



Arboricultural Assessment and Tree Impact Report

41 Monbulk Road,
Mount Evelyn

8 February 2022

Contents

1 Executive Summary..... 3

Objectives..... 3

Summary 3

2 Method 5

3 Tree Permit Requirements..... 7

4 Observations 9

5 Tree Protection Zones 12

6 Design review and Tree impact assessment 13

7 Tree protection and construction guidelines. 16

8 Conclusion. 18

Appendix 1: Tree Assessment Data: 41 Monbulk Road, Mt Evelyn..... 21

Appendix 2A: Tree Location Plan: 41 Monbulk Road, Mt Evelyn – Existing Conditions 22

Appendix 2B: Tree Location Plan: 41 Monbulk Road, Mt Evelyn – Proposed design..... 23

Tree pictures..... 24

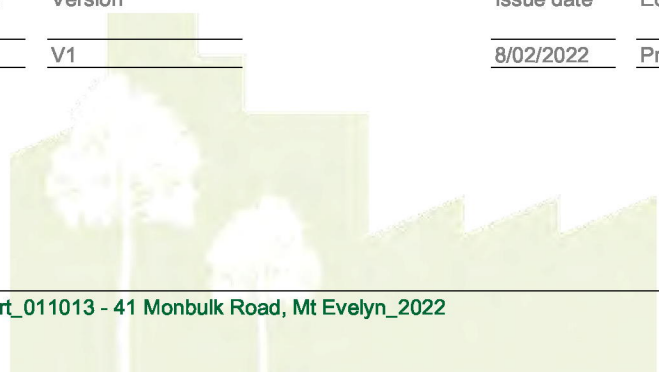
Appendix 3: Arboricultural Descriptors (June 2018) 28

Appendix 4: Tree protection zones. 35

Disclaimer..... 41

Tree report_011013 - 41 Monbulk Road, Mt Evelyn-

File No.	Version	Issue date	Edits	Issued by.
011013	V1	8/02/2022	Preliminary tree report	BC



1 Executive Summary

Objectives

undertake an arboricultural assessment and prepare a tree impact report for trees associated with the proposed redevelopment of 41 Monbulk Road, Mt Evelyn.

The primary objectives of the arboricultural report include;

- Ascertain the species and origin of the subject trees and provide information including dimensions, health, structural condition and the arboricultural value of the trees.
- Determine appropriate tree protection zone dimensions compliant with Australian Standard AS4970 'Protection of trees on development sites'
- Identify if trees are subject to permit and / or offset requirement under various planning overlays.
- Identify potential tree impacts associated with proposed works and offer recommendations regarding the management of trees, including any tree protection modification or additional requirements for trees required to be retained.

Summary

A feature survey plan was used as the basis of the tree assessment survey. Thirteen (13) tree features were recorded relating to surveyed tree points associated with the subject site, 41 Monbulk Road, Mt Evelyn, including 12 individual tree points and 1 tree group (comprised of approximately 20 constituent trees). Refer to Section 4.

1.1 Twelve (12) different species were recorded including

- 2 are council managed street trees to south-east of site (Trees 1 & 2)
- 4 tree features within the subject site (Trees 4, 10, 12 and Group 1)
- 6 trees within the adjacent property to the south (Trees 3, 5, 6, 7, 8 & 11)
- 1 tree in the adjacent property to the north (Trees 9)

1.2 The tree population included 4 specimens of indigenous species and the remainder were introduced exotic and native species.

1.3 Each tree feature was attributed an arboricultural rating which reflects the retention value of the trees.

- Nine (9) trees were attributed a Moderate arboricultural rating including,
 - Six (6) trees rated Moderate B, being middle of the range and typical of the species in this environment.
 - Three (3) trees rated Moderate C, being of either small size or displaying accumulated deficiencies that are tending towards becoming of Low arboricultural value.

- Three (3) trees were attributed an arboricultural rating of Low, displaying symptoms of decline and structural deficiencies.
- One (1) tree was attributed a rating of Very Low due to being self-sown weed trees.

Refer to Section 4 for trees sorted by arboricultural rating.

1.4 The site falls within the Yarra Ranges Council Planning Scheme. The land is zoned Industrial 3 Zone (IN3Z).

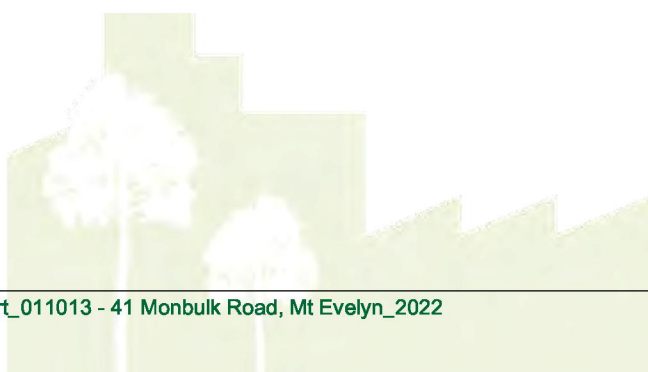
- Specific tree and vegetation controls apply under Significant Landscape Overlay - Schedule 22 (SLO22) and Native Vegetation Clause 52.17.
- Bushfire Management Overlay (BMO) applies to each subject site. Under Clause 52.12, relating to Bushfire Exemptions, trees within 10 metres of existing dwellings and 4 metres of existing fences are exempt from other tree controls. Refer to Section 3 for tree permit requirements.

1.5 The land which is currently used as a garden supply centre is proposed to be redeveloped as a service station, car wash and convenience store with looping access driveways.

Under the current design proposal for site redevelopment;

- One small tree /large shrub (Tree 10) and a group of hedge trees (Group 1) exist within the proposed building envelope and will be required to be removed.
- Tree 4, a Messmate Stringybark growing on the southern boundary, may have TPZ encroachment of approximately 22% of the TPZ. The tree has been subject to a history of continual soil compaction and smothering of the TPZ within the site where concrete bins for storing and distributing garden materials of sand, soil, rock. The level of TPZ encroachment is not likely to impact the tree given the current level of use within the TPZ and can be sustained with appropriate TPZ barrier fencing installed at the edge of works and maintained throughout the site redevelopment stages.
- Four (4) trees (Trees 3, 5, 6 and 7) will have minor TPZ encroachment of less than 6% and will not be impacted if appropriate TPZ barrier fencing is installed and maintained during the site redevelopment stages.
- All other street trees and trees in neighbouring properties will not be impacted. These trees must be adequately protected to ensure they remain viable.

Refer to Section 6 for design review and details of tree impacts.



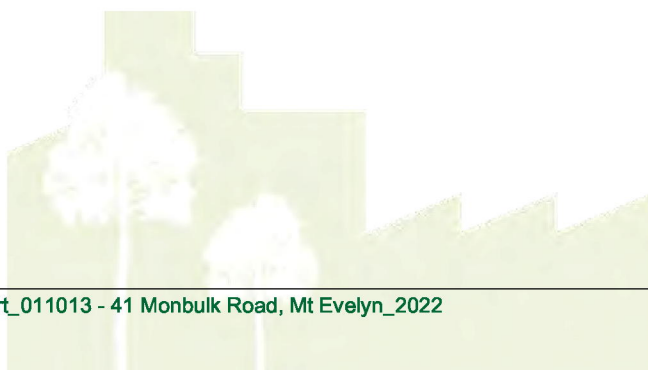
2 Method

- 2.1 A site inspection was carried out on Tuesday, August 18th, 2020, during mild conditions
- 2.2 Tree locations were recorded on mobile field computers equipped with GIS software displaying the level and feature survey plan of the site including all tree point data, property cadastral data, GPS and geo-referenced aerial imagery.
- 2.3 Observations were made of the assessed trees to determine the species, age category, and condition with measurements taken to establish tree crown height (measured with a height meter) and crown width (paced) and trunk dimensions (measured 1.4 metres above ground level with a diameter tape unless otherwise stated).
- 2.4 Assessment details of individual trees are listed in Appendix 1 and a copy of the tree location plan can be seen in Appendix 2.
Descriptors used in the assessment can be seen in Appendix 3.
- 2.5 Photographs of the trees and the environs were taken for further reference when preparing the report.
- 2.6 Each of the assessed trees was attributed an 'Arboricultural Rating'. The arboricultural rating correlates the combination of tree condition factors (health and structure) with tree amenity value. Definitions of arboricultural ratings can be seen in Appendix 3.
- 2.7 The assessed trees have been allocated tree protection zones (TPZ). The Australian Standard, AS 4970-2009, has been used as a guide in the allocation of TPZs for the assessed trees. This method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius, from the centre of the trunk at (or near) ground level. All TPZ measurements for are provided in Appendix 1.

Documents reviewed:

- Planning Property reports for 41 Monbulk Road, Mount Evelyn & 43 Monbulk Road, Mount Evelyn 3796. Department of Planning & Community Development - 10/08/2020
 - Site 41 is within Industrial 3 Zone (IN3Z).
 - Site 43 is within Low Density Residential Zone (LDRZ).
- Bushfire Management Overlay (BMO) applicable to both sites.
- Environmental Significance Overlay - Schedule 2 (ESO2) applicable to both sites.
- Significant Landscape Overlay - Schedule 22 (SLO22) applicable to Site 43 only.
- Detail Survey 41-43 Monbulk Road, Mt Evelyn (Fyfe: Proj: 80875-1. 22/06/2020)

- Shire of Yarra Ranges Request for Further Information - Application YR-2019/718.
Location 41-43 Monbulk Road (Lot 2 PS603099), Mount Evelyn. Date: 31/10/2019.
Proposal Development of service station and convenience shop, warehouse, use and development of an illuminated business sign and business identification signs
- Plan of Proposed Site Redevelopment – OTR Mount Evelyn Concept Plan - 41 Monbulk Road, Mount Evelyn (ADS Architects – Proj. No: JN1399 / Con04d, Date 24/10/21.
Prepared by ADS Architects)



