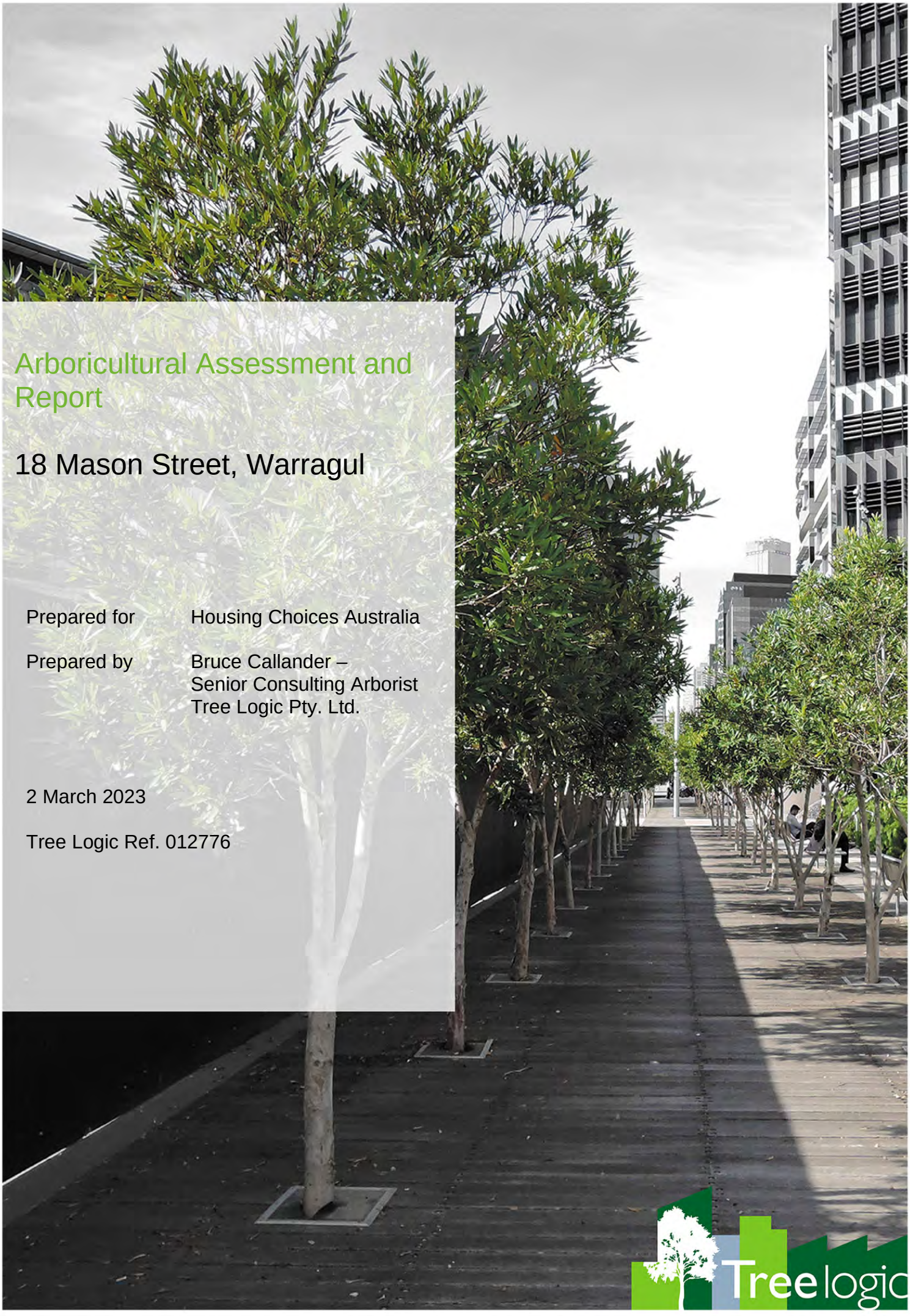

Arboricultural Assessment and Report

18 Mason Street, Warragul

Prepared for	Housing Choices Australia
Prepared by	Bruce Callander – Senior Consulting Arborist Tree Logic Pty. Ltd.

2 March 2023

Tree Logic Ref. 012776

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File No.	Version	Author	Issue date	Edits	Issued by.
012776	V1	Bruce Callander	2/03/2023	Preliminary tree report	BC

Objectives

Tree Logic was engaged by Housing Choices Australia to undertake an arboricultural assessment and prepare a preliminary arboricultural report and impact assessment for trees associated with proposed redevelopment of 18 Mason Street, Warragul.

The primary objectives of the arboricultural report include;

- Ascertain the species and origin of the subject remaining trees and provide information including dimensions, health, structural condition and the arboricultural value of the trees.
- Determine appropriate tree protection zone (TPZ) 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.

1 Summary

1.1 Nine (9) tree features were assessed, all growing in the adjacent property, being 115 Queen Street Warragul, to the south of the subject site.

1.2 Eight (8) different species were recorded comprising entirely of introduced & exotic species including several noxious weeds spreading along the boundary in the adjacent land to the south. .
Refer to Section 4 for details of species distribution.

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

- Tree 1 was attributed an arboricultural rating of Moderate A, being a prominent tree in the surrounding landscape, displaying better than typical size and condition for the species and being desirable to retain.
- Tree 5 was attributed an arboricultural rating of Moderate C, displaying generally typical health for the species but having crown asymmetry towards the north (subject site) and potentially being a re-sprout from an 80cm decayed Blackwood stump at the base.
- Six (6) trees were attributed an arboricultural rating of Low, displaying symptoms of decline and / or structural deficiencies or being an invasive weed species.
- Group 1 was attributed a rating of Very Low due to being invasive woody weeds.

Refer to Table 3 in Section 4 for trees sorted by Arboricultural Rating.

1.4 The site exists within the Baw Baw Local Government Area planning scheme. The site is zoned as Commercial 1 Zone - Schedule 1 (C1Z).

- Development Contributions Plan Overlay - Schedule 1 (DCPO1), Design and Development Overlay - Schedule 1 (DDO1), Heritage Overlay - Schedule (HO89) and Parking Overlay - Precinct 1 Schedule (PO1) applies to the site but does not confer any particular trees controls on the trees in the neighbouring property.
- A permit is required to remove or damage street trees and neighbour's trees should be appropriately protected to ensure they remain viable post construction.
  Refer to Section 3 for trees sorted by Permit requirements.

1.5 Plans for a Proposed Multi-Residential Development including Survey Plan, Basement Plan, Ground Floor Plan and Level 01 Floor Plan were provided for review at the time of preparing this impact assessment report (*Proposed Multi-Residential Development. Prepared by Freadman White – Proj No: 18 Mason Street, Warragul. DWG Nos: TP.03, TP.2.1, TP.2.2, TP.2.3*).
Under the current design proposal

- Tree 2 and Street tree 8. can be sustained without any impacts if appropriate TPZ fencing is established
- The basement footprint will encroach the TPZ of Tree 1 by approximately 4% which is considered minor and acceptable under AS4970.
  - The potential for any tree roots from Tree 1 being present within the subject site is reduced by the presence of a 2 metre deep concrete pit for industrial plant, 1 metre north of tree base and that runs 5 m west.
    This pit along with the extensive weed growth along the boundary will have effectively impeded root growth into the site.
- The proposed residential development will encroach the Structural Root Zone (SRZ) of Trees 3, 4, 5, 6 and 7. These trees would become unsustainable under the current design proposal.
  - With the exception of Tree 5, these trees are either invasive weed trees, shrubs or in poor health.
  - Tree 5 is a semi-mature self-sown Blackwood tree arising next to a large decayed stump at the base.

