic shoots
79	Eucalyptus dawsonii	< 5	< 5%	Mature	Fair	Poor	Poor	Poor	epicormic shoots
80	Eucalyptus dawsonii	5 - 10	< 5%	Mature	Fair	Fair	Fair	Good	epicormic shoots
81	Eucalyptus dawsonii	< 5	< 5%	Mature	Fair	Fair	Fair	Good	
82	Eucalyptus socialis	5 - 10	20 - 30	Mature	Poor	Poor	Poor	Poor	failed branch/es; tip die back
83	Eucalyptus albens	5 - 10	5 - 10	Mature	Poor	Poor	Poor	Poor	failed branch/es; epicormic shoots
84	Eucalyptus albens	5 - 10	40 - 50	Senescent	Poor	Poor	Poor	Poor	failed branch/es; tip die back, epicormic shoots
85	Dead	-	-	Dead					Dead
86	Eucalyptus melanophloia	< 5	< 5%	Mature	Good	Good	Good	Fair	
87	Eucalyptus crebra	< 5	< 5%	Mature	Good	Good	Good	Good	



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
88	Eucalyptus largiflorens	5 - 10	5 - 10	Mature	Good	Good	Good	Poor	Included bark - stem junction;
89	Eucalyptus dawsonii	5 - 10	< 5%	Mature	Good	Good	Good	Good	poor pruning
90	Eucalyptus propinqua	< 5	< 5%	Mature	Good	Good	Good	Good	11-flowered form
91	Eucalyptus sp	5 - 10	< 5%	Mature	Good	Good	Good	Fair	rubbing branch
92	Eucalyptus sp	15 - 20	10 - 20	Mature	Fair	Fair	Fair	Fair	failed branch/es; epicormic shoots
93	Eucalyptus sp. (sim. to E.gracilis)	5 - 10	30 - 40	Senescent	Poor	Poor	Poor	Poor	failed branch/es; tip die back, epicormic shoots
94	Eucalyptus (fibrosa OR sideroxylon)	< 5	< 5%	Mature	Poor	Fair	Fair	Good	
95	Eucalyptus albens	5 - 10	20 - 30	Mature	Poor	Poor	Poor	Poor	failed branch/es; tip die back
96	Eucalyptus crebra	< 5	< 5%	Mature	Good	Good	Good	Good	
97	Eucalyptus crebra	< 5	< 5%	Mature	Fair	Fair	Fair	Poor	
98	Eucalyptus albens	< 5	< 5%	Mature	Fair	Good	Good	Good	
99	Eucalyptus crebra / beyeriana	< 5	< 5%	Mature	Good	Good	Good	Poor	
100	Eucalyptus albens	< 5	< 5%	Mature	Good	Good	Good	Poor	Included bark - stem



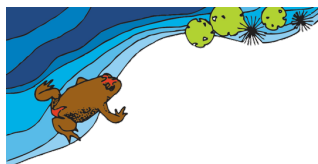
Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
									junction;
101	<i>Ulmus parvifolia</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
102	<i>Eucalyptus albens</i>	15 - 20	10 - 20	Mature	Good	Fair	Fair	Poor	Included bark - stem junction; tip die back, failed branches, epicormic shoots
103	<i>Eucalyptus albens</i>	10 - 15	10 - 20	Mature	Fair	Fair	Fair	Poor	poor pruning
104	<i>Corymbia eximia</i>	-	-	Semi-mature	Good	Good	Good	Poor	
105	<i>Fraxinus greywoodii</i>	5 - 10	5 - 10	Mature	Good	Good	Good	Good	failed branch/es; tip die back
106	<i>Callistemon viminalis</i>	-	-	Mature	Select...	Select...	Select...	Select...	
107	<i>Callistemon viminalis</i>	-	-	Mature	Good	Good	Excellent	Good	
108	<i>Grevillea robusta</i>	< 5	< 5%	Mature	Excellent	Fair	Excellent	Excellent	
109	<i>Grevillea robusta</i>	< 5	< 5%	Mature	Good	Good	Good	Poor	
110	<i>Callistemon viminalis</i>	< 5	< 5%	Mature	Fair	Fair	Fair	Poor	
111	<i>Callistemon viminalis</i>	< 5	< 5%	Mature	Good	Good	Good	Poor	
112	<i>Callistemon viminalis</i>	< 5	< 5%	Mature	Good	Good	Good	Poor	
113	<i>Callistemon viminalis</i>	5 - 10	5 - 10	Senescent	Fair	Fair	Fair	Poor	failed branch/es;