3 Tree Permit Requirements

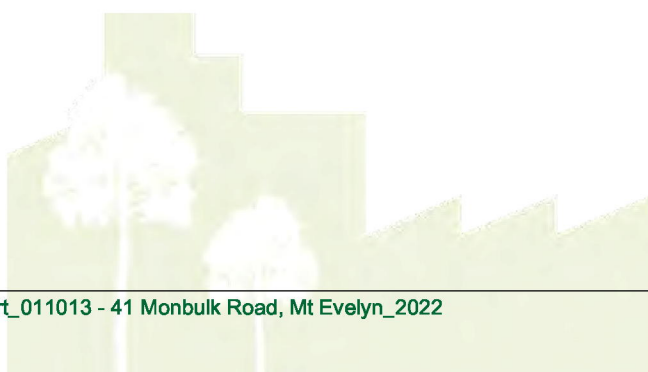
- 3.1 The subject tree study area falls within the Shire of Yarra Ranges Council Planning Scheme.
- The site, 41 Monbulk Road, is within Industrial 3 Zone (IN3Z).
 - The adjacent site, 43 Monbulk Road, is within Low Density Residential Zone (LDRZ).
- 3.2 Environmental Significance Overlay - Schedule 2 (ESO2) applicable to both sites.
- The objectives of ESO2 relate to restoring the ecological function and health of the Little Stringybark Creek. No specific tree controls apply under ESO2.3
- 3.3 Bushfire Management Overlay (BMO) is applicable to both sites.
- Under clause 52.12-1 and 52.12-2, specific exemptions apply to the permitted clearing of vegetation.
 - Any requirement of a planning permit, including any condition, which has the effect of prohibiting the removal, destruction or lopping of vegetation, or any requirement of this planning scheme to obtain a planning permit, or any provision of this planning scheme that prohibits the removal, destruction or lopping of vegetation or requires the removal, destruction or lopping of vegetation to be carried out in a particular manner, does not apply to the removal, destruction or lopping of any vegetation
 - within 10 metres of an existing building used for accommodation if the building was constructed before 10 September 2009
 - along a boundary fence between properties in different ownership if the fence is located in an area that is designated as a bushfire prone area under the Building Act 1993 and
 - The fence was constructed before 10 September 2009 and
 - The clearing alongside both sides of the fence when combined must not exceed 4 metres in width, except where land has already been cleared 4 metres or more along one side of the fence, then up to 1 metre can be cleared along the other side of the fence.
- 3.4 Under Native Vegetation Clause 52.17, removal of naturally occurring trees native to Victoria may be subject to permit and offset requirements on properties greater than 0.4 hectares (4,000 square metres).
- It is understood that Clause 52.12 - Bushfire Protection Exemption override all other vegetation removal conditions within the Bushfire Management Overlay.
- 3.5 Significant Landscape Overlay - Schedule 22 (SLO22) applicable to Site 43 only.
- The objectives of SLO22 include maintaining vegetation as a dominant element of the landscape and encourage retention and regeneration of native vegetation.

- A permit is required to remove, destroy or lop any indigenous vegetation or substantial tree. A substantial tree is defined as having a diameter at breast height (DBH) greater than 0.16 metres 1.3 m above the ground.
 - This does not apply If the species appears in the Shire of Yarra Ranges Environmental Weed List - Clause 22.05.

3.6 All trees in adjoining land including street trees and neighbour’s trees must be adequately protected to ensure they remain viable.

3.7 An assessment of trees that trigger permit requirement has been made based on a review of the tree assessment data and the spatial layout of the trees in relation to house and property boundaries. Refer to Table 1 for tree numbers sorted by Permit requirements and column titled ‘Permit’ in the tree assessment tables in Appendix 1.

Table 1: Permit type	Total	Tree Numbers
52.12 exempt, IZ, 52.17	1	4
52.12 exempt, IZ	1	G1
Undersize	2	10, 11
Neighbour's tree, SLO22	6	3, 5, 6, 7, 8, 9
Street tree	2	1, 2
Weed	1	12
Total	13	



4 Observations

- 4.1 The subject study area comprises 41 Monbulk Road, Mount Evelyn, an established garden & building supply business located within Industrial 3 zone. Buildings comprising offices, sales area and storage space are located in the western half of the site with looped driveway access, parking and soil, gravel & sand storage bins in the rear yard.

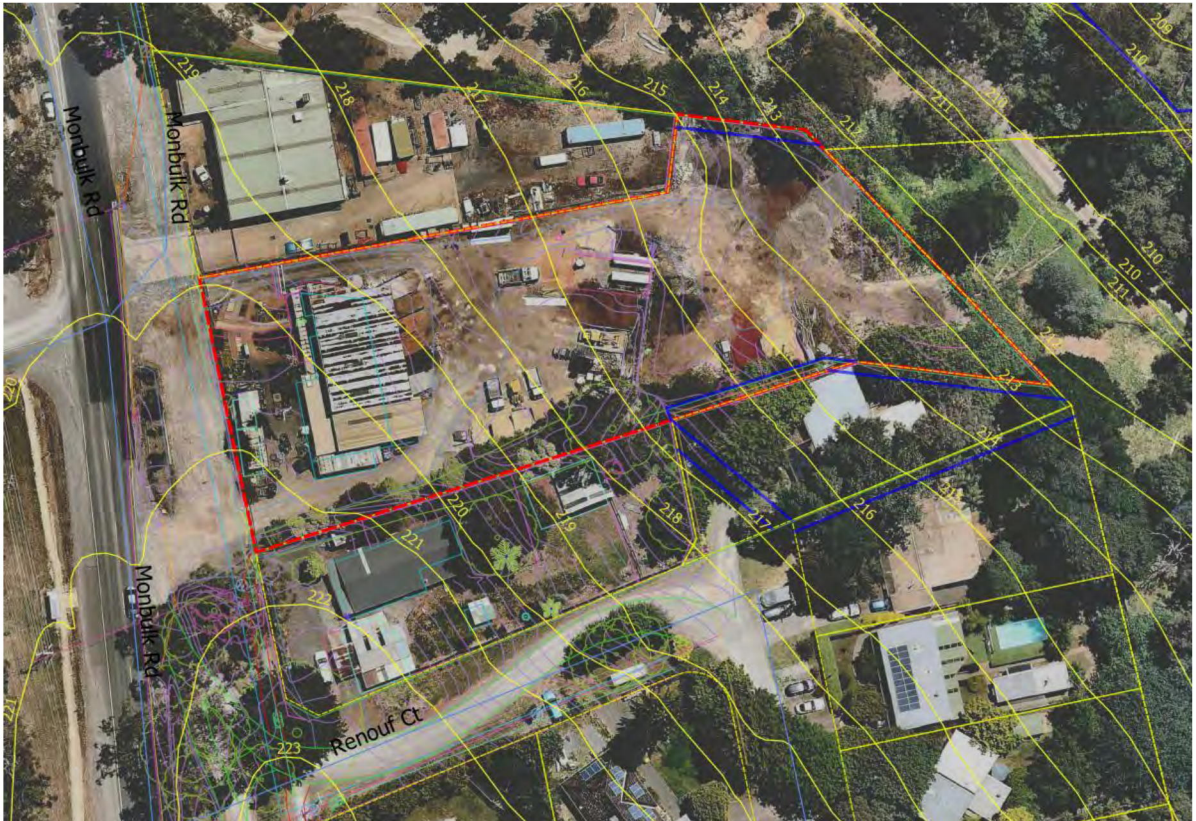


Plate 1. Aerial view of the subject sites, 41 Monbulk Road, Mount Evelyn. Red dash line indicates extents of tree study area. Yellow contour lines are shown. Blue lines indicate approved easements.

The site has a moderate slope downwards towards the eastern boundary.

The slope falls from approximately 222m at the south west corner to approximately 212 metres at the eastern boundary over a distance of approximately 120 metres (Slope of ~1:12).

While there were no creeks or natural drainage lines within the study area, the fall of the land drains steadily to the east towards a shared path in adjacent land.

4.2 Tree population

Thirteen (13) tree features were recorded in total comprising 10 significant trees, 3 small non-significant trees (for purposes of SLO22 definition) and 1 tree group comprising approximately 20 planted hedge / screen trees.

Twelve (12) different species were identified during the tree survey. They included 4 specimens of indigenous tree species and 9 introduced native or exotic species.

Refer to Table 2 for predominant species and origins.

Table 2: Trees by species and origin

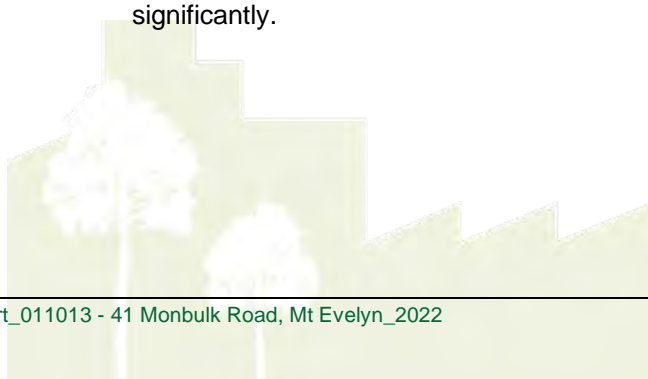
Botanic name	Common Name	Origin	No of trees
<i>Eucalyptus obliqua</i>	Messmate Stringybark	Indigenous	2
<i>Eucalyptus baxteri</i>	Brown Stringybark	Indigenous	1
<i>Eucalyptus viminalis</i>	Manna Gum	Indigenous	1
<i>Eucalyptus globulus subsp. bicostata</i>	Victorian Blue Gum	Victorian native	1
<i>Allocasuarina torulosa</i>	Rose She-oak	Australian native	1
<i>Castanospermum australe</i>	Black Bean	Australian native	1
<i>Cryptomeria japonica</i>	Japanese Cedar	Exotic conifer	1
<i>XCupressocyparis leylandii</i>	Leyland Cypress	Exotic conifer	1
<i>Liquidambar formosana</i>	Formosan Evergreen Liquidamber	Exotic deciduous	1
<i>Ligustrum lucidum</i>	Shining Privet	Exotic evergreen	1
<i>Pittosporum eugenioides 'Variegatum'</i>	Variegated Tarata	Exotic evergreen	1
<i>Photinia serratifolia; Pittosporum eugenioides 'Variegatum'; Pittosporum undulatum</i>	Chinese Hawthorn, Variegated Tarata, Sweet Pittosporum	Exotic evergreen, Victorian native	1 group of 20
Total			13

4.3 **Tree health** was assessed based on foliage colour, size and density, shoot initiation and elongation where possible as well as wound wood response where applicable.

- All tree features displayed Fair or better health considered typical for the species growing in this location under current conditions.