Refer to Section 6 for trees sorted by perceived TPZ encroachments and impacts.

2 Method

2.1 A site inspection was carried out on Tuesday, February 21st, 2023, during mild conditions by Bruce Callander, Senior Consultant Arborist (Dip Hort. Cert 5 Arb. NMIT, TRAQ trained and qualified).

2.2 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.

2.3 Observations were made of the assessed trees to determine the species, age category, and condition with measurements taken to establish tree crown height (measured with a height meter) and crown width (paced) and trunk dimensions (measured 1.4 metres above ground level with a diameter tape unless otherwise stated).

2.4 Assessment details of individual trees are listed in Appendix 1 and a copy of the tree location plan can be seen in Appendix 2.
Descriptors used in the assessment can be seen in Appendix 3.

2.5 Photographs of 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.

2.8 Documents reviewed:

- Planning Property reports for 18 Mason Street, Warragul and 115 Queen Street, Warragul. 3820. Department of Planning & Community Development. (23/02/2023)
- Commercial 1 Zone - Schedule 1 (C1Z).
- Development Contributions Plan Overlay - Schedule 1 (DCPO1)
- Design And Development Overlay - Schedule 1 (DDO1)
- Heritage Overlay - Schedule (HO89)
- Parking Overlay - Precinct 1 Schedule (PO1)
- Title Re-Establishment Survey and Feature Plan (KLM Spatial. Ref: 11317_DE01. Date 12/1/23)
- Proposed Multi-Residential Development. Prepared by Freadman White – Proj No: 18 Mason Street, Warragul. DWG Nos: TP.03, TP.2.1, TP.2.2, TP.2.3.
- Baw Baw Significant Tree Register

3 Tree Permit Requirements

3.1 The sites exist within the Baw Baw Local Government Area and planning scheme.

3.2 The site is zoned as Commercial 1 Zone - Schedule 1 (C1Z).

- Development Contributions Plan Overlay - Schedule 1 (DCPO1), Design And Development Overlay - Schedule 1 (DDO1), Heritage Overlay - Schedule (HO89) and Parking Overlay - Precinct 1 Schedule (PO1) apply to the subject site.
- The same overlays apply to the adjacent site to the south where the trees are growing with the exception of Heritage Overlay - Schedule which instead is covered by HO78.
- No specific tree controls apply to any of the subject trees in the neighbouring site as they are non-native and generally of low size and significance, with the exception of Tree 1.
- There are no trees associated with the subject site itself.
- None of the trees are recognized in the Significant Tree Register.

3.3 All trees in adjoining land including street trees and neighbour's trees must be adequately protected to ensure they remain viable in conjunction with any site redevelopment.

3.4 Refer to Table 1 for tree permit requirements.

Table 1: Permit requirement	**Count**	**Tree numbers**
On site	0	
Neightbour's tree - No permit	8	1, 2, 3, 4, 5, 6, 7, 8 and Group 1
Street tree – Council permit req'd	1	9
Total	**9**	

4 Observations

4.1 The subject study area comprises the vacant allotment at 18 Mason Street and the trees abutting the southern boundary growing within 115 Queens Street, Warragul the adjacent street tree. The site was previously occupied by residential units until approximately 2016. The site has been vacant since.

Plate 1. Aerial view of the subject site indicated by red boundary and the adjacent property to the south (Nearmap aerial imagery – dated 8/01/2023).
Red shading indicates easements.

4.2 The site is gently sloped downwards from Mason Street towards the eastern boundary with a fall of approximately 1 in 12. There are no creeks or natural drainage lines within the vicinity of the site.

4.3 No vegetation exists within the subject site. All trees are located in a vegetation strip abutting the subject site and the carpark of the Commercial Hotel at 115 Queen Street.

4.4 **Tree population**

Nine (9) trees were recorded in total comprising 8 different species.
Refer to Table 2 for species and origins recorded.

Table 2: Botanic name	Common Name	Origin	Count (Location)
Corymbia maculata	Spotted Gum	Victorian native	1 (Neighbours)
Acacia melanoxylon	Blackwood	Indigenous	1 (Neighbours)
Callistemon citrinus	Crimson Bottlebrush	Victorian native	1 (Neighbours)
Coprosma repens	Mirror Bush	Exotic evergreen	2 (Neighbours)
Ilex aquifolium	English Holly	Exotic evergreen	1 (Neighbours)
Lophostemon confertus	Brush Box	Australian native	1 (Neighbours)
Prunus cerasifera 'Nigra'	Purple Leaf Cherry Plum	Exotic deciduous	1 (street tree)
Coprosma repens, Phoenix canariensis, Pittosporum undulatum	Mirror Bush, Canary Island Date Palm, Sweet Pittosporum	Exotic evergreen, Exotic palm, Victorian native	1 group (~ 7 neighbours trees)

4.5 **Tree Origin**

Based on observations of species diversity, age class and general spatial arrangement it is apparent that all trees are introduced specimens of Australian native or exotic origins either planted for amenity purposes or are self-sown woody weeds or stump resprouts.

As such the trees are not subject to any native vegetation controls such as Clause 52.17.

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

- 7 trees displayed Good to Fair or typical health condition.
- 1 tree displayed Fair to Poor health indicated by minor dieback or reduced foliage density.
- 1 tree displayed Poor health with sparse foliage and large dead wood.

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

- Tree 1 displayed Good structure with good taper, branch architecture and wound wood development.
- Tree 5 displayed Fair and acceptable structural condition though there is a possibility the tree is a stump re-sprout emanating from an 80cm decayed Blackwood stump at the base. The tree has a canopy bias to the north that overhangs the subject site. As such the tree may have a reduced useful life expectancy if insufficient roots have developed to the south where the decayed stump is.
- 5 trees displayed Fair to Poor Structural condition, being either multi-stemmed or having been lopped.
- 2 trees displayed Poor Structure having been lopped or lost a main leader.

4.8 **Arboricultural Rating**

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

It should be noted that the arboricultural rating is different to the conservation / ecological values placed on trees by other professions.

Refer to Table 3 for tree numbers sorted by Arboricultural rating

Table 3: Arboricultural rating	Total	Tree Numbers
Moderate A	1	1
Moderate C	1	5
Low	6	2, 3, 4, 6, 7, 8
Very Low	1	Group 1
Total	9	

- Trees rated Moderate A are generally prominent trees displaying better than typical health and structural condition with a moderate to long useful life expectancy. In the case of Tree 1, the site location may not be entirely suitable being so close to the concrete pit to the north and this may ultimately reduce its useful life expectancy.
- Trees rated Moderate C 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. In the case of Tree 5, almost half of the crown extends over the boundary and the canopy and tree roots extend into the proposed building footprint.
- 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.