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
114	<i>Callistemon viminalis</i>	< 5	40 - 50	Senescent	Poor	Poor	Poor	Poor	failed branch/es; tip die back, epicormic shoots
115	<i>Fraxinus griffithii</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
116	<i>Photinia robusta</i>	< 5	< 5%	Mature	Good	Good	Good	Poor	
117	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
118	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
119	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
120	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
121	<i>Melaleuca styphlioides</i>	< 5	< 5%	Over-mature	Fair	Poor	Fair	Poor	
122	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
123	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
124	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
125	<i>Melaleuca styphlioides</i>	< 5	< 5%	Mature	Good	Good	Good	Good	
126	<i>Cupaniopsis anacardioides</i>	< 5	< 5%	Mature	Good	Good	Good	Poor	
127	<i>Murraya</i> sp.	< 5	< 5%	Mature	Good	Good	Good	Good	



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
128	Chamaecyparis sp. (or Cupressus sp.)	< 5	< 5%	Semi-mature	Good	Good	Good	Good	
129	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Poor	Dangerous overweight on highway side, Stem wound Included bark - stem junction; Included bark - branch stem attachment;
130	Casuarina cunninghamiana	5 - 10	< 5%	Mature	Poor	Poor	Poor	Poor	Stem wound, poor occlusion, decay
131	Casuarina cristata	< 5	10 - 20	Mature	Good	Good	Good	Poor	Included bark - stem junction;
132	Casuarina cunninghamiana	15 - 20	10 - 20	Mature	Poor	Poor	Poor	Poor	failed branch/es;
133	Casuarina cristata	20 - 25	5 - 10	Mature	Good	Fair	Fair	Poor	Decay, Included bark - branch stem attachment; failed branch/es;
134	Casuarina cunninghamiana	5 - 10	30 - 40	Mature	Poor	Poor	Poor	Fair	Decay, failed branch/es; poor pruning
135	Casuarina cristata	< 5	5 - 10	Mature	Good	Fair	Good	Good	



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
136	Casuarina cunninghamiana	10 - 15	20 - 30	Mature	Poor	Poor	Fair	Poor	Lost leader, failed branch/es; tip die back
137	Casuarina cristata	< 5	5 - 10	Mature	Fair	Good	Good	Fair	
138	Casuarina cunninghamiana	10 - 15	40 - 50	Mature	Poor	Poor	Poor	Poor	failed branch/es; tip die back, epicormic shoots
139	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	Included bark - stem junction;
140	Casuarina cunninghamiana	10 - 15	10 - 20	Mature	Fair	Fair	Fair	Poor	Borer, failed branch/es; tip die back
141	Casuarina cristata	5 - 10	< 5%	Mature	Good	Good	Good	Fair	Suppressed canopy
142	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	
143	Casuarina cristata	< 5	< 5%	Mature	Poor	Poor	Poor	Fair	failed branch/es; tip die back
144	Casuarina cristata	< 5	5 - 10	Mature	Poor	Fair	Poor	Fair	tip die back
145	Casuarina cristata	< 5	< 5%	Mature	Poor	Poor	Poor	Fair	tip die back
146	Dead	-	-	Dead					
147	Casuarina cristata	< 5	5 - 10	Mature	Fair	Fair	Poor	Poor	Stem wound, tip die back, tip die back



