Arboricultural Assessment Report

St Carlo Borromeo Catholic Primary School

5-9 Drummond Street, Greenvale

Prepared for St Carlo Borromeo Catholic Primary School

Prepared by Bruce Callander – Senior Consulting Arborist Tree Logic Pty. Ltd.

10 July 2023

Tree Logic Ref. 012878

Contents

Tree Impact Report_12878_St Carlo Borromeo PS-

File No.	Version	Author	Issue date	Edits	Issued by.
012878	1	Bruce Callander	12/05/2023	Preliminary tree assessment report	BC
012878	2	Bruce Callander	10/07/2023	Tree Impact Report	BC

Objectives

Tree Logic was engaged by St Carlo Borromeo Catholic Primary School to undertake an arboricultural assessment and prepare a preliminary arboricultural report for selected trees associated with the school grounds at 5-9 Drummond Street, Greenvale.

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.
- Offer recommendations regarding any tree protection requirements for trees required to be retained.

1 Summary

1.1 Seventy two (72) tree features were assessed within the nominated tree study area associated with St Carlo Borromeo PS. They include 51 trees and 1 group of 21 ornamental trees growing beside the perimeter fence.

1.2 Twenty four (24) different species were recorded comprising predominantly introduced plantings of native and exotic tree species.

1.3 The trees exhibited health and structural condition considered generally typical for the species growing in this location under current conditions.

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

- One (1) trees were attributed an arboricultural rating of Moderate A, being a prominent tree in better than typical condition for the species and highly desirable to retain.
- Sixteen (16) trees were attributed an arboricultural rating of Moderate B, being middle of the range, typical of the species and worthy of retention.
- Fifty (50) trees were attributed an arboricultural rating of Moderate C, being either maturing trees that are acruing deficiencies or trees of comparatively small size that could be readily replaced in the new landscape if required.
- Five (5) trees were atributed an arboricultural rating of Low, due to health and / or structural deficincies.

Refer to Section 4 for observations of tree and site conditions and Table 3 for trees sorted by Arboricultural Rating.

1.5 The school site is within the City of Hume Local Government Area planning scheme. The site is zoned General Residential Zone - Schedule 1 (GRZ1).
No environmental Overlays apply to the site.

1.6 No specific tree controls apply under any environmental overlays or tree protection local law.

1.7 A Feature and Level Survey plan (JRL Land surveyors. Ref: 20-137 D3. Date: 14/11/2023) was used to determine tree locations.

1.8 At the time of preparing the tree impact assessment report, plans for new works were provided that indicate new car parks, play and sporting facilities and new buildings with extensive new plantings around these new facilities. Percieved impacts associated with these various works are identified in Section 6 – Design Review to assist planners and designers to allocate sufficent space to appropriately protect trees that are to be retained in conjunction with the design proposal.

1.9 In summary,

- Twenty six (26) trees are indicated to be removed, the majority of which are relatively small trees planted in conjunction with recent school upgrade and expansion works.
- No permit is required to remove these trees under any local law, environmental overlay or under Native Vegetation - Clause 52.17.
- Ninety (90) new advanced trees are proposed to be planted in conjunction with the current design proposal.

2 Method

2.1 A site inspection was carried out on Thursday, May 4th , 2023, during mild conditions by Bruce Callander, Senior Consultant Arborist (Dip Hort. Cert 5 Arb. NMIT, TRAQ qualified) and Thiet Nguyen (Master of Forestry).

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 properties 5-9 Drummond Street, Greenvale 3059. Department of Planning & Community Development. (30/1/2023)
- General Residential Zone - Schedule 1 (GRZ1).
- Feature Survey Plan prepared by JRL Land surveyors. Ref: 20-137 D3. Date: 14/11/2023
- City of Hume Planning scheme
- City of Hume Tree Protection Procedures
- XLA_St Carlo_L_Tree Retention / Removal Plan (Dwg No: L101. Date: 1/6/23)
- XLA_St Carlo_Stage B_2023_08_01_Trees (planting plan)

3 Tree Permit Requirements

3.1 The school is located within the City of Hume Local Government Area and Planning Scheme.

3.2 The site is zoned General Residential Zone - Schedule 1 (GRZ1).

3.3 No environmental Overlays apply to the site and No specific tree controls apply under any environmental overlays or tree protection local law.

3.4 There are no locally native or naturally occurring indigenous trees within the study area and therefore Native Vegetation controls associated with Clause 52.17 do not apply.

3.5 Tree controls will apply to council managed street trees within the road reserves abutting the western, northern and eastern boundaries.

3.6 Refer to Table 1 for tree permit requirements.

Table 1: Permit requirement	**Count**	**Tree numbers**
Street trees	4	1, 2, 3, 4
On school property (No permit)	68	Trees 5 to 71, Group 1
Total	**72**	

4 Observations

4.1 The subject study area comprises trees associated with St Carlo Borromeo Catholic Primary School at 5 -9 Drummond Street, Greenvale.

The site is a relatively newly established school with various single storey class rooms linked by paths, fenced playgrounds and sports facilities with young to early mature trees and shrubs distributed around the perimeters of the various areas.
The site and surrounds is generally flat and highly modified.

Plate 1. Aerial view of the tree study area associated with St Carlo Borromeo PS indicated by red line. Blue dashed lines represent easements. (Nearmap aerial imagery – dated 16/02/2023).

4.2 **Tree population**

Seventy two (72) tree features were recorded in total including 71 individual trees and 1 tree group comprising 21 regularly spaced trees growing adjacent to the northern perimeter fence.

4.3 Twenty four (24) different species were identified as indicated below in Table 2.

Table 2: Tree species and origins

Botanic name	Common Name	Origin	Count	Tree Numbers.
Pyrus calleryana 'Capital'	Capital Callery Pear	Exotic deciduous	12	4, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, Group 1
Eucalyptus leucoxylon 'Rosea'	Pink-flowered Yellow Gum	Australian native	7	2, 61, 63, 64, 66, 68, 70
Lagerstroemia indica	Crape Myrtle	Exotic deciduous	7	5, 6, 39, 40, 41, 42, 43
Grevillea Gaudi Chaudi	Grevillea Grafted Standard	Australian native	6	50, 51, 52, 53, 55, 56
Pyrus calleryana	Callery's Pear	Exotic deciduous	6	46, 47, 48, 49, 54, 71
Corymbia citriodora	Lemon-scented Gum	Australian native	3	36, 37, 38
Eucalyptus mannifera	Brittle Gum	Australian native	3	17, 18, 19
Eucalyptus sideroxylon	Red Ironbark	Australian native	3	1, 3, 67
Cercis canadensis	Redbud	Exotic deciduous	2	14, 15
Corymbia maculata	Spotted Gum	Victorian native	2	13, 23
Eucalyptus leucoxylon subsp. *pruinosa*	Inland Blue Gum	Australian native	2	60, 62
Fraxinus angustifolia	Narrow-leaved Ash	Exotic deciduous	2	34, 35
Hymenosporum flavum	Native Frangipani	Australian native	2	11, 12
Melaleuca armillaris	Bracelet Honey-myrtle	Victorian native	2	57, 58
Pittosporum tenuifolium	Kohuhu	Exotic evergreen	2	9, 10
Platycladus orientalis	Bookleaf Cypress	Exotic conifer	2	7, 8
Prunus persica	Peach	Exotic deciduous	2	32, 33
Acacia longifolia	Sallow Wattle	Victorian native	1	16
Agonis flexuosa	Willow Myrtle	Australian native	1	45
Callistemon salignus	Willow Bottlebrush	Australian native	1	59
Eucalyptus cladocalyx	Sugar Gum	Australian native	1	65
Eucalyptus sp.	Gum Tree	Australian native	1	69
Olea europaea	Olive	Exotic evergreen	1	44
Prunus cerasifera	Cherry-plum	Exotic deciduous	1	31

4.4 **Tree Origin**

Based on observations of the variety of species, age class and general spatial arrangement within of the site it is apparent that all trees are introduced specimens of native and exotic species planted for amenity and garden purposes.

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

- 67 trees displayed Fair or better health condition.
- 3 trees displayed Fair to Poor health indicated by reduced foliage density or dieback.
- 2 trees displayed Poor Health with suckering regrowth.

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

- 65 trees displayed Fair and acceptable structural condition.
- 5 trees displayed Fair to Poor structural condition due to included bark forks, past failures, suckering or dieback.

  In particular, Tree 67, Red Ironbark, displays co-dominant stems with over-extended limbs developing to the east and has several bracing cables. This tree needs to be pruned for weight reduction and to reduce lesser co-dominant stems. The cables must also be adjusted.
- 2 trees displayed Poor structural condition being self sown or strump resprouts.

4.7 **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

Arboricultural rating	Count	Tree Numbers
Moderate A	1	1
Moderate B	16	2, 3, 13, 23, 34, 35, 45, 60, 61, 62, 63, 64, 65, 67, 70, 71
Moderate C	50	4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 31, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 66, 68, Group 1
	5	16, 30, 32, 33, 69
Total	72	

- Red Ironbark street tree number 1 is rated Moderate A being a prominent tree in better than typical condition for the species and highly desirable to retain.
- Trees rated Moderate B are generally typical of the species growing in this area under prevailing conditions and are deemed suitable to retain in conjunction with development where possible.
- Trees rated Moderate C are either established smaller trees of Fair condition or maturing trees that might be accumulating defects and trending towards becoming of Low arboricultural value.
- Low rated trees are an established resource of generally low condition that may be retained if not requiring dispropotionate expenditure of resources to maintain.

4.8 The majority of trees have medium to long useful life expectancies of between 15 to 40 years with periodic inspection and maintenance as required.

4.9 Work recommendations have been provided for four (4) trees that were identified as having structural deficiencies that require remedial pruning including weight reduction, reduction of over-extended limbs and adjustment to existing bracing cables. They are Trees 38, 61, 64 and 67.

