



IRONBARK

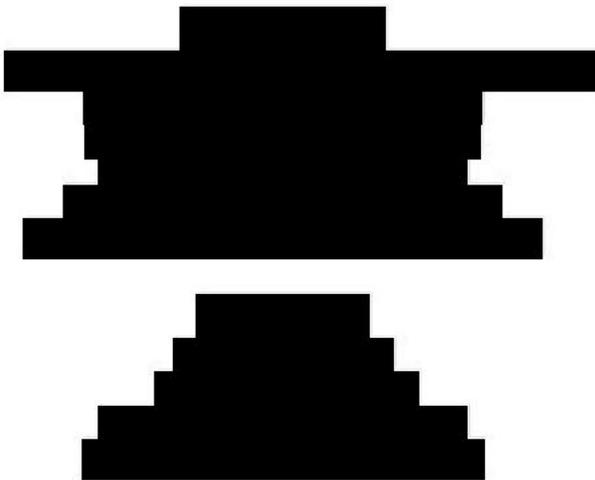
Environmental Arboriculture

Habitat Tree Feasibility Assessment

Mountain Grey Gum
(*Eucalyptus cypellocarpa*)

3459 Warburton Highway
Warburton, VIC 3799

Prepared by



Prepared for

Yarra Ranges Shire

3rd of April 2023



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Tree Risk Assessment – 3459 Warburton Highway -V1	Prepared		03/04/2023
Tree Risk Assessment – 3459 Warburton Highway -V2	Reviewed		03/04/2023
Tree Risk Assessment – 3459 Warburton Highway - FINAL	Checked		03/04/2023
Tree Risk Assessment – 3459 Warburton Highway - FINAL	Checked		06/04/2023

Executive Summary

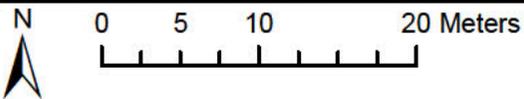
- Two (2) sonic tomographs were undertaken at 1m and 1.5m above ground level. Both showed significant decay is present in the lower trunk. This aligns with the sonic tomograph testing undertaken by ENSPEC on the 9th of January 2022.
- Using the *Tree Risk Assessment Qualification* (TRAQ) method, Tree #1 Mountain Grey Gum (*Eucalyptus cypellocarpa*) currently presents a *high* level of risk.
- The lower trunk has two (2) hollows suitable for use by native fauna.
- To reduce the level of risk to *low* and retain the lower trunk as a habitat tree the following actions are required:
 - Reduce the height from 34.5m to 10m; this would allow two (2) natural hollows present in the lower trunk to be retained. This would reduce the *likelihood of failure* of the lower trunk from *probable* to *possible*.
 - Modifying the carpark to create a garden bed around tree #1 (10m in radius). This would mean if the trunk fails due to decay it will not impact pedestrians and/or parked vehicles. The *likelihood of impact* would be reduced from *high* to *very low*.
 - In the new garden bed, underplant the trunk of tree #1 with fast-growing, understorey trees and shrubs typical of ecological vegetation class (EVC) 29 *Damp Forest* in the Highlands – Southern Fall bioregion or Yarra Ranges Council plant communities 07 *Mountain Grey Gum Damp Forest – Central Highlands*. The new canopy will provide shade for the trunk and resources for native fauna.
 - The trunk is a suitable size to create additional hollows suitable for native wildlife; this can be achieved with the use of a specialised hollow-boring tool (Hollow-hog).
 - It is recommended that the stubs of the cut trunks are coronet cut. This is a technique that mimics natural breakages, providing a natural aesthetic and habitat for invertebrates. It is also possible to include slits, suitable for microbats (Microchiroptera) in the coronet cut.
 - Ongoing management of the tree will require *remedial (restoration) pruning* of epicormics (regrowth shoots) which entails the reduction pruning and/or crown thinning in accordance with AS 4373-2007 Pruning of Amenity Trees (Section 7.3.5., p.17).
 - An annual visual tree assessment and risk assessment will be required to assess the development of the crack and the size of epicormic growth (regrowth shoots).

