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## Arboricultural Assessment and Report

375 Swansea Rd, Lilydale

Prepared for      Lilydale Development Pty.  
Ltd

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Senior Consulting Arborist  
Tree Logic Pty. Ltd.

29 August 2022

Tree Logic Ref. 012211



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TL\_tree report\_012211 - 375 Swansea Rd, Lilydale-

(Review and update of previous Tree Impact Assessment Report prepared by Arbor Survey (*Arbor Survey Reference: R4143\_3 375 Swansea Rd Lilydale, Date: 23/4/2019*))

File No.	Version	Author	Issue date	Edits	Issued by.
012211	V1	Bruce Callander	03/06/2022	Preliminary tree report	BC

# 1 Executive Summary

## Objectives

Tree Logic was engaged by Lilydale Development Pty. Ltd to undertake an arboricultural assessment and prepare an updated tree impact report for trees associated with 375 Swansea Rd, Lilydale.

The primary objectives of the arboricultural report include;

- Ascertain the species and origin of the subject remaining trees and provide information including dimensions, current health and 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

- 1.1 A preliminary tree report was prepared in 2019 by Arbor Survey (*Arbor Survey Reference: R4143\_3. 375 Swansea Rd Lilydale, Date: 23/4/2019*). In the intervening period, a storm occurred on June 10, 2021 that caused wide-spread damage to trees and infrastructure across parts of Victoria, including the subject site. This report updates the condition of trees following the storm in relation to the revised design that was developed in response to the previous tree impact assessment report and recommendations.
- 1.2 The western extents of the site comprise a creek line and land that is subject to inundation. Twenty six (26) maturing Manna Gum and two (2) Silver Wattle trees 19 to 46 & 49 are growing within this area and based on a summary review of those trees, they appeared to be comparatively intact and undamaged following the storm. These trees are sufficiently isolated from any proposed works and do not warrant re-inspection. They are represented in the tree data as Group 2.
- 1.3 The assessment for this report is limited to only the thirty six (36) trees that are either within the proposed design footprint or growing within adjacent properties and close to proposed development footprint.
- 1.4 Ten (10) different species were recorded including
  - Six (6) indigenous tree species.
  - Two (2) Australian native tree species.
  - One (1) introduced exotic conifer and 1 exotic deciduous tree species.

Refer to Section 4 for a summary of individual species assessed on site.

- 1.5 Each tree feature was attributed an arboricultural rating which reflects the retention value of the trees.
- Nineteen (19) trees were attributed a Moderate arboricultural rating including,
    - One (1) tree attributed an arboricultural rating of Moderate A, being maturing trees in Fair or better condition with a moderate to long ULE.
    - Nine (9) trees rated Moderate B, being middle of the range, typical of the species and worthy of retention.
    - Nine (9) tree features rated Moderate C, being either trees of small size or mature trees displaying accumulated deficiencies that are tending towards becoming of Low arboricultural value.
  - Seven (7) trees were attributed an arboricultural rating of Low, displaying symptoms of decline and / or structural deficiencies.
  - Eight (8) trees were attributed a rating of Very Low due to being either defective, dead, becoming hazardous or a weed species.

Refer to Section 4 for trees sorted by Arboricultural Rating.

- 1.6 The site is within the Shire of Yarra Ranges Council planning scheme and zoned as Rural Living Zone - Schedule 2 (RLZ2)
- Specific tree protection, permit and offset conditions apply under Clause 52.17 - Native Vegetation. Under Clause 52.17, naturally occurring trees native to Victoria are subject to permit and offset requirements if they were proposed to be removed.
  - Land Subject to Inundation overlay (LSIO) is the only other overlay applicable to the site but does not confer any tree controls other than preventing any development in those areas.

Refer to Section 3 for trees sorted by Permit requirements.

- 1.7 Under the current design proposal for a retirement / lifestyle village
- Thirteen (13) trees exist within the proposed footprint and are required to be removed.
  - Two (2) trees in adjacent land have development encroachment within the Structural Root Zone (SRZ). One tree is a dead stag that can be retained as a habitat stump and the other has collapsed to the east within the road reserve and will need to be removed.
  - One (1) neighbour's tree could have major Tree Protection Zone (TPZ) encroachment of approximately 19 associated with a boundary road alignment. There is scope within the design to reduce encroachment to less than 10% with minor design amendments or minimize potential impacts with above grade road and permeable road construction.
  - Three (3) trees may have minor TPZ encroachment that can be managed with appropriate TPZ exclusion fencing.
  - Seventeen (17) will have no TPZ impacts and can be protected with TPZ fencing.

Refer to Section 6 for design review and impact assessment.

## 2 Method

- 2.1 A site inspection was carried out on Thursday, August 25<sup>th</sup>, 2022, during overcast & wet conditions by Bruce Callander, Senior Consultant Arborist (Dip Hort. Cert 5 Arb. NMIT, TRAQ trained and qualified).
- 2.1 Tree locations were recorded on mobile field computers equipped with GIS software, feature survey plans with tree point data, property cadastral data, GPS and geo-referenced aerial imagery. The locations of the trees are derived from the tree points supplied in the previously supplied Development Impact Assessment report (Arbor Survey Reference: R4143\_3 375 Swansea Rd LILYDALE).
- 2.2 Observations were made of the assessed trees to confirm 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).
- 2.3 Dead trees were also recorded based on potential requirements for a permit to remove standing dead native trees with a trunk diameter greater than 40cm at 1.3m above ground level under Native Vegetation – Clause 52.17.
- 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 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 375 Swansea Rd, Lilydale 3175. Department of Planning & Community Development, dated 26/5/2022
- Rural Living Zone - Schedule 2 (RLZ2)
- Land Subject to Inundation Overlay Schedule (LSIO)
- Tree Survey Plan - The locations of the trees are derived from the tree points supplied in the previously supplied Development Impact Assessment report (Arbor Survey Reference: R4143\_3 375 Swansea Rd Lilydale, Date: 23/4/2019 (with base map prepared by Bosco Johnson – Ref: 32288 – Sheet 1 – Date : 13/3/2018)

### 3 Tree Permit Requirements

- 3.1 The site is located within the Shire of Yarra Ranges Council planning scheme and zoned as Rural Living Zone - Schedule 2 (RLZ2)
- 3.2 Specific tree protection, permit and offset conditions apply under Clause 52.17 - Native Vegetation. Under Clause 52.17 - Native Vegetation, naturally occurring trees native to Victoria are subject to permit and offset requirements if they were proposed to be removed or if development impacts extend into more than 10% of the recommended TPZ.  
This clause does not apply to;
  - Native vegetation that is to be removed, destroyed or lopped that was either planted or grown as a result of direct seeding.
  - Native vegetation that is dead which is less 40cm in trunk diameter measured at 1.3 metres above ground level.
- 3.3 Land Subject to Inundation overlay (LSIO) is the only other overlay applicable to the site but does not confer any tree controls other than preventing any development in those areas.
- 3.4 All trees in adjoining land including council managed street trees and neighbour’s trees must be adequately protected to ensure they remain viable.

Refer to Table 1 for tree numbers sorted by permit requirements.

Table 1: Permit	Total	Tree numbers
On site - 52.17 Permit	9	10, 11, 12, 13, 14, 15, 16, 18, G2 (Trees 19 to 46 & 49)
On site - No Permit	4	7, 8, 9, 47
Council / Street tree	22	1, 2, 3, 4, 5, 48, 50, 51, 52, 53, 54, 55, 56, 57 (Gone), 58, 59, 60, 61, 71, 72, 73, G1
Neighbour’s tree	1	6
<b>Total</b>	<b>36</b>	



## 4 Observations

- 4.1 The subject study area associated with 375 Swansea Rd, Lilydale, is a vacant semi-rural allotment with a history of grazing and horse agistment. The site is ostensibly flat with a slight fall towards the creek line to the west from the raised road levels of Swansea Road. The north east corner of the site is particularly swampy.