4.4 **Tree structure** was assessed for structural defects and deficiencies, likelihood of failures and risk to potential targets.

- Seven (7) trees displayed Fair and acceptable structural characteristics for the species and age of the trees.
- Six (6) tree features displayed Fair to Poor structure with dieback, deadwood, onset of decay, crown asymmetry, crossing / crowded branches, trunk or limb wounds, or previous lopping.
- In particular, Tree 3, a maturing Victorian Blue Gum, has trunk and limb wounds at 2.8 and 8 metres respectively with fungal decay brackets (*Phellinus spp.*) present. The tree species is known to have a poor ability to compartmentalize advancing decay and the presence of *Phellinus* brackets suggest that wood decay is associated with the wound sites and likely to spread, reducing the long term safety and viability of the tree significantly.



4.5 Arboricultural Rating

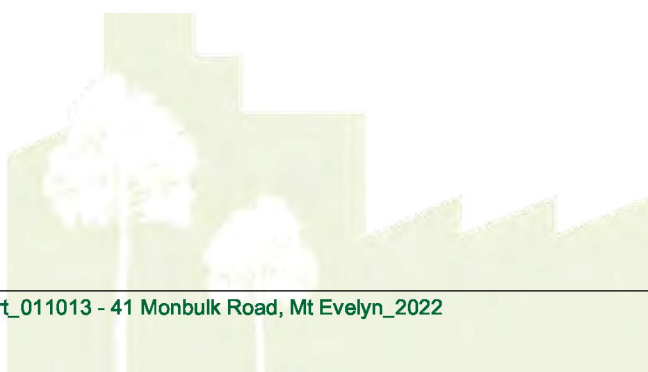
The assessed trees were attributed an arboricultural rating. This rating relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value.

It should be noted that the arboricultural rating is different to the conservation / ecological values placed on trees by other professions. Refer to Table 3 for tree numbers sorted by Arboricultural rating

Table 3: Arboricultural rating	Total	Tree Numbers
Moderate B	6	1, 2, 4, 6, 7, 9
Moderate C	3	5, 8, G1
Low	3	3, 10, 11
Very Low	1	12
Total	13	

- Trees rated Moderate B are generally typical of the species growing in this area under prevailing conditions and are deemed suitable to retain in conjunction with development where possible.
- Trees rated Moderate C are either established smaller trees of Fair condition or maturing trees that might be accumulating deficiencies and trending towards becoming of Low arboricultural value.
- Trees attributed an arboricultural rating of Low are generally not considered worthy of being a constraint on reasonable design intent and outcome delivery due to either health and / or structural deficiencies, being a small specimen that could be readily replaced in a new landscape plan.
- Trees attributed an arboricultural rating of Very Low are generally unsuitable to retain in conjunction with site redevelopment, being woody weed species or dead/declining.

Refer to Appendix 1 for individual tree data, Appendix 2 for Tree location plan sorted by Arboricultural rating and Appendix 3 for definitions of arboricultural ratings.



5 Tree Protection Zones

The Tree Protection Zones (TPZs) provided for each tree in the Tree Assessment Table in Appendix 1 are calculated using the formula provided in the Australian Standard AS4970 where the Radial TPZ = Trunk diameter (DBH) measured at 1.4m above grade and multiplied by 12. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The method for calculating, applying and managing the tree protection zone is described in Appendix 4.

The TPZ forms an area around a tree or group of trees that addresses both the stability and growing requirements of a tree in which excavation or filling vehicle movements, installation of underground services and other construction activities are either excluded or controlled.

Minor encroachment, up to 10% of the TPZ area, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Encroachment greater than 10% is considered major encroachment under AS4970 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable. Refer to Figure 2A and 2B.

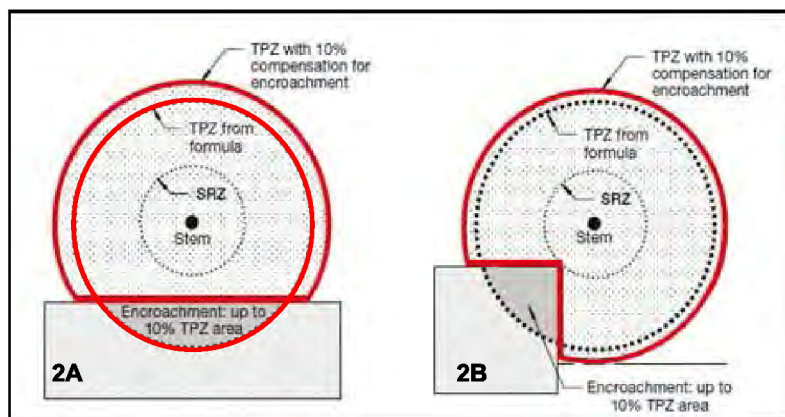


Figure 2: 2A & 2B - Examples of minor encroachment into a TPZ.

Extract from: AS4970-2009, Appendix D, pg. 30 of 32

The Structural Root Zone (SRZ) provided for each tree has been calculated using the method provided in AS4970. The SRZ is the area in which the larger woody roots required for tree stability are found close to the trunk and which then generally taper rapidly. This is the minimum area recommended to maintain tree stability but does not reflect the area required to sustain tree health. No works should occur within the SRZ radius as tree stability could be compromised.

The TPZs for all trees to be retained must be transferred and overlaid on all design plans.

All TPZ measurements are provided in the tree assessment data in Appendix 1 and displayed on the tree location plan in Appendix 2. See Appendix 4 for TPZ establishment guidelines.

6 Design review and Tree impact assessment

The pre – development arboricultural inspection report provides planners and designers with information on whether trees are worthy or not of being a constraint on the proposed repurposing of the site.

It also provides a basis on which to identify when and where potential impacts to trees will occur from various design elements and evaluates the possible severity of the impact during the design phase of any site redevelopment.

Trees grow in a delicate balance with their environment and any changes to that balance must be minimised if a tree is to remain in a healthy state and fulfil its potential.

It is rarely possible to repair stressed and injured trees, so damage needs to be avoided during all stages of development and construction.

Tree protection cannot be achieved without a proactive approach. The planning and design stages of any construction project can be instrumental and determine the success of tree preservation.

The hierarchy of principles for tree protection are:

- Avoid damage to the subject trees
- Minimise damage to the subject trees
- Replace the subject trees and improve the landscape (as a last resort).

Plans for site redevelopment were provided for review. (*Plan of Proposed Site Redevelopment – OTR Mount Evelyn Concept Plan - 41 Monbulk Road, Mount Evelyn (ADS Architects – Proj. No: JN1399 / Con04d, Date 24/10/21. Prepared by ADS Architects)*)

The proposed design is for a service station, car wash, drive-through convenience store and looping driveways with sufficient space for semi-trailers to manoeuvre as required for exiting after refuelling are included in the design.

6.1 Under the current design, Tree 10 and Group 1 exist within the proposed construction impact zone and are unsustainable and proposed to be removed. These trees are permit exempt. Refer to Plate 4.

6.2 Tree 4, a maturing Messmate Stringybark is growing less than 2 metre from the boundary fence.

- Being within the industrial zone and so close to the boundary this tree is exempt from permit requirement under Clause 52.12.
- The TPZ of Tree 4 comprises an area that has a long history of being used for truck access storage bins within the garden centre and level changes where rock and materials are dumped and loaded.
- The proposed automatic carwash is indicated to encroach the TPZ of Tree 4 by 21.5% . This extent of TPZ encroachment is considered major. However, given the history of heavy truck movements around the concrete storage bins, it is likely that high levels of disturbance and soil compaction will have inhibited any significant root growth in this area.

- Given the historical extent of soil compaction and level changes it is concluded that the tree will tolerate the proposed construction within the TPZ if appropriate TPZ exclusion fencing is established adjacent to the edge of the driveway and maintained for the duration of the site redevelopment. Refer to Plates 1 and 2 below.

<p>Plate 1</p>  <p>View of the prolonged use of the land within the TPZ of Tree 4, Messmate Stringybark (arrow)</p>	<p>Plate 2</p>  <p>View of the prolonged use of the land within the TPZ of Tree 4, Messmate Stringybark. (arrow)</p>
<p>Plate 3</p>  <p>View of the prolonged use of the land within the TPZ of Tree 3, neighbours Victorian Blue Gum</p>	<p>Plate 4</p>  <p>View of the prolonged use of the land within the TPZ of Group 1 trees</p>

6.3 Tree 3, Victorian Blue Gum, located in the rear yard of 43 Monbulk Road has structural deficiencies associated with advancing wood decay that will reduce the long-term safety and viability of the tree. The driveway will encroach the TPZ of Tree by less than 2% in an area that has a long history of being used as a driveway within the garden centre. Refer to Plate 3.

6.4 The driveway will encroach the TPZ of neighbour’s mature Rose She-oak Tree 5, by approximately 5.4% in an area with a history of dumping and loading garden supply materials. It is expected that the encroachment will comprise mostly compacted fill being installed to raise the levels for the loop driveway.

- This extent of TPZ encroachment is considered minor and will be tolerated by the tree if appropriate TPZ exclusion fencing is established adjacent to the edge of the driveway and maintained for the duration of the site redevelopment.

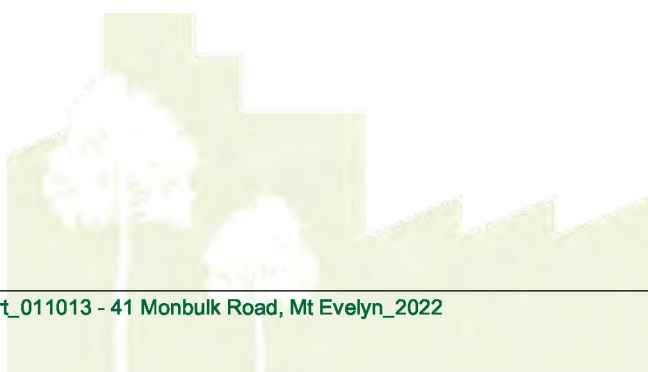
6.5 The rear looping driveway will encroach the TPZ of neighbour’s Trees 6 and 7 by less than 1% in an area with a history of dumping and loading garden supply materials. It is expected that the encroachment will comprise mostly compacted fill being installed to raise the levels for the loop driveway.