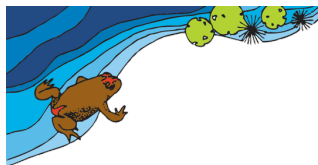
Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
148	Casuarina cunninghamiana	5 - 10	40 - 50	Senescent	Poor	Poor	Poor	Poor	epicormic shoots, tip die back, failed branches
149	Casuarina cristata	< 5	5 - 10	Over-mature	Fair	Poor	Poor	Fair	Stem wound, tip die back, decay, failed branches
150	Casuarina cristata	< 5	< 5%	Mature	Fair	Fair	Poor	Fair	
151	Casuarina cristata	< 5	10 - 20	Mature	Fair	Fair	Fair	Poor	Decay, failed branches, poor occlusion, Lost leader
152	Casuarina cristata	< 5	5 - 10	Mature	Fair	Fair	Fair	Fair	Stem wound, decay, cavity
153	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	Double trunk 4m
154	Casuarina cristata	5 - 10	20 - 30	Mature	Fair	Fair	Fair	Poor	Included bark - stem junction;
155	Casuarina cristata	< 5	< 5%	Mature	Fair	Good	Fair	Poor	Include bark - several junction types; stem wound, poor pruning. Lopped tops at 5m
156	Casuarina cristata	5 - 10	5 - 10	Mature	Fair	Fair	Good	Fair	Stem wound, cavity
157	Casuarina cristata	< 5	5 - 10	Mature	Good	Good	Good	Fair	Included bark - stem junction;



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
158	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Fair	
159	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Poor	Included bark - stem junction;
160	Casuarina cristata	10 - 15	10 - 20	Mature	Good	Fair	Fair	Fair	Stem wound, decay, cavity, poor pruning
161	Casuarina cristata	5 - 10	5 - 10	Mature	Good	Good	Good	Fair	
162	Casuarina cristata	5 - 10	10 - 20	Over-mature	Poor	Poor	Fair	Good	failed branch/es; tip die back
163	Casuarina cristata	5 - 10	5 - 10	Mature	Good	Good	Good	Fair	poor pruning
164	Casuarina cristata	5 - 10	5 - 10	Mature	Good	Good	Good	Fair	Stem wound, Included bark - stem junction;
165	Casuarina cristata	10 - 15	30 - 40	Over-mature	Poor	Poor	Fair	Poor	failed branch/es; Included bark - stem junction;
166	Casuarina cristata	5 - 10	10 - 20	Mature	Fair	Fair	Good	Fair	
167	Casuarina cristata	5 - 10	30 - 40	Over-mature	Fair	Poor	Fair	Poor	Weak branch attachment
168	Acacia williamsonii	< 5	10 - 20	Mature	Excellent	Excellent	Excellent	Fair	
169	Eucalyptus camaldulensis	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Fair	Planted on a mound.



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
170	Eucalyptus propinqua	< 5	< 5%	Mature	Good	Fair	Good	Poor	11-flowered form
171	Acacia sp. (sim. to A.macradenia)	5 - 10	10 - 20	Mature	Excellent	Good	Excellent	Good	
172	Eucalyptus viridis	5 - 10	5 - 10	Mature	Good	Good	Fair	Good	Bracket fungus, failed branch/es; poor pruning
173	Eucalyptus viridis	-	-	Mature	Poor	Poor	Poor	Poor	Stem wound, bracket fungus, epicormic shoots, included bark stem junction
174	Melia azedarach	< 5	< 5%	Mature	Good	Poor	Fair	Poor	
175	Acacia salicina	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Good	
176	Dead	-	-	Dead					
177	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Good	
178	Acacia salicina	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Good	
179	Eucalyptus dawsonii	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Excellent	
180	Eucalyptus dawsonii	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Excellent	
181	Dead	-	-	Dead					
182	Casuarina cunninghamiana	25 - 30	30 - 40	Over-mature	Fair	Poor	Poor	Poor	Decay, Included bark - branch stem attachment; failed branches, tip dieback



