RYDER
ARBORICULTURE & ENVIRONMENT

Assessment of trees along the proposed Mordialloc Bypass

Preliminary Tree Assessment Report

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31 May 2018

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1. Introduction

It is proposed to create the Mordialloc bypass from Dingley Bypass to the Mornington Peninsula Freeway. C&R Ryder Consulting has been engaged to assess the trees located along the length of the project site.

All the trees within the project boundary and those outside the boundary that may be impacted by the work have been assessed. Detailed tree locations are presented in Appendix 4 Enlarged Maps. This report will provide:

- the findings of the assessment
- tree retention summary
- any protection measures for trees to ensure their longevity.

2. Methodology

Trees located within the Mordialloc bypass project boundary were assessed between 22 March and 20 April 2018 (Figure 1). The following data were collected for the trees:

- Unique ID
- Image of tree
- Botanic and common name
- Tree dimensions (Height x Width)
- Diameter at breast height (DBH, measured at 1.3m above ground)
- Diameter at base (DAB)
- Health
- Structure
- Useful life expectancy (ULE)
- Tree significance
- Retention value
- Comments

The trees were assessed from ground level and differential GNSS (Global Navigation Satellite System) technique was used to locate the assessed trees. Trees have been aligned to match the feature survey wherever possible. Tree heights and crown widths were estimated, and trunk diameters were measured with a diameter tape. No invasive tests were conducted or samples taken and any assessments of decay are qualitative only.

For all tree assessment descriptors, see Appendix 1.

Several locations were assessed as groups (Appendix 2). This involved review of the trees as a whole, a brief description of the patch and mapping of an appropriate no-go zone that largely encompasses the trees' TPZs.

The data was collected for use by ecologists to assist in calculating likely offsets in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017).

3. Site Map

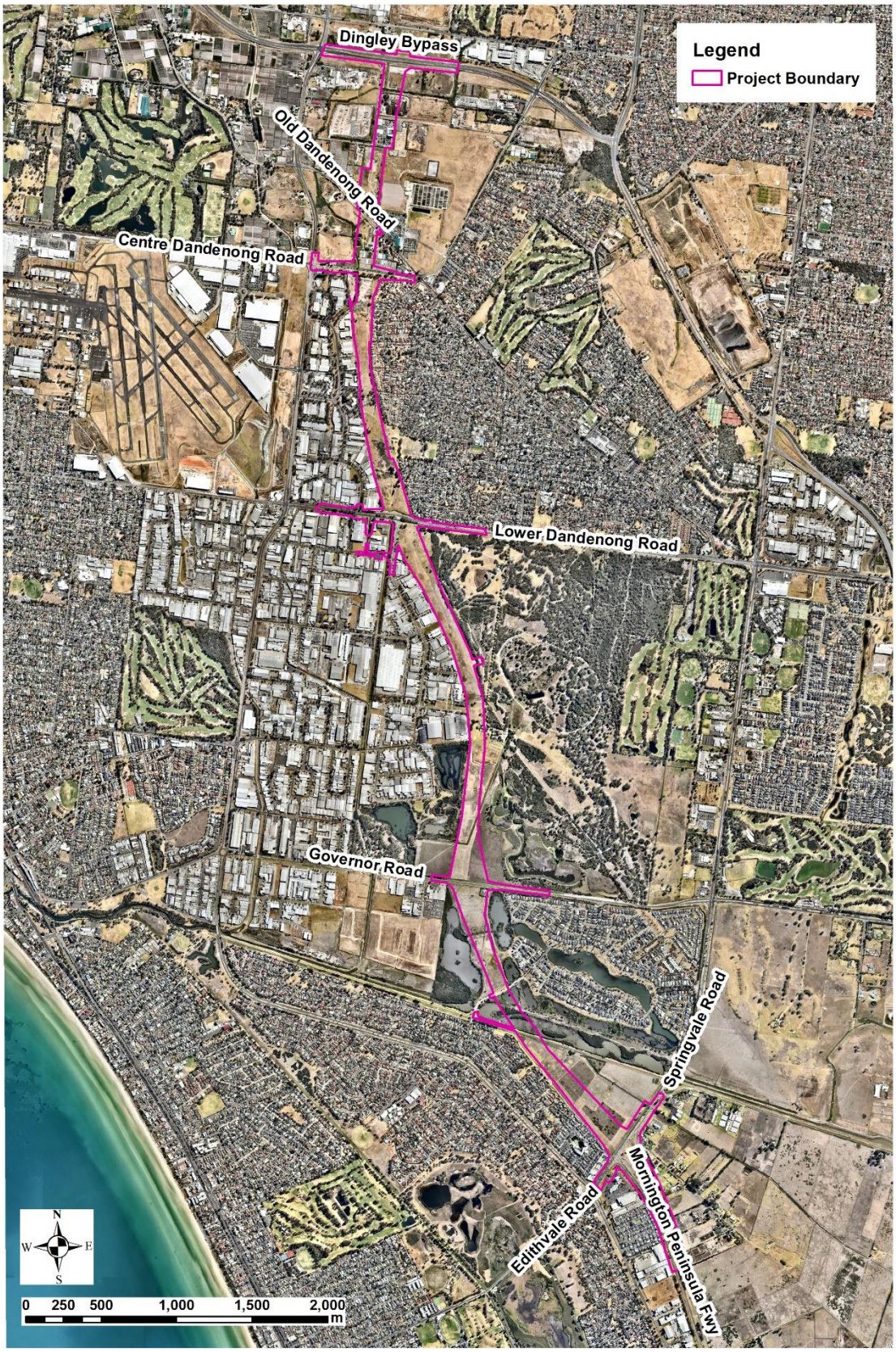

Figure 1: Aerial image of the project boundary

4. Tree Details

3,144 trees were assessed at the project site along Mordialloc bypass. It includes:

- 1,591 indigenous specimens
- 959 Australian native specimens
- 594 exotic specimens

As 82% of the trees are indigenous or native to Australia, they are largely well adapted to the site. Tabular tree data were provided in Appendix 3 and photographic reports on individual trees were provided in Appendix 5.

