

Arbor Survey

DEVELOPMENT IMPACT ASSESSMENT

Site Address:

173 Burke Road and 28 Hope Street

GLEN IRIS

ADVERTISED PLAN

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DOCUMENT CONTROL

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1. SUMMARY

The Development Impact Assessment has been undertaken to determine the impact to trees or vegetation on or adjoining 173 Burke Road and 28 Hope Street, Glen Iris from the proposed construction of a mixed-use development and apartment complex. The report provides an overview of the site characteristics and relevant regulatory controls, the arboricultural condition of the trees and determines the Protection Value of the trees and vegetation on the project site and adjoining lands where the tree protection zones may be impacted. The primary purpose of this assessment is to identify the impact from the proposed construction and to outline impact mitigation and tree protection measures for trees of high or moderate protection value. The survey has identified a total of 19 trees and or groups of trees within and surrounding the project sites. The following is a summary of the protection value of the trees.

HIGH PROTECTION VALUE TREES

- 8 trees / groups are of high protection value. Trees/groups 1-5*, 13*, 14* and 16* are located on the Council road reserves of Burke Road and Hope Street and the neighbouring property to the west and potential construction impacts should be minimised where possible.

MODERATE PROTECTION VALUE TREES

- 1 tree group, Tree 6* are of moderate protection value. These trees have been given this rating as they are of good health with fair structure and of moderate landscape significance. Where possible and practical, these trees should be considered for protection within the project site.

TREES OF NO PROTECTION VALUE

- 10 trees / groups (Trees 7-10-12, 15 & 17-19) are of no protection value. Trees of no protection value may be of poor arboricultural condition in terms of their health and/or structure, low landscape significance, unsuitable within the project site as they are situated in an inappropriate location for long term growth or landscape functionality or causing damage to surrounding infrastructure. It should be noted that Tree 15 is located on the neighbouring property, however, it is of no protection value as it is dead.

The proposed development plans were viewed in the preparation of this report. Based on the proposed design and the guidelines of the *Australian Standard AS4970 - 2009 - Protection of Trees on Development Sites*:

TREES THAT CANNOT BE PROTECTED

- 13 trees / groups cannot be protected as they are located within or in very close proximity to building or crossover envelopes. Of these trees:
 - 3 trees / groups (Trees 2, 3 & 5*) are considered to be of high protection value (Note: only 1 tree of Tree 5* are lost),
 - 1 group (Tree 6*) is of moderate protection value and,
 - 9 trees / groups (Trees 7-12 & 17-19) are of no protection value.

TREES THAT WILL INCUR MAJOR ENCROACHMENT (GREATER THAN 10%) INTO THE TREE PROTECTION ZONE

- 6 trees/groups will incur 'Major Encroachment' into its tree protection zones.
 - Trees 1 is of high protection value. A Non-Destructive Root Investigation (NDRI) has been undertaken to determine the impact to this high protection value tree. The results of the NDRI and impact mitigation recommendations are provided in Section 6.2 and 6.3.
 - Trees 4, 13*14* and 16* are of high protection value. The potential impact to these trees may be mitigated through the recommendations provided in Section 6.2.
 - Trees 15 is of no protection value. Whilst this tree is on adjoining land it is dead and therefore not worthy of protection.

TREES THAT WILL INCUR NO OR MINOR ENCROACHMENT (10% OR LESS) INTO THEIR TREE PROTECTION ZONE

- 1 group will not be impacted by the proposed development. Tree group 5 (5 trees within the tree group) are of high protection value. Standard tree protection measures are outlined in Section 6.3.

The Tree Location Plan (Existing Conditions) and Development Impact Plan in Section 7.2 provide a visual representation of the protection values of the trees and indicates the Tree Protection Zone (TPZ), Structural Root Zone (SRZ) and encroachment from proposed works for trees that are considered to be of high or moderate protection value.

* - Denotes groups of trees

2. INTRODUCTION

Arbor Survey Pty Ltd has undertaken a Development Impact Assessment in accordance with the *Australian Standard AS4970 - 2009 - Protection of Trees on Development Sites* for the trees on and adjoining 173 Burke Street and 28 Hope Street, Glen Iris. This assessment is an analysis of 19 trees or groups of trees that are located within the project site and on adjacent land where the tree protection zones (TPZ) may extend into the project site and may be affected by the proposed construction.

This report provides an assessment of the condition of the trees, expressed as the Arboricultural Value and a determination of the Protection Value. The Protection Value of the trees takes into account the arboricultural condition, landscape and environmental significance, ownership and relevant legislative controls including local municipal laws and vegetation, environmental/ landscape significance, cultural or heritage overlays or any other relevant considerations (i.e. exemptions) of the relevant Planning Scheme.

The assessment of the trees in terms of their overall condition has been made in accordance with the Survey Methodology and Descriptors in Appendix 8.1. These must be referred to when reading this report.

Impact mitigation and tree protection measures are recommended to reduce the impact on high and moderate protection value trees where possible. These measures are based on the guidelines of the *Australian Standard AS4970 - 2009 - Protection of Trees on Development Sites*.

3. REPORT OBJECTIVES, RESOURCE DOCUMENTS AND VEGETATION CONTROLS

3.1 REPORT OBJECTIVES

The Development Impact Assessment has been prepared in accordance with relevant industry standards. The report objectives are:

- To assess tree condition based on the Visual Tree Assessment Methodology (VTA) and landscape significance of the trees or groups of trees on the project site and adjacent land where the tree protection zones (TPZ) may extend into the project site and may be affected by any proposed development or construction
- To identify any relevant Local Laws or Planning controls or exemptions that may be applicable to the site
- To assess the impact to all trees from the proposed development or construction (based upon the *Australian Standard AS 4970 - 2009 - Protection of Trees on Development Sites*)
- To provide impact mitigation and tree protection measures for trees of moderate or high protection value.

The recommendations given are based on the condition of the trees or groups of trees and their suitability for retention and or protection in relation to their current and future growing environment. Recommendations are not driven by the proposed development of the land and impact mitigation measures are provided where possible and practical regarding trees that are of moderate or high protection value.

Trees that are considered to be worthy of protection are afforded general guidelines for tree protection measures. These guidelines do not constitute a Tree Management or Protection Plan (as per the *Australian Standard AS 4970 - 2009 - Protection of Trees on Development Sites*).

3.2 DOCUMENTS / RESOURCES VIEWED IN PREPARATION OF THIS REPORT

The following documents and resources were viewed or relied upon in preparation of this report:

PLANS

- Existing Conditions: Plan of Features and Levels from Reeds Consulting (Ref No.: 23692, Sheets: 1-4, Revision: D, Dated: 21/09/2021)
- Proposed Development Plans: Cera Stribley Pty Ltd (Ref No.: 23076, Drawings: TP.1090.1 – TP.1104, Revision: -, Dated: 10/10/2023).

(Note: All plans assessed from others and used as a basis for this assessment are assumed to be true and correct)

PLANNING CONTROLS

- Vic Plan – Department of Environment, Land, Water and Planning (DELWP) (<https://mapshare.vic.gov.au/vicplan/>)

RESPONSIBLE AUTHORITY

- Stonnington Planning Scheme
- Stonnington City Council General Local Law 2018 (No. 1)

OTHER

- VicMap Data (Spatial Property Cadastre) (<http://services.land.vic.gov.au/SpatialDatamart/>)
- Aerial Photograph of the site (Nearmap™ – Dated: 24/04/2023).
- Development Impact Assessment prepared by Arbor Survey Pty Ltd (R5175, Version: 2, Date: 03/12/2020)
- Non-Destructive Root Investigation prepared by Arbor Survey Pty Ltd (R5421, Date: 29/07/2021)

3.3 VEGETATION CONTROLS

The project sites are located within Commercial 1 Zone (C1Z) and General Residential Zone – Schedule 10 (GRZ10) of the Stonnington Planning Scheme. The following table shows the statutory regulations and / or exemptions that may or not apply:

Table 1: Vegetation Protection Controls

Vegetation Controls / Exemptions	Applies to tree(s):	Reason
Heritage Overlay (HO)	N/A	Does not apply.
Significant Landscape Overlay (SLO)	N/A	Does not apply.
Environmental Significance Overlay (ESO)	N/A	Does not apply.
Vegetation Protection Overlay (VPO)	N/A	Does not apply.
Clause 52.17 'Native Vegetation'	N/A	Combine site area is greater than 4000m ² however no trees are Victorian Native specimens.
Clause 52.12 'Bushfire Protection: Exemptions'	N/A	Site is not within a Bushfire Prone Area (BPA)
Local Law	Project Site Tree 19 Council Trees / groups 1-5*	Unless in accordance with a Permit, a person must not remove/damage/kill, prune/lop/trim or perform works within the TPZ of a Significant Tree. A Significant tree means a tree or palm: <ul style="list-style-type: none"> has a trunk (single or multi-stem) circumference greater than 140cm (44.6cm Ø) measured at 1.4m above ground: or has a trunk (single or multi-stem) circumference greater than 180cm (57.3cm Ø) measured at its base. A person must not, without a Permit, remove, damage, kill, destroy or prune any tree or plant on Council land.

