

ALLIED TREE
CONSULTANCY
Level 5 and 8 Arboriculturist

Arboricultural Impact Assessment Report

For the project titled
Waratah Station Upgrade;
Transport Access Program 3
WARATAH, NSW

Prepared for
RPS
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1.0 Introduction

- 1.1** The following Arborist report has been requested by *RPS* for the development proposal at Waratah Station, Waratah, titled the Waratah Station Upgrade; Transport Access Program 3. The area of assessment consists of both southern and northern sides of the station, although limited to the areas where the works are likely to be proposed. This report includes thirty trees located on, and adjacent to the area of proposed works, and discusses the viability of these trees based on the proposed works.
- 1.2** This report will address for these trees, the:
- species' identification, location, dimensions, and condition;
 - SULE (Safe Useful Life Expectancy) and STARS (Significance of a Tree Assessment Rating System) rating;
 - discussion and impact of the proposed works on each tree;
 - recommendations for the removal, retention and/or pruning;
 - tree protection zones and protection specifications for trees recommended for retention.
- 1.3** The subject site resides within Waratah. The proposal will be assessed under Part 5, Division 5.1 of the *Environmental Planning and Assessment Act* (1979), and the determining authority for this proposal is Transport for NSW.

2.0 Standards

- 2.1** *Allied Tree Consultancy* provides an ethical and unbiased approach to all assignments, possessing no association with private utility arboriculture or organisations that may reflect a conflict of interest.
- 2.2** This report must be made available to all contractors during the tendering process so that any cost associated with the required works for the protection of trees can be accommodated.
- 2.3** It is the responsibility of the contractor to provide the requirements outlined in this report relative to the Protection Zones, Measures (Section 7.0) and Specifications (Section 8.0) to all contractors associated with the project before the initiation of work.
- 2.4** All tree-related work outlined in this report is to be conducted in accordance with the:
- Australian Standard – AS4373; Pruning of Amenity Trees.

- Guide to Managing Risks of Tree Trimming and Removal Work¹.
- All tree works must be carried out at a tertiary level (minimum Certificate-level 3) qualified and experienced (minimum five years) arboriculturist.
- For any works in the vicinity of electrical lines, the arboriculturist must possess the ISSC26 endorsement (Interim guide for operating cranes and plant in proximity to overhead powerlines).

2.5 As a minimum requirement, all trees recommended for retention in this report must have removed all dead, diseased, and crossing limbs and branch stubs to be pruned to the branch collar. This work must comply with the local government tree policy (Newcastle City Council) and Section 2.4.

2.6 Any tree stock subject to conditions for works carried out in this report must be supplied by a registered Nursery that adheres to the AS 2303; 2015².

- All tree stock must be of at least 'Advanced' size (minimum 75lt) unless otherwise requested.
- All tree stock requested must be planted with adequate protection. This may include tree guards (protect stem and crown) and if planted in a lawn area, a suitable barrier (planter ring) of an area, at least, 1m² to prevent grass from growing within the area adjacent to the stem.

3.0 Disclosure Statement

Trees are living organisms and, for this reason, possess natural variability. This cannot be controlled. However, risks associated with trees can be managed. An arborist cannot guarantee that a tree will be safe under all circumstances, nor predict the time when a tree will fail. To live or work near a tree involves some degree of risk, and this evaluation does not preclude all the possibilities of failure.

4.0 Methodology

4.1 The following tree assessment was undertaken using criteria based on the guidelines laid down by the International Society of Arboriculture.

4.2 The format of the report is summarised below;

¹ Safe Work Australia; July 2016; Guide to Managing Risks of Tree Trimming and Removal Work, Australia

