Eastlakes Shopping Centre (North)

Arboricultural Impact Assessment

Prepared for
Crown Group

7 July 2017

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Contents

Abbreviations

Abbreviation	Description
AIA	Arboricultural Impact Assessment
AQF	Australian Qualifications Framework
AS	Australian Standards
DBH	Diameter at Breast Height
ELA	Eco Logical Australia
HDD	Horizontal Directional Drilling
LGA	Local Government Area
m	Metre
mm	Millimetre
NDE	Non-Destructive Excavation
NO	Number
NSW	New South Wales
SP	Species
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment

1 Background

1.1 Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by Crown Group to prepare an arboricultural impact assessment (AIA) for stage one of the proposed redevelopment of the Eastlakes Town Centre.

The purpose of this report is to:

- Assess the current overall health and condition of the subject trees.
- Evaluate the significance of the subject trees and assess their suitability for retention.
- Provide recommendations for the offsetting and replacement of trees which are unable to be retained.

1.2 The proposal

The key features of the proposed construction works are summarised as follows:

- Relocation of overhead wires along Evans Avenue to below ground, as per consent conditions.
- Demolition of existing buildings and structures.
- Excavation and earthworks for construction of two levels of basement car parking.
- Ground floor development for retail outlets.
- Residential and serviced apartments above retail outlets.
- Associated above and below ground services, drainage and landscaping works.

1.3 The study area

The study area is located within the Local Government Area (LGA) of the Bayside Council. The study area is flanked by Evans Avenue to the south, Gardeners Road to the north and residential apartments to the east and west. A map of the study area is located in **Appendix A**.

1.4 The subject trees

The subject trees were inspected on the 9th March 2017. A total of **5** trees were identified within the study area. Further information, observations and measurements specific to each of the subject trees can be found in **Chapter 3.**

1.5 Documents and plans referenced

The conclusions and recommendations of this report are based on the *Australian Standard, AS 4970-2009, Protection of Trees on Development Sites*, the findings from the site inspections and analysis of the following documents/plans:

- TreeScan: *Arborist Report - Redevelopment of Eastlakes Town Centre,* April 2012.
- Dunlop Thorpe and Co: *Tree Survey Plan.*
- *Botany Bay Development Control Plan 2013*, (Amendment 7); Enforced 25/10/2016.
- *City of Botany Bay Street Tree Master Plan 2014*; Adopted 26 November 2014.
- Turf Design Studio: *Landscape plan*, Drawing No. L-DA-01, 23 June 2016.

2 Method

2.1 Visual tree assessment

The subject trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck & Breloer (1994).

The following limitations apply to this methodology:

- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing
- No aerial inspections or root mapping was undertaken
- Tree heights, canopy spread and diameter at breast height (DBH) was estimated, unless otherwise stated
- Tree identification was based on broad taxonomical features present and visible from ground level at the time of inspection

2.2 Retention value

The retention value of a tree or group of trees is determined using a combination of environmental, cultural, physical and social values.

- **Low:** These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention
- **Medium:** These trees are moderately important for retention. Their removal should only be considered if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted
- **High:** These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by *Australian Standard AS4970 Protection of trees on development sites*.

This tree retention assessment has been undertaken in accordance with the undertaken in accordance with the IACA *Significance of a Tree, Assessment Rating System* (STARS). The subject trees have not been assessed for ecological or environmental value**.** Further details and assessment criteria are in **Appendix F.**

2.3 Protection zones

- **Tree protection zone (TPZ):** The TPZ is the optimal combination of crown and root area (as defined by AS 4970-2009) that requires protection during the construction process so that the tree can remain viable. The TPZ is an area that is isolated from the work zone to insure no disturbance or encroachment occurs into this zone. Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.
- **Structural root zone (SRZ):** The SRZ is the area of the root system (as defined by AS 4970-2009) used for stability, mechanical support and anchorage of the tree. The SRZ is critical for the support and stability of the tree, it provides the bulk of mechanical support and anchorage for a tree. The SRZ only considers a tree's structural stability, not the area of root zone required for long term viability. Severance of structural roots (>50 mmØ) within the SRZ is generally not recommended as it may lead to the destabilisation and/or decline of the tree.
- **Root investigation:** When assessing the potential impacts of encroachment into the TPZ consideration will need to be given to the location and distribution of the roots, including above or below ground restrictions affecting root growth. Location and distribution of roots may be determined through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), air spade and manual excavation. Root investigation is used to determine the extent and location of roots within the zone of conflict. Root investigation does not guarantee the retention of the tree.