* - Denotes groups of trees

4. SITE ANALYSIS

4.1 SITE LOCATION, AREA AND TOPOGRAPHY

The project sites are located on the eastern side of Burke Road and southern side of Hope Street, Glen Iris. The combined site area is approximately 4739m² in size and has a change in grade of approximately 3 metres across the site. The aerial photograph in Figure 1 shows the project site and the approximate outline of the property boundaries.



4.2 TREE LOCATION

From the 19 trees or groups of trees assessed:

- 10 trees or tree groups are located within the project site boundaries
- 4 trees / groups are located on the neighbouring properties to west (26 Hope Street)
- 5 trees / groups are located on the Council owned road reserve with 4 individual London Planes trees located on the Hope Street frontage (1 mature and 3 newly planted) and approximately 6 Hills Fig trees (Tree 5*) located on the Burke Road frontage.

4.3 ORIGIN AND LANDSCAPE SIGNIFICANCE

From the assessment, 2 trees / groups are Australia Native specimens (not native to Victoria) and 17 trees / groups are Exotic specimens. Tree 1, the *Platanus x acerifolia* (London Plane), is of high landscape significance. This tree forms part of an avenue of the same species on Hope Street and is the first tree of the Avenue on the southern side of the road. Tree 19 is also considered to be of high landscape value and contributes to the canopy coverage. Trees 6*, 7 and 9* are considered to be of moderate landscape. These trees may provide screening or other landscape attributes that are of value. The remaining trees are of low landscape significance and value in terms of their mass and contribution to the canopy coverage to the immediate local area. Some of these trees may be in good condition in terms of their arboricultural characteristics, however, the landscape or amenity value they provide could easily be replaced with new planting.

5. ARBORICULTURAL AND PROTECTION VALUE ASSESSMENT

5.1 ARBORICULTURAL VALUE ASSESSMENT

Arboricultural value is rated according to the overall health, structure, life expectancy and significance within the landscape. The Arboricultural Value only relates to the physical condition of the tree or trees and does not take into account the vegetation/ environmental status/ controls, the suitability of the tree in the landscape or the ownership of the tree (Refer to Appendix 8.1 for further information on the descriptors used).

The Arboricultural Value rankings are provided in the tree data is found in Section 7.1. The Arboricultural Value only provides a rating of the arboricultural condition of the trees. In general, trees that are considered to be of moderate to high Arboricultural Value are also considered to be of moderate to high Protection Value unless the trees are inappropriate for long term growth or landscape functionality or causing damage to surrounding infrastructure. Additionally, some trees may be of no Protection Value if there are relevant planning exemptions (i.e. Clause 52.12). Similarly, some trees may be of low Arboricultural Value, however they are given a high Protection Value as they are located on adjoining private property or Council owned land.

5.2 PROTECTION VALUE ASSESSMENT

The Protection Value of the trees has been determined by taking into consideration the arboricultural value, landscape significance, habitat value, ownership and relevant legislative controls (including local municipal laws, vegetation protection and environmental/landscape significance overlays and cultural/heritage overlays) or any other relevant considerations (i.e. exemptions) of the relevant Planning Scheme. Only trees of high and moderate protection value should be considered for protection (Refer to Appendix 8.1 for further information).

Table 2 documents the trees that are worthy of protection and provides the trunk and basal diameters (DBH and Basal Dia.), Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) (Note: SRZ and TPZ are a radial measurement from the centre of the trunk). This table should be viewed in conjunction with the Tree Location (Existing Conditions) and Development Impact (Proposed Development) Plans located in Section 7.2. Trees that have been determined to have a high and moderate protection value are shown and have the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) drawn.

Table 2: High and Moderate Protection Value Trees - Tree Protection Distances

Tree No	Botanical Name	Ownership	Protection Value	DBH (cm)	Basal Dia (cm)	SRZ (m)	TPZ (m)	TPZ Area (m ²)
1	<i>Platanus x acerifolia</i>	Council	High	70	82	3.0	8.4	222
2	<i>Platanus x acerifolia</i>	Council	High	<10	<10	1.5	2.0	13
3	<i>Platanus x acerifolia</i>	Council	High	<10	<10	1.5	2.0	13
4	<i>Platanus x acerifolia</i>	Council	High	<10	<10	1.5	2.0	13
5*	<i>Ficus hillii</i>	Council	High	15	17	1.6	2.0	13
6*	<i>Cupressus sempervirens</i>	Project Site	Moderate	Multi-stem	24	1.8	2.9	26
13*	<i>Pittosporum tenuifolium</i>	Neighbours	High	Multi-stem	Approx. 15	1.5	2.0	13
14*	<i>Yucca sp. / Musa sp.</i>	Neighbours	High	Multi-stem	Approx. 30	1.5	2.0	13
16*	<i>Pittosporum eugenioides</i>	Neighbours	High	Multi-stem	Approx. 15	1.5	2.0	13

* - Denotes groups of trees

Note: DBH (cm) is the diameter at breast height (1.4m from natural ground level), Basal Dia (cm) is the diameter of the trunk above the root flare, SRZ (m) is the structural root zone in metres in a radius from the centre of the trunk, TPZ (m) is the tree protection zone in metres in a radius from the centre of the trunk. These measurements and distances are calculated based on the Australian Standard AS4970 - 2009 - Protection of Trees on Development sites.

It should be noted that Tree 15 is located on the neighbouring property however is of no protection value as it is dead.

6. DEVELOPMENT IMPACT ASSESSMENT AND IMPACT MITIGATION RECOMMENDATIONS

6.1 DEVELOPMENT / CONSTRUCTION IMPACT ASSESSMENT

The following table provides a summary of the impact of the proposal on the assessed trees based on their protection value in accordance with the guidelines of the *Australian Standard AS4970 - 2009 - Protection of Trees on Development Sites*. The encroachment is based on all works including the building footprint, crossovers, driveways and hard landscaping elements such as pathways.

Table 3: Encroachment Summary

Protection Value	No Encroachment	Minor Encroachment	Major Encroachment	Cannot be Protected
None	0 trees	0 trees	1 tree (Tree 15)	9 trees / groups (Trees 7-12 & 17-19)
Moderate	0 trees	0 trees	0 trees	1 group (Trees 6*)
High	1 group (Trees 5* (part))	0 trees	5 trees / groups (Trees 1, 4, 13*, 14* & 16*)	4 trees / groups (Trees 2, 3 & 5* (part))

* - Denotes groups of trees

The encroachment into the tree protection zone from buildings and or any works (including the construction of paths, driveways, landscaping etc) may be considered as low impact to significant impact. For example, a tree may have an encroachment of 30% into the tree protection zone (TPZ), however this encroachment is from landscaping/ path works or for a wooden deck that is to be constructed above natural ground level. In such cases, the impact can be defined as 'Low Impact' and impact mitigation actions can be easily applied during construction. Conversely, an encroachment into the TPZ of 30% may be from a deep excavation (such as a basement) in which case the impact would be defined as 'Significant Impact' and impact mitigation can only be achieved through a redesign of the works proposal.

In some cases, similar type works (i.e. such as a new driveway or crossover in a TPZ) may be defined as either Low, Moderate, High or Significant Impact. In these cases, the impact level will be defined by the topography of the site and the ability to construct above natural grade.

