Arboricultural Impact Assessment

Tuggerah Station TAP
Tuggerah NSW 2259

Version 2

Prepared for:

Jacobs

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Abbreviations

Ø	Diameter
R	Radius
AGL	Above Ground Level
AQF	Australian Qualifications Framework
AS	Australian Standards
BGL	Below Ground Level
DBH	Diameter at Breast Height
DBR	Diameter at Root Flare
Id	Identification
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

Contents

1 Introduction

Report Purpose

Tree Report has been engaged by Jacobs to prepare an Arboricultural Impact Assessment (herein referred to as the 'AIA') and Tree Protection Plan (herein referred to as the 'TPP') for a proposed development located at Tuggerah Railway Station, Tuggerah NSW 2259 (herein referred to as the 'Site'). The purpose of this report is to:

- Identify trees (herein referred to as the 'Subject Trees') that are likely to be affected by the proposed works.
- Assess the current overall health and condition of the Subject Trees.
- Assess and discuss likely impacts to the Subject Trees as a result of the proposed development.
- Evaluate the significance of the Subject Trees and assess their suitability for retention.

Project Overview

The proposed development relates to the proposed intersection upgrade at the Site. Key features of the proposal likely to affect the Subject Trees are summarised as follows:

- construction of a new pedestrian footbridge north of the existing footbridge with new stairs connecting the Pacific Highway, the commuter car park and the station platforms with canopies for weather protection over the footbridge and all stairs,
- installation of a two-stop lift connecting Platform 1 and the new pedestrian footbridge, and installation of a three-stop lift connecting the Pacific Highway station entrance, Platform 2 and the new pedestrian footbridge,
- removal of the existing non-compliant ramps, stairs and pedestrian footbridge,
- removal of the existing Station Master's office, and construction of a new Station Master's office,
- widening and lengthening of Platforms 1 and 2 to achieve compliant platform widths, improve accessibility and space for station customers and allow for future rolling stock,
- construction of a new family accessible toilet and two new unisex ambulant toilets,
- interchange upgrade work including provision of new bike parking facilities at the new station entrances, provision of 15 DDA compliant accessible parking spaces to replace 19 existing non-compliant parking spaces in the commuter car park, new accessible footpaths on both eastern and western side of the station, and upgrade to the existing Pacific Highway southbound bus stop to be DSAPT compliant,
- landscaping work including public domain improvements at the station forecourt areas, new lighting, and enhancement of sightlines between Anzac Road and Bryant Drive,
- ancillary work including station power supply upgrade, replacement of existing 11kV and 66kV overhead power lines with underground cables, construction of new equipment room, provision of new or reinstated tactile pavement markings where required and improvements to station communication systems including CCTV and hearing loops.

The Subject Trees

Inspection of the site was undertaken on the 16th of November 2021.

A total of **forty-six** individual trees were identified and recorded during the site inspection. Of these:

- **Thirty** Subject Trees (**id. 1-8, 14, 17-30, 39-43, 45 & 46**) are of Low retention value
- **Fifteen** Subject Trees (**id. 9-13, 15, 16 & 31-38**) are of Medium retention value
- **One** Subject Tree (**id. 44**) is of High retention value

Further information, observations and measurements specific to each of the Subject Trees can be found in **Chapter 6** and **Appendix II.**

The Study Area

The Study Area is located at Tuggerah Railway Station, Tuggerah NSW 2258. The Site falls within the Central Coast Council Local Government Area (LGA).

The Site is shown in **Figure 1.**

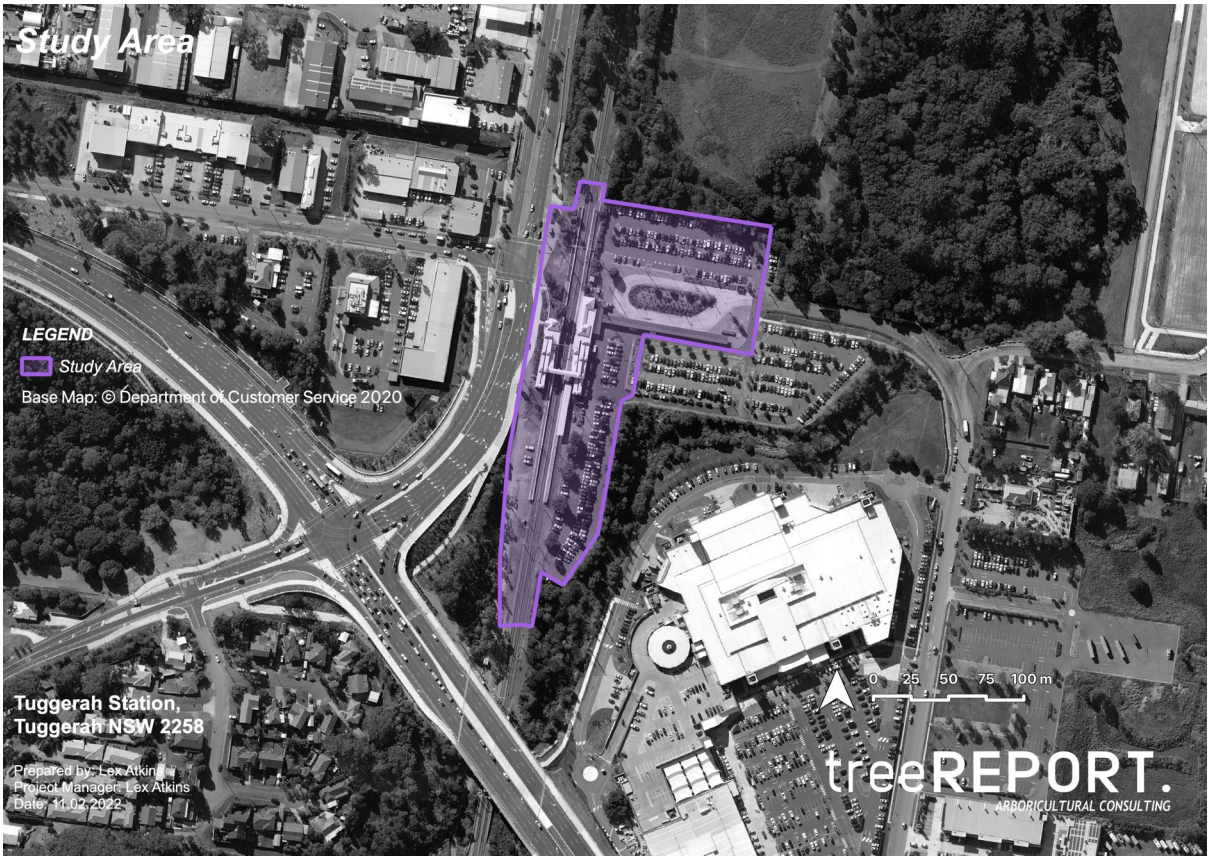


Figure 1: The Study Area

2 Method

Visual Tree Assessment

The Subject Trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck & Breloer (1994)[1], and practices consistent with modern arboriculture.

The following limitations apply to this methodology:

- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing.
- Trees within adjacent properties or restricted areas were not subject to a complete visual inspection (i.e. defects and abnormalities may be present but not recorded).
- Trunk Diameter at Breast Height (DBH) has been accurately measured using a diamter tape measure. Tree height and canopy spread has been estemated unless otherwise stated.
- Tree identification was based on broad taxonomical features present and visible from ground level at the time of inspection.

Retention Value

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

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

This tree retention assessment has been undertaken in accordance with the Institute of Australian Consulting Aboriculturalists (IACA) Significance of a Tree, Assessment Rating System (STARS). The system uses a scale of High, Medium and Low significance in the landscape. Once the landscape significance of a tree has been defined, the retention value can be determined. Each tree must meet a minimum of three (3) assessment criteria to be classified within a category. Further details and the assessment criteria are in **Appendix VI.**

[1] VTA is an internationally recognised practice in the visual assessment of trees as formulated by Mattheck & Breloer (1994). Principle explanations and illustrations are contained within the publication, Field Guide for Visual Tree Assessment by Mattheck, C., and Breloer, H. Arboricultural Journa1, Vol 18 pp 1-23 (1994).

