canopy consulting

arborist report

Arboricultural Impact Assessment
&
Tree Protection Management Plan

28-30 Burrows Rd,
St Peters NSW 2044

Inspection Date: 26 July 2022

PREPARED FOR:

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Document Information

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Project Name:	**Sydney Flight Training Centre**
Reference #:	**E-001620-22**
Client:	**LOGOS Development Management Pty Ltd**
Site:	**28-30 Burrows Rd, St Peters NSW 2044**
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Document Status

Status	Date	Revision type
Version 1 - Draft	10 August 2022	
Version 2 - Final	28 September 2022	Updated based on revised plans package
Version 2 - Final	30 September 2022	Updated based on revised plans package

Report Assumptions and Limitations

1. Any description or information provided to the consultant by the client or third party is assumed to be correct.
2. All information has been sourced with care and verified to the best of the consultant's knowledge. Any opinions not duly researched is based upon the consultant's experience and observations.
3. The consultant shall not be required to give testimony or attend court by reason of this report unless under a contractual agreement, including payment of additional fees and charges for such services.
4. Modification or extraction of key contextual components invalidates the entire report.
5. There is no warranty, explicit or implicit that the problems and deficiencies associated with the site or vegetation may not arise in future.
6. Unless stated otherwise, the information contained within the report will address the items outlined in the project brief or that were examined during any site assessment and reflect the condition of those items at the time of inspection.
7. Unless otherwise specified, the inspection is limited to ground-based inspection of accessible areas without dissection, excavation or probing.
8. This report and its recommendations reflect an impartial assessment of the tree and its condition based on the available evidence and projected outcomes.

Executive Summary

The following report examines the potential arboricultural impacts of the proposed state significant development within 28-30 Burrows Rd, St Peters NSW 2044 on existing trees in the vicinity of the development site. The client proposes to construct and manage a flight training centre.

This report is designed to provide information about the relative retention values of all trees that may be affected by the project, assess the project's impacts, and provide recommendations for alteration to design or construction methods where necessary to minimise negative impacts. The report also provides recommended tree protection measures to ensure the viable, long-term retention of trees to be retained where appropriate.

The report has applied the Australian Standard AS4970-2009 *Protection of trees on development site*s which provides radial offsets to ensure the viability of trees where they are to be retained. These offsets are known as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ). An encroachment of less than 10% of the entire TPZ is considered minor provided it is outside the SRZ, and the area lost is compensated for elsewhere and contiguous to the TPZ. A major TPZ encroachment is considered to be greater than 10% of the entire TPZ area or within the SRZ.

The trees have been allocated a significance rating and retention value as determined by using the Tree Significance - Assessment Criteria of the IACA Significance of a Tree, Assessment Rating System (STARS)© (IACA, 2010). An explanation of the attributes required to achieve each category can be found in Appendix A. The encroachment type relative to tree retention value is summarised in Table 1.

Table 1: Recommendations relative to encroachment type and retention value

		Retention Value				
Recommendation	***Encroachment Type***	**High - Priority for Retention**	**Medium - Consider for Retention**	**Low - Consider for Removal**	**Priority for Removal**	**Grand Total**
Remove	**Major**		2	6	2	10
Remove Total			2	6	2	10
Retain - generic	**Nil**		4			4
Retain - generic Total			4			4
Retain - no protection	**Minor**	1				1
Retain - no protection Total		1				1
Retain - specific	**Major - manageable**		2			2
Retain - specific Total			2			2
Grand Total		**1**	**8**	**6**	**2**	**17**

A total of ten trees will be subject to major, unmanageable TPZ encroachments due to the proposed construction of the facility and connecting vehicle crossovers and demolition, and will therefore require removal. Of these:

- Four are council street trees (T2, T3, T10, T11)
- None are High Retention Value
- Two (T2 & T12) are Medium Retention Value
- Six (T3, 10, 11, 13, 14 & 15) are Low Retention Value
- Two (T1 & T16) are a Priority for Removal as they are a weed species and exempt under the Sydney Development Control Plan 2012. The stability of these trees will be affected during demolition.

The remaining trees are recommended to be retained with a mix of generic and specific tree protection measures.

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1. Background

1.1. Introduction

LOGOS Development Management Pty Ltd (LOGOS) proposes to construct and manage a training centre on behalf of their client at 28-30 Burrows Rd, St Peters NSW 2044. The application submission will be under (SSD 47601708) for the proposed flight training centre.

LOGOS has engaged Canopy Consulting to investigate trees adjacent to the proposed works where they may be adversely affected by the project (hereafter 'the site' or 'the project').

The purpose of this report is to:

- identify trees within the study area
- assign retention values of all trees that may be affected within the site and those on adjoining properties
- assess the impacts of the project
- provide recommendations for alteration to design or construction methods where necessary to minimise negative impacts
- make recommendations in accordance with Australian Standard 4970–2009: *Protection of Trees on Development Sites* to ensure the viable, long-term retention of trees to be retained where appropriate

1.2. Project Location

The proposal applies to all land at 28-30 Burrows Rd, St Peters NSW. The site comprises two allotments on the southern side of Burrows Rd.

Existing attributes of the site are noted as follows:

- The site is currently occupied by two industrial/warehouse buildings.
- The greater portion of the site is concrete or hardstand with a small garden area in the northwestern corner.
- The site is accessed via two existing vehicle crossovers from Burrows Road.

Table 2: Site Information

Allotment Type	Industrial
Address	28-30 Burrows Rd, St Peters NSW
Local Government Area (LGA)	Council of the City of Sydney
Lot & DP Number	Lot 2 DP 212652 Lot 15 DP 32332

Zoning and Local Environment Plan (LEP)	IN1 General Industrial under the Sydney Local Environmental Plan 2012 (SLEP 2012)
Site/Study Area	7,961 m^2

1.3. Project Area

The project area comprises the overall potential area of direct disturbance or impact by the project.

This may be temporary for construction or permanent for operational infrastructure and extend below the ground surface.

Note that proposed laydown areas have not been formally provided, and their impacts have not been assessed. However, the recommendations of this report will guide the placement of these areas.

1.4. Reviewed Plans and Documents

This report has relied on the following plans and documents:

Table 3: Reviewed Plans and Documents

Title	Author	Dwg. No.	Revision	Date
DETAIL SURVEY OF LOT 2 IN DP212652 AND LOT 15 IN DP32332	Land Partners Surveying and Planners	SY075517.000.1.1	N/A	25/03/2022
GROUND FLOOR PLAN	PACE Architects	220507 - CT101	10	08/08/2022
SYDNEY FLIGHT TRAINING CENTRE SSDA DOCUMENTATION	PACE Architects	CT100-CT212	16	20/09/2022
DRAWING LIST & GENERAL NOTES	Costin Roe Consulting	C014585.00-DA10	A	01/07/2022
EROSION & SEDIMENT CONTROL PLAN	Costin Roe Consulting	C014585.00-DA20	A	01/07/2022
EROSION SEDIMENT CONTROL DETAILS	Costin Roe Consulting	C014585.00-DA25	A	01/07/2022
BULK EARTHWORKS PLAN	Costin Roe Consulting	C014585.00-DA30	A	01/07/2022
BULK EARTHWORKS SECTION - SHEET 1	Costin Roe Consulting	C014585.00-DA35	A	01/07/2022
STORMWATER DRAINAGE PLAN	Costin Roe Consulting	C014585.00-DA40	A	01/07/2022
STORMWATER DRAINAGE LONG SECTIONS - SHEET 1	Costin Roe Consulting	C014585.00-DA45	A	01/07/2022
STORMWATER DRAINAGE DETAILS- SHEET 2	Costin Roe Consulting	C014585.00-DA46	A	01/07/2022
FINISHED LEVELS PLAN	Costin Roe Consulting	C014585.00-DA50	A	01/07/2022

1.5. Development Description

The proposal entails the construction of a three-storey flight training facility, which includes:

- Demolition of all existing buildings and structures (to be undertaken separately under CDC)

- Site preparation works including tree clearing (to be undertaken separately under CDC)
- Earthworks (largely fill) to achieve varying R.L's depending on the proposed building element.
- Infrastructure comprising civil works and utilities servicing
- Two vehicular crossovers from Burrows Rd
- Construction of the training facility
- Complementary landscaping and offset planting.

The layout of the proposal is shown in Figure 1.

Figure 1: Site location and project layout.

1.6. Planning Controls

The report has considered the provisions of the Sydney Local Environmental Plan (SLEP) 2012 and the City of Sydney Development Control Plan (SDCP) 2012.

1.7. Tree Management Controls

Prescribed trees within the City of Sydney are protected under Part 3.5.3 of the SDCP made pursuant to Chapter 2 of the State Environmental Planning Policy (Biodiversity and Conservation) 2021 (the BCSEPP). The SDCP generally protects all trees and palms as 'declared vegetation' that meet the following:

- has a height of 5m or more; or
- has a canopy spread of over 5m; or
- has a trunk diameter of more than 300mm, measured at ground level; or
- is listed in the Register of Significant Trees

Some exemptions related to tree species do apply to site trees.

2. Scope

Detail the health and condition of site trees and those on adjoining properties that may be affected by the proposed works. This will be undertaken to derive tree retention values within the landscape, based on any heritage, environmental and arboricultural principles.

Provide as an outcome of the assessment, the following:

- a description of the trees
- observations made
- retention values
- discussion of the effects the location of the proposed works may have on the trees
- make recommendations required for remedial or other works to the trees, if and where appropriate
- provide a description of the works or measures required to ameliorate the impact upon the trees to be retained; by the proposed building works or future impacts the trees may have upon the new building works if and where appropriate;
- or discuss the possible benefits of removal and replacement, if appropriate, for the medium to the long-term amenity of the site.

3. Method

3.1. Data Collection

To record each tree's above-ground health and condition, a Visual Tree Assessment (VTA), adapted from (Lonsdale, 1999), was undertaken from ground level on 26 July 2022 by Kane Hollstein.

This involved an inspection of:

- Tree health and structural condition; both long and short term
- Site conditions
- Amenity value
- Heritage value
- Habitat value
- Environmental value

All diameter measurements were taken with a diameter tape or forestry callipers. All height and canopy spread values were estimated. Any offset measurements were measured with a tape measure.