Table 4 below provides a summary of the encroachment and indicates whether the impact is considered to be Low, Moderate, High or Significant. The impact mitigation recommendations in Section 6.3 outline what is required to protect these trees where possible. The impact to trees of no protection value are not provided as these trees should not be considered for retention or protection as part of the proposal. Encroachment calculations are provided for these trees in the tree data in Section 7.1

Table 4: Construction / Development Impact Summary

Tree No.	Botanical Name	Protection Value	Encroach (%)	Element	Impact Level
1	<i>Platanus x acerifolia</i>	High	30%	Ramp, Crossover & Bin Room (Hope St)	Moderate – Refer to NDRI & Impact Mitigation recommendations
2	<i>Platanus x acerifolia</i>	High	100%	Crossover (Hope St)	Lost – Within works footprint
3	<i>Platanus x acerifolia</i>	High	100%	Modified kerb (Hope St)	Lost – Kerb at base of tree – will require removal.
4	<i>Platanus x acerifolia</i>	High	53%	Bike Parking	Significant – Could be retained in short term.
5*	<i>Ficus hillii</i>	High	0%/100%	None / Crossovers (Burke Rd)	Lost (1 tree) - Within works footprint. No Impact (4 trees) - Standard tree protection measures.
6*	<i>Cupressus sempervirens</i>	Moderate	100%	Building	Lost – Within works footprint

Tree No.	Botanical Name	Protection Value	Encroach (%)	Element	Impact Level
13*	<i>Pittosporum tenuifolium</i>	High	Up to 17%	Terrace	Low – Terrace can be constructed above grade. Refer to Impact Mitigation.
14*	<i>Yucca</i> sp. / <i>Musa</i> sp.	High	Up to 17%	Terrace	Low – Palm/grass species will tolerate impact.
16*	<i>Pittosporum eugenioides</i>	High	Up to 25%	Carpark	Moderate – Carpark can be constructed above grade. Refer to Impact Mitigation.

* - Denotes groups of trees

6.2 NON-DESTRUCTIVE ROOT INVESTIGATIONS

Extracted from Non-Destructive Root Investigation prepared by Arbor Survey Pty Ltd (R5421, Date: 29/07/2021)

Inspection Date: 23 June 2021

Instructions:

Non-Destructive Digging (NDD) works adjacent to 1 tree (Tree 1) located on the road reserve in front of 28 Hope Street (associated with the proposed redevelopment at the site 173 Burke Road).

Scope of Advice/ Limitations:

This advice only relates to the observations taken on site during the Non-destructive digging (NDD – hydro excavation) works to determine the feasibility of the proposed development application on the property, specifically the impact of the proposed crossover located within the tree protection zone of the *Platanus x acerifolia* (London Plane).

Advice/ Site Notes:

On Wednesday 23 June 2021, Arbor Survey Pty Ltd I supervised the NDD (Hydro excavation) adjacent to Tree 1, being a *Platanus x acerifolia* (London Plane).

The original proposed crossover is within the identified structural root zone of the Plane tree and there is an encroachment of greater than 10%. As per the *Australian Standard AS4970 -2009 – Protection of Trees on Development Sites* recommendations where encroachment over 10% will occur, a non-destructive excavation (NDD) was undertaken at an offset distance of 1.8 metres from the outside edge of the trunk to the edge of the proposed 'splay' of the original crossover. The hydro excavation in this location was difficult due to the mass of roots present. A second trench was also excavated 4.5 metres from the tree (Trench 2).

The objective of the NDD was primarily to determine the size, number and depth of the roots as this was the key determining factor in assessing the potential impact to the tree and to determine suitable recommendations.

Findings:

The results of the non-destructive (Hand) excavation works at a distance of 1.8 – 2.0 metres from the outside edge of the trunk revealed a mass of large structural roots and fine roots (Refer to Photographic Records). These large structural roots and the finer surface roots play a significant role in the structural stability of the tree given that root growth is restricted on the northern side due to the kerb and channel.

A second trench was excavated at a distance of 4.5 metres from the outside edge of the trunk of the tree to the kerb and channel. The results of this excavation revealed that the root mass reduced considerably in size and number with the largest roots observed being <50mm in size (Refer Photographic Records). Although there were still a number of smaller surface roots, it is considered feasible that these roots could be pruned with no long-term impact on tree health.

Recommendations:

Based on the large number of structural roots in Trench 1 at a distance of 1.8 – 2.0 metres from the tree, it is not recommended that a new crossover is constructed in this location. However, at a distance of 4.5 – 5.0 metres (Trench 2), the roots are considerably smaller in size ~<50mm diameter was the largest root observed and there were only ~3 roots of this size that would be severed from any new crossover.

Based on the findings it is considered feasible to construct a new crossover at a minimum distance of 4.5 metres from the tree (subject to Council Arborist approval). However, specialised construction requirements would need to be undertaken to ensure that the roots are pruned correctly during crossover construction.

Photographic Records:





Trench 2



Trench 2 – Largest ~50mm root running through trench



Trench 2 – close to kerb edge



Trench 2 – on kerb edge

6.3 IMPACT MITIGATION RECOMMENDATIONS

Trees that have been determined to have no protection value should not be considered for long term retention and or protection as part of any future development on the project site. Trees of no protection value are not provided impact mitigation recommendations in this Development Impact Assessment.

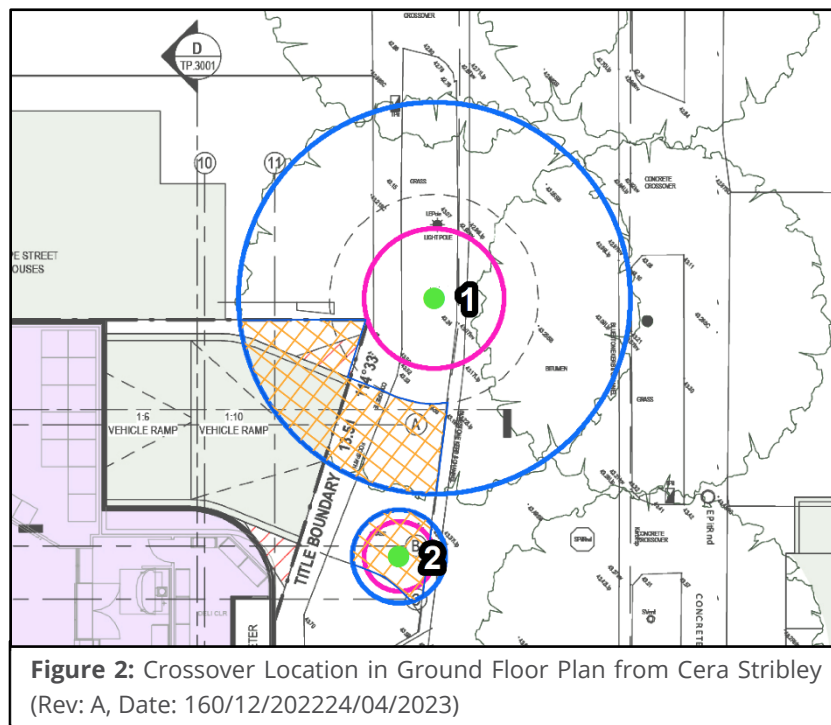
Tree protection and impact mitigation measures are listed below in order to reduce the potential of direct or indirect impacts (soil compaction, physical tree/root damage etc). For further information on general guidelines for tree protection see Appendix 8.3.

TREES RETENTION STATUS

- It is recommended that Trees 1, 4, 5* (part), 13*, 14* and 16*, (high protection value) are retained and protected as part of the proposed development. Specific construction recommendations are provided below for Trees 1, 4, 13* and 16*.
- Trees 2, 3 and part of Tree group 5 located on the Council road reserve (high protection value) cannot be retained as they are located within or very close to the proposed works footprint. The removal of these street trees is subject to approval from the Responsible Authority.
- Although Tree group 6 within the project site is of moderate protection value, it cannot be retained as part of the proposal.
- Tree 15 is located on the neighbouring property however is dead and therefore not worthy of protection.
- The remaining trees/groups (Trees 7-12 & 17-19) are not worthy of retention. Suitable replacement planting should be undertaken in lieu of their removal.

RECOMMENDED DESIGN CHANGES

- **Tree 1:** The crossover on Hope Street within the TPZ of Tree 1 is to be modified as specified in the NDRI results (i.e. 4.5m from the tree) and as previously shown in the provided plans(Refer to Figure A). is to Relocate Hope Street Crossover as stated in NDRI and as shown in previous Ground Floor Plan (Rev: A, Date: 10/10/2022).



- **Tree 1:** The Hope Street Apartment Bin Room and Bike Parking is to be at/above grade. There should be no continuous strip footing as part of the construction works of any walls/fencing. All fencing / walls should be on piers with edge beams above existing grade.
- **Trees 13* & 16*:** The Hope Street Apartment Terraces and Car Parking is to be at/above grade. There should be no continuous strip footing as part of the construction works. All fencing / retaining walls should be on piers with edge beams above existing grade.

PERMIT REQUIREMENTS

- Trees 19 within the project site meet the size criteria of requiring a local Law permit for removal.
- All street trees are protected by the General Local Law. A permit / approval from the Responsible Authority is required for the removal of the street trees (Trees 2, 3 & 5* (part of group)).

