TOGA Central 2-8 Lee Street, Haymarket Arboricultural Impact Assessment

Toga Central Development Pty Ltd

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Template 2.8.1

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Abbreviations

Abbreviation	Description
AQF	Australian Qualifications Framework
AS	Australian Standards
DAB	Diameter at Base
DBH	Diameter at Breast Height
ELA	Eco Logical Australia
GIS	Geographic Information Systems
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. Executive Summary

This Arboricultural Impact Assessment report has been prepared by Eco Logical Australia Pty Ltd (ELA) to accompany a detailed State significant development (SSD) development application (DA) for the mixed-use redevelopment proposal at TOGA Central, located at 2 & 8A Lee Street, Haymarket (the site). The site is legally described as Lot 30 in Deposited Plan 880518, Lot 13 in Deposited Plan 1062447 and part of Lot 14 in Deposited Plan 1062447. The site is also described as 'Site C' within the Western Gateway sub-precinct at the Central Precinct.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the SSD DA (SSD 33258337).

Based on the outcome of this AIA, 20 trees will require removal and 2 trees will be retained, subject to approval for pruning. Development consent from the consent authority (the Minister of Planning or their delegate) is required prior to any tree removal. Any loss of trees should be offset with replacement planting in accordance with the relevant offset policy.

2. Introduction

2.1 Background

This report has been prepared to accompany a SSD DA for the for the mixed-use redevelopment proposal at TOGA Central, located at 2 & 8A Lee Street, Haymarket.

The Minister for Planning, or their delegate, is the consent authority for the SSD DA and this application is lodged with the NSW Department of Planning and Environment (DPE) for assessment.

The purpose of the SSD DA is to complete the restoration of the heritage-listed building on the site, delivery of new commercial floorspace and public realm improvements that will contribute to the realisation of the Government's vision for an iconic technology precinct and transport gateway.

2.2 Proposed activity

The application seeks consent for the conservation, refurbishment and adaptive re-use of the Adina Hotel building (also referred to as the former Parcel Post building (fPPb)), construction of a 45-storey tower above and adjacent to the existing building and delivery of significant public domain improvements at street level, lower ground level and within Henry Deane Plaza. Specifically, the SSD DA seeks development consent for:

- Site establishment and removal of landscaping within Henry Deane Plaza.
- Demolition of contemporary additions to the fPPb and public domain elements within Henry Deane Plaza.
- Conservation work and alterations to the fPPb for retail premises, commercial premises, and hotel and motel accommodation. The adaptive reuse of the building will seek to accommodate:
    - Commercial lobby and hotel concierge facilities,
    - Retail tenancies including food and drink tenancies and convenience retail with back of house areas,
    - 4 levels of co-working space,
    - Function and conference area with access to level 7 outdoor rooftop space, and
    - Reinstatement of the original fPPb roof pitch form in a contemporary terracotta materiality.
- Provision of retail floor space including a supermarket tenancy, smaller retail tenancies, and back of house areas below Henry Deane Plaza (at basement level 1 (RL12.10) and lower ground (RL 16)).
- Construction of a 45-storey hotel and commercial office tower above and adjacent to the fPPb. The tower will have a maximum building height of RL 202.28m, and comprise:
    - 10 levels of hotel facilities between level 10 – level 19 of the tower including 204 hotel keys and 2 levels of amenities including a pool, gymnasium and day spa to operate ancillary to the hotel premises. A glazed atrium and hotel arrival is accommodated adjacent to the fPPb, accessible from Lee Street.
    - 22 levels of commercial office space between level 23 – level 44 of the tower accommodated within a connected floor plate with a consolidated side core.
    - Rooftop plant, lift overrun, servicing and BMU.

- Provision of vehicular access into the site via a shared basement, with connection points provided to both Block A (at RL 5) and Block B (at RL5.5) basements. Primary access will be accommodated from the adjacent Atlassian site at 8-10 Lee Street, Haymarket, into 4 basement levels in a split-level arrangement. The basement will accommodate:
  - Car parking for 106 vehicles, 4 car share spaces and 5 loading bays.
  - Hotel, commercial and retail and waste storage areas.
  - Plant, utilities and servicing.
- Provision of end of trip facilities and 165 employee bicycle spaces within the fPPb basement, and an additional 72 visitor bicycle spaces within the public realm.
- Delivery of a revitalised public realm across the site that is coordinated with adjacent development, including an improved public plaza linking Railway Square (Lee Street), and Block B (known as 'Central Place Sydney'). The proposal includes the delivery of a significant area of new publicly accessible open space at street level, lower ground level, and at Henry Deane Plaza, including the following proposed elements:
  - Provision of equitable access within Henry Deane Plaza including stairways and a publicly accessible lift.
  - Construction of raised planters and terraced seating within Henry Deane Plaza.
  - Landscaping works within Henry Deane Plaza.
- Utilities and service provision.
- Realignment of lot boundaries.

2.3 Proposed activity

The description of the proposed activity impacting trees is outlined in Table 1 is based on information available at the time of preparing this report.

Table 1: Proposed activity

Activities that can impact trees	Description of proposed activities
Clearing vegetation	Yes, 20 trees are proposed to be cleared. Permission must be sought from the City of Sydney Council to remove Council Street trees. Permission must also be granted from the Minister of Planning (consenting authority) prior to any tree removal. Any loss of trees should be offset with replacement planting in accordance with the relevant offset policy.
Pruning vegetation	Yes, 2 trees are proposed to be pruned in order to achieve retention. Permission must be sought from the City of Sydney Council to prune these trees, prior to undertaking any pruning.
Earthworks including regrading, excavation and trenching	Yes, proposed excavation and construction will involve the creation of a new ground plane and public domain including a new plaza and a different level to the existing Henry Deana Plaza. The basement plan is shown in Appendix F.
Compaction	Yes, all onsite parking, temporary site compounds, storage of materials, installing of structures, stockpiling fill or materials will be positioned outside of the TPZ of trees to be retained.
Refuelling and chemical use (e.g. herbicides)	No

Activities that can impact trees	Description of proposed activities
Erection of scaffolding	Yes
Vehicle movements	No
Changes to stormwater management	Yes
Landscaping	Yes

2.4 SEARS issued

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 17 December 2021 and issued for the SSD DA. Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Table 2: SEARS response

SEARS ISSUED Criteria	Description	Criteria
9. Trees and Landscaping	• Assess the number, location, condition and significance of trees to be removed and retained and note any existing canopy coverage to be retained on-site. • Provide a detailed site-wide landscape plan, that: ○ details the proposed site planting, including location, number and species of plantings, heights of trees at maturity and proposed canopy coverage. ○ provides evidence that opportunities to retain significant trees have been explored and/or informs the plan. ○ demonstrates how the proposed development would: - contribute to long term landscape setting in respect of the site and streetscape. - mitigate the urban heat island effect and ensure appropriate comfort levels on-site. - contribute to the objective of increased urban tree canopy cover. - maximise opportunities for green infrastructure, consistent with Greener Places.	Arboricultural Impact Assessment

2.5 The site

The site is located within the suburb of Haymarket, in the City of Sydney Local Government Area (LGA). The site is situated 1.5km south of the Sydney CBD and 6.9km north-east of the Sydney International Airport, within the Western Gateway sub-precinct, covering an area of approximately 1.65ha immediately west of Central Station. Immediately north of Central Station is Belmore Park, to the west is Haymarket (including the University of Technology, Sydney and Chinatown), to the south and east is rail lines and services and Prince Alfred Park and to the east is Elizabeth Street and Surry Hills.