3 Arboricultural Impact Assessment

Impact Assessment

AS 4970-2009 defines two types of 'zones' which have to be considered when undertaking and arboricultural impact assessment. These zones are:

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

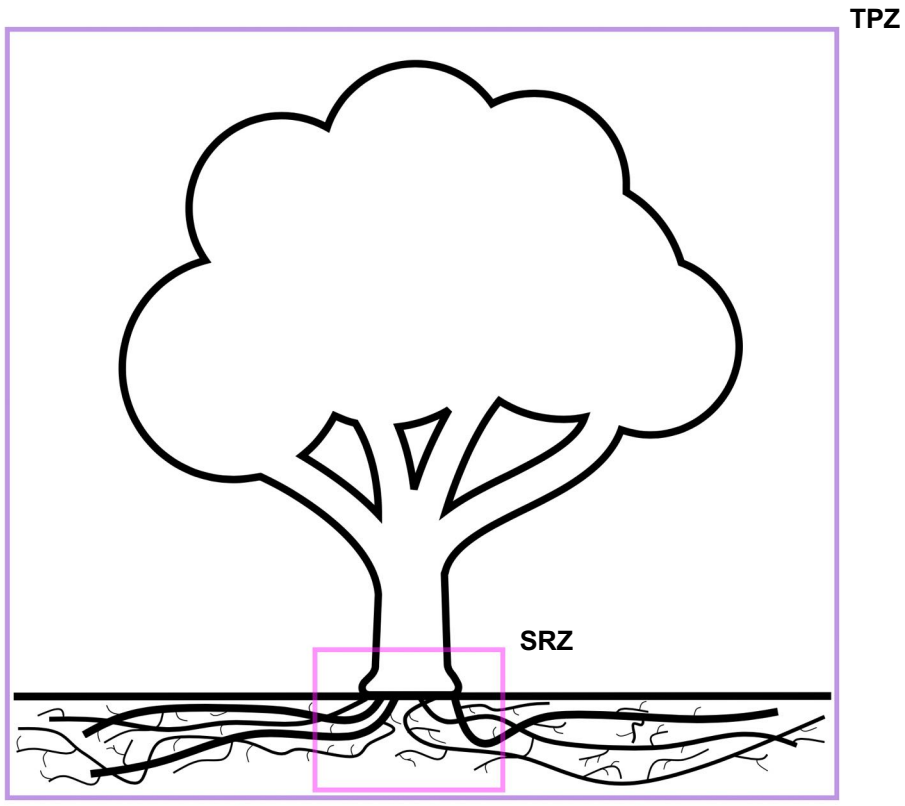


Figure 2: Indicative TPZ and SRZ

Encroachments Within the TPZ

Encroachment within the TPZ of a Subject Tree is acceptable under the *AS4970-22009*, providing that the consulting arborist can demonstrate that the Subject Tree can remain viable. There are four (4) encroachment thresholds to be considered when assessing a proposed development:

- **No encroachment (0%):** There are no likely or foreseeable encroachment within the TPZ as a result of the proposed development.
- **Minor encroachment (<10%):** The proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ.
- **Major encroachment (>10%):** The proposed encroachment is greater than 10% (total area) of the TPZ.
- **Total encroachment:** The Subject Tree(s) located wholly within the proposed development footprint.

Figure 3: Indicative levels of encroachment

Mitigating Development Impacts

Encroachment within the TPZ must be compensated with a range of mitigation measures to ensure that impacts to the Subject Tree(s) are reduced or restricted wherever possible. Mitigation must be increased relative to the level of encroachment within the TPZ to ensure the Subject Tree(s) remain viable. **Table 1** outlines development impact thresholds (based on TPZ encroachment), and mitigation measures required within each impact threshold. These mitigation measures will only apply if trees are proposed to be retained.

Development impact threshold (TPZ encroachment %)	***Development impact mitigation measures***
No impact (0%)	• N/A
Minor impact (1-20%)	• The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. • Detailed root investigations should not be required. • Tree protection should be installed.
Major impact (>20%)	• The project arborist must demonstrate the tree(s) would remain viable. • The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. • Non-destructive root investigation may be required for any trees proposed for retention. • The project arborist will be required to supervise any works within the TPZ. • Tree protection must be installed.
Total impact	• Subject Tree(s) cannot be successfully retained.

Table 1: Impact mitigation measures

4 Results

Nil Impact (0% TPZ encroachment)

A total of **thirty-nine** Subject Trees (**id. 1-37, 45 & 46**) are located outside of the proposed area of disturbance and there are no foreseeable impacts to the Subject Trees as a result of the proposed development.

Under the current proposal, these trees can be successfully retained.

Total Impact

A total of **seven** Subject Trees (**id. 38-46**) are located wholly within the construction footprint of the proposed development.

Under the current proposal, these trees cannot be successfully retained.

*Further information specific to each of the Subject Trees can be found in **Tables 2 & 3 and Appendix III.***

5 Discussion

Trees on development sites

Construction and development can change the way an area is utilised by adding buildings, infrastructure and pedestrians to the location. This can result in an increased potential of damage and harm to property and people. Therefore, trees that contain significant defects, are structurally poor or have a short useful life expectancy should be considered for removal.

Furthermore, it is not always possible or reasonably practicable to retain all trees within a proposed development. It can be better to select the higher retention value trees and protect these well, rather than trying to retain all trees and decreasing the quality of tree protection (Matheny & Clark, 1998).
Trees can be negatively affected in a number of ways during construction. These include root loss, lack of water and oxygen to the root zone, damage to the trunk or canopy and/or poisoning. Failure to protect trees, particularly root zones, during development can lead to an increased risk of tree death and/or failure post construction.

Impacts - Roots

Most tree roots will usually be found in the top 600mm of soil (Harris, Clark & Matheny, 1999). Radiating outwards from the base of the trunk are several large woody roots. These structural roots anchor the tree in the ground. Cutting or affecting those roots is likely to undermine the stability of the tree. The spread of a tree's structural roots, herein termed its Structural Root Zone (SRZ), is generally proportioned to the diameter of its trunk (Matthek & Breloer, 1994).

Beyond this zone extends the network of woody transport roots and fine absorbing roots, which absorb and transport water and nutrients. Most of these roots are found in the top 150mm of soil (Harris, Clark & Matheny, 1999). Trees can lose a portion of their absorbing roots without being significantly affected in the long term.

Impacts – Canopy

Fundamentally, pruning is the removal of plant parts. Tree pruning involves the removal of living and dead tissues in an attempt to control or redistribute growth and to create a structurally sound mature form. Tree health and the ability to recover from the myriad of urban stressors are directly related to canopy area and the loss of live foliage and woody transport tissue can lead to a significant negative impact a Subject Tree's ability to photosynthesise light energy into chemical energy necessary for the normal physiological functioning and survival of the tree. Live crown ratios of 50%-60% maintain tree vitality while reducing the risk of premature limb/tree failure.

Natural Target Pruning is the removal of branches, stems, and stubs such that final cuts are achieved as close as possible to the branch collar without cutting into the brach collar or leaving a protruding stub. The branch collar is an area of over lapping trunk and branch tissue forming a swelling around the base of many branches. It contains defensive chemicals that can prevent infection from bacterial and/or fungal pathogens. **Figure 2.3** shows final cut locations when undertaking pruning works.

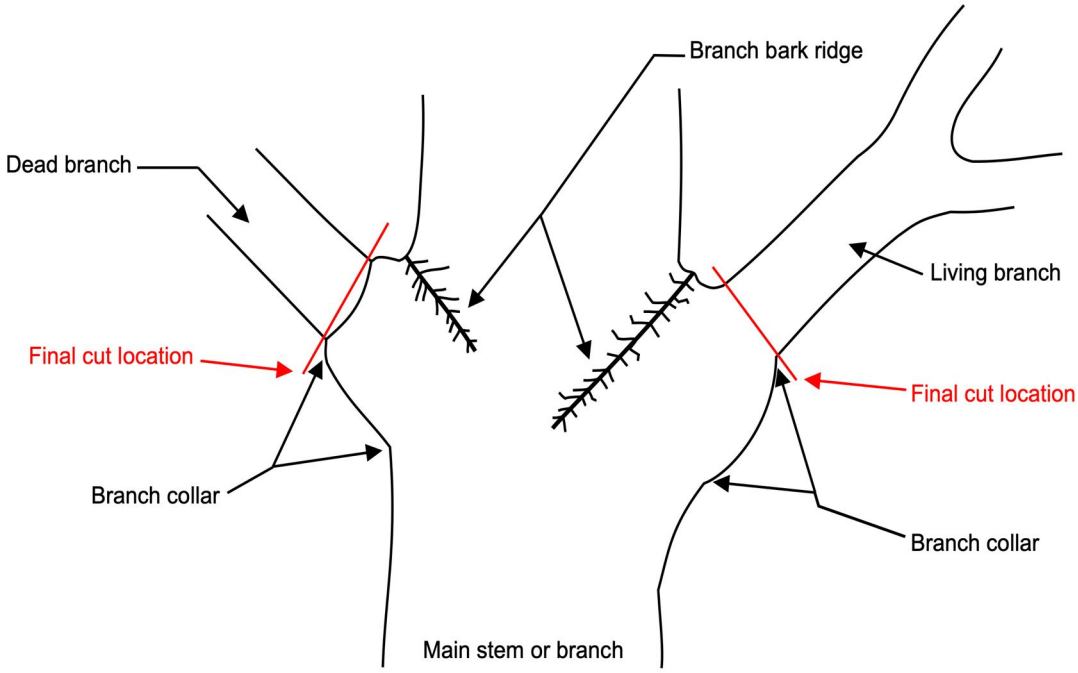


Figure 2.3

On branches where the branch bark collar connot be found, the branch bark ridge is to be used as a pruning guide. **Figure 2.4** shows final cut location where – Line A to X is a line parallel to the trunk occuring just outside the branch bark ridge. Line A to C indicates the angle of the branch bark ridge and Line A to B represents the angle and location of the final cut. Angle ‘a’ should equal angle ‘b’.