Data was collected using GIS software linked to a Trimble Catalyst DA-2 GPS antenna with 1cm-2cm accuracy in optimal GPS conditions. Where trees were located on the survey plan, the locations were corrected using the following parameters:

- Locations were corrected to the dwg survey plan where present.
- Where absent from the survey, the GPS location was used. Using this method, locations may be +- 1m due to tree canopies and GPS interference.

Proposed plans were georeferenced to the survey plan and impacts were assessed in GIS software.

3.2. Useful Life Expectancy

Estimated remaining Useful Life Expectancy (ULE) has been derived using a modified version of the TreeAZ SULE method (Barrell, 2009). An explanation of attributes required to achieve each category can be found in Appendix A.

3.3. Retention Value

The trees have been allocated a significance rating determined using the Tree Significance - Assessment Criteria of the IACA Significance of a Tree, Assessment Rating System (STARS)©. An explanation of attributes required to achieve each category can be found in Appendix A.

Tree retention value has been assessed using the Retention Value - Priority Matrix of the IACA Significance of a Tree, Assessment Rating System (STARS) © which is a matrix assessment of

landscape significance and estimated Useful Life Expectancy. An explanation of attributes required to achieve each category can be found in Appendix A.

3.4. Tree Protection Zone and Structural Root Zone

The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) methods have been derived from the Australian Standard 4970–2009: Protection of Trees on Development Sites (Standards Australia Limited, 2009). The radius of the TPZ is calculated for each tree by multiplying its Diameter at Breast Height (DBH) by 12.

$$\text{TPZ radius} = \text{DBH} \times 12$$

In the event the crown spread of the tree extends beyond this offset; the TPZ may be adjusted to the outer extent of the crown spread.

The SRZ is the area around the base of a tree required for the tree's stability in the ground. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64$$

4. Observations

4.1. The Site

The site is currently occupied by two industrial/warehouse buildings and hardstand areas. The site possessed a relatively flat gradient and southeasterly aspect. The Alexandra Canal was located to the south.

4.2. Site Soils

Site soils are expected to deviate from their natural state due to past urban development, which corresponds to the site being located on the Disturbed Terrain soil landscape. This soil landsape is described as 'level plain to hummocky terrain, extensively disturbed by human activity, including complete disturbance, removal or burial of soil. Local relief <10 m, slopes <30%. Landfill includes soil, rock, building and waste materials. Original vegetation completely cleared, replaced with turf or grassland.' (Department of Planning, Industry and Environment, 2020)

Soils of the Disturbed Terrain landscape are characterised by 'turfed fill areas commonly capped with up to 40 cm of sandy loam or up to 60 cm of compacted clay over fill or waste materials.' (Department of Planning, Industry and Environment, 2020)

Vegetation of this soil landscape is described as 'completely cleared. Disturbed terrain may be bare or covered with opportunist weeds such as cobbler's peg *Bidens pilosa*, purple top *Verbena bonariensis* and ribwort *Plantago lanceolata*. Most areas are eventually turned to grassland or lawn. Species typically include kikuyu *Pennisetum clandestinum*, couch *Cynodon dactylon* and paspalum *Paspalum dilatatum*.' (Department of Planning, Industry and Environment, 2020)

4.3. Additional Legislative Protections

The following relevant Government environmental and heritage mapping and overlays have been reviewed (SEED - NSW Government, 2022). Table 4 indicates the presence of the items on site.

Table 4: Mapping Overlays

NSW OEH	Present on Site
Threatened Ecological Communities (TEC) Greater Sydney	☐
State Heritage Register	☐
DCP/LEP	
Heritage	☐
Terrestrial Biodiversity	☐
Environmentally Sensitive Land	☐

The site is not a listed heritage item or within a heritage conservation area. The state heritage-listed Alexandra Canal was located to the south of the site, outside the boundary.

The site is not mapped to contain any vegetation of heightened environmental significance.

The 10/50 Vegetation Clearing Scheme was introduced following the 2013 bushfires in which more than 200 properties were destroyed. The entitlement allows landowners within a designated 10/50 vegetation clearing entitlement area to clear trees if any part of the trunk that measures more than 30 centimetres in circumference (around the trunk) at the height of 1.3 metres above the ground, is within 10 metres of the external wall of a building (NSW Rural Fire Service, 2020). This also applies to multi-stemmed trees.

The site is not within a designated 10/50 vegetation clearing entitlement area.

4.4. Summary of Tree Observations

Complete tree attributes and observations can be found in Appendix B - Tree Assessment Schedule. A total of 17 trees were assessed. Trees 6, 13, 15 and 17 were absent from provided plans and documents so our collected GPS position has been used for assessment.

Trees 2-11 were located in the council verge to the north of the site, south of Burrows Rd. Tree 17 was located in the adjoining property to the west.

Trees 1 and 16 appeared to be self-sown and had established between concrete footings and paths to the rear of the property.

No trees were observed to possess hollow bearing parts capable of supporting large fauna.

A subset of data and photos of each tree can be accessed using this link.

Table 5 summarises the mix of species.

Table 5: Tree Species Summary

Botanical Name	Total
Allocasuarina littoralis	1
Celtis sinensis	2
Corymbia citriodora	1
Cupaniopsis anacardioides	4
Eucalyptus nicholii	1
Eucalyptus scoparia	2
Melaleuca quinquenervia	4
Melia azedarach	1
Tristaniopsis laurina 'Luscious'	1
Grand Total	**17**

Table 6 summarises total trees by origin.

Table 6: Tree Origin Summary

Origin	Total
Exotic	2
Indigenous	4
Native	11
Grand Total	**17**

Table 7 summarises the trees' legislated protection status under the SDCP. This assessment considers the size of the tree as being exempt due to their species as they are under 10m in height.

Table 7: Tree Legislated Protection Status

DCP Status	No. of trees	Tree Numbers
Protected	15	2 3 4 5 6 7 8 9 10 11 12 13 14 15 17
Exempt	2	1 16
N/A	0	
Total	**17**	

4.5. Tree Significance

Tree significance has been determined using the Tree Significance - Assessment Criteria of the IACA Significance of a Tree, Assessment Rating System (STARS)© (IACA, 2010).

Tree 17 was determined to possess a High Landscape Significance Rating due to it being:

- in good condition and good vigour;
- having a form typical for the species;
- 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;
- 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;

Table 8: Landscape Significance Rating

Landscape Value	No. of trees	Tree Numbers
1 (High)	1	17
2 (Medium)	5	2 4 5 10 14
3 (Low)	9	3 6 7 8 9 11 12 13 15
4 (Environmental Pest / Noxious Weed)	2	1 16
5 (Hazardous / Irreversible Decline)	0	
Total	**17**	

4.6. Retention Value

Determined using the Retention Value - Priority Matrix of the *IACA Significance of a Tree, Assessment Rating System* (STARS) © (IACA, 2010) which is a matrix assessment of landscape significance and estimated Useful Life Expectancy. Tree retention values are summarised in Table 9. Trees located under power lines were generally given a shorter estimated life expectancy due to the ongoing loss of foliage and arboricultural issues arising from continued line clearance works.

Table 9: Retention Value

Retention Value	No. of trees	Tree Numbers
High - Priority for Retention	1	17
Medium - Consider for Retention	8	2 4 5 6 7 8 9 12
Low - Consider for Removal	6	3 10 11 13 14 15
Priority for Removal	2	1 16
Total	**17**	

4.7. High Retention Value Trees

These trees are considered important for retention and should be retained and protected. Design modification or re-location of buildings should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970-2009 *Protection of trees on development sites*. Tree sensitive construction must be implemented e.g. pier and beam, etc if works are to proceed within the Tree Protection Zone

4.8. Medium Retention Value Trees

These trees may be retained and protected. These are considered less critical; however, their retention should remain a priority, with removal only if adversely affecting the proposed building/works and all other alternatives have been exhausted.

4.9. Low Retention Value Trees

These trees are not important for retention, nor require special works or design modifications to be implemented for their retention.

