OLDMEADOW
ARBORICULTURE
TREE CARE SPECIALISTS

Lot 2 Clarkes Lane Wangaratta

Preliminary Arboricultural Report

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	2047 clar1221_PAR	Preliminary Arboricultural Report	21 January 2022	1	Rhys Oldmeadow
	2047 clar1221_PAR_V2	Preliminary Arboricultural Report	27 January 2022	2	Rhys Oldmeadow
>	2047 clar1221_PAR_V3	Preliminary Arboricultural Report	31 May 2022	3	Rhys Oldmeadow

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1. Introduction

1.1 Purpose

Oldmeadow Arboriculture has been engaged to undertake a preliminary arboricultural assessment of trees on, or adjacent to, proposed works at Lot 2 Clarkes Lane, Wangaratta.

The proposed works involve the subdivision of the land into housing lots including all associated infrastructure, as well as the installation of a water treatment plant and storage facility.

Background

This version 3 report has been updated to consider possible impacts from updated subdivision plans, including some preliminary intersection design in the north east corner.

1.2 Scope

- Visually assess any trees (the subject trees) that are located within, or immediately adjacent to, Lot 2 Clarkes Lane, Wangaratta, and collect the following data:
  - Tree species (comment on whether indigenous)
  - Tree location (~5m accuracy – relying on combination of GPS and aerial imagery)
  - Height and canopy spread (widest point)
  - Condition (health/structure)
  - Age/maturity
  - DBH (at 1.4m above ground)
  - Defects
  - Arboricultural value (amenity value)
  - Useful life expectancy
  - Tag trees (trees will be tagged with an aluminium tag)
- Provide recommendations regarding the ongoing management of the subject trees.
- Provide a plan showing the location of all trees individually assessed with detail on:
  - Tree number (corresponding to aluminium tag)
  - Arboricultural value
  - Tree protection zones will be mapped

1.3 Method

- A site visit was undertaken by Rhys Oldmeadow on 13 January 2022.
- Data was collected using a Panasonic Toughpad and the application QGIS Roam. Spatial data was collected by aligning data points with aerial imagery from VicMaps, in the projection GDA94 / MGA Zone 55.
- All observations were taken at ground level, using stage 1 of the Visual Tree Assessment (VTA) method (Mattheck and Breloer 1994).
- Where appropriate, trees were collected as a group (tree dimensions were estimated as an average). This occurred when trees of similar species were growing in close proximity e.g., shelter belts, groups of remnant vegetation or groups of planted vegetation. Trees of high or very high arboricultural value were individually identified even if they were part of a group (with the exception of the areas marked in the fee proposal as native vegetation stands, or planted vegetation stands).

Documents viewed for the preparation of this report

- Concept development plan 1. Project number – M6801. No Date. Version – 13. Created by – North East Survey Design.

1.4 Limitations

- The assessment was undertaken from ground and did not involve excavation; root condition was not investigated unless above ground signs were observed such as surface roots or cracking/heaving of the soil

- No instruments were used to record internal tree structure
- No aerial examination (climbing) was undertaken of the upper canopy
- Only noteworthy trees that might be significantly impacted by the proposed works (regardless of property boundaries) are included in this report. Some smaller trees (<25cm DBH) were not individually assessed if it was deemed that their loss would be calculated as patch vegetation by vegetation assessors.
- A full risk assessment was not undertaken, however, tree features identified as significantly increasing the likelihood of failure or requiring arboricultural action to mitigate are detailed within the report (including those trees within areas proposed to be grouped but may have the potential to impact within the subject site).

2. Observations

2.1 Site summary

The subject site is bounded to the west by One Mile Creek, to the south by Clarkes Lane, and to the east by both the Wangaratta Whitfield Road and Laceby-Targoora Road. The north of the subject site is bounded by Cathedral College, Targoora Park and Wenham's Lane Reserve.

Existing vegetation within the proposed development area is primarily comprised of open farmland with a few scattered remnant trees. There are significant pockets of vegetation in the south-eastern corner (Corner of Laceby-Targoora Road and Clarkes Lane) as well as along One Mile Creek and in Wenham's Lane Reserve. The dense vegetation to the south and south-east of Wenham's Lane Reserve is primarily comprised of planted eucalypt species.

Plate 1: Typical panorama of the subject site – open farmland with a few scattered remnant trees.

Plate 2 Planted vegetation to the south-east of Wenham's Lane Reserve, with a few scattered remnant trees.