4.10 In summary, the majority of the trees associated with the school grounds are of Moderate quality that can be sustained for several decades in the current locations and set out with periodic inspection and maintenance as required.

4.11 Refer to Section 5 – Tree Protection Zones establishment and guidelines. 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

Tree roots typically develop as larger woody roots radiating from the trunk base before gradually reducing and branching out towards the canopy dripline. The roots predominantly are shallow and exist within the upper 150 mm to 500mm where the essential elements of water and air are most abundant. Hence the tree root zone is frequently referred to as a 'Root Plate'.

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.

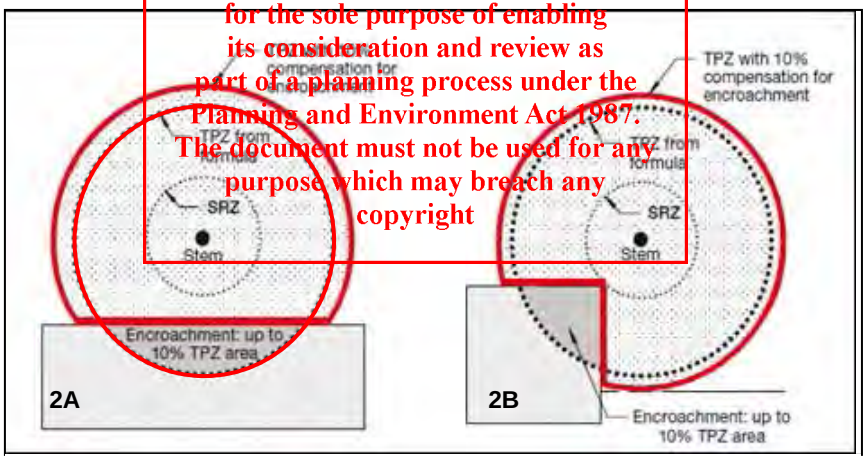

Figure 2: 2A & 2B - Examples of minor encroachment into a TPZ.

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 considerations

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
- Minimize damage to the subject trees
- Replace the subject trees and improve the landscape (as a last resort).

Retention suitability will be dependent on the proposed landscape setting in which trees are intended to be retained. The following recommendations are provided for consideration in the design process.

- On the basis of future site safety and potential amenity, preference should be given to retaining trees of High and Moderate arboricultural value in built areas, or areas of increased target potential.
- Small trees of Low arboricultural value that are otherwise in reasonable condition (Fair-poor or better Health and /or Structure) may offer a potential established tree resource, even if only as an interim measure.
- Trees of Low arboricultural value should not compromise reasonable design intent.
- Low rated trees with health or structural deficiencies (Poor or worse Health and/or Structure) or trees recognized as environmental weed species should generally be considered for removal based on sound arboricultural opinion.
- Trees attributed and arboricultural rating of Very Low are not suitable to retain and should be removed.
- Trees under third party ownership such as street trees must be duly protected unless the council, tree owner or manager of the tree authorises works to occur to the tree or within the TPZ.

At the time of preparing the tree impact assessment report, plans for new works were provided that indicate new car parks, play and sporting facilities and new buildings with extensive new plantings around these new facilities. They include

- XLA_St Carlo_L_Tree Retention / Removal Plan (Dwg No: L101. Date: 1/6/23)
- XLA_St Carlo_Stage B_2023_08_01_Trees (planting plan)

Percieved impacts associated with these various works are identified below.

6.1 Thirty two (32) trees can be excluded from the area identified as the Edge of Works (EoW) and can be successfully retained.

6.2 Forty (40) trees are potentially impacted by the EoW with;

- the TPZ of 3 trees extending into the EOW,
- the SRZ of two (2) trees extending into the EoW and
- twenty four (24) trees being within the EoW.

6.3 Of the trees impacted by the EoW, several trees can be successfully excluded from potential impacts by establishing TPZ fencing panels around the trees to exclude or minimise any potential construction impacts from affecting the trees. Of the trees affected by the EoW;

6.5.1 Seven (7) trees can be entirely fenced to exclude all potential construction impacts. They are Trees 1, 2, 4, 5, 6, 59 and 66.

6.5.2 The TPZs of seven (7) trees extend into the construction impact zone and will need to be protected with TPZ fencing up the extent of the actual construction footprint. i.e.

- The TPZ for council's street tree, Tree 3, must be fenced up to the extent of the car park to prevent any works extending more that 10% of the 7.7 metre TPZ radius (i.e no closer than 5.4 metres from the centre of the tree.)
  Excavation works, dumping of spoil or machine operation must not between the boundary fence and the edge of the car park.
- Small Tree 42 can be retained with TPZ fencing to edge of works.
- The TPZ for Trees 57 & 58 already have the covered play area within the TPZ area. The TPZ must be fenced to the edged of the existing covered play area and back to the boundary fence.
- The TPZs for Trees 64, 65 and 67 must be fenced to the edge of the new playing courts and back to the boundary.

6.5.3 The SRZ of two (2) trees extend into the construction impact zone.

- Small Tree 43 can be transplanted if required.
- Tree 63 is idenitified for removal.

6.5.4 Twenty four (24) trees exist within the construction impact zones and cannot be sustained. They are indicated as being removed.

Refer to Table 4 for tree numbers sorted by construction impacts and tree removal / retention intent.

Impact	Action	Count	Tree numbers
None	Establish exclusion fencing to all trees	39	1, 2, 4, 5, 6, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 59, 66, Group 1
TPZ	Establish TPZ fencing at edge of works	7	3, 42, 57, 58, 64, 65, 67
SRZ	Unsustainable -To be removed	2	43 (can be transplanted), 63 (to be removed)
Within	To be removed	24	7, 8, 9, 10, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 60, 61, 62, 68, 69, 70, 71

6.4 Ninety (90) new advanced trees are proposed to be planted in conjunction with the current design proposal.

6.5 No permit is required to remove the indicated trees under any local law, environmental overlay or under Native Vegetation - Clause 52.17.

6.6 All 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. Appropriate tree protection fencing must be established and maintained around all trees to be retained.
Refer to Appendix 2B for Design Proposal and TPZ fencing plan.

6.7 Where the trees exist in adjacent properties the part of the TPZ that exists within the subject site must still be protected to avoid adversely affecting the tree or compacting the soil within the root zone of neighbour's trees.
Appropriate ground buffering materials should be installed on the TPZ area that extends into the subject site to prevent root damage and soil compaction.

6.8 No form of excavation or trenching for installation of underground services is permitted within the nominated TPZ areas of any retained trees without prior consultation with the council and / or site arborist, to avoid or minimise severing roots that could be vital to the continued sustainability and stability of the retained trees.

6.9 Design should ensure appropriate growing space is allocated for all trees that are to be retained. If infrastructure is constructed too close to any of the retained trees, there is potential for damage to occur resulting from incremental root growth.
Damage to paving from root activity is most likely to occur within 2 m of the trunk base of a tree where the large woody structural root zone may contributes to upheaval. It is recommended that a minimum 2 metre clearance is provided from any tree to any hard paved surface.

6.10 TPZs for council street trees should be fenced to the back of kerb, edge of the foot path and the radial distance of the TPZ within the nature strip to prevent storage of materials or spoil or vehicular access damaging the trees or compacting soil within the TPZ.
The TPZ fencing should not hinder pedestrian access unless an alternative arrangement has been approved by the relevant authorities.

All TPZ and SRZ radius distances are provided in Appendix 1 as well as percieved tree impacts.

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 2 metre tall star pickets at 2 metre spacing with top wire supporting fluro para-webbing.
Whichever TPZ fencing is used, it must be sufficiently robust to withstand knocks and bumps from plant and machinery, delivery vehicles and effectively exclude or prevent any storage of materials dumping of spoil or waste products being disposed of in the Tree Protection Zone.

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 fencing example.

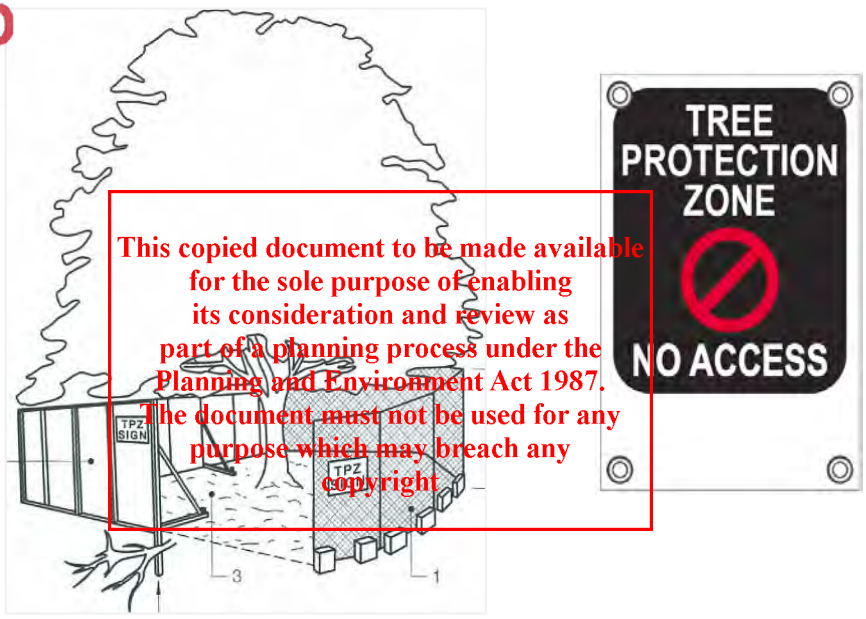

Figure 1. Above left - Example of TPZ fencing above right -Example of TPZ signage.

7.6 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 unless specified by design & project arborist.
- 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 unless specified by design & project arborist.

7.7 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.