SPECIFIC CONSTRUCTION RECOMMENDATIONS

- **Tree 1:** It is recommended that a qualified Arborist supervises the soil excavation for the proposed crossover and correctly prunes the roots with sharp, sterile tools. Ideally, a trench should be excavated using roots sensitive

methods (Hydro or manual) along the edge of the crossover prior so that the roots may be pruned prior to bulk soil excavation from the crossover.

- **Tree 1:** The Hope Street Apartment Bin Room and Bike Parking is to be at/above grade. There should be no continuous strip footing as part of the construction works of any walls/fencing. All fencing / walls should be on piers with edge beams above existing grade.
- **Tree 4:** Ideally the bike parking is constructed at/above grade with no more than a minor site scrape. Root observed should be cleanly prune with sharp sterile tools.
- **Trees 13* & 16*:** The Hope Street Apartment Terraces and Car Parking is to be at/above grade. There should be no continuous strip footing as part of the construction works. All fencing / retaining walls should be on piers with edge beams above existing grade.

STANDARD TREE PROTECTION MEASURES

- Standard tree protection fencing must be established around the TPZs of Protected Trees (where outside proposed works footprint). The fencing is to remain in place during all site preparation / levelling and construction works.

SPECIALISED TREE PROTECTION MEASURES

- Not required

GENERAL TREE PROTECTION REQUIREMENTS

- Soil levels within the TPZs (where outside building/ driveway or works footprints) should remain at existing grade and permeable
- Any excavation (demolition and construction) within the TPZs should be supervised by a qualified arborist. Any roots uncovered must be cleanly pruned with sharp/sterile hand tools
- All tree protection measures must remain in place for the duration of works and can only be removed in consultation with the Project Arborist or local Responsible Authority
- Any new boundary fencing within the TPZ should be of light weight construction with no continuous footings and manually excavated stump holes (by hand or post hole auger only)
- Any required pruning must be in accordance with *Australian Standard AS4373-2007 Pruning of Amenity Trees* and carried out by a minimum AQF Level 3 Arborist.
- All services should be located outside the TPZ of trees to be protected. Where no alternative exists, a non-destructive root investigation or directional boring under supervision of a qualified Arborist must be undertaken to install the services.

TREE MANAGEMENT DURING CONSTRUCTION

Dependant on the final design, it is recommended that a Tree Management Report and Protection Plan (TMPP) is created as a condition of permit that will specify the exact requirements for tree protection of all high and moderate protection value trees to be protected. As part of the TMPP, it is recommended that there is a certification framework that details the actions required at all stages of development, the timing of supervision and the Certification methods to be undertaken by the Project Arborist.

7. TREE DATA AND PLANS

7.1 TREE DATA

Tree No	Botanical Name	Common Name	Origin	DBH (cm)	Basal Dia (cm)	Height (m)	Spread (m)	Health	Structure	Age Class	Arbor Value	Owner	Protect Value	SRZ (m)	TPZ (m)	Encroach (%)	Notes
1	<i>Platanus x acerifolia</i>	London Plane	Exotic	70	82	17	15	Good	Fair	Mature	Medium	Council	High	3.0	8.4	30%	Street tree, exposed roots, Valley pruned around wires, part of avenue planting
2	<i>Platanus x acerifolia</i>	London Plane	Exotic	<10	<10	2.5	1	Good	Good	New Planting	Medium	Council	High	1.5	2.0	100%	Newly planted street tree
3	<i>Platanus x acerifolia</i>	London Plane	Exotic	<10	<10	2.5	1	Good	Good	New Planting	Medium	Council	High	1.5	2.0	100%	Newly planted street tree
4	<i>Platanus x acerifolia</i>	London Plane	Exotic	<10	<10	2.5	1	Good	Good	New Planting	Medium	Council	High	1.5	2.0	53%	Newly planted street tree
5*	<i>Ficus hillii</i>	Hills Fig	Aus Native	15	17	2	1.5	Good	Fair-Good	Semi-Mature	Medium	Council	High	1.6	2.0	0%/100%	Clipped street trees x 6
6*	<i>Cupressus sempervirens</i>	Italian Cypress	Exotic	Multi-stem	24	6	2.5	Good	Fair	Semi-Mature	Medium	Project Site	Moderate	1.8	2.9	100%	14 trees total, clipped
7	<i>Prunus cerasifera</i>	Cherry Plum	Exotic	Multi-stem	49	7	10	Fair	Fair-Poor	Mature	Low	Project Site	None	2.5	5.9	100%	Possibly self-sown weed of low value
8	<i>Malus domestica</i>	Common Apple	Exotic	26	33	7	7	Fair	Poor	Mature	Low	Project Site	None	2.1	3.1	100%	Planted tree, low amenity, and landscape contribution
9*	<i>Betula pendula</i>	Silver Birch	Exotic	19	24	12	7	Fair-Good	Fair-Good	Semi-Mature	Medium	Project Site	None	1.8	2.3	100%	6 trees in total, TPZ if for the largest tree, Low landscape contribution
10	<i>Malus domestica</i>	Common Apple	Exotic	Approx. 25	Approx. 30	6	6	Good	Fair-Poor	Mature	Low	Project Site	None	2.0	3.0	100%	Planted tree, low amenity, and landscape contribution
11	<i>Hakea salicifolia</i>	Willow Leaved Hakea	Aus Native	34	46	5.5	3	Fair-Poor	Fair	Mature	Low	Project Site	None	2.4	4.1	100%	Dieback, weed species
12	<i>Ligustrum lucidum</i>	Glossy Privet	Exotic	Multi-stem	43	6	4	Fair	Fair-Poor	Mature	Low	Project Site	None	2.3	5.2	100%	Weed species
13*	<i>Pittosporum tenuifolium</i>	Kohuhu	Exotic	Multi-stem	Approx. 15	5	1.5	Fair-Good	Fair	Semi-Mature	Low	Neighbours	High	1.5	2.0	Up to 17%	Hedgerow
14*	<i>Yucca sp. / Musa sp.</i>	Yucca / Banana Palms	Exotic	Multi-stem	Approx. 30	4.5	2	Good	Fair	Mature	Low	Neighbours	High	1.5	2.0	Up to 17%	
15	<i>Photinia serratifolia</i>	Chinese Photinia	Exotic	Multi-stem	Approx. 25	5	4	Dead	Poor	Dead	Low	Neighbours	None	1.8	3.0	31%	Approx. 0.3m from fence
16*	<i>Pittosporum eugenioides</i>	Tarata	Exotic	Multi-stem	Approx. 15	4.5	3	Good	Fair-Poor	Semi-Mature	Low	Neighbours	High	1.5	2.0	Up to 25%	3 trees
17	<i>Citrus limon</i>	Lemon	Exotic	Multi-stem	14	3	3.5	Fair	Poor	Semi-Mature	Low	Project Site	None	1.5	2.0	100%	Suppressed growth
18	<i>Prunus cerasifera</i>	Cherry Plum	Exotic	Multi-stem	45	6	6	Fair	Fair-Poor	Mature	Low	Project Site	None	2.4	5.4	100%	Suppressed growth
19	<i>Cedrus deodara</i>	Deodar Cedar	Exotic	50	55	16	11	Fair	Fair-Poor	Mature	Low	Project Site	None	2.6	6.0	100%	Asymmetric form. Possible failed leader. Minor deadwood, codominant stem

* - Denotes groups of trees

Note: DBH (cm) is the diameter at breast height (1.4m from natural ground level), Basal Dia (cm) is the diameter of the trunk above the root flare, Arbor Value is the Arboriculture Vale, SRZ (m) is the structural root zone in metres in a radius from the centre of the trunk, TPZ (m) is the tree protection zone in metres in a radius from the centre of the trunk. The Encroach (%) is the level of encroachment into the tree protection zone of the tree from the excavation/ construction works. These measurements and distances are calculated from the Australian Standard AS4970 - 2009 - Protection of Trees on Development sites.