Central Station is a public landmark, heritage building, and the largest transport interchange in NSW. With regional and suburban train services, connections to light rail, bus networks and to Sydney Airport, the area around Central Station is one of the most-connected destinations in Australia.

The site (2 & 8A Lee Street, Haymarket) is legally described as Lot 30 in Deposited Plan 880518, Lot 13 in Deposited Plan 1062447 and part of Lot 14 in Deposited Plan 1062447.

The land that comprises the site under the Proponent's control (either wholly or limited in either height or depth) comprises a total area of approximately 4,159sqm.

The location of the TOGA Central site is illustrated in Figure 1.

The site currently comprises the following existing development:

- Lot 30 in Deposited Plan 880518 (Adina Hotel building): the north-western lot within the Western Gateway sub-precinct accommodates a heritage-listed building which was originally developed as the Parcels Post Office building. The building has been adaptively re-used and is currently occupied by the Adina Hotel Sydney Central. The eight-storey building provides 98 short-stay visitor apartments and studio rooms with ancillary facilities including a swimming pool and outdoor seating at the rear of the site.
- Lot 13 in Deposited Plan 1062447 and part of Lot 14 in Deposited Plan 1062447 (Henry Deane Plaza): the central lot within the Western Gateway sub-precinct adjoins Lot 30 to the south. It accommodates 22 specialty food and beverage, convenience retail and commercial service tenancies. The lot also includes publicly accessible space which is used for pop-up events and a pedestrian thoroughfare from Central Station via the Devonshire Street Tunnel. At the entrance to Devonshire Street Tunnel is a large public sculpture and a glazed structure covers the walkway leading into Railway Square. This area forms part of the busy pedestrian connection from Central Station to Railway Square and on to George and Pitt Streets, and pedestrian subways.

The site is listed as an item of local significance under Schedule 5 of the Sydney Local Environmental Plan 2012 'Former Parcels Post Office including retaining wall, early lamp post and building interior', Item 855.

The site is also included within the Central Railway Station State heritage listing. This is listed on the State Heritage Register 'Sydney Terminal and Central Railway Station Group', Item SHR 01255, and in Schedule 5 of the Sydney Local Environmental Plan 2012 'Central Railway Station group including buildings, station yard, viaducts and building interiors' Item 824.

The site is not listed independently on the State Heritage Register. There is an array of built forms that constitute Central Station, however the Main Terminal Building (particularly the western frontage) and associated clocktower constitute key components in the visual setting of the Parcel Post building.

2.6 Purpose of report

The purpose of this report is to:

- identify the trees within the site that are likely to be affected by the proposed works
- undertake a visual tree assessment of the subject trees
- assess the current overall health and condition of the subject trees
- evaluate the retention value of the subject trees
- identify trees to be removed, retained or transplanted
- determine the likely impacts on trees to be retained
- recommend tree protection measures to minimise adverse impacts.

2.6.1 Impact area

The Impact Area identified for this assessment was derived from the 'Toga Central 2 Lee Street, Haymarket General Arrangement Plan – Basement Level 01 (*BSMART-AR-DAD-10B01000*)' provided by Bates Smart Architects Pty Ltd, 2022, with additional consideration to ground level works. As the Adina Hotel is to be retained (confirmed via email (1st *November 2022* from David Springford)), this area was excluded from the impact area. Additional impacts from construction activities were considered as shown in Figure 4. As detailed below, these impact areas comprise canopy impact and ground level impacts.

- Canopy impacts: relate to crown damage, where foliage may be lost or damaged by pruning or injury by cranes, trucks and so on (AS 4970-2009, Appendix B3.2). Two construction access lift zones are proposed adjacent to the western site boundary on Lee Street as seen in Figures 4 and 6. Whiles these lifts will be positioned on the roadway, their position results in canopy impacts to two street trees.
- Ground level impacts: relate to damage occurring to all parts of the tree, particularly root, trunk, and crown damage. The site will experience an array of demolition, landscaping, excavation, construction, resulting from basement and ground level works.

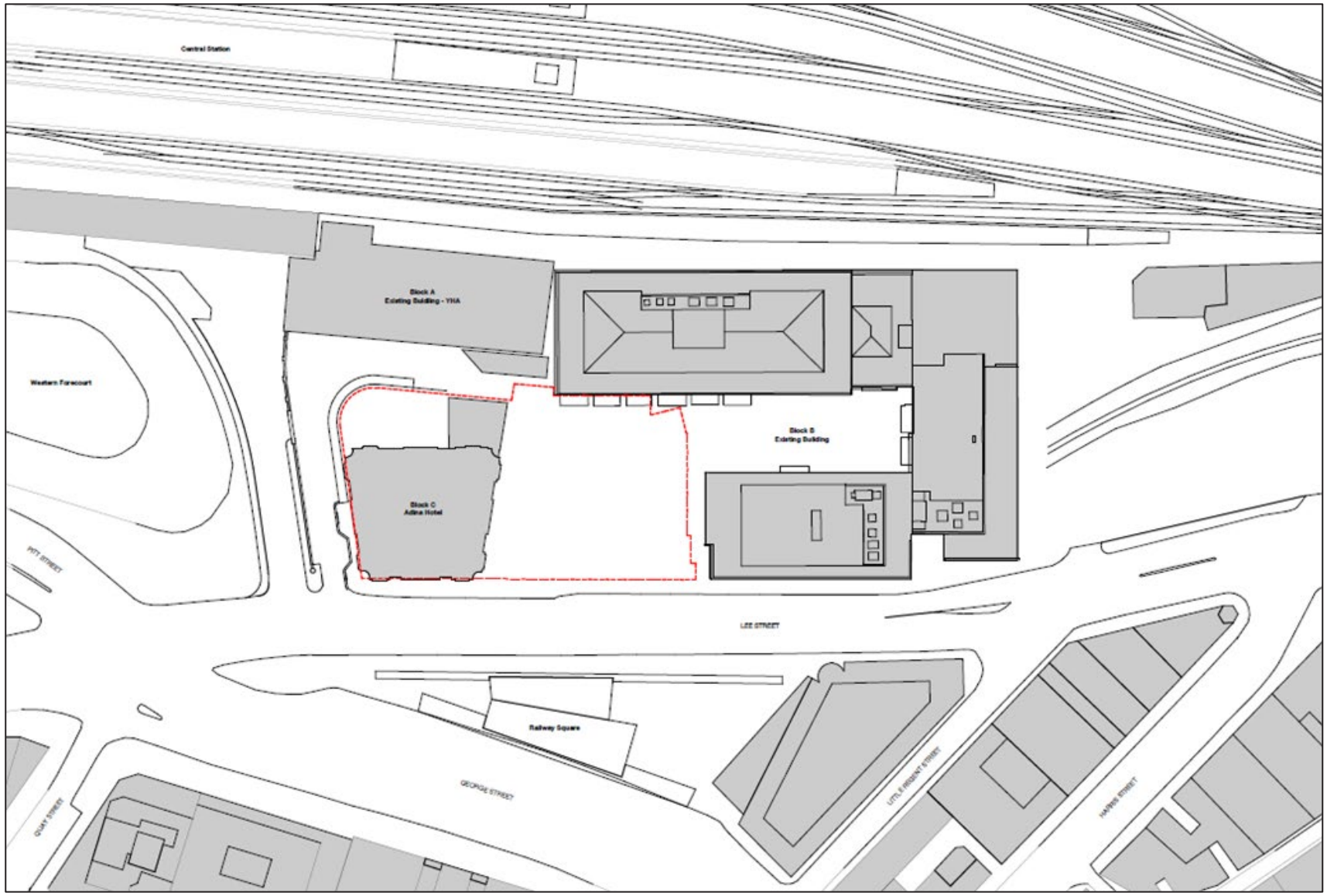


Figure 1: Location of TOGA Central Source: Bates Smart

3. Method

3.1 Definition of a tree

A tree is defined under the Australian Standard, *AS 4970-2009, Protection of Trees on Development Sites* as a long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks.