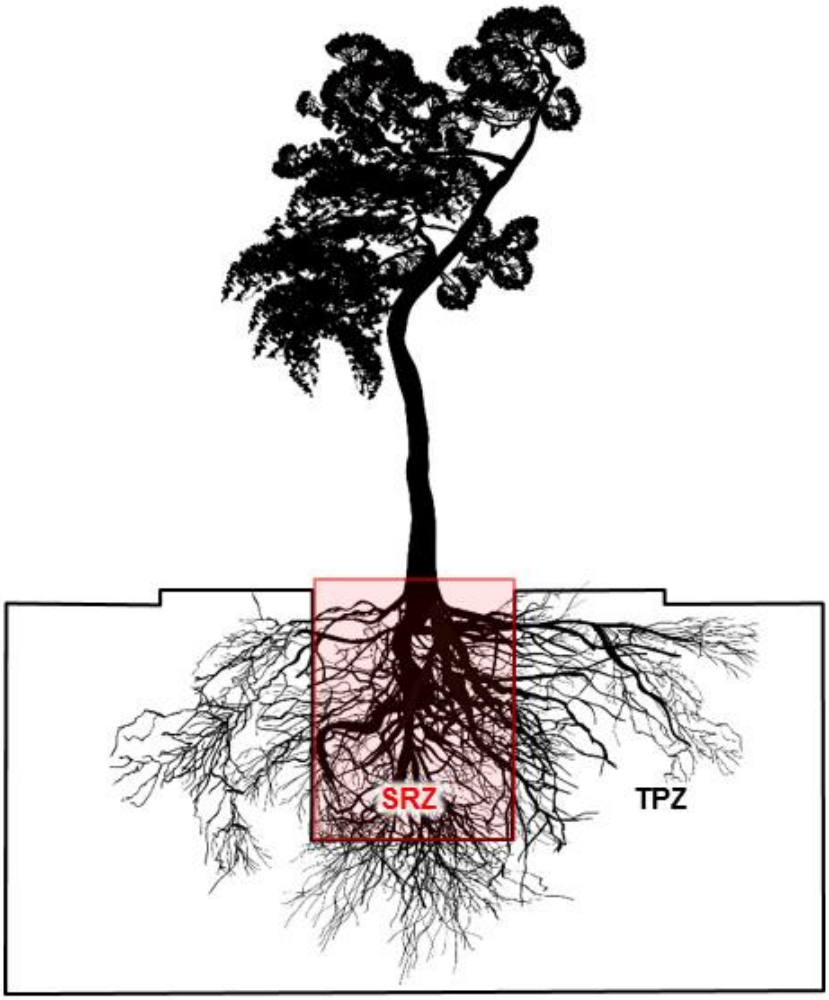


Figure 1: Indicative TPZ and SRZ

2.4 Encroachment within the TPZ

Encroachment includes, but is not limited to excavation, compacted fill, machine trenching, ground penetration, soil disturbance.

- **No encroachment:** The tree is located outside of the proposed footprint and is unlikely to be affected by construction activities.
- **Minor Encroachment:** If the proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere, and be contiguous with the TPZ.
- **Major Encroachment <25%:** If the proposed encroachment is greater than 10% of the TPZ and outside of the SRZ, the project arborist must demonstrate that the tree(s) remain viable. This may require root investigation by non-destructive methods. The area lost to this encroachment should be compensated for elsewhere, and be contiguous with the TPZ.
- **Major Encroachment >25%:** If the proposed encroachment is greater than 25% of the TPZ the SRZ is likely to be impacted and the tree cannot remain viable. Tree sensitive construction techniques may be used for minor works within this area providing no roots (>50 mmØ) are likely to be impacted and the project arborist can demonstrate that the tree(s) remain viable. Root investigation by non-destructive methods is essential for any proposed works within this area.

