



# Arboricultural Report Eastern Ranges School site, Wantirna

28 August 2014

Prepared for: Department of Education and Early Childhood Development

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## Executive Summary

The Department of Education and Early Childhood Development contracted Tree Logic to undertake an assessment of trees associated with rezoning and potential development of the former Eastern Ranges School located at 56 Kingloch Parade, Wantirna (subject site).

The primary aims of the report were to:

- To provide information on the species, dimensions, health and the structure of the trees and their appropriateness for retention.
- To offer recommendations regarding the management of the trees, including any tree protection requirements.
- Provide a plan (aerial image) that geographically locates and identifies the assessed trees.
- Additional information included:
  - Recommendations on any tree works required.
  - Geographic location point data for each tree point (X, Y co-ordinates) or polygon for tree groups (supplied in shape file format).

There were fifty trees and two tree groups located within and adjacent to the subject site.

All trees were attributed an arboricultural rating that reflects the retention value of each tree. There were no trees of any particularly arboricultural significance.

- Fourteen trees were attributed an arboricultural rating of Moderate.
- Thirty trees and one tree group were rated Low.
- Six trees and one tree group were attributed an arboricultural rating of None.

Refer to Page 4, Table 2 for tree numbers, Appendix 2 for tree locations and Appendix 3 for tree descriptors.

The site is not covered by any specific overlays or provisions relating to tree preservation and, in my opinion, the site is not subject to Clause 52.17 Native Vegetation, as all of the assessed trees were planted specimens.

The fourteen moderate rated trees, however, should be considered during any rezoning or potential development of the site.

To successfully retain trees, tree protection measures must be implemented prior to commencement of any construction related activity including demolition, and bulk earthworks. The most important component of tree protection is the allocation of appropriate tree protection zones (TPZ). Tree protection distances for the assessed trees can be seen in appendix 1. Tree protection zones must be appropriately fenced to prevent vehicle access, excavation, trenching, contamination or raised soil levels occurring within the TPZ. The tree protection measures must be maintained for the duration of the construction process including landscaping.

## 1. Objectives

- I. To provide an arboricultural assessment and report for trees located within Eastern Ranges School site, Wantirna in regard to proposed rezoning of the site.
- II. To provide information on the species, dimensions, health and the structure of the trees and their appropriateness for retention.
- III. To offer recommendations regarding the management of the trees, including any tree protection requirements.
- IV. Provide a plan (aerial image) that geographically locates and identifies the assessed trees.
- V. Additional information included:
  - A. Recommendations on any tree works required.
  - B. Geographic location point data for each tree point (X, Y co-ordinates) or polygon for tree groups (supplied in shape file format).

## 2. Method

- I. A site inspection was carried out on the 11<sup>th</sup> August 2014. The trees were inspected from the ground and observations made of the growing environment and surrounding area. The assessment was undertaken with regard to contemporary arboricultural practices and consisted of a visual inspection of external and above-ground tree parts. The trees were not climbed and no samples of the tree or site soil were taken.
- II. Assessment details of individual trees are listed in the Tree Assessment Table in Appendix 1. A copy of the tree plan can be seen in Appendix 2.
- III. Observations were made of the assessed trees to determine age category, and condition with measurements taken to establish tree trunk dimensions (measured 1.4m up the trunk with a diameter tape unless otherwise stated). The basal trunk diameter for trees designated for retention was also captured. This will allow the establishment of a structural root zone (SRZ). Descriptors used in the tree assessment can be seen in Appendix 3.
- IV. The health and structural characteristics of each tree were assessed and each tree was attributed an 'Arboricultural Rating'. The arboricultural rating correlates the combination of tree condition factors (health, structure & form) with tree amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics within a built environment. The arboricultural rating in combination with other factors can assist the project team and planners in nominating trees suitable for retention. The four arboricultural ratings used by Tree Logic include:
  - A. High: Trees of high quality in good to fair condition. Retention of such trees is highly desirable.
  - B. Moderate: Trees with a Moderate arboricultural rating were generally suitable for retention and design should attempt to incorporate these trees and provide adequate clearances during development stages where reasonable design intent is not unduly hampered.
  - C. Low: Trees with a Low arboricultural rating generally had low retention values. They were either fair specimens of relatively small size or displayed general health or structural deficiencies. Retention of Low rated trees may be considered in some instances if not

requiring a disproportionate expenditure of resources to successfully incorporate into the design or manage ongoing condition.

- D. None: Trees attributed an arboricultural rating of None have health or structural characteristics that were beyond arboricultural maintenance or were environmental weed species.
- V. The trees were plotted on orthorectified aerial imagery with GIS based software on field tablet computers with GPS and measuring tool capabilities. Geographical latitude and longitudinal reference points (X, Y coordinates) have been generated and included in the assessment data tables supplied with the report. These coordinates are accurate to within 2 to 3 metres and are considered adequate for pre-planning purposes. The location of trees nominated to be retained should be accurately located by conventional survey means prior to preparing any final designs.
- VI. The Australian Standard *AS 4970-2009 Protection of trees on development sites*, has been used as a guide in the allocation of tree protection zones (TPZ) for the assessed trees.
- VII. The site falls within the Knox Planning Scheme and is currently zoned Public Use Zone-Education (PUZ2). The site is not covered by any specific overlays or provisions relating to tree preservation. The site may be covered by Clause 52.17 Native Vegetation, which amongst a range of conditions, applies to the site because the allotment is greater than 4,000 m<sup>2</sup> in area (site was approximately 12,500m<sup>2</sup>). For the purposes of this report Native Vegetation refers to vegetation that is deemed to be remnant, i.e. remnant woody vegetation is vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has >70% of the height and >50% of the cover relative to the benchmarks outlined in the specific Ecological Vegetation Class (EVC) (Tree Logic definition).
- VIII. Only trees were assessed and data collected. A tree is generally a plant with a height greater than 5 metres on a single trunk. Single trunk diameter to be 150 mm or greater at a height of 1.4 metre above ground level.
- IX. Trees located on adjoining properties were observed only from within the subject site with measurements estimated where required.