4.10. Priority for Removal Trees

These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

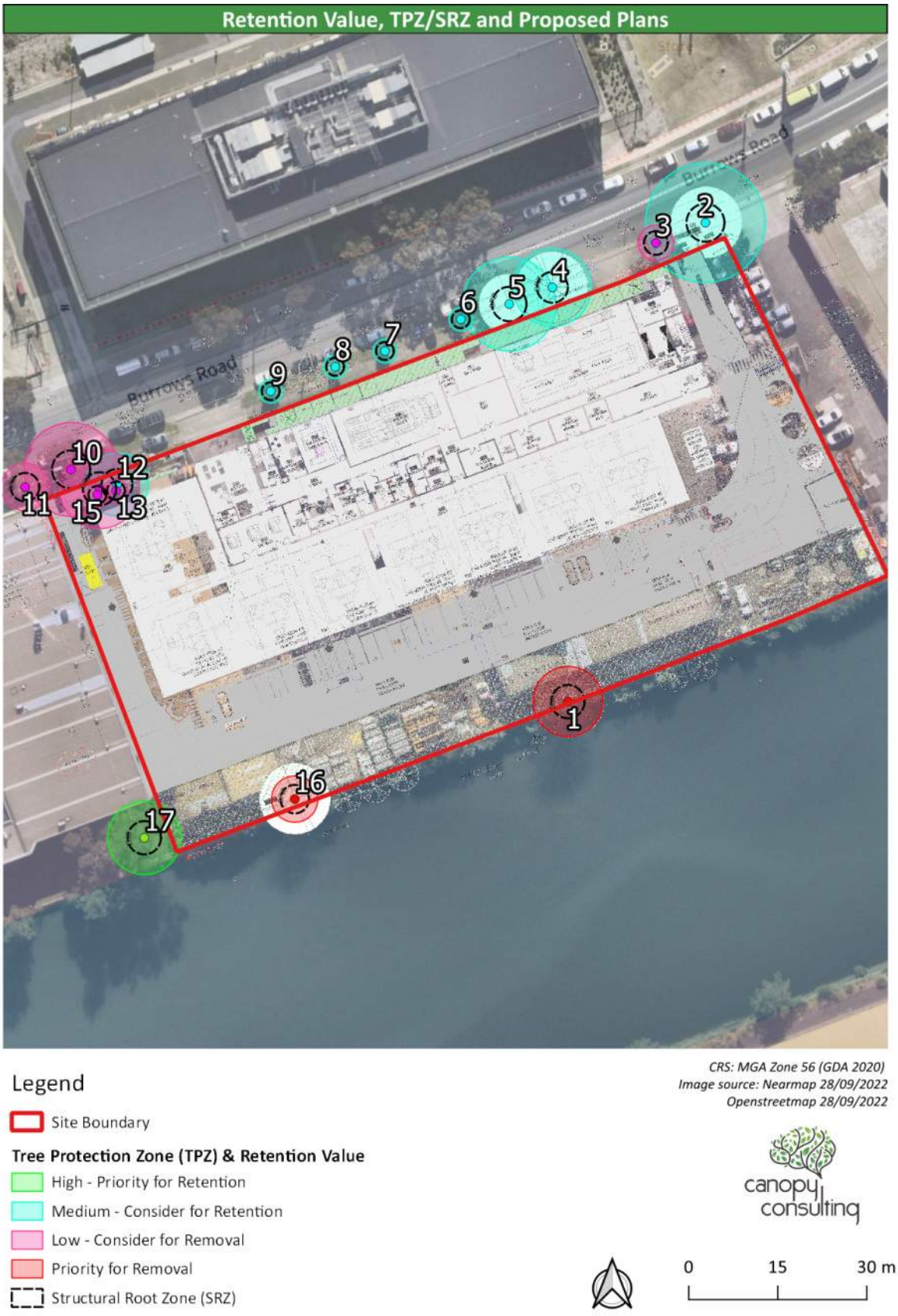


Figure 2: Map showing retention values, tree protection zones, structural root zones and overlaid plans.

5. Discussion

5.1. Tree Protection Zone (TPZ)

The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk. Application of the TPZ is intended to ensure the protection of the root system and canopy from potential damage incurred from construction works and ensure the long-term health, stability and landscape viability of each tree to be retained.

Incursions into the TPZ may occur due to excavation, modification of existing ground levels, trenching or inverting the soil profile. Such works may damage part or all of the root system or affect soil structure and growing conditions required for long-term growth.

5.2. Structural Root Zone (SRZ)

The Structural Root Zone (SRZ) is the area required for mechanical support and anchorage of a tree. The woody root growth and soil cohesion in this area are required to hold a tree upright.

Incursions into the SRZ are not recommended as they are likely to result in loss or damage to woody roots which may significantly affect stability. However, fully elevated, pier and beam type construction or hand-dug services are possible within the SRZ.

5.3. Acceptable Encroachments into the TPZ

An encroachment of less than 10% of the entire TPZ is considered minor provided it is outside the SRZ and the area lost is compensated for elsewhere and contiguous to the TPZ.

A major encroachment is considered to be greater than 10% of the entire TPZ area. Where unavoidable, exploratory excavation using non-destructive methods such as pneumatic, hydraulic or hand digging may be required to evaluate the extent of potential damage to the root system and determine whether the tree(s) will remain viable. The area lost to encroachment should be compensated for elsewhere and contiguous to the TPZ.

Additional encroachments within the TPZ are acceptable, provided the arborist can demonstrate the tree(s) will remain viable.

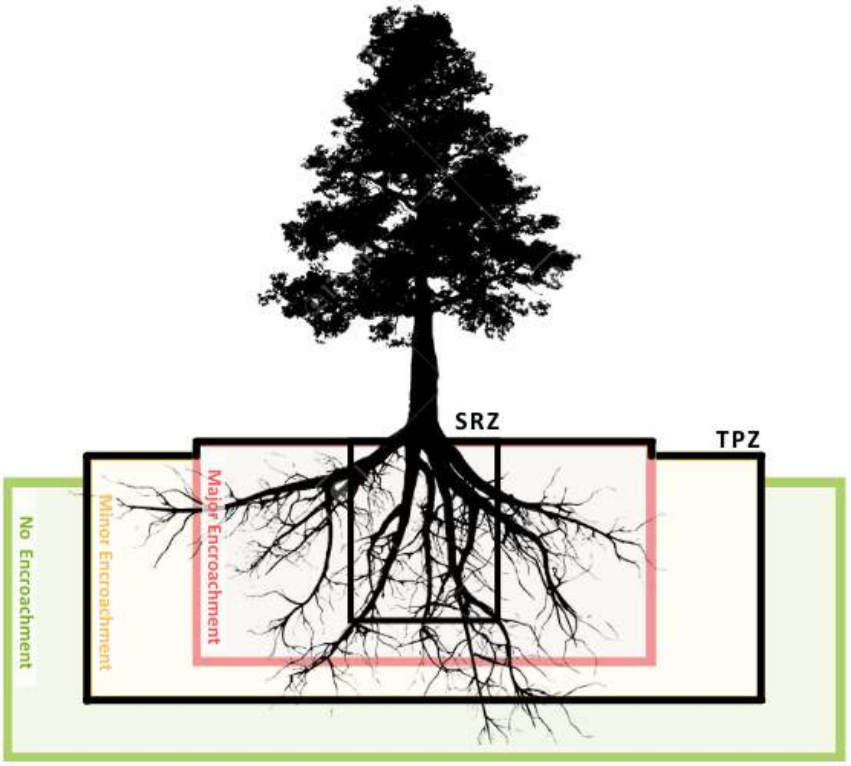


Figure 3: Indicative zones of TPZ and SRZ encroachment.

5.4. Impact Assessment

Where plans and documents have been provided, the following criteria have been considered to determine the impact to site trees that may occur due to the proposed development:

- Existing ground levels (R.L)
- Footprint of the proposed development
- Extent of the TPZ/SRZ
- Incursion into the TPZ including any cut, fill, benching and shoring activities beyond the development footprint.
- Incursions to the tree canopy from the building or temporary structures (scaffolding)
- Existing site and soil conditions

The impacts of the proposed development are summarised in Table 10.

Table 10: Impact Assessment Schedule

		Retention Value				
Recommendation	***Encroachment Type***	**High - Priority for Retention**	**Medium - Consider for Retention**	**Low - Consider for Removal**	**Priority for Removal**	**Grand Total**
Remove	**Major**		2	6	2	10
Remove Total			2	6	2	10
Retain - generic	**Nil**		4			4
Retain - generic Total			4			4
Retain - no protection	**Minor**	1				1
Retain - no protection Total		1				1
Retain - specific	**Major - manageable**		2			2
Retain - specific Total			2			2
Grand Total		**1**	**8**	**6**	**2**	**17**

No tree protection measures may be recommended if the tree(s) are outside the expected area of construction or will not be subject to a major TPZ encroachment either due to direct or indirect construction factors.

Generic tree protection measures include tree protection fencing, trunk and/or branch protection and restriction of activities within the TPZ.

Specific tree protection measures include generic tree protection measures plus supervision of works within the TPZ and may include, in combination:

- The use of root-sensitive construction techniques
- Design revision
- Routing services outside the TPZ
- Root mapping

A total of ten trees will be subject to major, unmanageable TPZ encroachments due to the proposed construction of the facility and connecting vehicle crossovers and demolition, and will therefore require removal. Of these:

- Four are council street trees (T2, T3, T10, T11)
- None are High Retention Value

- Two (T2 & T12) are Medium Retention Value
- Six (T3, 10, 11, 13, 14 & 15) are Low Retention Value
- Two (T1 & T16) are a Priority for Removal as they are a weed species and exempt under the SDCP. The stability of these trees will be affected during demolition.

The remaining trees are recommended to be retained with a mix of generic and specific tree protection measures.

A total of two trees (T4 & T5) have major TPZ encroachments of 20% and 25%, respectively which will be subject to grading works of up to 0.1m. The percentage for permanent hard infrastructure is considered to be minor (1% & 6%, respectively) with the remaining encroachment for landscaping. Possible additional encroachments may be realised during demolition. These trees can be retained with the following requirements:

- Trunk protection is to be installed.
- Demolition and earthworks are to be supervised by the project arborist.
- Landscaping works are not to require a significant increase or decrease (+- 100mm) in grade.
- Works are to be designed to have the least impact on tree roots.

One tree numbered 17 has a minor TPZ encroachment for landscaping works. This tree can therefore be retained with no tree protection as the existing fence line will serve as tree protection fencing.

The proposed development would therefore see the removal of a total of ten trees and retention of seven.

Tree no.	Retention Value	Encroachment into TPZ/SRZ	Encroachment % Hardstand	Encroachment % Landscape	Total Encroachment %	Encroachment Type	Likely Impact	Recommendation	Specific Recommendation
1	Priority for Removal	53% TPZ/SRZ encroachment for landscaping	0%	53%	53%	**Major**	Tree will become unstable following demolition of existing concrete surrounds as this likely provide structural support	Remove	
2	Medium - Consider for Retention	Tree within proposed new vehicle crossover which enters the SRZ	35%	0%	35%	**Major**	Not viable for retention due to location of works and method of construction	Remove	
3	Low - Consider for Removal	Tree within proposed new vehicle crossover which enters the SRZ	33%	0%	33%	**Major**	Not viable for retention due to location of works and method of construction	Remove	
4	Medium - Consider for Retention	Demolition of existing structures within TPZ. 1% TPZ encroachment for proposed building & 20% TPZ encroachment for proposed landscaping.	1%	19%	20%	**Major - manageable**	Impacts are manageable to TPZ as roots are likely to have been deflected by existing structures and landscaping appears to maintain a similar R.L. Tree is viable for retention as landscaping works can be designed to be low impact	Retain - specific	Supervised excavation during demolition and tree sensitive landscaping

Tree no.	Retention Value	Encroachment into TPZ/SRZ	Encroachment % Hardstand	Encroachment % Landscape	Total Encroachment %	Encroachment Type	Likely Impact	Recommendation	Specific Recommendation
5	Medium - Consider for Retention	Demolition of existing structures within TPZ. 6% TPZ encroachment for proposed building & 18% TPZ encroachment for proposed landscaping.	6%	18%	25%	**Major - manageable**	Impacts are manageable to TPZ as roots are likely to have been deflected by existing structures and landscaping appears to maintain a similar R.L. Tree is viable for retention as landscaping works can be designed to be low impact	Retain - specific	Supervised excavation during demolition and tree sensitive landscaping
6 7 8 9	Medium - Consider for Retention	No direct encroachment	0%	0%	0%	**Nil**	No significant impact expected provided tree protection measures are installed and maintained	Retain - generic	Trunk protection
10 11	Low - Consider for Removal	Tree within the proposed new vehicle crossover and stormwater enters the SRZ.	40% 15%	6% 0%	45% 15%	**Major**	Not viable for retention due to location of works and method of construction	Remove	
12	Medium - Consider for Retention	Tree within proposed new vehicle crossover, building footprint and stormwater which enters the SRZ	48%	25%	73%	**Major**	Not viable for retention due to location of works and method of construction	Remove	