Introduction

Yarra Ranges Council has engaged Ironbark Environmental Arboriculture (IEA) to provide a *habitat tree feasibility assessment* for Tree #1, located in the carpark at 3459 Warburton Highway, Warburton (Overview Map).

Existing Conditions

- There are two (2) trunks, with an open crack between them and the lower trunk is extensively decayed.
- Tree #1 is 34.5m tall; if it were to fail at the crack between the trunks, the targets are vehicles in the carpark or on the Warburton Highway, pedestrians using the footpath or nearby bus stop, the toilet block in the north area of the car park, the hardware store to the east and the power pole and service wires to the south-west.
- There are two (2) natural hollows within the tree, at 4.0m (hollow #1) and at 8.4m (hollow #2) above ground level and a large crevice in the trunk.
- A pre-clear fauna survey was undertaken by a zoologist on the 22nd of March 2023, with the use of a remote-controlled extendable pole camera. Both hollows were found to be unoccupied but are suitable for use by native fauna.
- The crevice is suitable for microbats; however, at the time of inspection, there was no opportunity to adequately investigate occupancy, as this requires the use of an endoscope and thermal imaging camera from an elevated work platform (EWP).
- Two (2) steel cables have been installed in the canopy, one at 8.6m (cable #1) and one at 16.6m (cable #2) above ground level.



Tree Location Map

Tree #1 Mountain Grey Gum at 3459 Warburton Highway, Warburton VIC 3799.
Adapted from Nearmap image dated 27 January 2023.
Projection: GDA 94 / MGA 55.

Scope of Assessment

The purpose of this assessment is to:

- Undertake ground-based visual tree assessment of the tree's structure.
- Undertake a tree risk assessment using the TRAQ method, with the *likelihood of failure* determined by the results of the visual tree assessment and sonic tomograph tests.
- Provide recommendations for risk mitigation actions to achieve a residual risk rating of *low*.
- Provide recommendations on the suitability of retaining tree #1 as a habitat tree.
- Provide recommendations for habitat creation.

Methods

On the 28th of March 2023, [REDACTED] of IEA assessed the structure of tree #1 from ground level. Following the visual tree assessment, two (2) sonic tomographs were undertaken a 1m and 1.5m above ground level.

Based on the visual assessment results and sonic tomograph investigations, the *likelihood of failure* was determined using the TRAQ method.

TRAQ is the International Society of Arboriculture (ISA) tree risk assessment method which uses two (2) matrices, the *likelihood of failure* and the *consequences of failure*.

Tree structure was assessed with reference to the following texts:

- Mattheck, C. & Breloer, H. (1994) *The Body Language of Trees*, Office of the Deputy Prime Minister, UK.
- Lonsdale, D. (1999) *Principles of Tree Hazard Assessment and Management*, The Stationery Office, London, UK.
- Dunster, J.A., Smiley, E.T., Matheny, N & Lilly, S. (2017) *Tree Risk Assessment Manual*, 2nd Edition, International Society of Arboriculture, Champaign, IL, USA.