4.9 In summary,

- There were no trees within the subject site.
- Trees 1 to 7 were growing in the vegetation strip abutting the southern boundary. Tree 8 is an over-mature street tree with a short useful life expectancy.
- Trees 1, 2, 3 and 8 are planted specimens. All others are self-sown specimens of weed species or from stump re-sprout.
- There are no specific tree controls applicable to any of the trees and no trees are on a significant tree register.
- Apart from Tree 1 and Tree 5, overall the trees were diminished by weed invasion or having been lopped.

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.

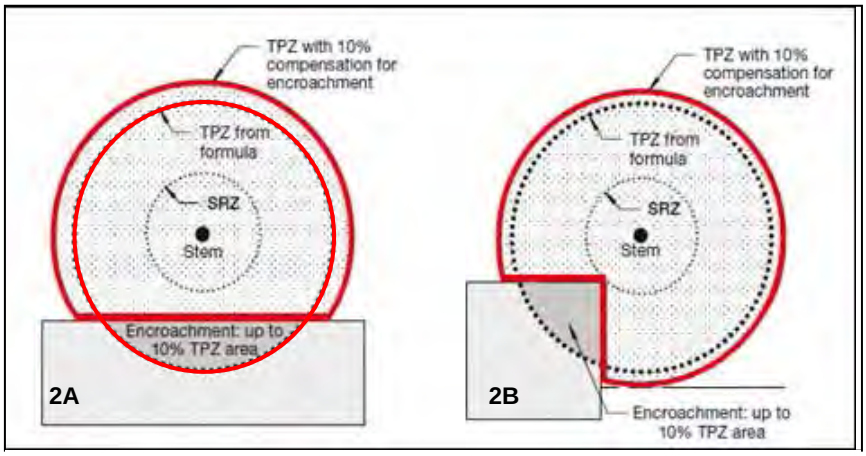

Figure 2: 2A & 2B - Examples of minor encroachment into a TPZ.

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 preliminary tree impact assessment, plans for a Proposed Multi-Residential Development, Basement, Ground Floor Plan were provided for review at the time of preparing this impact assessment report (*Proposed Multi-Residential Development. Prepared by Freadman White – Proj No: 18 Mason Street, Warragul. DWG Nos: TP.03, TP.2.1, TP.2.2, TP.2.3.*).

Based on a review of the supplied plan the following observations are made.
Under the current design proposal

6.1 Trees 2 and 8 and Group 1 can be sustained without any impacts.

- TPZ fencing should be established around street 8.
- Tree 2 and the weed trees within Group 1 do not warrant any additional protection other than the boundary fence.

6.2 The basement will extend into the TPZ of Tree 1 by approximately 4%.

- The trees can be successfully sustained with appropriate TPZ fencing established 1 metre back from the proposed basement footprint.
- The shared path to be constructed in the paper road to the east of the site will notionally encroach the TPZ also. The path must adopt a shallow profile that does not require excavation greater than 100-150 mm depth for compacted sub-base material, in order to avoid any potential root damage. Any discrepancy between the finished surface level and natural ground would be made up with either mulch or uncompacted top-soil.

6.3 The SRZ of five (5) trees will be encroached by the building footprint which will cause the trees to decline and potentially become unstable.

- Four of these trees are invasive weeds that should be removed for sound environmental reasons.
- Tree 5 is likely to be a stump re-sprout from an 80cm decaying Blackwood stump at the base with a canopy bias to the north over the subject site. As such the tree has a reduced useful life expectancy.

Refer to Table 4 for tree numbers sorted by perceived impacts and permit requirements. Refer to Section 6 for trees sorted by perceived TPZ encroachments and impacts.

Table 4: Tree numbers sorted by perceived impacts and permit requirements

TPZ impact	Count	Tree numbers	comment
None	3	2, 8, G1	Tree 2 and Grp 1 unsuitable to retain.
Basement in TPZ <5%	1	1	Establish TPZ fencing 1 metre from basement footprint.
Basement in SRZ	5	3, 4, 5, 6, 7	Tree at risk of decline and failure. Trees generally unsuitable to retain
Total	9		

6.4 Based on the perceived impacts to Tree 5 and the other low rated trees within the vegetation strip abutting the southern boundary it is recommended that removal and replacement of the Blackwood, Tree 5 and all of the other weed or poor quality trees is negotiated with the land-owner, on the basis that the boundary is so degraded, overgrown and weed infested that it is necessary for any future development to improve the fence and boundary plantings.

- Future planting species selection should be from trees that will tolerate shading and maintain a relatively narrow upright form.

Refer to appendix 2B for map showing design proposal and TPZ incursions.

7 Tree Protection guidelines

7.1 Any trees that are to be retained in the vicinity of any proposed works will require Tree Protection Zones to be established prior to commencing any works onsite including demolition, bulk earthworks, trenching, construction, landscaping activity, delivery and storage of materials or placement of site sheds.

7.2 Tree protection must be incorporated into the design and appropriate construction controls, fencing and management practices must be implemented prior to commencing any construction related activity, including demolition, bulk earthworks construction of gantries, etc.

7.3 The tree protection zones for all trees to be retained within the site must be clearly shown on all design drawings and plans with appropriate notations so that all staff and contractors are aware of the responsibility to protect trees throughout the design, development and delivery of the project.

7.4 The TPZ fencing must be in the form of either temporary fencing panels with concrete block feet and locked together, 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.

7.5 Appropriate signage stating ‘Tree protection Zone- No access’ is to be fixed to the fencing to alert people as to importance of the tree protection zone. Refer to Figure 1 for signage example.

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

7.6 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.

7.7 The following activities must be excluded from or controlled within the Tree Protection Zones (TPZ) unless otherwise approved by the relevant authority or the Project Arborist.

- Machine excavation (including trenching) for continuous strip footings or installation of underground services or road base
- Alteration of soil levels including placement of fill
- Storage of wastes or materials (including fuels, oils or chemicals)
- Preparation of or cleaning of any cement products
- Storage and or parking of vehicles or any plant/machinery within TPZ
- Washing down of equipment
- Installation of utilities
- Physical damage of any kind to the tree (including direct attachment of anything into the tree)
- Soil cultivation

7.8 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.

7.9 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.

8 Conclusion.

8.1 In summary, nine (9) trees were assessed within the narrow vegetation strip between the southern boundary of the subject site and the carpark of the Commercial Hotel at 115 Queen Street to the south of the site. Refer to Section 4.1.

8.2 Eight (8) different species were identified comprising trees and shrubs of Australian native or exotic origins, either planted for amenity purposes or being self-sown invasive weed species. Refer to Table 2 in Section 4.4 for indication of species diversity and origin.

8.3 No specific tree protection or permit conditions apply to any of the trees within the defined study area.

8.4 Trees in adjacent properties including street trees require appropriate tree protection measures to be implemented to ensure the trees remain viable post construction works.

- Refer to Section 3 and column titled Permit in tree assessment data tables in Appendix 1.