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
183	Acacia sp. (sim. to A.macradenia)	< 5	< 5%	Mature	Excellent	Fair	Good	Poor	poor pruning
184	Casuarina cunninghamiana	5 - 10	20 - 30	Over-mature	Poor	Poor	Poor	Poor	Included bark - stem junction;
185	Casuarina cristata	5 - 10	< 5%	Mature	Good	Good	Good	Fair	Included bark - stem junction;
186	Casuarina cunninghamiana	5 - 10	5 - 10	Mature	Poor	Fair	Good	Fair	poor occlusion, decay, rubbing branch
187	Casuarina cristata	10 - 15	< 5%	Mature	Good	Good	Good	Fair	
188	Casuarina cristata	20 - 25	5 - 10	Mature	Fair	Fair	Good	Fair	Stem wound, decay, stem wound
189	Casuarina cunninghamiana	5 - 10	10 - 20	Senescent	Poor	Poor	Poor	Poor	Decay, tip dieback, epicormic shoots
190	Casuarina cunninghamiana	10 - 15	5 - 10	Mature	Fair	Good	Fair	Good	failed branch/es;
191	Tamarix aphylla	-	-	Mature	Excellent	Excellent	Excellent	Good	Tamarix aphylla (Athel Pine) (Weed of National Significance)



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
192	Casuarina cristata	5 - 10	< 5%	Mature	Good	Fair	Good	Poor	Cavity, poor pruning. Top lopped at 10m and major limbs cut back
193	Casuarina cristata	5 - 10	10 - 20	Mature	Fair	Fair	Fair	Poor	Included bark - stem junction; longitudinal cracks (compression)
194	Melaleuca sp. (sim to M.decussata)	< 5	5 - 10	Mature	Good	Fair	Good	Good	
195	Melaleuca decussata	< 5	50 - 60	Senescent	Poor	Poor	Poor	Poor	
196	Melaleuca halmaturorum	< 5	< 5%	Mature	Select...	Select...	Select...	Select...	failed branch/es; crack in crotch. Failing at base
197	Callistemon citrinus	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Excellent	
198	Callistemon citrinus	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Excellent	
199	Melaleuca bracteata	< 5	< 5%	Mature	Good	Good	Good	Fair	Revolution green
200	Melaleuca bracteata	< 5	< 5%	Mature	Good	Good	Good	Good	Revolution gold
201	Melaleuca bracteata	< 5	< 5%	Mature	Good	Good	Good	Good	R green



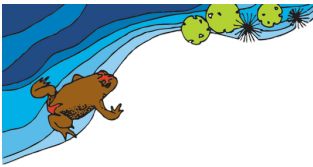
Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
202	Melaleuca bracteata	< 5	< 5%	Mature	Good	Good	Good	Good	R gold
203	Dead	-	-	Dead					
204	Dead	-	-	Dead					
205	Populus deltoides	< 5	< 5%	Mature	Poor	Poor	Fair	Poor	
206	Populus deltoides	< 5	< 5%	Senescent	Poor	Poor	Poor	Poor	failed branch/es;
207	Dead	-	-	Select...	Select...	Select...	Select...	Select...	
208	Casuarina cristata	< 5	< 5%	Mature	Good	Good	Good	Good	
209	Callistemon sp	< 5	< 5%	Mature	Excellent	Excellent	Excellent	Good	
210	Callistemon sp	10 - 15	> 90	Senescent	Poor	Poor	Poor	Poor	failed branch/es; tip dieback
211	Callistemon sp	15 - 20	> 90	Senescent	Poor	Poor	Poor	Poor	
212	Callistemon sp	15 - 20	80 - 90	Senescent	Poor	Poor	Poor	Fair	
213	Callistemon sp	5 - 10	60 - 70	Over-mature	Fair	Fair	Poor	Fair	
214	Callistemon viminalis hannah ray	< 5	< 5%	Mature	Good	Good	Good	Good	
215	Callistemon viminalis hannah ray	< 5	< 5%	Mature	Fair	Poor	Good	Poor	Lopped, poor pruning
216	Callistemon viminalis hannah ray	< 5	< 5%	Over-mature	Good	Poor	Good	Poor	poor pruning
217	Callistemon viminalis	< 5	< 5%	Mature	Fair	Fair	Fair	Fair	tip die back, leaf miner