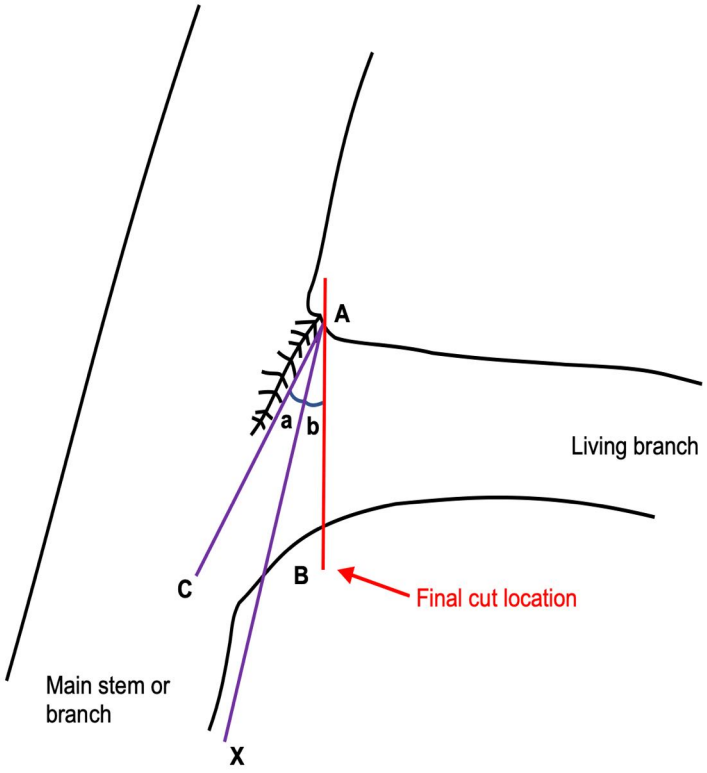


Figure 2.4

The cutting of branches which results in a stub, reffered to as lopping is regaraded as an unacceptable practice, except in certain circumstances. Lopping may result in:

- An increased rate of shoot production and elongation, which is weakly attached to the parent tree.
- Decay of the stubs.
- Poor form and visual amenity.
- Reduced life expectancy of the tree.
- Pre-disposing the tree to pathogenic infection and insect attack.

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
1	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
2	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
3	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
4	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
5	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
6	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
7	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
8	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
9	*Casuarina cunninghamiana*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
10	*Casuarina cunninghamiana*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
11	*Casuarina cunninghamiana*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
12	*Casuarina cunninghamiana*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
13	*Casuarina cunninghamiana*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
14	*Cupaniopsis anacardioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
15	*Waterhousia floribunda*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
16	*Melaleuca styphelioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
17	*Melaleuca styphelioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
18	*Melaleuca styphelioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
19	*Melaleuca styphelioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
20	*Melaleuca styphelioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
21	*Melaleuca linariifolia*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
22	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
23	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
24	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
25	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
26	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
27	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
28	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
29	*Tristaniopsis laurina*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
30	*Melaleuca linariifolia*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
31	*Melaleuca styphelioides*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
32	*Callistemon salignus*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
33	*Lophostemon confertus*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
34	*Lophostemon confertus*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
35	*Lophostemon confertus*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 2: Results of Arboricultural Assessment – No Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
36	*Lophostemon confertus*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
37	*Melaleuca quinquenervia*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
45	*Acacia sp.*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**
46	*Acacia sp.*	Nil	0	• Subject Tree proposed for removal for landscaping purposes.	• Detailed root investigations should not be required. • Tree protection measures to be installed in accordance with **Chapter 4.**	**Retain**

Table 3: Results of Arboricultural Assessment – Total Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
38	*Callistemon linearis*	Total	100	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**
39	*Callistemon salignus*	Total	100	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**
40	*Callistemon salignus*	Total	100	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**
41	*Callistemon salignus*	Total	100	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**
42	*Callistemon salignus*	Total	100	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**
43	*Callistemon salignus*	Total	100	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**

Table 3: Results of Arboricultural Assessment – Total Impact

Id.	Botanical name	Impact	Encroachment within TPZ (%)	Description of impacts	Impact mitigation	Result
44	*Corymbia maculata*	**Total**	**100**	• Subject Tree is located wholly within the development footprint.	• Subject Tree cannot be successfully retained	**Remove**

6 Recommendations

Trees Proposed for Removal

Total Impact: Subject Trees **id. 38-44** are located wholly within the construction footprint and is recommended for removal as part of the proposed development.

Tree Proposed for Retention

Nil impact: Subject Trees **id. 1-37, 45 & 46** are located outside the proposed area of disturbance and there are no foreseeable impacts to these trees as a result of the proposed development. Impact mitigation measures are not required for successful tree retention; **however,** tree protection (**Chapter 7 and Appendix III**) should be installed to protect the Subject Trees during the construction phase of the development.

Vegetation Offset

Offset replacement planting to compensate for the loss of the tree as part of this development should be undertaken in accordance with the TfNSW Vegetation Offset Guidelines and consist of tree species which are endemic to the local area and suited to the size of the area of which they are planted.

Tree Removal

Where tree removal is required, the following is recommended:

- Any approved pruning and/or tree removal work is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture.
- Any approved pruning must be in accordance with *AS 4373-2007, Pruning of Amenity Trees*.
- Any approved tree removal work is to be carried out in accordance with 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.

Tree Pruning

Where tree pruning is required, the following is recommended:

- No more than 20% live canopy volume should be removed per tree.
- No branches >100mmØ should be removed.
- Final pruning cuts are to be made as close as possible to the branch collar without cutting into the branch collar or leaving a protruding stub.
- Deadwood identified within the canopy of the Subject Trees >25mmØ should be removed.
- All tree work is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture.

- Any approved tree pruning works 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 pruning of any of the Subject Trees.

7 Tree Protection Plan

General Tree Protection Measures

The following general tree protection measures are recommended:

- Engagement of an AQF Level 5 (Diploma of Arboriculture) arborist for the role of Project Arborist should be undertaken prior to the commencement of works (including site establishment)
- The approved tree protection plan must be available onsite prior to the commencement of works, and throughout the entirety of the project.
- The Tree Protection Plan (**Chapter 7 and Appendix III**) must be implemented prior to demolition and/or site establishment.
- Tree protection measures are to be installed in accordance with *AS 4970-2009, Protection of Trees on Development Sites*.
- All proposed works within the TPZ (**Appendix I and III**) must be carried out under the supervision of the project arborist.
- The area lost to encroachment should be compensated for elsewhere, contiguous with the TPZ (**Appendix IV**).
- Any underground services proposed within the TPZ should be installed using tree sensitive methods such as: horizontal directional drilling boring, non-destructive excavation and carried out under the supervision of the project arborist.

Specific Tree Protection Measures

The following specific tree protection measures are recommended:

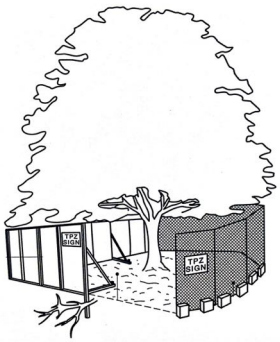
- If, at any time, it is not feasible to carry out works in accordance with this report, an alternative must be agreed in writing with the Project Arborist.
- Subject Trees **id. 15-37, 45 & 46** are to be protected via the use of tree protection fencing and ground protection (utilising existing hard surfaces), in accordance with **Chapter 7** and *AS 4970-2009, Protection of Trees on Development Sites*, and should be installed prior to site establishment and commencement of construction activities.
- Subject Trees **id. 1-14** are to be protected via the use of trunk amour and ground protection (utilising existing hard surfaces), in accordance with **Chapter 7** and *AS 4970-2009, Protection of Trees on Development Sites*, and should be installed prior to site establishment and commencement of construction activities.
- It is the responsibility of the Principal Contractor to install and maintain tree protection measures in accordance with this report for the duration of the development.
- Where it is not feasible to install tree protection fencing at the specified location due to unforeseen factors, a modified tree protection specification must be agreed to by the Project Arborist.
- Approved excavations carried out within the TPZ of a Subject Tree proposed for retention should be supervised by the project arborist via the use of tree sensitive methods.
- Where possible, footings of existing structures and hardscapes proposed for demolition within the TPZ should remain in situ (just below grade) to prevent damage to existing root material.

- Exposed root material should be clean cut using secateurs, hand saw or similar.
- Structural soil as coarse or slightly coarser than the existing soil should be used for any fill requirements within the TPZ of a Subject Tree proposed for retention.

Tree Protection Fencing

Tree protection fencing must be established in the locations shown in **Appendix III**. Existing fencing, site hoarding or structures (such as a wall or building) may be used as tree protection fencing, providing the TPZ remains isolated from construction footprint.

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.



Tree protection fencing shall be:

- Enclosed to the full extent of the TPZ (or as specified in the Recommendations and Tree Protection Plan).
- Temporary mesh panel fencing (minimum height 1.8m).
- Certified and inspected by the project arborist.
- Installed prior to the commencement of works.
- Prominently signposted with 300mm x 450mm boards stating, “NO ACCESS - TREE PROTECTION ZONE”.

If tree protection fencing cannot be installed due to sloping or uneven ground, tree protection barriers must be installed as an alternative.