Arbor Survey

37 Arbor Way
CARRUM DOWNS VIC 3201
Phone: 03 8521 4966

7.2 TREE LOCATION PLAN

Site:
173 Burke Road & 28 Hope Street
GLEN IRIS

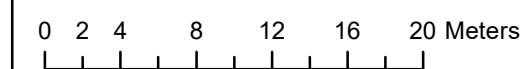
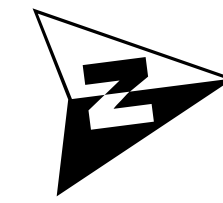
Client:
[REDACTED]

Arbor Survey Ref:
R6435

Revision:
A (11/12/2023)

Date Drawn:
27 July 2023

Source Plan:
Plan of Features & Levels
Reeds Consulting
Ref: 23692 Sheet: 1
Rev: D Date: 21/09/2021



Coordinate System: GDA 2020 MGA Zone 55
Scale: 1:400 at Sheet Size A3

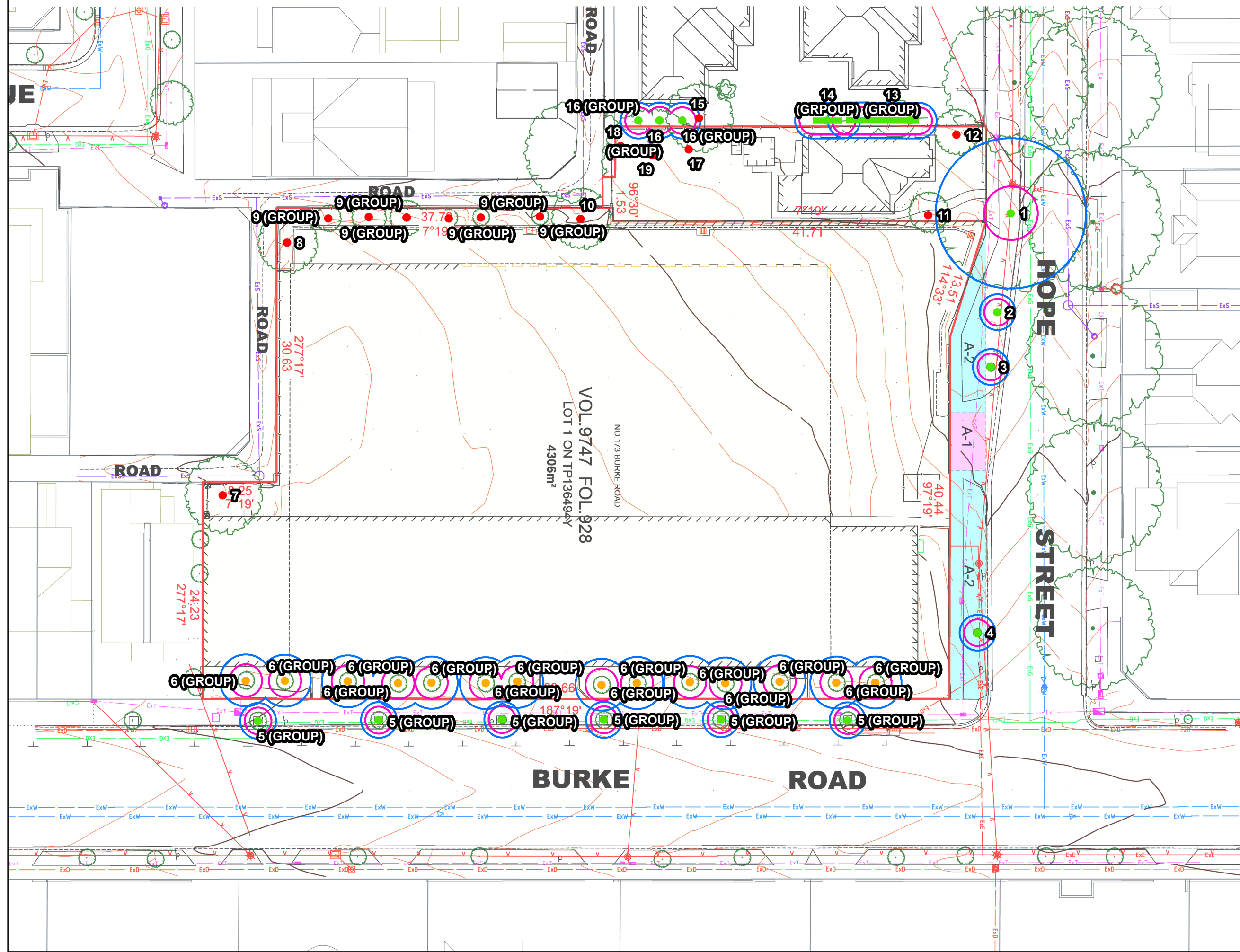
Legend

Tree Protection Value

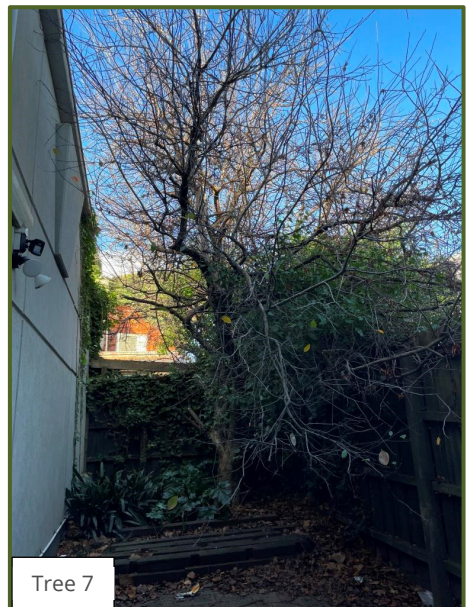
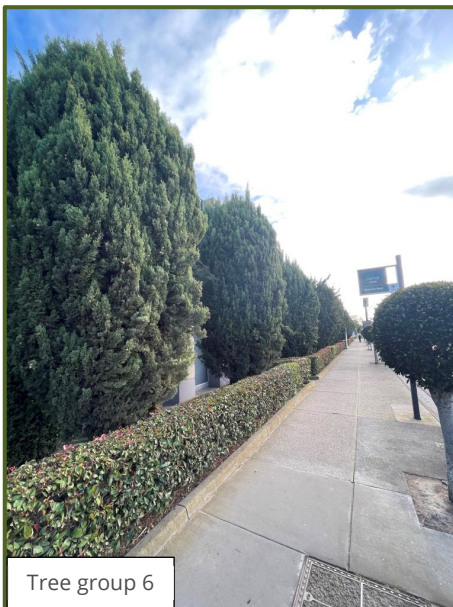
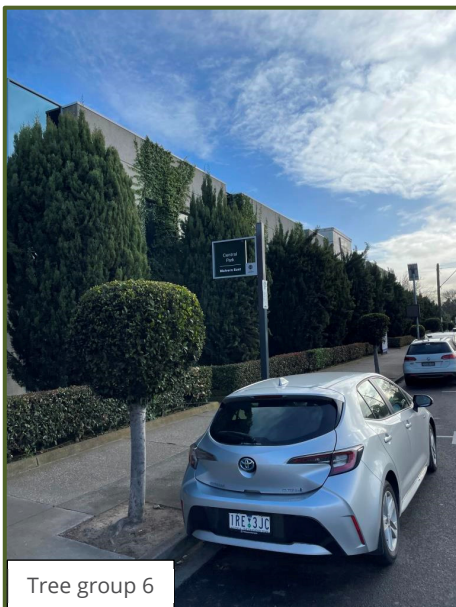
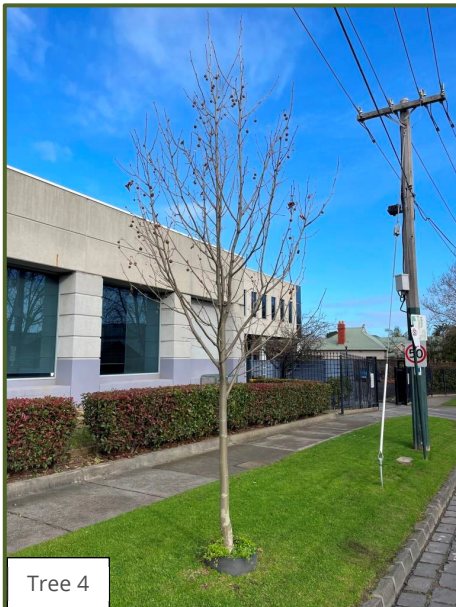
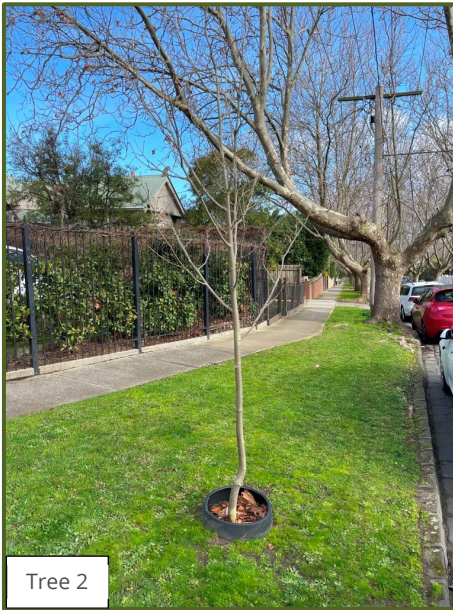
- High (8)
- Moderate (1)
- None (10)