² Australian Standard, 2015, AS2303- Tree stock for landscape use, Australia

- 4.2.1 Plan 1; Tree Location Relative to Site:** This is an unscaled plan reproduced from the Survey Plan as referenced in Section 4.4.1, depicting the area of assessment.
- 4.2.2 Table 1;** This table compiles the tree species, dimensions, brief assessment (history, structure, pest, disease or any other variables subject to the tree), significance, allocation of the zones of protection (i.e., Tree Protection Zone³; TPZ and Structural Root Zone; SRZ) for each tree illustrated in Plan 1, Section 5.0. All measurements are in metres. An 'Action' is included and provides the nomination for retention/removal based on the tree location relative to the proposed design (drawing set, Section 4.4.2).
- 4.2.3 Discussion relating to the site assessment and proposed works regarding the trees.**
- 4.2.4 Protection Specification;** This Section (Section 8.0) details the requirements for that area designated as the Tree Protection Zone (TPZ), for those trees recommended for retention.
- 4.3** The opinions expressed in this report, and the material, upon which they are based, were obtained from the following process and data supplied:
- 4.3.1** Site assessment on the 3rd October 2018 using the method of the Visual Tree Assessment⁴. This has included a Level 2 risk assessment, being a *Basic Assessment*⁵. The assessment has been conducted by Warwick Varely⁶ on behalf of *Allied Tree Consultancy*.
- 4.3.2** Trees included in this report are those that are three meters or greater in height.
- 4.3.3** All measurements, unless specified otherwise are taken from the tree centre.
- 4.3.4** Raw data from the preliminary assessment including the specimen's dimensions was compiled by the use of a diameter tape, height clinometer, angle finder, compass, steel probes, Teflon hammer, binoculars and recording instruments.

³ Australian Standard, 2009, AS4970; – Protection of Trees on Development Sites, Australia

⁴ Mattheck, C. Breloer, H., 1994, The Body Language of Trees – A handbook for failure analysis
The Stationary Office, London

⁵ Dunster J.A., 2013, Tree Risk Assessment Manual, International Society of Arboriculture, 2013, USA

⁶ Consulting Arborist, Level 5 and 8

4.4 Documentation provided

The following documentation has been provided to Allied Tree Consultancy and utilised within the report.

4.4.1 Design

Drawn by *Architectus P/L*

Date: 11th October 2018

Reference: 150110

Drawing No:

TAP-WARA-15110-AR-DRAW-0000, Revision D

TAP-WARA-15110-AR-DRAW-0001, Revision E

TAP-WARA-15110-AR-DRAW-0002, Revision E

TAP-WARA-15110-AR-DRAW-1001, Revision E

TAP-WARA-15110-AR-DRAW-1101, Revision E

TAP-WARA-15110-AR-DRAW-1102, Revision E

TAP-WARA-15110-AR-DRAW-1201, Revision D

TAP-WARA-15110-AR-DRAW-1251, Revision E

TAP-WARA-15110-AR-DRAW-1252, Revision E

TAP-WARA-15110-AR-DRAW-1101, Revision E

TAP-WARA-15110-AR-DRAW-1301, Revision E

TAP-WARA-15110-AR-DRAW-1302, Revision E

TAP-WARA-15110-AR-DRAW-1303, Revision E

Note 1: See Section 4.5.1

4.4.2 Document

Engineering Services Report

Author: *Norman Disney and Young P/L*

Reference: 1.0 Draft

Date: 11 October 2018

Fourteen pages

4.4.3 Document

Preliminary Memo for TfNSW Procurement

Transport Access program 3 Package 1-Waratah Station

Author: *SMEC Australia P/L*

Reference: 3001533-WARA-GE-MEMO-01

Date: 11th October 2008

Ten pages

4.4.4 Design notes

Drawn by *untitled*

Date: 4th October 2018

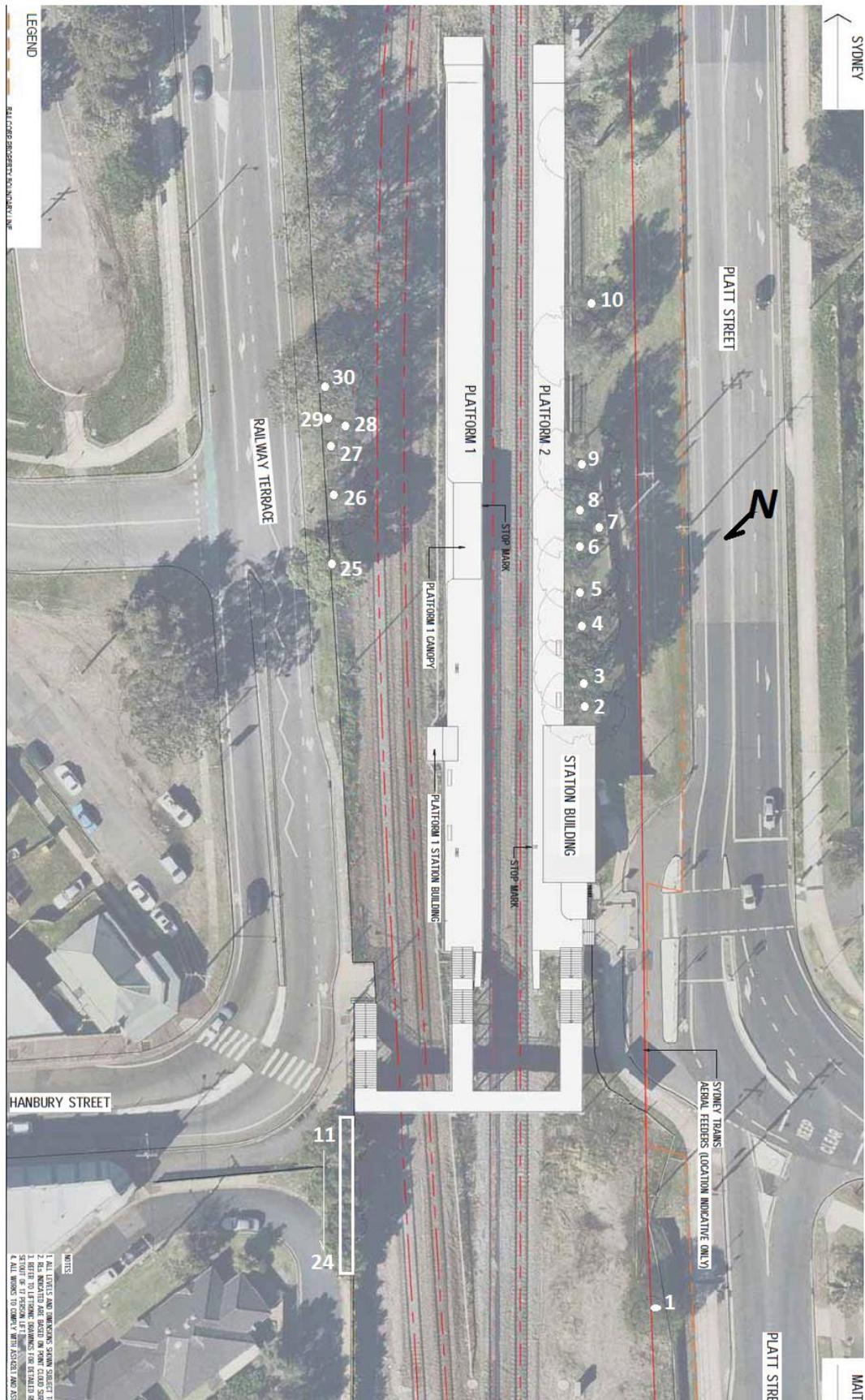
Reference: unreferenced

Drawing title: Waratah Station Proposed Link Slab Connection
Detail

4.5 Limitations of the assessment/discussion process

- 4.5.1** This drawing set includes an aerial photo with the existing (Site Plan) and proposed design imposed over the aerial photo. That is, the specific location of the tree stem is not illustrated on the drawing set. The tree location has been plotted onto the Plan 1 by *Allied Tree Consultancy*. *Allied Tree Consultancy* is not a registered surveyor and, although the accuracy of the Plan 1 is attempted; the true position of the trees may marginally deviate. Any such deviation provides the potential for changing the actual impact (encroachment) provided to a tree.
- 4.5.2** Several trees (1, 25-30) are located behind chain wire fencing and within the rail corridor. Based on the restricted access, these trees were unable to be thoroughly. Therefore the ratings applied are estimates and may not be a true representation of the tree condition.
- 4.5.3** The assessment has considered only those target zones that are apparent to the author and the visually apparent tree conditions, during the time of assessment.
- 4.5.4** Any tree regardless of apparent defects would fail if the forces applied to exceed the strength of the tree or its parts, for example, extreme storm conditions.
- 4.5.5** The assessment has been limited to that part of the tree which is visible, existing from the ground level to the crown. Root decay can exist and in some circumstances provide no symptoms of the presence. This assessment responds to all the symptoms provided by a tree, however, cannot provide a conclusive recommendation regarding any tree that may have extensive root decay that leads to windthrow without the appropriate symptoms.