Specifications for tree protection barriers are as follows:

- Star pickets spaced at 2m intervals,
- Connected by a continuous high-visibility barrier/hazard mesh.
- Maintained at a minimum height of 1m.

Where approved works are required within the TPZ, fencing may be setback to provide construction access. Trunk, branch and ground protection shall be installed and must comply with *AS 4970-2009, Protection of Trees on Development Sites*. Any additional construction activities within the TPZ of the subject trees must be assessed and approved by the project arborist.

Trunk Armour

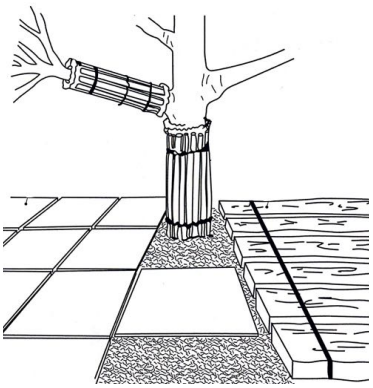
Where provision of tree protection fencing is impractical or must be temporarily removed, trunk armour shall be installed to avoid accidental mechanical damage.

Specifications for trunk armour are as follows:

- A thick layer of carpet underfelt, geotextile fabric or similar wrapped around the trunk to a minimum height of 2m.
- 1.8m lengths of softwood timbers aligned vertically and spaced evenly around the trunk (with a small gap of approximately 50mm between the timbers).
- The timbers must be secured using galvanised hoop strap (aluminium strapping).

The timbers shall be wrapped around the trunk but not fixed to the tree, as this will cause injury/damage to the tree.

Ground Protection



If temporary access for vehicle, plant or machinery is required within the TPZ ground protection shall be installed. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Where possible, areas of existing pavement shall be used as ground protection.

Specifications for light traffic access (<3.5 tonne) are as follows:

- Permeable membrane such as geotextile fabric.
- Layer of mulch or crushed rock (at minimum depth of 100mm)

Specifications for heavy traffic access (>3.5 tonne) are as follows:

- Permeable membrane such as geotextile fabric.
- Layer of lightly compacted road base (at minimum depth of 200mm)
- Geotextile fabric shall extend a minimum 300mm beyond the edge of the road base.

Pedestrian, vehicular and machinery access within the TPZ shall be restricted solely to areas where ground protection has been installed.

Excavations

All approved excavations (including root investigations) within the TPZ must be carried out using tree sensitive methods under supervision of the project arborist. These methods may include:

- Manual excavation (hand tools).
- Air spade.
- Hydro-vacuum excavations (sucker-truck).

Where approved by the project arborist, excavations using compact machinery fitted with a flat bladed bucket is permissible. Excavations using compact machinery shall be undertaking in small increments and guided by the Project Arborist who is to look for and prevent root damage to roots (>50mm in diameter).

Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with geotextile fabric, and plastic membrane or glad wrap (where practical). Coverings shall be weighted to secure them in place. The geotextile fabric shall be kept damp at all times.

No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the project arborist. Hand excavation and root mapping shall be undertaken along excavation lines within the TPZ prior to the commencement of mechanical excavation (to prevent tearing and shattering of roots from excavation equipment). Any conflicting roots (>50mm in diameter) shall be pruned using clean, sharp secateurs or a pruning saw to ensure a clean cut, free from tears. All root pruning must be documented and carried out by the project arborist.

Underground Services

All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they must be installed using tree sensitive excavation methods under

supervision of the project arborist. Alternatively, boring methods such as horizontal directional drilling (HDD) may be used for underground service installation, providing the installation is at minimum depth of 800mm below grade. Excavations for entry/exit pits must be located outside the TPZ

Hold Points, Inspections, and Certification

The approved tree protection plan must be available onsite prior to the commencement of works, and throughout the entirety of the project. To ensure the tree protection plan is implemented, hold points have been specified in the schedule of works (**Table 2**). It is the responsibility of the principal contractor to complete each of the tasks.

Once each stage is reached, the work will be inspected and certified by the project arborist and the next stage may commence. Alterations to this schedule may be required due to necessity, however, this shall be through consultation with the project arborist only.

Table 6: Schedule of works

Pre-construction	1	Engagement of AQF Level 5 (Diploma of Arboriculture) arborist for the role of project arborist.
	2	Prior to demolition and site establishment indicate clearly with spray paint on trunks trees marked for removal only.
	3	Tree protection shall be installed in accordance with approved tree protection plan and certified by the project arborist prior to demolition and site establishment, this will include mulching of areas within the TPZ.
During Construction	4	Inspection and certification of trees by the project arborist should be undertaken monthly during the construction period.
	5	Project arborist to supervise and document all works carried out within the TPZ of trees to be retained.
	6	Inspection and certification of trees by project arborist after all major construction has ceased, following the removal of tree protection measures.
Post Construction	7	Final inspection and certification of trees by project arborist.

8 References

General References

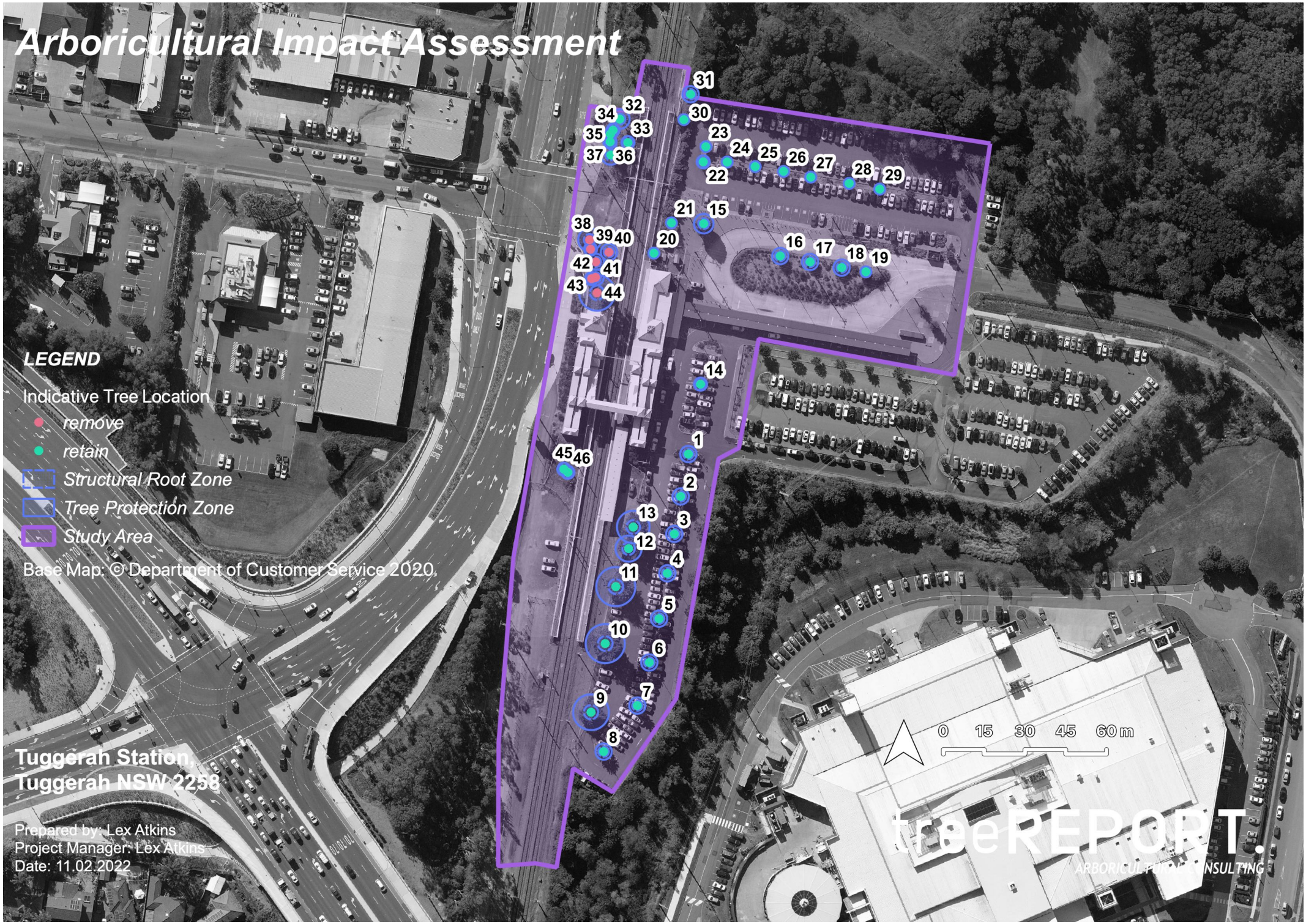
- *Australian Standard, AS 4373-2007, Pruning of Amenity Trees.*
- *Australian Standard, AS 4970-2009, Protection of Trees on Development Sites.*
- *Harris, R., Clark, J., Matheny, N. and Harris, V. 2004. Arboriculture. Upper Saddle River, N.J.: Prentice Hall.*
- *Lonsdale, D. 1999. Principles of tree hazard assessment and management. London: Stationery Office.*
- *Loughran, A. 2007. Native plant or weed. Paterson, N.S.W.: Tocal College, NSW Dept. of Primary Industries.*
- *Mattheck, C. 2007. Updated field guide for visual tree assessment. Karlsruhe: Forschungszentrum Karlsruhe.*
- *Mattheck, C., Bethge, K. and Weber, K. 2015. The body language of trees. Karlsruhe: Karlsruher Inst. fuÌˆr Technologie.*
- *Mattheck, C., Lonsdale, D. and Breloer, H. 1994. The body language of trees. London: H.M.S.O.*
- *MacLeod, R D. and Cram, W J. 1996. Forces Exerted by Tree Roots, Arboriculture Research Information Note, 134/96/EXT.*
- *Smiley, T. and Fite, K. 2008. Managing Trees During Construction. Arborist News. WorkCover NSW. 1998. Code of Practice: Amenity Tree Industry.*