Tree no.	Retention Value	Encroachment into TPZ/SRZ	Encroachment % Hardstand	Encroachment % Landscape	Total Encroachment %	Encroachment Type	Likely Impact	Recommendation	Specific Recommendation
13 14 15	Low - Consider for Removal	Tree within proposed new vehicle crossover, building footprint and stormwater which enters the SRZ	65% 60% 59%	35% 16% 41%	100% 76%	**Major**	Not viable for retention due to location of works and method of construction	Remove	
16	Priority for Removal	71% TPZ/SRZ encroachment for landscaping	0%	71%	71%	**Major**	Tree will become unstable following demolition of existing concrete surrounds as this likely provide structural support	Remove	
17	High - Priority for Retention	10% TPZ encroachment for proposed landscaping works with only minor fill proposed.	0%	10%	10%	**Minor**	Encroachment is permissible under the standard as the area lost can be offset contiguous	Retain - no protection	

5.5. Impact Mitigation Measures

TPZ encroachments should be offset and mitigated using a range of possible measures to ensure impacts are minimised and therefore trees remain viable post construction. Mitigation measures should be increased relative to the level of encroachment within the TPZ.

AS 4970-2009 outlines the types of TPZ encroachment and mitigation measures required to ensure long term viability which are summarised in Table 11. These measures are only required if a tree is to be retained.

Table 11: Mitigation Measures

Encroachment Type	Mitigation Measures
Nil	• Where indirect or inadvertent encroachments may occur due to haul routes or machinery movement tree protection should be installed.
Minor	• The area lost to encroachment must be offset elsewhere and contiguous to the TPZ. • Detailed root investigations should not be required. • Tree protection must be installed and maintained.
Major	• The Project Arborist must demonstrate the tree(s) will remain viable. • Root investigations using non-destructive methods may be required to clarify or confirm the impacts to trees to be retained. • The area lost to encroachment must be offset elsewhere and contiguous to the TPZ. • All works and excavations within the TPZ must be supervised by the Project Arborist. • Tree protection must be installed and maintained for the duration of the project. • Additional measures such as mulching or temporary irrigation may be required.

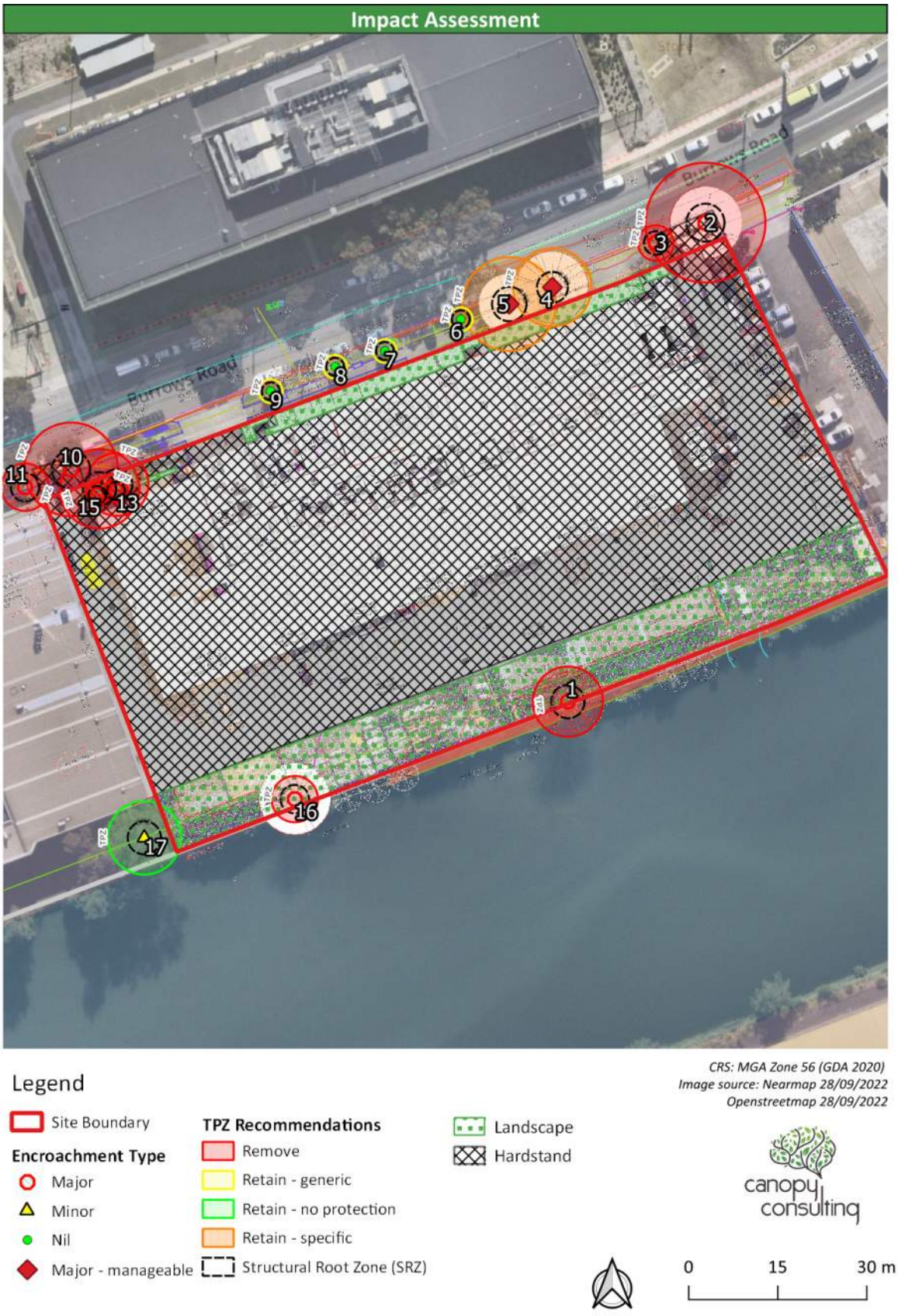


Figure 4: Impact Assessment

6. Recommendations

6.1. Project Arborist

An official "Project Arborist" must be commissioned to oversee the tree protection, any works within the TPZ's and complete regular monitoring compliance certification.

The project arborist must have minimum five (5) years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and Diploma level qualifications in arboriculture – AQF Level 5.

6.2. Tree Retention and Removal

The recommendations of this report do not constitute consent to remove trees subject to this report. The council or consent authority should be contacted prior to undertaking works as consent may be required to remove and/or prune the tree(s).

Table 12 summarises tree removal and retention and is shown in the tree removal and retention plan. Ten trees require removal to facilitate the proposed development.

Table 12: Tree Retention and Removal

Recommendation	No. of tree	Tree Numbers
Remove	10	1 2 3 10 11 12 13 14 15 16
Retain - no protection	1	17
Retain - specific	2	4 5
Retain - generic	4	6 7 8 9
Total	**17**	

Two trees numbered 4 and 5 are recommended to be retained and protected with the following measures:

- Trunk protection is to be installed.
- Demolition is to be supervised by the project arborist.
- Landscaping works are not to require a significant increase or decrease (+- 100mm) in grade.
- Works are to be designed to have the least impact on tree roots.

Trees 6-9 are small trees that are recommended to be retained and protected with trunk protection only.

Tree 17 is recommended to be retained and protected with the existing boundary fence line to serve as protection fencing.

Trees marked for removal are to be physically marked with paint prior to site establishment as per the approved TPMP. Before removal, the Project Arborist must confirm that all marked trees correspond with those shown in Appendix B - Tree Assessment Schedule and Appendix C – Tree Protection Management Plan.

Tree removal is to be carried out prior to the erection of protection fencing. Under no circumstances are trees marked for retention within protection areas to be damaged. Vehicles and heavy machinery used by contractors are also to be kept clear of these protection areas.

Stumps to be removed from within protection areas are to be removed in a manner that avoids damaging or disturbing roots of trees to be retained. This may include stump grinding or careful 'picking' of the stumps with machinery. Both methods are to be approved by the Project Arborist.

6.3. Specific Tree Protection Measures

Table 13 shows specific tree protection measures that are required to ensure the trees nominated for retention remain viable post-construction. These measures are to be read in conjunction with Appendix D – Tree Protection Management Plan (TPMP). The TPMP indicates the position of tree protection devices and other measures to ensure the protection of trees within the site to be retained as part of the proposed development.

Table 13: Specific Tree Protection Measures

Specific Recommendation	No. of tree	Tree Numbers
Trunk protection	4	6 7 8 9
Supervised excavation during demolition and tree-sensitive landscaping plus trunk protection	2	4 5
Total	**6**	

6.4. Tree Pruning

Tree 4 will require pruning to clear the proposed building facade and provide clearance for scaffolding.

Trees are to be pruned in accordance with AS 4373-2007: *Pruning of Amenity Tree*s (Standards Australia, 2007).

Trees are to be dismantled and/or removed in such a manner as to avoid damage to adjacent or understory vegetation and structures.

All pruning works should be completed by a minimum AQF Level 3 Arborist or under direct supervision thereof.