### 3. Observations

- I. The tree study area is the former site of Eastern Ranges School located on the southern side of Kingloch Street on the corner of Greenlow Avenue, Wantirna. The site was approximately 12,500m<sup>2</sup> and generally flat topography. Residential housing abutted the site to the south and west. The school buildings, playgrounds and previous pavement sections were still in place at the time of the assessment.
- II. The majority of trees were located around the perimeter of the site with groups of trees located around the buildings.
- III. Fifty (50) trees and two tree groups were assessed and included in this report. The trees were all planted species; including Tree No. 3 Late Black Wattle (*Acacia mearnsii*), located on the adjoining property to the west, and Tree No. 20 Manna Gum (*Eucalyptus viminalis*).
- IV. Seventeen (17) individual trees and one tree group were Victorian native species (tree species that occur naturally within some part of the State of Victoria (not exclusively) but is not indigenous). Twenty-one (21) of the assessed trees were Australian native species (tree

species that occur naturally within Australia but is not a Victorian native or indigenous). Twelve (12) of the assessed trees and one tree group were exotic deciduous species (tree species that occur outside of Australia and typically shed their leaves during winter). None of the assessed trees were remnant, indigenous species (tree species that occur naturally in the area or region of the subject site).

V. Table 1 - Tree origin

Tree origin	Total	% of total
Victoria native	17 trees and 1 tree group	34.5%
Australian native	21 trees	40.5%
Exotic deciduous	12 trees and 1 tree group	25%

- VI. Eucalypts (including *Eucalyptus* spp., *Corymbia* spp. and *Angophora costata*) provided the dominant canopies within the site. Of the eucalypts, Sydney Blue Gum (*Eucalyptus saligna*) with seven specimens, and Yellow Gum (*E. leucoxylon*) with six specimens were the most common. Snow-in-summer (*Melaleuca linariifolia*) also featured in the site with 10 specimens, primarily due to row along southern boundary.
- VII. It is the opinion of this report that all of the trees within the site were planted specimens. Clause 52.17 Native Vegetation applies only to native (remnant, indigenous) vegetation. Vegetation planted for purposes of 'shelter belts, woodlots, street trees, gardens or the like' are exempt under 52.17-6 unless planted with assistance from public funding.
- VIII. In general the assessed trees were displaying characteristics considered typical of the species growing in this area of Melbourne.
- IX. The assessed trees were given 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. Amenity relates to the trees biological, functional and aesthetic characteristics within an urban landscape context.
- X. There were no trees of high arboricultural merit. The moderately rated trees, however, should be considered for retention within the proposed development of the site. These trees have the potential to be a medium to long-term components of the landscape if managed appropriately. Trees with a low arboricultural rating were either fair specimens of relatively small size or displayed general health or structural deficiencies. Retention of low rated trees may be considered in some instances if not requiring a disproportionate expenditure of resources to successfully incorporate into the design or manage ongoing condition.
- XI. Table 2 - Arboricultural ratings

Arboricultural rating	Tree Numbers	Comment
Moderate (14 trees)	1, 6, 8, 11-16, 18, 21, 24, 27 & 28	These tree are worthy of retention and should be considered during any proposed development of the site.
Low (30 trees & 1 group)	2, 3, 4, 7, 9, 10, 17, 19, 20, 22, 23, 26, 29, 30, 35-41, 42-50. Groups 1	Trees displaying structural faults or poor health that reduce their long-term viability. Trees may have been of a size that could be easily replaced.
None (6 trees & 1 group)	5, 25, 31, 32, 33, & 34. Group 2	Trees were displaying deteriorating condition, were dead or were environmental woody weed species.

**Photographs - Trees within eastern Ranges School site. 26 August 2014**



Photograph above shows (from right) Tree Nos. 27 Smooth-barked Apple, 28 Yellow Gum and 29 Victorian Blue Gum adjacent to Kingloch St frontage.



Photograph above shows Group 3 Narrow-leaved Ash which were self-sown. Tree No. 33, also a Narrow-leaved Ash and Tree No. 32 the no (None) rated Red-flowering Gum are also highlighted.