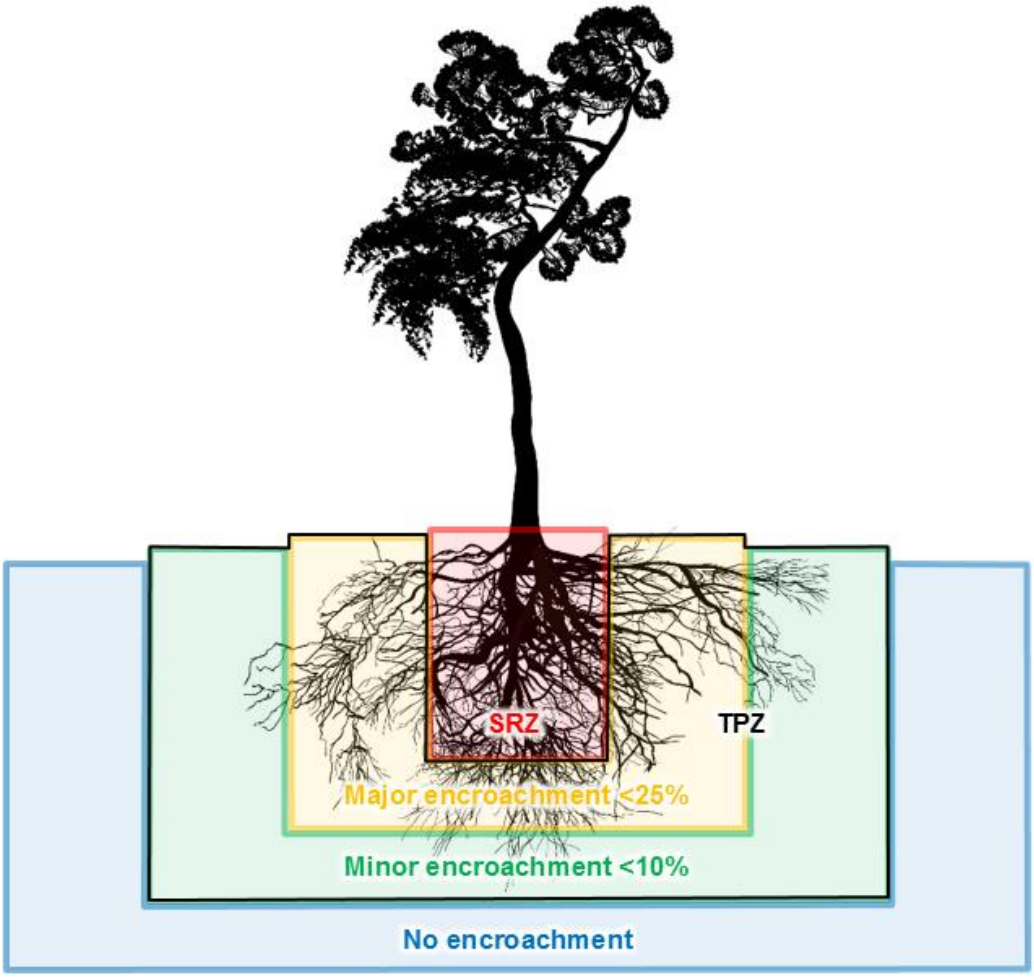


Figure 2: Indicative zones of encroachment within the TPZ

3 Observations

The following observations were made at the time of inspection:

- **Tree 3, 4, 5, 6, 7:** Tree crown has been lopped to maintain powerline clearances, root system is being confined by carpark and footpath, and tree roots are lifting footpath.

4 Results

Table 1 shows the results of the arboriculture assessment. Key points are:

- **Major encroachment (>25%): 5** trees will be subject to a major encroachment (>25%) within the TPZ. Under the current proposal, none of these subject trees will be retained. Trees proposed for removal have the following retention values:
    - **5** trees with a medium retention value.

Table 1: Results of the arboricultural assessment

No.	Botanical Name	Height (m)	Spread (m)	Health	Structure	Retention value	DBH (mm)	TPZ (m)	SRZ (m)	Encroachment into TPZ		Cause of encroachment	Proposal
3	*Platanus x acerifolia*	13	10	Good	Fair	Medium	600	7.2	2.7	**Major**	**100%**	Excavation for basement levels and installation of underground services.	Remove
4	*Platanus x acerifolia*	12	7	Fair	Fair	Medium	450	5.4	2.4	**Major**	**100%**	Excavation for basement levels and installation of underground services.	Remove
5	*Platanus x acerifolia*	15	7	Fair	Fair	Medium	550	6.6	2.6	**Major**	**100%**	Excavation for basement levels and installation of underground services.	Remove
6	*Platanus x acerifolia*	12	7	Fair	Fair	Medium	650	7.8	2.8	**Major**	**100%**	Excavation for basement levels and installation of underground services.	Remove
7	*Platanus x acerifolia*	13	9	Fair	Fair	Medium	600	7.2	2.7	**Major**	**100%**	Excavation for basement levels and installation of underground services.	Remove

5 Recommendations

5.1 Trees proposed for removal

A total of **5** trees cannot be retained under the current proposal:

- **Medium retention value:** A total of **5** trees with a medium retention value cannot be retained under the current proposal. Removal and offset of these trees are recommended.

5.2 Offsetting and tree replacement

Any loss of trees should be offset with replacement planting such that there is a net increase in the number of trees and that there is no net canopy area loss within 5 years of replacement.

Offsetting and tree replacement must be undertaken accordance with *Botany Bay Development Control Plan 2013,* (Amendment 7); Enforced 25/10/2016; Part 3L.4.5 Section C12:

- "If consent is granted for the removal or pruning of a tree, suitable replacement tree/s will be required to be planted on the subject property by the property owner or applicant."
- "Council will stipulate the minimum acceptable replacement tree/s pot size and number of trees and may recommend a suitable species."
- "Replacement trees are to be planted with consideration of the location of boundary fences, walls, pipes and buildings."

5.3 Tree selection and planting

Suitable replacement species selection should be undertaken in consultation with Bayside Council and in accordance with *City of Botany Bay Street Tree Master Plan 2014,* Section 3*.*

Tree replacements are to be a minimum plant container size of 400 litre or above and planted in accordance with the *City of Botany Bay Street Tree Master Plan 2014,* Section 7.3.