5.0 Plan 1; Area of assessment illustrating tree location



Not to scale

Source: Adapted from Architectus P/L, Drawing TAP-WARA-15110-AR-DRAW-0000, Revision D, see Section 4.4.1

6.0 Table 1 – Tree Species Data

Terminology/references provided in Appendix A.

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
1	<i>Acacia saligna</i> ^A Coojong	4	0.40 ^{B,C}	6 x 6	M	D	Sym.	A	A2 ^C	MEDIUM	4.8	2.3
Assessment		This tree presents the habit typical for a self-sown species. The tree is growing flush with the chain wire fence.									RETAIN See Section 7.1.1	
2	<i>Casuarina cunninghamiana</i> River Oak	15	0.22 0.37 0.50	10 x 8	M	C	NW	A	D2	MEDIUM	7.9	2.8
Assessment		This tree is composed of three leaders that are supported by an included bark crotch. The southern leader has a dubious attachment point and provides a risk for failure. However, the target zone (drainage culvert) offers a low use target zone. This tree has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
3	<i>Casuarina cunninghamiana</i> River Oak	15	0.47	10 x 6	M	I	Sym.	A	A1	MEDIUM	5.6	2.4
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
4	<i>Casuarina cunninghamiana</i> River Oak	15	0.44	11 x 5	M	I	Sym.	A	A2	MEDIUM	5.3	2.4
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
5	<i>Eucalyptus tereticornis</i> Forest Red Gum	14	0.44	5 x 5	M	I	Sym.	A	A1	MEDIUM	5.3	2.4
Assessment		This tree presents typical form and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
6	<i>Casuarina cunninghamiana</i> River Oak	15	0.39	8 x 5	M	I	Sym.	A	A1	MEDIUM	4.7	2.3
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
7	<i>Casuarina cunninghamiana</i> River Oak	15	0.31	5 x 3	M	C	S	A	A1	MEDIUM	3.7	2.1
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
8	<i>Casuarina cunninghamiana</i> River Oak	15	0.43	8 x 6	M	I	Sym.	A	A1	MEDIUM	5.2	2.3
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
9	<i>Casuarina cunninghamiana</i> River Oak	15	0.37	6 x 5	M	D	Sym.	A	A1	MEDIUM	4.4	2.2
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
10	<i>Casuarina cunninghamiana</i> River Oak	15	0.43	6 x 10	M	D	Sym.	A	A1	MEDIUM	5.2	2.3
Assessment		This tree presents typical form, and has been crown lifted and additional pruning to the southwestern side of the crown for power line clearance.									RETAIN See Section 7.1.1	
11	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	6	0.27 ^B 0.30	7 x 3	M	C	E	A	A2	MEDIUM	4.8	2.3
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									REMOVE See Section 7.1.4	
12	<i>Callistemon salignus</i> Pink Tips	6	0.15 0.15 0.15	5 x 2	M	S	Sym.	B	A4	LOW	3.2	1.8
Assessment		Tree presents poor form, a result of the suppressed habit.									REMOVE See Section 7.1.4	
13	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	6	0.30	5 x 4	M	C	N	A	A2	MEDIUM	3.6	2.0
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.3	
14	<i>Callistemon salignus</i> Pink Tips	6	0.17 0.13	1 x 1	M	I	Sym.	-	A4	LOW	-	-
Assessment		Tree presents poor form, a result of the suppressed habit.									RETAIN See Section 7.1.3	
15	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	4	0.10	2 x 1	Y	I	N	A	A2	LOW	2.0	1.5