Table 14: Pruning schedule

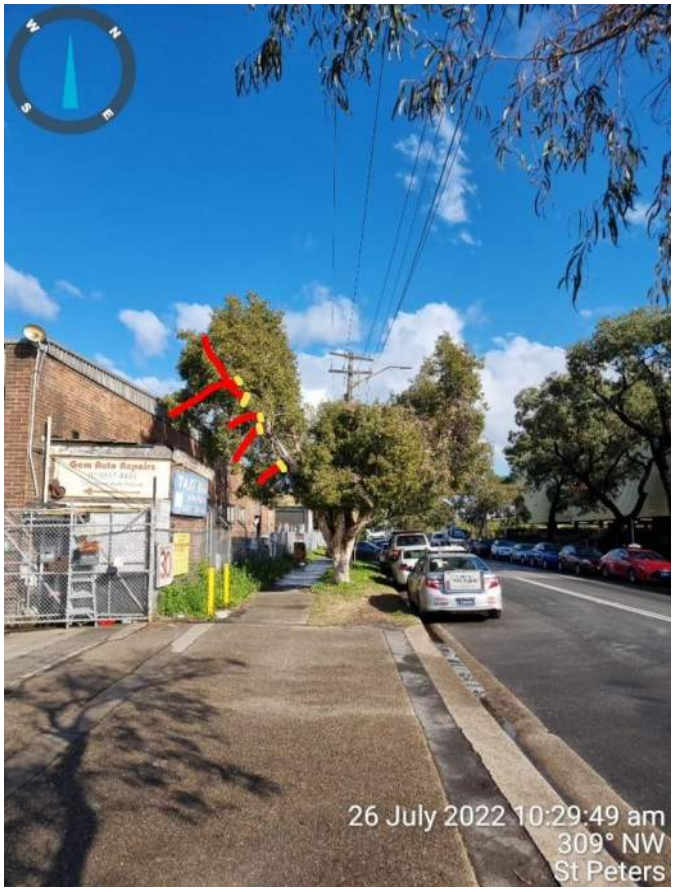
Tree no.	Pruning Class	Cardinal Bearing	Crown % to be pruned	Pruning Required (Diameter of final cut)	Photo
4	Selective & Reduction pruning	South	5-10%	1x70mm 1x50mm 3x30-50mm	

Figure 5: Tree 4 pruning

6.5. Compliance Inspection and Reporting

Compliance inspections are recommended to be completed on a quarterly basis through the construction stage.

Following each inspection, the project arborist shall prepare a document detailing the condition of the trees. These documents should certify whether the works have been completed in compliance with the approved consent conditions relating to tree protection. These reports should contain photographic evidence where necessary.

Inspections are to be conducted by the project arborist at several key points during the construction in order to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.

Any works within tree protection zones are to be monitored and supervised by the Project Arborist.

6.6. Compliance and Certification Reporting – Hold Points

The following project milestones are recommended to be carried out by the project arborist.

These inspections are summarised below and expanded upon in the following sections.

Table 15: Compliance and Certification Table

Construction Stage	Task	Responsibility	Certification	Timing of Inspection
Pre-construction	Indicate clearly (with spray paint or tape on trunks) trees approved for removal only	Principal Contractor	Project Arborist	Prior to site establishment
	Install tree protection measures			
	Induct construction staff into Tree Protection Management Plan			
During Construction	Supervise all excavation works proposed within the TPZ of trees to be retained			As required prior to the works proceeding adjacent to trees to be retained
	Inspection of trees by Project Arborist			Quarterly during construction period
Post-construction	Final Inspection of trees by Project Arborist			Following practical completion of works

6.7. Demolition of Existing Hard Stand Areas

Demolition of existing hard stand areas within the TPZ of trees to be retained may be undertaken using machinery but must be under the supervision of the Project Arborist. Demolition of the ground surfaces must be undertaken from existing hard stand areas or ground protection and should

commence at the outer extent of the existing surface material and move away from trees to be retained.

6.8. Exploratory Root Investigation

Where trees are intended to be retained and potential works areas may enter the TPZ or SRZ, determining root location and therefore the impact to the trees is an important process.

Exploratory root excavation should be undertaken in a manner that causes the least amount of damage to root material in the process. This may include use of air excavation (air-spade) or hydro or dry-vac excavation. Root investigations should be undertaken at pre-agreed locations that will most effectively guide the design.

Findings of the root investigation should be compiled into a report which identifies significant roots that should be retained and less significant roots that may be appropriate for severance. The size and volume of roots which may be cut needs to be assessed by an arborist and consider tree physiology, existing site and soil conditions and species traits and tolerance of root pruning.

6.9. Fill within Tree Protection Zones

Where unavoidable, fill placed within TPZ of trees to be retained shall be well-drained material equivalent or finer in texture than the existing site topsoil material and should comply with AS 4419:2003 *Soils for Landscaping and Garden Use*.

The fill can be lightly consolidated but not to engineering standards. If fill is to be placed by machinery, this must be done from outside the TPZ or from existing hard stand areas. Alternatively, ground, trunk and branch protection may be used to facilitate machine access.

6.10. Pavements within Tree Protection Zones

Any pavements or footpaths within TPZ of trees to be retained should be installed at or above existing grade to minimise the need for excavation to avoid damage or severance of primary woody roots. The pavement sub-base shall be a coarse, gap-graded material with no fines in order to allow some aeration and moisture infiltration to the root zone. The use of permeable pavements, bonded aggregate or cellular confinement systems should be investigated as alternative construction methods.

6.11. Offset Planting

Any tree approved to be removed from a site should be replaced with a tree of like habit and indigenous to the LGA where possible, planted as near as practicable to the location of the removed tree, grown to maturity and replaced if the planting fails to survive and thrive. A replacement planting ratio of 1:5 trees is proposed which will offset the loss of amenity. Consideration should be given to replacing street trees.

Suggested species for replacement include:

- *Angophora costata* (Smooth-barked Apple Myrtle)
- *Corymbia eximia* (Yellow Bloodwood)
- *Tristaniopsis laurina* (Kanooka)
- *Lagerstroemia indica* (Crepe Myrtle)

Trees should be sourced from a reputable nursery with stock grown to NATSPEC and Australian Standard AS 2303:2018 *Tree Stock for Landscape Use* criteria.

Trees should be a minimum of 100L pot size at the time of planting.

The trees should be planted and mulched with suitably composted, natural, hardwood mulch as per Figure 6.

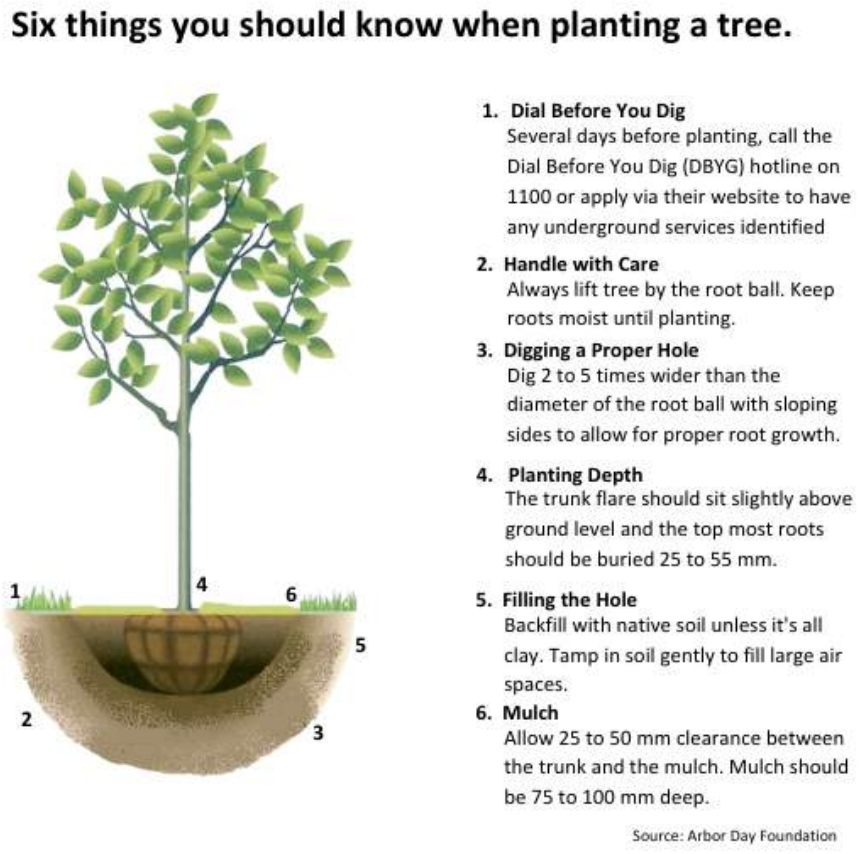


Figure 6: Recommended tree planting process. (Arbor Day Foundation, 2020)

6.12. Landscaping Works within Tree Protection Zones

The landscape plan is to be checked for compliance with the TPMP. Staged removal of tree protection methods may be required to facilitate landscaping works.

Any landscaping works within the TPZ of trees to be retained is to be under the direct Supervision of the Project Arborist. These may include but are not limited to; retaining walls, irrigation and lighting systems, topdressing, planting and paving.

Any landscaping works requiring excavation for drainage or the like is to be undertaken using tree root sensitive methods.

6.13. Trenching for Installation of Underground Services

All underground services should be routed outside the TPZ of trees to be retained. Where unavoidable, services may be installed via alternative methods which may include tree sensitive excavation or Horizontal Directional Drilling (HDD). Where HDD is used, entry and exit pits are to be located outside the TPZ of trees to be retained.

Where excavation or trenching is required to facilitate installation of underground services within the TPZs of any site trees arborist supervision is required. Works should be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:

- Excavation by hand
- Excavation using a high-pressure water jet and vacuum truck
- Excavation using an Air Spade with a vacuum truck.

Machine excavation is prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.

Where a situation occurs that a significant root (root greater than >50 mm diameter) requires pruning or removal, the root is to be severed with a sharp saw implement by or under instruction of the Project Arborist.

7. Tree Protection Methodology – Construction Stage

7.1. Excavations Within Tree Protection Zones

The Project Arborist is to monitor the impacts of demolition, bulk earthworks, installation of temporary infrastructure including building, sediment control and drainage works.

Where the extent of an encroachment is less than 10% of the TPZ, including any excavations for benching and shoring, excavation may be undertaken using conventional construction methods. 10% of the TPZ is equivalent to one-third of the TPZ radius on one side and shown in Figure 7.