7.8 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, seventy two (72) tree features were assessed within the defined study area comprising 71 individual trees and 1 group of semi-mature trees.

8.2 Twenty four (24) different tree species were identified comprising a selection of native and exotic species planted for amenity and street tree purposes.
Refer to Table 2 in Section 4 for indication of species diversity and origin.

8.3 No specific tree permit conditions apply to the trees under the City of Hume planning overlays or Tree Protection Local Law.

- All street trees should be appropriately protected to ensure they remain viable during and post any proposed construction works.

8.4 The trees generally displayed health and structural conditions considered to be typical for the species and age class growing in this area under prevailing conditions.

8.5 Each tree feature was attributed an arboricultural rating which reflects the retention value of the trees. In general, the majority of the tree population was considered to be appropriate to site and worthy of retention and protection in conjunction with the growth of the school.
Refer to Table 3 - Section 4.7 for tree numbers sorted by arboricultural rating.

8.6 The preliminary tree 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 the proposed site redevelopment.

- At the time of preparing the tree impact assessment report, plans for new works were provided that indicate new car parks, play and sporting facilities and new buildings with extensive new plantings around these new facilities. (Refer to *XLA_St Carlo_L_Tree Retention / Removal Plan (Dwg No: L101. Date: 1/6/23*).

8.7 Perceived impacts associated with these various works are identified in Table 4 at Section 6 – Design Review. Planners and designers must allocate sufficient space to appropriately protect trees that are to be retained in conjunction with the design proposal.

- Of particular note is the car park in relation to council managed street tree, Tree 3. TPZ fencing must be established at the edge of the car park foot print and not exceed 10% of the recommended 7.7 metre TPZ radius (i.e no closer than 5.4 metres from the centre of the tree.) Excavation works, dumping of spoil or machine operation must not between the boundary fence and the edge of the car park.

8.8 In summary,

- Twenty six (26) trees are indicated to be removed, the majority of which are relatively small trees planted in conjunction with recent school upgrade and expansion works.
- No permit is required to remove these trees under any local law, environmental overlay or under Native Vegetation - Clause 52.17.
- Ninety (90) new advanced trees are proposed to be planted in conjunction with the current design proposal.

8.9 Any trees that are to be retained in the vicinity of any proposed works will require Tree Protection Zone measures to be implemented prior to commencing any works onsite including demolition, bulk earthworks, trenching, construction, landscaping activity, delivery and storage of materials or placement of site sheds. Further recommendations and guidelines on TPZ establishment and management are provided in Section 6 and Appendix 4

8.10 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. All contractors must observe and comply with the requirements of tree protection zone establishment and maintenance as described in Appendix 4 for the duration of the redevelopment project.

8.11 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.

Signed

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Appendix 1: Tree Assessment Data: St Carlo Borromeo PS

Refer to following 3 pages

Key: DBH = Diameter measured in centimetres at breast height (1.4m up trunk) unless otherwise indicated.

Arb. Rating = Arboricultural Rating.

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.

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	EoW impact	Construction impact_desc	Impact	% TPZ_impact
1	*Eucalyptus sideroxylon*	Red Ironbark	Early-mature	Australian native	55	8	10	Good	Fair	Mod.A	21-40 y	Street tree.	6.6	2.5	TPZ	NA	None	0
2	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Early-mature	Australian native	15,13,13 @0.8m	4	5	Fair	Fair	Mod.B	21-40 y	Street tree.	2.8	1.8	TPZ	NA	None	0
3	*Eucalyptus sideroxylon*	Red Ironbark	Early-mature	Australian native	64	15	13	Fair	Fair	Mod.B	21-40 y	Street tree, over-extended limbs developing-. East.	7.7	3	SRZ	carpark - 9.15%	TPZ	10.32
4	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Young	Exotic deciduous	7	2	1	Fair	Fair	Mod.C	21-40 y	Street tree.	2	1.5	SRZ	NA	None	0
5	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y	5.39	2	1.5	Within	NA	None	0
6	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	Within	NA	None	0
7	*Platycladus orientalis*	Bookleaf Cypress	Semi-mature	Exotic conifer	6	2	1	Fair	Fair	Mod.C	21-40 y		2	1.5	Within	New works - 87.8% / (Non-Contiguous Areas: New works - 12.2%)	Within	100.01
8	*Platycladus orientalis*	Bookleaf Cypress	Semi-mature	Exotic conifer	6	2	1	Fair	Fair	Mod.C	21-40 y		2	1.5	Within	New works - 92.69%	Within	92.69
9	*Pittosporum tenuifolium*	Kohuhu	Semi-mature	Exotic evergreen	9	2	1	Fair	Fair	Mod.C	11-20 y	Hedged.	2	1.5	Within	New works - 92.96%	Within	92.96
10	*Pittosporum tenuifolium*	Kohuhu	Semi-mature	Exotic evergreen	9	2	1	Fair	Fair	Mod.C	11-20 y	Hedged.	2	1.5	Within	New works - 92.76%	Within	92.76
11	*Hymenosporum flavum*	Native Frangipani	Semi-mature	Australian native	7	3	3	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
12	*Hymenosporum flavum*	Native Frangipani	Semi-mature	Australian native	7	4	3	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
13	*Corymbia maculata*	Spotted Gum	Semi-mature	Victorian native	21	8	5	Fair	Fair	Mod.C	21-40 y		2.5	1.9	#N/A	NA	None	0
14	*Cercis canadensis*	Redbud	Semi-mature	Exotic deciduous	7	3	3	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
15	*Cercis canadensis*	Redbud	Semi-mature	Exotic deciduous	7	3	3	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
16	*Acacia longifolia*	Sallow Wattle	Semi-mature	Victorian native	3	4	2	Fair	Fair to Poor	Low	1-5 y	Canopy touching wall.	2	1.5	#N/A	NA	None	0
17	*Eucalyptus mannifera*	Brittle Gum	Semi-mature	Australian native	16	5	3	Fair	Fair	Mod.C	11-20 y	Canopy close to gutter.	2	1.7	#N/A	NA	None	0
18	*Eucalyptus mannifera*	Brittle Gum	Young	Australian native	7	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
19	*Eucalyptus mannifera*	Brittle Gum	Semi-mature	Australian native	8	4	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
20	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Semi-mature	Exotic deciduous	9	4	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
21	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Semi-mature	Exotic deciduous	9	4	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
22	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Semi-mature	Exotic deciduous	10	4	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
23	*Corymbia maculata*	Spotted Gum	Early-mature	Victorian native	27	10	6	Fair	Fair	Mod.B	21-40 y		3.2	2.1	#N/A	NA	None	0
24	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Early-mature	Exotic deciduous	8	7	2	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
25	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Early-mature	Exotic deciduous	8	7	2	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
26	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Early-mature	Exotic deciduous	6	7	2	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
27	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Early-mature	Exotic deciduous	6	7	2	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
28	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Early-mature	Exotic deciduous	6	7	2	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
29	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Semi-mature	Exotic deciduous	6	7	2	Fair	Fair	Mod.C	11-20 y		2	1.5	#N/A	NA	None	0
30	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Semi-mature	Exotic deciduous	6	5	2	Fair to Poor	Fair to Poor	Low	6-10 y	Suckering.	2	1.5	#N/A	NA	None	0
31	*Prunus cerasifera*	Cherry-plum	Semi-mature	Exotic deciduous	12	7	3	Fair	Fair	Mod.C	11-20 y	Woody weed sp	2	1.5	#N/A	NA	None	0