Elaeocarpus emundi has been recommended by Turf Design Studio as a replacement species along Gardeners Road and the *Platanus x acerifolia* trees located in the car park area, which have been approved for removal, may be transplanted to replace trees along Evans Avenue.

Costs associated with the replacement and planting of trees will be at the burden of the property owner or applicant.

5.4 Tree establishment, formative pruning and tree management

The relocation of overhead wires to underground, will allow for replacement species to be formatively pruned/managed so as to re-establish an avenue canopy, whilst maintaining the Councils standard pruning clearances. This will also allow re-alignment of trees to suit existing neighbour sites existing tree alignment as shown in **Appendix C.**

The ongoing costs associated with formative pruning and tree management of the replacement trees will be at the burden of the property owner or applicant until appropriate canopy area has been achieved.

All formative pruning should be undertaken in accordance with *City of Botany Bay Street Tree Master Plan 2014,* Section 7.4

5.5 Tree work

- All tree work is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture.
- All tree work must be in accordance with *Australian Standard AS 4373-2007, Pruning of Amenity Trees* and the *NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).*
- Permission must be granted from the relevant consent authority, prior to removing or pruning of any of the subject trees.
- Any trees selected for planting should be in accordance with the *Australian Standard AS2303:2015 Tree stock for landscape*

References

Australian Standard, AS 4373-2007*, Pruning of Amenity Trees*, SAI Global.

Australian Standard, AS 2303:2015, *Tree Stock for Landscape Use*, SAI Global.

Australian Standard, AS 4970-2009, *Protection of Trees on Development Sites*, SAI Global.

Harris, R., Clark, J., Matheny, N. and Harris, V. 2004. *Arboriculture.* Upper Saddle River, N.J.: Prentice Hall.

Institute of Australian Consulting Arboriculturists (IACA) 2010*. IACA Significance of a Tree, Assessment Rating System (STARS)* Australia, www.iaca.org.au

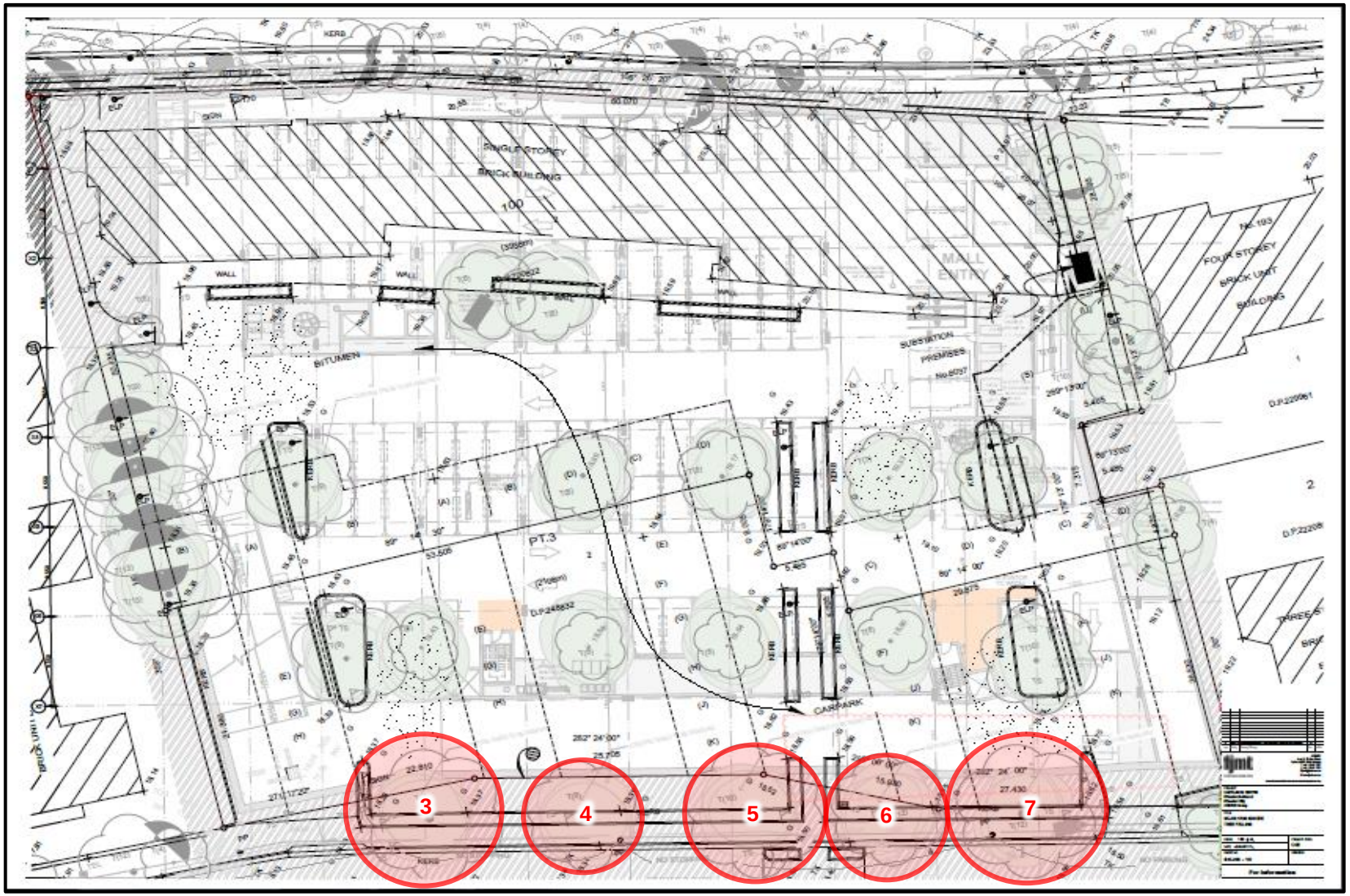
Mattheck, C. 2007. *Updated field guide for visual tree assessment*. Karlsruhe: Forschungszentrum Karlsruhe.