Plate 3 Wenham's Lane Reserve

2.2 Tree data

Trees

ID	Species	Common Name	Age	Origin	DBH (cm)	Height (m)	Width (m)	Health	Structure	Arb Rating	ULE (yrs)	Comments	Recommendations	TPZ (m radius)
1	*Robinia pseudoacacia*	Locust	Maturing	Exotic deciduous	113	7	8	Fair to Poor	Fair to Poor	Mod.B	15-40 y	Deadwood in the crown	Proposed for removal.	13.6
2	*Robinia pseudoacacia*	Locust	Maturing	Exotic deciduous	88	10	8	Fair to Poor	Fair to Poor	Mod.C	5-15 y	Significant deadwood and dieback in the crown.	Proposed for removal.	10.6
3	*Schinus areira*	Peppercorn Tree	Over-mature	Exotic evergreen	178	10	15	Fair	Poor	Mod.C	5-15 y	Significant trunk decay and hollows.	Proposed for removal.	15
4	*Ulmus procera*	English Elm	Maturing	Exotic deciduous	84	13	11	Fair	Fair	Mod.B	15-40 y	Significant stem failure and trunk hollow.	Proposed for removal.	10.1
5	*Ulmus procera*	English Elm	Maturing	Exotic deciduous	90	11	11	Fair	Fair to Poor	Mod.B	5-15 y	Significant stem failures and trunk hollows.	Proposed for removal.	10.8
6	*Robinia pseudoacacia*	Locust	Maturing	Exotic deciduous	20, 30, 30, 30	8	7	Fair	Fair	Mod.B	15-40 y	Multi stemmed weed species.	Proposed to be retained.	6.7
7	*Robinia pseudoacacia*	Locust	Maturing	Exotic deciduous	90	7	8	Fair	Fair	Mod.B	15-40 y	Multi stemmed weed species.	Proposed to be retained.	10.8
8	*Ficus carica*	Common Fig	Maturing	Exotic deciduous	30, 20	4	5	Fair to Poor	Fair to Poor	Low	5-15 y	Significant deadwood. Depression surrounding tree from cattle.	Proposed to be retained.	4.3
9	*Pyrus sp.*	Pear	Maturing	Exotic deciduous	35	2	5	Poor	Very Poor	Very Low	1-5 y	Trunk failure.	Proposed for removal.	4.2
10	*Eucalyptus sp.*	Gum Tree	Early-mature	Remnant	35	8	6	Dead	Fair to Poor	Very Low	1-5 y	Dead tree, TPZ irrelevant. Growing in road verge.	May be possible to retain within road reserve. Minimise impacts to TPZ.	4.2
11	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	163	17	17	Fair	Fair to Poor	High	15-40 y	Located just inside property boundary. Heavily leaning trunk, toward Clarkes Ln, with significant basal decay. Codominant stems, epicormic growth and mistletoe. Located with proposed road upgrade footprint.	May be possible to retain within road reserve. Minimise impacts to TPZ.	15
12	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	90	11	5	Fair	Fair to Poor	Mod.C	15-40 y	Main leader snapped out. Significant trunk hollow at 4 metres.	Retain within reserve.	10.8
13	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	96	23	15	Fair	Fair	High	>40 y	Past limb failure.	Retain within reserve.	11.5
14	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	104	23	14	Fair	Fair	High	>40 y	Crowded stem, leaning east.	Retain within reserve.	12.5

ID	Species	Common Name	Age	Origin	DBH (cm)	Height (m)	Width (m)	Health	Structure	Arb Rating	ULE (yrs)	Comments	Recommendations	TPZ (m radius)
15	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	120, 110	21	30	Fair	Fair to Poor	Mod.A	15-40 y	Two significant stems leaning heavily away from each other.	If retained do not install infrastructure within falling distance. Retain within reserve.	15
16	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	70, 116	23	28	Fair	Fair	High	15-40 y	Red gum and grey box possibly grafted at base.	Retain within reserve.	15
17	*Eucalyptus microcarpa*	Grey Box	Early-mature	Remnant	50	15	9	Fair	Fair	Mod.B	>40 y	DBH estimated. Stump regrowth with 4 live stems growing within road verge.	May be possible to retain within road reserve. Minimise impacts to TPZ.	6
18	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	110	15	13	Fair	Fair	Mod.A	>40 y	Located just inside site boundary.	May be possible to retain within road reserve. Minimise impacts to TPZ.	13.2
19	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	68	20	10	Fair	Fair	Mod.A	>40 y	Growing within road reserve. Codominant stems from 4 metres.	May be possible to retain within road reserve. Minimise impacts to TPZ.	8.2
20	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	155	22	28	Fair to Poor	Fair	High	>40 y	Stem dieback, significant deadwood. Sparse canopy. May be impacted by footpath.	Retain within reserve. Minimise impacts from footpath construction.	15
21	*Eucalyptus microcarpa*	Grey Box	Early-mature	Remnant	30	8	5	Dead	Fair to Poor	Very Low	1-5 y	Main stem deceased. Single basal sucker alive.	Proposed for removal.	3.6
22	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	60	10	12	Fair	Fair	Mod.B	>40 y	Multiple stems from ground. Dead stem adjacent.	Proposed for removal.	7.2
23	*Eucalyptus cladocalyx*	Sugar Gum	Maturing	Australian native	147	22	20	Good	Fair	Mod.A	>40 y	Past limb failure and trunk wounds. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	15
24	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Remnant	100	17	17	Fair	Fair	Mod.B	>40 y	Multi stemmed from 1.5 metres. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	12
25	*Eucalyptus microcarpa*	Grey Box	Early-mature	Indigenous	30	10	10	Fair	Fair	Mod.C	>40 y	Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	3.6
26	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Remnant	20, 25, 30	10	9	Fair	Fair	Mod.B	>40 y	Multi stemmed from base. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	5.3
27	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Remnant	25	7	4	Fair	Fair	Low	>40 y	Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	3
28	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	112	17	19	Fair	Fair	High	>40 y	Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	13.4