*Photograph above shows (from left) Tree Nos. 21 Narrow-leaved Peppermint, 20 Manna Gum and other eucalypts adjacent to Greenlow Ave frontage. Younger eucalypts adjacent to the playground were not assessed.*

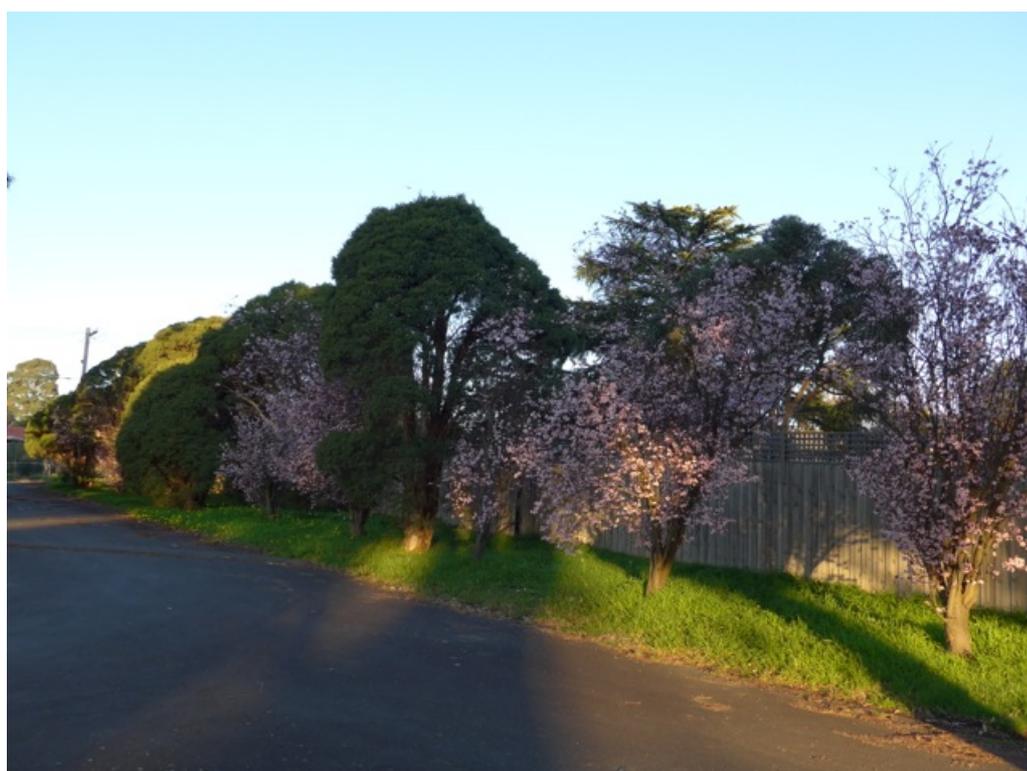


*Photograph above shows Group 1 the young Black She-oak*



*Photograph on left shows the moderate rated Tree No. 11 Sydney Blue Gum.*

*Photograph below shows Snow-in-summer, Trees 42-50, and Prunus cerasifera 'Nigra' along southern boundary.*



## 4. Tree Management

### I. Tree retention

The site is not covered by any specific overlays or provisions relating to tree preservation and, in my opinion, the site is not subject to Clause 52.17 Native Vegetation, as all of the assessed trees were planted specimens.

The fourteen moderate rated trees, however, should be considered during any rezoning or potential development of the site. These trees are more often than not well-located towards the periphery of the site, they generally contribute to the landscape character of the area and could be potentially long-term components of the landscape if managed appropriately.

The remaining thirty-five trees and the tree groups are of little consequence if they were to be retained or not. Retention of low rated trees may be considered in some instances if not requiring a disproportionate expenditure of resources to successfully incorporate into a design or, if applicable, manage their ongoing condition. Two of the low rated trees, Tree No. 3 Late Black Wattle (*Acacia mearnsii*) and Tree No. 9 Sweet Pittosporum (*Pittosporum undulatum*), were located on adjoining properties. These two trees, albeit low quality trees, would need to be considered during any proposed development of the site.

Retained trees will require the implementation of tree protection measures to ensure they remain viable trees into the future.

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. Tree protection zones for individual trees can be seen in appendix 1.

Details of the AS4970 and other tree protection measures can be seen in appendix 4.

## 5. Conclusion

There were fifty trees and two tree groups located within and adjacent to the Eastern Ranges School site, Wantirna.

All trees were attributed an arboricultural rating that reflects the retention value of each tree. There were no trees of any particularly arboricultural significance.

- Fourteen trees were attributed an arboricultural rating of Moderate.
- Thirty trees and one tree group were rated Low.
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The fourteen moderate rated trees, however, should be considered during any rezoning or potential development of the site.

To successfully retain trees, tree protection measures must be implemented prior to commencement of any construction related activity including demolition, and bulk earthworks. The most important component of tree protection is the allocation of appropriate tree protection zones (TPZ). Tree protection distances for the assessed trees can be seen in appendix 1. Tree protection zones must be appropriately fenced to prevent vehicle access, excavation, trenching, contamination or raised soil levels occurring within the TPZ. The tree protection measures must be maintained for the duration of the construction process including landscaping.

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Stephen Frank BAppSci (Hort.)

## Appendix 1: Tree assessment table - Eastern Ranges School site, Wantirna

Key: H x W = Crown height & width. DBH = Diameter at breast height, 1.4m up trunk, unless otherwise indicated. Basal dimension is trunk diameter at base immediately above root buttress. Arb. rating = arboricultural rating. TPZ = Tree Protection Zone in metres. SRZ = Structural Root Zone in metres. TPZ & SRZ measurements are radius from the centre of the trunk. G1, G2 & G3 were tree groups. Definitions of the descriptor categories used in the assessment can be seen in appendix 3.