For the purpose of this report this AIA has assessed trees in line with the local Councils definition of a tree. City of Sydney Development Control Plan (2012) defines a tree as:

> *'(a) has a height of 5m or more; or*
>
> *(b) has a canopy spread of over 5m; or*
>
> *(c) has a trunk diameter of more than 300mm, measured at ground level; or*
>
> *(d) is listed in the Register of Significant Trees.'*

3.2 Visual tree assessment

The health and condition of the subject trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck and Breloer (1994) and practices consistent with modern arboriculture.

A total of **22 trees** were inspected on Wednesday 25 May 2022 by AQF Level 5 Consulting Arborist, Sophie Diller as shown in Figure 3.

The following limitations apply to this methodology:

- Tree height was measured using a laser clinometer.
- Diameter at breast height (DBH) and diameter at base (DAB) was measured using DBH tape.
- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing.
- Trees were inspected within limits of site access.
- In addition to the 22 trees assessed, there is a group of planted palm trees located within the pool area at 2 Lee Street (Adina Apartments). This group consisted of *Strelitzia nicolai* (Giant Bird of Paradise), *Dypsis lutescens* (Golden Cane Palms) and *Livistona australis* (Cabbage-tree Palms). These trees were not accessible and therefore not included in this assessment. However, given their low height, constrained surroundings and limited ability to provide canopy , they are considered to be of Low Retention value.
- The locations of the subject trees were recorded by ELA in the field using hand-held GPS units which have errors in accuracy of approximately 5-20 m pending satellite availability on the day. Tree locations were subsequently matched to surveyed prepared by Nortons Survey Partners (2019) where possible. Remaining trees were matched to Near map (2021) aerial imagery using geographic information systems (GIS) techniques (see Appendix D).
- Tree canopy was measured by stepping out the distance within the dripline
- No aerial inspections or root mapping was undertaken.

- Tree identification was based on broad taxonomical features present and visible from ground level at the time of inspection.

3.3 Retention value & landscape significance

The retention value or importance of a tree or group of trees, is determined in accordance with the Institute of Australian Consulting Arborists (IACA) Significance of a Tree Assessment Rating System (STARS©), which is summarised in Appendix A. The method considers the Safe Useful Life Expectancy (SULE) and landscape significance of a tree. Trees are provided one of the following ratings:

- **High - priority for retention:** These trees are considered important 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 *AS 4970–2009 Protection of trees on development sites.*
- **Medium - consider for retention:** These trees are moderately important for retention. Their removal should only be considered if adversely affected by the proposed works and all other alternatives have been considered and exhausted.
- **Low - consider for removal:** These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
- **Priority for removal:** These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

3.4 Protection zones

3.4.1 Tree protection zone (TPZ)

The TPZ is a specific radius area above and below ground and at a distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by the development. The TPZ (as defined by AS 4970-2009) requires restriction of access during the development process. Groups of trees with overlapping TPZs may be included within a single protection area. Tree sensitive measures must be implemented if works are to proceed within the TPZ. The TPZ radius is determined by multiplying its DBH by 12 however, the TPZ of palms and monocots should not be less than 1 m outside the crown projection.

3.4.2 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. It is critical for the support and stability of trees. Severance of roots within the SRZ is not recommended as it may lead to the destabilisation and/or decline of the tree. The SRZ does not apply for palms and monocots (as outlined in AS 4970-2009).

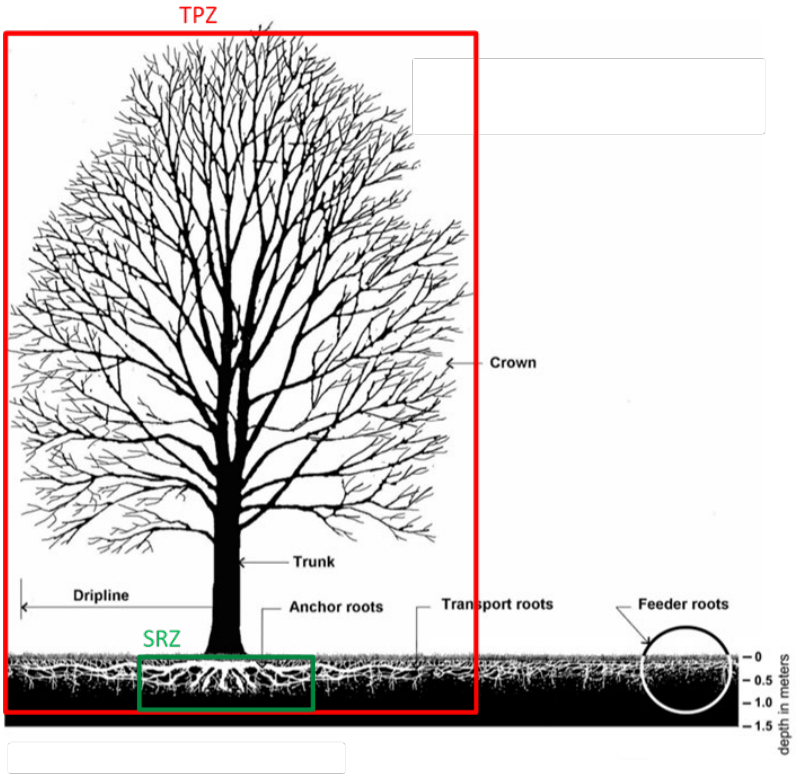


Figure 2: Representative tree structure and indicative TPZ and SRZ

3.5 Potential impacts

Trees may be impacted by physical or chemical damage to roots or above tree parts. Examples include impacts associated with site grading, soil compaction, excavation, stock piling within TPZ as well as changes in site hydrology, changes in soil level and site contamination. The extent of encroachment to the TPZ and SRZ determines the level of potential impact. AS 4970-2009 defines types of encroachment as follows and as illustrated in Appendix B:

- **Major encroachment** - If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. The location and distribution of roots may be determined through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), Air Spade or manual extraction. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.
- **Minor encroachment** – If the proposed encroachment is less than 10% 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 contiguous with the TPZ.