Visual Tree Assessment

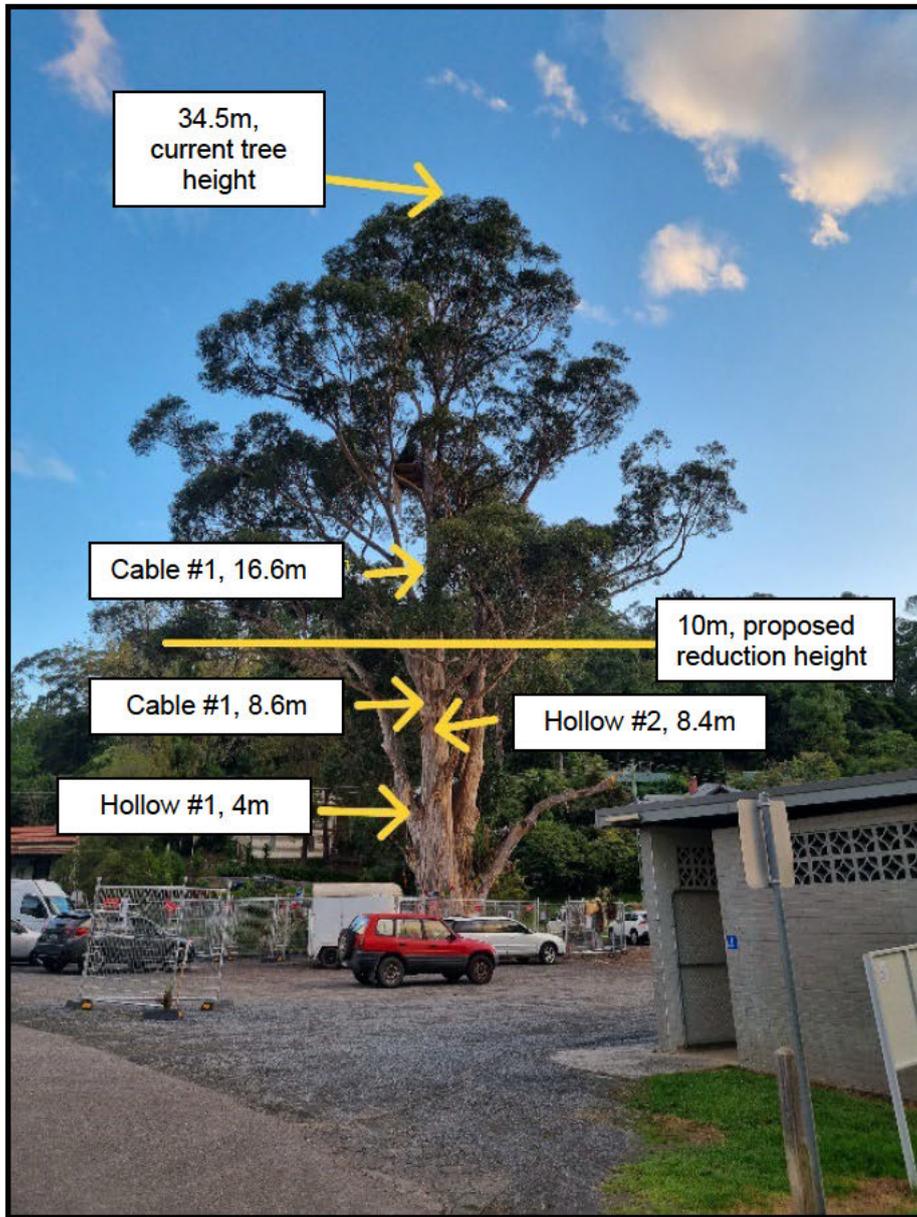


Figure 1: Showing the position of hollows and cables in tree #1.



Figure 2: Showing Hollow #1 on the south side of the tree



Figure 3: Showing Hollow #2 on the north side of the tree

Tree Data

Tree ID	Common Name	Botanical Name	Height (m)	DBH (cm)	Health	Structure
1	Mountain Grey Gum	<i>Eucalyptus cypellocarpa</i>	34.5	293	Good	Poor

Comments

Tree #1 presents with a *poor* structure which is attributed to the significant cracking and decay present in the lower stem. The tree has previously been cabled to reduce the likelihood of failure associated with the cracking and decay in the lower trunk.

As tree #1 is 34.5m tall and the decay and cracking present are found in the lower trunk height, this significantly compromises the structure of tree #1 as it allows for maximum leverage of sail area provided by the canopy, on this weakened section on the lower trunk.

Despite the structural factors, tree #1 still presents with *good* health with appropriate wound wood present at all pruning wounds and around the cracking in the trunk; there is also evidence of adaptive growth around sections of the crack where tree #1 has attempted to apply wood growth.