8.5 Apart from Trees 1 and 5, the trees generally displayed diminished health and structural conditions considered to be below typical for the species and age growing in this area under prevailing conditions. Refer to Sections 4.7 and 4.8.

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

- Tree 1 was rated Moderate A, being a prominent tree in better than typical condition.
- Tree 5 was rated Moderate C being generally typical for the species but possibly being a stump re-sprout.
- Refer to Table 3 - Section 4.9 for tree numbers sorted by arboricultural rating.

8.7 Apart from Tree 1, the prominent Spotted Gum, the remainder of the tree population was considered to be unremarkable and canopy coverage was diminished by being primarily weedy trees or lopped trees and stump re-sprouts.

- Tree canopy could be enhanced by replacement planting in conjunction with redevelopment of the site with consent from the land-owner of 115 Queen Street.

8.8 The preliminary tree impact assessment report provides information on the tree population associated with the site, its arboricultural (retention) value and the appropriate tree protection zones required to preserve trees in conjunction with future site redevelopment.

8.9 At the time of preparing the preliminary tree impact assessment, plans for a Proposed Multi-Residential Development were provided for review at the time of preparing this impact assessment report (*Proposed Multi-Residential Development. Prepared by Freadman White – Proj No: 18 Mason Street, Warragul. DWG Nos: TP.03, TP.2.1, TP.2.2, TP.2.3*).

8.10 Under the current design proposal

- Three (3) tree features would have no construction impacts.
  These trees could be successfully sustained with appropriate TPZ protection from maintaining the boundary fence. Each of these features was of low arboricultural value.
- Tree 1 can be retained with less than 5% TPZ encroachment. TPZ fencing should be established 1 metre back from the eastern boundary / basement footprint.
  - The shared path to be constructed in the paper road to the east of the site should adopt a shallow profile that does not require excavation greater than 100-150 mm depth for compacted sub-base material. Any discrepancy between the finished surface level and natural ground would be made up with either mulch or uncompacted top-soil.
- The SRZ of five (5) trees will be encroached by the basement footprint and are expected to decline and become unstable. These trees are generally of Low or Very Low arboricultural value.
  - It is recommended that the removal and replacement planting with better tree species in conjunction with an effective weed removal strategy should be negotiated with the land-owner of 115 Queen Street. No permit is required for their removal.

Refer to Table 4 and Section 6 for details of design review and tree impact assessments.

8.11 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.

8.12 The tree protection zones for all trees to be retained within the site and on adjacent properties must be clearly shown on all design drawings and plans with appropriate notations so that all staff and contractors are aware of the responsibility to protect trees throughout the design, development and delivery of the project.

8.13 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.

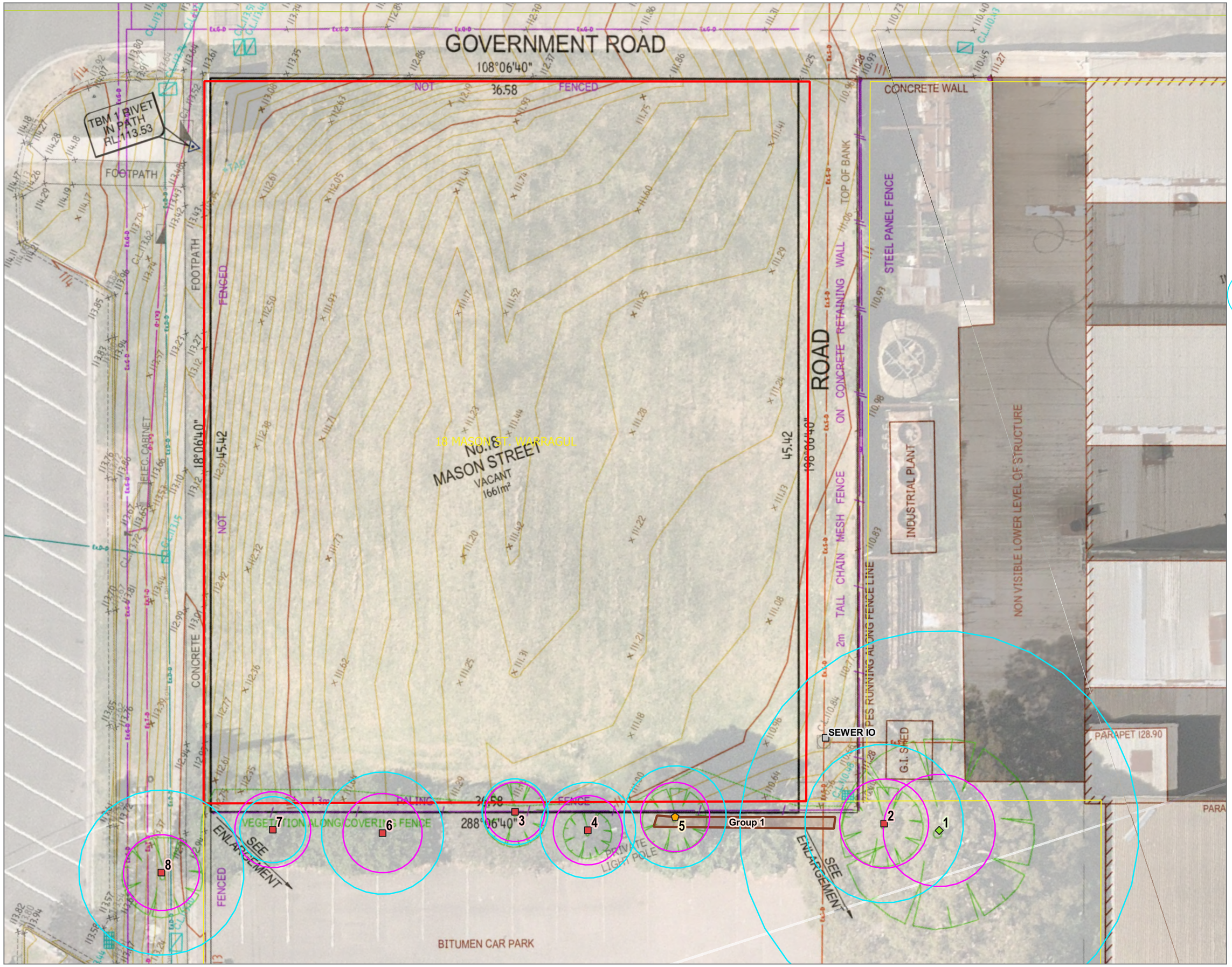
Appendix 1: Tree Assessment Data: 18 Mason Street, Warragul