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
218	Callistemon viminalis	< 5	< 5%	Mature	Good	Good	Good	Good	
219	Callistemon viminalis	< 5	< 5%	Mature	Good	Good	Good	Good	
220	Casuarina cunninghamiana	10 - 15	20 - 30	Over-mature	Poor	Poor	Poor	Poor	failed branch/es; tip dieback, epicormic shoots
221	Casuarina cunninghamiana	15 - 20	5 - 10	Over-mature	Fair	Fair	Good	Good	failed branch/es; tip dieback,
222	Casuarina cunninghamiana	5 - 10	10 - 20	Over-mature	Fair	Fair	Fair	Good	failed branch/es; tip dieback, poor pruning
223	Casuarina cunninghamiana	5 - 10	5 - 10	Over-mature	Good	Fair	Good	Good	failed branch/es; poor pruning
224	Casuarina cunninghamiana	5 - 10	40 - 50	Senescent	Poor	Poor	Poor	Poor	failed branch/es; tip dieback, poor pruning
225	Casuarina cunninghamiana	15 - 20	< 5%	Mature	Good	Good	Good	Fair	failed branch/es; poor pruning
226	Casuarina cunninghamiana	5 - 10	5 - 10	Over-mature	Fair	Fair	Fair	Good	poor pruning, decay, poor occlusion
227	Casuarina cunninghamiana	10 - 15	5 - 10	Over-mature	Fair	Fair	Fair	Good	failed branch/epicormic shoots
228	Casuarina cunninghamiana	25 - 30	> 90	Senescent	Poor	Poor	Poor	Poor	Dying, dangerous, failed branch/es; decay



Tree #	Species	Dead wood size (cm)	% DW	Age Class	Vitality	Condition	Health	Structure	Defect or disease
229	Casuarina cunninghamiana	5 - 10	5 - 10	Over-mature	Fair	Fair	Poor	Fair	Decay, stem wound, epicormic shoots
230	Casuarina cunninghamiana	5 - 10	< 5%	Over-mature	Fair	Fair	Fair	Good	failed branch/es; tip dieback, decay
231	Casuarina cunninghamiana	5 - 10	30 - 40	Senescent	Poor	Poor	Poor	Poor	failed branch/es; cavity, decay
232	Casuarina cunninghamiana	5 - 10	20 - 30	Senescent	Fair	Fair	Fair	Fair	failed branch/es; decay, poor pruning
233	Casuarina cristata	5 - 10	< 5%	Mature	Good	Good	Good	Good	
234	Casuarina cunninghamiana	< 5	30 - 40	Over-mature	Poor	Fair	Fair	Fair	failed branch/es; poor occlusion
235	Casuarina cunninghamiana	5 - 10	30 - 40	Senescent	Fair	Fair	Fair	Poor	failed branch/es; cavity, decay
236	Casuarina cunninghamiana	5 - 10	< 5%	Over-mature	Fair	Fair	Good	Good	
237	Casuarina cunninghamiana	5 - 10	20 - 30	Over-mature	Fair	Fair	Fair	Poor	Stem wound, tip dieback, failed branches
238	Casuarina cunninghamiana	10 - 15	10 - 20	Over-mature	Good	Fair	Good	Good	
239	Casuarina cunninghamiana	5 - 10	5 - 10	Mature	Good	Good	Good	Good	
240	Casuarina cunninghamiana	5 - 10	5 - 10	Mature	Good	Good	Good	Good	



Appendix 3. Tree protection guidelines

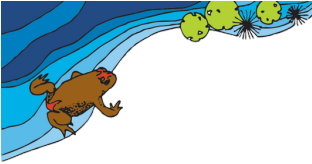
A Pre-construction/Demolition phase

The following methods are to be implemented to minimise potential damage to retained trees, e.g. from soil compaction and site activity. Trees are to be protected at all stages of the development, and growing conditions are to be improved within the Tree Protection Zone (TPZ). These guidelines are consistent with AS4970-2009 Protection of trees on development sites.