- This extent of TPZ encroachment is considered minor and will be tolerated by the tree if appropriate TPZ exclusion fencing is established adjacent to the edge of the driveway and maintained for the duration of the site redevelopment

6.6 All other street trees and trees in neighbouring properties are set sufficiently far from the construction impact zone that they will not be impacted providing that appropriate TPZ exclusion fencing is established.

The trees impacted by the works are summarised below in Table 4.

Table 4: Design review and tree impacts		
Tree Impacts	Total	Tree numbers
None	6	1, 2, 8, 9, 11, 12
TPZ Minor (<6%)	4	3, 5, 6, 7
TPZ (Major) (>10%)	1	4
Within (To be removed)	2	10, Group 1
Total	13	



7 Tree protection and construction guidelines.

- 7.1 Any trees that are to be retained in the vicinity of any proposed works will require Tree Protection Zones to be established prior to commencing any works onsite including demolition, bulk earthworks, trenching, construction, landscaping activity, delivery and storage of materials or placement of site sheds.
- 7.2 Tree protection must be incorporated into the design and appropriate construction controls, fencing and management practices must be implemented prior to commencing any construction related activity, including demolition, bulk earthworks construction of gantries, etc.
- 7.3 The tree protection zones for all trees to be retained within the site and on adjacent properties must be clearly shown on all design drawings and plans with appropriate notations so that all staff and contractors are aware of the responsibility to protect trees throughout the design, development and delivery of the project.
- 7.4 The TPZ fencing must be in the form of either temporary fencing panels with concrete block feet and locked together or water filled barriers with locking pins installed. TPZ fencing must be sufficiently robust to withstand knocks and bumps from plant and machinery, delivery vehicles, storage of materials and dumping of spoil.
- 7.5 Appropriate signage stating 'Tree protection Zone- No access' is to be fixed to the fencing to alert people as to importance of the tree protection zone.
Refer to Figure 1 for fencing example.

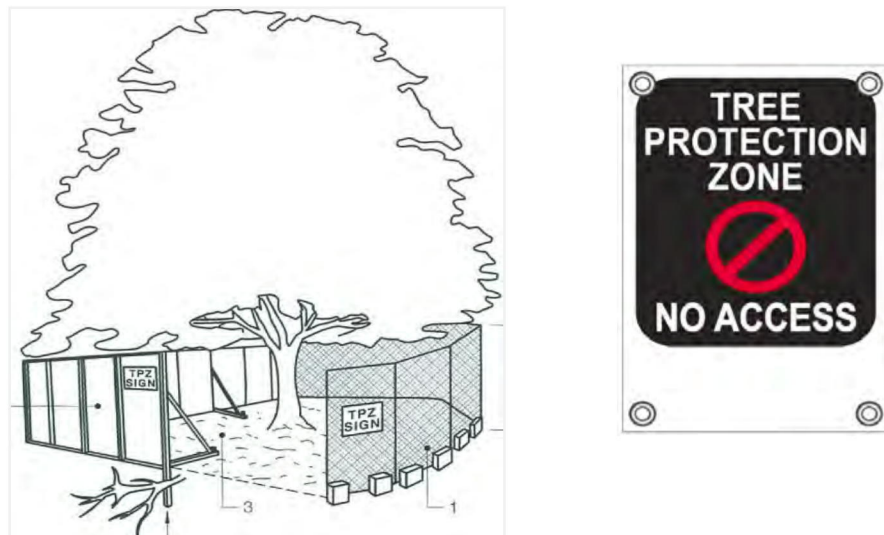


Figure 1. Above left - Example of TPZ fencing above right -Example of TPZ signage.

- 7.6 The following activities must be excluded from or controlled within the Tree Protection Zones (TPZ) unless otherwise approved by the relevant authority or the Project Arborist.
 - Machine excavation (including trenching) for continuous strip footings or installation of underground services or road base
 - Alteration of soil levels including placement of fill

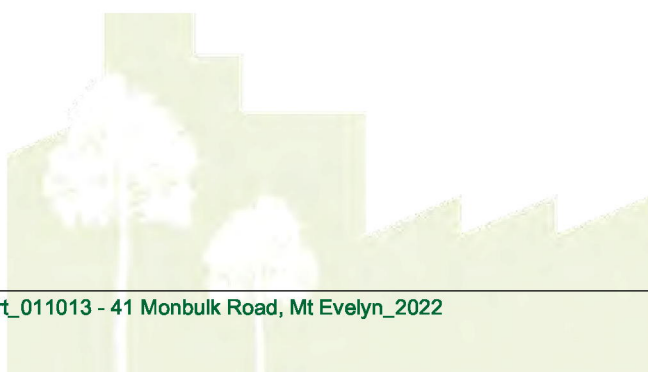
- Storage of wastes or materials (including fuels, oils or chemicals)
- Preparation of or cleaning of any cement products
- Storage and or parking of vehicles or any plant/machinery within TPZ
- Washing down of equipment
- Installation of utilities
- Physical damage of any kind to the tree (including direct attachment of anything into the tree)
- Soil cultivation

7.7 No form of excavation or trenching for installation of underground services is permitted within the nominated TPZ areas of any retained trees without prior consultation with the council and / or site arborist, to avoid severing roots that could be vital to the stability and continued sustainability of the retained trees.

- Trenching for the installation of any and all underground services must be designed to avoid encroaching the TPZ of any retained trees.
- If it is unavoidable that an underground service must pass through a defined TPZ, the service must be installed via directional boring at a minimum depth of 750mm to the top of the bore head.
All entry and exit points for the boring must be located beyond the TPZ radius.
- Lubricants or waste water from the boring process must not be permitted to enter or contaminate the soils within the TPZ.

7.8 Temporary facilities and site sheds may be established on existing hard stand if already present within a TPZ providing there is no physical impacts to the trees and no requirement to penetrate the surface within the TPZ for installation of footings or underground services. Access / egress to these facilities must not encroach or compact the native soil within the TPZ.

7.9 Refer to Appendix 1 for all tree data, Appendix 2 for tree location and TPZ maps and Appendix 3 for Tree Descriptors.



8 Conclusion.

- 8.1 In summary, thirteen (13) tree features were assessed comprising 12 trees and 1 linear hedge group comprising approximately 20 individual screening trees / shrubs.
- 8.2 The trees within the site comprise a mixture of introduced native and exotic species planted for garden and amenity purposes interspersed with maturing indigenous trees growing primarily in the adjacent road reserves or on the southern boundary.
- 8.3 An assessment of which trees may trigger permit requirement has been made based on a review of the tree assessment data including tree species and dimensions, and the spatial layout of the trees in relation to buildings, driveways and property boundaries. Refer to Table 1 in Section 3 for tree numbers sorted by Permit requirements and Column titled 'Permit' in the tree assessment tables in Appendix 1.
- 8.4 The trees generally displayed health and structural condition considered to be typical and acceptable for these species and age growing in this area under prevailing conditions with the exception of Tree 3 which displayed evidence of progressing trunk and limb decay.
- 8.5 Each tree feature was attributed an arboricultural rating which reflects the retention value of the trees.
- Nine (9) trees were attributed a Moderate arboricultural rating including,
 - Six (9) trees rated Moderate B, being middle of the range and typical of the species in this environment.
 - Three (3) trees rated Moderate C, being of either small size or displaying accumulated deficiencies that are tending towards becoming of Low arboricultural value.
 - Three (3) trees were attributed an arboricultural rating of Low, displaying symptoms of decline and structural deficiencies.
 - One (1) trees were attributed a rating of Very Low due to being self-sown weed trees.
 - Refer to Table 3 in Section 4 for tree numbers sorted by arboricultural rating.
- 8.6 The tree assessment report provides preliminary information on the tree population associated with the site, its arboricultural value and the appropriate tree protection zones required to preserve trees in conjunction with future site redevelopment.
- 8.7 Plans for site redevelopment as a service station, car-wash and drive-through convenience store with looping driveway access for cars and trucks were reviewed. *(Plan of Proposed Site Redevelopment – OTR Mount Evelyn Concept Plan - 41 Monbulk Road, Mount Evelyn (ADS Architects – Proj. No: JN1399 / Con04d, Date 24/10/21. Prepared by ADS Architects)*
- 8.8 Under the current design proposal
- Tree 10 and Group 1 exist within the proposed construction impact zone and are considered lost. Neither tree feature triggers permit requirements.

- Tree 4 will potentially be impacted by approximately 21.5% of the TPZ for construction of the automatic car wash.
 - Given the extent of precedent disturbance, soil compaction and level changes within the TPZ of Tree 4 that will have inhibited root colonization within this part of the TPZ, it is considered unlikely that the tree will incur any negative impacts from the proposed design and alignment of the car wash.
 - TPZ exclusion fencing must be established at the edge of the proposed works approximately 5 metres north of the trunk centre and maintained for the duration of the works on site.
- Four (4) trees in the southern neighbour's property, being Trees 3, 5, 6 and 7 will have minor TPZ encroachment of less than 6% in areas that have already had precedent site disturbance and soil compaction associated with the garden centre activities.
 - TPZ exclusion fencing must be established at the edge of the proposed works and maintained for the duration of the works on site.
- Refer to Table 4 and Section 6 for details of design review and tree impact assessments.
- All other trees can be retained without impact with appropriate TPZ fencing established and maintained for the duration of the site redevelopment works.

- 8.9 Any trees that are to be retained in the vicinity of any proposed works will require Tree Protection Zones to be established prior to commencing any works onsite including demolition, bulk earthworks, trenching, construction, landscaping activity, delivery and storage of materials or placement of site sheds.
- 8.10 Tree protection must be incorporated into the design and appropriate construction controls, fencing and management practices must be implemented prior to commencing any construction related activity.
- 8.11 The tree protection zones for all trees to be retained within the site and on adjacent properties must be clearly shown on all design drawings and plans with appropriate notations so that all staff and contractors are aware of the responsibility to protect trees throughout the design, development and delivery of the project.
- 8.12 Tree condition can change quickly in response to environmental conditions or altered landscape conditions. Retained trees should be re-inspected on a 3-5 year basis or following any locally damaging weather events and appropriate remedial works undertaken as required.

I am available to answer any questions arising from this report.

No part of this report is to be reproduced unless in full.