50% of the tree population comprised of only 4 tree species including River Red Gum *Eucalyptus camaldulensis*, Leyland Cypress x *Cuprocyparis leylandii,* Giant Honey Myrtle *Melaleuca armillaris* and Blackwood *Acacia melanoxylon* Table 1.

Table 1: Top 10 tree species at the project site.

Botanical Name	Common Name	Origin	Count	% of population
Eucalyptus camaldulensis	River Red Gum	Indigenous	835	27%
x *Cuprocyparis leylandii*	Leyland Cypress	Exotic	358	11%
Melaleuca armillaris	Giant Honey Myrtle	Native	224	7%
Acacia melanoxylon	Blackwood	Indigenous	142	5%
Eucalyptus leucoxylon	Yellow Gum	Native	121	4%
Allocasuarina verticillata	Drooping She Oak	Indigenous	108	3%
Eucalyptus viminalis	Manna Gum	Indigenous	96	3%
Eucalyptus ovata	Swamp Gum	Indigenous	94	3%
Eucalyptus botryoides	Southern Mahogany	Native	73	2%
Acacia dealbata	Silver Wattle	Indigenous	71	2%
	Other species		1,022	33%
	Total		3,144	

River Red Gum *Eucalyptus camaldulensis* is a medium to tall woodland tree that can grow up to 45m tall. When grown in open areas they often form a short, stout trunk and a wide spreading crown. It is one of the few eucalypts that lack a lignotuber; an underground swelling which is an organ for food storage and regeneration (Penfold & Willis 1961). The most widely distributed species in Australia, River Red Gums are found throughout most of Victoria and in every mainland state of Australia (Nicolle 2006).

Leyland Cypress *x Cuprocyparis leylandii* is a very fast-growing species commonly used for hedging and screening. It's height often exceeds that of expectations commonly reaching 20m or more in 20 years (Spencer 1995). It is usually purchased in the hope that it will provide a screen 3-4m in height and in a short time has out grown its position.

Giant Honey Myrtle or Bracelet Honey Myrtle *Melaleuca armillaris* is a large shrub or small tree to 10m high usually with a rounded crown and rough, grey bark. It is one of the most commonly cultivated melaleucas for shelter belts and road verge plantings. Leaves are dark green, narrow-linear usually of 1-3cm long with short petiole and a conspicuous hooked tip. Flowers are cream white or rarely mauve-pink borne as spikes on short lateral branches (Brophy, Craven & Doran 2013; Wrigley & Fagg 1993).

Blackwood *Acacia melanoxylon* is a small to large tree, 6-30m tall with hard and fissured bark and foliage that is usually dense and dark-green. This tree is very common on a variety

of sites when annual rainfall exceeds 600mm (including the basalt plains of Western Victoria), but best development is on deep soils, especially in tall forests and 'jungle' pockets in mountain valleys (Costermans 1981).

4.1 Health, Structure and ULE of Trees

The subject site has a healthy tree population as about 86% of the trees were assessed with fair to good health and about 1% (42 trees) were assessed with very good health Table 2. Borer damage, trunk decay, stem dieback and leaf wilting are the major threats observed on tree health.

About 65% of the trees are demonstrating fair to good structure and 35% of the tree population rated as poor to very poor structure. Presence of codominant stems with included bark, atypical canopies and splits along the stem have potentially reduced the structural value of the trees on site.

Codominant stems containing included bark can be a major structural defect within trees. With traditional branch attachment, the branch and trunk fibres overlap each other as they grow forming a strong, embedded attachment. With codominant stems, this is not the case as the fibres run roughly parallel and don't knit together. This form of attachment is regarded as far weaker and more prone to failure (Kane, Farrell, Zedaker, Loferski & Smith 2008; Harris, Clark & Matheny 1999; Shigo 1991). When combined with included bark, it is often only a matter of time until the stems fail.

Useful life expectancy of a tree is not an estimate of tree longevity but the estimated duration with which it will be useful in the landscape at an acceptable level of risk and management input. In general, there is a reasonably even spread of ULE ratings across the site.

609 specimens with good health and structure were assessed with the ULE of 20+ years and 829 trees were assessed with 10-20 years. 863 specimens with fair health and structural conditions were assessed with 5-10 years of ULE and 824 trees generally in decline and/or with poor structure were assessed with 1-5 years. 19 trees assessed with 0 years ULE are either dead or have substantial defects requiring their removal.