WorkCover NSW. 1998. *Code of Practice: Amenity Tree Industry*

Appendix A - Tree locations

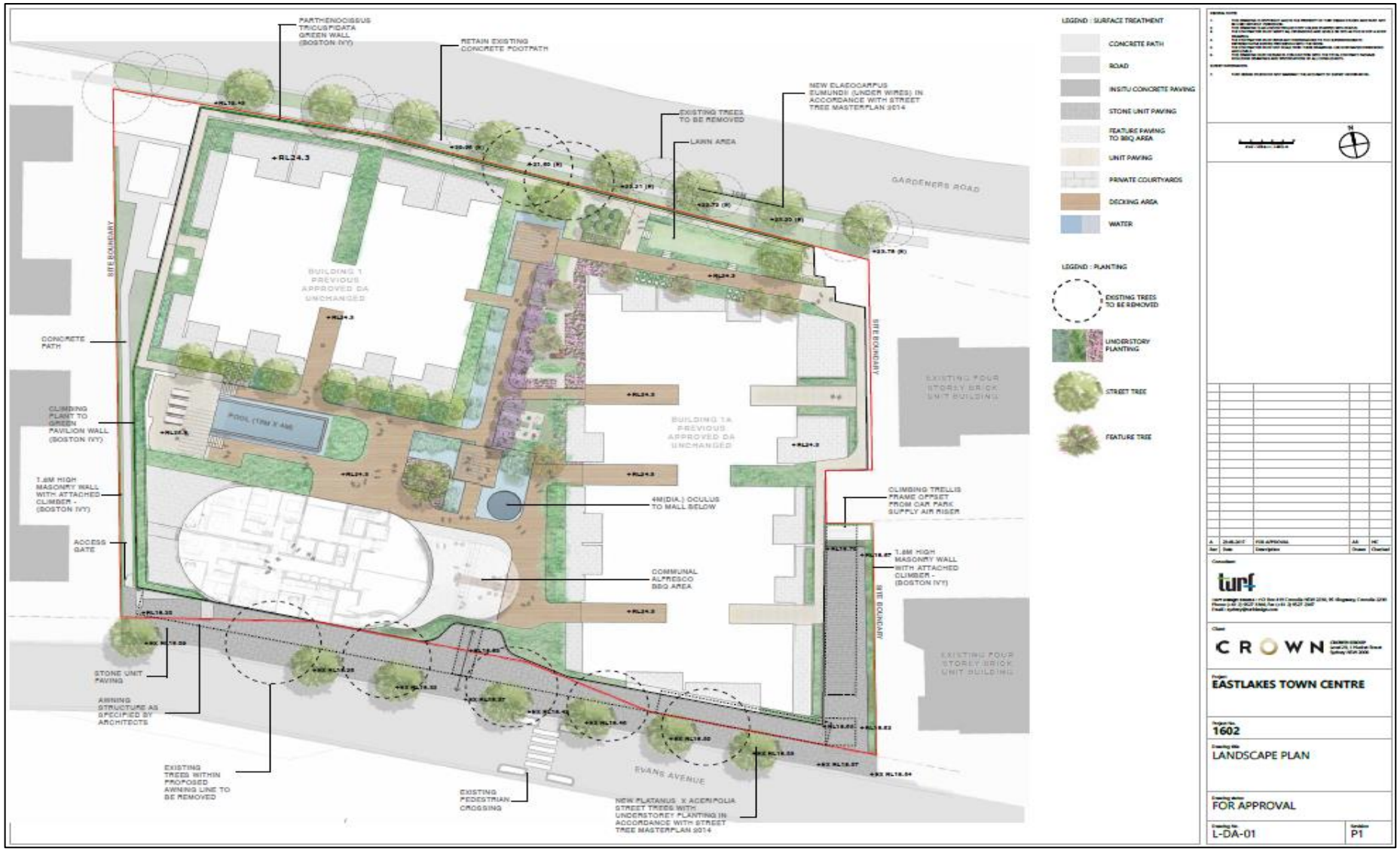
Appendix A: The study area, the subject trees

Appendix B - Impact assessment



Appendix B: **Major encroachment (>40%)**

Appendix C – Landscape plan



Appendix C: Landscape plan

Appendix D - Tree protection guidelines

The following tree protection guidelines must be implemented during the construction period in the event that no tree-specific recommendations are detailed.