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	EoW impact	Construction impact_desc	Impact	% TPZ_impact
32	*Prunus persica*	Peach	Semi-mature	Exotic deciduous	4	3	1	Poor	Poor	Low	1-5 y		2	1.5	#N/A	NA	None	0
33	*Prunus persica*	Peach	Semi-mature	Exotic deciduous	5	3	2	Fair to Poor	Fair to Poor	Low	6-10 y		2	1.5	#N/A	NA	None	0
34	*Fraxinus angustifolia*	Narrow-leaved Ash	Maturing	Exotic deciduous	35 @<=0.5m	7	7	Fair	Fair	Mod.B	11-20 y		4.2	2.1	#N/A	NA	None	0
35	*Fraxinus angustifolia*	Narrow-leaved Ash	Maturing	Exotic deciduous	24	7	7	Fair	Fair	Mod.B	11-20 y	Woody weed sp Canopy over roof.	2.9	2.1	#N/A	NA	None	0
36	*Corymbia citriodora*	Lemon-scented Gum	Semi-mature	Australian native	7	6	3	Fair	Fair	Mod.C	21-40 y	Tree 1m away from the building, potential risks in the future.	2	1.5	#N/A	NA	None	0
37	*Corymbia citriodora*	Lemon-scented Gum	Semi-mature	Australian native	4	4	2	Fair to Poor	Fair	Mod.C	11-20 y	Tree 1m away from the building, potential risks in the future.	2	1.5	#N/A	NA	None	0
38	*Corymbia citriodora*	Lemon-scented Gum	Semi-mature	Australian native	8	6	3	Fair	Fair	Mod.C	21-40 y	Co-dominant stems. Formative prune to reduce lesser co-dominant stem	2	1.5	#N/A	NA	None	0
39	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
40	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
41	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	#N/A	NA	None	0
42	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	TPZ	New works - 0.6%	TPZ	0.64
43	*Lagerstroemia indica*	Crape Myrtle	Semi-mature	Exotic deciduous	3	3	2	Fair	Fair	Mod.C	21-40 y		2	1.5	SRZ	New works - 37.6%	SRZ	37.68
44	*Olea europaea*	Olive	Maturing	Exotic evergreen	13, 11, 9	4	3	Fair	Fair	Mod.C	11-20 y		2	1.8	Within	New works - 100.01%	Within	99.95
45	*Agonis flexuosa*	Willow Myrtle	Early-mature	Australian native	22,21	5	5	Fair	Fair	Mod.B	11-20 y	Past clearance pruning.	3.6	2.3	Within	New works - 99.99%	Within	77.46
46	*Pyrus calleryana*	Callery's Pear	Maturing	Exotic deciduous	35	6	5	Fair	Fair	Mod.C	11-20 y		4.2	2.3	Within	New works - 100.0%	Within	100
47	*Pyrus calleryana*	Callery's Pear	Early-mature	Exotic deciduous	19	4	4	Fair	Fair	Mod.C	11-20 y	In 1.5m cut-out, canopy just over roof.	2.3	1.8	Within	New landscape - 100.01%	Within	100.01
48	*Pyrus calleryana*	Callery's Pear	Early-mature	Exotic deciduous	19	5	6	Fair	Fair	Mod.C	11-20 y	In 1.5m cut-out, canopy just over roof.	2.3	1.7	Within	New landscape - 99.39%	Within	99.39
49	*Pyrus calleryana*	Callery's Pear	Early-mature	Exotic deciduous	17	5	6	Fair	Fair	Mod.C	11-20 y		2	1.6	Within	New landscape - 100.01%	Within	100.01
50	*Grevillea Gaudi Chaudi*	Grevillea Grafted Standard	Semi-mature	Australian native	8	1	1	Fair	Fair	Mod.C	11-20 y	Standard form shrub.	2	1.5	Within	New landscape - 63.42%	Within	63.42
51	*Grevillea Gaudi Chaudi*	Grevillea Grafted Standard	Semi-mature	Australian native	7	1	1	Fair	Fair	Mod.C	11-20 y	Standard form shrub.	2	1.5	Within	New landscape - 100.01%	Within	100.01
52	*Grevillea Gaudi Chaudi*	Grevillea Grafted Standard	Semi-mature	Australian native	7	1	2	Fair	Fair	Mod.C	11-20 y	Standard form shrub.	2	1.5	Within	New landscape - 99.87%	Within	99.87
53	*Grevillea Gaudi Chaudi*	Grevillea Grafted Standard	Semi-mature	Australian native	7	1	1	Fair	Fair	Mod.C	11-20 y	Standard form shrub.	2	1.5	Within	New landscape - 99.38%	Within	99.38
54	*Pyrus calleryana*	Callery's Pear	Early-mature	Exotic deciduous	16	4	6	Fair	Fair	Mod.C	21-40 y		2	1.7	Within	New landscape - 100.01%	Within	100.01
55	*Grevillea Gaudi Chaudi*	Grevillea Grafted Standard	Semi-mature	Australian native	7	1	1	Fair	Fair	Mod.C	11-20 y	Standard form shrub.	2	1.5	Within	New landscape - 80.03%	Within	80.03
56	*Grevillea Gaudi Chaudi*	Grevillea Grafted Standard	Semi-mature	Australian native	7	1	1	Fair	Fair	Mod.C	11-20 y	Standard form shrub.	2	1.5	Within	New landscape - 79.54%	Within	79.54
57	*Melaleuca armillaris*	Bracelet Honey-myrtle	Maturing	Victorian native	39,35,29	8	11	Fair	Fair to Poor	Mod.C	11-20 y	Past stem failure, over-extended limbs developing-. East over footpath.	7.2	2.8	Within	Existing Covered play area - 13.1%,New landscape - 6.79%	TPZ	19.89
58	*Melaleuca armillaris*	Bracelet Honey-myrtle	Maturing	Victorian native	39	6	9	Fair	Fair	Mod.C	11-20 y	Trunk wounds.	4.7	2.5	Within	Existing Covered play area - 11.54%	TPZ	11.54
59	*Callistemon salignus*	Willow Bottlebrush	Semi-mature	Australian native	11 @0.8m	2	2	Fair	Fair	Mod.C	11-20 y	Shrub.	2	1.5	Within	NA	None	0
60	*Eucalyptus leucoxylon subsp. pruinosa*	Inland Blue Gum	Early-mature	Australian native	24	7	8	Fair	Fair	Mod.B	21-40 y	Over-extended limbs developing-. East over footpath.	2.9	2.3	Within	Playing courts - 65.23%	Within	65.23

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	EoW impact	Construction impact_desc	Impact	% TPZ_impact
61	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Early-mature	Australian native	44 @0.8m	8	10	Fair	Fair	Mod.B	21-40 y	Over-extended limbs developing-. NW towards sand play cover. Prune for Weight reduction, Reduce over-extended branch	5.3	2.5	Within	Playing courts - 75.04%	Within	75.04
62	*Eucalyptus leucoxylon subsp. pruinosa*	Inland Blue Gum	Early-mature	Australian native	29	8	9	Fair	Fair	Mod.B	21-40 y		3.5	2.2	Within	Playing courts - 83.9%	Within	83.9
63	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Maturing	Australian native	23	10	8	Fair	Fair	Mod.B	21-40 y	Past pruning.	2.8	2	Within	Playing courts - 45.07%	SRZ	45.07
64	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Maturing	Australian native	41	14	10	Fair	Fair	Mod.B	21-40 y	Acute forks. Dynamic cable should be installed or remove less co-dominant stem.	4.9	2.5	Within	Playing courts - 0.28%	TPZ	0.28
65	*Eucalyptus cladocalyx*	Sugar Gum	Maturing	Australian native	48	14	15	Fair	Fair	Mod.B	21-40 y		5.8	2.8	Within	Playing courts - 3.92%	TPZ	3.92
66	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Maturing	Australian native	23, 21, 20	8	9	Fair	Fair	Mod.C	21-40 y		4.4	2.4	Within	NA	None	0
67	*Eucalyptus sideroxylon*	Red Ironbark	Maturing	Australian native	62	16	12	Fair	Fair to Poor	Mod.B	21-40 y	Co-dominant stems, over-extended limbs developing-. E, Prune for Weight reduction, Reduce lesser co-dominant stem. Adjust cables	7.4	2.8	Within	New landscape - 1.68%	TPZ	1.68
68	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Maturing	Australian native	18	7	6	Fair	Fair	Mod.C	11-20 y		2.2	1.7	Within	New landscape - 97.81%	Within	97.81
69	*Eucalyptus sp.*	Gum Tree	Maturing	Australian native	2	1	1	Poor	Poor	Low	11-20 y	Stump re-sprout.	2	1.5	Within	New landscape - 100.01%	Within	100.01
70	*Eucalyptus leucoxylon 'Rosea'*	Pink-flowered Yellow Gum	Maturing	Australian native	28	7	6	Fair	Fair	Mod.B	21-40 y		3.4	2.1	Within	New landscape - 100.0%	Within	100
71	*Pyrus calleryana*	Callery's Pear	Maturing	Exotic deciduous	15	6	5	Fair	Fair	Mod.B	11-20 y		2	1.6	Within	New landscape - 100.01%	Within	100.01
Group 1	*Pyrus calleryana 'Capital'*	Capital Callery Pear	Semi-mature	Exotic deciduous	<10	3	2	Fair	Fair	Mod.C	21-40 y	Group of 21 semi mature trees around perimeter fence	2	1.5	#N/A	NA	None	0

Appendix 2A: Tree Location & TPZ Plan: St Carlo Borromeo PS – Existing Conditions