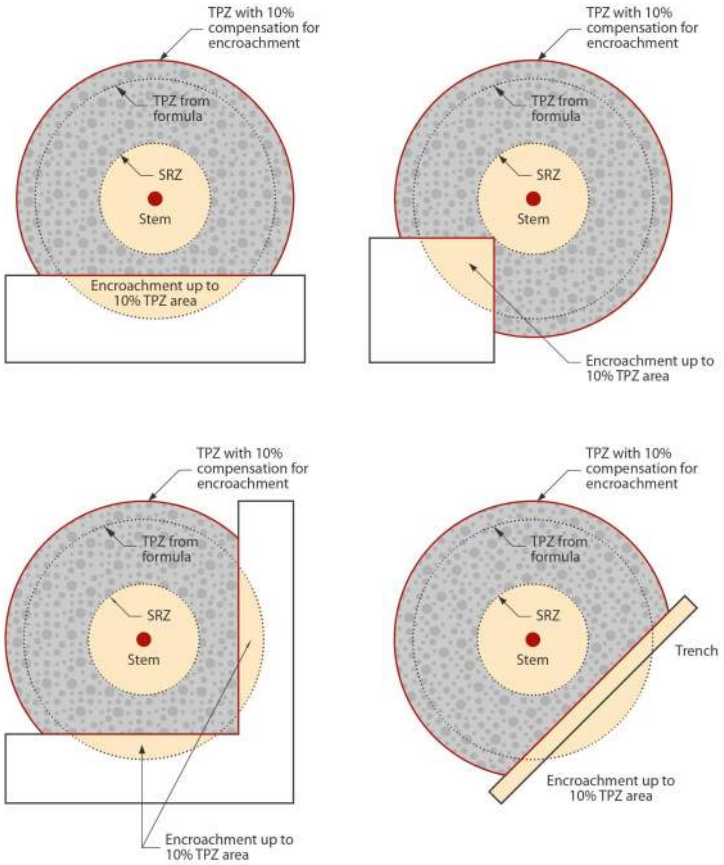


Figure 7: Example of permissible encroachment into the TPZ. (Standards Australia, 2009)

Where the encroachment is to be greater than 10% of the TPZ and prior to any mechanical excavations for building foundations, shoring, retaining wall or pavement subgrade within the TPZ of trees to be retained; exploratory excavation using non-destructive methodology shall be undertaken at the perimeter of the structure, excavation required for shoring, retaining wall or pavement subgrade within the TPZ.

Such techniques include:

- Excavation by hand
- Excavation using a high-pressure water jet and vacuum truck
- Excavation using an Air Spade with a vacuum truck.

The non-destructive excavation shall be undertaken at the outer limits of the structure to the depth of the foundation or excavation, or to a maximum of 800mm below existing surface levels. All care must be taken to prevent the damage or severance of roots greater than 50mm diameter. Any roots encountered that are less than 50mm diameter may be cleanly severed with a sharp pruning implement at the interface of the excavation nearest the tree. The exposed root zone is to be kept

moist by way of geotextile or hessian placed along the open interface of the excavation nearest the tree.

Where roots greater than 50mm diameter are encountered during exploratory excavation, advice from the Project Arborist shall be sought.

7.2. Tree Damage

Care is to be taken when operating cranes, piling rigs or similar near trees to avoid damage to tree canopies. Under no circumstances are branches to be torn off by construction equipment.

8. Tree Protection – Post-construction

8.1. Defects Liability Period

Completion of outstanding building or landscaping works following the construction period must not injure trees.

8.2. Final Certification

The final inspection by the Project arborist should detail the health and condition of the trees and their growing environment and provide recommendations for any necessary remedial actions. These actions may include pruning in accordance with AS4373-2007 *Pruning of amenity trees* and/or soil remediation to repair the growing environment.

On project completion, the project arborist shall certify in writing to the Certifying Authority that the conditions of consent relating to tree protection, tree removal, pruning and planting of new trees have been complied with or, if the conditions have been contravened, detail the extent and nature of the departure from the conditions and their impacts on trees.

9. References

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10. Appendix A - IACA Significance of a Tree, Assessment Rating System (STARS) ©

Tree Landscape Significance - Assessment Criteria

1. High Significance in landscape	2. Medium Significance in landscape	3. Low Significance in landscape
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.	The tree is in fair-good condition and good or low vigour; 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 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 surrounding properties as 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 dimension 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 potential to become structurally unsound. **Environmental Pest / Noxious Weed Species** 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.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group. Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

Estimated Life Expectancy

1. Long	2. Medium	3. Short	4. Remove
Trees that appear to be retainable with an acceptable level of risk for more than 40 years. Structurally sound trees located in positions that can accommodate future growth. Storm damaged or defective trees that could be made suitable for retention in the long term by remedial tree surgery. Trees of special significance for historical, commemorative, or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.	Trees that appear to be retainable with an acceptable level of risk for 15-40 years. Trees that may only live between 15 and 40 more years. Trees that may live for more than 40 years but would be removed to allow the safe development of more suitable individuals. Trees that may live for more than 40 years but would be removed during the course of normal management for safety or nuisance reasons. Storm damaged or defective trees that require substantial remedial work to make safe and are only suitable for retention in the short term.	Trees that appear to be retainable with an acceptable level of risk for 5-15 years. Trees that may only live between 5 and 15 more years. Trees that may live for more than 15 years but would be removed to allow the safe development of more suitable individuals. Trees that may live for more than 15 years but would be removed during the course of normal management for safety or nuisance reasons. Storm damaged or defective trees that require substantial remedial work to make safe and are only suitable for retention in the short term.	Trees with a high level of risk that would need removing within the next 5 years. Dead trees. Trees that should be removed within the next 5 years. Dying or suppressed or declining trees through disease or inhospitable conditions. Dangerous trees through instability or recent loss of adjacent trees. Dangerous trees through structural defects, including cavities, decay, included bark, wounds, or poor form. Damaged trees that are considered unsafe 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 will become dangerous after removal of trees for other reasons.

Tree Retention Value – Priority Matrix

		Landscape Significance Rating				
		1 (High)	2 (Medium)	3 (Low)	4 (Environmental Pest / Noxious Weed)	5 (Hazardous / Irreversible Decline)
Estimated Life Expectancy	Long (>40)	High - Priority for Retention	High - Priority for Retention	Medium - Consider for Retention	Low - Consider for Removal	Priority for Removal
	Medium (15-40)	High - Priority for Retention	Medium - Consider for Retention	Medium - Consider for Retention / Low - Consider for Removal	Low - Consider for Removal	Priority for Removal
	Short (5-15)	Low - Consider for Removal	Low - Consider for Removal	Low - Consider for Removal	Priority for Removal	Priority for Removal
	Dead Or Hazardous (0-5)	Low - Consider for Removal	Priority for Removal	Priority for Removal	Priority for Removal	Priority for Removal

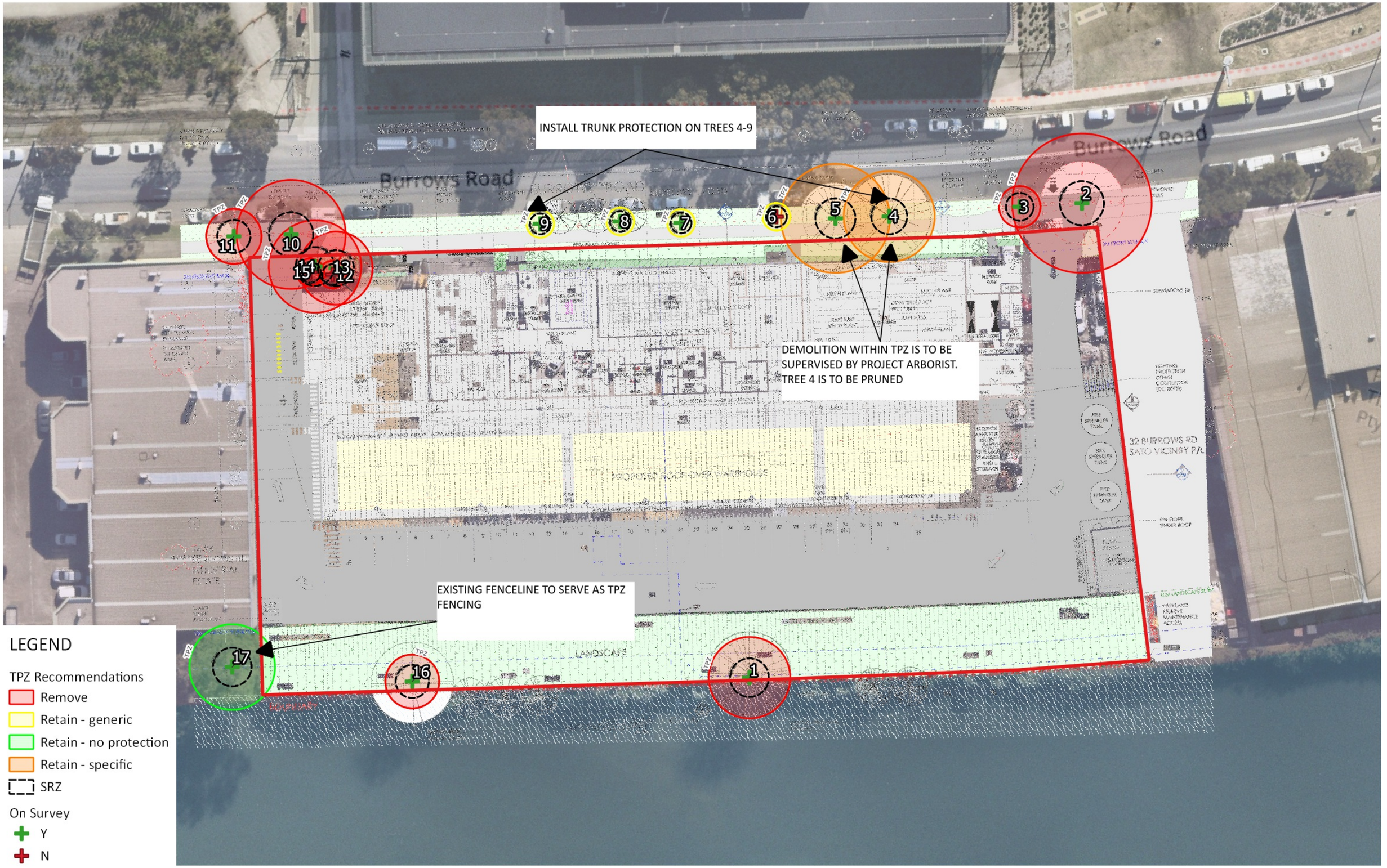
Legend for Matrix Assessment

High - Priority for Retention	These trees are considered important for retention and should be retained and protected. Design modification or re-location of buildings should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4979 *Protection of trees on development sites*. Tree sensitive construction must be implemented e.g. pier and beam, etc if works are to proceed within the Tree Protection Zone
Medium - Consider for Retention	These trees may be retained and protected. These are considered less critical; however their retention should remain a priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered exhausted.
Low - Consider for Removal	These trees are not 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.