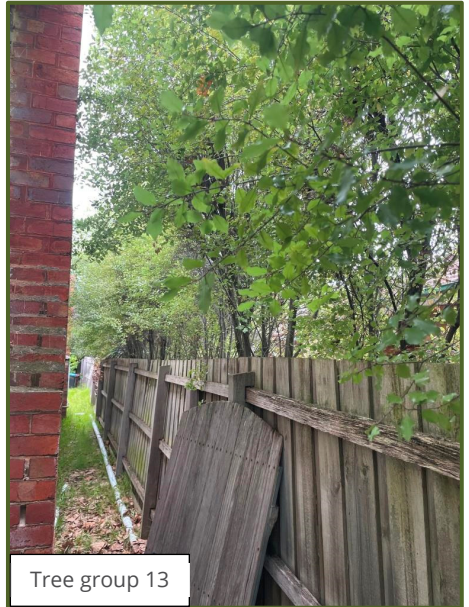
Tree Protection Areas

- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)



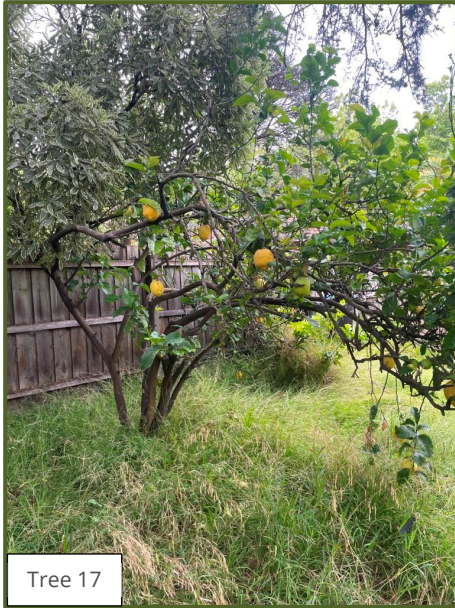
7.3 PHOTOGRAPHIC REFERENCES







Tree group 16



Tree 17



Tree 18



Tree 19

8. APPENDICES

8.1 SURVEY METHODOLOGY AND DESCRIPTORS

Site observations and tree data was recorded on site at the date noted within Section 2 (Introduction). This report is based upon the condition of the trees and the site conditions noted on the inspection date(s) only. The characteristics of each tree or group of trees of similar characteristics have been undertaken in accordance with the Visual Tree Assessment (VTA) methodology (Mattheck & Breloer, 1998).

The data is included in this report in a detailed table, located in Section 7.1. Tree Location (existing conditions) and Development Impact (proposed development) Plans are provided in Section 7.2 where relevant. Site photographs (if relevant) are provided in Section 7.3.

The survey identifies all trees or groups of trees within the project site over 2 metres in height and on adjoining lands (neighbouring properties and or Council or other regulatory body or Crown land) where their projected Tree Protection Zones (TPZs) extend to within the project site and may be affected by the proposed buildings and or works. The assessment is undertaken from a visual inspection from ground level only. No individual tree or trees were climbed and no samples of soil, plant material or pest and disease infestation (if present) were taken for analysis. Defects not apparent from this ground-based visual inspection are excluded from the discussion within this report. This report is not a risk assessment and no other assessment methodologies have been used.

This assessment is based on an improved and modified version of current industry best practice. 'Retention Value' is not used as the primary driver for any recommendations. The primary driver for the recommendations within the report is the characteristic of 'Protection Value'. Protection value is derived from a combination of the physical arboricultural characteristics and life expectancy recorded as the 'Arboricultural Value' in conjunction with the landscape significance or amenity value, ownership, and relevant regulatory controls.

The following data is recorded on site:

- **Tree Identification Number (Tree No.)** – This is a sequential numeric numbering system used to identify each tree on the attached site map. These numbers may also relate to tags placed on each tree in the field if required. Any deviation of the numbering system will be specifically noted within the report.
- **Genus/ Species (Botanical Name)** – Species identification is considered as common and made using species characteristics observed on site or sampled and researched off site. Specific cultivar or subspecies details are omitted unless where known. No samples have been taken to the National Herbarium of Victoria for accurate analysis and identification unless specifically noted within the report.
- **Common Name** – This is the typical common name assigned to the tree species. For many trees, there is likely to be numerous common names that could be used. The common name provided should only be seen as a secondary identification tool.
- **Origin** – Relates to the species natural origin (i.e. if the tree would have been found in the local environment, pre-European settlement). Origin is recorded based on the following categories:

Category	Description
Exotic	May be planted or self-sown, Originates from outside of Australia.
Aus Native	May be planted or self-sown, Originates from Australia, but does not originate from Victoria.
Vic Native	May be planted or self-sown, Naturally found within Victoria but <u>not</u> originating from within the Local Government area
Indigenous	May be planted or self-sown, Originates from within the Local Government area of the site

- **DBH (cm)** – this is the Diameter at Breast Height (DBH) measured using a diameter tape at approximately 1.4 metres from natural ground level. Where the trunk diameter at this point may be affected by natural growth such as a major union point, the DBH will be measured just below this union point. For multiple stemmed trees, the measurements are provided for up to 4 stems (at 1.4 metres from natural ground level). These will be recorded, and the combined or total diameter will be calculated in accordance with the Australian Standard AS 4970-2009-Protection of Trees on Development Sites using the formula below:

$$\text{Total DBH} = \sqrt{(\text{DBH}_1)^2 + (\text{DBH}_2)^2 + (\text{DBH}_3)^2 + (\text{DBH}_4)^2}$$

This is represented in the tree data as “Stem1/Stem2/Stem3/Stem4 (Calculated DBH)” – i.e. 15/28/34/19 (50.3). The calculated DBH of the stems is used to determine the Tree Protection Zone. For trees with more than 4 stems, the DBH (cm) measurement is recorded as ‘Multi-stemmed’ or similar. In instances where ‘Multi-stemmed’ is recorded, the Tree Protection Zone will be based on a basal measurement. For neighbouring property trees and where access is limited, an approximate DBH (cm) will be provided.

- **Basal Dia (cm)** – this is the diameter of the tree at the trunk base (including multiple stemmed trees) at a level above the trunk basal flare. This is used to determine the Structural Root Zone (SRZ). In some cases, this will be noted as being ‘Multi -stemmed’ and the SRZ will be estimated using an approximate basal diameter. For neighbouring property trees and where access is limited, an approximate Basal Diameter (cm) will be provided.
- **Height (m)** – this is the approximate height of the canopy of the tree or the largest canopy height of a group of trees. This is an approximated height based on known landscape reference points. In cases of large significant trees where accurate height measurements are required (as height will directly affect the outcome or recommendations of the report), a Nikon Forestry Pro Laser Range finder will be used. Where measured heights have been used, this will be noted within the report data and detailed within the report.
- **Spread (m)** – this is the approximate canopy spread of the tree on the widest axis. This is given as a single measure and is provided as a guide to show overall canopy spread within the landscape. Where multiple canopy dimensions are required (i.e. proximity to buildings and or severely asymmetric canopy growth) as it may affect the outcome of tree protection, these will be noted within the report data and detailed in the Development Impact Assessment.
- **Health** - relates to the tree vigour and canopy density. The characteristic assigned to the tree may be represented as a combination of any of these categories (e.g. Fair to Poor or Fair-Poor). In these instances, there may be a combination of the characteristics listed below or the foliage density is at the upper or lower scale of each category. In some cases, ‘Health’ may be noted as being ‘Very Good’ which indicates an optimal condition or ‘Very Poor’ which indicates that the tree is of such poor health and is unlikely to recover. In some cases, the ‘Health’ condition will be provided as ‘Dead’. In this case, there is no observable indication that the tree is alive at the time of inspection. Health is rated according to the following categories:

Category	Description
Good	Foliage density / bud formation (Deciduous) is greater than 75% at optimal growth. There is less than 10% canopy dieback present and foliage has no or very minor tip dieback. Tree may also have visible extension growth if it is in active growth and is showing no signs of nutrient deficiency (i.e. chlorosis) or active pest or disease presence. The tree may also have good wound wood development.
Fair	Foliage density / bud formation (Deciduous) is between 50-75% at optimal growth for the species. There may be 10-30% canopy dieback present and foliage may have minor tip dieback. Tree maybe showing signs of normal growth, but it is not consistent throughout the crown. Some foliage discolouration may be present from possible nutrient deficiency or other cause (i.e. pest or disease).
Poor	Canopy may be asymmetrical (not typical for the species and affecting vigour) and or canopy may be suppressed. There may be greater than 30% canopy dieback present and foliage density is below 50%. Stunted growth through leaf size or petiole extension and discolouration of the leaf may be present. Tree may be producing epicormic shoots as a stress response. Nutrient deficiency, lack of resources (water, light etc) or pathogens may be the causal agent in the tree’s decline.