Refer to following page

LEGEND

tl_trees

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

tl_treegrps_traq

- Mod-C
- survey
- roads
- easements
- cadastre

Tree Protection Zone
Structural Root Zone

APPENDIX 2
TREE LOCATIONS AND PROTECTION ZONES

MAP NO. 1 / 1

PROJECT
ST CARLOS BORROMEO CATHOLIC PRIMARY SCHOOL

CLIENT
ST CARLOS BORROMEO CATHOLIC PS

TL REF.
10104

DATE
2023-05-10

DATA SOURCES

TREE LOCATION DISCLAIMER
Tree locations are approximate

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

0 10 20m

TREELOGIC PTY LTD
ABN: 95 080 021 610
TEL: 1300 656 926

4 / 21 Eugene Tce
Ringwood, VIC
Australia 3134

Treelogic
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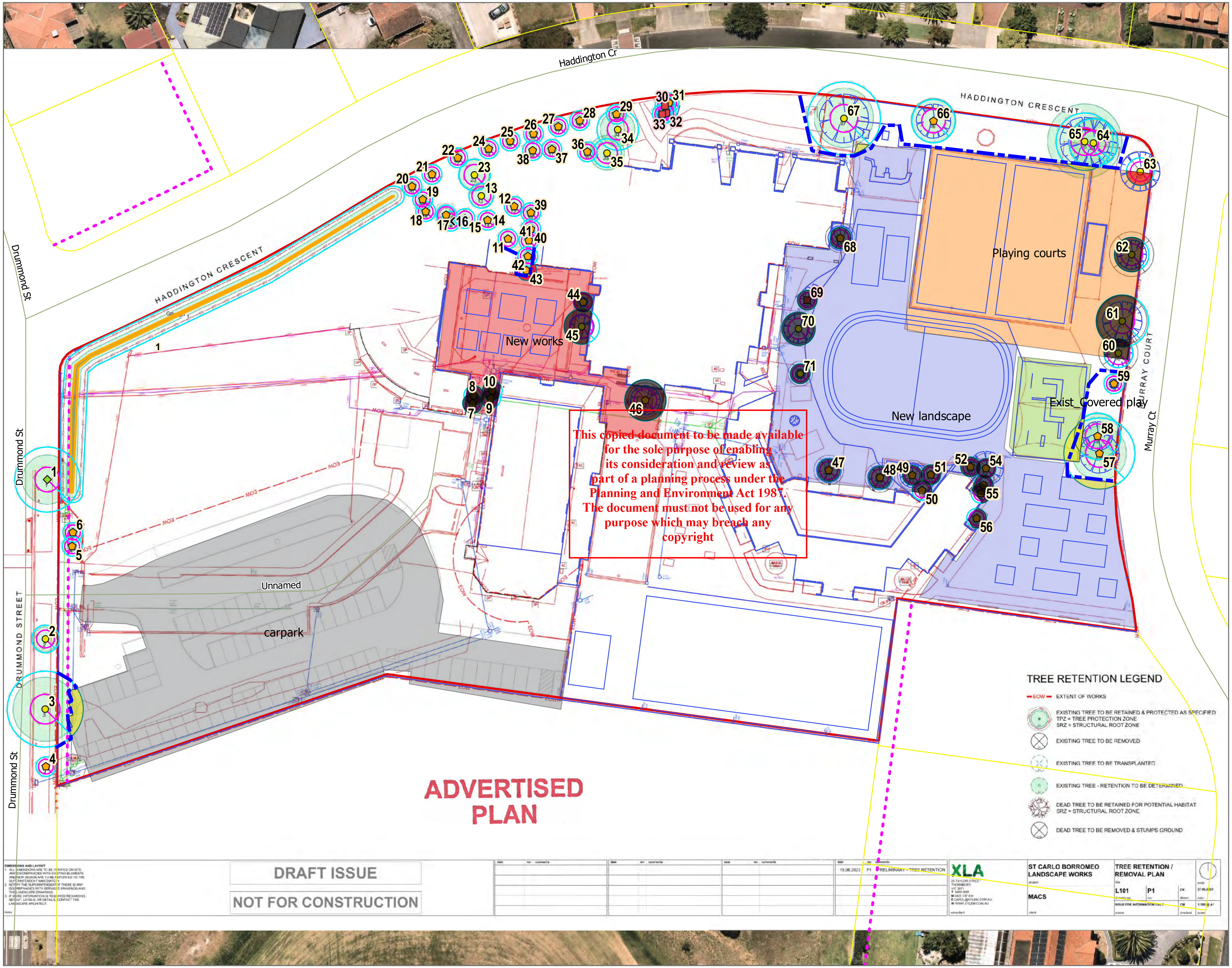
Appendix 2B & C: St Carlo Borromeo PS – TPZ fencing and Construction Impact Plan

Refer to following 2 pages



LEGEND

Trees by Arb rating

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

Grps by Arb rating

- Mod-C

TPZ Impacts

- TPZ - Excude w TPZ fence
- SRZ - To be removed
- Within - To be removed
- TPZ FENCE

Cadastre

- Subject site
- Other
- Easements

Tree Protection Zone
Structural Root Zone

APPENDIX 2B

Tree removal & retention plan

MAP NO. 1 / 1

PROJECT
ST CARLOS BORROMEO CATHOLIC PRIMARY SCHOOL

CLIENT
ST CARLOS BORROMEO CATHOLIC PS

TL REF.
10104

DATE
2023-07-10

DATA SOURCES

TREE LOCATION DISCLAIMER
Tree locations are approximate

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

0 10 20m

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

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LEGEND

Trees by Arb rating
- Mod-A
- Mod-B
- Mod-C
- Low
- Very Low

Grps by Arb rating
- Mod-C
- TPZ FENCE

TPZ Impacts
- TPZ
- SRZ
- Within

Cadastre
- Subject site
- Other
- Easements

Tree Protection Zone
Structural Root Zone

APPENDIX 2C
Design review & TPZ impacts

MAP NO. 1 / 1

PROJECT
ST CARLOS BORROMEO CATHOLIC PRIMARY SCHOOL

CLIENT
ST CARLOS BORROMEO CATHOLIC PS

TL REF.
10104

DATE
2023-07-10

DATA SOURCES

TREE LOCATION DISCLAIMER
Tree locations are approximate

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

0 10 20m

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

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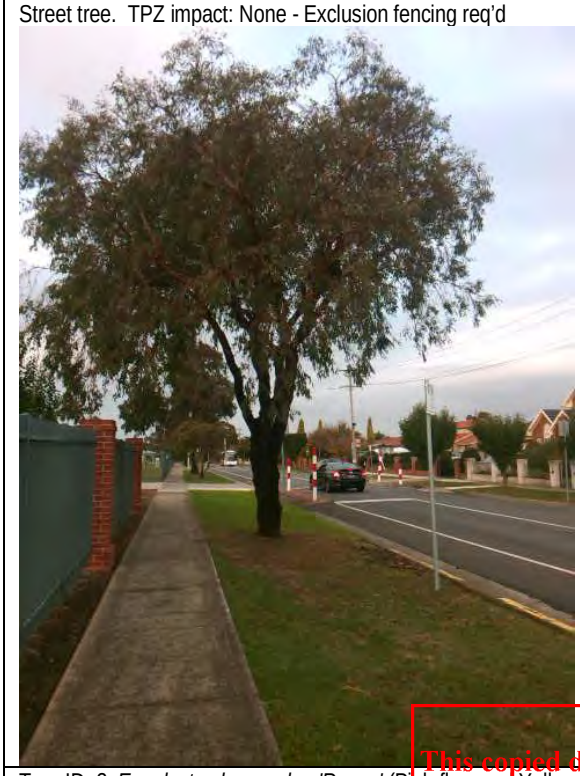
Tree pictures

Tree ID: 1. *Eucalyptus sideroxylon* (Red Ironbark), Early-mature, Australian native. Arb. Rating: Mod.A. DBH: 55 cm. TPZ rad 6.6 m^r. Street tree. TPZ impact: None - Exclusion fencing req'd



Tree ID: 3. *Eucalyptus sideroxylon* (Red Ironbark), Early-mature, Australian native. Arb. Rating: Mod.B. DBH: 64 cm. TPZ rad 7.7 m^r. Street tree, over-extended limbs developing-. East. TPZ impact: TPZ - TPZ fencing req'd to edge of carpark design footprint.

Tree ID: 2. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Early-mature, Australian native. Arb. Rating: Mod.B. DBH: 15,13,13 @0.8m cm. TPZ rad 2.8 m^r. Street tree. TPZ impact: None - Exclusion fencing req'd

Tree ID: 4. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Young, Exotic deciduous. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. Street tree. TPZ impact: None - Exclusion fencing req'd

Tree ID: 5. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 mʳ. 5.39. TPZ impact: None - Exclusion fencing req'd

Tree ID: 6. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 7. *Platycladus orientalis* (Bookleaf Cypress), Semi-mature, Exotic conifer. Arb. Rating: Mod.C. DBH: 6 cm. TPZ rad 2 mʳ. TPZ impact: Within footprint. To be removed.

Tree ID: 8. *Platycladus orientalis* (Bookleaf Cypress), Semi-mature, Exotic conifer. Arb. Rating: Mod.C. DBH: 6 cm. TPZ rad 2 mʳ. TPZ impact: Within footprint. To be removed.

Tree ID: 9. *Pittosporum tenuifolium* (Kohuhu), Semi-mature, Exotic evergreen. Arb. Rating: Mod.C. DBH: 9 cm. TPZ rad 2 m^r. Hedged. TPZ impact: Within footprint. To be removed.

Tree ID: 11. *Hymenosporum flavum* (Native Frangipani), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 10. *Pittosporum tenuifolium* (Kohuhu), Semi-mature, Exotic evergreen. Arb. Rating: Mod.C. DBH: 9 cm. TPZ rad 2 m^r. Hedged. TPZ impact: Within footprint. To be removed.

Tree ID: 12. *Hymenosporum flavum* (Native Frangipani), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 13. *Corymbia maculata* (Spotted Gum), Semi-mature, Victorian native. Arb. Rating: Mod.B. DBH: 21 cm. TPZ rad 2.5 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 15. *Cercis canadensis* (Redbud), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 14. *Cercis canadensis* (Redbud), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 16. *Acacia longifolia* (Sallow Wattle), Semi-mature, Victorian native. Arb. Rating: Low. DBH: 3 cm. TPZ rad 2 m^r. Canopy touching wall. TPZ impact: None - Exclusion fencing req'd

Tree ID: 17. *Eucalyptus mannifera* (Brittle Gum), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 16 cm. TPZ rad 2 m. Canopy close to gutter. TPZ impact: None - Exclusion fencing req'd

Tree ID: 19. *Eucalyptus mannifera* (Brittle Gum), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 8 cm. TPZ rad 2 m. TPZ impact: None - Exclusion fencing req'd

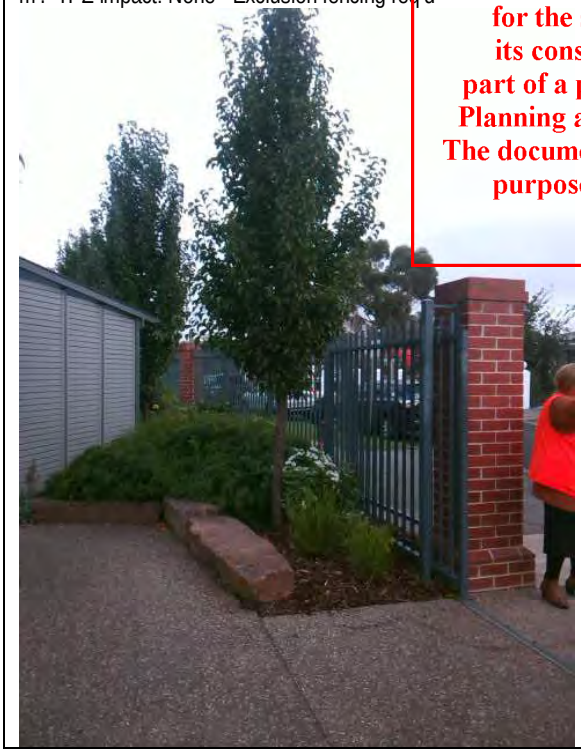
Tree ID: 18. *Eucalyptus mannifera* (Brittle Gum), Young, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m. TPZ impact: None - Exclusion fencing req'd