11. Appendix B - Tree Assessment Schedule

Tree no.	Botanical Name	Common Name	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Vigour	Structural Condition	Age Class	ULE (Yrs.)	Observations	Comments	DCP Status	Origin	STARS Significance Rating	Retention Value	Recommendation	Specific Recommendation
1	*Celtis sinensis*	Chinese Hackberry	1	49	70	5.9	107.9	2.8	10	11	Good	Fair	Mature	Short (5-15)	Co-dominant stems, Damaging infrastructure	Self sown tree located in canal corridor. Growing beneath concrete slab. Diameters estimated due to access.	Exempt	Exotic	4 (Environmental Pest / Noxious Weed)	Priority for Removal	Remove	
2	*Melaleuca quinquenervia*	Broad-leaved Paperbark	1	84	94	10.1	319.2	3.2	8	9	Good	Fair	Mature	Medium (15-40)	Co-dominant stems, Included bark, Poor pruning	Previously lopped for powerline clearance. Council street tree.	Protected	Indigenous	2 (Medium)	Medium - Consider for Retention	Remove	
3	*Eucalyptus scoparia*	Wallangarra White Gum	1	25	30	3.0	28.3	2.0	4	4	Poor	Poor	Semi-mature	Short (5-15)	Epicormic shoots, Poor pruning, Wound(s)	Previously lopped for powerline clearance. Council street tree.	Protected	Native	3 (Low)	Low - Consider for Removal	Remove	
4	*Melaleuca quinquenervia*	Broad-leaved Paperbark	1	55	55	6.6	136.8	2.6	8	8	Good	Fair	Mature	Medium (15-40)	Co-dominant stems, Included bark, Poor pruning	Previously lopped for powerline clearance. Council street tree.	Protected	Indigenous	2 (Medium)	Medium - Consider for Retention	Retain - specific	Supervised excavation during demolition and tree sensitive landscaping
5	*Melaleuca quinquenervia*	Broad-leaved Paperbark	1	66	75	7.9	197.1	2.9	8	9	Good	Fair	Mature	Medium (15-40)	Co-dominant stems, Included bark, Poor pruning	Previously lopped for powerline clearance. Council street tree.	Protected	Indigenous	2 (Medium)	Medium - Consider for Retention	Retain - specific	Supervised excavation during demolition and tree sensitive landscaping
6	*Cupaniopsis anacardioides*	Tuckeroo	1	11	12	2.0	12.6	1.5	2	2	Good	Good	Juvenile	Medium (15-40)	Wound(s)	Council street tree. Location under power lines limits ULE.	Protected	Native	3 (Low)	Medium - Consider for Retention	Retain - generic	Trunk protection
7	*Tristaniopsis laurina 'Luscious'*	Water Gum	1	11	15	2.0	12.6	1.5	2	2	Good	Good	Juvenile	Medium (15-40)	Wound(s)	Council street tree. Location under power lines limits ULE.	Protected	Native	3 (Low)	Medium - Consider for Retention	Retain - generic	Trunk protection
8	*Cupaniopsis anacardioides*	Tuckeroo	1	11	12	2.0	12.6	1.5	2	2	Good	Good	Juvenile	Medium (15-40)	Wound(s)	Council street tree. Location under power lines limits ULE.	Protected	Native	3 (Low)	Medium - Consider for Retention	Retain - generic	Trunk protection
9	*Cupaniopsis anacardioides*	Tuckeroo	1	11	14	2.0	12.6	1.5	2	2	Good	Good	Juvenile	Medium (15-40)	Wound(s)	Council street tree. Location under power lines limits ULE.	Protected	Native	3 (Low)	Medium - Consider for Retention	Retain - generic	Trunk protection
10	*Melaleuca quinquenervia*	Broad-leaved Paperbark	1	66	89	7.9	197.1	3.2	7	7	Good	Fair	Mature	Short (5-15)	Co-dominant stems, Included bark, Poor pruning	Previously lopped for powerline clearance. Council street tree. Heavily unbalanced crown.	Protected	Indigenous	2 (Medium)	Low - Consider for Removal	Remove	
11	*Eucalyptus scoparia*	Wallangarra White Gum	1	33	47	4.0	49.3	2.4	6	9	Fair	Poor	Semi-mature	Short (5-15)	Epicormic shoots, Over-extended branch(es), Poor pruning, Wound(s)	Previously lopped for powerline clearance which has caused a severely unbalanced crown. Council street tree.	Protected	Native	3 (Low)	Low - Consider for Removal	Remove	
12	*Allocasuarina littoralis*	Black Sheoak	1	44	55	5.3	88.0	2.6	8	5	Fair	Fair	Mature	Medium (15-40)	Co-dominant stems, Deadwood minor (<3cm diameter), Dieback, Included bark		Protected	Native	3 (Low)	Medium - Consider for Retention	Remove	
13	*Cupaniopsis anacardioides*	Tuckeroo	1	7	10	2.0	12.6	1.5	2	2	Good	Fair	Juvenile	Short (5-15)	Suppressed	Heavily suppressed, self sown tree.	Protected	Native	3 (Low)	Low - Consider for Removal	Remove	
14	*Eucalyptus nicholii*	Narrow Leaved Peppermint	1	56	66	6.7	141.9	2.8	9	7	Fair	Fair	Mature	Short (5-15)	Deadwood moderate (3-10cm diameter), Dieback, Wound(s)	Mature example of the species that does not readily tolerate decay with multiple large trunk wound.	Protected	Native	2 (Medium)	Low - Consider for Removal	Remove	
15	*Melia azedarach*	White Cedar	1	9	10	2.0	12.6	1.5	5	3	Good	Good	Juvenile	Short (5-15)	Suppressed	Small self sown tree.	Protected	Native	3 (Low)	Low - Consider for Removal	Remove	
16	*Celtis sinensis*	Chinese Hackberry	1	33	45	3.9	47.9	2.4	10	10	Good	Poor	Mature	Short (5-15)	Co-dominant stems, Damaging infrastructure	Self sown tree located in canal corridor. Growing beneath concrete slab.	Exempt	Exotic	4 (Environmental Pest / Noxious Weed)	Priority for Removal	Remove	
17	*Corymbia citriodora*	Lemon-scented Gum	1	52	65	6.2	122.3	2.8	19	13	Good	Good	Mature	Long (>40)		Located on adjoining property to south.	Protected	Native	1 (High)	High - Priority for Retention	Retain - no protection	

12. Appendix C – Tree Protection Management Plan



LEGEND

TPZ Recommendations

- Remove
- Retain - generic
- Retain - no protection
- Retain - specific
- SRZ

On Survey

- Y
- N

0 5 10 15 20 25 m

SCALE: 1:500@A3

REV	DESCRIPTION	DATE
A	DRAFT	10/08/2022
B	SSDA	30/09/2022

TREE PROTECTION MANAGEMENT PLAN

PROPOSED INDUSTRIAL DEVELOPMENT
CLIENT: LOGOS PROPERTY
SITE: 28-30 BURROWS RD, ST PETERS NSW

JOB No. E-001620-22
DWG No. TPMP.01
DRAWN KH

canopy consulting
PO Box 902
Five Dock NSW 2046

TREE PROTECTION MANAGEMENT PLAN
28-30 BURROWS RD, ST PETERS NSW

PROJECT ARBORIST

An official "Project Arborist" must be commissioned to oversee the tree protection, any works within the TPZ's and complete regular monitoring compliance certification.
The project arborist must have minimum five (5) years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and Diploma level qualifications in arboriculture – AQF Level 5.

COMPLIANCE INSPECTION AND REPORTING

Compliance inspections are recommended to be completed on a quarterly basis through the construction stage.
Following each inspection, the project arborist shall prepare a document detailing the condition of the trees. These documents should certify whether the works have been completed in compliance with the approved consent conditions relating to tree protection. These reports should contain photographic evidence where necessary.
Inspections are to be conducted by the project arborist at several key points during the construction in order to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.
Any works within tree protection zones are to be monitored and supervised by the Project Arborist.

TRUNK BRANCH AND GROUND PROTECTION

If temporary access for machinery is required within the TPZ of trees to be retained ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction. Measures may include a permeable membrane such as geotextile fabric beneath a 100mm thick layer of mulch or crushed rock below rumble boards, or steel plates or track mats.
Tree trunk/s and/or major branches located within close proximity to works, must be wrapped with protective hessian or similar acceptable material to prevent tree injury. Major branches would typically be considered to be of a diameter greater than 100mm diameter.
Timber battens (50 mm x 100 mm x 2000mm or similar) must be placed around tree trunks with battens spaced at 100 mm intervals and fixed against the trunk using metal or durable plastic strapping with connections appropriately finished or covered to protect pedestrians from snagging injury. The hessian and timber battens must not be fixed to the tree. Tree trunk and major branch protection are to remain in place for the duration of works and must be removed at the completion of the project.

PROHIBITED ACTIVITIES WITHIN THE TPZ

Activities generally excluded from the TPZ included but are not limited to-
Machine excavation including trenching;
Excavation for silt fencing;
cultivation;
storage;
preparation of chemicals, including preparation of cement products;
parking of vehicles and plant;
refuelling;
dumping of waste;
wash down and cleaning of equipment;
placement of fill;
lighting of fires;
soil level changes;
temporary or permanent installation of utilities and signs, and
physical damage to the tree.

UNDERGROUND SERVICES WITHIN TREE PROTECTION ZONES

All underground services should be routed outside the TPZ of trees to be retained. Where unavoidable, services may be installed via alternative methods which may include tree sensitive excavation or Horizontal Directional Drilling (HDD). Where HDD is used, entry and exit pits are to be located outside the TPZ of trees to be retained.
Where excavation or trenching is required to facilitate installation of underground services within the TPZs of any site trees arborist supervision is required. Works should be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:
Excavation by hand
Excavation using a high-pressure water jet and vacuum truck
Excavation using an Air Spade with vacuum truck.
Machine excavation is prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.
Where a situation occurs that a significant root (root greater than >50 mm diameter) requires pruning or removal, the root is to be severed with a sharp saw implement by or under instruction of the Project Arborist.