For the purposes of this Arboricultural Impact Assessment, impacts were calculated using GIS techniques and defined as follows:

- **High impact:** The SRZ is directly affected, or the proposed encroachment is greater than 20% of the TPZ. Trees may not remain viable if they are subject to high impact. These trees cannot be retained unless the proposal is changed.
- **Medium impact:** If the proposed encroachment is greater than 10% of the TPZ (but less than 20% of the TPZ) and outside of the SRZ, the project arborist may require detailed root investigation to demonstrate that the tree(s) would remain viable. These trees may be retained subject to further investigation and mitigation measures.
- **Low impact:** 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. These trees can be retained.
- **No impact:** No likely or foreseeable encroachment within the TPZ. These trees can be retained.

Impacts are calculated using GIS techniques.

3.6 Proposed action

The proposed actions to either retain or remove each tree are determined by the impact from the proposed design footprint, conversations of intent with the client and corresponding mitigation measures. The following are the definition of these actions:

- **Remove:** Trees that are subject to major encroachment (>10% TPZ and or SRZ encroachment) by the proposed development to the extent whereby retention is not suitable and / or incompatible if the current plans are approved. All tree removal must comply with guidelines specified in section 4 of this report and subject to regulatory approval.
- **Retain:** Trees that are suitable for retention granted they follow the specific mitigation measures discussed in section 3 and / or the tree protection measures outlined in section 4 and / or the tree protection guidelines outlined in Appendix E.
- **Retain with mitigation measures:** The Project Arborist will need to confirm the viability of tree retention depending on proposed construction methods

Figure 3: Tree locations

4. Assessment & findings

Results of the arboricultural assessment are summarised in Table 3. Detailed results are included in Appendices C and D. Site plans are provided in Appendix E, F and G. Photos are provided in Appendix F.

Table 3: Summary of tree retention values and impacts

	High Impact (>20% TPZ and/or SRZ encroachment)	Medium Impact (<20% TPZ encroachment)	Low Impact (<10% TPZ encroachment)	Low Impact (<10% canopy encroachment)	No Impact	Total
Priority for retention (High)	5	-	-	2	-	**7**
Consider for retention (Medium)	12	-	-	-	-	**12**
Consider for removal (Low)	3	-	-	-	-	**3**
Total	**20**	**0**	**0**	**2**	**0**	**22**

Tree IDs and retention values are outlined below. Specific TPZ/SRZ/canopy% encroachments are outlined in Appendix D.

Proposed for removal: High Impact (>20% TPZ and/or SRZ encroachment)

- **High retention: five** high retention value trees (Trees 12, 14, 18, 19, 20)
- **Medium retention: twelve** medium retention value trees (Trees 1 to 8, 13, 15, 16 and 17)
- **Low retention: three** low retention value trees (Trees 9, 10 and 11)

Proposed for retention: Low Impact (<10% canopy encroachment)

- **High retention: two** trees (Council trees 21 and 22)

Of the 22 trees assessed, 20 trees are proposed to be removed, all of which will be subject to high impact (>20% TPZ and/or SRZ encroachment) from the proposed site plan and under the *AS4970-2009 Protection of trees on development sites* retention is not viable.

The remaining two trees (Tree 21 and 22) are Council Street trees located within the footpath area and are subject to no impact (0% TPZ encroachment) from the proposed site plan, however these trees will be subject to a low impact (<10% canopy encroachment) from the proposed access lift zones required during the construction phase. Given these trees have been pruned in the past and have a slight phototropic lean away from the building, less than 10% of the total canopy is required to be pruned, and therefore, these trees are viable for retention, subject to whether the mitigation measures outlined in Section 5 are followed.

Any loss of trees should be offset with replacement planting in accordance with the relevant offset policy. Please refer to the Landscape Report prepared by Arcadia for the additional new trees proposed

to be planted to offset these losses. It is recommended that any onsite replacement landscape planting plans are reviewed by the project arborist to ensure adequate soil volumes are considered in landscape design.

5. Tree management plan

- 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. Approved tree works should not be carried out before the installation of tree protection measures.
- All tree pruning and removal is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture.
- Any additional construction activities within the TPZ of the subject trees must be assessed and approved by the project arborist and must comply with *AS 4970-2009 - Protection of trees on development sites.*

Tree protection measures are summarised in Table 4 and further information is in Appendix E. Specific measures complying with *AS 4970-2009*, Clauses 4.5.3 and 4.5.6 for Trees 21 and 22 include:

- Type A or Type B hoarding or containment screening should be a minimum height of 1800 mm.
- Boards and padding used for trunk and branch protection must be strapped to the trees, not screwed or nailed.
- Under the direction of the project arborist, any small branches that are flexible enough, are recommended to be tied back, as opposed to being pruned.
- Where pruning is unavoidable, it must be specified by the Project Arborist in accordance with *AS 4373*.

Table 4: Summary of tree protection measures

Type	More details	Comment
Signage	Appendix E1	Prominently sign posted with 300 mm x 450 mm boards stating, "NO ACCESS - TREE PROTECTION ZONE".
Tree protection fencing	Appendix E1	Protective cyclone chain wire link fence to be erected around the TPZ to protect and isolate retained trees from the construction works. Existing boundary fencing may be used.
Crown protection	Appendix E2	Where required, crown protection may include the installation of a physical barrier, pruning selected branches to establish clearance, or the tying/bracing of branches.
Trunk and branch protection	Appendix E3	When fencing is not practical or prior to any activities within the TPZ, trunk protection is required and consist of a layer geotextile fabric or similar followed by 1.8 m lengths of softwood timbers spaced evenly around the trunk and secured with a galvanised hoop strap.
Ground protection	Appendix E4	Install and maintain 100mm thick layer of mulch around tree in TPZ. For machine or vehicle access within TPZ geotextile fabric beneath crushed rock or rumble boards may be required.
Soil moisture		Soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within TPZ.

Type	More details	Comment
Root protection and investigation	Appendix E5	If incursions/excavation within the TPZ are unavoidable, root investigation may be needed to determine the extent and location of roots within the area of construction activity using non-destructive excavation (NDE) methods.
Underground services	Appendix E6	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), non-destructive excavation (NDE) methods such as hydro-vacuum, Air Spade or manually excavated trenches.

6. Conclusion

Of the 22 trees assessed, 20 are proposed to be removed. All of these trees will be subject to high impact (>20% TPZ encroachment) from the proposed development.

Two (2) Council street trees proposed to be retained, are subject to minor canopy impacts (low impact <10% canopy encroachment) due to the positioning of lift access required during construction. Prior to pruning, it is recommended that these trees are reviewed by the Project Arborist, to assess suitability for tying down flexible branches to minimise pruning impacts.

Development consent from the consenting authority (the Minister of Planning or their delegate) is required prior to any tree removal or pruning.

7. References

7.1 General references

Barrell, J. 2001. 'SULE: Its use and status into the new millennium', in *Management of mature trees, Proceedings of the 4th NAAA Tree Management Seminar*, NAAA, Sydney.

Brooker M.I.H, Kleinig D.A. 2006. *Field Guide to Eucalypts*. Volume 1, South-eastern Australia, 3rd ed Bloomings Books, Melbourne

Draper, B. and Richards, P., 2009. *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Harris, R.W., Matheny, N.P., and Clark, J.R., 1999. *Arboriculture: integrated management of landscape trees, shrubs, and vines*, Prentice Hall, Upper Saddle River, New Jersey.