Tree ID: 20. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 9 cm. TPZ rad 2 m. TPZ impact: None - Exclusion fencing req'd

Tree ID: 21. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 9 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 23. *Corymbia maculata* (Spotted Gum), Early-mature, Victorian native. Arb. Rating: Mod.B. DBH: 27 cm. TPZ rad 3.2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 22. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 10 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd



Tree ID: 24. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 8 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

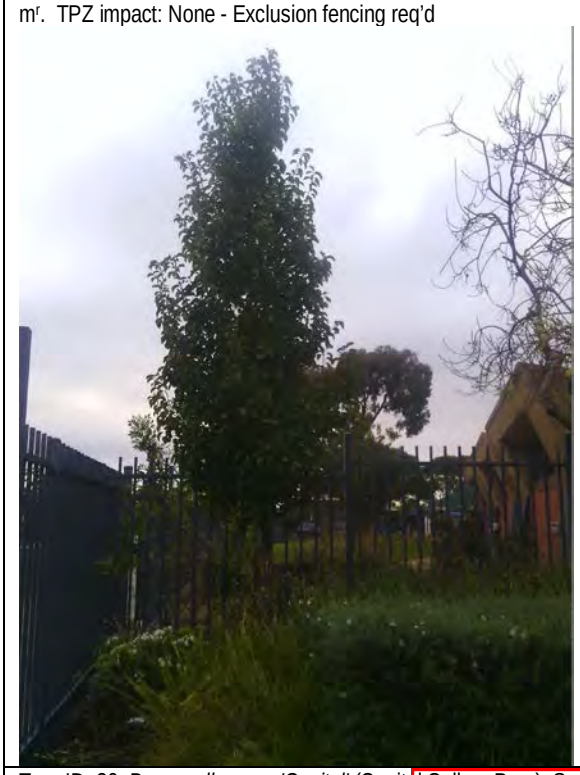
Tree ID: 25. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 8 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 27. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 6 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 26. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 6 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 28. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 6 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 29. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 6 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd



Tree ID: 30. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Semi-mature, Exotic deciduous. Arb. Rating: Low. DBH: 6 cm. TPZ rad 2 mʳ. Suckering. TPZ impact: None - Exclusion fencing req'd

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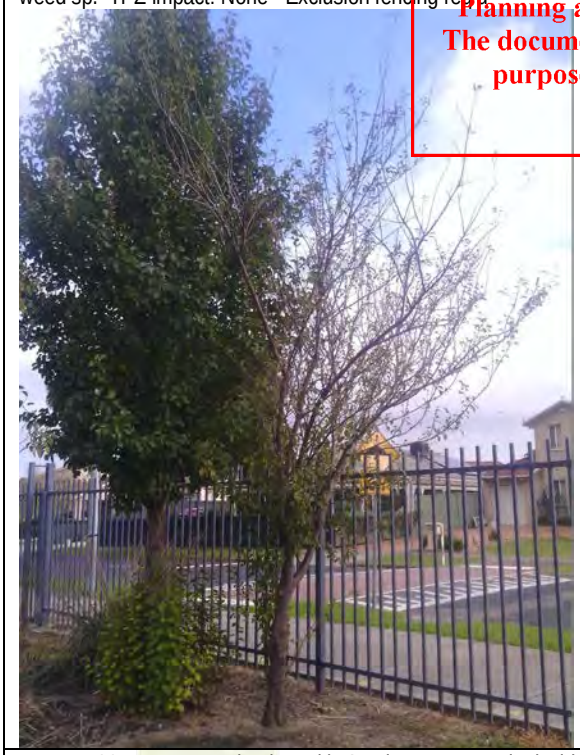
Tree ID: 31. *Prunus cerasifera* (Cherry-plum) Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 12 cm. TPZ rad 2 mʳ. Woody weed sp. TPZ impact: None - Exclusion fencing req'd



Tree ID: 32. *Prunus persica* (Peach), Semi-mature, Exotic deciduous. Arb. Rating: Low. DBH: 4 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

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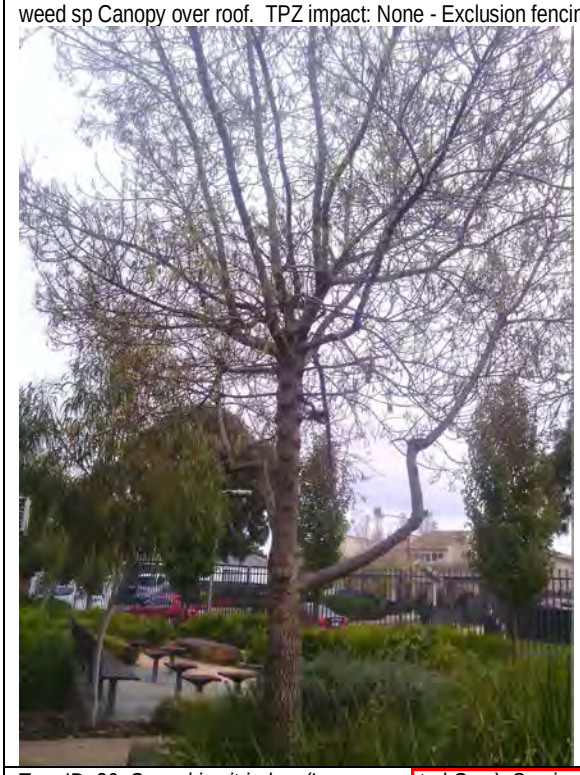
Tree ID: 33. *Prunus persica* (Peach), Semi-mature, Exotic deciduous. Arb. Rating: Low. DBH: 5 cm. TPZ rad 2 mʳ. TPZ impact: None - Exclusion fencing req'd

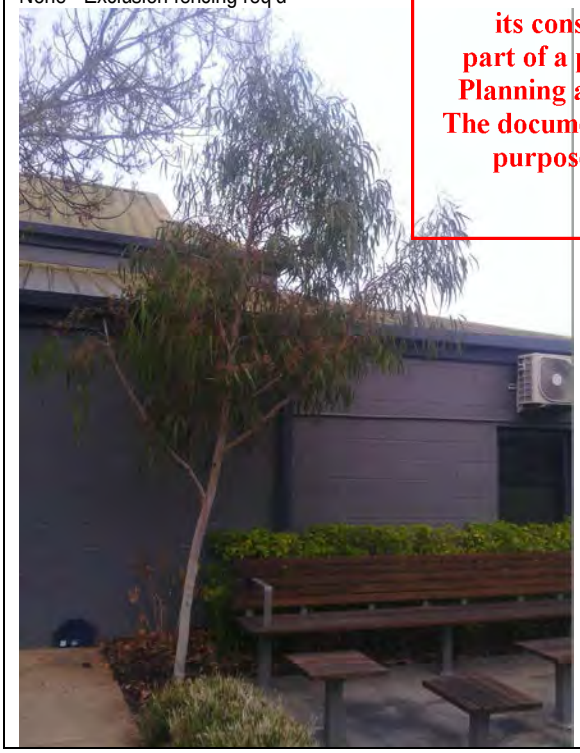
Tree ID: 34. *Fraxinus angustifolia* (Narrow-leaved Ash), Maturing, Exotic deciduous. Arb. Rating: Mod.B. DBH: 35 @<=0.5m cm. TPZ rad 4.2 mʳ. TPZ impact: None - Exclusion fencing req'd

Tree ID: 35. *Fraxinus angustifolia* (Narrow-leaved Ash), Maturing, Exotic deciduous. Arb. Rating: Mod.B. DBH: 24 cm. TPZ rad 2.9 m^r. Woody weed sp Canopy over roof. TPZ impact: None - Exclusion fencing req'd



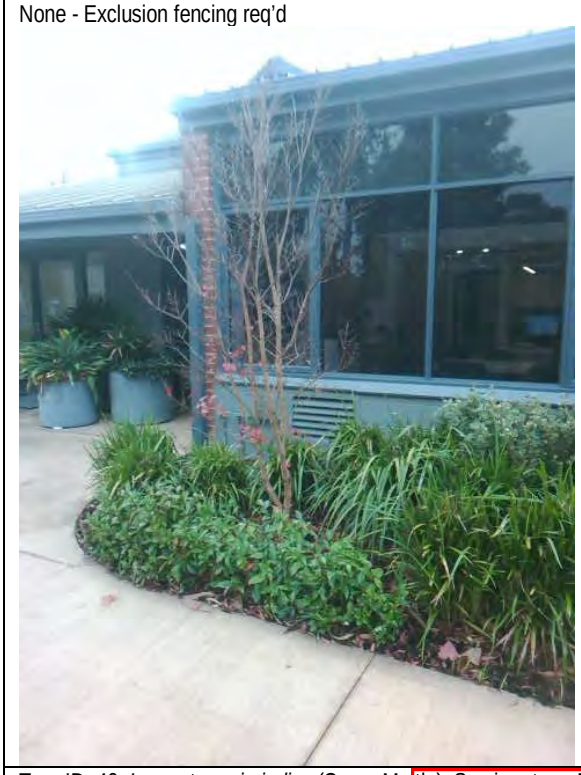
Tree ID: 37. *Corymbia citriodora* (Lemon-scented Gum), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 4 cm. TPZ rad 2 m^r. Tree 1m away from the building, potential risks in the future. TPZ impact: None - Exclusion fencing req'd

Tree ID: 36. *Corymbia citriodora* (Lemon-scented Gum), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. Tree 1m away from the building, potential risks in the future. TPZ impact: None - Exclusion fencing req'd