Plate 1. Aerial view of the subject site being 375 Swansea Rd, Lilydale indicated by red boundaries (Nearmap aerial imagery – dated 4/2/2022). Blue shading indicates the extents of the Land Subject to Inundation Overlay (LSIO) Trees within Group 2 and Trees 43 to 46 were not re-assessed.

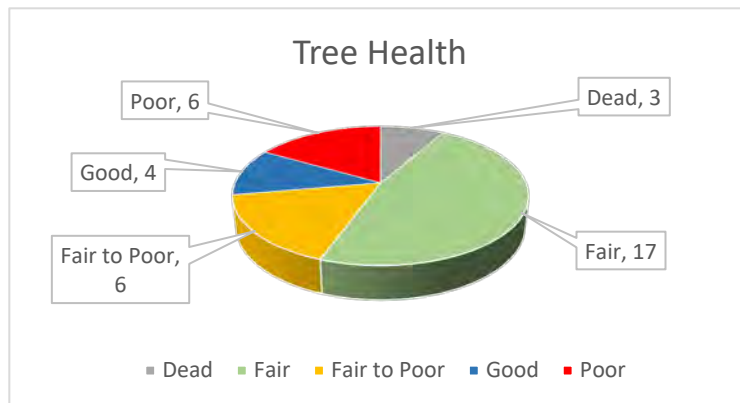
- 4.2 Tree numbering provided in the original 2019 assessment, from 1 to 61, has been adopted during this recent update.
- 4.3 Tree population  
 Thirty six (36) tree features were recorded during this assessment comprising 34 individual trees and 2 tree groups. refer  
 Ten (10) different species were identified during the tree survey.  
 Refer to Table 2 for most prevalent species and origins recorded.

Table 2: Tree population sorted by Species and Origin

Assessed	Botanic name	Common Name	Origin	Total
2022	<i>Eucalyptus ovata</i>	Swamp Gum	Indigenous	17
	<i>Eucalyptus yarraensis</i>	Yarra Gum	Indigenous	7
	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	3
	<i>Eucalyptus viminalis</i>	Manna Gum	Indigenous	2
	<i>Melaleuca ericifolia</i>	Swamp Paperbark	Indigenous	1
	<i>Eucalyptus viminalis, Acacia dealbata</i>	Manna Gum, Silver Wattle	Indigenous	Group 2
	<i>Corymbia maculata</i>	Spotted Gum	Victorian native	1
	<i>Eucalyptus mannifera</i>	Brittle Gum	Australian native	2
	<i>Cupressus macrocarpa</i>	Monterey Cypress	Exotic conifer	1
	<i>Quercus robur</i>	English Oak	Exotic deciduous	1
2022 Total				36
2019	<i>Acacia dealbata</i>	Silver Wattle	Indigenous	2
	<i>Eucalyptus viminalis</i>	Manna Gum	Indigenous	26
2019 Total				28

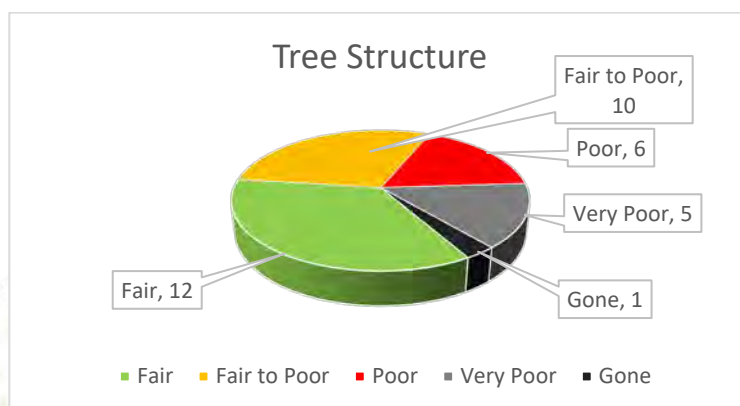
4.4 **Tree health** was assessed based on foliage colour, size and density as well as shoot initiation and elongation where possible.

Refer to Figure 1 for a breakdown of health ratings.



- Poor condition is generally associated with old Swamp Gum trees that have either collapsed or been severely damaged during the recent storm events.

4.5 **Tree structure** was assessed for structural defects and deficiencies, likelihood of failures and risk to potential targets. Refer to Figure 2 for a breakdown of Structural ratings





- Since the 2019 assessment, Trees 7, 8, 18, 51, 57 and 72 collapsed during the 2021 storm.
- Trees 10, 13, 14, 15, 16 and 71 have sustained major limb or stem failures and are significantly decay affected.
- Better trees on site are generally of either smaller size or in groups and have avoided damage from the storm events.

4.6 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 4 for tree numbers sorted by Arboricultural rating

Table 4: Arboricultural rating	Total	Tree Numbers
Moderate A	1	73
Moderate B	9	3, 6, 11, 52, 53, 54, 56, 58, G2 - (Trees 19-42 & 43-46)
Moderate C	9	1, 2, 4, 8, 12, 50, 55, 60, G1
Low	7	5, 10, 13, 14, 15, 59, 61
Very Low	8	7, 9, 16, 18, 51, 57 (Gone), 71, 72
Total	36	

- Trees rated Moderate A are generally prominent trees that display fair and typical condition with medium to long useful life expectancy.
- 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 suckering specimen or being woody weed species.
- Trees attributed an arboricultural rating of Very Low are generally unsuitable to retain in conjunction with site redevelopment.

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.

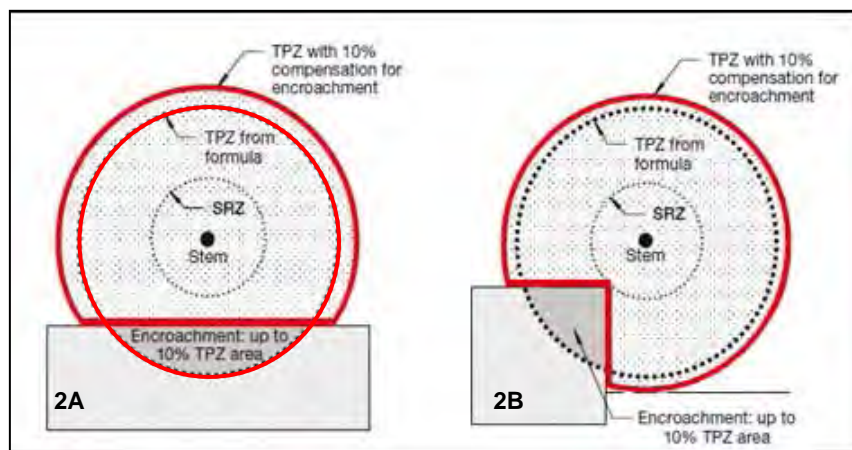


Figure 2: 2A & 2B - Examples of minor encroachment into a TPZ.

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).

At the time of preparing the updated tree impact report, plans for a retirement / lifestyle village were provided for review. Based on review of the supplied plans, development is confined to the eastern half of the site above the land subject to inundation.

All trees within the development footprint will be removed due to the level of fill required to prevent inundation.

- 6.1 Thirteen (13) trees exist within the development footprint including the new proposed access road connecting to Akarana Road.
- Seven (7) trees on site are subject to permit and offset under Clause 52.17 (Trees 10, 11, 12, 13, 14, 15, 16).
  - Two (2) trees are under the management of Yarra Ranges Council (Trees 54, 56) (Tree 57 is Gone).
  - Trees 7, 8 & 9, on site, are not subject to permit as they are specimens planted for amenity purpose and not naturally occurring.
- 6.2 Council managed trees 71 and 72 would have potential impacts to the Structural Root Zone (SRZ) from the proposed Bowling Green. One of these trees is a large dead stag that could be reduced to a habitat stump and the other has collapsed within the road reserve of Swansea Road.
- 6.3 Tree 6, neighbour's Oak tree, would have TPZ encroachment of approximately 19%. This is considered to be major encroachment and minor design amendments to move the perimeter road further north can be made to reduce TPZ encroachment to less than 10%.