Mattheck, C. and Breloer, H. 1994. 'Field Guide for Visual Tree Assessment' *Arboricultural Journal*, Vol 18 pp 1-23.

Mattheck, C. 2007. *Updated Field Guide for Visual Tree Assessment*. Karlsruhe: Forschungszentrum Karlsruhe.

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

Robinson L, 2003. *Field Guide to the Native Plants of Sydney*, 3rd ed, Kangaroo Press, East Roseville NSW

Standards Australia 2003. *Composition, Soil and Mulches, AS 4454 (2003),* Standards Australia, Sydney.

Standards Australia 2007. *Australian Standard: Pruning of amenity trees, AS 4373 (2007),* Standards Australia, Sydney.

Standards Australia 2009. *Australian Standard: Protection of trees on development sites, AS 4970 (2009)*. Standards Australia, Sydney.

7.2 Project specific references

Arcadia 2022. *Landscape SSD Package TOGA Central, Henry Deane Plaza.*

Bates Smart Architects 2022. *Toga Central 2 Lee Street, Haymarket General Arrangement Plan Basement Level 01.* Dwg no. BSMART-AR-DAD-10B01000, revision 2 dated 25.11.2022

City of Sydney 2012. *Development Control Plan 2012, Section 3 General Provisions, 3.5.3 Tree management.* December 2012

Norton Survey Partners 2019. *Plan Showing Selected Detail & Levels For Planning Purposes at no. 2 Lee Street, Haymarket & Surrounds*. Ref. 37908, dated 29.04.2019

Appendix A Tree retention assessment method

A1 Tree Significance Assessment Criteria - STARS©

The tree is to have a minimum of three criteria in a category to be classified in that group.

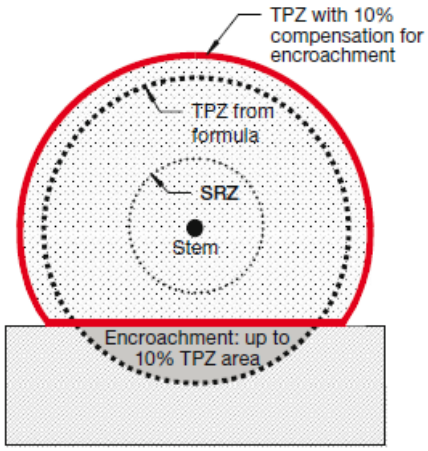
Low	Medium	High
The tree is in fair-poor condition and good or low vigour.	The tree is in fair to good condition and good or low vigour	The tree is in good condition and good vigour
The tree has form atypical of the species	The tree has form typical or atypical of the species	The tree has a form typical for the species
The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings	The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area	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 provides a minor contribution or has a negative impact on the visual character and amenity of 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 is listed as a heritage item, threatened species or part of an endangered ecological community or listed on Council's significant tree register
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 provides a fair contribution to the visual character and amenity of the local area	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'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'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 supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values.
The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms		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.
The tree has a wound or defect that has the potential to become structurally unsound.		
Environmental Pest / Noxious Weed The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation.		
Hazardous /Irreversible Decline The tree is structurally unsound and / or unstable and is considered potentially dangerous. The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.		

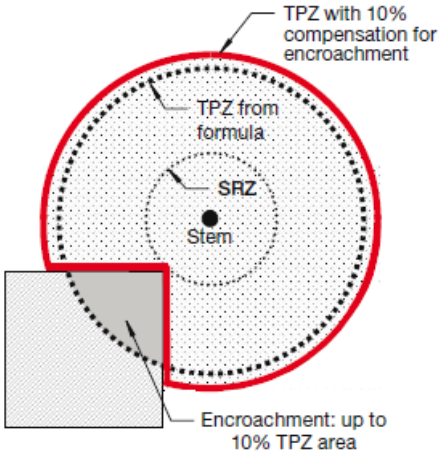
A2 Matrix assessment - STARS©

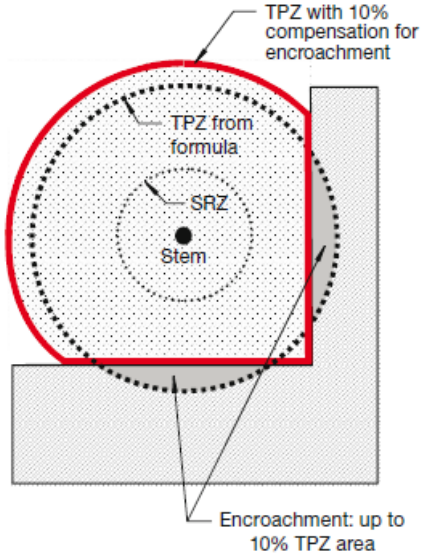
		Tree significance				
		High	Medium	Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest/Noxious Weed Species	Hazardous/ Irreversible Decline
Useful Life Expectancy	Long >40 years					
	Medium 15-40 years					
	Short <1-15 years					
	Dead					

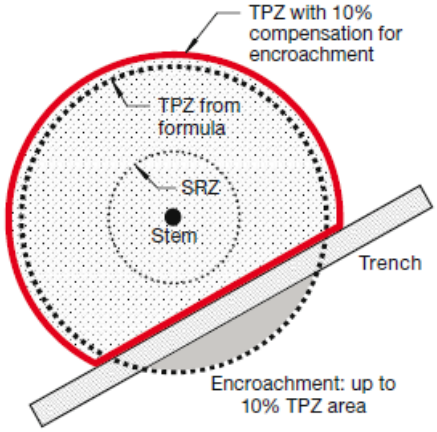
	Priority for retention (High): Tree considered important so should be retained and protected. Design modification or re-location of structure should be considered to accommodate the setbacks as prescribed by the *Australian Standard AS4970 Protection of trees on development sites*. Tree sensitive construction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