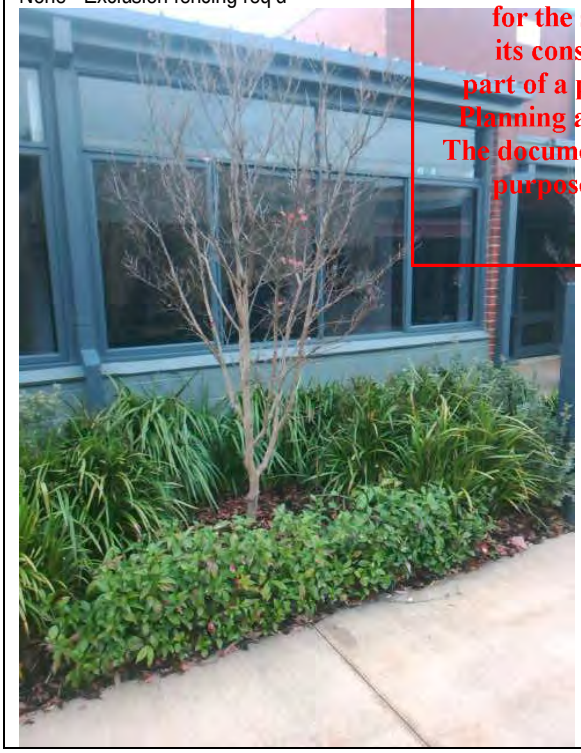
Tree ID: 38. *Corymbia citriodora* (Lemon-scented Gum), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 8 cm. TPZ rad 2 m^r. Co-dominant stems. TPZ impact: None - Exclusion fencing req'd

Tree ID: 39. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd



Tree ID: 41. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 40. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 m^r. TPZ impact: None - Exclusion fencing req'd



Tree ID: 42. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 m^r. TPZ impact: TPZ - TPZ fencing req'd to edge of design footprint.

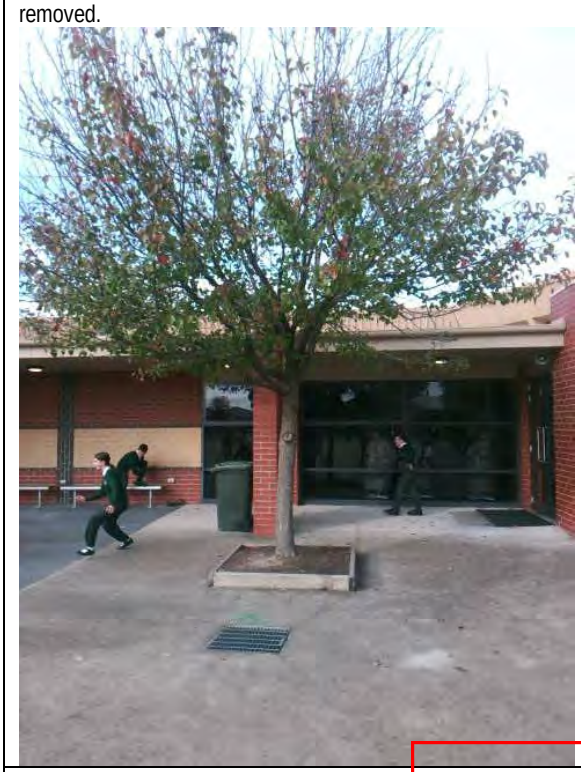
Tree ID: 43. *Lagerstroemia indica* (Crape Myrtle), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 3 cm. TPZ rad 2 mr. TPZ impact: SRZ – May be transplanted or removed.

Tree ID: 45. *Agonis flexuosa* (Willow Myrtle), Early-mature, Australian native. Arb. Rating: Mod.B. DBH: 22,21 cm. TPZ rad 3.6 mr. Past clearance pruning. TPZ impact: Within footprint. To be removed.

Tree ID: 44. *Olea europaea* (Olive), Maturing, Exotic evergreen. Arb. Rating: Mod.C. DBH: 13, 11, 9 cm. TPZ rad 2 mr. TPZ impact: Within footprint. To be removed.

Tree ID: 46. *Pyrus calleryana* (Callery's Pear), Maturing, Exotic deciduous. Arb. Rating: Mod.C. DBH: 35 cm. TPZ rad 4.2 mr. TPZ impact: Within footprint. To be removed.

Tree ID: 47. *Pyrus calleryana* (Callery's Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 19 cm. TPZ rad 2.3 m^{r}. In 1.5m cut-out, canopy just over roof. TPZ impact: Within footprint. To be removed.



Tree ID: 48. *Pyrus calleryana* (Callery's Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 19 cm. TPZ rad 2.8 m^{r}. In 1.5m cut-out, canopy just over roof. TPZ impact: Within footprint. To be removed.

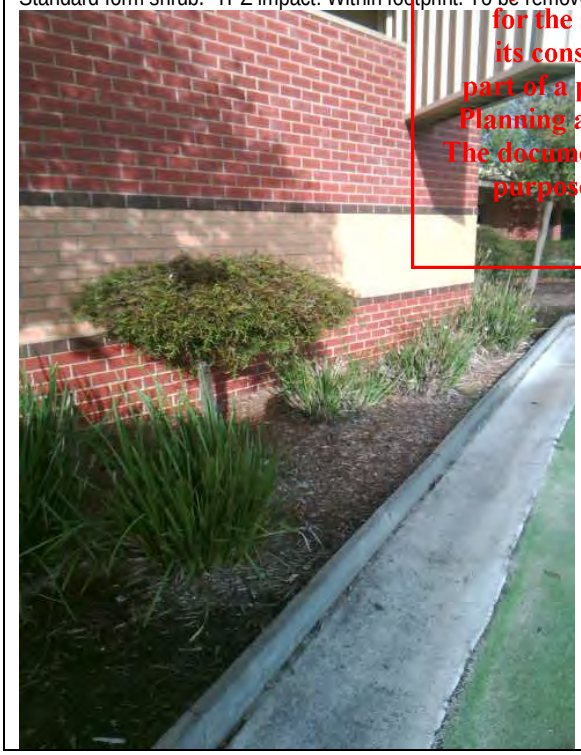
Tree ID: 49. *Pyrus calleryana* (Callery's Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 17 cm. TPZ rad 2 m^{r}. TPZ impact: Within footprint. To be removed.

Tree ID: 50. *Grevillea Gaudi Chaudi* (Grevillea Grafted Standard), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 8 cm. TPZ rad 2 m^{r}. Standard form shrub. TPZ impact: Within footprint. To be removed.

Tree ID: 51. *Grevillea Gaudi Chaudi* (Grevillea Grafted Standard), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. Standard form shrub. TPZ impact: Within footprint. To be removed.

Tree ID: 53. *Grevillea Gaudi Chaudi* (Grevillea Grafted Standard), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. Standard form shrub. TPZ impact: Within footprint. To be removed.

Tree ID: 52. *Grevillea Gaudi Chaudi* (Grevillea Grafted Standard), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m^r. Standard form shrub. TPZ impact: Within footprint. To be removed.



Tree ID: 54. *Pyrus calleryana* (Callery's Pear), Early-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: 16 cm. TPZ rad 2 m^r. TPZ impact: Within footprint. To be removed.

Tree ID: 55. *Grevillea Gaudi Chaudi* (Grevillea Grafted Standard), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m. Standard form shrub. TPZ impact: Within footprint. To be removed.

Tree ID: 56. *Grevillea Gaudi Chaudi* (Grevillea Grafted Standard), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 7 cm. TPZ rad 2 m. Standard form shrub. TPZ impact: Within footprint. To be removed.

Tree ID: 57. *Melaleuca armillaris* (Bracelet Honey-myrtle), Maturing, Victorian native. Arb. Rating: Mod.C. DBH: 39,35,29 cm. TPZ rad 7.2 m. Past stem failure, over-extended limbs developing-. East over footpath. TPZ impact: TPZ - TPZ fencing req'd to edge of design footprint.

Tree ID: 58. *Melaleuca armillaris* (Bracelet Honey-myrtle), Maturing, Victorian native. Arb. Rating: Mod.C. DBH: 39 cm. TPZ rad 4.7 m. Trunk wounds. TPZ impact: TPZ - TPZ fencing req'd to edge of design footprint.

Tree ID: 59. *Callistemon salignus* (Willow Bottlebrush), Semi-mature, Australian native. Arb. Rating: Mod.C. DBH: 11 @0.8m cm. TPZ rad 2 mʳ. Shrub. TPZ impact: None - Exclusion fencing req'd

Tree ID: 61. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Early-mature, Australian native. Arb. Rating: Mod.B. DBH: 44 @0.8m cm. TPZ rad 5.3 mʳ. Over-extended limbs developing-. NW towards sand play cover. TPZ impact: Within footprint. To be removed.

Tree ID: 60. *Eucalyptus leucoxylon subsp. pruinosa* (Inland Blue Gum), Early-mature, Australian native. Arb. Rating: Mod.B. DBH: 24 cm. TPZ rad 2.9 mʳ. Over-extended limbs developing-. East over footpath. TPZ impact: Within footprint. To be removed.

Tree ID: 62. *Eucalyptus leucoxylon subsp. pruinosa* (Inland Blue Gum), Early-mature, Australian native. Arb. Rating: Mod.B. DBH: 29 cm. TPZ rad 3.5 mʳ. TPZ impact: Within footprint. To be removed.

Tree ID: 63. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Maturing, Australian native. Arb. Rating: Mod.B. DBH: 23 cm. TPZ rad 2.8 m^r. Past pruning. TPZ impact: SRZ - to be removed.

Tree ID: 65. *Eucalyptus cladocalyx* (Sugar Gum), Maturing, Australian native. Arb. Rating: Mod.B. DBH: 48 cm. TPZ rad 5.8 m^r. TPZ impact: TPZ - TPZ fencing req'd to edge of design footprint.

Tree ID: 64. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Maturing, Australian native. Arb. Rating: Mod.B. DBH: 41 cm. TPZ rad 4.9 m^r. Acute forks. Dynamic cable should be installed or remove less co-dominant stem. TPZ impact: TPZ - TPZ fencing req'd to edge of design footprint.