Tree No.	Tree name	Origin	Age	H x W (m)	DBH (cm)	Basal (cm)	Health	Structure	Arb. rating	TPZ (m)	SRZ (m)	Comments
1	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Mature	19 x 16	62	76	Fair	Fair - Poor	Moderate	7.4	2.9	Large wound from past stem removal.
2	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Mature	19 x 18	83	89	Fair	Fair - Poor	Low	10.0	3.2	Partly suppressed, lopsided to west.
3	Late Black Wattle (Acacia mearnsii)	Indigenous	Mature	11 x 12	37	43	Good	Poor	Low	4.4	2.3	Located in adjacent property.
4	Locust (Robinia pseudoacacia)	Exotic Deciduous	Mature	7 x 7	25,17	36	Fair - Poor	Fair - Poor	Low	3.6	2.2	
5	Sweet Pittosporum (Pittosporum undulatum)	Victorian Native	Semi-mature	4 x 5	15	18	Good	Good	None	1.8	1.6	Environmental woody weed species
6	Golden Ash (Fraxinus excelsior 'Aurea')	Exotic Deciduous	Semi-mature	8 x 9	27	32	Fair	Fair	Moderate	3.2	2.1	
7	Elm Tree (Ulmus sp.)	Exotic Deciduous	Semi-mature	5 x 5	13	18	Good	Good	Low	2.0	1.6	Low rated due to size
8	Liquidamber (Liquidambar styraciflua)	Exotic Deciduous	Semi-mature	7 x 7	19	25	Good	Good	Moderate	2.3	1.8	
9	Sweet Pittosporum (Pittosporum undulatum)	Victorian Native	Semi-mature	8 x 8	20, 17, 15	33	Good	Good	Low	3.6	2.1	Located in adjacent property.
10	Desert Ash (Fraxinus angustifolia subsp. angustifolia)	Exotic Deciduous	Semi-mature	6 x 4	17	23	Fair	Good	Low	2.0	1.8	
11	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Mature	17 x 19	69	81	Fair	Fair	Moderate	8.3	3.0	

Tree No.	Tree name	Origin	Age	H x W (m)	DBH (cm)	Basal (cm)	Health	Structure	Arb. rating	TPZ (m)	SRZ (m)	Comments
12	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Mature	16 x 17	45	67	Fair	Fair	Moderate	5.4	2.8	
13	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Mature	19 x 18	61	69	Fair	Fair	Moderate	7.3	2.8	
14	Red Ironbark (Eucalyptus sideroxylon)	Victorian Native	Mature	15 x 9	50	59	Good	Fair	Moderate	6.0	2.7	
15	Victorian Blue Gum (Eucalyptus bicostata)	Victorian Native	Mature	14 x 12	70	88	Good	Fair	Moderate	8.4	3.1	
16	Smooth-barked Apple (Angophora costata)	Australian Native	Semi-mature	11 x 10	30	41	Fair	Fair	Moderate	3.6	2.3	
17	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Mature	16 x 14	61	74	Fair - Poor	Fair - Poor	Low	7.3	2.9	
18	Sydney Blue Gum (Eucalyptus saligna)	Australian Native	Semi-mature	13 x 10	41	47	Good	Fair	Moderate	4.9	2.4	Lopsided to west.
19	Yellow Gum (Eucalyptus leucoxylon)	Victorian Native	Semi-mature	13 x 7	28	35	Fair	Fair - Poor	Low	3.4	2.1	
20	Manna Gum (Eucalyptus viminalis)	Victorian Native	Mature	14 x 11	71	83	Fair - Poor	Fair - Poor	Low	8.5	3.1	
21	Narrow-leaved Peppermint (Eucalyptus nicholii)	Australian Native	Mature	18 x 15	72	88	Fair	Fair	Moderate	8.6	3.1	
22	Yellow Gum (Eucalyptus leucoxylon)	Victorian Native	Semi-mature	9 x 6	15	19	Fair	Fair	Low	1.8	1.6	
23	Yellow Gum (Eucalyptus leucoxylon)	Victorian Native	Semi-mature	7 x 6	14	18	Fair	Fair	Low	2.0	1.6	
24	Snow in Summer (Melaleuca linariifolia)	Australian Native	Semi-mature	5 x 5	29	33	Fair	Fair	Moderate	3.5	2.1	Street tree
25	Lemon Bottlebrush (Callistemon pallidus)	Victorian Native	Over Mature	4 x 7	26, 17, 16	48	Fair	Very Poor	None	4.2	2.4	Active splits & decay. Recommend removal of tree
26	Weeping Bottlebrush (Callistemon viminalis)	Australian Native	Mature	4 x 7	16, 15, 14, 14, 10	44	Fair	Fair - Poor	Low	3.7	2.3	Low rating due to size
27	Smooth-barked Apple (Angophora costata)	Australian Native	Mature	15 x 10	49	57	Fair	Fair - Poor	Moderate	5.9	2.6	Past power line clearance pruning