Sonic Tomograph Investigation

1.5m from above ground level

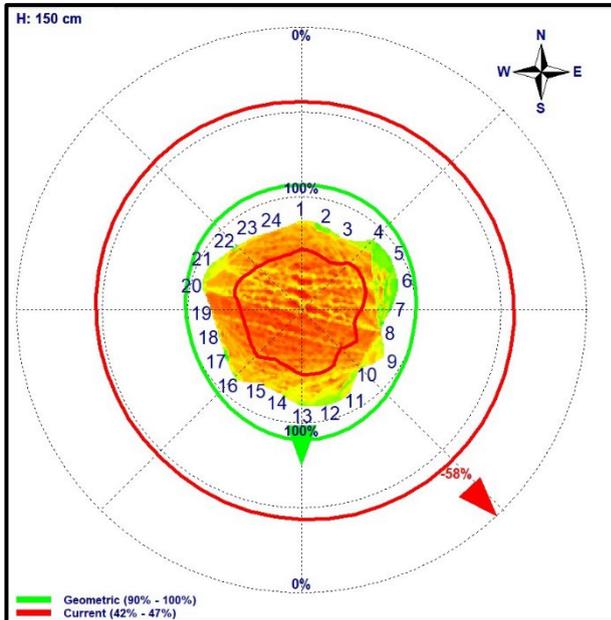


Figure 4: Showing sonic tomograph conducted on 28/03/2023 at 1.5m from ground level. Showing 58% strength loss to the south-east



Figure 5: Showing sensors on the lower trunk at 1.5m above ground level. 28/03/2023.

- The sonic tomograph shows a 58% strength loss to the southeast of the tree.
- There is very little sound wood tissue measured around the edges of the trunk.
- There is interference in the reading as a result of the crack in the middle of the trunk, which has resulted in a partial distortion of the image (striping).

Tree Risk Assessment

Targets

Targets include:

- Vehicles in the carpark or on the road
- Pedestrians using the footpath or nearby bus stop.
- Toilet block in the north area of the car park
- Hardware store to the east
- Power pole and service wires to the south-west

TRAQ Assessment – Existing Conditions

The scenario of:

- Lower trunk failure, striking pedestrians or vehicles in the carpark.

Matrix 1: Likelihood Matrix

Likelihood of Failure	Likelihood of Impact			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Risk Rating Matrix

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

- Tree #1 currently presents a *high* level of risk.

TRAQ Assessment – Residual Risk

The scenario of:

- Following the reduction of the trunks to 10m in height and the establishment of a garden bed (10m in radius) around the trunk.

Matrix 1: Likelihood Matrix

Likelihood of Failure	Likelihood of Impact			
	Very low	Low	Medium	High
Imminent	Unlikely	Somewhat Likely	Likely	Very Likely
Probable	Unlikely	Unlikely	Somewhat Likely	Likely
Possible	Unlikely	Unlikely	Unlikely	Somewhat Likely
Improbable	Unlikely	Unlikely	Unlikely	Unlikely

Matrix 2: Risk Rating Matrix

Likelihood of Failure & Impact	Consequences of Failure			
	Negligible	Minor	Significant	Severe
Very Likely	Low	Moderate	High	Extreme
Likely	Low	Moderate	High	High
Somewhat Likely	Low	Low	Moderate	Moderate
Unlikely	Low	Low	Low	Low

- Following the completion of the recommended works the residual risk is *low*.

TRAQ Discussion

Tree #1 is currently 34.5m tall, if it were reduced in height to 10m, this would allow for retention of tree #1, which would reduce the lever arm effect acting upon the cracking and decay present in the lower trunk, reducing the likelihood of failure to *possible*.

Furthermore, if an exclusion zone was put in place in a 10m radius around the tree this would reduce the likelihood of impact to *unlikely*.

Ongoing risk management will be required to monitor the condition of the trunk crack and manage the epicormic growth (regrowth shoots).