Tree ID: 66. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Maturing, Australian native. Arb. Rating: Mod.C. DBH: 23, 21, 20 cm. TPZ rad 4.4 m^r. TPZ impact: None - Exclusion fencing req'd

Tree ID: 67. *Eucalyptus sideroxylon* (Red Ironbark), Maturing, Australian native. Arb. Rating: Mod.B. DBH: 62 cm. TPZ rad 7.4 m^r. Co-dominant stems, over-extended limbs developing-. E, Adjust existing cables . TPZ impact: TPZ - TPZ fencing req'd to edge of design footprint.

Tree ID: 68. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Maturing, Australian native. Arb. Rating: Mod.C. DBH: 18 cm. TPZ rad 2.2 m^r. TPZ impact: Within footprint. To be removed.

Tree ID: 69. *Eucalyptus sp.* (Gum Tree), Maturing, Australian native. Arb. Rating: Low. DBH: 2 cm. TPZ rad 2 m^r. Stump re-sprout. TPZ impact: Within footprint. To be removed.

Tree ID: 70. *Eucalyptus leucoxylon 'Rosea'* (Pink-flowered Yellow Gum), Maturing, Australian native. Arb. Rating: Mod.B. DBH: 28 cm. TPZ rad 3.4 m^r. TPZ impact: Within footprint. To be removed.

Tree ID: 71. *Pyrus calleryana* (Callery's Pear), Maturing, Exotic deciduous. Arb. Rating: Mod.B. DBH: 15 cm. TPZ rad 2 m^{r}. TPZ impact: Within footprint. To be removed.

Tree ID: Group 1. *Pyrus calleryana 'Capital'* (Capital Callery Pear), Semi-mature, Exotic deciduous. Arb. Rating: Mod.C. DBH: <10 cm. TPZ rad 2 m^{r}. Group of 21 semi mature trees around perimeter fence. TPZ impact: None - Exclusion fencing req'd

Appendix 3: Arboricultural Descriptors (June 2018)

Note that not all of the described tree descriptors may be used in a tree assessment and report. The assessment is undertaken with regard to contemporary arboricultural practices and consists of a visual inspection of external and above-ground tree parts.

1. Tree Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen to what could be considered typical for that species growing in its location under current climatic conditions. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the assessor.

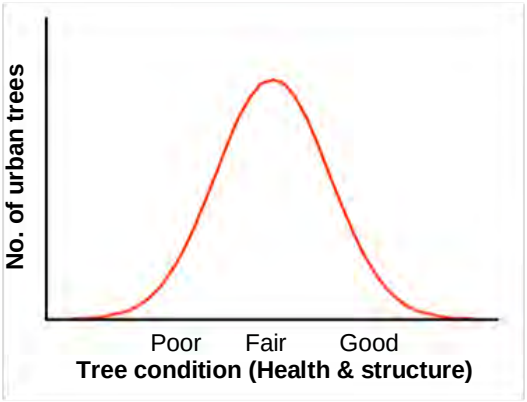


Diagram 1: Indicative normal distribution curve for tree condition

Diagram 1, provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

2. Tree Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

3. Tree Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site. Remnant.
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous (component of EVC benchmark). Could be planted indigenous trees.
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

4. Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with previous height meter readings in conjunction with assessor's experience. Crown widths are generally paced (estimated) at the widest axis or can be measured on two axes and averaged. In some instances the crown width can be measured on the four cardinal direction points (North, South, East and West).

Crown height, crown spread are generally recorded to the nearest half metre (crown spread would be rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m. Estimated dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered) shall be clearly identified in the assessment data.

5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment and an individual trees specific characteristics. DBH is the typical trunk diameter captured as it relates to the allocation of tree protection distances. The basal trunk diameter assists in the allocation of a structural root zone. Some municipalities require trunk diameters be captured at different heights, with 1.0 m above grade being a common requirement. The specific planning schemes will be checked to ascertain requirements.

Stem diameters shall be recorded in centimetres, rounded to the nearest 1 cm (0.01 m).

Diameter at Breast Height (DBH)

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m above the existing ground level or where otherwise indicated, multiple leaders are measured individually. Plants with multiple leader habit may be measured at the base. The range of methods to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of Australian Standard *AS 4970-2009 Protection of trees on development sites*. Measurements undertaken using foresters tape or builders tape.

Basal trunk diameter

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

6. Age class

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

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

7. Health

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

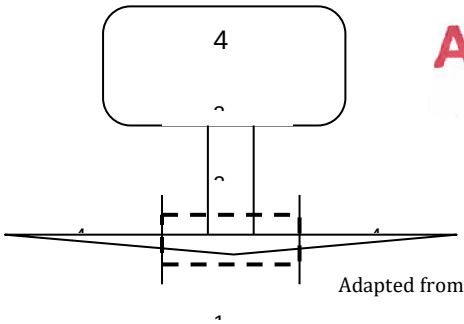
Health Category	Vigour, Extension growth	Decline symptoms, Deadwood, Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical. Excellent. Full canopy density	Negligible	Better than typical	Negligible
Fair	Typical vigour. >80% canopy density	Minor or expected. Little or 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 with 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.

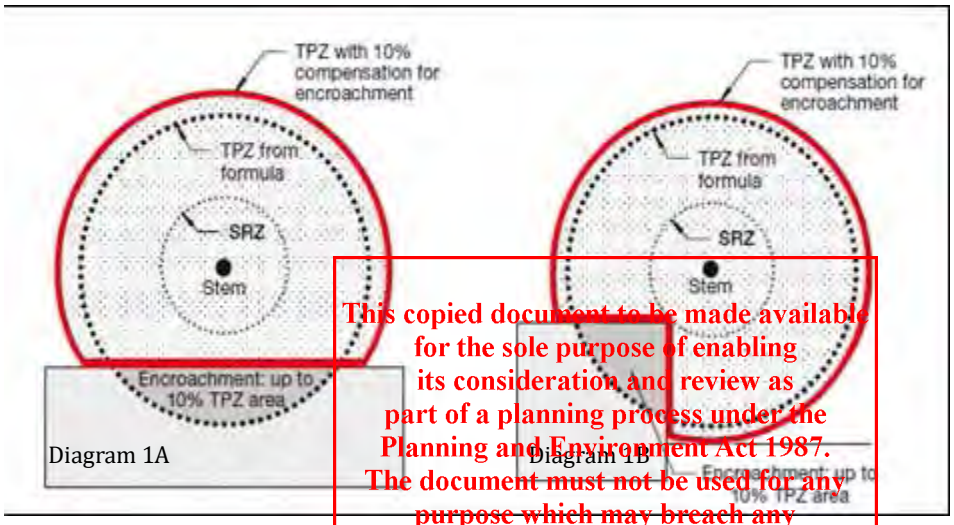


Diagram 1: Examples of minor encroachment into a TPZ.

(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:

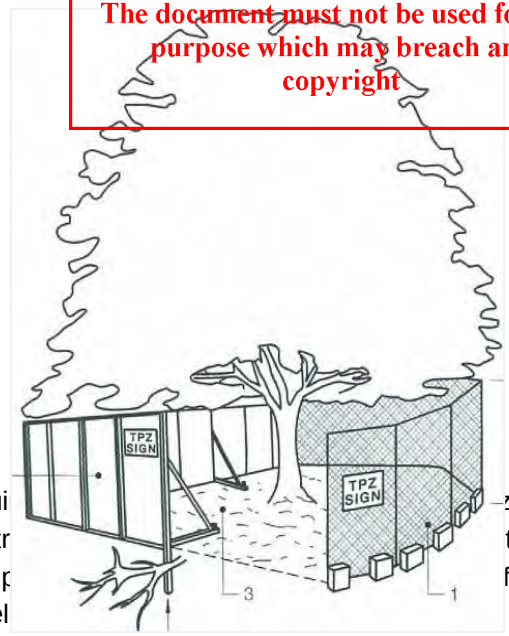
- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is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

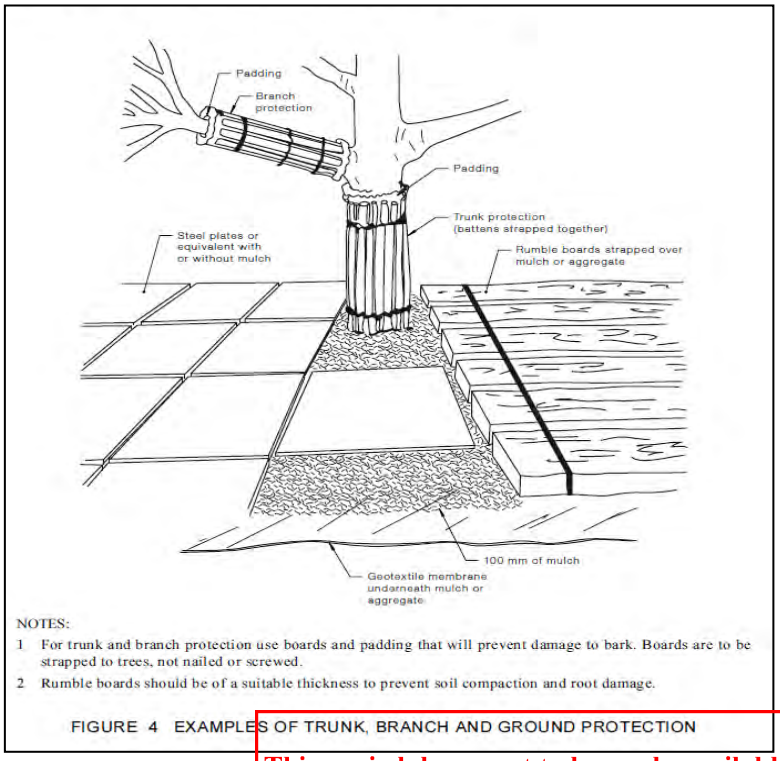


Ground buffering

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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