Tree No.	Tree name	Origin	Age	H x W (m)	DBH (cm)	Basal (cm)	Health	Structure	Arb. rating	TPZ (m)	SRZ (m)	Comments
28	Yellow Gum (Eucalyptus leucoxydon)	Victorian Native	Semi-mature	6 x 8	33	36	Fair	Fair - Poor	Moderate	4.0	2.2	Past power line clearance pruning
29	Victorian Blue Gum (Eucalyptus bicostata)	Victorian Native	Mature	18 x 14	77	93	Fair	Fair - Poor	Low	9.2	3.2	Congested primary union with included bark. Girdling roots.
30	Spotted Gum (Corymbia maculata)	Victorian Native	Mature	16 x 18	49	65	Fair	Fair - Poor	Low	5.9	2.8	Trunk wounds-past limb failures, crossing branch.
31	Sallow Wattle (Acacia longifolia)	Victorian Native	Over Mature	5 x 10	17,15,14	30	Fair	Very Poor	None	3.2	2.0	Collapsing.
32	Red-flowering Gum (Corymbia ficifolia)	Australian Native	Mature	9 x 8	17, 16, 15, 14, 14	70	Good	Very Poor	None	4.1	2.8	Stump sprout.
33	Desert Ash (Fraxinus angustifolia subsp. angustifolia)	Exotic Deciduous	Semi-mature	4 x 6	14, 12	24	Fair	Fair	None	2.2	1.8	Weed species.
34	Desert Ash (Fraxinus angustifolia subsp. angustifolia)	Exotic Deciduous	Semi-mature	5 x 5	15, 14	32	Fair	Fair - Poor	None	2.5	2.1	Weed
35	Yellow Gum (Eucalyptus leucoxydon)	Victorian Native	Semi-mature	15 x 5	20	26	Fair - Poor	Fair - Poor	Low	2.4	1.9	Low live crown ratio.
36	Yellow Gum (Eucalyptus leucoxydon)	Victorian Native	Semi-mature	4 x 7	12, 10, 10	19	Fair	Fair	Low	2.2	1.6	Low rating due to size
37	Callery's Pear (Pyrus calleryana)	Exotic Deciduous	Semi-mature	6 x 3	14	16	Fair	Fair - Poor	Low	2.0	1.5	Group of 5. Low rating due to size
38	Callery's Pear (Pyrus calleryana)	Exotic Deciduous	Semi-mature	6 x 3	14	16	Fair	Fair - Poor	Low	2.0	1.5	Group of 3. Suckering below graft.
39	Box Elder (Acer negundo)	Exotic Deciduous	Semi-mature	4 x 4	14	16	Fair	Fair	Low	2.0	1.5	Low rating due to size
40	Box Elder (Acer negundo)	Exotic Deciduous	Semi-mature	5 x 5	14	16	Fair	Fair	Low	2.0	1.5	Low rating due to size
41	Box Elder (Acer negundo)	Exotic Deciduous	Semi-mature	4 x 3	10	13	Fair	Fair	Low	2.0	1.4	Low rating due to size

Tree No.	Tree name	Origin	Age	H x W (m)	DBH (cm)	Basal (cm)	Health	Structure	Arb. rating	TPZ (m)	SRZ (m)	Comments
42	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	5 x 5	24, 18, 16, 15, 14	49	Fair - Poor	Fair - Poor	Low	4.8	2.5	Component of row of Melaleuca & small Prunus sp. on southern boundary.
43	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	5 x 4	24, 14	36	Fair	Fair - Poor	Low	3.3	2.2	Component of row of Melaleuca & small Prunus sp. on southern boundary.
44	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	5.5 x 4	22, 19, 16	37	Fair - Poor	Fair - Poor	Low	4.0	2.2	Component of row of Melaleuca & small Prunus sp. on southern boundary.
45	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	6 x 3.5	20, 19, 13	34	Fair - Poor	Fair - Poor	Low	3.7	2.1	Component of row of Melaleuca & small Prunus sp. on southern boundary.
46	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	7 x 4	37	43	Fair - Poor	Fair - Poor	Low	4.4	2.3	Component of row of Melaleuca & small Prunus sp. on southern boundary.
47	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	5 x 3.5	18, 16	27	Fair - Poor	Fair - Poor	Low	2.9	1.9	Component of row of Melaleuca & small Prunus sp. on southern boundary.
48	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	5 x 5	19, 16, 14, 12, 9	43	Fair - Poor	Fair - Poor	Low	3.9	2.3	Component of row of Melaleuca & small Prunus sp. on southern boundary.
49	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	6.5 x 6	33, 17, 14	46	Fair - Poor	Fair - Poor	Low	4.8	2.4	Component of row of Melaleuca & small Prunus sp. on southern boundary.
50	Snow-in-summer (Melaleuca linariifolia)	Australian Native	Mature	6 x 4.5	33, 18, 17, 17	48	Fair - Poor	Fair - Poor	Low	5.4	2.4	Component of row of Melaleuca & small Prunus sp. on southern boundary.
G 1	Black She-oak (Allocasuarina littoralis)	Victorian Native	Semi-mature	6 x 2	12	15	Fair	Fair	Low	2.0	1.5	27 small trees. Average dimensions 6 x 2m and 12 cm DBH. Low rated due to size.
G 2	Narrow-leaved Ash (Fraxinus angustifolia)	Exotic Deciduous	Semi-mature	5 x 4	15	19	Fair	Fair-poor	None	2.0	1.6	6 self-sown stems - many multi-stemmed. Weed species. Mixed with Acacia spp.

# Appendix 2 - Eastern Ranges Site Map



## Appendix 4: Protection of retained trees

### Tree protection distances

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. A TPZ should not be less than 2 m or greater than 15 m.

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.

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 total area of the TPZ, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. The 10% encroachment on one side equates to approximately  $\frac{1}{3}$  radial distance. 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.