Table 2: Summary of tree condition

Health	Count	Health percent	Structure	Count	Structure percent	ULE	Count	ULE percent
Very good	42	1%	**Good**	485	15%	**20+ years**	609	19%
Good	1,126	36%	**Fair**	1,566	50%	**10-20 years**	829	26%
Fair	1,578	50%	**Poor**	1,074	34%	**5-10 years**	863	27%
Poor	307	10%	**Very Poor**	18	1%	**Less than 5 years**	824	26%
Very poor	18	1%	**Hazardous**	1	0.03%	**0 years**	19	1%
Dead	73	2%						
Total	3,144			3,144			3144	

4.2 Tree Retention Value

4.2.1 Trees assessed as Very High Retention Value

20 trees were assessed as very high retention value. They included Trees 317, 319, 320, 1,394, 1,397, 1,455, 1,456, 1,569, 1,572, 1,575, 1,576, 1,621, 1,685, 1,757, 1,861, 1,889, 1,893, 2,302, 2,936 and 2,991. All 20 trees assessed in this category are River Red Gum *Eucalyptus camaldulensis.* They are the largest and most significant trees at the project site, demonstrating good to very good health, fair to good structure and 20+ years of ULE (Figure 2). They can be a long-lived species capable of living upwards of 500-1000 years (Jacobs 1955). They should be retained and protected for their indigenous origin, habitat significance and massive size.

Figure 2: Large specimens of River Red Gum *Eucalyptus camaldulensis*

4.2.2 Trees assessed as High Retention Value

327 trees were assessed as high retention value. About 90% of them are indigenous eucalypts that includes 163 specimens of River Red Gums and 129 specimens of other eucalypts. Trees assessed in this category are demonstrating fair to good health and structure and have 10-20 years or 20+ years of ULE. Their retention is preferred, and the design should accommodate them wherever possible.

4.2.3 Trees assessed as Moderate Retention Value

474 trees were assessed as moderate retention value. Generally, they are semi mature to mature specimens with fair to good health and structure. Majority of the trees (359 specimens) assessed in this category are indigenous eucalypts which includes 182 specimens of River Red Gum. They are suitable for retention; however, are such that their individual loss would not have a significant impact on the landscape. Wherever possible, these trees are to be retained unless the design does not allow.

4.2.4 Trees assessed as Low Retention Value

2,253 trees (72% of the tree population) were assessed as low retention value. In general, these are young or declining specimens with limited landscape value. Major tree species assessed in this category included 806 specimens of eucalypts, 357 specimens of Leyland Cypress, 355 specimens of melaleuca, 300 specimens of wattle and 137 specimens of sheoak. The majority of Leyland Cypress in this category are hedges along the boundary of a private nursery located within the project site. The planted young specimens of indigenous eucalypts and wattles along Dingley bypass are assessed in this category (Figure 3).

Whilst these could be retained, they are not considered worthy of design alterations and could be compensated for with post construction landscape plantings.

Figure 3: Young specimens of River Red Gum *Eucalyptus camaldulensis* and Blackwood *Acacia melanoxylon.*

4.2.5 Trees assessed with No Retention Value

70 trees were assessed with no retention value. This includes 33 dead specimens of eucalypts and 31 dead specimens of indigenous wattles. Trees in this category should be removed irrespective of the design as they are in severe decline, hazardous condition or dead trees.

Trees with significant habitat value may be considered for retention where safe to do so within the project.

4.2.6 Tree Retention Summary

The trees were assessed for their health, structure and ULE and placed in a retention category:

- 20 trees have Very High Retention Value
- 327 trees have High Retention Value
- 474 trees have Moderate Retention Value
- 2,253 trees have Low Retention Value
- 70 trees have No Retention Value

The tree retention values will provide a guideline to retain or remove trees at the project site and to ensure the protection of retained trees in relation to construction activities.

4.3 Group Area Assessments

Due to the high numbers of trees and their locations on the margins of the project, at 9 areas trees were assessed as groups (Figure 4). Appendix 2 provides greater detail of each group assessment area. The mapped polygon represents the approximate no-go zone required to protect the trees. In some cases, a detailed, individual assessment may reduce the buffer offsets.

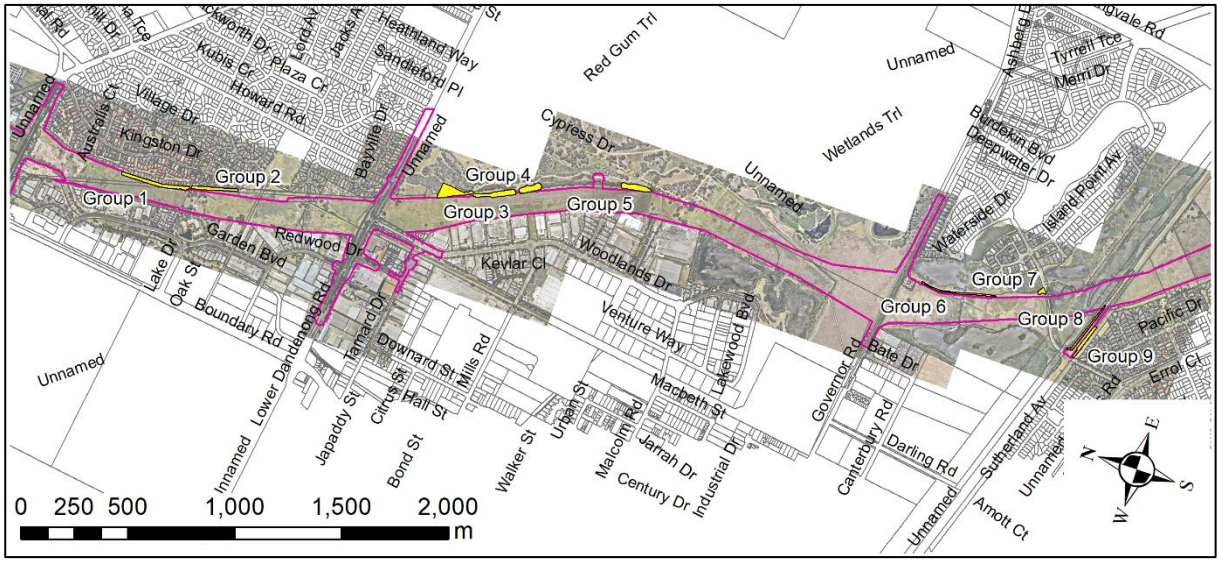

Figure 4: Location of group area assessments.