Appendix B Encroachment into tree protection zones - AS 4970-2009









Appendix C Maps

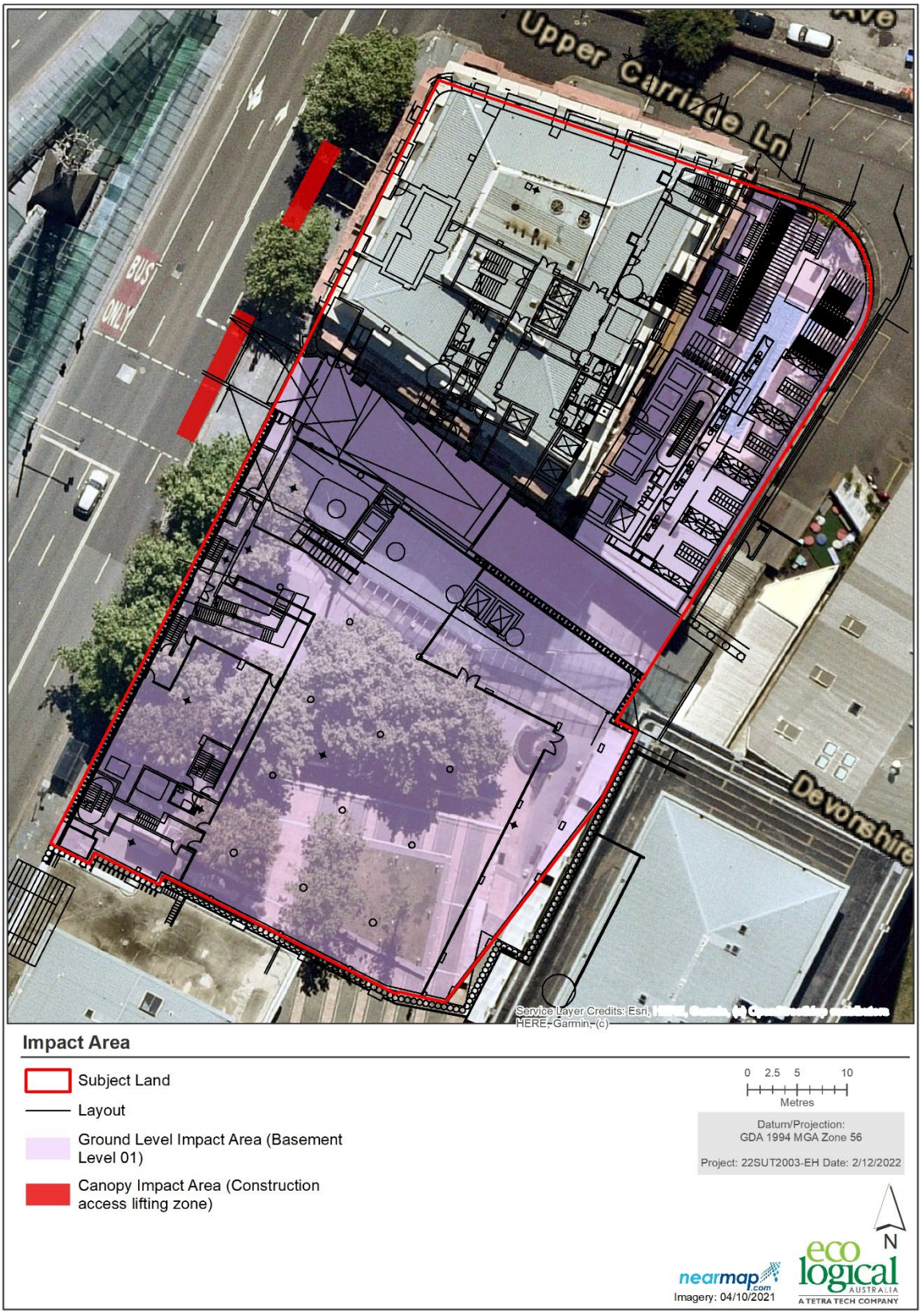


Figure 4: Impact area and layout

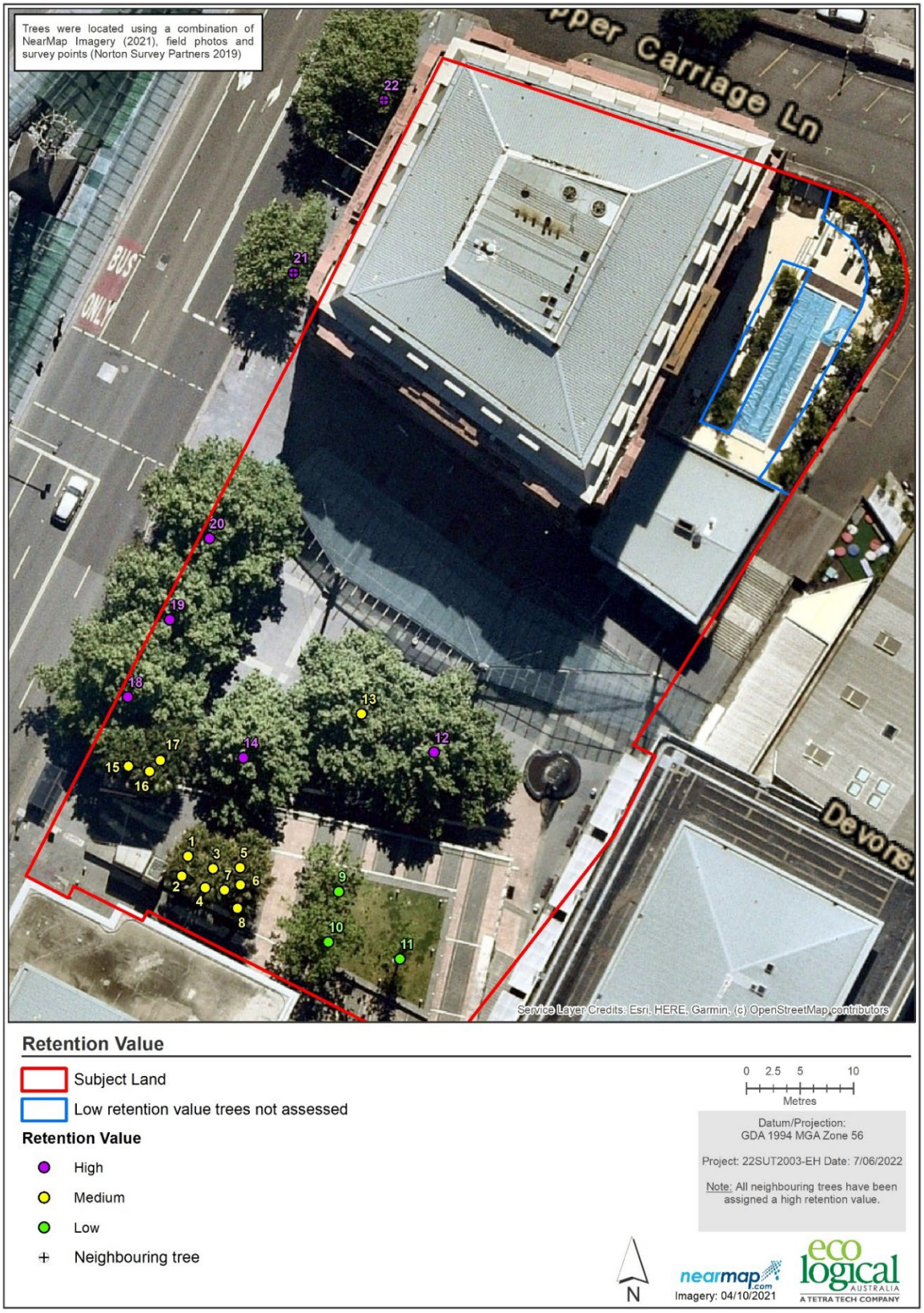