Recommendations

- Reduce the tree's height to 10m.
- Prior to reduction pruning the upper canopy must be inspected by a zoologist to determine if nature fauna is present and undertake the mitigation measures if required.
- Install coronet cuts on the stubs of cut trunks and pruned branches to provide a natural aesthetic and provide habitat for invertebrates. Include microbat slits in the coronet cuts.
- Plant a native garden bed around the tree's base, encouraging more fauna presence and acting as a passive exclusion zone.
- To minimise root damage, arborist supervision is required for the removal of the existing carpark within the footprint of the proposed garden bed.
- Underplanting the trunk with indigenous understorey trees and large shrubs typical of EVC 29 *Damp Forest* in the Highlands – Southern Fall bioregion or Yarra Ranges Council plant communities 07 *Mountain Grey Gum Damp Forest – Central Highlands*.
- Quick-growing tree understorey trees such as Silver Wattle (*Acacia dealbata*) would provide a canopy to shade the trunk hollows (Figure 7).
- The use of prickly shrubs such as Hedge-wattle (*Acacia paradoxa*) and Sweet Bursaria (*Bursaria spinosa*) would discourage the use of the garden bed by people and provide habitat for small passerines (songbirds).
- Ongoing management of the tree will require *remedial (restoration) pruning* of epicormics (regrowth shoots) which entails the reduction pruning and/or crown thinning in accordance with AS 4373-2007 Pruning of Amenity Trees (Section 7.3.5., p.17).
- An annual visual tree assessment and risk assessment will be required to assess the development of the crack and the size of epicormic growth (regrowth shoots).
- If the creation of a garden bed 10m in a radius around the trunk of tree #1 is not feasible, it is not possible to reduce the risk level presented by tree #1 to *low*. In this circumstance, tree #1 should be removed.



Figure 7: Showing proposed habitat works and passive exclusion zone.

Appendix 1: Tree Descriptors

Tree Health

Good

The tree:

- displays 71-100% live canopy mass.
- exhibits near-optimal foliage characteristics in size, colour and density.
- may have deadwood in the interior canopy.
- is expected to maintain its condition of health without plant-health treatments.

Fair

The tree:

- displays 51-70% live canopy mass.
- foliage may be stunted or partly discoloured.
- may display dieback of the peripheral canopy.
- may exhibit medium-level pest/pathogen infestation.
- is expected, with plant-health treatments, to improve its condition of health.

Poor

The tree:

- displays < 50% live canopy mass.
- foliage is completely discoloured, dying or both.
- has extensive pest/pathogen infestation and is unlikely to improve its condition of health even with plant-health treatments.

Dead

The tree:

- has no live vascular tissue.

Tree Structure

Good

The tree:

- has well-formed unions.
- has no signs of decay in either the trunk or 1st order branches.
- has good trunk and 1st order branch taper and is displaying pronounced reactive wood growth, indicating it has adapted to its location.
- may exhibit structural defects on either the 2nd or 3rd order branches or both. Such deficiencies can be remediated by pruning as per AS 4373-2007 *Pruning of Amenity Trees*

Fair

The tree:

- may have some included bark between unions.
- may have signs of decay in either the trunk, the 1st order branches or both.
- may have a suboptimal taper in either the trunk, 1st order branches or both and is displaying some reactive wood growth, indicating it has not fully adapted to its location.
- structural defects of 1st order branches can be mitigated but not remediated by pruning as per AS 4373-2007 *Pruning of Amenity Trees*

Poor

The tree:

- may have extensive included bark, signs of splitting and/or decay in the unions.
- has evidence of extensive decay in either the trunk, the 1st order branches or both.
- has poor taper in the trunk, 1st order branches or both, indicating either exposure to new conditions or a *poor* condition of health; indicating it does not have the resources to allocate to reactive wood growth.
- has structural defects of 1st order branches that cannot be mitigated by pruning as per AS 4373-2007 *Pruning of Amenity Trees*

Coronet Cuts



Example of coronet cuts on a hollow-bearing lower trunk and indigenous underplanting at Banksia Reserve, Beaumaris. Undertake by IEA for Bayside City Council, 2022.

Appendix 2: Glossary of Arboricultural Terms

Epicormic Shoot

Regrowth shoots are produced from latent buds that are commonly less strongly attached than the original branches.



Appendix 3: Expertise to Prepare the Report

I have over twenty (20) years of experience in arboricultural and ecological industries, including over sixteen (16) years of consultancy. My expertise and experience lie in the fields of arboriculture, planning and wildlife biology.

I have training and experience in the collection of biological samples and data for scientific research and have co-authored papers published in peer-reviewed scientific journals.

My qualifications and experience ensure I have the expertise to make informed, independent assessments of issues about the management of vegetation and associated fauna.

Yours Sincerely

[Redacted signature]

[Redacted contact information]

References

Standards Australia (2007) *Pruning of Amenity Trees – AS 4373-2007*. SAI Global