- The perimeter road must be no closer than 6.5 metres from the centre of Tree 6.
- 6.4 Two (2) trees have minor TPZ encroachment of less than 10% associated with the bowling green and the access road respectively. It is concluded that these 2 early-mature trees will adapt and tolerate the minor TPZ encroachment if appropriate TPZ exclusion fencing is established at the edge of the proposed development footprint prior to any works commencing on site.
- 6.5 Sixteen (16) tree features can be successfully retained without any impacts if appropriate TPZ exclusion fencing is established prior to any works commencing on site.
- 6.6 Permit and offset will be required for the indigenous trees proposed to be removed including Trees 10, 11, 12, 13, 14, 15 and 16 within the site and Trees 54, 56 within the council land to the north. (Tree 57 is Gone)
- 6.7 Potential ownership / permit constraints are summarised in Table 4 below.

Table 4 – Tree numbers sorted by ownership constraints.

Impact	Count of trees	Tree numbers
Within	13	7, 8, 9, <b>10, 11, 12, 13, 14, 15, 16, 54, 56</b> , (57 Gone)
SRZ	2	<b>71, 72</b>
TPZ Major	1	6
TPZ	2	<b>3, 55</b>
None	16	<b>1, 2, 4, 5, 18, 50, 51, 52, 53, 58, 59, 60, 61, 73, G1, G2</b> - (Trees 19-42 & 43-46)
Total	36	<b>Bold</b> = 52.17 permit & offset <b>Bold italics</b> = Council tree & 52.17 <i>Italicised</i> = Neighbour's tree

- 6.8 Retention suitability will be dependent on the proposed landscape setting in which trees are intended to be retained. The following recommendations are provided for consideration in the design process.
- 6.9 Low and Very Low rated trees that are generally defective and decay affected and are considered as unsuitable to retain in conjunction with any such redevelopment of the site due to the elevated risk of further tree failures. Such trees are not worthy of being a constraint on reasonable design intent and outcomes.
- Low and Very Low rated trees with health or structural deficiencies (Poor or worse Health and/or Structure) should generally be considered for removal based on sound arboricultural opinion
- 6.10 Trees attributed an arboricultural rating of Moderate A and B are considered more significant to the site and more appropriate to retain over trees attributed a rating of Moderate C.
- 6.11 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.

- 6.12 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.
- 6.13 The tree protection zones for all trees to be retained within the site 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.
- 6.14 The TPZ fencing must be in the form of either temporary fencing panels with concrete block feet and locked together, water filled barriers with locking pins installed or similar exclusion fencing options. Refer to Figure 1 for fencing example. TPZ fencing must be sufficiently robust to withstand knocks and bumps from plant and machinery, delivery vehicles, storage of materials and dumping of spoil.
- 6.15 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 signage example.



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

- 6.16 Regardless of which TPZ exclusion fencing option is selected, the TPZ fence must effectively provide an exclusion barrier to entry to the TPZ, prevent vehicles, plant or equipment traversing the TPZ and dumping or stockpiling of spoil or materials. It must be sturdy and withstand winds and construction impacts. The protection fence may only be moved with approval of the project arborist or relevant authority. Other root zone protection methods must be incorporated if the TPZ area needs to be entered or traversed.
- 6.17 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

6.18 No form of excavation for trenching for installation of underground services is permitted within the nominated TPZ areas for 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.

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

## 7 Conclusion.

- 7.1 A survey was undertaken for the site in 2019 by Arbor Survey at which time 61 tree features were recorded and discussed. Since that assessment, several damaging storms have occurred resulting in 6 trees having collapsed and another 6 trees have suffered major limb and stem failures.
- 7.2 A design proposal has been provided that shows development is proposed of the eastern half of the site only, meaning trees 19 to 46, located along the western creek line and within the LSIO area are located away from and effectively excluded from any potential construction impacts. These trees do not warrant re-inspection but were observed to be comparatively undamaged by the storms.
- 7.3 Only Trees 1 to 18 and Trees 47 to 61 warranted re-inspection. In summary, thirty six (36) tree features were assessed including 34 trees and 2 tree groups.
- 7.4 Group 2 represents trees 19 to 46 located in the western half of the site within the LSIO.
- 7.5 The majority of trees are either indigenous Swamp Gum, Yarra Gum or Silver Wattle trees located within the eastern half of the study area with a small number of introduced native or exotic species planted for garden and amenity purposes around the permitter.  
Refer to Table 2 at Section 4.3 for indication of species diversity and origin.
- 7.6 Specific tree protection, permit and offset conditions apply under Native Vegetation - Clause 52.17 which triggers permit and offset requirements to naturally occurring trees native to Victoria.
- All trees in adjoining land including neighbour's trees and trees in the road reserve must be adequately protected to ensure they remain viable.

Refer to column titled Permit in tree assessment data tables in Appendix 1 and Table 1 at Section 3 for trees sorted by Permit requirement.

- 7.7 The trees generally displayed health and structure conditions considered to be typical for these species and age growing in this area under prevailing conditions.  
Refer to Sections 4.4 and 4.5
- 7.8 Each tree feature was attributed an arboricultural rating which reflects the retention value of the trees.
- Nineteen (19) trees were attributed a Moderate arboricultural rating including,
    - One (1) trees attributed an arboricultural rating of Moderate A being prominent trees displaying fair and typical condition with medium to long useful life expectancy.
    - Nine (9) trees rated Moderate B, being middle of the range and typical of the species worthy of retention.
    - Nine (9) trees rated Moderate C, being of either small size or displaying accumulated deficiencies that are tending towards becoming of Low arboricultural value.

- Seven (7) trees were attributed an arboricultural rating of Low, displaying symptoms of decline and structural deficiencies.
- Eight (8) trees were attributed a rating of Very Low due to being either in irreversible decline, dead or inappropriate weed species.

Refer to Table 4 - Section 4.7 for tree numbers sorted by arboricultural rating.

- 7.9 The preliminary tree assessment report provides 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.
- 7.10 At the time of preparing the arboricultural report plans for a retirement village were provided for review.
- 7.11 Under the current design,
- Thirteen (13) trees exist within the development footprint including the new proposed access road connecting to Akarana Road. They include;
    - 7 trees on site that trigger permit and offset under Clause 52.17.
    - 3 trees on site that do not trigger permit and offset as they are introduced planted specimens, 2 of which have collapsed.
    - 3 council managed trees located in the Akarana Road reserve.
  - Two council managed trees have notional encroachment of the SRZ. However
    - Tree 71 is a dead stag that should be reduced to a habitat stump
    - Tree 72 has recently collapsed towards Swansea Road.
  - Tree 6, an Oak tree in the southern neighbour's property would have TPZ encroachment of more than 10% by the southern perimeter road.
    - The road alignment must be no closer than 6.5 metres from the base of this tree and thereby reduce TPZ encroachment to less than 10%.
  - Trees 3 and 55 have minor TPZ encroachment of less than 10% and can be successfully retained with TPZ exclusion fencing established at the edge of proposed works prior to any works commencing on site.
  - Sixteen (16) tree features can be successfully retained without any potential construction related impacts from the proposed development with appropriate TPZ exclusion fencing established prior to any works commencing on site.
    - This includes group 2 which comprises Trees 19 to 46 in the western half of the site.
- 7.12 Ultimately, tree retention suitability will be dependent on the proposed landscape setting in which trees are intended to be retained.