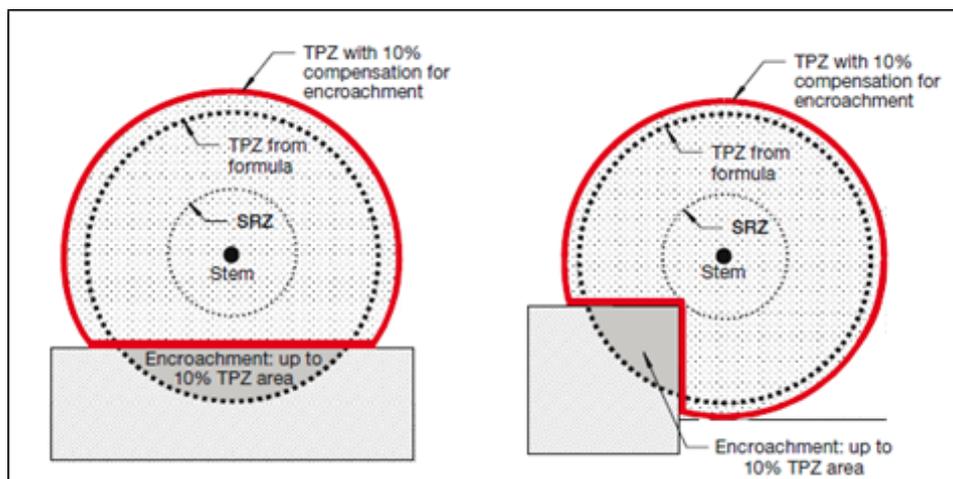


Diagram 1: Examples of minor encroachment into a TPZ. Extract from: AS4970-2009, Appendix D, p30 of 32.

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.

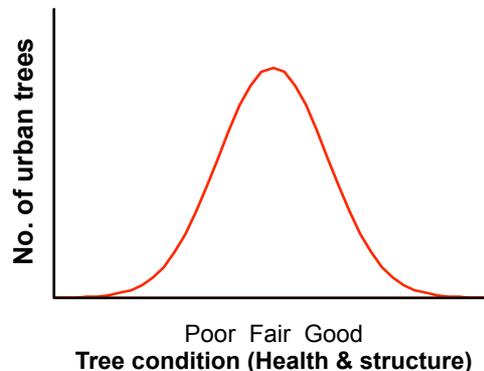
Existing infrastructure around some trees may be within the TPZ or root plate radius. The roots of some trees may have grown in response to the site conditions and therefore if existing hard surfaces and building alignments are utilised in new designs the impacts on the trees should be minimal. The most 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.

# Appendix 3 - Arboricultural Descriptors (August 2013)

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. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the author.



**Diagram 1:** 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
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

## 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 author's experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances the crown width can be measured on the four cardinal direction points (North, South, East and West).

## 5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment. 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.

### • 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 with forestersØ 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. Health

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

Category	Vigour/Extension growth	Decline symptoms/ Deadwood/Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical	Negligible	Better than typical	Negligible
Fair	Typical	Minor or expected	Typical	Minor, within damage thresholds
Fair to Poor	Below typical	More than typical	Exhibiting deficiencies	Exceeds damage thresholds
Poor	Minimal	Excessive, large and/or prominent amount/size	Exhibiting severe deficiencies	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

## 7. Structure

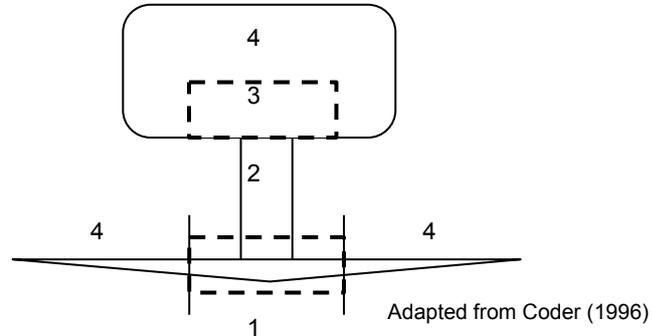
Assesses principal components of tree structure (Diagram 2).

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No 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 obvious damage, disease, decay or structural defect
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Typically formed, attached, spaced and tapered	Minor damage, disease or decay; minor branch end-weight or over-extension
Fair to Poor	Moderate damage or decay; minimal basal flare	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence	Moderate damage, disease or decay; moderate branch end-weight or over-extension
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump resprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
<b>Very Poor</b>	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump resprout	Decayed, cavities or branch attachments with active split; failure imminent	Excessive damage, disease or decay; excessive branch end-weight or over-extension

**Diagram 2:** Tree structure zones

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



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.

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

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).

## 8. Life Stage

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.
Maturing	Specimen approaching expected size in situation, with reduced incremental growth
Over-mature	Tree is senescent and in decline. Significant decay generally present

## 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.

Category	Description
High	Tree of high quality in good to fair condition. Generally a prominent arboricultural feature. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is highly desirable.