treeid	species	comm_name	age_class	origin_typ	dbh_cm	height_m	width_m	health	structure	arb_rating	ule_yrs	comments	tpz_rad_m	srz_rad_m	impact description	impact	PZ incurs	overlay
1	*Corymbia maculata*	Spotted Gum	Maturing	Victorian native	101	31	18	Good	Good	Mod.A	21-40 y	2m deep Concrete pit 1 metre Nth extends ~5m west will have impeded root growth towards subject site. Damaged kerb 0.5m Sth, Preferential root growth evident below asphalt carpark to SE where water collects. Weed infested w Coprosma, Ivy, Blackberry, Holly, Phoenix, Pittos, Privet	12.1	3.4	Basement - 4.0%,POS - 2.65%,ground - 1.14%	TPZ	4.1%	HO78, PO1, DDO1, DCPO1
2	*Lophostemon confertus*	Brush Box	Early-mature	Australian native	24, 20, 19, 16, 9	8	7	Poor	Poor	Low	6-10 y	Multi-stemmed, Stump re-sprout, Weed infested. 2 x 16cm stems dead. Adjacent to 2m concrete pit 1m Nth	4.8	2.7	NA	None	0.0%	HO78, PO1, DDO1, DCPO2
3	*Callistemon citrinus*	Crimson Bottlebrush	Maturing	Victorian native	10, 9, 9, 8, 7	3	7	Fair	Fair to Poor	Low	6-10 y	Neighbour's Multi-stemmed Shrub, Ivy infested	2	2.1	Basement - 35.19%,ground - 36.86%	SRZ	36.9%	HO78, PO1, DDO1, DCPO3
4	*Ilex aquifolium*	English Holly	Early-mature	Exotic evergreen	12, 11, 10, 10, 10 (est.)	6	3	Fair	Fair to Poor	Low	6-10 y	Multi-stemmed, neighbour's tree, weed infested, woody weed sp	2.9	2.1	Basement - 17.02%,ground - 17.82%	SRZ	17.8%	HO78, PO1, DDO1, DCPO4
5	*Acacia melanoxylon*	Blackwood	Early-mature	Indigenous	26	8	7	Fair	Fair	Mod.C	11-20 y	Neighbour's tree, Weed infested. Possible stump re_sprout, ~80cm decayed stump at base south. Overhangs boundary by ~3m	3.1	2.1	Basement - 34.01%,ground - 34.62%	SRZ	34.6%	HO78, PO1, DDO1, DCPO5
6	*Coprosma repens*	Mirror Bush	Maturing	Exotic evergreen	15, 15, 14, 13, 12	3	9	Fair	Fair to Poor	Low	1-5 y		3.7	2.4	Basement - 20.97%,ground - 22.08%	SRZ	22.1%	HO78, PO1, DDO1, DCPO6
7	*Coprosma repens*	Mirror Bush	Maturing	Exotic evergreen	11, 9, 8, 8, 7	3	8	Fair	Fair to Poor	Low	1-5 y	Neighbour's Multi-stemmed Woody weed tree, hangs 1m over fence	2	2.3	Basement - 6.27%,ground - 8.13%	SRZ	8.1%	HO78, PO1, DDO1, DCPO7
8	*Prunus cerasifera 'Nigra'*	Purple Leaf Cherry Plum	Over-mature	Exotic deciduous	42	4	8	Fair to Poor	Poor	Low	1-5 y	Street tree, Past powerline clearance, Past stem failure w Trunk decay, Over-extended limbs developing-SW. Future removal & new planting scheme likely,	5	2.3	NA	None	0.0%	PO1, DDO1, DCPO1
G1	*Coprosma repens, Phoenix canariensis, Pittosporum undulatum*	Mirror Bush, Canary Island Date Palm, Sweet Pittosporum	Maturing	Exotic evergreen, Exotic palm, Victorian native	15	4	4	Fair	Fair to Poor	Very Low	1-5 y	Neighbour's Group of ~ 7 self-sown weed trees, some multi-stemmed, all weed infested.	2	14.8	NA	None	0.0%	HO78, PO1, DDO1, DCPO7

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. ULE = Useful Life Expectancy (Estimated)
Definition of the descriptor categories used in the assessment can be seen in Appendix 3.

Appendix 2A: Tree Location Plan: 18 Mason Street, Warragul – Existing Conditions

Refer to following page



LEGEND

Trees by Arb rating

- Mod-A
- Mod-B
- Mod-C
- Low

Groups by Arb rating

- Very Low

cadastre

- SS
- G

Tree Protection Zone
Structural Root Zone

NOTES

APPENDIX 2
TREE LOCATIONS AND PROTECTION ZONES

PROJECT
18 MASON STREET, WARRAGUL

TL REF. 12776
MAP NO. 1 / 1
CLIENT Housing Choices Australia
DATE 2023-02-23

DATA SOURCES
Proposed Multi-Residential Development 18 Mason St, Warragul Survey Plan