Specific References

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

- *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017.*
- *Central Coast Council: Wyong Development Control Plan (WDCP) 2013.*
- *Transport for NSW: Tuggerah Station Upgrade; Review of Environmental Factors; DRAFT version (Reference Design), dated November 2021.*
- *Jacobs: Plan Showing Proposal Study Area, Site Compound and Laydown Areas (indiciative-Not Finalised) IA399500_GIS_F010_v03_AncillaryFacillities_LR, dated 2021.*

Appendix I Impact Assessment


Arboricultural Impact Assessment
LEGEND
Indicative Tree Location
remove
retain
Structural Root Zone
Tree Protection Zone
Study Area
Base Map: © Department of Customer Service 2020
Tuggerah Station,
Tuggerah NSW 2259
Prepared by: Lex Atkins
Project Manager: Lex Atkins
Date: 11.02.2022
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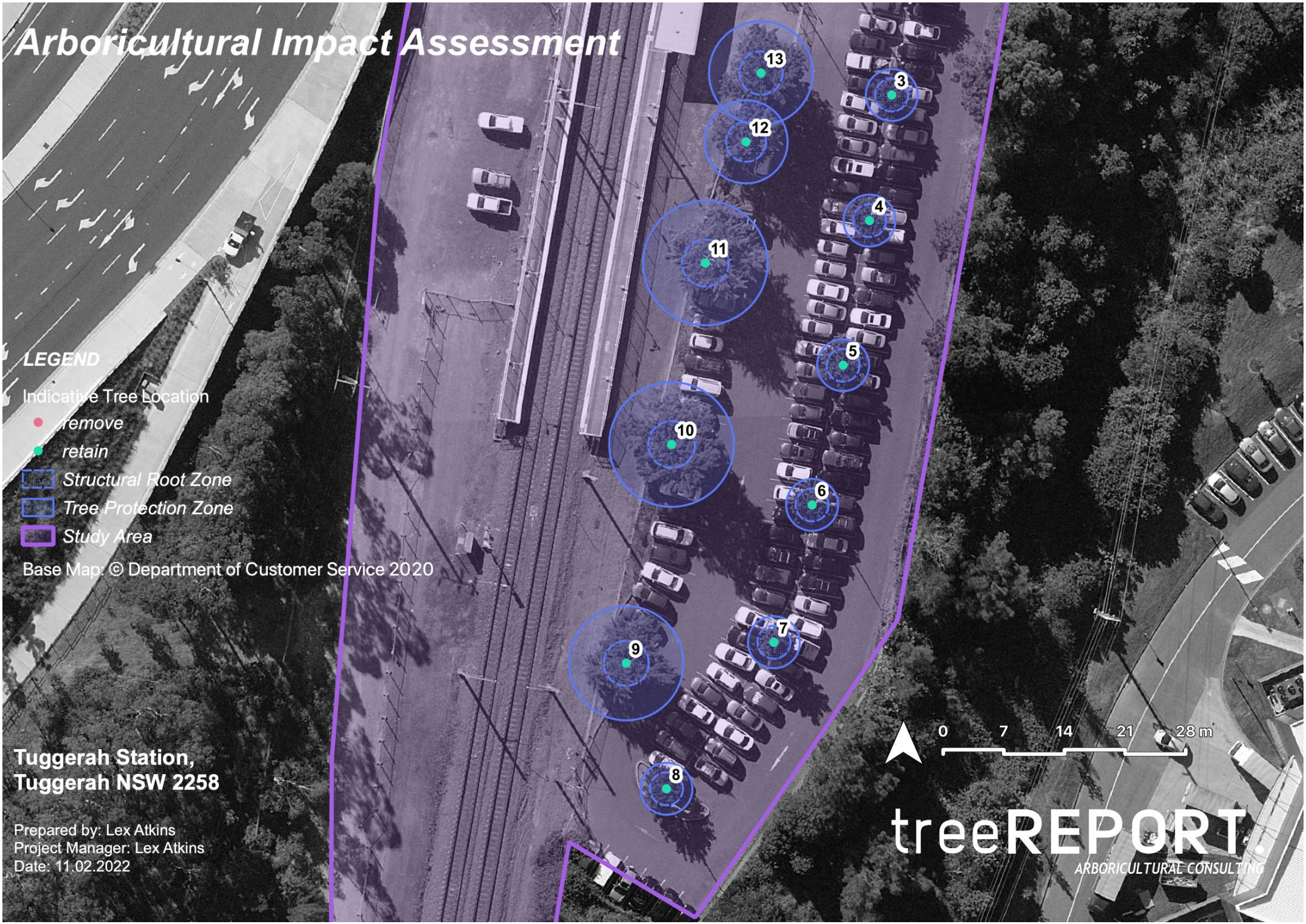
treeREPORT.
ARBORICULTURAL CONSULTING

Arboricultural Impact Assessment



LEGEND

Indicative Tree Location

- *remove*
- *retain*
- *Structural Root Zone*
- *Tree Protection Zone*
- *Study Area*

Tuggerah Station,
Tuggerah NSW 2258

Prepared by: Lex Atkins
Project Manager: Lex Atkins
Date: 11.02.2022

treeREPORT.
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Arboricultural Impact Assessment
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Indicative Tree Location
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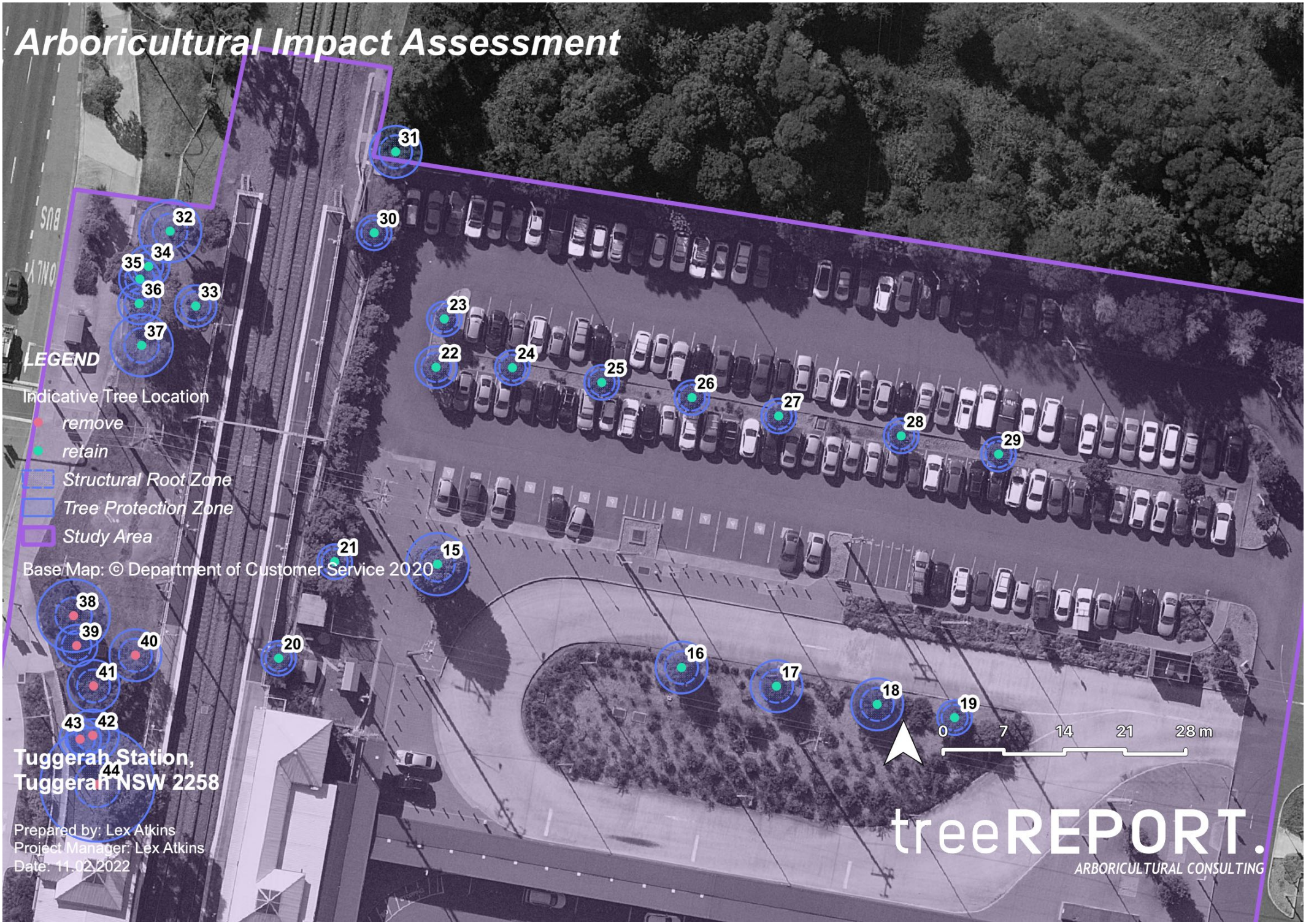
Arboricultural Impact Assessment