5. Discussion

5.1 The Site

The subject site is the proposed Mordialloc Bypass between Dingley bypass in the north and Mornington Peninsula Freeway in the south. The project boundary includes sections of Braeside park, Springvale road, Governor road, Lower Dandenong road, Centre Dandenong road, and Old Dandenong road.

5.2 Design Proposal and Construction Impact

It is proposed to construct an 8.5km Mordialloc Bypass from Dingley bypass in the north to Mornington Peninsula Freeway at Springvale road in the south. To inform the design, preliminary tree assessment at the project site has been completed. Any tree to be retained within the project boundary will require protection during construction located within and around the project boundary will be assessed. The easiest way of achieving this is the establishment of Tree Protection Zones and Structural Root Zones (Refer section 5.3 Tree Protection). In accordance with AS4970-2009 *Protection of trees on Development Sites*, construction impact of the proposed design on the trees will then be determined based on the level of encroachment into Tree Protection Zones (TPZ) and whether or not there is encroachment into the Structural Root Zones (SRZ).

Following finalisation and approval of a design, a Tree Protection Management Plan (TPMP) is to be prepared and incorporated into the constructor's Environmental Management Procedures outlining how the retained trees will be protected throughout the construction process. The Environment/Vegetation Management Overlays and Environmental Weeds List of the respective Councils are also to be considered before planning on any tree removal.

5.3 Tree Protection

5.3.1 Tree Protection Zones (TPZ)

It is important when considering development or construction that assets to be retained are properly protected. In this case the trees are the assets and require protection if they are to be retained in the landscape long-term. Damage to the trees can come in 1 of 2 ways. The first is immediate damage directly to the tree in the form of root severance, breaking of branches and wounding of the trunk. The second is more insidious and can take some time to manifest. This is a more indirect form of damage and usually relates to modification of soil structure or grade, drainage patterns or hydrology (Coder 1995).

Trees can be easily protected from development by the installation of Tree Protection Zones (TPZ). TPZs have been calculated according to AS4970-2009 *Protection of Trees on Development Sites* for all trees to be retained. This calculates the TPZ radius by multiplying the trunk DBH by 12 to a maximum of 15m radius. These figures have been supplied in Appendix 3 Tabular Tree Data.

A tree protection fence should be designed to be robust and withstand easy movement or ingress. Chain mesh fencing, temporary fencing panels or solid hoarding are all good examples (Figure 5).

Figure 5: Indicative TPZ construction

Figure 6: Suitable TPZ signage to be displayed on TPZ fences

The following should be prohibited within a TPZ (adapted from AS 4970-2009):

- built structures or hard landscape features (i.e. paving, retaining walls)
- materials storage (i.e. equipment, fuel, building waste or rubble)
- soil disturbance (i.e. stripping or grade changes)
- excavation works including soil cultivation (specifically surface-dug trenches for underground utilities)
- placement of fill
- lighting of fires
- preparation of chemicals, including preparation of cement products
- pedestrian or vehicular access (i.e. pathways).

The following procedures should be included in setting up and maintaining any TPZ (adapted from AS 4970-2009):

- erect warning signs at regular intervals along the entire length of any protective TPZ fencing (Figure 6)
- construct TPZ fencing to prevent pedestrian access into the protected area
- mulch the TPZ area to a depth of 100mm with woodchips (if available, use woodchips generated from onsite tree clearing)
- irrigate TPZs periodically, as determined by the consulting arborist.

5.3.2 Structural Root Zones (SRZ)

The structural root zone is a formula to define the theoretical volume of soil and tree roots required to keep a tree stable in the ground. It is in no way related to tree health and significant excavation at or near the SRZ for many trees will cause severe decline and/or death.

Excavation within SRZs can lead to whole tree failure often with devastating results. SRZs have been calculated in accordance with AS 4970-2009 *Protection of Trees on Development Sites* using the equation:

$$R_{srz} = (D \times 50)^{0.42} \times 0.64$$

Where D=trunk diameter at base in metres.

These figures have been supplied in Appendix 3 Tabular Tree Data.

5.3.3 Encroachment

Encroachment of less than 10% of the TPZ and outside the SRZ is deemed to be minor encroachment according to AS 4970-2009. See Figure 7. Variations must be made by the project arborist considering other relevant factors including tree health, vigour, stability, species sensitivity and soil characteristics.

Encroachment of more than 10% of the TPZ or into the SRZ is major encroachment. The project arborist must demonstrate that the tree(s) would remain viable. This may require root investigation by non-destructive methods and consideration of relevant factors including tree health, vigour, stability, species sensitivity and soil characteristics.

In any case, the lost TPZ should be compensated and be contiguous with the existing TPZ.

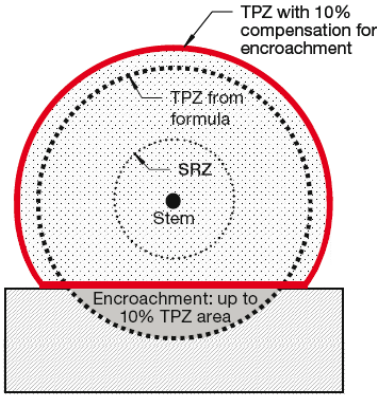

Figure 7: Example of TPZ encroachment and compensatory offset (image from AS 4970-2009).