- **Structure** - relates to the physical form of the tree, including the trunk(s), main scaffold branches and roots. Structure includes the attributes that may influence the probability of trunk, limb, or root plate failure. The characteristic assigned to the tree may be represented as a combination of any of these categories (e.g. Fair to Poor or Fair to Good). In these instances, there may be a combination of the characteristics listed below. In some cases, 'Structure' may be noted as being 'Very Good' which indicates an optimal condition or 'Very Poor' which indicates that the tree has major structural defects and may be of a relatively high risk of failure of the identified tree part.

Structure is rated according to the following categories:

Category	Description
Good	The form of the tree is excurrent or decurrent and typical of the species characteristics and exhibits good symmetrical form. Major limbs are well formed with acceptable branch taper and unions appear to be strong with no signs of major defects. The tree has minimal defects or decay throughout the trunk and limbs. There is no signs of root plate heave or damage to the root system (mechanical or other). The tree is unlikely to suffer major branch or trunk failure under normal environmental (weather) conditions.
Fair	The form of the tree is excurrent or decurrent and typical of the species characteristics and has a fairly symmetrical form. Tree may exhibit minor structural defects that may be managed through formative/remedial/restorative or structural pruning. Only minor wounds and or areas of decay are present that do not affect the overall stability or structural integrity of any major parts of the tree. Minor root damage may have occurred in the past. Defects present are likely to cause only minor branch failure under normal environmental (weather) conditions.
Poor	Tree has a poorly formed crown that is not symmetrical. Branch and or trunk taper may be unacceptable and scaffold limbs may be overextended. Branch unions may exhibit significant defects that cannot be managed through formative pruning. There is likely to be decay in parts of the tree that may result in branch or trunk failure. Major root damage may have occurred and there may be evidence of root plate heave. Defects that are present may result in major failure of branches or trunk under normal environmental (weather) conditions.

- **Age Class** - is given as a guide to the current life stage of the tree. Ultimately, the level of maturity that a tree may reach is dependent on the growing environment. The 'Mature' age class may extend for many years and is given only as an indication of the maturity of the tree based on the conditions of the local environment. Age Class is rated according to the following categories:

Category	Description
New Planting	Planted within approximately 2 years
Juvenile	Estimated as between 2 - 10 years old
Semi-mature	Estimated at between 10 - 20 years old, however, this may be species dependant
Mature	Estimated at over 25 years old or in a life stage that is considered at the peak of growth for the species.
Senescent	In the declining phase of the tree's lifespan

- **Landscape Significance** - Landscape Significance only relates to the size of the tree relative to the immediate local area and its visual presence. Landscape significance should not be considered as the only factor in determining if a tree is worthy of retention. Landscape significance is rated according to the following categories:

Category	Description
None	Tree is dead and provides no value in the landscape from a visual amenity perspective
Low	Tree is less than 8 metres in height and spread and is not easily seen from outside of the site from within the public realm
Moderate	Tree is generally between 8 - 12 metres in height and can be easily viewed from within 50 metres of the site from the public realm
High	Tree is generally over 12 metres in height and can be viewed from over 50 metres away from the site and from adjoining streets

- **Arboricultural Value** - is rated according to the overall health, structure, and estimated life expectancy of the tree (often referred to as 'Useful Life Expectancy -ULE'). Often the life expectancy or ULE of a tree may be difficult to quantify as there are too many variables and therefore it is not directly recorded as a characteristic in the report. ULE has traditionally been used to guide future replanting and tree population heuristics.

The 'Arboricultural Value' takes into account the overall condition and life expectancy of the tree however it does not take into account the landscape or environmental status or suitability of the tree in the landscape. This rating is not a 'Retention Value' or 'Protection Value', it is only a rating of the overall condition of the physical characteristics of the tree and its expected longevity (based on growing conditions). For example, a tree of a semi mature or younger age class may be given a medium or high arboricultural value based on its condition, however it may be given no protection value based on its current size and low landscape significance and or amenity value. The arboricultural value is rated based on the following categories:

Category	Description
Low	A tree of low arboricultural value may be considered to be in poor condition overall with a low life expectancy (less than 10 years). The tree may be showing signs of poor health and or structure. The tree may either have a poor health rating and it is unlikely to recover or a poor structure that cannot be remedied through normal arboricultural pruning practices.
Medium	A tree of medium arboricultural value may be considered to be in fair condition overall. This tree may be considered as an average tree that provides average benefits to the site and local area with an estimated longevity of between 10 – 20 years. The tree may have evidence of fair to poor health that may be improved through cultural practices. The tree may have some structural defects that can be remedied through normal arboricultural pruning practices.
High	A tree of high arboricultural value may be considered to be of good overall health and structure. The tree is considered to have a life expectancy of greater than 20 years. Under normal maintenance practices this tree is expected to perform well in the landscape in the long term.

- **Ownership** – the ownership is noted as this may affect the 'Protection Value' of a tree or group of trees. Generally, trees and or vegetation that are located on adjoining lands that are not of the ownership of the project site may be subject to permission for removal and or works within the tree protection zone. Traditionally, this may be referred to as 'Third Party Ownership'. Adjoining lands may be owned by private property owners and this is noted as being in the category 'Neighbours'. Trees located on road reserves, nature strips or adjoining parklands/ open spaces are often owned or managed by the local Responsible Authority and are given the ownership category of 'Council'. Where known, ownership may be noted as being 'Crown' or another regulatory body (e.g. Melbourne Water). In some cases, the ownership will be noted as 'Other' and this will be explained in the 'Site Analysis' section of the report.
- **Protection Value** - is determined based on a combination of the Arboricultural Value, the ownership/ location of the tree, the landscape/ ecological and or cultural / heritage significance of the tree. The Protection Value also takes into account the suitability of the tree in the current and future landscape and the species status (i.e. identified weed species). The tree may also be protected under any relevant Planning or Local Law regulations which is also taken into account under Protection Value. Protection Value is rated according to the following categories:

Category	Description
None	A tree or group of trees of 'No' protection value may be considered to be in poor condition overall and is assigned a low arboricultural value and is within the project site. The tree may be of medium or high arboricultural value, however, if it is a known weed species, is doing considerable infrastructure damage or is not suitable to the site (based on its physical characteristics) it is considered to be of no protection value. The tree may be a juvenile to young specimen that can easily be replaced with new tree planting that will provide a greater amenity in the next 5 – 10 years. This tree may have a low landscape significance in terms of its height and mass within the landscape (i.e. generally less than 8 metres in height and spread) Trees that are located on adjoining land may be given a rating of 'None' if they are found to be dead or extremely hazardous and do not have any regulatory protection and or habitat value. In such instances this will be defined within the report.

Moderate	<p>A tree or group of trees of 'Moderate' protection value may be considered to be in fair to good condition overall and is located within the project site. The tree may be of medium or high arboricultural value, however, it may or may not be suitable to the site in the long term (based on its physical characteristics) for greater than 20 years. The tree may provide a moderate level of landscape significance or amenity and be of moderate individual significance. The tree may be in a semi mature to early mature life stage.</p> <p>Ideally any future development should consider a moderate protection value to be retained and incorporated into the design. However, if the retention and or adequate protection of this tree cannot be achieved with a reasonable design footprint then consideration should be given to the removal of the tree and replacement with a new tree suitable to the landscape and available space.</p> <p>Only trees within the project site may be given a rating of 'Moderate'. Trees that are located on adjoining land are not given a rating of 'Moderate'.</p>
High	<p>A tree or group of trees of 'High' protection value may be considered to be in good condition overall and is suitably located within the project site (i.e. within the front setback). The tree (if within the project site) will be of high arboricultural value and should have a life expectancy of greater than 20 years if protected and managed. The tree may provide a moderate to high level of landscape significance or amenity and be of moderate to high individual significance. The tree will be in a mature life stage but not beginning senescence. Ideally any future development should consider a high protection value to be retained and incorporated into the design when the tree is located on the site. The design should have regard to the adequate protection of this tree throughout any development on the project site. This tree may have a high landscape significance in terms of its height and mass within the landscape (I.e. generally greater than 12 metres in height and spread)</p> <p>Trees located on adjoining lands, not of the ownership of the project site, are given a high protection value, regardless of their overall condition (Arboricultural Value), the environmental / landscape significance and or cultural / heritage significance (i.e. historic or remnant old veteran trees) unless they are Dead and do not have any regulatory protection and or habitat value. High protection value may also be assigned to known weed species, however this will be noted within the report.</p> <p>The tree(s) may or may not be subject to any local Planning or other regulatory control (i.e. Local Law).</p>