Tuggerah Station,
Tuggerah NSW 2258

Prepared by: Lex Atkins
Project Manager: Lex Atkins
Date: 11.02.2022

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Appendix II Tree Schedule

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
1	*Cupaniopsis anacardioides*	5	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• **Retain**
2	*Cupaniopsis anacardioides*	6	4	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• **Retain**
3	*Cupaniopsis anacardioides*	5	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• **Retain**
4	*Cupaniopsis anacardioides*	5	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• Located within proposed site compound and laydown area (Bryant Drive). • **Retain**
5	*Cupaniopsis anacardioides*	4	3	Fair	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• Located within proposed site compound and laydown area (Bryant Drive). • **Retain**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
6	*Cupaniopsis anacardioides*	5	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• Located within proposed site compound and laydown area (Bryant Drive). • **Retain**
7	*Cupaniopsis anacardioides*	7	4	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• Located within proposed site compound and laydown area (Bryant Drive). • **Retain**
8	*Cupaniopsis anacardioides*	4	4	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	250	-	-	250	1.9	3	• Located within proposed site compound and laydown area (Bryant Drive). • **Retain**
9	*Casuarina cunninghamiana*	7	6	Fair	Poor	Mature	Medium	Short (5-15yrs)	Medium	550	-	-	550	2.6	6.6	• Located below OHW. • Heavily pruned. • Located within proposed site compound and laydown area (Bryant Drive) • **Retain.**
10	*Casuarina cunninghamiana*	8	6	Fair	Poor	Mature	Medium	Short (5-15yrs)	Medium	600	-	-	600	2.7	7.2	• Located below OHW. • Heavily pruned. • Located within proposed site compound and laydown area (Bryant Drive). • **Retain.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
11	*Casuarina cunninghamiana*	8	6	Fair	Poor	Mature	Medium	Short (5-15yrs)	Medium	600	-	-	600	2.7	7.2	• Located below OHW. • Heavily pruned. • Located within proposed site compound and laydown area (Bryant Drive). • **Retain.**
12	*Casuarina cunninghamiana*	8	5	Fair	Poor	Mature	Medium	Short (5-15yrs)	Medium	400	-	-	400	2.3	4.8	• Located below OHW. • Heavily pruned. • **Retain.**
13	*Casuarina cunninghamiana*	9	6	Fair	Poor	Mature	Medium	Short (5-15yrs)	Medium	500	-	-	500	2.5	6	• Located below OHW. • Heavily pruned. • **Retain.**
14	*Cupaniopsis anacardioides*	4	3	Fair	Fair	Mature	Low i	Medium (15-40yrs)	Low	200	-	-	200	1.7	2.4	• Pest infestation. • **Retain.**
15	*Waterhousia floribunda*	9	7	Good	Fair	Mature	Medium	Medium (15-40yrs)	Medium	300	-	-	300	2	3.6	• **Retain.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
16	*Melaleuca styphelioides*	7	4	Good	Fair	Mature	Medium	Medium (15-40yrs)	Medium	<150	<150	<150	250	1.9	3	• **Retain.**
17	*Melaleuca styphelioides*	5	4	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	200	<150	<150	250	1.9	3	• **Retain.**
18	*Melaleuca styphelioides*	5	4	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	200	<150	<150	250	1.9	3	• **Retain.**
19	*Melaleuca styphelioides*	3	4	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	<150	<150	<150	1.5	2	• **Retain.**
20	*Melaleuca styphelioides*	5	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	<150	<150	<150	1.5	2	• **Retain.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
21	*Melaleuca linariifolia*	4	4	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	<150	<150	-	<150	1.5	2	• **Retain.**
22	*Tristaniopsis laurina*	4	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	200	-	-	200	1.7	2.4	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
23	*Tristaniopsis laurina*	3	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
24	*Tristaniopsis laurina*	3	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
25	*Tristaniopsis laurina*	4	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
26	*Tristaniopsis laurina*	4	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
27	*Tristaniopsis laurina*	4	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
28	*Tristaniopsis laurina*	4	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
29	*Tristaniopsis laurina*	4	3	Good	Fair	Mature	Low i	Medium (15-40yrs)	Low	<150	-	-	<150	1.5	2	• Located within proposed site compound and laydown area (Bryant Drive North). • **Retain.**
30	*Melaleuca linariifolia*	4	4	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	<150	<150	<150	<150	1.5	2	• **Retain.**

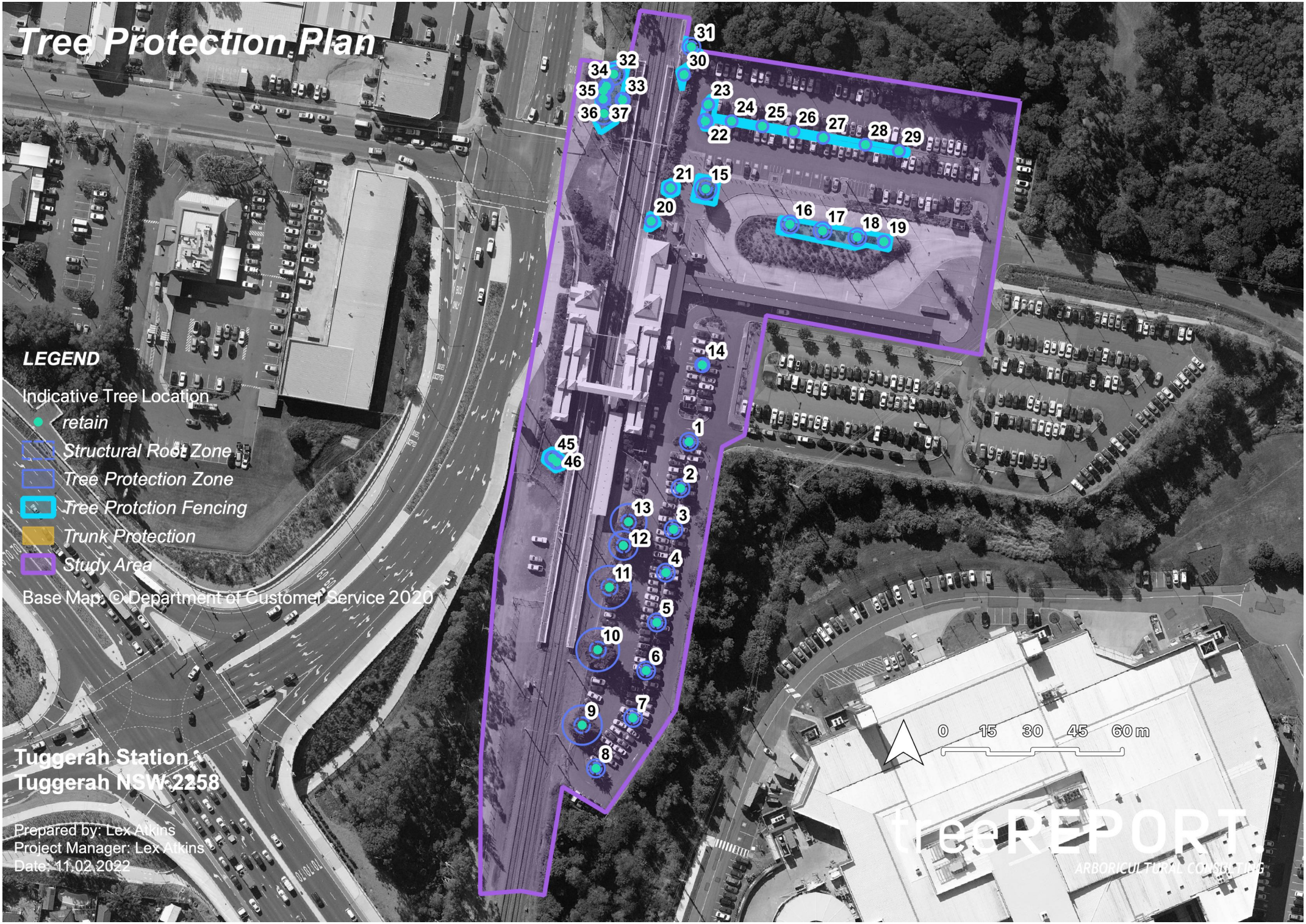
Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
31	*Melaleuca styphelioides*	7	3	Good	Fair	Mature	Medium	Medium (15-40yrs)	Medium	250	-	-	250	1.9	3	• **Retain.**
32	*Callistemon salignus*	6	3	Good	Fair	Mature	Medium	Medium (15-40yrs)	Medium	250	250	-	300	2	3.6	• **Retain.**
33	*Lophostemon confertus*	9	2	Fair	Fair	Mature	Medium	Medium (15-40yrs)	Medium	200	-	-	200	1.7	2.4	• **Retain.**
34	*Lophostemon confertus*	7	3	Fair	Fair	Mature	Medium	Medium (15-40yrs)	Medium	200	-	-	200	1.7	2.4	• **Retain.**
35	*Lophostemon confertus*	7	3	Fair	Fair	Mature	Medium	Medium (15-40yrs)	Medium	200	-	-	200	1.7	2.4	• **Retain.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
36	*Lophostemon confertus*	7	3	Fair	Fair	Mature	Medium	Medium (15-40yrs)	Medium	200	-	-	200	1.7	2.4	• **Retain.**
37	*Melaleuca quinquenervia*	7	3	Good	Fair	Mature	Medium	Medium (15-40yrs)	Medium	300	-	-	300	2	3.6	• **Retain.**
45	*Acacia sp.*	4	3	Good	Fair	Mature	Low i	Short (5-15yrs)	Low	<150	<150	<150	200	1.7	2.4	• **Remove.**
46	*Acacia sp.*	4	3	Good	Fair	Mature	Low i	Short (5-15yrs)	Low	<150	<150	<150	200	1.7	2.4	• **Remove.**
38	*Callistemon linearis*	8	5	Good	Fair	Mature	Medium	Medium (15-40yrs)	Medium	250	250	250	350	2.1	4.2	• Located below OHW. • Located wholly within proposed development footprint. • **Remove.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
39	*Callistemon salignus*	4	3	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	200	-	-	200	1.7	2.4	• Located below OHW. • Suppressed canopy. • Located wholly within proposed development footprint. • **Remove.**
40	*Callistemon salignus*	4	3	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	250	-	-	250	1.9	3	• Located wholly within proposed development footprint. • **Remove.**
41	*Callistemon salignus*	4	3	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	250	-	-	250	1.9	3	• Located wholly within proposed development footprint. • **Remove.**
42	*Callistemon salignus*	4	3	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	250	-	-	250	1.9	3	• Located wholly within proposed development footprint. • **Remove.**
43	*Callistemon salignus*	4	3	Fair	Fair	Mature	Low i	Short (5-15yrs)	Low	200	-	-	200	1.7	2.4	• Located below OHW. • Located wholly within proposed development footprint. • **Remove.**