Tree protection fencing

The TPZ is a restricted area delineated by protective fencing or the use of an existing structure (such as a wall or fence).

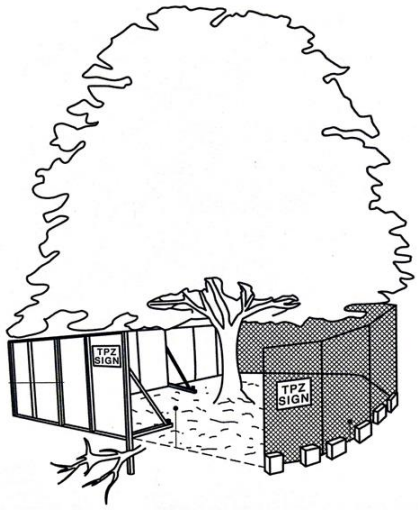
Trees that are to be retained must have protective fencing erected around the TPZ (or as specified in the body of the report) to protect and isolate it from the construction works. Fencing must comply with the *Australian Standard, AS 4687-2007, Temporary fencing and hoardings*.

Tree protection fencing must be installed prior to site establishment and remain intact until completion of works. Once erected, protective fencing must not be removed or altered without the approval of the project arborist.

If the protective fencing requires temporary removal, trunk, branch and ground protection must be installed and must comply with *AS 4970-2009, Protection of Trees on Development Sites*.

Tree protection fencing shall be:

- Enclosed to the full extent of the TPZ (or as specified in the Recommendations and Tree Protection Plan).
- Cyclone chain wire link fence or similar, with lockable access gates.
- Certified and Inspected by the Project Arborist.
- Installed prior to the commencement of works.
- Prominently signposted with 300mm x 450mm boards stating “NO ACCESS - TREE PROTECTION ZONE”.



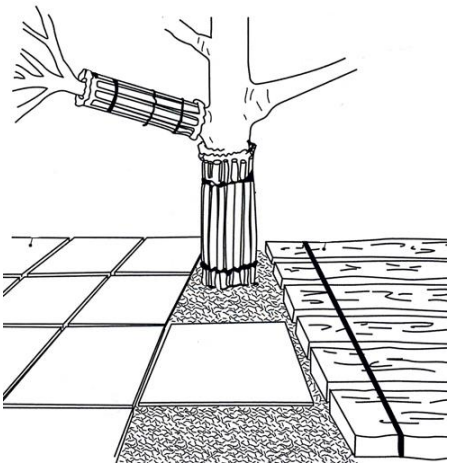
Crown protection

Tree crowns/canopy may be injured or damaged by machinery such as; excavators, drilling rigs, trucks, cranes, plant and vehicles. Where crown protection is required, it will usually be located at least one meter outside the perimeter of the crown.

Crown protection may include the installation of a physical barrier, pruning selected branches to establish clearance, or the tying/bracing of branches.

Trunk protection

Where provision of tree protection fencing is impractical or must be temporarily removed, truck protection shall be installed for the nominated trees to avoid accidental mechanical damage.



The removal of bark or branches allows the potential ingress of micro-organisms which may cause decay. Furthermore, the removal of bark restricts the trees' ability to distribute water, mineral ions (solutes), and glucose.

Trunk protection shall consist of a layer of either carpet underfelt, geotextile fabric or similar wrapped around the trunk, followed by 1.8 m lengths of softwood timbers aligned vertically and spaced evenly around the trunk (with an approx. 50 mm gap between the timbers).

The timbers must be secured using galvanised hoop strap (aluminium strapping). The timbers shall be wrapped around the trunk but not fixed to the tree, as this will cause injury/damage to the tree.

Ground protection

Tree roots are essential for the uptake/absorption of water, oxygen and mineral ions (solutes). It is essential to prevent the disturbance of the soil beneath the dripline and within the TPZ of trees that are to be retained. Soil compaction within the TPZ will adversely affect the ability of roots to function correctly.

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Ground protection may include a permeable membrane such as geotextile fabric beneath a layer of mulch, crushed rock or rumble boards.

If the grade is to be raised within the TPZ, the material should be coarser or more porous than the underlying material.

Root protection & pruning

If incursions/excavation within the TPZ are unavoidable, exploratory excavation (under the supervision of the Project Arborist) using non-destructive methods may be considered to evaluate the extent of the root system affected, and determine whether or not the tree can remain viable.