ID	Species	Common Name	Age	Origin	DBH (cm)	Height (m)	Width (m)	Health	Structure	Arb Rating	ULE (yrs)	Comments	Recommendations	TPZ (m radius)
29	*Eucalyptus camaldulensis*	River Red Gum	Semi-mature	Remnant	22	7	3	Fair	Fair	Low	>40 y	Suppressed beneath larger canopy. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	2.6
30	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Victorian native	35, 43	14	12	Fair	Fair	Mod.B	>40 y	Codominant stems from base. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	6.7
31	*Angophora floribunda*	Rough-barked Apple	Young	Victorian native	15	6	2	Fair	Fair	Low	>40 y	Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	2
32	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Remnant	25, 30, 40	12	10	Fair	Fair	Mod.B	>40 y	3 stems from base. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	6.7
33	*Angophora floribunda*	Rough-barked Apple	Maturing	Victorian native	63	16	14	Good	Fair	Mod.A	>40 y	Excellent specimen tree. Likely to be significantly impacted by residential lot development and bulk earthworks.	Proposed to be retained.	7.6
34	*Eucalyptus melliodora*	Yellow Box	Maturing	Indigenous (planted)	40, 45, 50	16	10	Fair	Fair	Mod.B	>40 y	3 stems from 0.5 metres, eastern stem in decline.	Proposed to be retained.	9.4
35	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	119	29	20	Fair	Fair	High	>40 y	All proposed works are outside of TPZ.	Proposed to be retained.	14.3
36	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Remnant	42	13	8	Fair	Fair	Mod.B	>40 y	All proposed works are outside of TPZ.	Proposed to be retained.	5
37	*Eucalyptus camaldulensis*	River Red Gum	Maturing	Remnant	50, 45	18	13	Fair	Fair	Mod.B	>40 y	Past branch failure. All proposed works are outside of TPZ.	Proposed to be retained.	8.1
38	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	80	14	6	Fair to Poor	Poor	Mod.C	5-15 y	Main trunk snapped out. Epicormic crown. All proposed works are outside of TPZ.	Proposed to be retained.	9.6
39	*Eucalyptus sp.*	Gum Tree	Maturing	Remnant	80	21	15	Dead	Fair to Poor	Mod.C	5-15 y	Large dead tree with habitat hollows. TPZ irrelevant. All proposed works are outside of TPZ.	Proposed to be retained.	9.6
40	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	105	22	20	Fair	Fair	High	>40 y	Leaning tree. All proposed works are outside of TPZ.	Proposed to be retained.	12.6
41	*Eucalyptus camaldulensis*	River Red Gum	Early-mature	Remnant	100	16	17	Fair	Fair to Poor	Mod.B	>40 y	Fire damage to trunk. All proposed works are outside of TPZ.	Proposed to be retained.	12
42	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	144	31	0	Fair	Fair	High	>40 y	Codominant stems from 1.5 metres. All proposed works are outside of TPZ.	Proposed to be retained.	15
43	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	85	15	0	Fair to Poor	Poor	Mod.C	5-15 y	Dead central stem with two epicormic basal shoots. All proposed works are outside of TPZ.	Proposed to be retained.	10.2
44	*Eucalyptus microcarpa*	Grey Box	Maturing	Remnant	100	28	16	Fair to Poor	Fair	Mod.A	>40 y	Significant deadwood throughout. Beehive in central stem. All proposed works are outside of TPZ.	Proposed to be retained.	12
45	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	Maturing	Australian native	60	13	13	Fair	Fair	Mod.B	>40 y	All proposed works are outside of TPZ.	Proposed to be retained.	7.2

Groups

ID	Species	Common Name	Age	Origin	No. Stems	DBH (av_cm)	Height (m)	Width (m)	Health	Structure	Arb Rating	ULE (yrs)	Comments	Recommendations	TPZ (m radius)
G1	Robinia pseudoacacia	Locust	Early-mature	Exotic deciduous	40	20	6	3	Fair to Poor	Fair to Poor	Mod.C	5-15 y	Woody weed species growing in the road verge.	Proposed for removal.	2.4
G2	Eucalyptus camaldulensis	River Red Gum	Maturing	Remnant	38	120	20	18	Fair	Fair	High	>40 y	Very significant river red gums growing along riverbank.	Ensure no work encroaches within 15m of this stand.	14.4
G3	Eucalyptus sp.	Gum Tree	Maturing	Remnant	3	110	18	16	Dead	Fair to Poor	Low	5-15 y	Stand of three dead stems with habitat hollows.	Proposed for removal.	13.2
G4	Eucalyptus microcarpa	Grey Box	Early-mature	Remnant	12	25	8	4	Dead	Fair to Poor	Low	1-5 y	Group of dead trees with two young live stems coming up. Growing within road verge.	Proposed for removal.	3
G5	Eucalyptus microcarpa	Grey Box	Maturing	Remnant	3	30	14	5	Good	Fair	Mod.B	>40 y	3 grey box growing within road verge.	May be possible to retain within road reserve. Minimise impacts to TPZ.	3.6
G6	Eucalyptus camaldulensis; Eucalyptus microcarpa	River Red Gum; Grey Box	Maturing	Remnant	50	45	18	10	Fair	Fair	Mod.B	>40 y	Large triangular group of mixed species, red gum and grey box.	Proposed to be retained. Likely to be significantly impacts by intersection upgrade.	5.4
G7	Eucalyptus melliodora; Eucalyptus microcarpa	Yellow Box; Grey Box	Semi-mature	Indigenous	300	25	13	4	Fair	Fair	Mod.B	>40 y	Large plantation, mixed species in rows.	Proposed to be retained. All proposed works are outside of TPZ.	3
G8	Eucalyptus melliodora; Eucalyptus microcarpa	Yellow Box; Grey Box	Semi-mature	Remnant; Indigenous	250	25	13	4	Fair	Fair	Low	>40 y	Large, planted block of mixed species with a few remnant trees over on the north-western edge.	Proposed to be retained. All proposed works are outside of TPZ.	3
G9	Eucalyptus camaldulensis; Eucalyptus microcarpa	River Red Gum; Grey Box	Maturing	Remnant; Indigenous	50	50	18	16	Fair	Fair	High	>40 y	Block of approximately 50 large remnant trees. Understory of planted and regenerating trees.	Ensure no work encroaches within 15m of this stand of trees.	6

- DBH: Diameter at breast height (estimated average for groups)
- ULE: Useful life expectancy
- TPZ: Tree protection zone
- No. Stems: Number of stems estimated in the group.
- Indigenous: a native tree indigenous to the area (could be planted)
- Remnant: an indigenous tree that has not been planted
- Victorian native: Native to Victoria, but not indigenous to the area.