5.4 Consideration to mitigate impacts

Consider the following to mitigate construction impacts to retained trees and to reduce the number of trees to be removed:

1. **Wire Rope Safety Barriers**
   a. All safety barriers are to be kept as far away as possible from retained trees
   b. TPZ impact will be minimised if the safety barriers are installed by post holes rather than trenching and footing method
   c. Details on soil excavation prior to barrier installation are to be provided for careful assessment of potential TPZ encroachments. This will not only ascertain the protection of retained trees but also help to retain more trees.
2. **No Go Zones**
   a. No Go Zones within the project boundary are to be established throughout the construction to protect the retained trees
   b. Areas where no work is proposed, are to be either fenced off and signed appropriately within the worksite or excluded from the worksite with proper construction fence to protect the trees.
3. **Levels and Grades**

a. All the grading details within the project boundary and cut and fill requirements during the construction are to be supplied for a detailed assessment of their impact on trees.

4. **Conduits**
   a. Location of power, communication and signal conduits need to be shown as part of the design
   b. Any installation work of these assets within TPZs of retaining trees is to be conducted by directional drilling/boring or with the use of hydro-excavation. Because soil excavation through trenching will potentially cause root damage to the nearby trees.
5. **Pedestrian bridges**
   a. Retention value of the neighbouring tress should be considered while selecting the location of Pedestrian bridges.
   b. Size and alignment of the ramp access to the bridge where possible should avoid or minimise the level of TPZ encroachments.
6. **Shared-use path**
   a. Relocation of shared-use path where possible to avoid or minimise TPZ encroachments. This will include not only trees with a high retention value but also the low/moderate retention value trees that are acting as windbreak or being part of an avenue or formal planting
   b. Shared-use paths should as a minimum be outside SRZs of the retained trees
   c. Reduce the width of shared-use paths where possible to minimise the level of TPZ encroachments
   d. Minimise soil excavation required to build shared-user path to mitigate the root damage. If required, build the path up and batter with additional top soil
   e. Apply suitable construction technique so that the path retains porosity within TPZs. Use alternative materials to create accents and points of difference along the route.
7. **Sound barriers**
   a. Consider locating and aligning the sound barrier where possible with no or minimal tree loss and no or least impact on retained trees
   b. Suitable construction technique should be selected to minimise soil excavation work.

5.5 Construction Impact Assessment

This is a preliminary tree assessment report and the preliminary data provided here is to help guide the design with the express aim of retaining as many trees of the highest value as possible. The proposed construction design should be reviewed to determine the possible impacts to the retained trees in accordance with AS4970-2009 *Protection of Trees on Development Sites.* And the construction impact statement is to be prepared on completion of the design.

5.6 Tree Protection Management Plan

On completion of design and determination of trees to be retained and removed, a Tree Protection Management Plan (TPMP) is to be developed in accordance with AS4970-2009 *Protection of Trees on Development Sites.* It includes:

- The engagement of a project arborist with a minimum qualification of Diploma in Arboriculture (AQF level 5 or equivalent)

- Procedures to follow for tree retention:
  - During pre and post construction
  - During initial grading
  - Throughout the construction
- A tree protection plan that shows:
  - All TPZs and SRZs
  - All tree protection fenced off areas and areas where ground protection systems will be applied
  - Construction techniques applied within TPZs
  - All services to be located within the TPZs and a notation to state that all services will either be located outside of TPZs or bored under TPZs
  - A notation to refer to TPMP for specific advice on what actions are to be taken within TPZs.
- Location of measures for trunk and branch protection and for ground protection
- Certifications, milestones, inspection times and hold points.

5.7 Pruning and Removal

Pruning and tree removal activities will be required throughout the construction to provide clearance and to accomplish the project activities. All pruning and tree removal works should be completed by qualified arborists with a minimum of Certificate III in Arboriculture (or equivalent). All pruning activities are to be completed in accordance with AS4373-2007 *Pruning of Amenity Trees*.

5.8 New Trees

Planting new trees will likely form part of the landscape plan to help compensate the trees being lost due to construction activities. All new trees should be sourced from reputable nurseries and inspected prior to delivery. Tree growth systems and the supplied stock are to be in accordance with AS2303-2015 *Tree Stock for Landscape Use.*

6. Conclusion

A project is proposed to construct Mordialloc Freeway between Dingley bypass in the north and Mornington Peninsula Freeway at Springvale road in the south. 3144 individual trees were assessed within and around the project boundary. About 82% of the trees are either indigenous or native to Australia and they are well adaptive to site.

In general, the project site contains a healthy tree population as 87% of the trees showing fair to very good health. About 65% of the trees are demonstrating fair to good structure and 46% of the trees are with 10-20 years or 20+ years of ULE. Based on their health, structure and ULE, the trees were assessed in each retention category as follows:

- 20 trees have Very High Retention Value
- 327 trees have High Retention Value
- 474 trees have Moderate Retention Value
- 2,253 trees have Low Retention Value
- 70 trees have No Retention Value.

In addition, trees were assessed as groups at 9 areas within the project boundary. The group assessments were carried out considering the density of trees and their presence on the periphery of the project boundary. Appropriate no-go-zones were established for each group encircling the TPZs.