TREE LOCATION DISCLAIMER
Tree locations are approximate

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

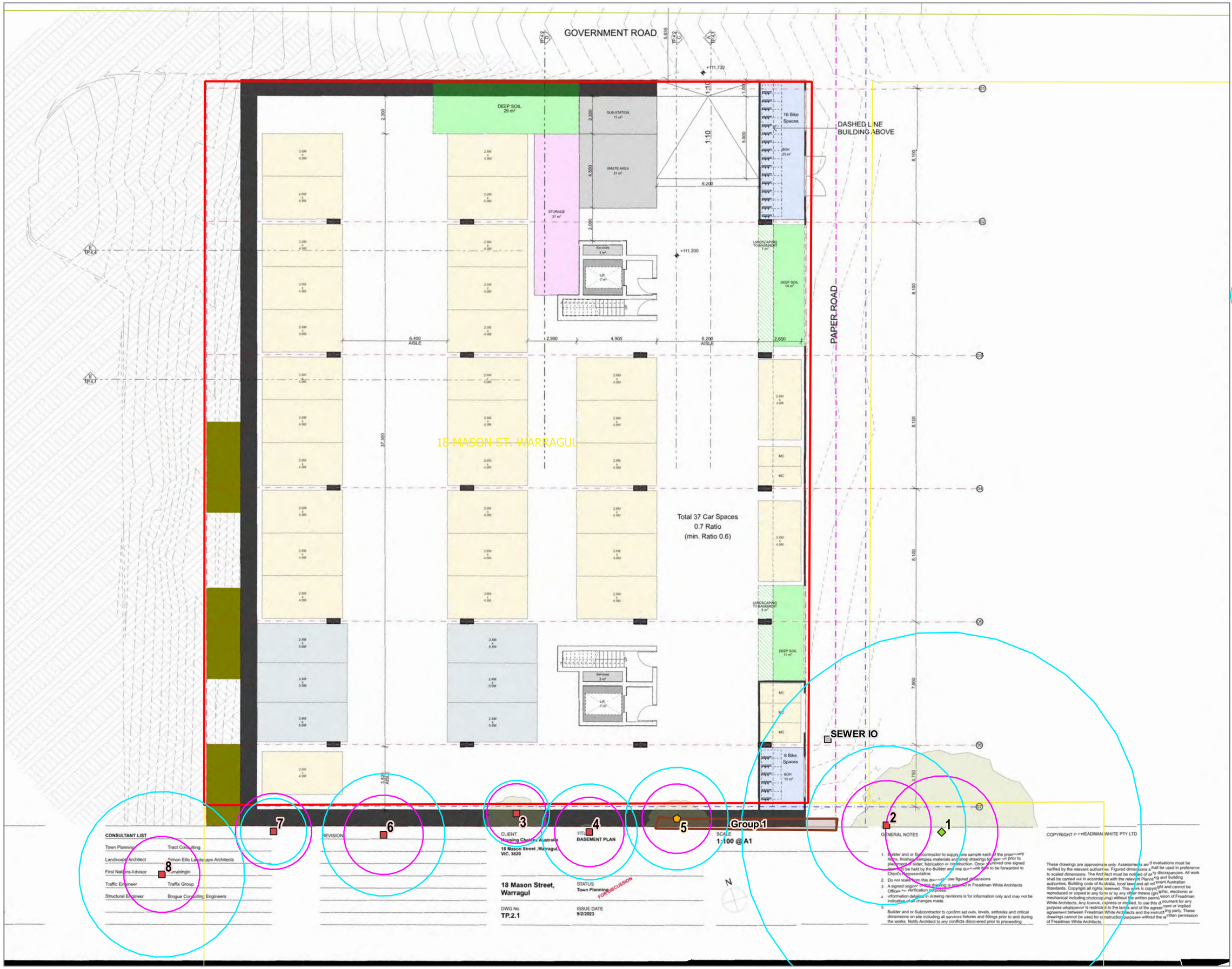
0 3 6m

TREELOGIC PTY LTD
ABN: 95 080 021 610
TEL: 1300 656 926
4 / 21 Eugene Tce
Ringwood, VIC
Australia 3134

Treelogic
Plan, manage, protect

Appendix 2B: Design Review – TPZ Impact Plan: 18 Mason Street, Warragul – Proposed

Refer to following page



LEGEND

Trees by Arb rating

- Mod-A
- Mod-B
- Mod-C
- Low

cadastre

- SS
- G

Group by Arb rating

- Very Low

Tree Protection Zone
Structural Root Zone

NOTES

APPENDIX 2A

TPZ encroachment
Basement level

PROJECT
18 MASON STREET,
WARRAGUL

TL REF.
12776

MAP NO.
1 / 1

CLIENT
Housing Choices Australia

DATE
2023-02-23

DATA SOURCES
Proposed Multi-Residential Development 18 Mason St, Warragul
Basement Plan

TREE LOCATION DISCLAIMER
Tree locations are approximate

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

0 3 6m

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Ringwood, VIC
Australia 3134

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LEGEND

Trees by Arb rating

- Mod-A
- Mod-B
- Mod-C
- Low

Groups by Arb rating

- Very Low

cadastre

- SS
- G

Tree Protection Zone
Structural Root Zone

NOTES

APPENDIX 2B

TPZ encroachment
Ground level

PROJECT
18 MASON STREET, WARRAGUL

TL REF. 12776
MAP NO. 1 / 1

CLIENT Housing Choices Australia
DATE 2023-02-23

DATA SOURCES
Proposed Multi-Residential Development 18 Mason St, Warragul Ground Floor Plan

TREE LOCATION DISCLAIMER
Tree locations are approximate

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

0 3 6m

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TEL: 1300 656 926
4 / 21 Eugene Tce
Ringwood, VIC
Australia 3134

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Tree pictures

Tree no: 1. *Corymbia maculata* (Spotted Gum). Maturing, Victorian native.
Permit: Neighbour's tree
Health: Good. Structure: Good. Arb. rating: Mod.A.
DBH: 101cm. TPZ: 12.1 (m radius). 2m deep Concrete pit 1 metre Nth extends ~5m west will have impeded root growth towards subject site. Damaged kerb 0.5m Sth, Preferential root growth evident below asphalt carpark to SE where water collects. Weed infested with Coprosma, Ivy, Blackberry, Holly, Phoenix, Sweet Pittos, Privet
Impact: Basement - 4.0%,POS - 2.65%,ground - 1.14%.

Tree 1 viewed from carpark

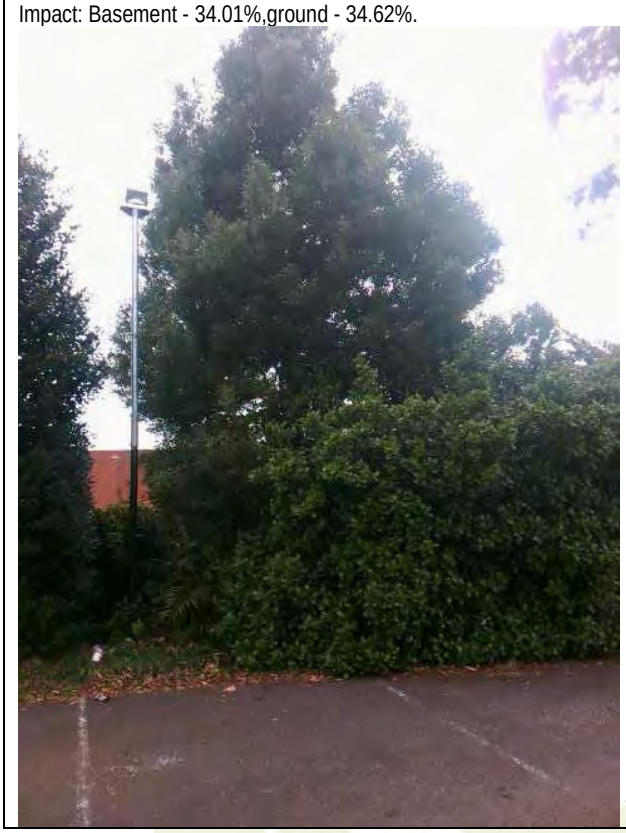
Tree 1 viewed from subject site

Tree no: 2. *Lophostemon confertus* (Brush Box). Early-mature, Australian native. Permit: Neighbour's tree
Health: Poor. Structure: Poor. Arb. rating: Low.
DBH: 24, 20, 19, 16, 9cm. TPZ: 4.8 (m radius). Multi-stemmed, Stump re-sprout, Weed infested. 2 x 16cm stems dead. Adjacent to 2m concrete pit 1m Nth
Impact: NA.

Tree no: 3. *Callistemon citrinus* (Crimson Bottlebrush). Maturing, Victorian native. Permit: Neighbour's tree
Health: Fair. Structure: Fair to Poor. Arb. rating: Low.
DBH: 10, 9, 9, 8, 7cm. TPZ: 2 (m radius). Neighbour's Multi-stemmed Shrub, Ivy infested
Impact: Basement - 35.19%,ground - 36.86%.

Tree no: 4. *Ilex aquifolium* (English Holly). Early-mature, Exotic evergreen. Permit: Neighbour's tree
Health: Fair. Structure: Fair to Poor. Arb. rating: Low.
DBH: 12, 11, 10, 10, 10 (est.)cm. TPZ: 2.9 (m radius). Multi-stemmed, neighbour's tree, weed infested, woody weed sp
Impact: Basement - 17.02%,ground - 17.82%.

Tree no: 5. *Acacia melanoxylon* (Blackwood). Early-mature, Indigenous.
Permit: Neighbour's tree
Health: Fair. Structure: Fair. Arb. rating: Mod.C.
DBH: 26cm. TPZ: 3.1 (m radius). Neighbour's tree, Weed infested. Possible stump re_sprout, ~80cm decayed stump at base south. Overhangs boundary by ~3m
Impact: Basement - 34.01%,ground - 34.62%.