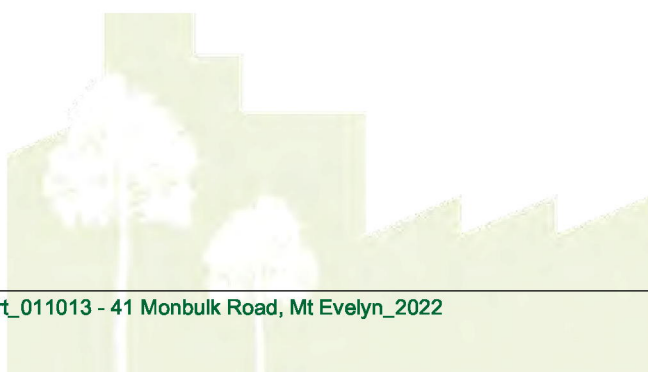
References and bibliography:

Australian Standard (4970-2009) Protection of Trees on development sites. Standards Australia, Sydney NSW Australia

Harris, R.W, Clark, J.R. & Matheny, N.P. (2004), *Arboriculture: Integrated Management of Landscape trees, shrubs and vines*, Prentice Hall, New Jersey.

Clark, J.R. & Matheny, N.P (1998), *Trees and Development: A technical guide to preservation of trees during land development*. ISA, Champaign, Illinois.

Standards Australia (2007), Australian Standard (4373-2007) - Pruning of Amenity trees, Standards Australia, Homebush.



Appendix 1: Tree Assessment Data: 41 Monbulk Road, Mt Evelyn

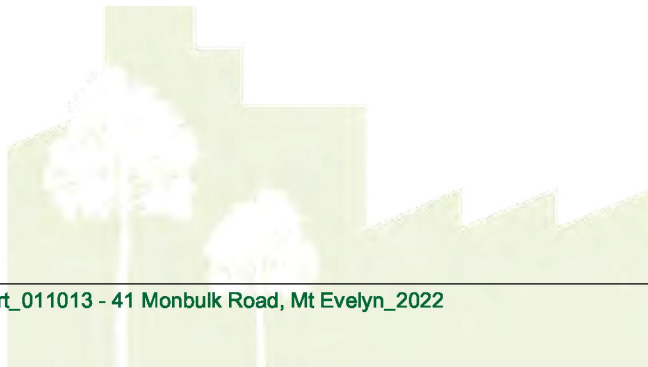
Key: DBH = Diameter measured in centimetres at breast height (1.4m up trunk) unless otherwise indicated.

Arb. Rating = Arboricultural Rating. ULE = Useful Life Expectancy.

TPZ = Tree protection zone in radial metres. SRZ = Structural root zone in radial metres.

TPZ & SRZ radius applies from centre of trunk.

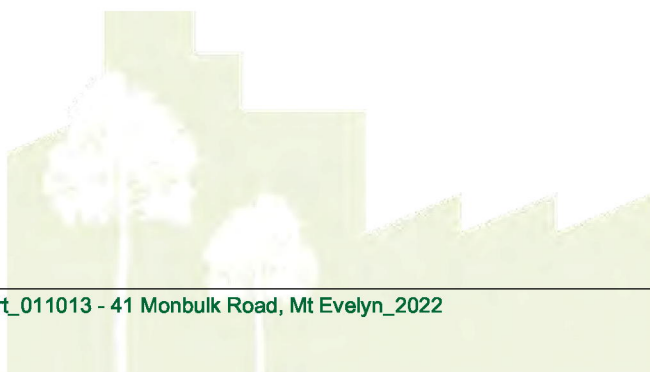
Definition of the descriptor categories used in the assessment can be seen in Appendix 3.



Tree ID	Botanic name	Common Name	Age class	Origin	DBH_cm	Height_m	Width_m	Health	Structure	Arb_rating	ULE_ys	Risk_level	Comments	Permit	TPZ rad_m	SRZ rad_m	Impact	%TPZ encroachment
1	<i>Eucalyptus baxteri</i>	Brown Stringybark	Maturing	Indigenous	62	23	15	Fair	Fair	Moderate B	11-20 y	Low	Acute forks, Over-extended limbs, Past branch failure, Street tree	Street tree	7.4	2.9	None	0
2	<i>Eucalyptus obliqua</i>	Messmate Stringybark	Maturing	Indigenous	63,62	21	14	Fair	Fair to Poor	Moderate B	11-20 y	Low	Co-dominant stems, Crossing branches, Over-extended limbs, Street tree, Trunk wounds, Stems cross over & rubbing	Street tree	10.6	3.6	None	0
3	<i>Eucalyptus globulus subsp. bicostata</i>	Victorian Blue Gum	Maturing	Victorian native	81	21	17	Fair	Fair to Poor	Low	6-10 y	Low	Bracket fungi, Limb wounds, Over-extended limbs, Trunk wounds, OXL developing, Phellinus on wound at 2.8m & dead branch union at 8m Nth, Future removal due to decay, 5.7m east of house, 9m off fence	Neighbour's tree, SLO22	9.7	3.2	TPZ	1.35
4	<i>Eucalyptus obliqua</i>	Messmate Stringybark	Maturing	Indigenous	89	22	19	Fair	Fair	Moderate B	11-20 y	Low	Hangers, Minor dieback, Over-extended limbs, Past branch failure, Possible hanger caught up in top of hedge trees	52.12 exempt, IZ, 52.17	10.7	3.4	TPZ (major)	21.51
5	<i>Allocasuarina torulosa</i>	Rose She-oak	Over-mature	Australian native	47,40,40 (est.)	14	14	Fair	Fair to Poor	Moderate C	6-10 y	Low	Acute forks, Included bark forks, Multi-stemmed, Neighbour's tree, Past stem failure	Neighbour's tree, SLO22	8.8	3.0	TPZ	5.42
6	<i>Liquidambar formosana</i>	Fornosan Evergreen Liquidamber	Maturing	Exotic deciduous	70 (est.)	13	14	Fair	Fair to Poor	Moderate B	11-20 y		Neighbour's tree, ~5m off boundary	Neighbour's tree, SLO22	8.4	2.9	TPZ	0.61
7	<i>Cryptomeria japonica</i>	Japanese Cedar	Early-mature	Exotic conifer	37 (est.)	14	8	Fair	Fair	Moderate B	11-20 y		Neighbour's tree, Partly suppressed - crown bias, NE. Impacting fence	Neighbour's tree, SLO22	4.4	2.3	TPZ	0.58
8	<i>Xcupressocypariss leylandii</i>	Leyland Cypress	Maturing	Exotic conifer	50,40 (est.)	14	14	Fair	Fair	Moderate C	11-20 y	Low	Neighbour's tree, ~1m off fence	Neighbour's tree, SLO22	7.7	2.9	None	0
9	<i>Eucalyptus viminalis</i>	Manna Gum	Early-mature	Indigenous	55 (est.)	23	13	Fair	Fair	Moderate B	11-20 y	Low	Neighbour's tree, <1m off fence	Neighbour's tree, SLO22	6.6	2.7	None	0
10	<i>Castanospermum australe</i>	Black Bean	Early-mature	Australian native	12,4,4,3	3	3	Fair	Fair	Low	6-10 y	Low	Lopped, multistemmed stump resprout	Undersize	2.0	1.5	Within	50.12
11	<i>Pittosporum eugenioides 'Variegatum'</i>	Variegated Tarata	Early-mature	Exotic evergreen	14	4	4	Fair	Fair	Low	6-10 y	Low		Undersize	2.0	1.5	None	0
12	<i>Ligustrum lucidum</i>	Shining Privet	Early-mature	Exotic evergreen	10,9,9,9,8	5	5	Fair	Fair to Poor	Very Low	6-10 y	Low	Self-sown weed species	Weed	2.0	1.5	None	0
G1	<i>Photinia serratifolia; Pittosporum eugenioides 'Variegatum'; Pittosporum undulatum</i>	Chinese Hawthorn, Variegated Tarata, Sweet Pittosporum	Early-mature	Exotic evergreen, Victorian native	20,18,17,14,10	7	7	Fair	Fair to Poor	Moderate C	11-20 y	Low	Linear row of approximately 20 hedge/screen trees at 2-3m spacings, Photinia becoming overgrown	52.12 exempt, IZ	4.3	2.0	Within	100

Appendix 2A: Tree Location Plan: 41 Monbulk Road, Mt Evelyn – Existing Conditions

Refer to following page.





APPENDIX 2 — TREE LOCATIONS & TPZ PLAN

PROJECT
41 Monbulk Road, Mt Evelyn

TL REF.
011013

DATE
2022-02-04

MAP NO.
1 / 1

CLIENT
PC Infrastructure Pty Ltd

DATA SOURCES
Nearmap Aerial Imagery (18/12/2019)
Detail Survey 41-43 Monbulk Road, Mt Evelyn (Fyfe: Proj: 80875-1. 22/06/2020.

LEGEND

- | | | | | | | | | | | | |
|----------------------------|---------|---------|---------|-------|------------|-----------------------------|---------|-----------------|----------------|---------|------------|
| Trees by Arb rating | ◆ Mod-A | ◆ Mod-B | ◆ Mod-C | ◆ Low | ◆ Very Low | Groups by Arb rating | ■ Mod-C | Cadastre | ■ SUBJECT SITE | ■ Other | ■ Easement |
| Protection Zones | ○ TPZ | ○ SRZ | | | | | | | | | |

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55



Appendix 2B: Tree Location Plan: 41 Monbulk Road, Mt Evelyn – Proposed design

Refer to following page.





APPENDIX 2 —Design Proposal and TPZ encroachments

PROJECT
41 Monbulk Road, Mt Evelyn

TL REF.
011013

DATE
2022-02-04

MAP NO.
1/1

CLIENT
PC Infrastructure Pty Ltd

DATA SOURCES
Nearmap Aerial Imagery (18/12/2019)
Detail Survey 41-43 Monbulk Road, Mt Evelyn (Fyfe: Proj: 80875-1. 22/06/2020.

LEGEND

Trees by Arb rating	▼ Very Low	□ SRZ	cadastre
◆ Mod-A	Groups by Arb rating	□ TPZ encroachment	▭ SS
● Mod-B	▭ Mod-C	▭ TPZ	▭ G
◆ Mod-C	Protection Zones	▭ TPZ (Major)	
■ Low	□ TPZ	▭ Within	

Design Plan
Plan of Proposed Site Redevelopment – OTR Mount Evelyn Concept Plan - 41 Monbulk Road, Mount Evelyn (ADS Architects – Proj. No: JN1399 / Con04d, Date 24/10/21. Prepared by ADS Architects

TREE LOCATION DISCLAIMER
Tree locations are approximate

COORDINATE REFERENCE SYSTEM
EPSG:28355 | GDA 94 MGA Zone 55

Tree pictures

Tree No: 1. Brown Stringybark
(*Eucalyptus baxteri*) Maturing, Indigenous
DBH: 62cm. Height x Width: 23 x 15m.
Arb. Rating: Moderate B. TPZ: 7.4m rad.