- On the basis of future site safety and potential amenity, preference should be given to retaining trees of Moderate arboricultural value in built areas, or areas of increased target potential.  
Trees attributed an arboricultural rating of Moderate A and B are considered more significant to the site and more appropriate to retain over trees attributed a rating of Moderate C.
- Trees of Low arboricultural value are generally not worthy of being a constraint on reasonable design intent and outcomes.

7.13 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.

Signed



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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: 375 Swansea Rd, Lilydale

Refer to following 2 pages

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. TPZ radius applies from centre of trunk.

SRZ = Structural root zone in radial metres. SRZ can be supplied on request

ULE = Useful Life Expectancy (Estimated)

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

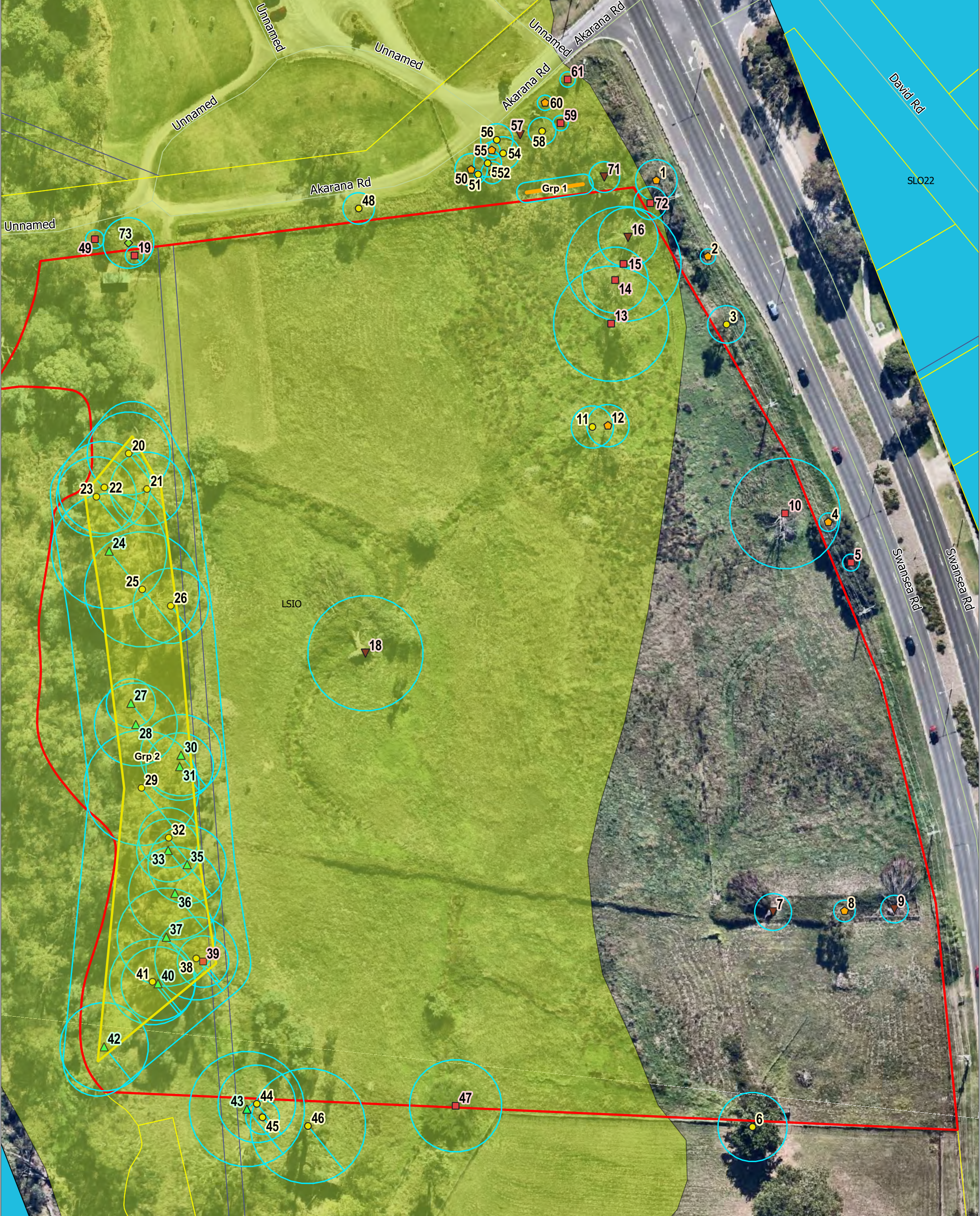
Assessed	Tree id	Species	Common Name	Age_class	Origin	DBH cm	Height_m	Width_m	Health	Structure	Arb rating	ULE yrs	Ownership	Impact_name	TPZ impact	Incur_m <sup>2</sup>	Incur_%	52.17	Comments	TPZ rad_m	SRZ rad_m
2022	1	<i>Eucalyptus ovata</i>	Swamp Gum	Semi-mature	Indigenous	26,24,22,18 (est.)	8	8	Fair	Fair to Poor	Mod.C	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect	Included bark forks, multi-stemmed, past powerline clearance.	5.4	2.5
2022	2	<i>Acacia melanoxylon</i>	Blackwood	Early-mature	Indigenous	16	5	4	Fair	Fair to Poor	Mod.C	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect	Past powerline clearance. x2 trees	2	1.8
2022	3	<i>Eucalyptus ovata</i>	Swamp Gum	Early-mature	Indigenous	38,16	8	8	Fair	Fair to Poor	Mod.B	11-20 y	Council	Bowling green - 2.52%,Development - 7.92%	TPZ	7.87	10.4%	Yes-Protect	Acute forks, past powerline clearance. Pruned for wire clearance	4.9	2.3
2022	4	<i>Eucalyptus ovata</i>	Swamp Gum	Semi-mature	Indigenous	20 (est.)	7	3	Fair	Fair to Poor	Mod.C	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect	Past powerline clearance, street tree, weed infested.	2.4	1.5
2022	5	<i>Melaleuca ericifolia</i>	Swamp Paperbark	Maturing	Indigenous	18	5	4	Fair	Fair	Low	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect	Suckering.	2.2	1.8
2022	6	<i>Quercus robur</i>	English Oak	Maturing	Exotic deciduous	75	10	12	Fair to Poor	Fair	Mod.B	21-40 y	Neighbours	Development - 18.69%	TPZ Major	47.53	18.7%	Exotic deciduous	Neighbour's tree. Dieback, epicormic growth.	9	3.7
2022	7	<i>Eucalyptus mannifera</i>	Brittle Gum	Maturing	Australian native	40	14	10	Poor	Very Poor	Very Low	<1 y	Subject Site	Development - 100.0%	Within	72.35	100.0%	Australian native	Collapsed, trunk re-sprout.	4.8	3.7
2022	8	<i>Corymbia maculata</i>	Spotted Gum	Maturing	Victorian native	23	12	7	Fair	Fair	Mod.C	21-40 y	Subject Site	Development - 100.0%	Within	24.62	100.0%	Victorian native	Bifurcated at 1.8m	2.8	3.7
2022	9	<i>Eucalyptus mannifera</i>	Brittle Gum	Maturing	Australian native	30	13	13	Poor	Very Poor	Very Low	<1 y	Subject Site	Development - 99.99%	Within	40.7	100.0%	Australian native	Collapsed, trunk re-sprout. Cracks/splits, in irreversible decline, weed infested. Almost dead, previous failures, habitat value.	3.6	3.3
2022	10	<i>Eucalyptus ovata</i>	Swamp Gum	Over-mature	Indigenous	120 (est.)	14	13	Poor	Poor	Low	<1 y	Subject Site	Development - 78.35%	Within	510.2	78.4%	Yes- Lost	Partly suppressed - crown bias nw, On lean, included union at ~3m.	14.4	3.7
2022	11	<i>Eucalyptus ovata</i>	Swamp Gum	Maturing	Indigenous	46	11	8	Good	Fair	Mod.B	11-20 y	Subject Site	Development - 100.0%	Within	94.99	100.0%	Yes- Lost	Minor dieback. Suppressed, bifurcated with included unions.	5.5	2.7
2022	12	<i>Eucalyptus ovata</i>	Swamp Gum	Maturing	Indigenous	46	14	7	Fair to Poor	Fair to Poor	Mod.C	11-20 y	Subject Site	Development - 100.0%	Within	94.99	100.0%	Yes- Lost	Decay, declining, main leader dead. Almost dead, hollows in trunk, habitat value.	8.6	3.1
2022	13	<i>Eucalyptus ovata</i>	Swamp Gum	Over-mature	Indigenous	163	22	14	Fair	Poor	Low	6-10 y	Subject Site	Bowling green - 32.81%,Clubhouse - 16.52%,Development - 46.19%	Within	706.54	100.0%	Yes- Lost	Decay, declining, main leader dead. Almost dead, hollows in trunk, habitat value.	15	4.2
2022	14	<i>Eucalyptus ovata</i>	Swamp Gum	Over-mature	Indigenous	72	12	8	Poor	Poor	Low	6-10 y	Subject Site	Bowling green - 67.31%,Development - 30.99%	Within	228.3	98.3%	Yes- Lost	Decay, declining, main leader dead. Almost dead, hollows in trunk, habitat value.	8.6	3.1
2022	15	<i>Eucalyptus ovata</i>	Swamp Gum	Over-mature	Indigenous	90,94 (est.)	17	11	Poor	Poor	Low	1-5 y	Subject Site	Bowling green - 71.16%,Clubhouse - 0.52%,Development - 21.67%	Within	706.54	100.0%	Yes- Lost	Decay, declining, main leader dead. Almost dead, hollows in trunk, habitat value.	15	3.1
2022	16	<i>Eucalyptus ovata</i>	Swamp Gum	Maturing	Indigenous	65	13	8	Dead	Poor	Very Low	<1 y	Subject Site	Bowling green - 99.93%	Within	190.92	99.9%	Yes- Lost	Trunk decay. 17cm sapling growing at base	7.8	2.8
2022	18	<i>Eucalyptus viminalis</i>	Manna Gum	Maturing	Indigenous	133	24	20	Poor	Very Poor	Very Low	<1 y	Subject Site	NA	None	NA	0.0%	Yes-Protect	Collapsed. Minor deadwood, requires pruning of crossing branches.	15	1.5
2022	50	<i>Eucalyptus yarraensis</i>	Yarra Gum	Semi-mature	Indigenous	26,23	8	6	Fair to Poor	Fair to Poor	Mod.C	6-10 y	Council	NA	None	NA	0.0%	Yes-Protect	Hangers, minor dieback, past stem failure.	4.2	2.7
2022	51	<i>Eucalyptus yarraensis</i>	Yarra Gum	Early-mature	Indigenous	37	1	2	Good	Very Poor	Very Low	<1 y	Council	NA	None	NA	0.0%	Yes-Protect	Collapsed, stump re-sprout.	1	1
2022	52	<i>Eucalyptus yarraensis</i>	Yarra Gum	Early-mature	Indigenous	24	8	5	Fair	Fair	Mod.B	21-40 y	Council	NA	None	NA	0.0%	Yes-Protect	Partly suppressed - crown bias sth.	2.9	2.7
2022	53	<i>Eucalyptus yarraensis</i>	Yarra Gum	Early-mature	Indigenous	30	11	7	Fair	Fair	Mod.B	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect		3.6	2.7
2022	54	<i>Eucalyptus yarraensis</i>	Yarra Gum	Early-mature	Indigenous	36	9	6	Fair	Fair	Mod.B	21-40 y	Council	Development/Driveway entry - 57.27% / (Non-Contiguous Areas: Development - 42.73%)	Within	33.25	57.3%	Yes- Lost		4.3	1.7
2022	55	<i>Eucalyptus yarraensis</i>	Yarra Gum	Early-mature	Indigenous	18	3	5	Fair	Fair to Poor	Mod.C	11-20 y	Council	Development/Driveway entry 6.41%	TPZ	0.97	6.4%	Yes-Protect	Partly suppressed - crown bias. Heavy trunk lean-NW shaded.	2.2	1.7
2022	56	<i>Eucalyptus ovata</i>	Swamp Gum	Early-mature	Indigenous	35	11	6	Fair to Poor	Fair	Mod.B	11-20 y	Council	Development/Driveway entry 68.07% / (Non-Contiguous Areas: Development - 31.93%)	Within	55.39	100.0%	Yes- Lost	Reduced foliage density.	4.2	1.7
2022	57	<i>Eucalyptus yarraensis</i>	Yarra Gum	Semi-mature	Indigenous	0	0	0	Dead	Gone	Very Low	0 y	Council	Tree Gone	Within	0	0.0%	No tree	Tree Gone.	0.2	0.2
2022	58	<i>Eucalyptus ovata</i>	Swamp Gum	Early-mature	Indigenous	30	10	6	Fair	Fair	Mod.B	21-40 y	Council	NA	None	NA	0.0%	Yes-Protect	Acute forks.	3.6	2.2
2022	59	<i>Eucalyptus ovata</i>	Swamp Gum	Semi-mature	Indigenous	15	9	3	Fair to Poor	Fair to Poor	Low	6-10 y	Council	NA	None	NA	0.0%	Yes-Protect	Reduced foliage density. x2 trees	2	2.2
2022	60	<i>Acacia melanoxylon</i>	Blackwood	Semi-mature	Indigenous	15	5	4	Fair	Fair	Mod.C	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect		2	2.2
2022	61	<i>Acacia melanoxylon</i>	Blackwood	Semi-mature	Indigenous	9	4	3	Fair	Fair	Low	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect		2	1.5
2022	71	<i>Eucalyptus ovata</i>	Swamp Gum	Over-mature	Indigenous	110 (est.)	10	6	Dead	Poor	Very Low	<1 y	Council	Bowling green - 1.34%	SRZ	0.67	1.3%	Yes- Lost	Habitat hollows.	4	3.7