This report presented with preliminary tree assessment data and retention summary. The final project design yet to be reviewed to determine the removal and retention of the assessed trees. While developing the construction design, the following measures are to be considered to mitigate the impact within TPZs of retaining trees:

- Adopt a suitable location, alignment and construction technique for shared-use path to avoid or minimise TPZ encroachments
- Wire Rope Safety Barriers should be installed using post holes at a sufficient distance from the retained trees
- Site gradients and plans for cut and fill activities should be provided for tree impact assessments
- Directional drilling and/or non-destructive digging should be preferred for the installation conduits
- No Go Zones should be established at worksite to protect the retained trees within the project boundary.

Following completion of final design, a Tree Protection Management Plan for the retaining trees should be prepared which shows the procedures to avoid or minimise the TPZ impact and protect the trees throughout the construction.

7. References

AS 2303, 2015, *Australian Standard Tree Stock for Landscape Use,* Standards Australia.

AS 4373, 2007, *Australian Standard, Pruning Amenity Trees*, 2nd Edition Standards Australia.

AS 4970, 2009, *Australian Standard, Protection of Trees on Development Sites*, Standards Australia.

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Appendix 1. Tree Assessment Descriptors

1.1 Image of tree

Digital image captured on the day of assessments.

1.2 Botanic Name/Common Name

The tree identified to genus and species level as well as the generally accepted common name for the tree.

1.3 Tree Dimensions

The height and width of the tree as estimated by the arborist in whole metres.

1.4 Diameter at Breast Height

The trunk diameter of the tree measured with a diameter tape at 1.3m above ground level.

1.5 Diameter at Base

The trunk diameter of the tree measured with a diameter tape above the root flare.

1.6 Health

Very Good	The tree is demonstrating exceptional growth for the species, has a full, dense canopy and there is no sign of any pest or disease.
Good	The tree is demonstrating good growth for the species in its location with respect to its location and broader context. The canopy is full and complete and there are no signs of pest of disease.
Fair	The tree may have shown a reduction in optimal growth and/or there may be some twiggy deadwood within the canopy. There may be the presence of some pests or diseases that are not causing a significant decline in the tree
Poor	The tree is in decline with little growth. There may be sections of the canopy missing and pests or diseases may be prevalent
Very Poor	The tree is in significant decline, with large sections of the canopy dead. This tree is very unlikely to recover.
Dead	The tree is dead

1.7 Structure

Good	The tree's structure is typical of the species with no significant hazards such as included bark, trunk decay, splits or tears. In general, there will be a single trunk with scaffold and/or subordinate branches that display good attachments
Fair	There may be minor defects in the canopy, but the overall tree is still relatively free of significant issues. The tree may need minor pruning to fix minor defects. The canopy will by mostly symmetrical and typical of the species.
Poor	The tree will have 1 or more significant defect that may be able to be remedied with pruning. This tree is likely to have an atypical canopy and may contain defects such as included bark or codominant stems.
Very Poor	The tree has substantial defects associated with its primary trunk and scaffold structure that cannot be remedied with pruning or other measures. It is likely that this tree will require removal in the short term.
Hazardous	The tree has major defects and is likely to fail. It should be removed as soon as possible.

1.8 Useful Life Expectancy

20+	The tree is a healthy specimen in good condition. It is expected to provide a degree of safety and contribution to the landscape for at least another 20 years with an appropriate level of management.
10-20 years	The tree is a reasonably healthy specimen in good or fair condition. It is expected to provide a degree of safety and contribution to the landscape for 10-20 years with an appropriate level of management.
5-10 years	The tree is in fair condition or a short lived species. It is likely to provide contribution to the landscape for 5-10 years with an appropriate level of management at which point removal may need to be considered.
1-5 years	The tree is a poor specimen in decline and is likely to require removal within 1-5 years.
0 years	The tree is either dead or has substantial defects requiring its removal in the short term.

1.9 Tree Significance

Highly Significant	The tree is a large, mature example of the species, generally in fair to good condition. It may be a remnant specimen or have substantial habitat value. The tree may have specific landscape context or be very prominent in the broader environment. This tree may be suitable for inclusion on a significant tree register at local or state government level. Significant efforts should be made to retain this tree.
Significant	The tree is a mature example of the species in good condition and/or have particular prominence in the landscape. There may be evidence of the tree being used as a habitat tree by local fauna and/or it may be a remnant specimen. It has a long ULE and should be considered for retention. The loss of the tree may have a significant impact on the surrounding landscape.
Moderately Significant	The tree is a semi mature to mature example of the species in good condition, may be well sited in the landscape and/or may have habitat value. The removal of this tree would be noticed in the landscape.
Low	The tree is generally a smaller specimen or may be in decline. It is not located in a prominent position and its removal would have little impact on the broader landscape.
None	The tree is considered insignificant and its loss would go unnoticed.

1.10 Tree Retention

Very High	The tree is an outstanding example of the species and it should be retained at all costs.
High	The tree is a mature specimen in fair to good condition with a ULE of at least 10 years, is suitable to the site and should be retained in a new development.
Moderate	The tree is a semi-mature or mature specimen, in fair to good condition that is suitable for retention; however, is located such that its loss would not have a significant impact on the landscape.
Low	The tree is likely to be juvenile or in decline and could be retained; however, design changes are not considered worthwhile to retain a tree in this category.
None	The tree should be removed irrespective of a design as it is in severe decline, hazardous or dead.
Third Party Tree	This tree is located off the subject property and is owned by a third party. The assessment of health and structure is considered irrelevant as the tree must be retained.