Figure 5: Retention values

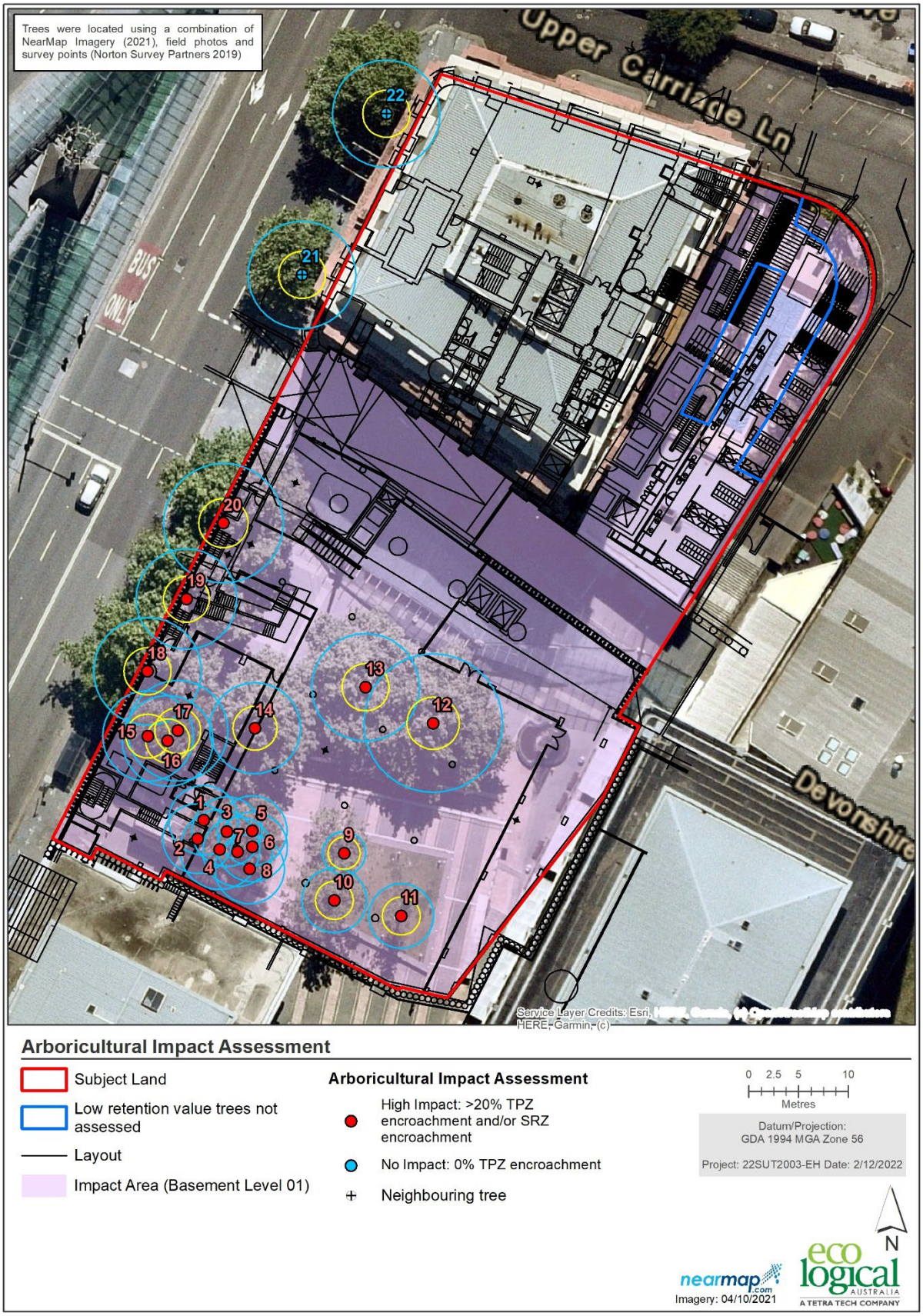


Figure 6: Arboricultural impact assessment

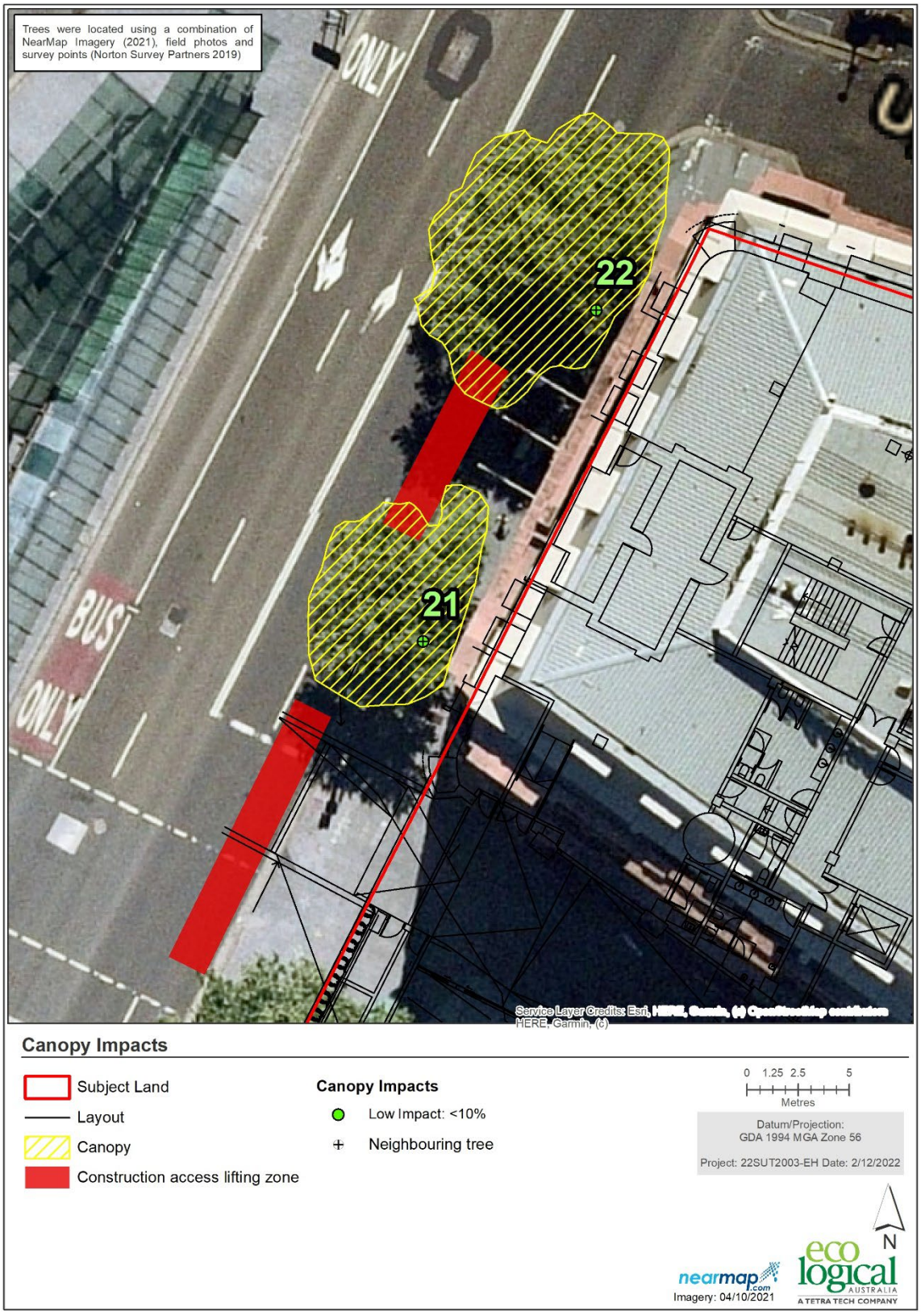


Figure 7: Canopy impacts (Trees 21 and 22)