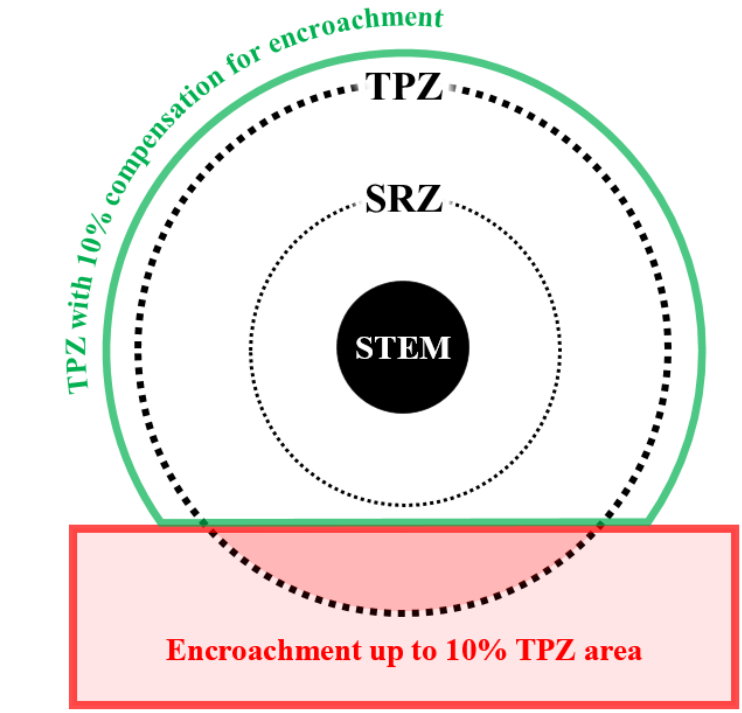
If the project arborist identifies conflicting roots that requiring pruning, they must be pruned with a sharp implement such as; secateurs, pruners, handsaws or a chainsaw back to undamaged tissue. The final cut must be a clean cut.

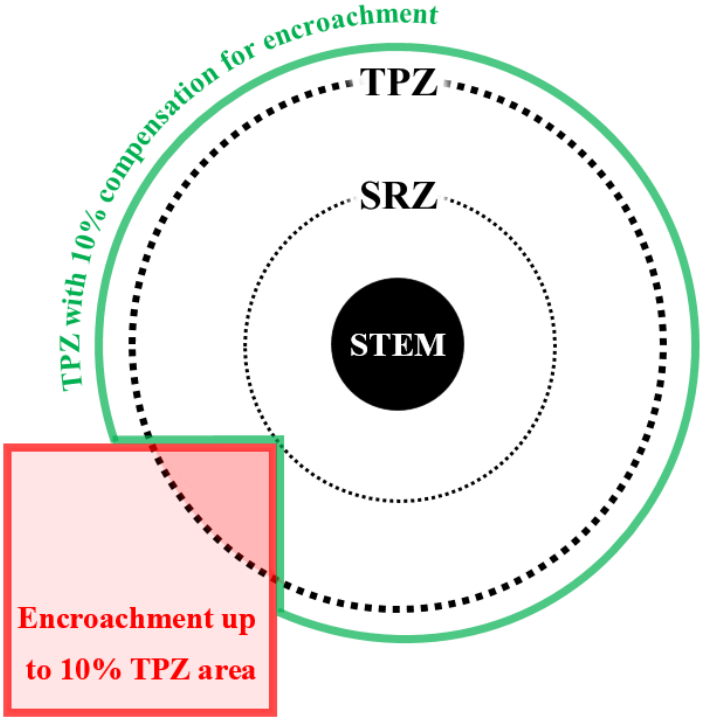
Underground services

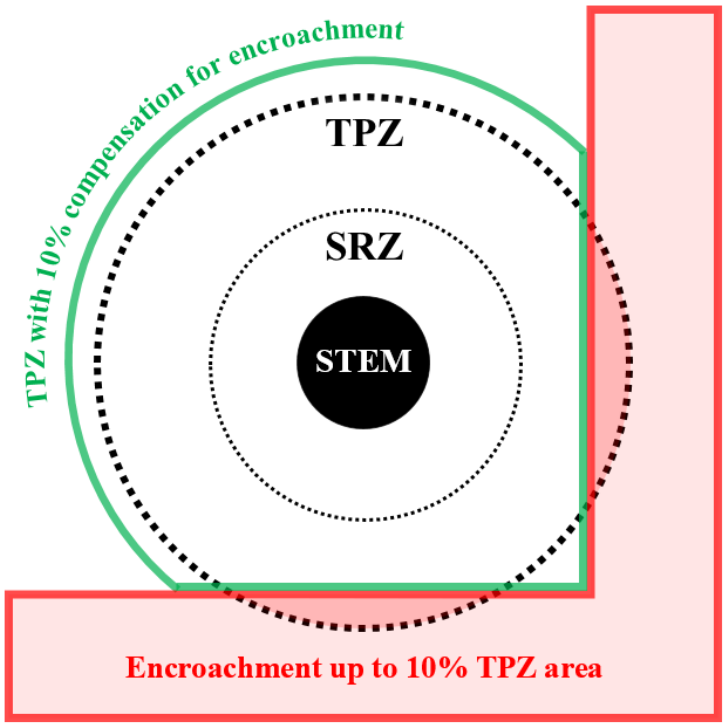
All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they should be installed using horizontal directional drilling (HDD). The horizontal drilling/boring must be at minimum depth of 600mm below grade. Trenching for services is to be regarded as "excavation"