Assessed	Tree id	Species	Common Name	Age_class	Origin	DBH cm	Height_m	Width_m	Health	Structure	Arb rating	ULE yrs	Ownership	Impact_name	TPZ impact	Incur_m <sup>2</sup>	Incur_%	52.17	Comments	TPZ rad_m	SRZ rad_m
2022	72	<i>Eucalyptus ovata</i>	Swamp Gum	Early-mature	Indigenous	28,22 (est.)	10	6	Fair	Very Poor	Very Low	1-5 y	Council	Bowling green - 24.57%	SRZ	14.26	24.6%	Yes- Lost	Co-dominant stems, collapsed. East & growing on.	4.3	2.3
2022	73	<i>Eucalyptus viminalis</i>	Manna Gum	Early-mature	Indigenous	55 (est.)	19	11	Good	Fair	Mod.A	21-40 y	Council	NA	None	NA	0.0%	Yes-Protect	On bank of drainage line.	6.6	2.7
2022	G1	<i>Eucalyptus ovata</i>	Swamp Gum	Semi-mature	Indigenous	20	10	4	Fair to Poor	Fair to Poor	Mod.C	11-20 y	Council	NA	None	NA	0.0%	Yes-Protect	Group of 5 semi-mature Swamp Gums in swamp	2.4	1.8
2022	G2	<i>Eucalyptus viminalis</i> ; <i>Eucalyptus ovata</i>	Manna Gum; Swamp Gum	Maturing	Indigenous	~80	22	15	Fair	Fair to Poor	Mod.B	21-40 y	Subject Site	NA	None	NA	0.0%	Yes-Protect	Twenty six (26) maturing Manna Gum and two (2) Silver Wattle trees - Trees 19 to 46 & 49	9	3

## Appendix 2A: Tree Location Plan: 375 Swansea Rd, Lilydale – Existing Conditions

Refer to following page.