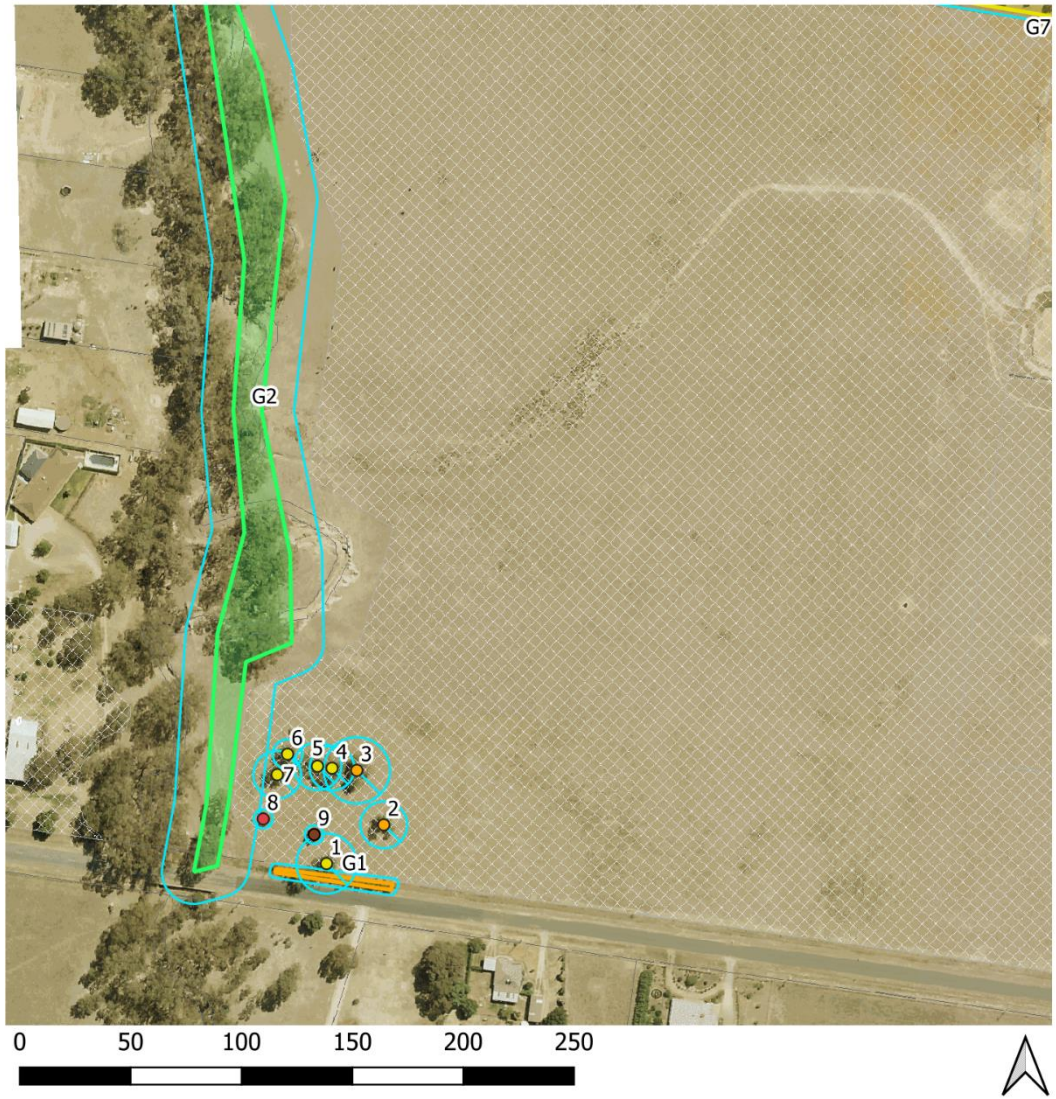
2.3 Site maps

Lot 2, Clarkes Lane, Wangaratta

Map 1 of 4

Lot 2, Clarkes Lane, Wangaratta

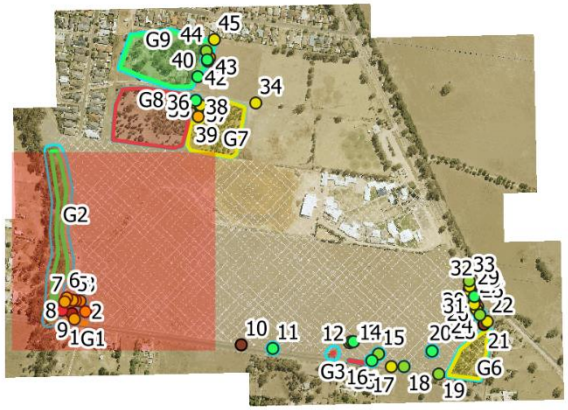
Map 2 of 4



Tree Arb Rating
- High
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

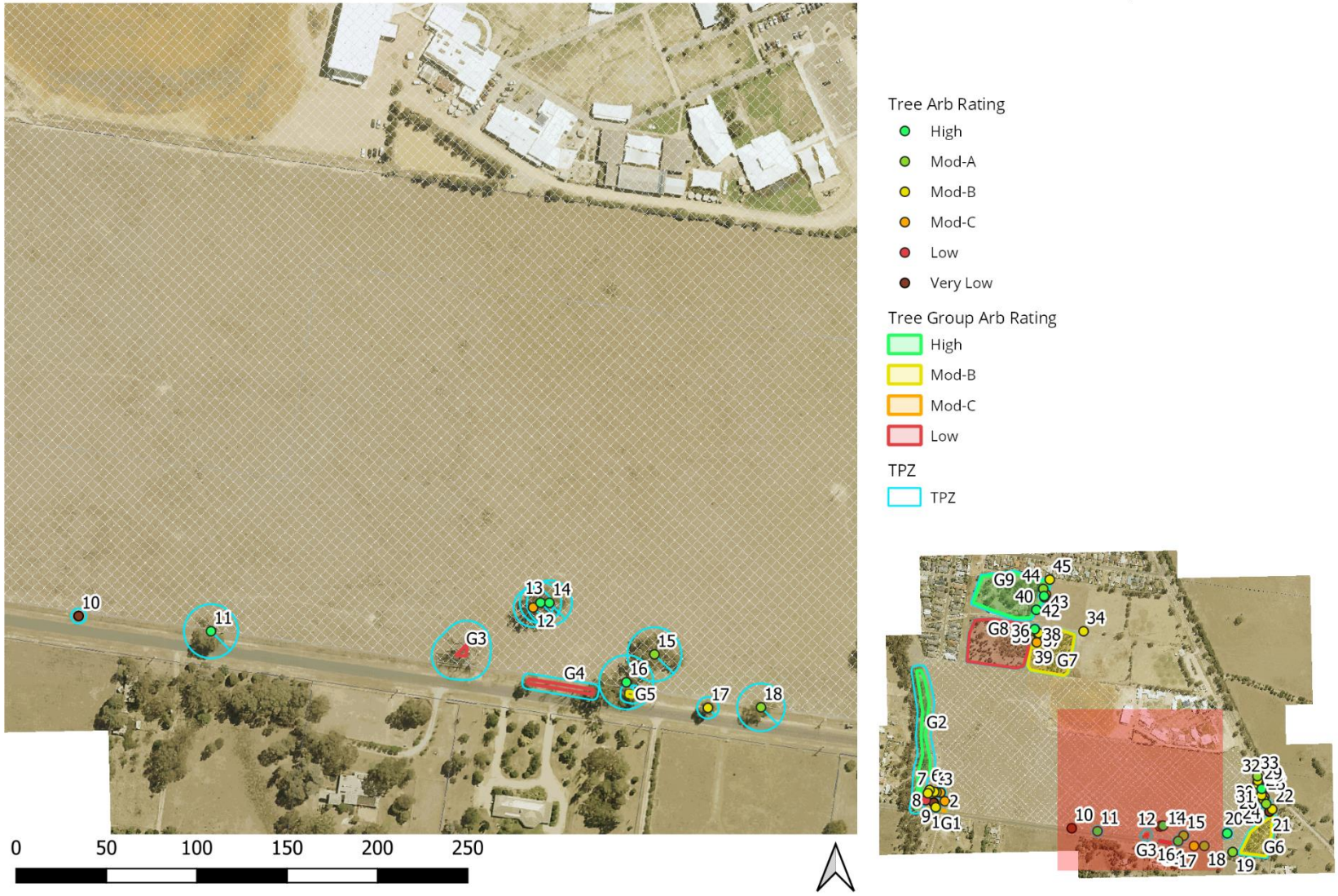
Tree Group Arb Rating
- High
- Mod-B
- Mod-C
- Low

TPZ
- TPZ



Lot 2, Clarkes Lane, Wangaratta

Map 3 of 4



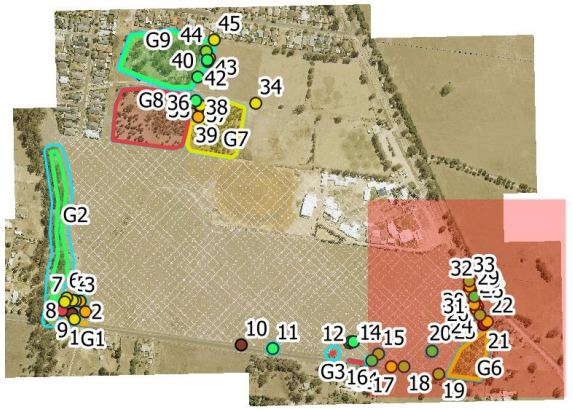
Lot 2, Clarkes Lane, Wangaratta

Map 4 of 4

Tree Arb Rating
- High
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

Tree Group Arb Rating
- High
- Mod-B
- Mod-C
- Low

TPZ
- TPZ



3. Discussion

Preliminary design

Other than large groups of planted vegetation, the tree population on site most likely to be impacted by the proposed development is remnant vegetation.

Modifying or manipulating the design to minimise the loss of significant trees will not only benefit the long-term amenity value of the site but has the potential to streamline the planning permit process.

- Works activities are considered as (but are not limited to):
- Demolition works
- Site cut and fill
- Parking and movement of construction vehicles
- Storage of construction materials
- Installation of driveways and pathways
- Trenching for underground services.

Careful consideration of all activities will help minimise impacts to the trees and may save time and money throughout the development process.

4. Conclusion

The assessment comprised a total of 45 individual trees as well as 9 tree groups, although several of the tree groups were quite large, numbering in the 10s to 100s of trees.

Of the 45 individually trees assessed, 29 were assessed as remnant and therefore protected by the Victorian Planning Provisions, Clause 52.17, Native Vegetation.

Tree groups G2, G6 and G9 were comprised of significant remnant vegetation, although there were a few scattered remnant trees in G8, as well as a some of the smaller groups.

The indicative concept plan largely avoids significant remnant vegetation groups, but does impact on some scattered remnant vegetation. * denotes remnant vegetation.

- Trees/groups proposed for removal includes 1-5, 9, and 21-22*, G1 and G3-4*.
- Trees proposed to retained, but likely to be impacted by proposed works include 10-11*, 17-19*, 23, 24-29*, 30-31, 32*, 33-34, and G5-6*.
-

The redesign of the wastewater treatment plan now avoids impacts to trees 35-44*, 45 as well as groups 7-9* (mostly planted). All proposed works remained outside of G2 TPZs.

Underground services are not shown on plans and impacts to trees may increase if underground services are located within tree protection zones.