Tree No: 2. Messmate Stringybark
(*Eucalyptus obliqua*) Maturing, Indigenous
DBH: 63,62cm. Height x Width: 21 x 14m.
Arb. Rating: Moderate B. TPZ: 10.6m rad.



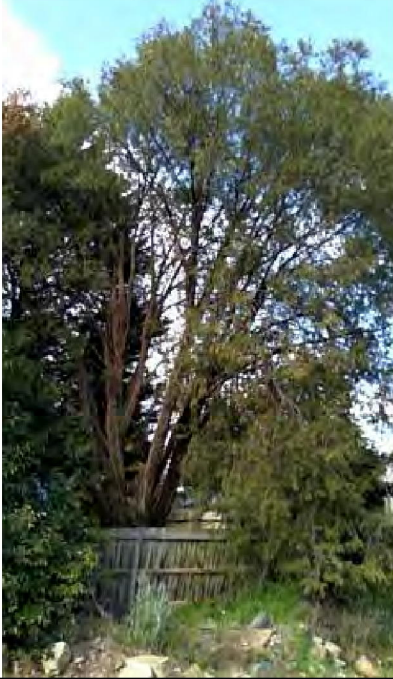
Tree No: 3. Victorian Blue Gum
(*Eucalyptus globulus subsp. bicostata*)
Maturing, Victorian native
DBH: 81cm. Height x Width: 21 x 17m.
Arb. Rating: Low (Decay affected).
TPZ: 9.7m rad.



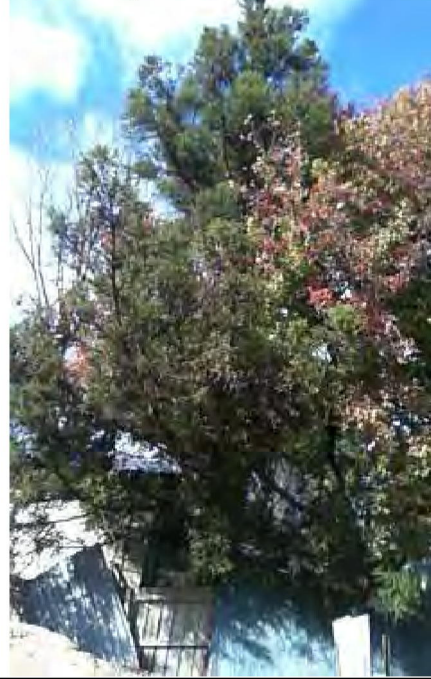
Tree No: 4. Messmate Stringybark
(*Eucalyptus obliqua*) Maturing, Indigenous
DBH: 89cm. Height x Width: 22 x 19m.
Arb. Rating: Moderate B. TPZ: 10.7m rad.



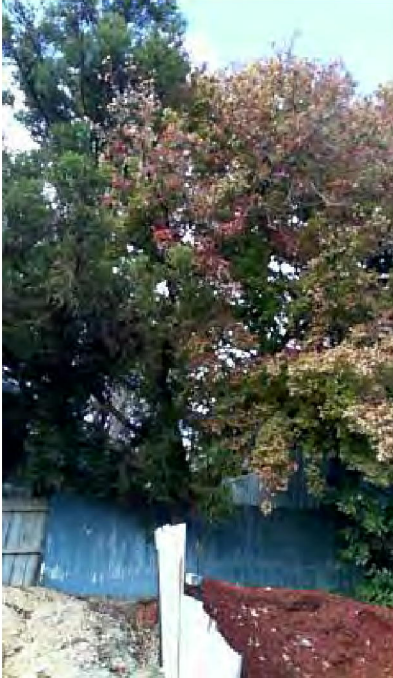
Tree No: 5 Rose She-oak
(*Allocasuarina torulosa*) Over-mature,
Australian native. DBH: 47,40,40
(est.)cm. Height x Width: 14 x 14m.
Arb. Rating: Moderate C. TPZ: 8.8m rad.



Tree No: 7. Japanese Cedar
(*Cryptomeria japonica*) Early-mature,
Exotic conifer. DBH: 37(est.)cm.
Height x Width: 14 x 8m.
Arb. Rating: Moderate B. TPZ: 4.4m rad.



Tree No: 6. Formosan Evergreen Liquidamber
(*Liquidambar formosana*) Maturing, Exotic
deciduous. DBH: 70 (est.)cm. Height x Width:
13 x 14m. Arb. Rating: Moderate B. TPZ: 8.4m
rad.



Tree No: 8. Leyland Cypress
(*XCupressocyparis leylandii*)
Maturing, Exotic conifer DBH: 50,40 (est.)cm.
Height x Width: 14 x 14m.
Arb. Rating: Moderate C. TPZ: 7.7m rad.



Tree No: 9. Manna Gum
(*Eucalyptus viminalis*) Early-mature,
Indigenous DBH: 55 (est.)cm.
Height x Width: 23 x 13m.
Arb. Rating: Moderate B. TPZ: 6.6m rad.



Tree No: 11. Variegated Tarata
(*Pittosporum eugenioides 'Variegatum'*)
Early-mature, Exotic evergreen
DBH: 14cm. Height x Width: 4 x 4m.
Arb. Rating: Low. TPZ: 2.0m rad.



Tree No: 10. Black Bean
(*Castanospermum australe*) Early-mature,
Australian native. DBH: 12,4,4,3cm.
Height x Width: 3 x 3m.
Arb. Rating: Low. TPZ: 2.0m rad.



Tree No: 12. Shining Privet
(*Ligustrum lucidum*) Early-mature,
Exotic evergreen. DBH: 10,9,9,9,8cm.
Height x Width: 5 x 5m.
Arb. Rating: Very Low. TPZ: 2.0m rad.



Tree No: Group 1. Chinese Hawthorn,
Variegated Tarata, Sweet Pittosporum
(*Photinia serratifolia*; *Pittosporum eugenioides*
'*Variegatum*'; *Pittosporum undulatum*) Early-
mature, Exotic evergreen & Victorian native
DBH: ~20,18,17,14,10cm.
Height x Width: ~7 x 7m.
Arb. Rating: Moderate C. TPZ: 4.3m rad.



Appendix 3: Arboricultural Descriptors (June 2018)

Note that not all of the described tree descriptors may be used in a tree assessment and report. The assessment is undertaken with regard to contemporary arboricultural practices and consists of a visual inspection of external and above-ground tree parts.

1. 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 under current climatic conditions. 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 assessor.

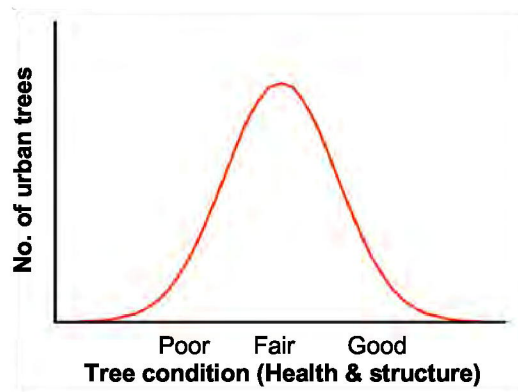


Diagram 1: Indicative normal distribution curve for tree condition

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.

2. Tree Name

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

3. 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. Remnant.
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous (component of EVC benchmark). Could be planted indigenous trees.
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

4. 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 assessor'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).

Crown height, crown spread are generally recorded to the nearest half metre (crown spread would be rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m. Estimated dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered) shall be clearly identified in the assessment data.

5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment and an individual trees specific characteristics. DBH is the typical trunk diameter captured as it relates to the allocation of tree protection distances. The basal trunk diameter assists in the allocation of a structural root zone. Some municipalities require trunk diameters be captured at different heights, with 1.0 m above grade being a common requirement. The specific planning schemes will be checked to ascertain requirements.

Stem diameters shall be recorded in centimetres, rounded to the nearest 1 cm (0.01 m).

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 sites*. Measurements undertaken using foresters tape or builders tape.

Basal trunk diameter

The basal dimension is the trunk diameter measured at the base of the trunk or main stem(s) immediately above the root buttress. Used to ascertain the Structural Root Zone (SRZ) as outlined in AS4970.

6. Age class

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

Category	Description
Young	Sapling tree and/or recently planted. Approximately 5 or less years in location.
Semi-mature	Tree increasing in size and yet to achieve expected size in situation. Primary developmental stage.
Early-mature	Tree established, generally growing vigorously. > 50% of attainable age/size.
Mature	Specimen approaching expected size in situation, with reduced incremental growth.
Over-mature	Mature full-size with a retrenching crown. Tree is senescent and in decline. Significant decay generally present.

7. Health

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

Health Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
Fair	Typical vigour. >80% canopy density	Minor or expected. Little or no dead wood	Typical. Minor deficiencies or defects could be present.	Minor, within damage thresholds
Fair to Poor	Below typical - low vigour	More than typical. Small sub-branch dieback	Exhibiting deficiencies. Could be thinning, or smaller	Exceeds damage thresholds
Poor	Minimal - declining	Excessive, large and/or prominent amount & size of dead wood	Exhibiting severe deficiencies. Thinning foliage, generally smaller or deformed	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

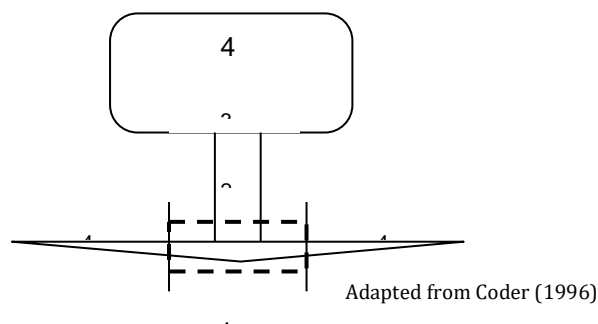
8. Structure

Assesses principal components of tree structure (Diagram 2).

Structure ratings will also take into account general branching architecture, stem taper, live crown ratio, crown symmetry (bias or lean) and crown position such as tree being suppressed amongst more dominant trees.