**APPENDIX 2 — TREE LOCATIONS AND PROTECTION ZONES**

**PROJECT**  
375 Swansea Road, Lilydale

**TL REF.**  
012211

**DATE**  
2022-08-29

**MAP NO.**  
1 / 1

**CLIENT**  
Lilydale Development Pty Ltd

Document Set ID: 7945666  
Version: 2, Version Date: 29/11/2023

**LEGEND**

**Trees by Arb rating**

- ◆ Mod-A
- Mod-B
- ◆ Mod-C
- Low

**Groups by Arb rating**

- ▽ Very Low
- Mod-B
- Mod-C

**Boundaries**

- ▭ Subject site
- ▭ Other

**Overlays**

- ▭ LSIO

▭ SLO22

— Easement

— Roads

○ Tree Protection Zone

○ Structural Root zone

**TREE LOCATION DISCLAIMER**  
Tree locations are approximate

**DATA SOURCES**

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

0 10 20m

ABN: 95 080 021 610  
TEL: 1300 656 926

**TREELOGIC PTY LTD**  
4 / 21 Eugene Toe  
Ringwood, VIC  
Australia 3134

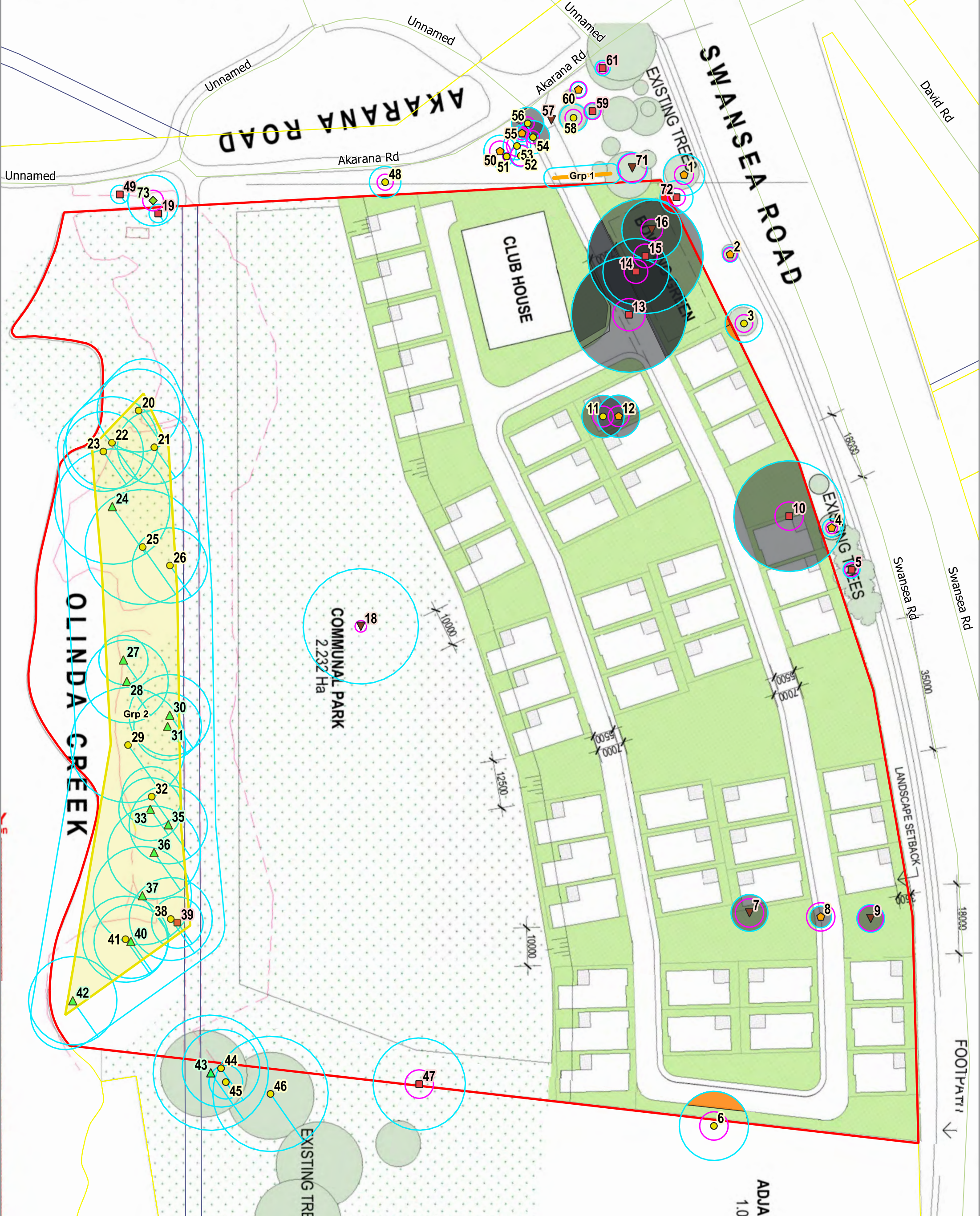


**NOTES**

## Appendix 2B: TPZ Impact Plan: 375 Swansea Rd, Lilydale – Proposed Development

Refer to following page





**APPENDIX 2 — TREE LOCATIONS AND PROTECTION ZONES**

**PROJECT**  
375 Swansea Road, Lilydale

**TL REF.**  
012211

**DATE**  
2022-08-29

**MAP NO.**  
1 / 1

**CLIENT**  
Lilydale Development Pty Ltd

Document Set ID: 7945666  
Version: 2, Version Date: 29/11/2023

**LEGEND**

- |                            |   |   |  |   |  |   |  |
|----------------------------|---|---|--|---|--|---|--|
| <b>Trees by Arb rating</b> | <ul style="list-style-type: none"> <li>◆ Mod-A</li> <li>● Mod-B</li> <li>◆ Mod-C</li> </ul> | <ul style="list-style-type: none"> <li>■ Low</li> <li>▼ Very Low</li> </ul> | <ul style="list-style-type: none"> <li>■ Mod-B</li> <li>■ Mod-C</li> </ul> | <ul style="list-style-type: none"> <li>■ Low</li> <li>▼ Very Low</li> </ul> | <ul style="list-style-type: none"> <li>■ Mod-B</li> <li>■ Mod-C</li> </ul> | <ul style="list-style-type: none"> <li>■ Subject site</li> <li>■ Other</li> <li>— Easement</li> </ul> | <ul style="list-style-type: none"> <li>— Roads</li> <li>— TPZ_impacts</li> <li>■ SRZ</li> <li>■ TPZ</li> <li>■ Within</li> </ul> |
|----------------------------|---|---|--|---|--|---|--|

**TREE LOCATION DISCLAIMER**  
Tree locations are approximate

**DATA SOURCES**

**NOTES**

Tree Protection Zone  
Structural Root zone

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

ABN: 95 080 021 610  
TEL: 1300 656 926

**TREELOGIC PTY LTD**  
4 / 21 Eugene Toe  
Ringwood, VIC  
Australia 3134





## Tree pictures

Tree id: 1. *Eucalyptus ovata* (Swamp Gum)  
 Semi-mature, Indigenous Arb rating. Mod.C  
 DBH: 26,24,22,18 (est.) cm TPZ: 5.4 m rad. Comments:  
 Included bark forks, multi-stemmed, past powerline  
 clearance.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 3. *Eucalyptus ovata* (Swamp Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 38,16 cm TPZ: 4.9 m rad. Comments: Acute forks,  
 past powerline clearance. Pruned for wire clearance