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	
16	<i>Callistemon salignus</i> Pink Tips	6	0.10 0.12 0.13 0.14	3 x 3	M	I	Sym.	A	A2	MEDIUM	3.0	1.8
Assessment		Composed of four leaders, this tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	
17	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	6	0.28	5 x 3	M	C	N	A	A2	MEDIUM	3.4	1.9
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	
18	<i>Callistemon salignus</i> Pink Tips	6	0.17	2 x 2	M	I	Sym.	A	A2	LOW	2.1	1.6
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	
19	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	4	0.14	2 x 1	M	S	S	B	A4	LOW	2.0	1.5
Assessment		Tree presents poor form, a result of the suppressed habit.									RETAIN See Section 7.1.1	
20	<i>Callistemon salignus</i> Pink Tips	6	0.10-0.15 x 5	4 x 4	M	I	Sym.	A	A2	MEDIUM	2.6	1.7
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
21	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	6	0.25	5 x 1	M	I	Sym.	A	A2	MEDIUM	3.0	1.8
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	
22	<i>Callistemon salignus</i> Pink Tips	6	0.16 0.15 0.15	3 x 3	M	I	Sym.	A	A2	MEDIUM	3.2	1.9
Assessment		This tree presents typical form, and the biased habit is a result of the sound wall and adjacent plantings.									RETAIN See Section 7.1.1	
23	<i>Syzygium paniculatum</i> Magenta Lilly Pilly	4	0.13 0.10	3 x 1	M	I	N	B	A3	LOW	2.0	1.5
Assessment		This tree is a slender scant specimen due to the overplanting									RETAIN See Section 7.1.1	
24	<i>Callistemon salignus</i> Pink Tips	3	< 0.10	1 x 1	M	S	N	B	A3	LOW	2.5	1.5
Assessment		This tree is a slender scant specimen due to the overplanting									RETAIN See Section 7.1.1	
25	<i>Lophostemon confertus</i> Brush Box	8	0.40 ^c	10 x 10	M	D	N	B	A2 ^c	MEDIUM	4.8	2.3
Assessment		This tree presents typical form. However dieback on the southern side of the tree is uncharacteristic, and no apparent reason exists for this.									RETAIN See Section 7.1.1	
26	<i>Casuarina cunninghamiana</i> River Oak	8	0.26 ^c 0.23	5 x 5	M	D	Sym.	A	A2 ^c	MEDIUM	4.2	2.2
Assessment		This tree presents typical form for the species.									RETAIN	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
											See Section 7.1.1	
27	<i>Casuarina cunninghamiana</i> River Oak	8	0.30 ^C	5 x 5	M	C	SW	A	A1 ^C	MEDIUM	3.6	2.0
	Assessment	This tree presents typical form for the species.									RETAIN See Section 7.1.1	
28	<i>Acacia saligna</i> ^A Coojong	4	0.16 ^C	3 x 3	M	S	N	A	A3 ^C	LOW	2.0	1.5
	Assessment	This tree has bowed completely north due to the suppressed class and extends well over the verge. The tree presents poor form.									RETAIN See Section 7.1.1	
29	<i>Eucalyptus tereticornis</i> Forest Red Gum	5	0.20 ^C	4 x 4	M	S	W	A	A2 ^C	MEDIUM	2.4	1.7
	Assessment	This tree presents typical form for the species.									RETAIN See Section 7.1.1	
30	<i>Eucalyptus tereticornis</i> Forest Red Gum	15	0.55 ^C	14 x 15	M	D	Sym.	A	A1 ^C	MEDIUM	6.6	2.6
	Assessment	This tree presents typical form for the species.									RETAIN See Section 7.1.1	

Syzygium paniculatum see Note 2, Section 7.0

- A. Incomplete identification of species due to insufficiently available plant material
- B. Diameter taken below 1.4m due to low stem bifurcation
- C. estimate due to overgrown area and/or limited access
- D. deciduous species, void of leaf at the time of assessment
- E. Level 3 assessment required to determine accurate rating

7.0 Site Assessment

The area of assessment consists of the southern and northern side of the Waratah station. The southern side of the station contains a platform and single story station building. A second platform is centrally located, and the northern side has a track extending adjacent to the boundary. Chainwire boundary fencing surrounds the station and has limited the assessment of trees No. 1 and 25 to 30. A drainage culvert extends near parallel with the southern boundary, and this structure is old and a brick construction, although some retaining stone walls have been constructed on portions of the western end. The thirty trees included in this assessment are divided between four areas as discussed.