Diagram 2: Tree structure zones

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



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 then 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.

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). See table over page.

Structure Category	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No obvious damage, disease or decay; obvious basal flare / stable in ground	No obvious damage, disease or decay; well tapered	Well formed, attached, spaced and tapered. No history of failure.	No obvious damage, disease, decay or structural defect. No history of failure.
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Generally well attached, spaced and tapered branches. Minor structural deficiencies may be present or developing. No history of branch failure.	Minor damage, disease or decay; minor branch end-weight or over-extension. No history of branch failure.
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. Minor branch failure evident.
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 re-sprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely. Evidence of major branch failure.	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension. Branch failure evident.
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump re-sprout	Decayed, cavities or branch attachments with active split; failure imminent. History of major branch failure.	Excessive damage, disease or decay; excessive branch end-weight or over-extension. History of branch failure.

Useful life expectancy

Assessment of useful life expectancy provides an indication of health and tree appropriateness and involves an estimate of how long a tree is likely to remain in the landscape based on species, stage of life (cycle), health, amenity, environmental services contribution, conflicts with adjacent infrastructure and risk to the community. It would enable tree managers to develop long-term plans for the eventual removal and replacement of existing trees in the public realm. It is not a measure of the biological life of the tree within the natural range of the species. It is more a measure of the health status and the trees positive contribution to the urban landscape.

Within an urban landscape context, particularly in relation to street trees, it could be considered a point where the costs to maintain the asset (tree) outweigh the benefits the tree is returning.

The assessment is based on the site conditions not being significantly altered and that any prescribed maintenance works are carried out (site conditions are presumed to remain relatively constant and the tree would be maintained under scheduled maintenance programs). See table over page.

Useful Life Expectancy category	Typical characteristics
<1 year (No remaining ULE)	Tree may be dead or mostly dead. Tree may exhibit major structural faults. Tree may be an imminent failure hazard. Excessive infrastructure damage with high risk potential that cannot be remedied.
1-5 years (Transitory, Brief)	Tree is exhibiting severe chronic decline. Crown is likely to be less than 50% typical density. Crown may be mostly epicormic growth. Dieback of large limbs is common (large deadwood may have been pruned out). Tree may be over-mature and senescing. Infrastructure conflicts with heightened risk potential. Tree has outgrown site constraints.
6-10 years (Short)	Tree is exhibiting chronic decline. Crown density will be less than typical and epicormic growth is likely to present. The crown may still be mostly entire, but some dieback is likely to be evident. Dieback may include large limbs. Over-mature and senescing or early decline symptoms in short-lived species. Early infrastructure conflicts with potential to increase regardless of management inputs.
11-20 years (Moderate)	Tree not showing symptoms of chronic decline, but growth characteristics are likely to be reduced (bud development, extension growth etc.). Tree may be over-mature and beginning to senesce. Potential for infrastructure conflicts regardless of management inputs.
21-40 years (Moderately long)	Trees displaying normal growth characteristics but vigour is likely to be reduced (bud development, extension growth etc.). Tree may be growing in restricted environment (e.g. streetscapes) or may be in late maturity. Semi-mature and mature trees exhibiting normal growth characteristics. Juvenile trees in streetscapes.
>40 years (Long)	Generally juvenile and semi-mature trees exhibiting normal growth characteristics within adequate spaces to sustain growth, such as in parks or open space. Could also pertain to maturing, long-lived trees. Tree well suited to the site with negligible potential for infrastructure conflicts.

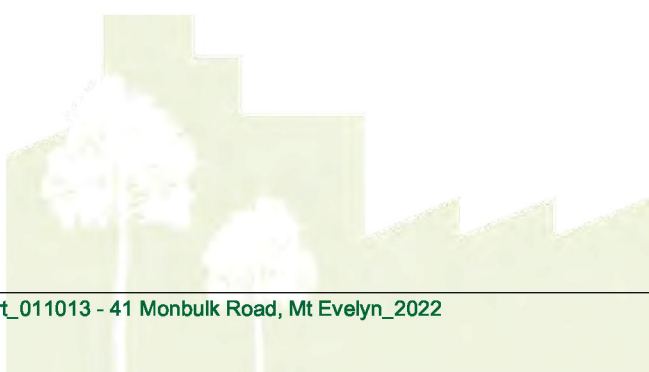
Note that ULE may change for a tree dependent on the prevailing climatic conditions, which can either increase or decrease, or sudden changes to a tree's growing environment creating an acute stress.

The ULE may not be applicable for trees that are manipulated, such as topiary, or grown for specific horticultural purposes, such as fruit trees.

There may be instances where remedial tree maintenance could be extend a tree's ULE.

9. Arboricultural Rating

Relates to the 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. See table over page.



Arboricultural rating Category	Description
High	<p>Tree of high quality in good to fair condition; good vigour. Generally a prominent arboricultural/landscape feature. Particularly good example of the species; rare or uncommon. Tree may have significant conservation or other cultural value.</p> <p>These trees have the potential to be a medium- to long-term components of the landscape (moderately long to long ULE) if managed appropriately.</p> <p>Retention of these trees is highly desirable.</p>
Moderate	<p><i>General -</i></p> <p>Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond to arboricultural treatment.</p> <p>These trees have the potential to be a moderate- to long-term component of the landscape (moderate to long ULE) if managed appropriately. Retention of these trees is generally desirable. The following sub-categories relate predominately to age and size and amenity.</p>
	<p>A. Moderate to large, maturing tree. Contributes to the landscape character. Tree may have conservation or other cultural value.</p>
	<p>B. Moderate sized, established tree, > 50% of attainable age/size. Contributes to the landscape character.</p> <p>Maturing tree with amenity value but with identified deficiencies</p>
<p>C. Small and/or semi-mature tree, established, >5 years in the location. May not be a dominant canopy. No special qualities.</p> <p>Maturing tree, accumulating deficiencies, trending towards being of Low arboricultural value.</p>	
Low	<p>Unremarkable tree of low quality or little amenity value. Tree in either poor health or with poor structure or a combination. Short to transitory useful life expectancy.</p> <p>Tree is not significant because of either its size or age, such as young trees with a stem diameter below 15 cm. Trees regularly pruned to restrict size. These trees are easily replaceable.</p> <p>Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained.</p> <p>Retention of such trees may be considered if not requiring a disproportionate expenditure of resources for a tree in its condition and location.</p>
Very Low	<p>Trees of low quality with an estimated remaining life expectancy of less than 5 years.</p> <p>Tree has either a severe 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.</p> <p>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.</p> <p>Tree whose retention would not be viable after the removal of adjacent trees (includes 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).</p> <p>Tree has a detrimental effect on the environment, for example, the tree is a recognised environmental woody weed with potential to spread into waterways or natural areas.</p> <p>Unremarkable tree of no material landscape, conservation or other cultural value.</p>

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 criterion is designed to highlight other considerations that may influence the future management of such trees.

Significance	Description
Horticultural Value/ Rarity	Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant 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 associations 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 contribute to biological diversity

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Appendix 4: Tree protection zones.

Introduction

In order to sustain trees on a development site consideration must be given to the establishment of tree protection zones.

The physical dimensions of tree protection zones can sometimes be difficult to define. The projection of a tree's crown can provide a guide but is by no means the definitive measure. The unpredictable nature of roots and their growth, differences between species and their tolerances, and observable and hidden changes to the trees growing environment, as a result of development, are variables that must be considered.

Most vigorous, broad canopied trees survive well if the area within the drip-line of the canopy is protected. Fine root density is usually greater beneath the canopy than beyond (Gilman, 1997). If few to no roots over 3cm in diameter are encountered and severed during excavation the tree will probably tolerate the impact and root loss. A healthy tree can sustain a loss of between 30% and 50% of absorbing roots (Harris, Clark, Matheny, 1999), however encroachment into the structural root system of a tree may be problematic.

The structural root system of a tree is responsible for ensuring the stability of the entire tree structure in the ground. A tree could not sustain loss of structural root system and be expected to survive let alone stand up to average annual wind loads upon the crown.

Allocation of tree protection zone (TPZ)

The method of allocating a TPZ to a particular tree will be influenced by site factors, the tree species, its age and developed form.

Once it has been established, through an arboricultural assessment, which trees and tree groups are to be retained, the next step will require careful management through the development process to minimise any impacts on the designated trees. The successful retention of trees on any particular site will require the commitment and understanding of all parties involved in the development process. The most important activity, after determining the trees that will be retained is the implementation of a TPZ.

The intention of tree protection zones is to:

- mitigate tree hazards;
- provide adequate root space to sustain the health and aesthetics of the tree into the future;
- minimise changes to the trees growing environment, which is particularly important for mature specimens;
- minimise physical damage to the root system, canopy and trunk; and
- define the physical alignment of the tree protection fencing

Tree protection

The most important consideration for the successful retention of trees is to allow appropriate above and below ground space for the trees to continue to grow. This requires the allocation of tree protection zones for retained trees.

The Australian Standard AS 4970-2009 Protection of trees on development sites has been used as a guide in the allocation of TPZs for the assessed trees.

The TPZ for individual trees is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the trees DBH by 12. The method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The minimum TPZ should be not less than 2m and the maximum no more than 15m radius. The TPZ of palms should be not less than 1.0m outside the crown projection.

Encroachment into the TPZ is permissible under certain circumstances though is dependent on both site conditions and tree characteristics. Minor encroachment, up to 10% of the TPZ, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Examples are provided in Diagram 1. Encroachment greater than 10% is considered major encroachment under AS4970-2009 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable.