Impact: TPZ. TPZ encroachment 10.4%



Tree id: 2. *Acacia melanoxylon* (Blackwood)  
 Early-mature, Indigenous Arb rating. Mod.C  
 DBH: 16 cm TPZ: 2 m rad. Comments: Past powerline  
 clearance. X2 trees.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 4. *Eucalyptus ovata* (Swamp Gum)  
 Semi-mature, Indigenous Arb rating. Mod.C  
 DBH: 20 (est.) cm TPZ: 2.4 m rad. Comments: Past  
 powerline clearance, street tree, weed infested.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 5. *Melaleuca ericifolia* (Swamp Paperbark)  
 Maturing, Indigenous Arb rating. Low  
 DBH: 18 cm) TPZ: 2.2 m rad. Comments: Suckering.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 7. *Eucalyptus mannifera* (Brittle Gum)  
 Maturing, Australian native Arb rating. Very Low  
 DBH: 40 cm) TPZ: 4.8 m rad. Comments: Collapsed, stump  
 re-sprout.  
 Impact: Within. TPZ encroachment 100.0%



Tree id: 8. *Corymbia maculata* (Spotted Gum)  
 Maturing, Victorian native Arb rating. Mod.C  
 DBH: 23 cm) TPZ: 2.8 m rad. Comments: Bifurcated at 1.8m

Impact: Within. TPZ encroachment 100.0%



Tree id: 6. *Quercus robur* (English Oak)  
 Maturing, Exotic deciduous Arb rating. Mod.B  
 DBH: 75 cm) TPZ: 9 m rad. Comments: Neighbour's tree.  
 Dieback, epicormic growth.  
 Impact: TPZ Major. TPZ encroachment 18.7%



Tree id: 9. *Eucalyptus mannifera* (Brittle Gum)  
 Maturing, Australian native Arb rating. Very Low  
 DBH: 30 cm) TPZ: 3.6 m rad. Comments: Collapsed, stump  
 re-sprout.  
 Impact: Within. TPZ encroachment 100.0%



Tree id: 11. *Eucalyptus ovata* (Swamp Gum)  
 Maturing, Indigenous Arb rating. Mod.B  
 DBH: 46 cm) TPZ: 5.5 m rad. Comments: Partly suppressed  
 - crown bias nw, On lean, included union at ~3m.  
 Impact: Within. TPZ encroachment 100.0%



Tree id: 10. *Eucalyptus ovata* (Swamp Gum)  
 Over-mature, Indigenous Arb rating. Low  
 DBH: 120 (est.) cm) TPZ: 14.4 m rad. Comments:  
 Cracks/splits, in irreversible decline, weed infested. Almost  
 dead, previous failures, habitat hollows.  
 Impact: Within. TPZ encroachment 78.4%



Tree id: 12. *Eucalyptus ovata* (Swamp Gum)  
 Maturing, Indigenous Arb rating. Mod.C  
 DBH: 46 cm) TPZ: 5.5 m rad. Comments: Minor dieback.  
 Suppressed, bifurcated with included unions.  
 Impact: Within. TPZ encroachment 100.0%



Tree id: 13. *Eucalyptus ovata* (Swamp Gum)  
 Over-mature, Indigenous Arb rating. Low  
 DBH: 163 cm TPZ: 15 m rad. Comments: Cavity, over-extended limbs, past stem failure, trunk decay. Dieback, bifurcated at 1.6m, previous failures.  
 Impact: Within. TPZ encroachment 100.0%



Tree id: 15. *Eucalyptus ovata* (Swamp Gum)  
 Over-mature, Indigenous Arb rating. Low  
 DBH: 90,94 (est.) cm TPZ: 15 m rad. Comments: Decay, main leader dead, past limb failure, past stem failure. Large stem tear, fungal fruiting bodies, in decline, habitat hollows.  
 Impact: Within. TPZ encroachment 100.0%



Tree id: 14. *Eucalyptus ovata* (Swamp Gum)  
 Over-mature, Indigenous Arb rating. Low  
 DBH: 72 cm TPZ: 8.6 m rad. Comments: Decay, declining, main leader dead. Almost dead, hollows in trunk.  
 Impact: Within. TPZ encroachment 98.3%



Tree id: 16. *Eucalyptus ovata* (Swamp Gum)  
 Maturing, Indigenous Arb rating. Very Low  
 DBH: 65 cm TPZ: 7.8 m rad. Comments: Trunk decay, 17cm sapling growing at base  
 Impact: Within. TPZ encroachment 99.9%



Tree id: 18. *Eucalyptus viminalis* (Manna Gum)  
 Maturing, Indigenous Arb rating. Very Low  
 DBH: 133 cm) TPZ: 15 m rad. Comments: Collapsed.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 47. *Cupressus macrocarpa* (Monterey Cypress)  
 Maturing, Exotic conifer Arb rating. Low  
 DBH: 100 cm) TPZ: 12 m rad. Comments: Regrowth from  
 failed stem

Impact: None. TPZ encroachment 0.0%



Tree id: 48. *Eucalyptus ovata* (Swamp Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 34 (est.) cm) TPZ: 4.1 m rad. Comments: Acute forks.  
 Bifurcated at 1.5m  
 Impact: TPZ. TPZ encroachment 2.0%



Tree id: 50. *Eucalyptus yarraensis* (Yarra Gum)  
 Semi-mature, Indigenous Arb rating. Mod.C  
 DBH: 26,23 cm) TPZ: 4.2 m rad. Comments: Hangers, minor  
 dieback, past stem failure.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 51. *Eucalyptus yarraensis* (Yarra Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 37 cm) TPZ: 1 m rad. Comments: Collapsed, stump re-sprout.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 53. *Eucalyptus yarraensis* (Yarra Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 30 cm) TPZ: 3.6 m rad. Comments:  
 Impact: None. TPZ encroachment 0.0%



Tree id: 52. *Eucalyptus yarraensis* (Yarra Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 24 cm) TPZ: 2.9 m rad. Comments: Partly suppressed  
 - crown bias sth.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 54. *Eucalyptus yarraensis* (Yarra Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 36 cm) TPZ: 4.3 m rad. Comments:  
 Impact: **Within**. TPZ encroachment 57.3%



Tree id: 55. *Eucalyptus yarraensis* (Yarra Gum)  
 Early-mature, Indigenous Arb rating. Mod.C  
 DBH: 18 cm) TPZ: 2.2 m rad. Comments: Partly suppressed  
 - crown bias. Heavy trunk lean-NW shaded.  
 Impact: TPZ. TPZ encroachment 6.4%



Tree id: 56. *Eucalyptus ovata* (Swamp Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 35 cm) TPZ: 4.2 m rad. Comments: Reduced foliage  
 density.  
 Impact: **Within**. TPZ encroachment 100.0%



Tree id: 57. *Eucalyptus yarraensis* (Yarra Gum) TREE GONE  
 Semi-mature, Indigenous Arb rating. NA  
 DBH: 0 cm) TPZ: 0 m rad. Comments: Tree Gone.  
 Impact: Within. TPZ encroachment - NA - Tree gone



Tree id: 58. *Eucalyptus ovata* (Swamp Gum)  
 Early-mature, Indigenous Arb rating. Mod.B  
 DBH: 30 cm) TPZ: 3.6 m rad. Comments: Acute forks.  
 Impact: None. TPZ encroachment 0.0%



Tree id: 59. *Eucalyptus ovata* (Swamp Gum)  
 Semi-mature, Indigenous Arb rating. Low  
 DBH: 15 cm) TPZ: 2 m rad. Comments: Reduced foliage  
 density, 2 x trees  
 Impact: None. TPZ encroachment 0.0%



Tree id: 61. *Acacia melanoxylon* (Blackwood)  
 Semi-mature, Indigenous Arb rating. Low  
 DBH: 9 cm) TPZ: 2 m rad. Comments:  
 Impact: None. TPZ encroachment 0.0%