Appendix D Tabulated results of arboricultural assessment

Tree	Botanical name	Location	Height (m)	Spread (m)	DBH (mm)	DAB (mm)	Health	Structure	ULE	Landscape significance	Retention value	TPZ (m)	SRZ (m)	TPZ% encroachment	Canopy% encroachment	SRZ encroachment	Impact	Proposed action	Notes
1	*Livistona australia*	NearMap 2021	16	5	220	320	Fair	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
2	*Livistona australia*	Survey (Norton Survey Partners 2019)	17	5	220	350	Fair	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
3	*Livistona australia*	Survey (Norton Survey Partners 2019)	17	5	220	330	Fair	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
4	*Livistona australia*	Survey (Norton Survey Partners 2019)	19	6	280	380	Good	Fair	Medium	Medium	Medium	4.0	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
5	*Livistona australia*	Survey (Norton Survey Partners 2019)	14	5	200	280	Good	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
6	*Livistona australia*	Survey (Norton Survey Partners 2019)	14	5	200	280	Fair	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
7	*Livistona australia*	Survey (Norton Survey Partners 2019)	12	5	260	340	Fair	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
8	*Livistona australia*	Survey (Norton Survey Partners 2019)	11	5	290	340	Fair	Fair	Medium	Medium	Medium	3.5	0.0	100		n/a	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Growth restricted in planter bed,
9	*Plata is acerifolius*	Survey (Norton Survey Partners 2019)	14	8	150	180	Fair	Poor	Short	Low	Low	2.2	1.6	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Planter bed, epicormic throughout, decaying terminal leader, basal damage

10	*Plata is acerifolius*	Survey (Norton Survey Partners 2019)	16	10	220	270	Fair	Fair	Short	Medium	Low	3.2	1.9	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Planter bed, kinked roots, root damage, epicormic
11	*Platanus acerifolius*	Survey (Norton Survey Partners 2019)	16	4	220	270	Poor	Poor	Short	Low	Low	3.2	1.9	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Planter bed, root damage, no branching, only epicormic growth
12	*Platanus acerifolius*	Survey (Norton Survey Partners 2019)	20	16	500	580	Fair	Good	Medium	High	High	7.0	2.6	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Good form, prominent, visible, fairy lights ring barking branches, paving
13	*Platanus acerifolius*	Survey (Norton Survey Partners 2019)	18	16	370	450	Good	Fair	Medium	Medium	Medium	5.4	2.4	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Good form, visible, fairy lights ring barking branches, paving
14	*Platanus acerifolius*	Survey (Norton Survey Partners 2019)	19	14	330	380	Fair	Good	Medium	High	High	4.6	2.2	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Good form, visible, fairy lights ring barking branches, paving
15	*Livistona australis*	Survey (Norton Survey Partners 2019)	18	6	300	380	Good	Fair	Medium	Medium	Medium	4.6	2.2	97		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Sloped planter bed with fire hydrant
16	*Livistona australis*	Survey (Norton Survey Partners 2019)	18	6	300	380	Good	Fair	Medium	Medium	Medium	4.6	2.2	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Sloped planter bed with fire hydrant
17	*Livistona australis*	Survey (Norton Survey Partners 2019)	18	6	350	420	Good	Fair	Medium	Medium	Medium	5.0	2.3	100		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Sloped planter bed with fire hydrant
18	*Platanus acerifolia*	Survey (Norton Survey Partners 2019)	18	15	400	450	Good	Good	Medium	High	High	5.4	2.4	60		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Good form, top of step, pavement lifting
19	*Platanus acerifolia*	Survey (Norton Survey Partners 2019)	18	10	360	420	Good	Good	Medium	Medium	High	5.0	2.3	63		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Constrained, top of step, pavement lifting

20	*Platanus acerifolia*	Survey (Norton Survey Partners 2019)	18	16	420	500	Good	Good	Medium	High	High	6.0	2.5	60		Yes	High Impact (>20% TPZ and/or SRZ encroachment)	Remove	Good form, top of step, pavement lifting, filtapave
21	*Platanus acerifolia*	Survey (Norton Survey Partners 2019)	16	8	320	450	Good	Good	Medium	High	High	5.4	2.4	0	3.7	No	Low Impact: <10% canopy encroachment	Retain	Council, phototropic
22	*Platanus acerifolia*	Survey (Norton Survey Partners 2019)	18	8	360	450	Good	Good	Medium	High	High	5.4	2.4	0	3.4	No	Low Impact: <10% canopy encroachment	Retain	Council, phototropic

Appendix E Tree protection guidelines

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

E1 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 any machinery or material are brought to site and before the commencement of works.
- Prominently sign posted with 300 mm x 450 mm boards stating, “NO ACCESS - TREE PROTECTION ZONE”.

E2 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. Tie back of flexible branches is preferrable to pruning where possible.

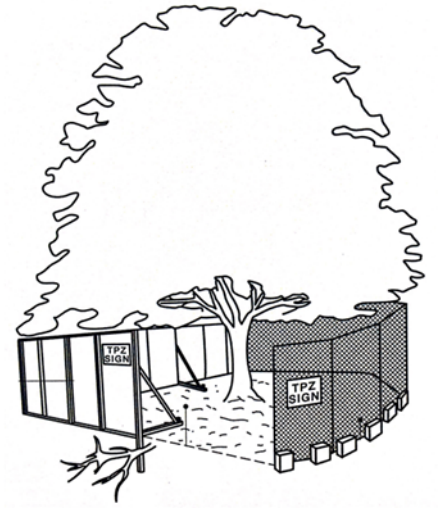
E3 Trunk protection

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

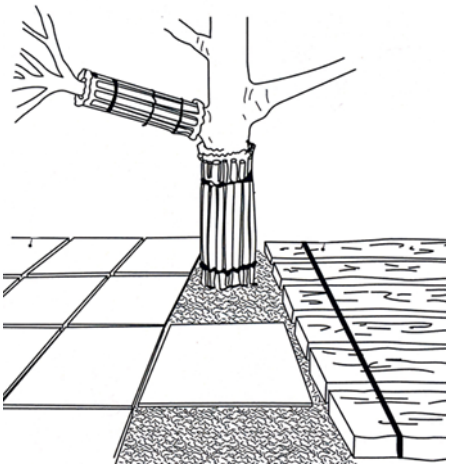
The removal of bark or branches allows the potential ingress of micro-organisms which may cause decay. Furthermore, the removal of bark restricts the trees' ability to distribute water, mineral ions (solutes), and glucose.

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.



Tree protection fencing



Trunk protection fencing

E4 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. Maintain a thick layer of mulch around all retained trees to a depth of 100 mm using coarse pine bark or wood chip material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

For heavy vehicle access within TPZ, ground protection may include a permeable membrane such as geotextile fabric beneath a layer of 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.

E5 Root protection and investigation

If incursions/excavation within the TPZ are unavoidable, root investigation may be needed to determine the extent and location of roots within the area of construction activity. The location and distribution of roots are found through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), air spade and manual excavation. Root investigation does not guarantee the retention of the tree.

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.

Appendix F Site photos

Figure 8: Low retention value trees not individually assessed

Figure 9: Medium retention value Trees 1 to 8

Figure 10: Low retention value Trees 9 to 11

Figure 11:High retention value Trees 12 and 14 & medium retention value Tree 13

Figure 12: High retention value Tree 15 to 17

Figure 13: High retention value Trees 18 to 20

Figure 14: High retention value Tree 21

Figure 15: High retention value Tree 22

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