View of Tree 5 from subject site

View of 80cm decayed stump at base of Tree 5

Tree no: 6. *Coprosma repens* (Mirror Bush). Maturing, Exotic evergreen.
Permit: Neighbour's tree
Health: Fair. Structure: Fair to Poor. Arb. rating: Low.
DBH: 15, 15, 14, 13, 12cm. TPZ: 3.7 (m radius).
Impact: Basement - 20.97%,ground - 22.08%.

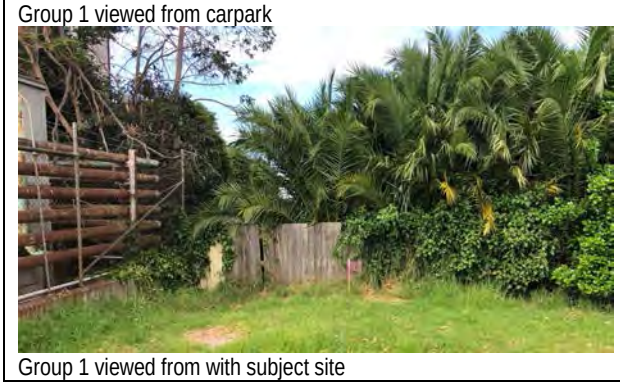
Tree no: 7. *Coprosma repens* (Mirror Bush). Maturing, Exotic evergreen.
Permit: Neighbour's tree
Health: Fair. Structure: Fair to Poor. Arb. rating: Low.
DBH: 11, 9, 8, 8, 7cm. TPZ: 2 (m radius). Neighbour's Multi-stemmed Woody weed tree, hangs 1m over fence
Impact: Basement - 6.27%,ground - 8.13%.

Viewed from subject site

Tree no: 8. *Prunus cerasifera 'Nigra'* (Purple Leaf Cherry Plum). Over-mature, Exotic deciduous. Permit: Neighbour's tree
Health: Fair to Poor. Structure: Poor. Arb. rating: Low.
DBH: 42cm. TPZ: 5 (m radius). Street tree, Past powerline clearance, Past stem failure w Trunk decay, Over-extended limbs developing-SW. Future removal & new planting scheme likely,
Impact: NA.

Tree no: Group 1. *Coprosma repens, Phoenix canariensis, Pittosporum undulatum* (Mirror Bush, Canary Island Date Palm, Sweet Pittosporum). Maturing, Exotic evergreen, Exotic palm, Victorian native. Permit: Neighbour's tree
Health: Fair. Structure: Fair to Poor. Arb. rating: Very Low.
DBH: 15cm. TPZ: 2 (m radius). Neighbour's Group of ~ 7 self-sown weed trees, some multi-stemmed, all weed infested.
Impact: NA.

Group 1 viewed from carpark



Group 1 viewed from with subject site

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.

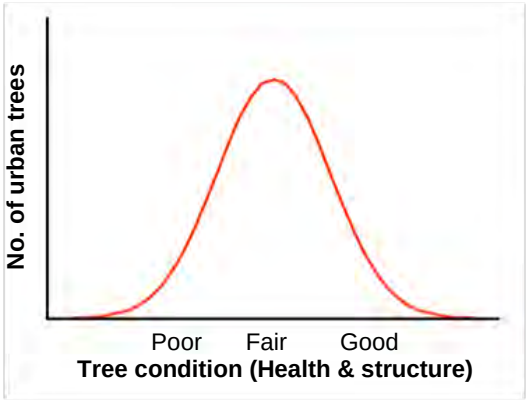


Diagram 1: Indicative normal distribution curve for tree condition

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, 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 site*s. Measurements undertaken using foresters tape or builders tape.

Basal trunk diameter

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

6. Age class

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

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

7. Health

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

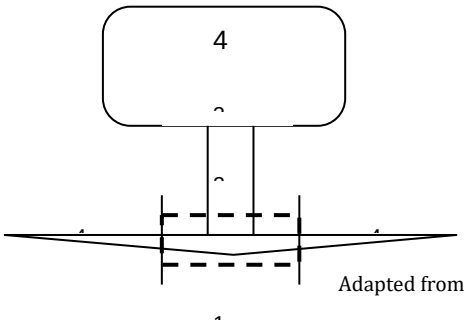
Health Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
Fair	Typical vigour. >80% canopy density	Minor or expected. Little or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

8. Structure

Assesses principal components of tree structure (Diagram 2).
Structure ratings will also take into account general branching architecture, stem taper, live crown ratio, crown symmetry (bias or lean) and crown position such as tree being suppressed amongst more dominant trees.

Diagram 2: Tree structure zones

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



Adapted from Coder (1996)

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

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s). See table over page.

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

Useful life expectancy

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

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

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

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

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

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

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

9. Arboricultural Rating

Relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics (Hitchmough 1994) within an urban landscape context. The presence of any serious disease or tree-related hazards that would impact risk potential are taken into account. See table over page.

Arboricultural rating Category	Description
High	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. These trees have the potential to be a medium- to long-term components of the landscape (moderately long to long ULE) if managed appropriately. Retention of these trees is highly desirable.
Moderate	*General -* Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond to arboricultural treatment. 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.
	A. Moderate to large, maturing tree. Contributes to the landscape character. Tree may have conservation or other cultural value.
	B. Moderate sized, established tree, > 50% of attainable age/size. Contributes to the landscape character. Maturing tree with amenity value but with identified deficiencies
	C. Small and/or semi-mature tree, established, >5 years in the location. May not be a dominant canopy. No special qualities. Maturing tree, accumulating deficiencies, trending towards being of Low arboricultural value.
Low	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. 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. Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained. Retention of such trees may be considered if not requiring a disproportionate expenditure of resources for a tree in its condition and location.
Very Low	Trees of low quality with an estimated remaining life expectancy of less than 5 years. 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. 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. 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). 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. Unremarkable tree of no material landscape, conservation or other cultural value.

Trees have many values, not all of which are considered when an arboricultural assessment is undertaken. However, individual trees or tree group features may be considered important community resources because of unique or noteworthy characteristics or values other than their age, dimensions, health or structural condition. Recognition of one or more of the following criterion is designed to highlight other considerations that may influence the future management of such trees.

Significance	Description
Horticultural Value/ Rarity	Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure. Any tree of a species or variety that is rare.
Historic, Aboriginal Cultural or Heritage Value	Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic aboriginal activities, including scar trees. Tree commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.
Ecological Value	Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant Indigenous vegetation that contribute to biological diversity

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Appendix 4: Tree protection zones.

Introduction

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

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

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

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

Allocation of tree protection zone (TPZ)

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

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

The intention of tree protection zones is to:

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

Tree protection

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

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

The TPZ for individual trees is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the trees DBH by 12. The method provides a TPZ that addresses both the stability and growing requirements of a tree. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The minimum TPZ should be no 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.