Appendix 2. Group Assessments

2.1 Group 1

Group 1 is a long row of approximately 320m comprising largely planted specimens south of Centre Dandenong Road (Figure 8). The dominant planted species is Giant Honey Myrtle *Melaleuca armillaris* along with a number of River Red Gum *Eucalyptus camaldulensis* (Figure 9). Near the southern end of the group area is one, large River Red Gum likely to be a remnant specimen (Figure 10).

In general, the trees present a significant screen between the houses and currently vacant paddock. The trees are generally in good health, with fair structure and as a patch are likely to be functional for another 10-20 years. Within that time, it is likely that many of the Giant Honey Myrtle will fail. The River Red Gums are likely to survive significantly longer.

There is an existing track that runs along the western side of the group. This could be retained if desired and used for continued small vehicle access.

Figure 8: Area of group 1.

Figure 9: Planted row of Giant Honey Myrtle and River Red Gum.

Figure 10: Large River Red Gum at the south end of the group area.

2.2 Group 2

Group 2 is a long row of approximately 220m comprising largely planted specimens south of Centre Dandenong Road (Figure 11). It comprises 3 main species being River Red Gum *Eucalyptus camaldulensis,* Swamp Gum *Eucalyptus ovata* and Yellow Gum *Eucalyptus leucoxylon* (Figure 12). At the northern end of the group is a row of mixed eucalypts and a larger patch of mature, likely remnant River Red Gums that were assessed individually (Figure 13).

In general, the trees present a screen between the houses and currently vacant paddock. The trees are generally in good health, with fair structure and as a patch are likely to be functional for at least another 20 years. General pruning and tree management will be required as the trees continue to increase in size.

Figure 11: Area of group 2.

Figure 12: Planted row of mixed eucalypts heading south.

Figure 13: Planted row of mixed eucalypts heading north.

2.3 Group 3

Group 3 is a large patch of trees located within Braeside Park (Figure 14). It comprises predominantly River Red Gum *Eucalyptus camaldulensis* at the northern end (Figure 15) transitioning to Gippsland Manna Gum *Eucalyptus viminalis* subsp*. pryoriana* at the southern end (Figure 16).

The trees are part of the park and are dense sections of bushland. The trees have good health and fair structure given that they have largely been left unmanaged. Canopy pruning may be a requirement as some of the trees have grown out and into the reserve area. The mapped buffer represents an area required for adequate protection of the trees.

Figure 14: Area of group 3.

Figure 15: River Red Gum at the northern edge of the patch.

Figure 16: Gippsland Manna Gum within Braeside Park.

2.4 Group 4

Group 4 is a moderate-sized patch of trees located within Braeside Park (Figure 17). It comprises predominantly Gippsland Manna Gum *Eucalyptus viminalis* subsp*. pryoriana* with relatively few understorey species (Figure 18).

The trees are part of the park and are dense sections of bushland. The trees have good health and fair structure given that they have largely been left unmanaged. Canopy pruning may be a requirement as some of the trees have grown out and into the reserve area. The mapped buffer represents an area required for adequate protection of the trees.

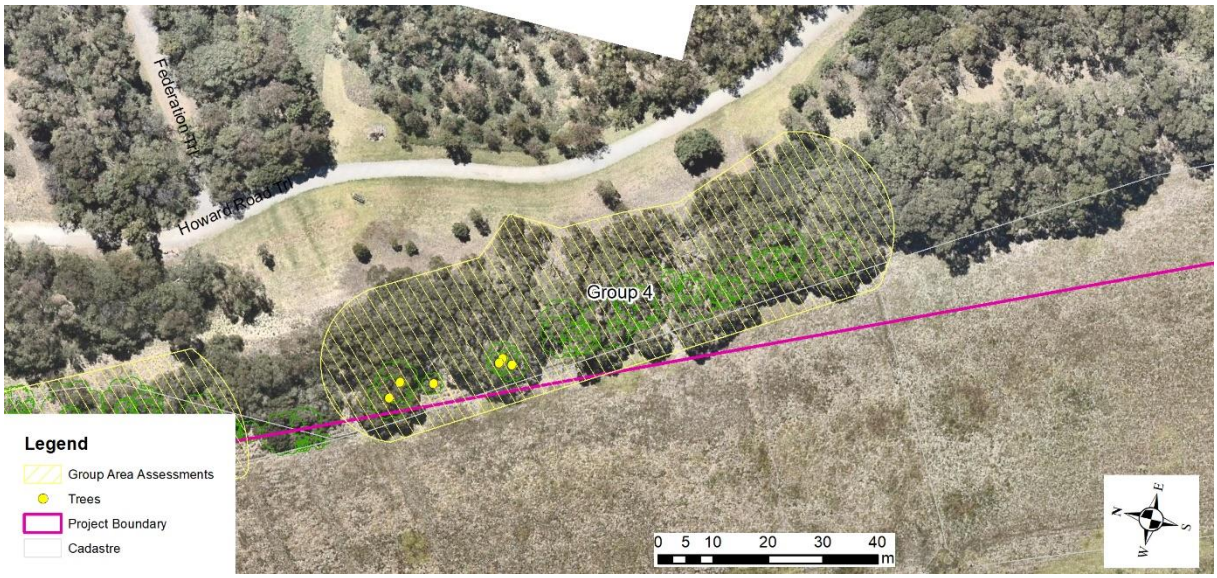

Figure 17: Area of group 4.

Figure 18: Gippsland Manna Gum within Braeside Park as part of Group 4.

2.5 Group 5

Group 5 is a large patch of trees located within Braeside Park near Cypress Drive (Figure 19). It comprises predominantly River Red Gum *Eucalyptus camaldulensis* (Figure 20 and Figure 21).

