Appendix G. Arborist report

OLDMEADOW ARBORICULTURE
TREE CARE SPECIALISTS

Arboricultural Assessment

Mountain Bike Trails
Falls Creek

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Title	Purpose	Revision	Date
18050 Falls Creek, mtb trails	Impact assessment	B	16/08/2019

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1. Introduction

1.1 Purpose

The purpose of this report is to review the impact historical mountain bike trail construction has had on indigenous trees in Alpine Ash forest near Howmans Gap and in Snow Gum forest closer to Falls Creek, and to provide guidance on the likely impact proposed new mountain bike trail construction will have on Tree Protection Zones and Structural Root Zones of adjacent trees in similar environs.

Furthermore, this report aims to provide guidance on the protection of trees which may be impacted by the construction of the mountain bike trail.

1.2 Scope

- Assess existing mountain bike trails to determine the impact that previous construction had on adjacent trees
- Determine if the mountain bike trails have an on-going impact on adjacent trees
- Provide guidance on the likely impact trail construction will have on adjacent trees
- Provide recommendations on measure required to protect trees adjacent to the mountain bike trail construction footprint

1.3 Method

- A site visit was undertaken by Rhys Oldmeadow on 6 June 2019. Rhys was met onsite by Callum Brown (Falls Creek Resort Management), who assisted as a guide to existing mountain bike trails.
- Where possible, proposed new trail were investigated to understand vegetation type and density.

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
- The scope of this report is limited to arboricultural observations and field knowledge.

1.5 Background

Oldmeadow Arboriculture has been engaged by the Falls Creek Resort Management to provide guidance on the likely impact proposed new mountain bike trail construction will have on adjacent indigenous tree populations.

2. Observations

2.1 Site summary

Proposed new mountain bike trails traverse two distinct forest types; montane damp forest – comprising *Eucalayptus dalrympleana* subsp *dalrympleana* (Mountain Gum) and *Eucalyptus delegatensis* subsp. *delegatensis* (Alpine Ash) overstory – closer to Howmans Gap, and sub-alpine woodland – comprising a *Eucalyptus pauciflora* subsp. *hedraia* (Snow Gum) overstory – closer to Falls Creek.

Plate 1 - Typical trail through montane damp forest

Approximately 9.5km of mountain bike trail is proposed for construction, with ~2.5km of this through montane damp forest and the remainder traversing through sub-alpine woodland.

Much of the area where trails are proposed was burnt during the 2002-2003 eastern Victoria bushfires.

Existing trails are surrounded by thick regrowth and, in the montane damp forest, tall dead trees which did not survive the fires. In the higher altitude sub-alpine woodlands, the regrowth of the snow gums is considerably thicker as it has regenerated from lignotubers, not seed.

3. Conclusion

Approximately 9.5km of new mountain bike trails are proposed for construction through montane damp forest (near Howmans Gap) and sub-alpine woodland (closer to Falls Creek).

On the day of inspection most trails were covered in snow, thus limiting tree inspections to what was visible above the snow. Either side of the existing trails (through the montane damp forest) were scattered dead mountain gum and alpine ash from the 2002-2003 eastern Victorian bushfires. The bushfires have reduced the number of large diameter trees that may be impacted by trail construction.

Plate 2 - Typical erosion of walking trail; noticeable 'valley' in trail.

Where the trails were visible there was no evidence of erosion. Existing mountain bike trails have been constructed to shed water, thus minimizing erosion damage. In contrast, a number of walking trails had considerable evidence of erosion.

Callum Brown, Falls Creek Resort Management, anecdotally noted that the only time he had noted the death of tree due to mountain bike trail construction was where the trail incorporated a live tree into the trail tread. Eventually the tree was ringbarked and died. This scenario should be avoided in all future trail construction.

Due to the nature of mountain bike trail construction, and the environment through which it traverses, traditional methods of calculating the impact on trees is problematic. The precise alignment of the trail needs to remain fluid to overcome unforeseen obstacles (such as rocks) and to minimise the impact to trees. It would be virtually impossible to avoid Tree Protection Zones as they are calculated in accordance with AS 4970 - Protection of trees on development sites, and thus a more proactive and fluid approach must be used to protect trees during trail construction and from trail use related impacts.

Plate 3 - Typical snow gum regrowth post bushfire.

Mountain bike trails can potentially impact trees in the followign ways;

1.) Excavation impact – damage to the root plate during construction.
2.) Use impact – compaction from use and damage from erosion due to poor construction and water shedding capability.