Tree id: 60. *Acacia melanoxylon* (Blackwood)  
 Semi-mature, Indigenous Arb rating. Mod.C  
 DBH: 15 cm) TPZ: 2 m rad. Comments: -  
 Impact: None. TPZ encroachment 0.0%



Tree id: 71. *Eucalyptus ovata* (Swamp Gum)  
 Over-mature, Indigenous Arb rating. Very Low  
 DBH: 110 (est.) cm) TPZ: 4 m rad. Comments: Habitat  
 hollows. Crown reduce  
 Impact: SRZ. TPZ encroachment 1.3%





Tree id: 72. *Eucalyptus ovata* (Swamp Gum)  
 Early-mature, Indigenous Arb rating. Low  
 DBH: 28,22 (est.) cm TPZ: 4.3 m rad. Comments: Co-  
 dominant stems, collapsed to East.  
 Impact: SRZ. TPZ encroachment 24.6%



Tree id: G1. *Eucalyptus ovata* (Swamp Gum)  
 Semi-mature, Indigenous Arb rating. Mod.C  
 DBH: 20 cm TPZ: 2.4 m rad. Comments: Group of 5 semi-  
 mature Swamp Gums in swamp  
 Impact: None. TPZ encroachment 0.0%



Tree id: G2. *Eucalyptus viminalis*; *Eucalyptus ovata* (Manna  
 Gum; Swamp Gum)  
 Maturing, Indigenous Arb rating. Mod.B  
 DBH: 75 cm TPZ: 9 m rad. Comments:  
 Impact: None. TPZ encroachment 0.0%



Tree id: 73. *Eucalyptus viminalis* (Manna Gum)  
 Early-mature, Indigenous Arb rating. Mod.A  
 DBH: 55 (est.) cm TPZ: 6.6 m rad. Comments: On bank of  
 drainage line.  
 Impact: None. TPZ encroachment 0.0%

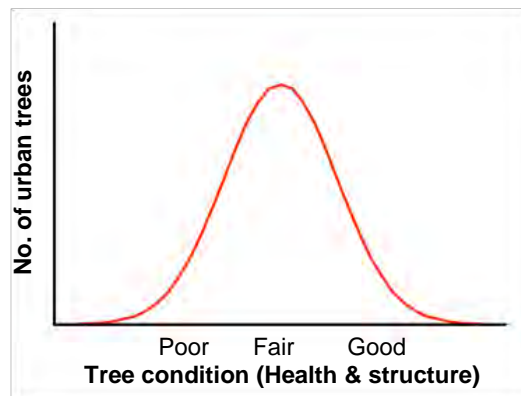


## Appendix 3: Arboricultural Descriptors (June 2018)

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
<b>Good</b>	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
<b>Fair</b>	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
<b>Fair to Poor</b>	Below typical - low vigour	More than typical. Small sub-branch dieback	Exhibiting deficiencies. Could be thinning, or smaller	Exceeds damage thresholds
<b>Poor</b>	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
<b>Dead</b>	N/A	N/A	N/A	N/A

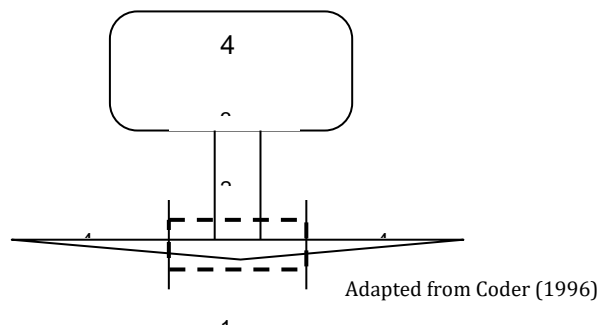
## 8. Structure

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
<b>Good</b>	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.
<b>Fair</b>	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.
<b>Fair to Poor</b>	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.
<b>Poor</b>	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.
<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 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, &gt; 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, &gt;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.

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### 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.

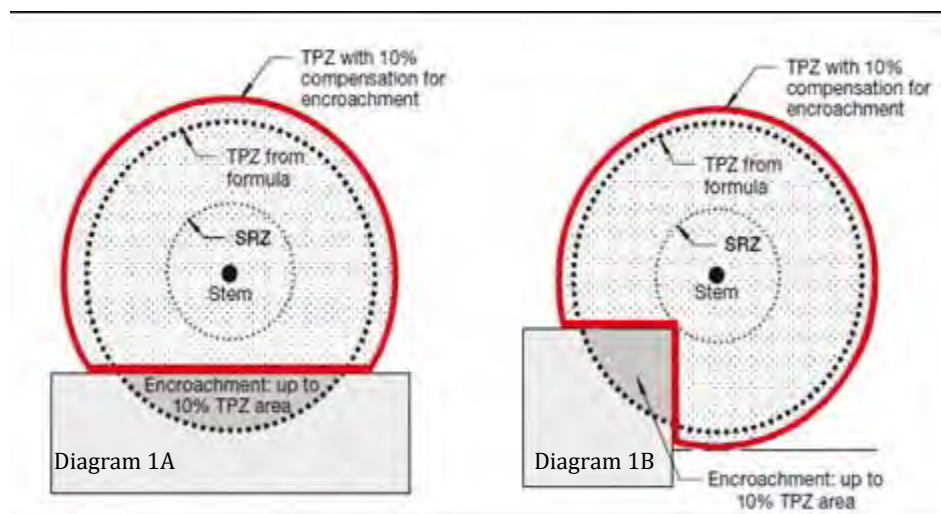


Diagram 1: Examples of minor encroachment into a TPZ.

(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.



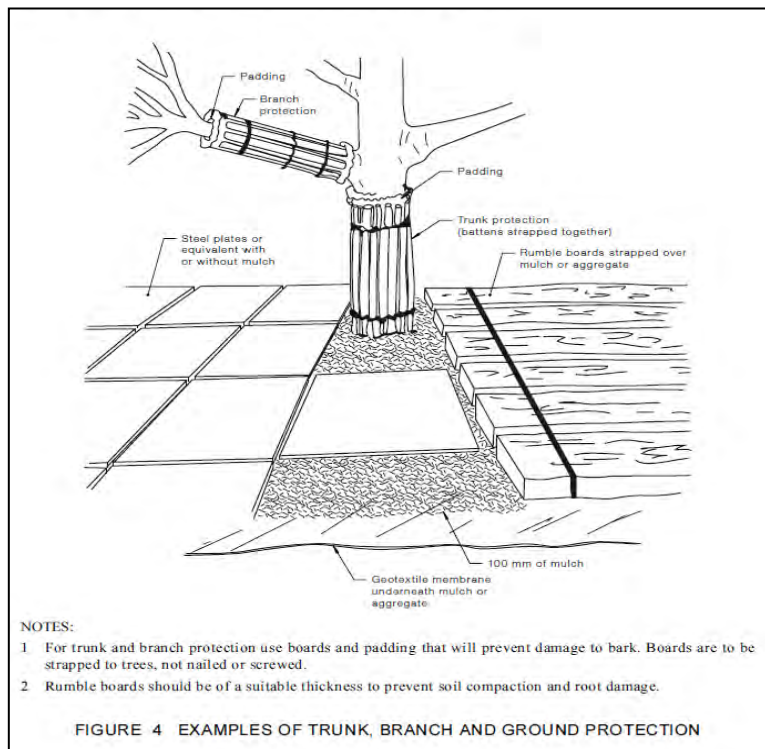
**Figure 1.** Above left - Example of TPZ fencing above right -Example of TPZ signage.

### 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.

## Disclaimer

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- The Report is strictly limited to the matters stated in it and does not apply by implication to any other matters.
- To the writer's knowledge all facts, matter and all assumptions upon which the Report proceeds have been stated within the body of the report and all opinion contained within the report will be fully researched and referenced and any such opinion not duly researched is based upon the writer's experience and observations.