Moderate	<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 medium- to long-term component of the landscape if managed appropriately. Retention of these trees is generally desirable.</p>
Low	<p>Tree of low quality and/or little amenity value. Tree in poor health and/or with poor structure.</p> <p>Tree is not significant because of its size and/or age. 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>
None	<p>Tree has a severe structural defect and/or health problem that cannot be sustained with practical arboricultural techniques and the loss of tree would be expected in the short term.</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 woody weed with potential to spread into waterways or natural areas.</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	<p>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.</p> <p>Tree commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.</p>
Ecological Value	<p>Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve.</p> <p>Remnant Indigenous vegetation that contribute to biological diversity</p>

#### Bibliography:

Coder, K D. (1996) Construction damage assessments: trees and sites, University of Georgia, USA

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Gooding, R.F., Ingram, J.B., Urban, J.R., Bloch, L.B., Steigerwaldt, W.M, Harris, R.W. and Allen, E.N. (2000) Guide for plant appraisal, 9th edition, International society of Arboriculture, USA

Pollard, A. H. (1974) Introductory statistics: a service course, Pergamon Press Australia, Australia.

Standards Australia (2009) Australian Standard AS 4970-2009 Protection of trees on development sites.

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.

More specific tree protection distances and other measures could be provided during the fine design phase of a development project.

### The Structural Root Zone (SRZ)

A Structural Root Zone (SRZ) comprises the area around the base of a tree where structural roots required to maintain the tree's stability in the ground are typically located. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is calculated using the formula provided in AS4970.

It is important to note that the SRZ relates to a tree's structural stability only, it does not include the absorbing root system involved with maintaining the tree's vigour and long-term viability. The maintenance of the SRZ is integral to the tree and should not be encroached under any circumstances.

### Tree protection fencing

Tree protection fencing is to be erected before any machinery or materials are brought on site and before the commencement of any construction works. Examples of fencing type and signage can be seen in photographs below.



*Photograph above left - Example of signage for TPZ. Photograph above right - Example of appropriate TPZ fencing.*

The photograph above shows indicative protection fencing for a street tree, such fencing would extend to the allocated tree protection distances of the retained trees within the subject site.

Once erected the protection fencing must not be removed or altered without approval from the project arborist. No persons, vehicles or machinery to enter the TPZ without the consent of the project arborist or site manager. The TPZ fencing must be secured to restrict access. *AS 4687 - 2007 Temporary fencing and hoardings*, specifies appropriate fencing requirements. Existing perimeter fencing can be incorporated into the protective fencing. Signs identifying the TPZ are to be placed on the fencing.

Tree protection fencing is to be placed around the retained trees within the site. The trees along the southern boundary can be incorporated into one fenced area.

## Ground protection systems

The TPZ area can be temporarily encroached if the area is protected. This area will require ground protection to prevent root damage and avoid compaction. Measures may include a permeable membrane, such as a geotextile, to cover the TPZ area beneath a 100 mm layer of crushed rock below rumble boards (See Diagram 2). This will allow temporary access.

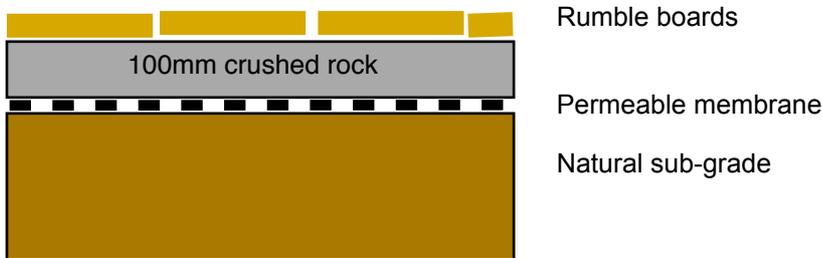


Diagram 2 Indicative ground protection system - adapted from AS4970 Clause 4.5.3 Ground protection.

### Process for installation and removal of ground protection system (GPS).

- No need to remove organic matter layer. Close mow of all grass within area. If excavation is required to attain levels, no more than 50 mm in depth is to be removed.
- The entire area is to be covered with a geotextile that will extend beyond the area by a distance to account for any crimping when a surface material is laid on top. Geotextile to be firmly anchored into soil. The geofabric shall comprise Bidim U34 filter fabric or equivalent. Install by hand.
- Place 100 mm crushed rock onto the geotextile and then place rumble boards on top of crushed rock. Crushed rock can be installed with light machinery working over the area already covered. The same principle applies when removing the material with the geotextile removed by hand.

### General tree protection guidelines

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

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood or other identified defects. Pruning works may also identify other tree hazards that require remedial works.
- The Tree Preservation Zone (TPZ) is fenced and clearly marked at all times. This fence should 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. Australian Standard AS 4687 - 2007 *Temporary fencing and hoardings*, specifies appropriate fencing requirements. Existing perimeter fencing can be incorporated into the protective fencing. Shade cloth should be attached to reduce the movement of dust and other particulates into the TPZ. Signs identifying the TPZ are to be placed on the fencing.
- If the area within the TPZ is to be accessed during the construction phase then the area will need ground protection. Measures may include a permeable membrane, such as a geotextile, to cover the TPZ area beneath a 100 mm layer of crushed rock below rumble boards.
- 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 consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- Apply 60-75 mm depth of approved woodchip mulch within the TPZ area. The mulch particles should be no less than 15 mm in size with no fines. Mulching underneath the canopy will improve the soil environment and deter activity and protect the root zone beneath the canopy. Monitoring of the trees in-line with prevailing weather conditions will indicate if supplemental irrigation is required.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No level changes, either raised or lowered, are to exceed 150 mm in depth without further consultation with arborist.
- 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.
- Any pruning that is required must be carried out by trained and competent arborist who has a thorough knowledge of tree physiology and pruning methods and carry out pruning to the Australian Standard – AS 4373 – 2007 *Pruning of amenity trees*.
- All root excavation should be carried out by hand digging or with the use of 'Air-Excavation' techniques, and roots should be severed by saw cutting or with a sharp axe and not with a Backhoe or any machinery or blunt instrument.