The trees are part of the park and provide a screen for trail users within the park to the vacant land to the west. The trees have good health and fair structure given that they have largely been left unmanaged. Canopy pruning may be a requirement as some of the trees have grown out and into the reserve area. The mapped buffer represents an area required for adequate protection of the trees. Detailed investigation of individual trees may result in a reduction of the required buffer intruding into the subject land.

Figure 19: Area of group 5.

Figure 20: River Red Gum within Braeside Park.

Figure 21: River Red Gum at the northern edge of the patch.

2.6 Group 6

Group 6 is a long, narrow strip of planted trees along the eastern border of the Waterways estate (Figure 22). A diverse range of species, the patch comprises River Red Gum, *Eucalyptus camaldulensis*, Swamp Gum *Eucalyptus ovata*, Black Wattle *Acacia mearnsii*, Kangaroo Wattle *Acacia paradoxa*, Lightwood *Acacia implexa*, Blackwood *Acacia melanoxylon*, Drooping Sheoak *Allocasuarina verticillata* and Sweet *Bursaria Bursaria* spinosa (Figure 23 and Figure 24).

The trees have variable conditions and size dimensions ranging from 2-3m to 8-10m tall. A track exists on both sides of the strip of vegetation. A no-go zone of 6m width is ample to protect this row of vegetation.

Figure 22: Area of group 6.

Figure 23: Planted vegetation comprising Group 6.

Figure 24: Planted vegetation comprising Group 6.

2.7 Group 7

Group 7 is a small patch of approximately 15-20 trees located adjacent to Bowen Parkway (Figure 25). It largely comprises River Red Gum, *Eucalyptus camaldulensis* with a few other smaller specimens (Figure 26).

The trees have variable conditions and size dimensions ranging from 8-10m tall and trunks 20-30cm in diameter at breast height. A track exists through the middle of the patch (Figure 26).

Figure 25: Area of group 7.

Figure 26: Planted vegetation comprising Group 7.

2.8 Group 8 & 9

Group 8 is a long thicket of Swamp Paperbark growing along the water's edge running off Bowen Parkway (Figure 27). It comprises a dense patch of stems ranging from less than 5cm to ~20cm diameter. In general, a relatively small strip is required to protect these trees as they are mostly small trees with small protection zones (Figure 28).

Group 9 is a row of River Red Gum growing along a narrow, deep channel. To the north of the trees is a levy and the south a deeper, wider channel drain. The offset as shown for the trees should ensure that they are sufficiently protected (Figure 29 and Figure 30)

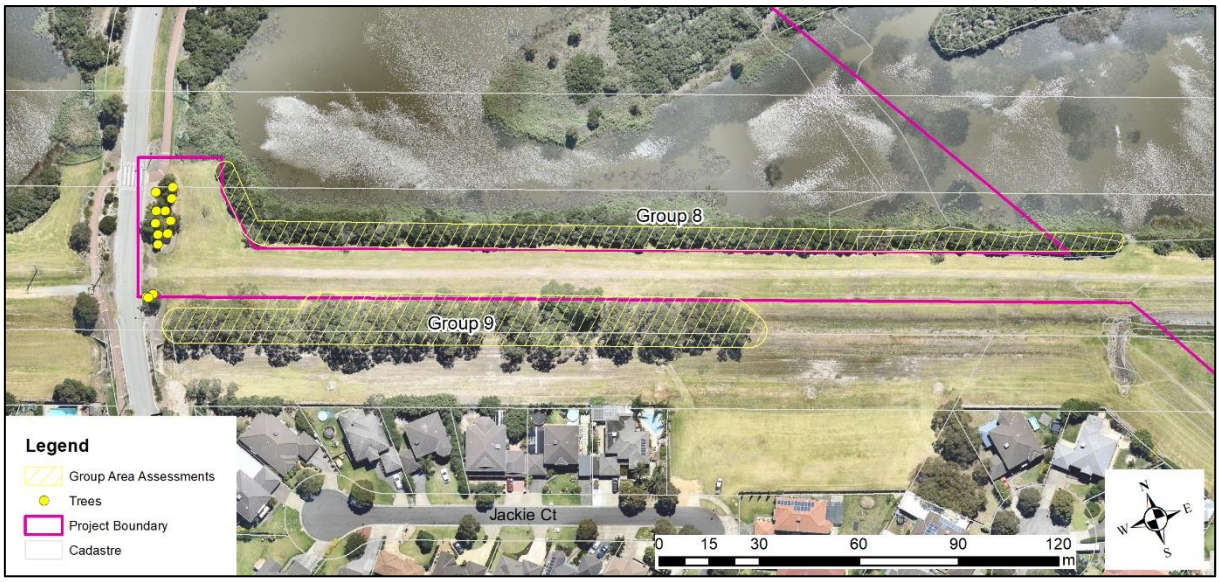

Figure 27: Area of groups 8 & 9.

Figure 28: Thicket of Swamp Paperbark along the water's edge comprising Group 8.

Figure 29: River Red Gums growing along the channel comprising Group 9.

Figure 30: River Red Gums with a significant channel along the middle comprising Group 9.

Appendix 3. Tabular Tree Data

See Additional File:

Appendix_III_TabularReport.pdf

Appendix 4. Enlarged Maps

See Additional File:

Appendix_IV_OverviewMap_NoAerial.pdf

Appendix_IV_TreeNumbers-Aerial.pdf

Appendix_IV_TreesTPZsSRZs.pdf

Appendix 5. Photographic Tree Reports

See Additional File:

Appendix_V_Ryder_3pp_report.pdf