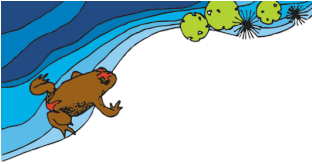
- A 1. All site workers are to be aware of relevant tree protection requirements. Nominated trees will be removed or transplanted as per the tree protection plan. An arborist is to supervise tree removal, pruning and transplanting and certify the completed works.
- A 2. All trees not nominated for retention are to be removed prior to any construction activity. Approved tree pruning and removal operations near retained trees are to be carried out in a way that avoids soil compaction and damage to canopy, trunk or roots. Works are to be supervised by an arborist or the person responsible for site management.
- A 3. Stumps are to be ground, not dozed or dug out, if in the vicinity of retained trees. Machinery (other than stump machines) is to be kept beyond the nominated protection zones of retained trees during all operations.
- A 4. Tree protection fencing is to be in place before the introduction of machinery or other materials to the site and before commencement of works. Fencing is to be located to at least the canopy dripline, be of sturdy construction and retained in-situ during works unless altered by the project arborist. All site activities are excluded from this zone. Refer to Appendix 2 for specific minimum setback distances. AS4687 specifies applicable fencing requirements.
- A 5. The TPZ is to be mulched using material compatible with 'AS4454-2003 Composts, soil conditioners and mulches', e.g. decomposed leaf litter, and maintained at 50-100 mm depth. Some areas, e.g. turf, may not require mulch. Temporary irrigation may be required. Weeds are to be removed and controlled.
- A 6. Pruning is to be undertaken by suitably qualified, skilled and insured people to comply with AS4373-2007, Australian Standard: Pruning of Amenity Trees. Initial pruning provides adequate clearances and general crown maintenance. Flexible branches are to be tied back, not pruned.

B Construction phase (Maintain tree protection fencing)

- B 1. Where access is required within a TPZ, temporary ground protection measures will be required (e.g. metal plates, rumble boards or exterior-grade ply over aggregate) capable of supporting the required load without deflection. Trunk protection may be required, e.g. battens wrapped around the trunk to a height of 2 m.