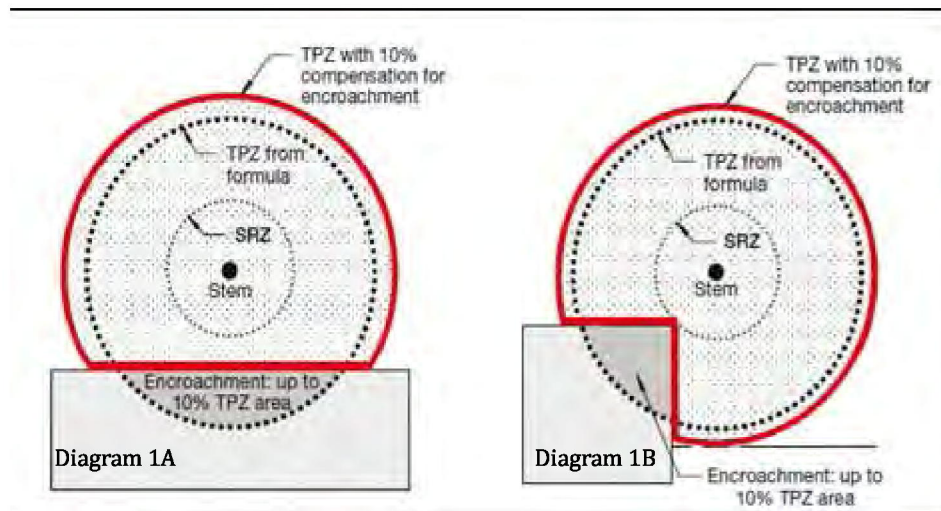


Diagram 1: Examples of minor encroachment into a TPZ.

(Extract from: AS4970-2009, Appendix D, p30 of 32)

The 10% encroachment on one side equates to approximately $\frac{1}{3}$ radial distance. Tree root growth is opportunistic and occurs where the essentials to life (primarily air and water) are present. Heterogeneous soil conditions, existing barriers, hard surfaces and buildings may have inhibited the development of a symmetrically radiating root system.

Existing infrastructure around some trees may be within the TPZ or root plate radius. The roots of some trees may have grown in response to the site conditions and therefore if existing hard surfaces and building alignments are utilised in new designs the impacts on the trees should be minimal. The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998). Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build.

The TPZ should also give consideration to the canopy and overall form of the tree. If the canopy requires severe pruning in order to accommodate a building and in the process the form of the tree is diminished it may be worthwhile considering altering the design or removing the tree.

General tree protection guidelines

The most important factors are:

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is to mulch the zone with woodchip and erect tree protection fencing. This must be completed prior to any materials being brought on-site, erection of temporary site facilities or demolition/earth works. The protection fencing must be sturdy and withstand winds and construction impacts. The protection fence should only be moved with approval of the site supervisor. Other root zone protection methods can be incorporated if the TPZ area needs to be traversed.
- Appropriate signage is to be fixed to the fencing to alert people as to importance of the tree protection zone.
- The importance of tree preservation must be communicated to all relevant parties involved with the site.
- Inspection of trees during excavation works.

TPZ fencing

TPZ fencing must be in the form of either temporary fencing panels with concrete block feet and locked together or water filled barriers with locking pins installed. TPZ fencing must be sufficiently robust to withstand knocks and bumps from plant and machinery, delivery vehicles, storage of materials and dumping of spoil.

- Appropriate signage stating 'Tree protection Zone- No access' is to be fixed to the fencing to alert people as to importance of the tree protection zone.

Refer to Figure 1 for fencing example.



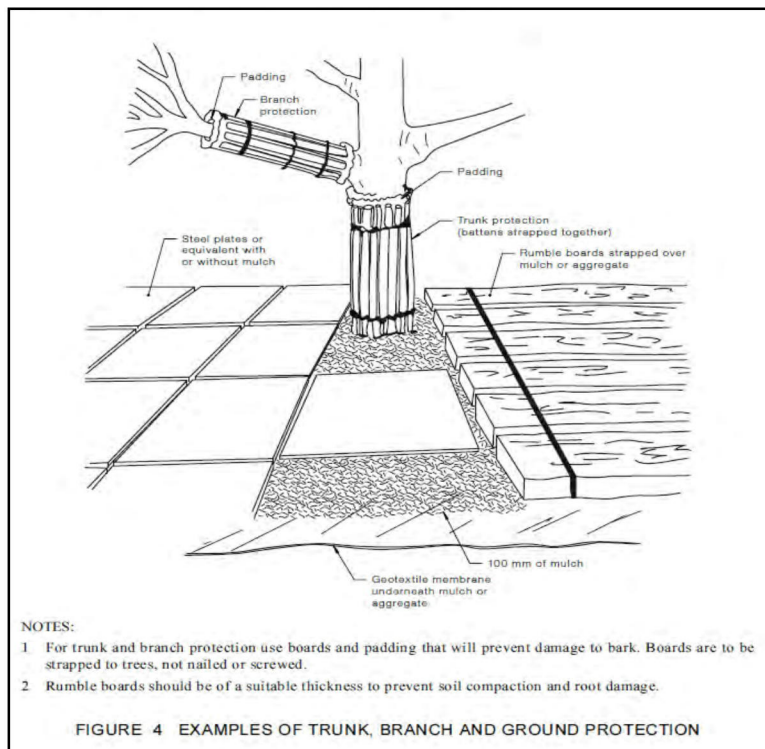
Figure 1. Above left - Example of TPZ fencing above right -Example of TPZ signage.

Ground buffering

Where works are required to be undertaken within the Tree root zone without penetration of the surface, ground buffering and trunk and limb protection must be provided to minimise the potential for soil to become compacted and avoid potential for impact wounds to occur to surface roots, trunk or limbs.

Refer to Diagram 2 below.

Diagram 2: Examples of ground buffering and trunk and limb protection.



(Extract from: AS4970-2009, Appendix D, pg17)

Exploratory excavation

The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998).

Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build. This also allows management decisions to be made and allows time for redesign works if required.

Any exploratory excavation within the allocated TPZ is to be undertaken with due care of the roots. Minor exploration is possible with hand tools. More extensive exploration may require the use of high pressure water or air excavation techniques. Either hydraulic or pneumatic excavation techniques will safely expose tree roots; both have specific benefits dependent on the situation and soil type. An arborist is to be consulted on which system is best suited for the site conditions.

Substantial roots are to be exposed and left intact.

Once roots are exposed decisions can be made regarding the management of the tree. Decisions will be dependent on the tree species, its condition, its age, its relative tolerance to root loss, and the amount of root system exposed and requiring pruning.

Other alternative measures to encroaching the TPZ may include boring or tunnelling.

How to determine the diameter of a substantial root

The size of a substantial root will vary according to the distance of the exposed root to the trunk of the tree. The further away from the trunk of a tree that a root is, the less significant the root is likely to be to the tree's health and stability.

The determination of what is a substantial root is often difficult because the form, depth and spread of roots will vary between species and sites. However, because smaller roots are connected to larger roots in a

framework, there can be no doubt that if larger roots are severed, the smaller roots attached to them will die. Therefore, the larger the root, the more significant it may be.

Gilman (1997) suggests that trees may contain 4-11 major lateral roots and that the five largest lateral roots account (act as a conduit) for 75% of the total root system.

These large lateral roots quickly taper within a distance to the tree, this distance is identified as the Structural Root Zone (SRZ). Within the SRZ distance, all roots and the soil surrounding the roots are deemed significant.

No root or soil disturbance is permitted within the SRZ.

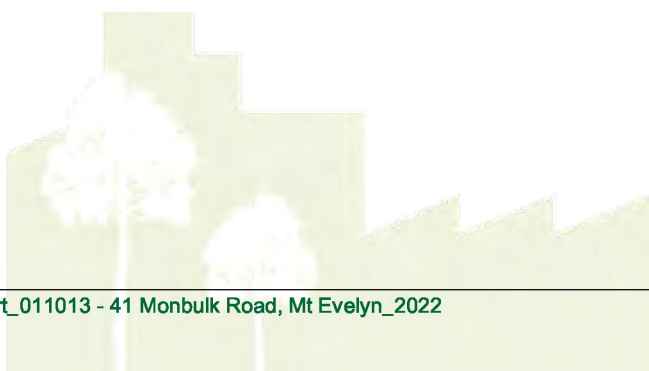
In the area outside the SRZ the tree may tolerate the loss of one or a number of roots. The table below indicates the size of tree roots, outside the SRZ that would be deemed substantial for various tree heights. The assessment of combined root loss within the TPZ would need to be undertaken by an arborist on an individual basis because the location of the tree, its condition and environment would need to be assessed.

Table 1: Estimated significant root sizes outside SRZ

Height of tree	Diameter of root
Less than 5m	≥ 30mm
Between 5m - 15m	≥ 50mm
More than 15m	≥ 70mm

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Construction Guidelines

The following are guidelines that must be implemented to minimise the impact of the proposed construction works on the retained trees.

- The Tree Protection Zone (TPZ) is fenced and clearly marked at all times. The actual fence specifications should be a minimum of 1.2 - 1.5 metres of chain mesh or like fence with 1.8 meter posts (e.g. treated pine or star pickets) or like support every 3-4 metres and a top line of high visibility plastic hazard tape. The posts should be strong enough to sustain knocks from on site excavation equipment. This fence will deter the placement of building materials, entry of heavy equipment and vehicles and also the entry of workers and/or the public into the TPZ. Note: There are many different variations on the construction type and material used for TPZ fences, suffice to say that the fence should satisfy the responsible authority.
- Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Successful tree preservation occurs when there is a commitment from all relevant parties involved in designing, constructing and managing a development project. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The importance of tree preservation must be communicated to all relevant parties involved with the site.
- The consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- A layer of organic mulch (woodchips) to a depth of no more than 100mm should be placed over the root systems within the TPZ of trees, which are to be retained so as to assist with moisture retention and to reduce the impact of compaction.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Where machinery is required to operate inside the TPZ it must be a small skid drive machine (i.e Dingo or similar) operating only forwards and backwards in a radial direction facing the tree trunk and not altering direction whilst inside the TPZ to avoid damaging, compacting or scuffing the roots.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No fuel, oil dumps or chemicals shall be allowed in or stored on the TPZ and the servicing and re-fuelling of equipment and vehicles should be carried out away from the root zones.
- No storage of material, equipment or temporary building should take place over the root zone of any tree.
- Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing device.
- Supplementary watering should be provided to all trees through any dry periods during and after the construction process. Proper watering is the most important maintenance task in terms of successfully retaining the designated trees. The areas under the canopy drip lines should be mulched with woodchip to a depth of no more than 100mm. The mulch will help maintain soil moisture levels. Testing with a soil probe in a number of locations around the tree will help ascertain soil moisture levels and requirements to irrigate. Water needs to be applied slowly to avoid runoff. A daily watering with 5 litres of water for every 30 mm of trunk calliper may provide the most even soil moisture level for roots (Watson & Himelick, 1997), however light frequent irrigations should be avoided. Irrigation should wet the entire root zone and be allowed to dry out prior to another application. Watering should continue from October until April.

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