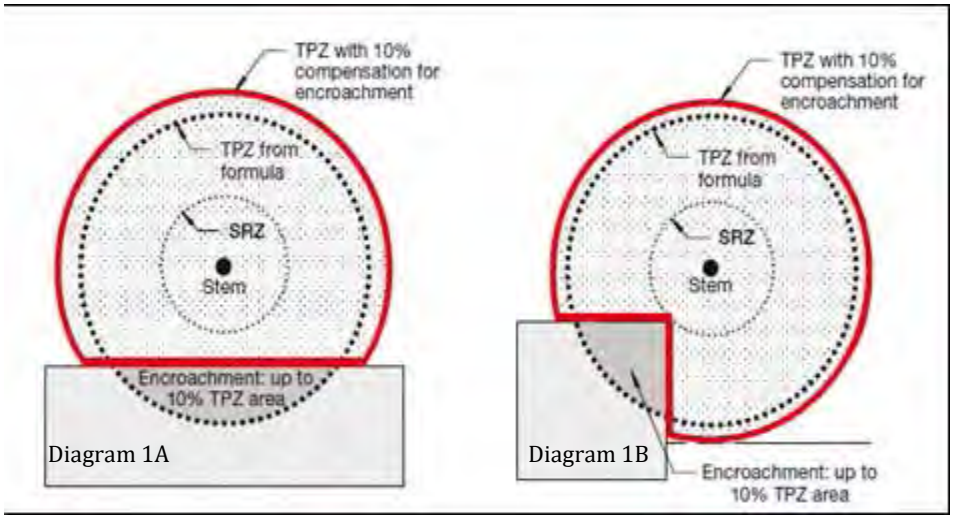


Diagram 1: Examples of minor encroachment into a TPZ.

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

The 10% encroachment on one side equates to approximately ⅓ 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:

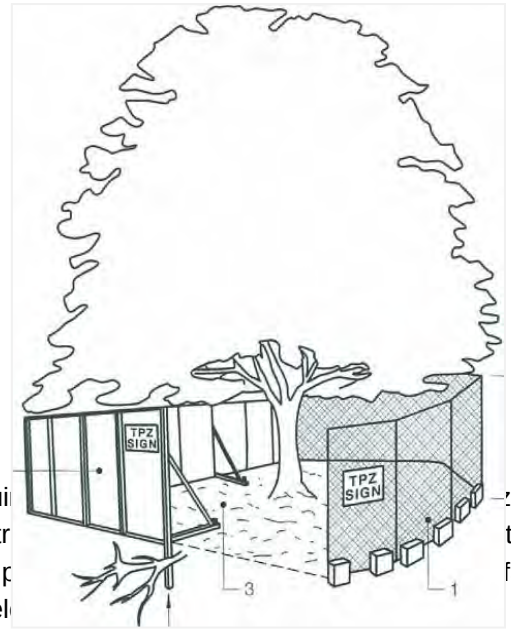
- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is 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.

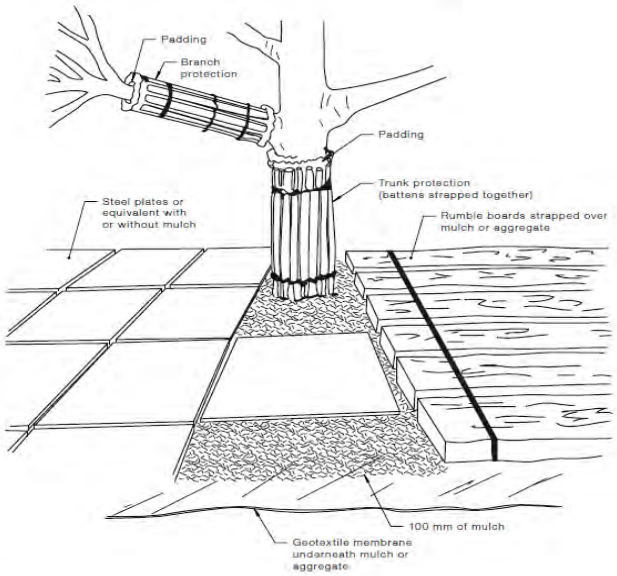


Ground buffering

Where works are requi zone with urface, ground buffering and tr to minimise the potential for soil to become compacted and avoid p face roots, trunk or limbs. Refer to Diagram 2 bel

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

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



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION

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

Exploratory excavation

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

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

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

Substantial roots are to be exposed and left intact.

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

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

How to determine the diameter of a substantial root

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

The determination of what is a substantial root is often difficult because the form, depth and spread of roots will vary between species and sites. However, because smaller roots are connected to larger roots in a framework, there can be no doubt that if larger roots are severed, the smaller roots attached to them will die. Therefore, the larger the root, the more significant it may be.

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

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

No root or soil disturbance is permitted within the SRZ.
In the area outside the SRZ the tree may tolerate the loss of one or a number of roots. The table below indicates the size of tree roots, outside the SRZ that would be deemed substantial for various tree heights. The assessment of combined root loss within the TPZ would need to be undertaken by an arborist on an individual basis because the location of the tree, its condition and environment would need to be assessed.

Table 1: Estimated significant root sizes outside SRZ

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

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Construction Guidelines

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

- The Tree Protection Zone (TPZ) is fenced and clearly marked at all times. The actual fence specifications should be a minimum of 1.2 - 1.5 metres of chain mesh or like fence with 1.8 meter posts (e.g. treated pine or star pickets) or like support every 3-4 metres and a top line of high visibility plastic hazard tape. The posts should be strong enough to sustain knocks from on site excavation equipment. This fence will deter the placement of building materials, entry of heavy equipment and vehicles and also the entry of workers and/or the public into the TPZ. Note: There are many different variations on the construction type and material used for TPZ fences, suffice to say that the fence should satisfy the responsible authority.
- Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Successful tree preservation occurs when there is a commitment from all relevant parties involved in designing, constructing and managing a development project. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The importance of tree preservation must be communicated to all relevant parties involved with the site.
- The consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- A layer of organic mulch (woodchips) to a depth of no more than 100mm should be placed over the root systems within the TPZ of trees, which are to be retained so as to assist with moisture retention and to reduce the impact of compaction.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Where machinery is required to operate inside the TPZ it must be a small skid drive machine (i.e Dingo or similar) operating only forwards and backwards in a radial direction facing the tree trunk and not altering direction whilst inside the TPZ to avoid damaging, compacting or scuffing the roots.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No fuel, oil dumps or chemicals shall be allowed in or stored on the TPZ and the servicing and re-fuelling of equipment and vehicles should be carried out away from the root zones.
- No storage of material, equipment or temporary building should take place over the root zone of any tree.
- Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing device.

- Supplementary watering should be provided to all trees through any dry periods during and after the construction process. Proper watering is the most important maintenance task in terms of successfully retaining the designated trees. The areas under the canopy drip lines should be mulched with woodchip to a depth of no more than 100mm. The mulch will help maintain soil moisture levels. Testing with a soil probe in a number of locations around the tree will help ascertain soil moisture levels and requirements to irrigate. Water needs to be applied slowly to avoid runoff. A daily watering with 5 litres of water for every 30 mm of trunk calliper may provide the most even soil moisture level for roots (Watson & Himelick, 1997), however light frequent irrigations should be avoided. Irrigation should wet the entire root zone and be allowed to dry out prior to another application. Watering should continue from October until April.

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