Id.	Botanical name	Height (m)	Spread (m)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH 1 (Ømm)	DBH 2 (Ømm)	DBH 3 (Ømm)	Calculated DBH (mmØ)	SRZ (*R*m)	TPZ (*R*m)	Other notes
44	*Corymbia maculata*	16	6	Good	Good	Mature	High	Medium (15-40yrs)	High	550	-	-	550	2.6	6.6	• Located wholly within proposed development footprint. • **Remove.**
45	*Acacia sp.*	4	3	Good	Fair	Mature	Low i	Short (5-15yrs)	Low	<150	<150	<150	200	1.7	2.4	• Located within proposed site compound and laydown area (Pacific Highway South). • **Retain.**
46	*Acacia sp.*	4	3	Good	Fair	Mature	Low i	Short (5-15yrs)	Low	<150	<150	<150	200	1.7	2.4	• Located within proposed site compound and laydown area (Pacific Highway South). • **Retain.**

Appendix III Tree Protection Plan


Tree Protection Plan
LEGEND
Indicative Tree Location
retain
Structural Root Zone
Tree Protection Zone
Tree Protction Fencing
Trunk Protection
Study Area
Base Map: © Department of Customer Service 2020
Tuggerah Station
Tuggerah NSW 2258
Prepared by: Lex Atkins
Project Manager: Lex Atkins
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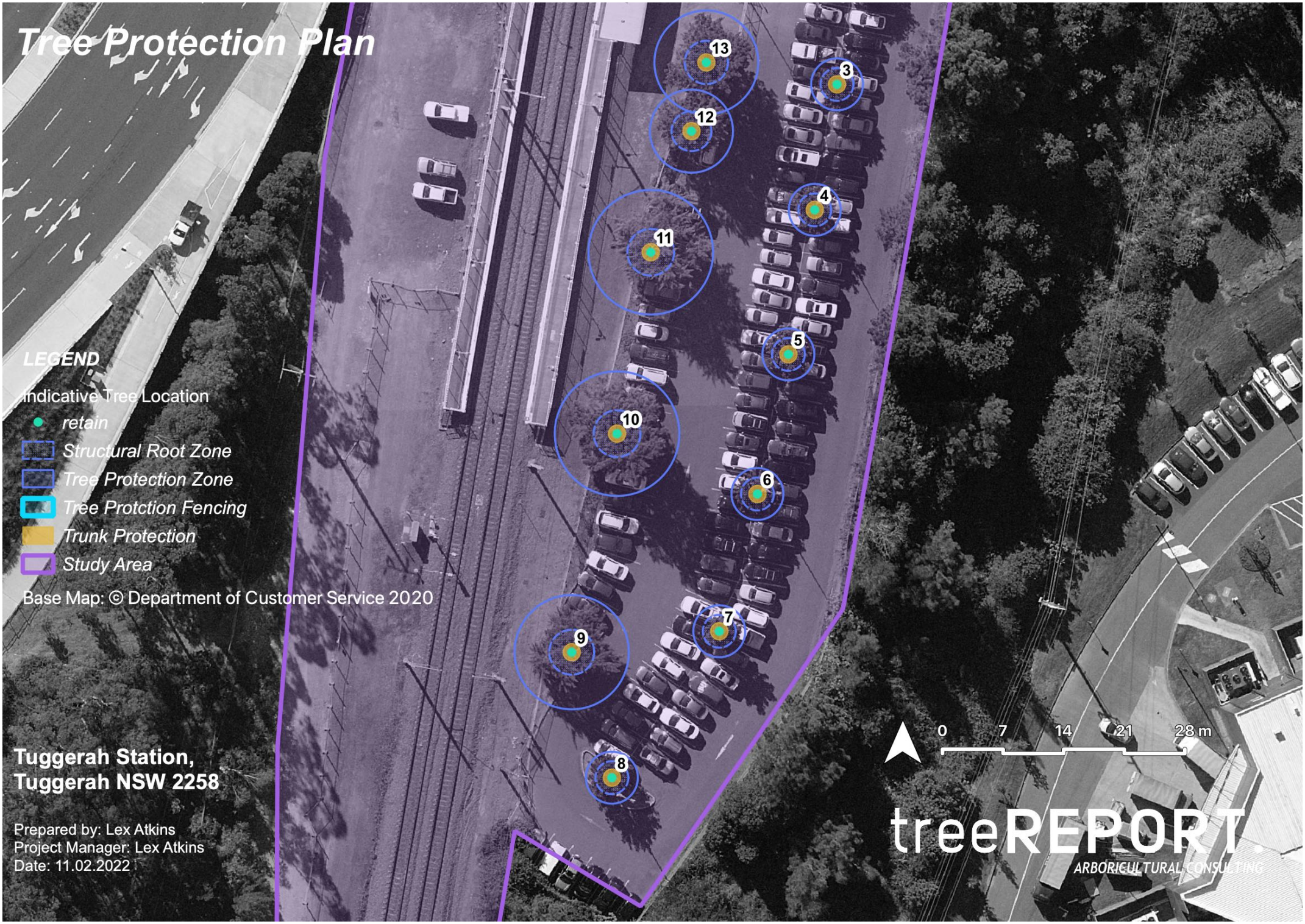
Tree Protection Plan
LEGEND
Indicative Tree Location
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Tree Protction Fencing
Trunk Protection
Study Area
Base Map: © Department of Customer Service 2020
13
3
12
4
11
5
10
6
7
9
8
0
7
14
21
28 m
Tuggerah Station,
Tuggerah NSW 2258
Prepared by: Lex Atkins
Project Manager: Lex Atkins
Date: 11.02.2022
treeREPORT
ARBORICULTURAL CONSULTING