FILL WITHIN TREE PROTECTION ZONES

Where unavoidable, fill placed within TPZ of trees to be retained shall be well-drained material equivalent or finer in texture than the existing site topsoil material and should comply with AS 4419:2003 (Soils for Landscaping and Garden Use).
The fill can be lightly consolidated but not to engineering standards. If fill is to be placed by machinery, this must be done from outside the TPZ of from existing hard stand areas. Alternatively, ground protection may be used to facilitate machine access.

LANDSCAPING WORKS WITHIN TREE PROTECTION ZONES

The landscape plan is to be checked for compliance with the TPMP. Staged removal of tree protection methods may be required to facilitate landscaping works.
Any landscaping works within the TPZ of trees to be retained is to be under the direct Supervision of the Project Arborist. These may include but are not limited to; retaining walls, irrigation and lighting systems, topdressing, planting and paving.
Any landscaping works requiring excavation for drainage or the like is to be undertaken using non-destructive methods previously described.

EXCAVATIONS WITHIN TREE PROTECTION ZONES

The Project Arborist is to monitor the impacts of demolition, bulk earth works, installation of temporary infrastructure including building, sediment control and drainage works.
Where the extent of an encroachment is less than 10% of the TPZ, including any excavations for benching and shoring, excavation may be undertaken using conventional construction methods. 10% of the TPZ is equivalent to one-third of the TPZ radius on one side
Where the encroachment is to be greater than 10% of the TPZ and prior to any mechanical excavations for building foundations, shoring, retaining wall or pavement subgrade within the TPZ of trees to be retained; exploratory excavation using non-destructive methodology shall be undertaken at the perimeter of the structure, excavation required for shoring, retaining wall or pavement subgrade within the TPZ.
Such techniques include:
Excavation by hand
Excavation using a high-pressure water jet and vacuum truck
Excavation using an Air Spade with vacuum truck.

The non-destructive excavation shall be undertaken at the outer limits of the structure to the depth of the foundation or excavation, or to a maximum of 800mm below existing surface levels. All care must be taken to prevent the damage or severance of roots greater than 50mm diameter. Any roots encountered that are less than 50mm diameter may be cleanly severed with a sharp pruning implement at the interface of the excavation nearest the tree. The exposed root zone is to be kept moist by way of geotextile or hessian placed along the open interface of the excavation nearest the tree.
Where roots greater than 50mm diameter are encountered during exploratory excavation, advice from the Project Arborist shall be sought.

PAVEMENTS WITHIN TREE PROTECTION ZONES

Any pavements or footpaths within TPZ of trees to be retained should be installed at or above existing grade to minimise the need for excavation to avoid damage or severance of primary woody roots. The pavement sub-base shall be a coarse, gap-graded material with no fines in order to allow some aeration and moisture infiltration to the root zone. The use of permeable pavements, bonded aggregate or cellular confinement systems should be investigated as alternative construction methods.

SCAFFOLDING

Where scaffolding is required it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable it must be specified by the project arborist in accordance with AS 4373-2007 Pruning of Amenity Trees. NOTE: Pruning works will require approval by determining authority.
Ground below the scaffolding should be protected by boarding (e.g. scaffold board or plywood sheeting). Where access is required, a board walk or other surface material should be installed to minimize soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed.

DEMOLITION OF HARDSTAND AREAS

Demolition of existing hard stand areas within the TPZ of trees to be retained may be undertaken using machinery but must be under the supervision of the Project Arborist. Demolition of the ground surfaces must be undertaken from existing hard stand areas or ground protection and should commence at the outer extent of the existing surface material and move away from trees to be retained.

DEFECTS LIABILITY PERIOD

Completion of outstanding building or landscaping works following the construction period must not injure trees.

FINAL CERTIFICATION

The final inspection by the Project arborist should detail the health and condition of the trees and their growing environment and provide recommendations for any necessary remedial actions. These actions may include pruning in accordance with AS4373-2007 Pruning of amenity trees and/or soil remediation to repair the growing environment.
On project completion, the project arborist shall certify in writing to the Certifying Authority that the conditions of consent relating to tree protection, tree removal, pruning and planting of new trees have been complied with or, if the conditions have been contravened, detail the extent and nature of the departure from the conditions and their impacts on trees.

REV	DESCRIPTION	DATE
A	DRAFT	10/08/2022
B	SSDA	30/09/2022

TREE PROTECTION MANAGEMENT PLAN

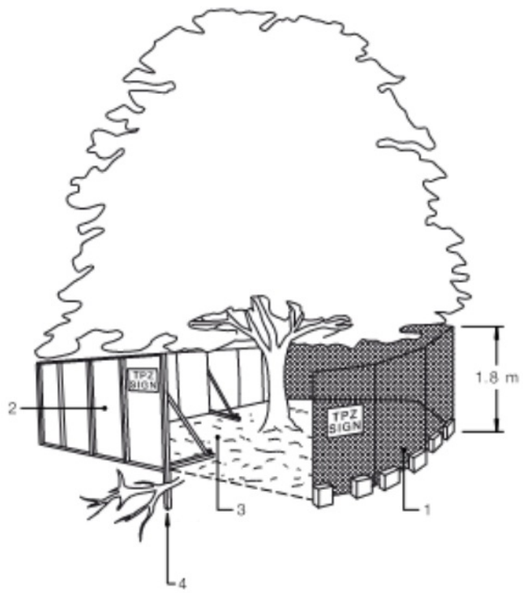
PROPOSED INDUSTRIAL DEVELOPMENT
CLIENT: LOGOS PROPERTY
SITE: 28-30 BURROWS RD, ST PETERS NSW

JOB No. E-001620-22
DWG No. TPMP.02
DRAWN KH

canopy consulting
PO Box 902
Five Dock NSW 2046

TREE PROTECTION MANAGEMENT PLAN

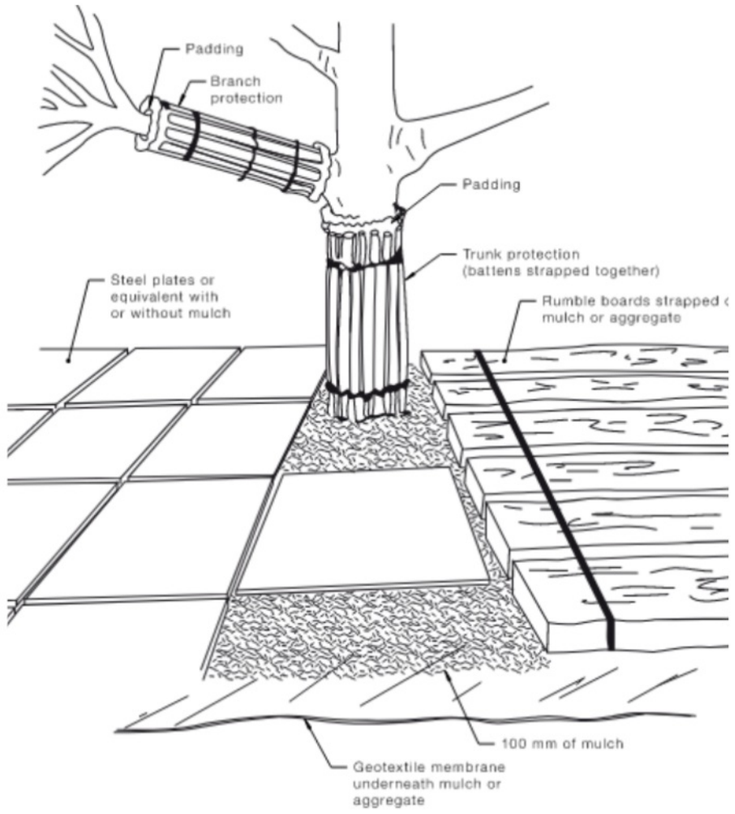
28-30 BURROWS RD, ST PETERS NSW



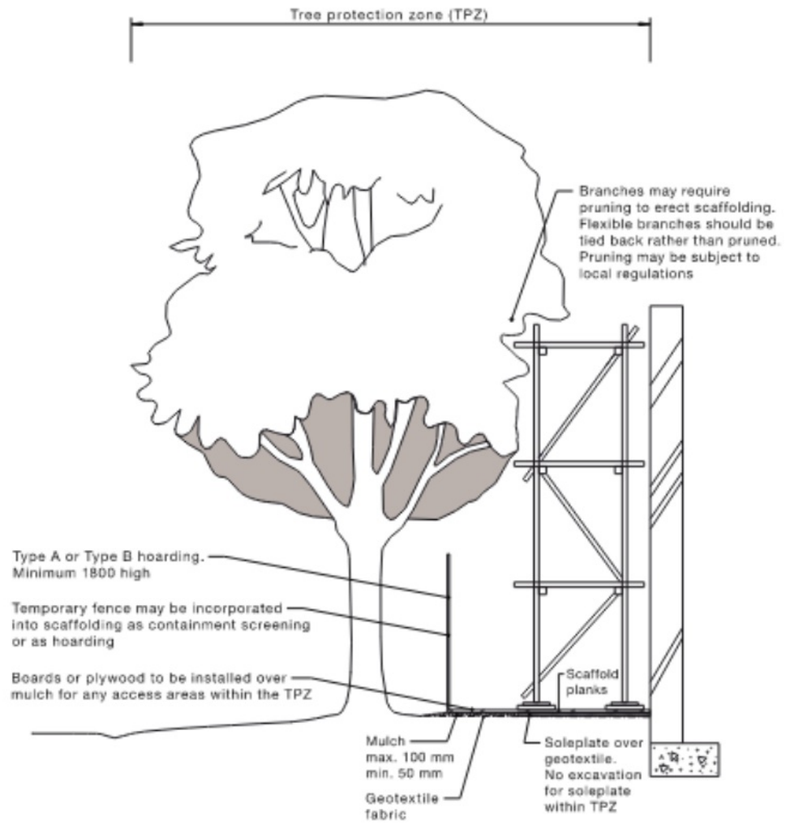
LEGEND:

1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

TPZ FENCING DETAIL



TRUNK BRANCH AND GROUND PROTECTION DETAIL



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

SCAFFOLDING DETAIL

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