Tree protection must come from sensitive construction methodology and include protocols should tree roots be encountered during construction. The governing principles of which are to:

a.) Prevent impact wherever possible.
b.) Where it is not possible to prevent impact, minimise the impact to acceptable levels.
c.) If it is not possible to minimise the impact to an acceptable level the tree must be removed and considered lost.

The below recommendations provide guidance on how to achieve minimal impact. Given a sensitive construction methodology, combined with the recently burnt environment the trails are traversing, impact to trees can be minimised to the almost negligible.

4. Recommendations

Oldmeadow Arboriculture makes the following recommendations where TPZs or SRZs are likely to be impacted;

- No trees are to be included in the trail tread
- Excavation must be minimised. Where possible fill should be used to level the trail, rather than excavation.
- If excavation is required within estimated tree protection zones[1] it must be minimised to no more than 100mm depth where practicable or undertaken by hand or other root sensitive methodology to minimise the impact to tree roots.
- Roots greater than 80mm diameter must not be damaged/severed without the approval of a qualified arborist. If encountered, an alternate construction method must be considered (e.g., platform over the area) or a qualified arborist consulted on site.
- No excavation must occur within the structural root zone of a tree. Given the difficulty of calculating SRZs for all trees on site, these can nominally be considered as:
    - Trees <150mm diameter: SRZ 1m radius[2]
    - Trees >150mm<250mm diameter: SRZ 1.5m radius[3]
    - Trees >250mm<400mm diameter: SRZ 2.3m radius
    - Trees >400mm<600mm diameter: SRZ 2.7m radius
    - Trees >600mm<800mm diameter: SRZ 3m radius
    - Trees >800mm diameter: SRZ 3.5m radius
- If excavation must occur inside the SRZ it must be undertaken by hand or other root sensitive method and in the presence of a qualified arborist.

If the above recommendations are followed, then no trees (beyond those marked as lost in the construction corridor) should be adversely impacted to such a degree that their useful life expectancy would be considered compromised.

5. References

Australian Standard AS 4970-2009: Protection of Trees on Development Sites.

Australian Standard AS 4373-2007: Pruning of Amenity Trees

C. Mattheck. The Body Language of Trees- Encyclopaedia of Visual Tree Assessment. 2015. KS Druck GmbH. Kronau.

Tree Protection Zone (TPZ) Encroachment Calculator. ProofDocs. https://www.proofdocs.com/arborist_report_template/tpz_incursion_calculator/

[1] Calculated as 12x Diameter at Breast Height in meters.
[2] AS 4970 Protection of trees on development sites provides a minimum SRZ of 1.5m. This is unreasonable given the site conditions and tree species in question. Given the recent wildfire damage and dense sapling regeneration it is reasonable to assume that construction works >1m distant to trees with a stem diameter of <150mm are unlikely to affect the structural root zone.
[3] The 1.5m radius provided is slightly less than the calculated radius for a 400mm diameter stem using the methods provided in AS 4970. Again, this is due to dense forest regrowth post wildfire damage.

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6. Appendix 1: Arboricultural descriptors

Tree 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.

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.

Figure 1 Tree condition\ (Health & Structure)
Indicative normal distribution curve for tree condition

Tree Name

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

Tree 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

Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a 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).

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

Structure

Assesses principal components of tree structure (Diagram 2).

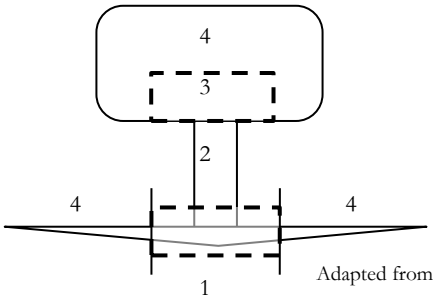
Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No damage, disease or decay; obvious basal flare / stable in ground	No damage, disease or decay; well tapered	Well formed, attached, spaced and tapered	No damage, disease, decay or structural defect
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. Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments.

Diagram 2: Tree structure zones

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



Adapted from Coder (1996)

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).

Life Stage

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

Category	Description
Young	Sapling tree and/or recently planted
Semi-mature	Tree rapidly increasing in size and yet 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

Useful Life Expectancy

The sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree is further modified where necessary in consideration of its current health and vigour, condition and suitability to the site.

Amenity Value

A judgment of amenity and utility the tree provides - primarily based on the trees visual contribution to the neighbourhood (i.e. can it be seen from the street). Other contributing factors include species, size, age, health and ecological value.

Amenity value does not consider the degree of risk associated with a tree.

Trees on neighbouring properties should be protected (unless otherwise negotiated with the owner) regardless of the amenity value or retention value assigned by the consulting arborist

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