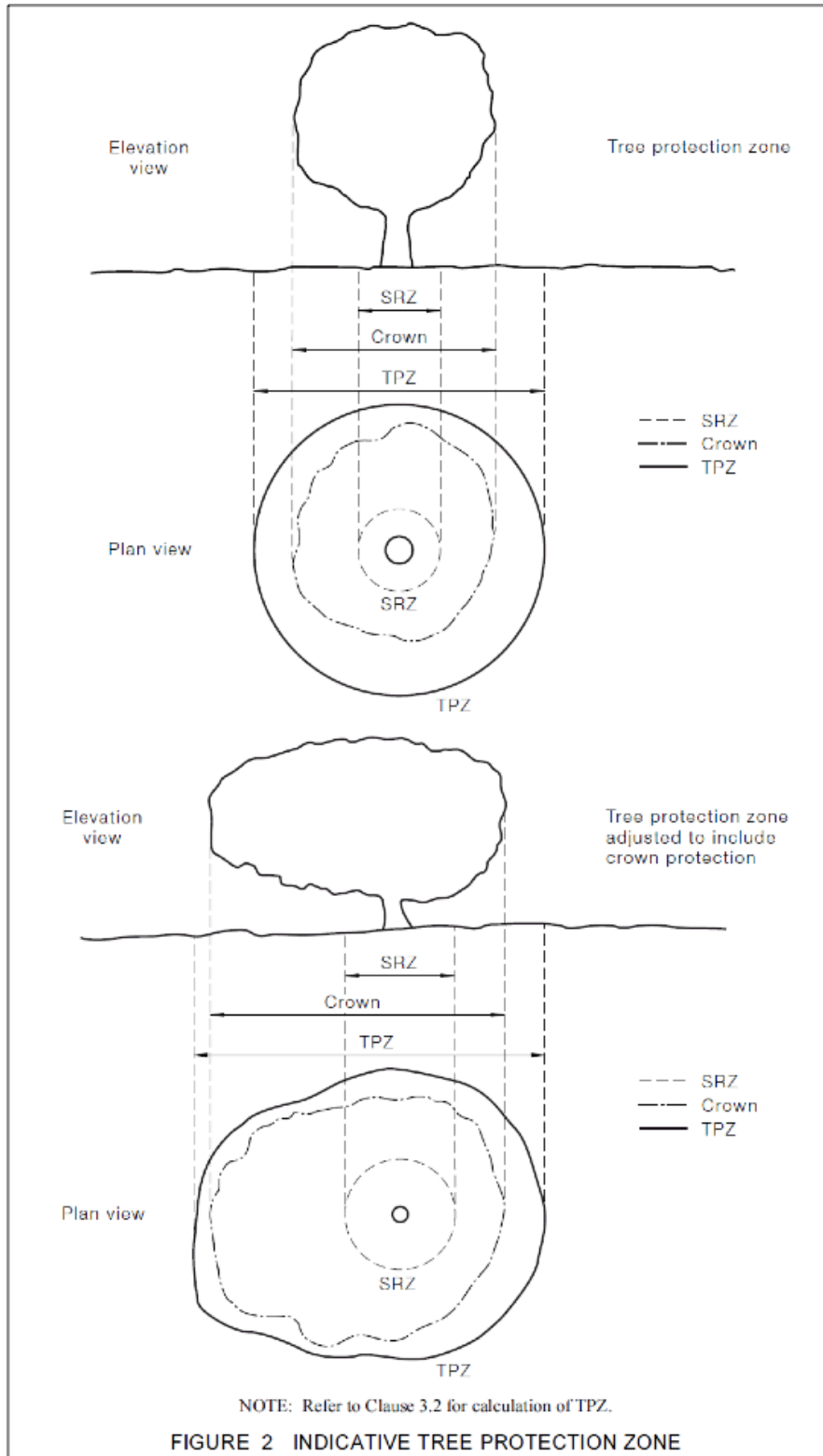


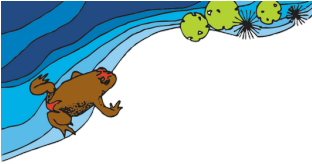
- B 2. Material stockpiles or dumps, parking, excavation, site sheds, preparation of chemicals, fires, wash down areas or similar are to be located clear of TPZs. Areas designated for such requirements are not to divert drainage water into tree protection areas.
- B 3. Machine trenching is to be excluded from the TPZ of retained trees. Any required root excavation inside a TPZ is to be done by hand and intact roots >40 mm in diameter are to be retained. Services are to be installed 100 mm clear of such roots. Damaged roots **must** be cut cleanly with sharp implements (backhoe blades and similar are excluded), with no root dressings or paints. Trenches are to be backfilled promptly to minimise soil desiccation. Underbore if no suitable alternative location is possible. All works within the TPZ are to be supervised by an arborist.