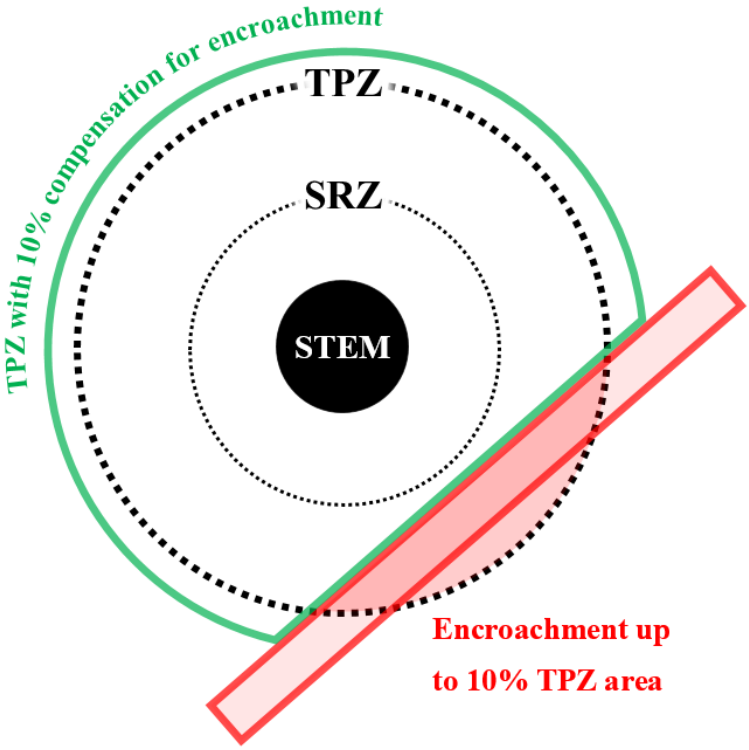
Appendix E - Minor encroachment to the TPZ

The following examples of minor encroachment are considered to be acceptable and will generally not require detailed root investigation.









Reference

Standards Australia
AS 4970-2009 Protection of Trees on Development Sites
(August 2009)

Appendix F - Tree retention assesment

Tree Significance - Assessment Criteria - STARS©		
Low	**Medium**	**High**
The tree is in fair-poor condition and good or low vigour. The tree has form atypical of the species The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms The tree has a wound or defect that has the potential to become structurally unsound. The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation	The tree is in fair to good condition The tree has form typical or atypical of the species The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street The tree provides a fair contribution to the visual character and amenity of the local area The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ	The tree is in good condition and good vigour The tree has a form typical for the species The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age. The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on councils significant tree register The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity. The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values. The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.

Useful Life Expectancy - Assessment Criteria – Tree AZ©			
Dead	**Short**	**Medium**	**Long**
Trees that should be removed within the next 5 years. Dead, dying, suppressed or declining trees because of disease or inhospitable conditions. Dangerous trees because of instability or recent loss of adjacent trees. Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form. Damaged trees that are clearly not safe to retain. Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. Trees that are damaging or may cause damage to existing structures within 5 years. Trees that will become dangerous after removal of other trees for the reasons.	Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk. Trees that may only live between 5 and 15 more years. Trees that could live for more than 15 years but may be removed for safety or nuisance reasons. Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk. Trees that may only live between 15 and 40 more years. Trees that could live for more than 40 years but may be removed for safety or nuisance reasons. Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that appear to be retainable at the time of the assessment for more than 40 years with an acceptable level of risk. Structurally sound trees located in positions that can accommodate future growth. Trees that could be made suitable for retention in the long term by remedial tree care. Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.

Tree Significance

Useful Life Expectancy	High	Medium	Low		
Long >40 years					
Medium 15-40 years					
Short <1-15 years					
Dead					

Legend for Matrix Assessment

	Priority for retention (High): These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 Protection of trees on development sites. Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.
	Consider for retention (Medium): These trees may be retained and protected. These are considered less critical; however their retention should remain priority with the removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for removal (Low): These tree are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Consider for removal (Low): These tree are not considered important for retention, nor require special works or design modification to be implemented for their retention.

ecological AUSTRALIA

ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management

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