5. Recommendations

General recommendations

- Ensure all works avoid impacting the TPZs of as many trees as is practicable.
- Include scaled Tree Protection Zones (TPZ) on proposed plans for all assessed trees (see tree data)
- If encroachments within TPZs are unavoidable, ensure less than 10% of the total area is impacted. The area lost should be compensated for elsewhere and contiguous with the TPZ
- All works should be shown on plans. Site cut and fill, location of buildings, driveways and pathways, all underground services, including storm water and sewerage
- Design of any underground services and landscaping should be cognisant of root protection. Do not excavate within the nominated Tree Protection Zones of retained trees including those trees on neighbouring properties unless permitted by the responsible authority.

6. References

Mattheck, C. and Breloer, H. (1994), The Body Language of Trees: A Handbook for Failure Analysis, London: HMSO.

Standards Australia (2007), AS 4373-2007 Pruning of amenity trees

Standards Australia (2009), AS 4970-2009 Protection of trees on development sites

Victorian Planning Provisions. Clause 52.17 Native Vegetation.

7. Appendix 1: Arboricultural descriptors

Age

Relates to the physiological stage of the tree's life cycle.

Category	Description
Juvenile	A young tree, given normal environmental conditions for that tree it will not yet flower or fruit.
Semi-mature	Able to reproduce yet still to achieve expected size in situation
Maturing	Specimen approaching expected size in situation, with reduced incremental growth
Over-mature	Tree is senescent and in decline

Arboricultural Rating/Amenity value

Arboricultural rating relates to a combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics (Hitchmough 1994) within an urban landscape context. The presence of any serious disease or tree-related hazards that would impact risk potential are taken into account.

Category	Description
High	Tree of high quality in good to fair condition. Generally a prominent arboricultural/landscape feature. These trees have the potential to be a medium – to long-term component of the landscape if managed appropriately. Retention of these trees is highly desirable.
Moderate	Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond with arboricultural treatment. Often the majority of a mature tree population will fit into this category. It is therefore often further divided into classes A, B and C with A being the more desirable for retention. These trees have the potential to be a medium – to long-term component of the landscape if managed appropriately. Retention of these trees is generally desirable.
Low	Unremarkable tree of low quality or little amenity value. Tree in either poor health or with poor structure or a combination. Tree is not significant because of either its size or age, such as young trees with a stem diameter below 15cm. These trees are easily replaceable. Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained. Retention of such trees may be considered if not requiring a disproportionate expenditure of resources for a tree in its condition and location.
None	Trees of low quality with an estimated remaining life expectancy of less that 5 years. Tree has either a sever structural defect or health problem or combination that cannot be sustained with practical arboricultural techniques and the loss of the tree would be expected in the short term. Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline. Tree infected with pathogens of significance to either the health or safety of the tree or other adjacent trees. Trees whose retention would no be viable after the removal of adjacent trees (including trees that have developed in close spaced groups and would not be expected to acclimatise to severe alterations to surrounding environment – removal of adjacent shelter trees). Tree has a detrimental effect on the environment, for example, the tree is recognised environmental woody weed with potential to spread into waterways or natural areas. Unremarkable tree of no material landscape, conservation or other cultural value.

Trees have many values, not all of which are considered when an arboricultural assessment is undertaken. However, individual trees or tree group features may be considered important community resources because of unique or noteworthy characteristics or values other than their age, dimensions, health or structural condition. Recognition of one or more of the following criteria is designed to highlight other considerations that may influence the future management of such trees.

Significant	Description
Horticultural Value/Rarity	Outstanding horticultural or genetic value; could be an important for propagating stock, including specimens that are particularly resistance to disease or exposure. Any tree of a species or variety that is rare.
Historic, Aboriginal Cultural or Heritage Value.	Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic aboriginal activities, including scar trees. Tree commemorates a particular occasion, including plantings by notable people, or having association with an important event in local history.
Ecological Value	Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant indigenous vegetation that contributes to biological diversity.

Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen to what could be considered typical for that species growing in its location. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the author.

Figure 1 Tree condition\ (Health & Structure) Indicative normal

Diagram 1, provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

Diameter at Breast Height (DBH)

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m above the existing ground level or where otherwise indicated, multiple leaders are measured individually. Plants with multiple leader habit may be measured at the base. The range of methods to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of Australian Standard *AS 4970-2009 Protection of trees on development site*s. Measurements undertaken with foresters ø tape or builders tape.

Health

Assesses various attributes to describe the overall health and vigour of the tree.

Category	Vigour/Extension growth	Decline symptoms/Deadwood	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical	None or minimal	Better than typical	None or minimal
Fair	Typical	Typical or expected	Typical	Typical, within damage thresholds

Fair to Poor	Below typical	More than typical	Exhibiting deficiencies	Exceeds damage thresholds
Poor	Minimal	Excessive and large amount/size	Exhibiting severe deficiencies	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a laser height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with previous height meter readings in conjunction with author's experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances the crown width can be measured on the four cardinal direction points (North, South, East and West).

Impact

An assessment of adverse impact the proposed works are likely to have on a tree or tree group. May be short or long term; usually judged on the likely reduction in ULE directly attributable to the works. Impact usually relates to the level of TPZ encroachment, but also factors the type of impact. One or more factors may apply.

Category	Impact
Low:	Proposed works are outside of the TPZ and impacts are likely to be nil. Or, minor damage may occur such as; smaller roots may be damaged or a small area of canopy pruned. Unlikely to significantly impact tree health, form, or ULE.
Moderate:	Direct (physical wounding), or indirect (environmental impacts) are possible, root damage may occur, canopy pruning likely, and an occurrence will reduce the ULE.
High (retain):	Tree must be considered lost when calculating offset costs. Tree is likely to be adversely impacted so that tree health, and therefore, ULE are significantly reduced. Tree is not likely to be destabilised by works and should be retained in situ and only removed or reduced to a habitat tree if it significantly declines in the future.
High (remove):	Tree must be considered lost when calculating offset costs. Tree will become unstable and/or present an unacceptable level of risk or must be removed to facilitate proposed works.

Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

Structure

Assesses principal components of tree structure (Diagram 2).

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No damage, disease or decay; obvious basal flare / stable in ground	No damage, disease or decay; well tapered	Well formed, attached, spaced and tapered	No damage, disease, decay or structural defect

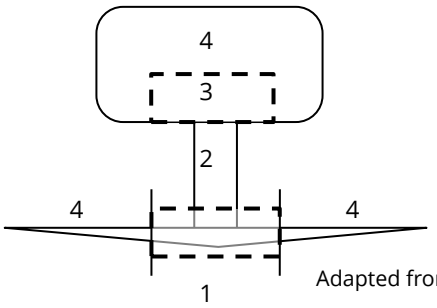
Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Typically formed, attached, spaced and tapered	Minor damage, disease or decay; minor branch end-weight or over-extension
Fair to Poor	Moderate damage or decay; minimal basal flare	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence	Moderate damage, disease or decay; moderate branch end-weight or over-extension
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump resprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump resprout	Decayed, cavities or branch attachments with active split; failure imminent	Excessive damage, disease or decay; excessive branch end-weight or over-extension

Structure ratings will also take into account general tree architecture which considers aspects of stem taper, live crown ratio, branch distribution or bias and crown position such as tree being suppressed amongst more dominant trees.

The lowest or worst descriptor assigned to the tree in any column could generally be the overall rating assigned to the tree. The assessment for structure is limited to observations of external and above ground tree parts. It does not include any exploratory assessment of underground or internal tree parts unless this is requested as part of the investigation. Trees are assessed and the given a rating for a point in time.

Diagram 2: Tree structure zones

1. Root plate & lower stem
2. Trunk
3. Primary branch support
4. Outer crown & roots



Adapted from Coder (1996)

Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments.

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s).

Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

8. Appendix 2. Protection of retained trees

Pruning standards / Lopping

An Australian standard exists to give guidance on pruning of trees.

It is important that all remedial works are carried out by a competent contractor in accordance with the Australian Standard. (AS. 4373 2007 - Pruning of Amenity Trees).

Lopping; as defined within the Standard, is detrimental to trees, often resulting in decay and poorly attached epicormic shoots. Natural Target Pruning methods should be used wherever possible when removing sections from trees.

Establishment of Tree Protection Zones

The tree protection zone (TPZ) is the principal means of protecting trees on development sites. Usually fencing will be used to delineate the Tree Protection Zones (TPZ) as defined by AS 4970-2009 Protection of trees on development sites.

Fencing is installed following permitted vegetation removal and pruning but prior to construction site establishment. Fencing should be retained until completion of all construction related activity.

Some works and activities within the TPZ may be authorised by the Responsible Authority. These works should be supervised by the project arborist. Any additional encroachment that becomes necessary as the site works progress should be reviewed by the project arborist and be acceptable to the Responsible Authority before being carried out (AS 4970--2009).

Activities restricted within the TPZ

A TPZ area may surround a single tree or group or a patch of vegetation, activities that must NOT be carried out within a TPZ include, but are not limited to, the following:

(a) machine excavation including trenching;

(b) excavation for silt fencing;

(c) cultivation;

(d) storage;

(e) preparation of chemicals, including preparation of cement products;

(f) parking of vehicles and plant;

(g) refuelling;

(h) dumping of waste;

(i) wash down and cleaning of equipment;

(j) placement of fill;

(k) lighting of fires;

(l) soil level changes;

(m) vehicle movement – access ways;

(n) changes of grade;

(o) temporary or permanent installation of utilities and signs, and

(p) damage to the tree.

Maintaining Tree Protection Zones (TPZ)

If at any time the TPZ must be infringed upon for works such as excavation for the installation of pipes or drainage or the movement of equipment or any other interference that may cause a change in the availability of water or oxygen to the tree, a suitably qualified arborist should be consulted to supervise the works and permission from the responsible authority may be required.

It may be possible to work or construct within a TPZ without significantly impacting a tree however the size and number of roots in the area would need to be determined and the specifics of the tree and its resilience to impacts would need to be reviewed prior to commencement. Design and construction methods may need alteration to minimise adverse tree impact.

AS 4970-2009 (extract)

Variations to the TPZ

General

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

Minor encroachment

If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

Variations must be made by the project arborist considering relevant factors listed in (see standard) …

Major encroachment

If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable.

The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods and consideration of relevant factors listed in (see standard)

Physical / mechanical damage to trees

Physical damage to tree parts, particularly the trunk, provides entry points for pests and diseases such as fungal infections. This may cause long-term decay and can lead to partial or complete tree failure and death.