Appendix 4. Tree protection zone and structural root zone

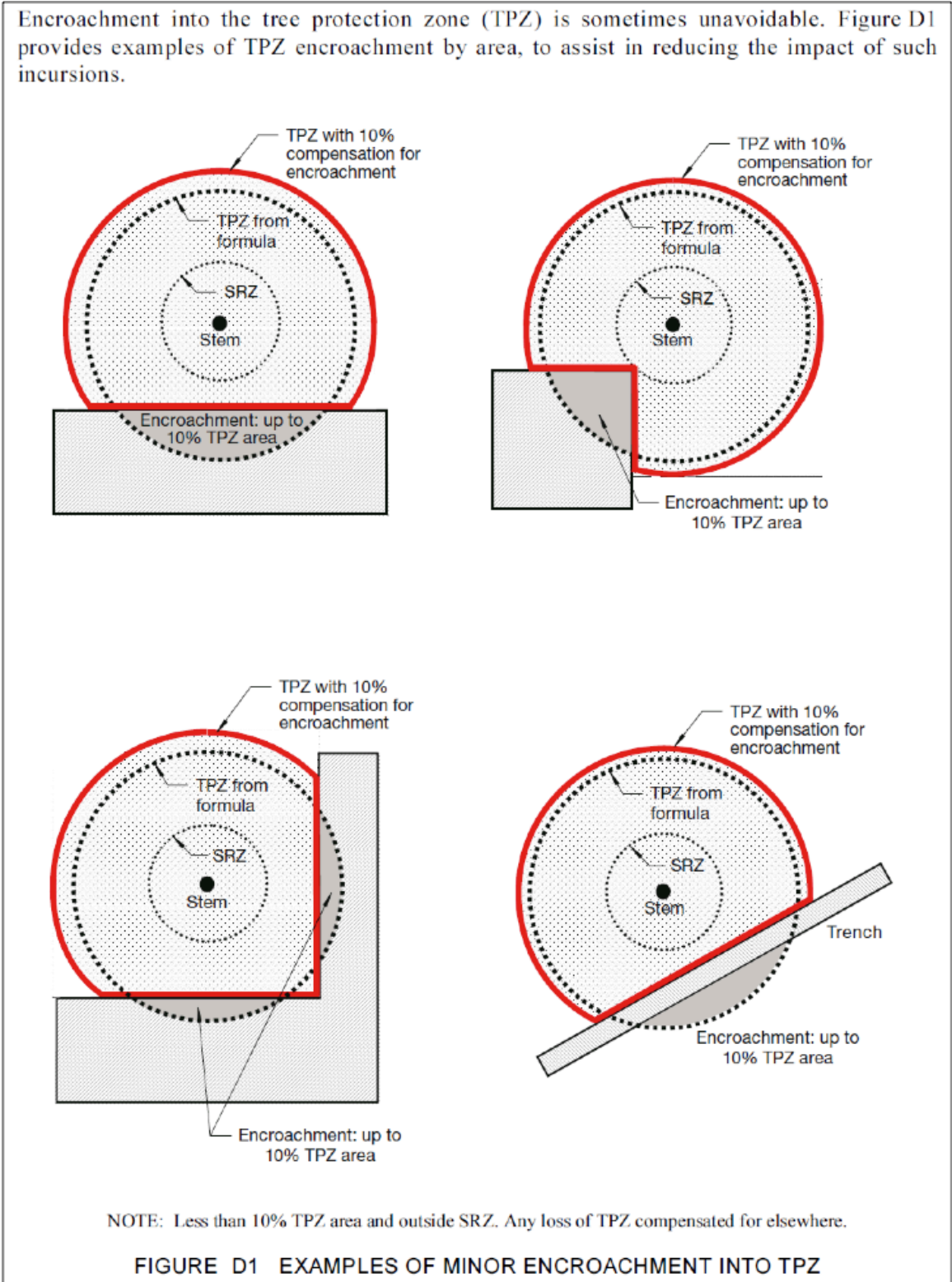
Extract from Section 3 of AS 4970-2009

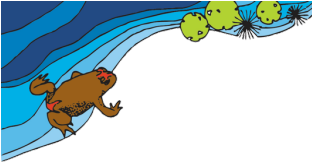




Appendix 5. Encroachment into tree protection zones

Extract from Appendix D of AS 4970-2009





Appendix 6. Company Profile

Abel Ecology has been in the flora and fauna consulting business since 1991, starting in the Sydney Region, and progressively more state wide in New South Wales since 1998, and now also in Victoria. During this time extensive expertise has been gained with regard to Master Planning, Environmental Impact assessments including flora and fauna, bushfire reports, Vegetation Management Plans, Management of threatened species, Review of Environmental Factors, Species Impact Statements and as Expert Witness in the Land and Environment Court. We have done consultancy work for industrial and commercial developments, golf courses, civil engineering projects, tourist developments as well as residential and rural projects. This process has also generated many connections with relevant government departments and city councils in NSW. Our team consists of five scientists and two administrative staff, plus casual assistants as required.

Licences

NPWS s132C Scientific licence number is SL100780 expires 31 July 2021

NPWS GIS data licence number is CON95034

DG NSW Dept of Primary Industries Animal Care and Ethics Committee Approval expires 8 November 2021

DG NSW Dept of Primary Industries Animal Research Authority expires 8 November 2020

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