Tree Protection Plan
LEGEND
Indicative Tree Location
retain
Structural Root Zone
Tree Protection Zone
Tree Protction Fencing
Trunk Protection
Study Area
Base Map: © Department of Customer Service 2020
Tuggerah Station,
Tuggerah NSW 2258
Prepared by: Lex Atkins
Project Manager: Lex Atkins
Date: 11.02.2022
14
1
45
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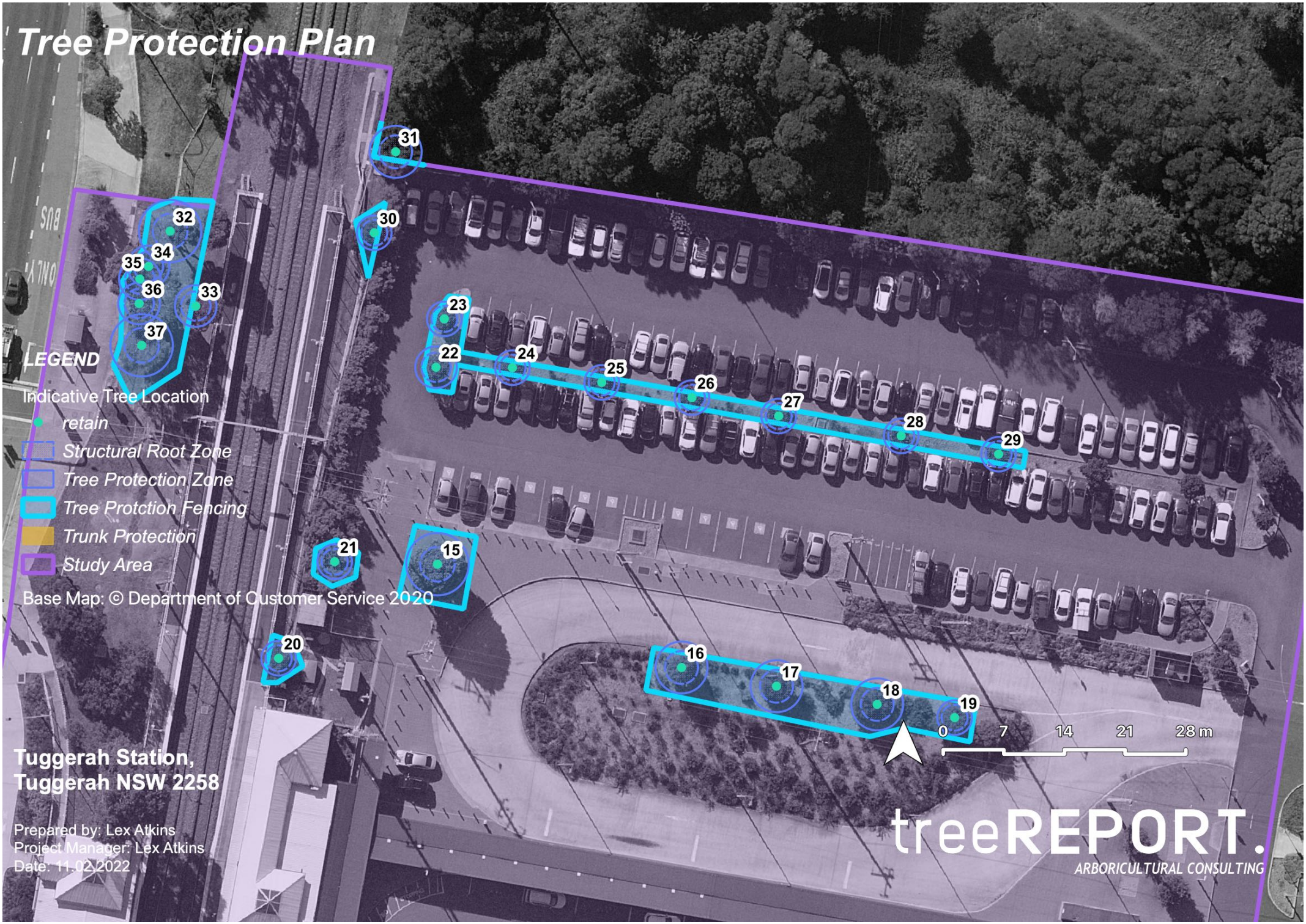
28 m
treeREPORT.
ARBORICULTURAL CONSULTING


Tree Protection Plan
LEGEND
Indicative Tree Location
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Base Map: © Department of Customer Service 2020
31
32
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34
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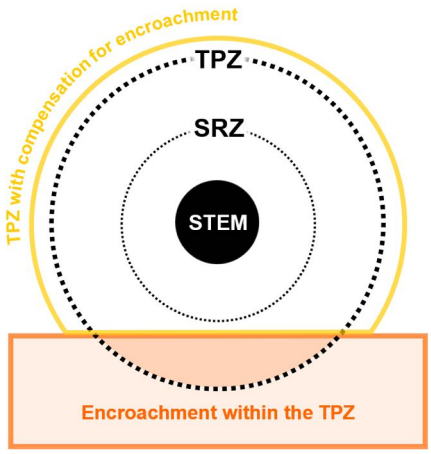
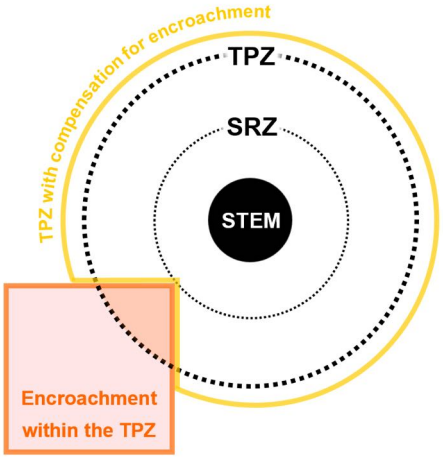
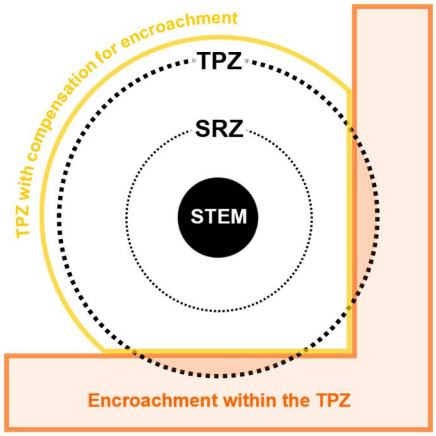
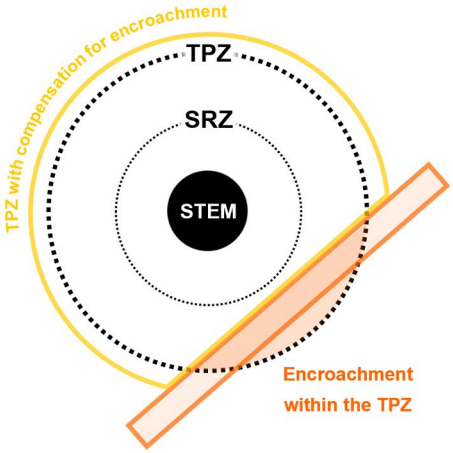
Appendix IV Encroachment within the TPZ

The images below show how encroachment within the tree protection zone can be compensated for elsewhere.









Reference

Council of Standards Australia (August 2009)
AS 4970-2009 Protection of Trees on Development Sites
Standards Australia, Sydney.

Appendix V STARS© assessment matrix

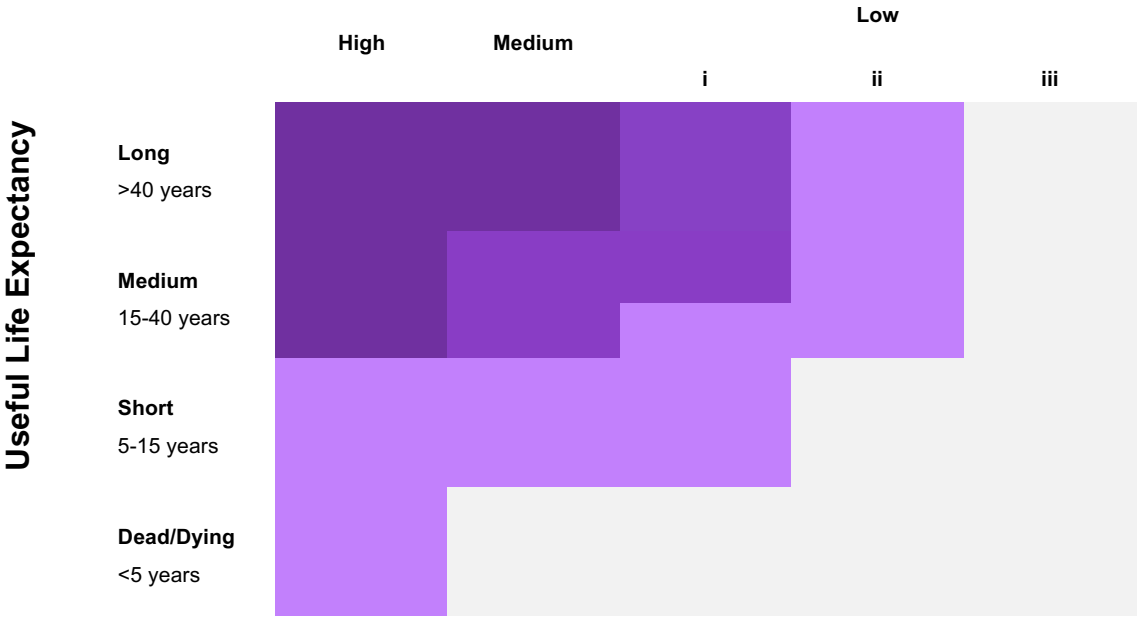
Tree Significance - Assessment Criteria - STARS©

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

Useful Life Expectancy - Assessment Criteria

Dead / Dying	Short	Medium	Long
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 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 other trees for the reasons.	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 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 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.

Tree Significance



Legend for Matrix Assessment

Priority for retention (High): These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 Protection of trees on development sites. Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.

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

Consider for removal (Low): These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.

Priority for removal (Low): These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of the proposed development.

tR.

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Website treereport.com.au

OUR MISSION

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