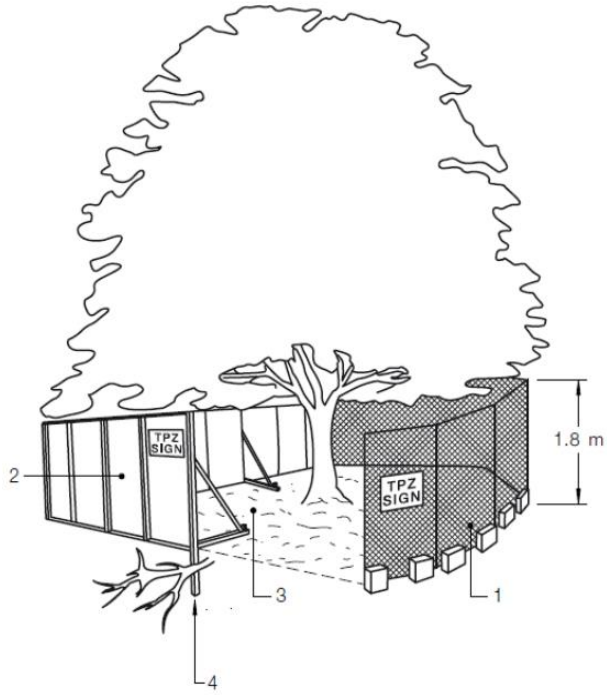
Alteration of soil levels

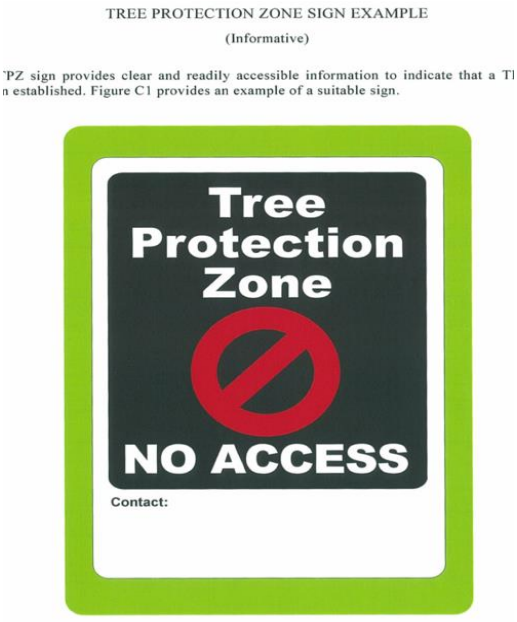
Alteration of soil levels around trees will affect the root zone and stability of a tree as well as tree metabolism. This may result in reduced tree health, excessive deadwood, thinning foliage and poor vigour; it can take some years for the impact to become evident at which time it is normally irreversible.

Tree protection zone fencing

Protective fencing is used to delineate the TPZ. The fence must provide high visibility and act as a physical barrier to construction vehicles. No construction activity is to be undertaken within the fenced TPZ. The fence should be adequately signed, be sturdy and prevent the entry of heavy equipment, vehicles, workers and the public.

Once erected, protective fencing must not be removed or altered without approval by the project arborist or responsible authority. The TPZ should be secured to restrict access. Tree protection fencing will consist of chain wire mesh panels held in place with concrete feet. The tree protection zone shall be clearly signed "Tree Protection Zone – No Access".




TREE PROTECTION ZONE SIGN EXAMPLE
(Informative)

'PZ sign provides clear and readily accessible information to indicate that a Tl
n established. Figure C1 provides an example of a suitable sign.

Source – AS 4970-2009 Protection of trees on development sites

Temporary access to the TPZ

When tree protection fencing cannot be installed or requires temporary removal, other tree protection measures should be used.

Where necessary, physical protection for the trunk and branches of trees should be installed. The materials and positioning of protection will be specified by the project arborist. A minimum height of 2m is recommended.

If temporary access for machinery is required within the TPZ, ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures

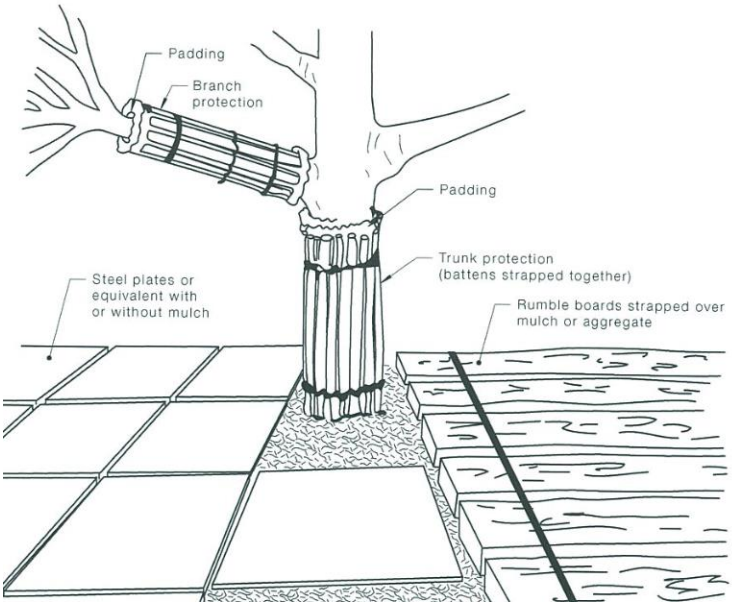
may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards. These measures may also be applied to root zones beyond the TPZ (see image).

Root protection during works within the TPZ

Works that have been approved by the Responsible Authority to occur within the TPZ, such as re-grading, installation of piers or landscaping have the potential to damage roots.

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

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



Source – AS 4970-2009 Protection of trees on development sites

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

It is not acceptable for roots within the TPZ to be 'pruned' with machinery such as backhoes or excavators.

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

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

If temporary access is required within a Tree Protection Zone this may be carried out using sheets of heavy plywood or like protection but should not be considered for long term requirements.

Installing underground services within TPZ

All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches using non-destructive methods such as Air or hydro excavation.

The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

Driveways and paving within TPZ's

Works should not encroach into a TPZ. If encroachment is unavoidable any hard surfaces such as paving or driveways should:

1. not require any scraping or excavation – most roots, particularly small absorbing roots, are shallow; within the upper 100mm of soil.

2. be constructed of a permeable material and laid on a base and subbase specifically designed to allow the movement of water through and into the soil below.

If construction is permitted within a TPZ it should be suspended on piers leaving the ground undisturbed other than the careful placement of pier holes. The bottom of supporting beams should be above existing ground level or, if this is not possible beams should run radially away from the tree trunk. There should be NO excavation of any description, including piers, within a Structural Root Zone (SRZ)

9. Arboricultural consultancy: Assumptions

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