- **SRZ (m)** - The Structural Root Zone (SRZ) (referenced from *Australian Standard AS4970-2009 - Protection of Trees on Development Sites*) is the calculated distance based on Basal Dia (cm). The SRZ identifies the minimum radius at which the root plate should not be disturbed. This measure only relates to the trees' stability and does not take into account the implications of a decline in health. The measurement is given in metres in a radius from the centre of the tree trunk.
- **TPZ (m)** - The Tree Protection Zone (TPZ) (referenced from *Australian Standard AS4970-2009 - Protection of Trees on Development Sites*) is the calculated distance based on the DBH of the tree. The TPZ addresses the physiological implications by retaining an ideal area around the tree to survive in the landscape on a long-term basis. The measurement is given in metres in a radius from the centre of the trunk.
- **TPZArea (m²)** - is the tree protection zone in square metres (m²) around the trunk.
- **TPZ10% (m)** - identifies the 10% encroachment radial distance into the tree protection zone on one side of the tree only (Minor Encroachment).
- **Encroach (%)** - is the level of encroachment into the TPZ of the tree from the excavation/ buildings and works.
- **Notes/ Comments** - The general notes/ comments provide additional support where required for the tree data collected in the field.

8.2 GLOSSARY OF COMMONLY USED TERMS

Amenity

Although difficult to quantify, the term as used in this report relates to the contribution given to the landscape or streetscape in terms of visual aesthetics. It may also relate to the contribution in terms of shade or protection from the elements.

Bifurcation

A stem or branch forked or divided into two or more parts or branches. Used to describe a union point. A bifurcation may have different characteristics dependant on the load distribution on the union and the size of the branches or stems that arise from the union point.

Branch Bark Ridge

Swelling of bark tissue on the upper side of the branch junction or union. Considered the normal pattern of development in contrast to included bark (from Matheny & Clark, 1994).

Branch collar

Trunk tissue that forms around the base of a branch between the main stem and the branch. As the branch decreases in vigour or begins to die, the branch collar becomes more pronounced (AS4373).

Chlorotic

Discolouration of the leaves, yellow in colour resulting from a lack of chlorophyll

Codominant

Generally, relates to trunks/ stems (although it may relate to scaffold branches within the crown) of two or more and of equal or similar size and relative importance (Matheny & Clark, 1994).

Compartmentalisation

Physiological process which creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms (Matheny & Clark, 1994).

Decay

Degeneration and de-lignification of plant tissue, including wood, by pathogens or micro-organisms (AS4373).

Epicormic Shoots

Shoots which arise from adventitious or latent buds (usually dormant). They are generally produced in response to environmental stress.

Included Bark

The pattern of development at a branch union where bark is turned inward rather than outward or pushed out. Relates to the branch bark ridge and bifurcations. (Matheny & Clark, 1994)

Live Crown Ratio (LCR)

Relative proportion of healthy crown in proportion to overall tree height. Often not used in isolation due to the different natural forms of many species and growing conditions. Generally, an LCR of less than 30% may result in a poor structural rating, however, when this is used and noted within this report, it is based on potential changes to the environment where this condition may have an effect on long term protection value.

Lateral

A branch arising from another branch or stem (AS4373)

Lopping

Cutting back a limb or stem at any point with no regard to natural target pruning. Random cutting of branches or stems between branch unions or at internodes on young trees. Not considered an acceptable practice as part of the *Australian Standard AS4373-2007 - Pruning of Amenity Trees*.

Senescence or Senescent

The organic process of age and the deterioration of tissue within the tree.

Wound wood/ Reaction Wood

Lignified, partially differentiated tissue which develops from the callus associated with wound or pruning cuts.

8.3 BIBLIOGRAPHY AND CITED REFERENCES

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8.4 TREE PROTECTION GUIDELINES**8.4.1 BACKGROUND**

Arbor Survey Pty Ltd assesses individual tree protection requirements based upon the *Australian Standard AS4970-2009 - Protection of Trees on Development Sites*. Tree protection requirements are calculated based upon trunk diameter of the tree at breast height. These calculations produce what is referred to in this report as the Tree Protection Zone (TPZ) and is provided as a measurement in metres in a radius from the centre of the trunk.

The TPZ is the zone in which protective measures should be applied in order to protect the tree(s) whilst maintaining the current levels of health and vigour.

Determination of the structural root zone or the zone of rapid taper is provided as the Structural Root Zone (SRZ). The structural root zone calculations (may also be referred to as the Root Plate Radius (RPR)) of the tree, based upon the *Australian Standard AS4970-2009*. The SRZ determines the minimum distance around the tree in which the structural stability of the tree should be able to be maintained.

It is important to note that the SRZ only determines the root plate area or the zone of rapid taper. Excavation within this area will not only cause a decline in tree vigour but may also cause catastrophic tree failure (Coder, 1996).

Often it is difficult to protect the entire TPZ due to site constraints. In such events it is imperative that condition and species tolerance to disturbance are evaluated in conjunction with the site characteristics. Helliwell (1985) and Harris (1999) identified that a healthy tree may tolerate removal of up to one-third of its roots and possibly up to 50% in some cases, although stability may be compromised at this level.

In situations where the TPZ of a tree to be retained will be in close proximity to a proposed development or where there will be encroachment into the TPZ of a tree, a specific tree management plan should be developed. This plan provides prescriptive measures to protect trees on development sites

8.4.2 GENERAL TREE PROTECTION REQUIREMENTS

The following requirements are only provided only for basic guidance, these guidelines do not constitute a specific tree management and protection plan.

- A tree protective fence should be installed at the recommended distance allocated for each tree to be retained. The fence should be located at the TPZ distance provided where possible.
- The protection fence should be rigid (chain link or similar) and should not be less than 1.8 metres in height. Fencing should be firmly attached to a removable concrete or similar base. Alternatively, star pickets (1.5 metre spacing) and para-webbing may be used to define the tree protection area. Fencing should be in accordance with the *Australian Standard for Temporary Fencing AS4687*.
- In cases where the TPZ cannot be entirely fenced, it is recommended that ground protection is used. Specific ground protection requirements will form part of a tree protection plan that should be developed for all trees to be retained.
- No soil levels must be altered within the fenced TPZ area, no heavy machinery should be allowed to pass within this area and no spoil, chemicals, building materials or refuse should be stored within this area. Nothing whatsoever should be attached to the tree (excluding tape to identify a tree to be protected).
- The area within the tree protection fence should be covered with a layer of organic mulch (mixed particle sized woodchip) to a depth of 100mm prior to the commencement of the project. Mulch material should comply with *Australian Standard AS4454*.
- The tree protective fencing should be installed prior to any works (including demolition) commencing on site and should remain in place until all site development work is completed. The protective fencing should be located at the prescribed TPZ distance where possible and clearly signed **TREE PROTECTION ZONE**. The sign should be similar to the attached image (as recommended by the *Australian Standard AS4970-2009*) and should be of a size no smaller than 400mm x 300mm:
- An area should be designated on site, outside of any tree protection zone, where all building materials, chemicals etc. can be stored throughout the proposed development.
- Open trenching for underground services located within the recommended tree protection zone (TPZ) must be avoided. Should there be no alternative for service location; the services must be bored underneath the TPZ or a non-destructive root investigation (NDRI) should be undertaken. No trenching with machinery should be used to install services within the protected area.
- Soil moisture during construction should be maintained at not less than 50% of field capacity (usually 10 litres of water per 10mm of each tree DBH per week). Irrigation may be applied by hand, automatic or manual irrigation system, or by fine spray from water tanker located outside the fenced area. Water is to be applied at a volume and frequency required so as to maintain turgor and leaf retention and encourage healthy root development. The Project Arborist should discuss variations to the amount of water to be supplied with the site or Project Manager.
- Remedial pruning works recommended to be undertaken on the project trees must be carried out to *Australian Standard AS4373-2007 - Pruning of Amenity Trees*, by a qualified Arborist (Minimum AQF Level 3). If pruning works are to be undertaken, then these works should be carried out prior to any construction works beginning on site.
- Documentation should be provided to the site manager by the Project Arborist for each inspection during the development process which details the consultant Arborist name, date and time of inspection, the stage of development, and provides comments of what actions are required.



8.5 TERMS AND CONDITIONS

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