### **Sympathetic pavement systems**

The construction of load bearing surfaces beneath the tree canopy can be undertaken using a variety of methods that aim to preserve the root system. The most important factor is that the entire pavement construction occurs above natural grade (removal of organic matter is generally permissible up to 100 mm so long as no major roots are injured).

In each situation a 'no dig' type of pavement is preferred. The pavement and sub base are basically installed on top of existing natural grade. This will minimise root disturbance and soil compaction.

Diagram 3 shows the 'no dig' style which places the pavement section on top of the natural existing grade. This can reduce root disturbance and compaction. Extra reinforcing in the pavement and use of geotextile under the base material can be used to increase the stability of the pavement (Matheny & Clark, 1998).

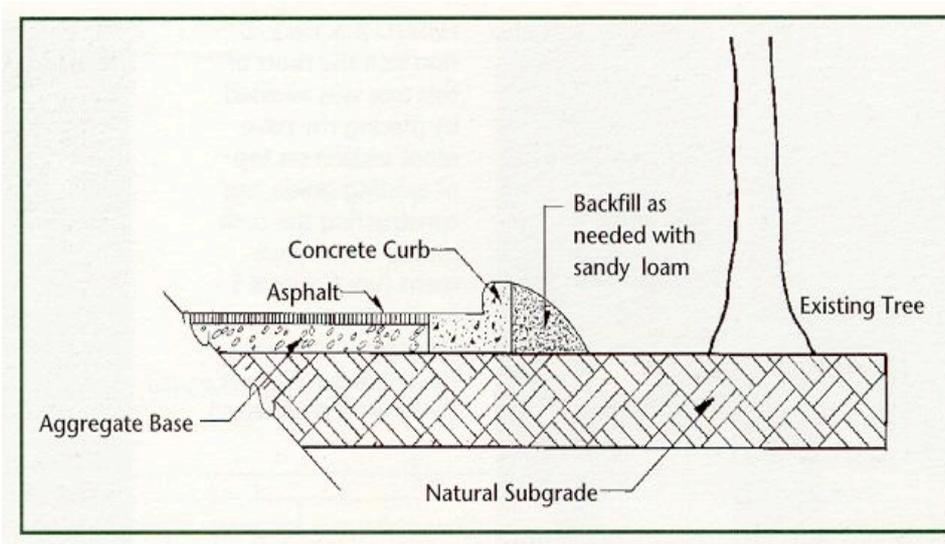
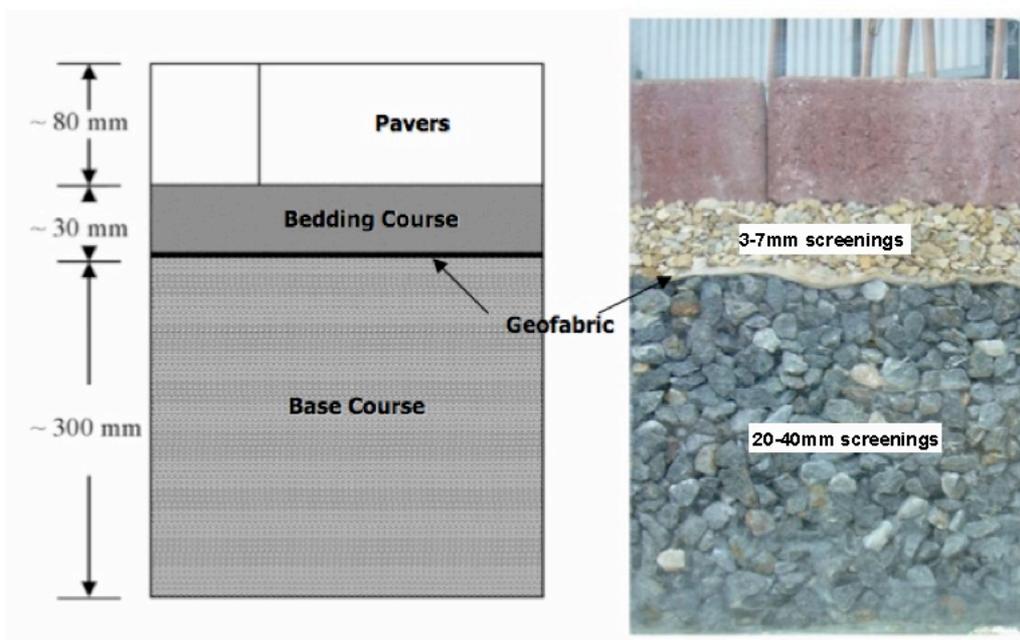


Diagram 3. The 'no dig' style places the pavement section on top of the natural existing grade. This can reduce root disturbance and compaction. Extra reinforcing in the pavement and use of geotextile under the base material can be used to increase the stability of the pavement (Matheny & Clark, 1998).

Permeable pavements are particularly useful where a hard surface is required in close proximity to trees and other planting as water flow and aeration to roots can be maintained. There are a number of materials that are suitable for the purpose, such as hydroston pavement systems (<http://hydroston.com.au>).

Diagram 4 shows indicative profile for a porous pavement.



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