Tree No. 1 is an isolated specimen and based on the area from where it is growing, species and habit are likely self-sown. This tree was unable to be accessed at the time of assessment and is contained behind a chain-wire fence and within a separate compound adjacent to the station.

Trees No. 2 to 10 are a linear planting. These are planted parallel and approximately 1200mm from a block (stacker) wall that supports the southern platform. They are located at the top of a lawn area that contains a moderate gradient and is bordered by the drainage culvert to the south. Based on the age of these trees, they are likely to form part of the initial landscape associated with the station building construction, that is, approximately 1985.

Trees No. 11 to 24, are a linear planting composed of *Callistemon salignus* and *Syzygium paniculatum* (see Note 2). The species are alternately planted, with an average spacing of 1000mm, and near flush with a sound wall, adjacent to the northern boundary. This planting arrangement appears to be intended to screen the sound wall. The sound wall has a climber (*Ficus pumila*) attached, and this has grown into the crown structure of these trees and distorted the assessment. The differing growth rates of the two species and close planting (1000mm apart) has resulted in several suppressed specimens as well as a biased habit. Crown lifting to allow for pedestrian access has further impacted on the habits. Based on the age of these trees, they could form part of the initial landscape associated with the station building construction, that is, approximately 1985 or a later planting. The tree group allows for predominately 'medium' significance' although, this is based on tree retention as a group.

Trees no. 25 to 30 are located on the top of an embankment that falls away to the tracks. The species are inconsistent, although the *Eucalyptus tereticornis* occurs in additional plantings in this area and not included in this report. Based on the tree size, they could predate the initial landscaping, however, are not considered to be remnant plantings.

Note 2: *Syzygium paniculatum*- the available plant parts are consistent with this species identification although, several cultivars exist. The flower/fruit was not available at the time of assessment, and the habit is distorted. Therefore the trees identified as this species can also be a cultivar of the species.

7.1 Proposed development

The proposed development consists of the Waratah Station Upgrade and the summary of these works in relation to the trees included in this report has been summarised from the document titled, Preliminary Memo for TfNSW Procurement (See Section 4.4.3). This document outlines all related works, and the majority of these will not be in the vicinity of any tree nor relate to any impact. Only those works that may have a possible impact have been included in the following list.

- Three new lifts
- New link span at Platform 1; and associated strengthening of impacted existing footbridge elements
- The new ramp from the new lift on Platt Street to station entry and Platform 2
- Two kiss n ride/taxi zone on Platt Street and Railway Terrace
- Local modification of rail corridor fencing on Railway Terrace to accommodate new kiss n ride/taxi zone
- New DDA car parking on Platt Street

Assumption 1: the work required to construct the lift well will require room outside of the footprint for this structure as part of the work methodology. The foundation/footing required for this structure is illustrated in the drawing referenced in Section 4.4.4, although the description is limited and the extent of work required outside of the lift well footprint is unknown. Therefore, an area of at least 1000mm outside of the footprint has been considered as the zone of encroachment for any tree.

Assumption 2: No survey indicating the accurate tree location has been issued for this project and based on Section 4.5.1, *Allied Tree Consultancy* has located the trees onto Plan 1. Although, some drawings as part of the drawing set referenced in Section 4.4.1 has illustrated trees. Included as part of this set, the drawing No. TAP-WARA-15110-AR-DRAW-1101, Revision E has been used for the impact by the proposed lift well located on the northern side of the site. Two trees have been included in this drawing, although the location of these trees is considered to be inaccurate. This is based on the distance between these trees is not representative of the actual distance measured on site, see Section 7.0, approximately 1000mm. Nor is the tree centre (assumed as the

centre of the illustrated dripline) located the actual distance from the sound wall. Based on this drawing, the tree indicated as the red outline is assumed to be tree No. 11.

This report discusses the impact of the proposed design on the trees. Thirty (30) trees have been listed within this report based upon the vicinity of the work. This has included trees located within and adjacent to the proposed works where any part of the zones of protection (TPZ, SRZ) could encroach into the area proposed for work. Recommendations based on the tree significance and condition, together with the impact on these trees regarding the development for this lot follow.

7.1.1 Trees and zones of protection (TPZ/SRZ) outside of the proposed design

Trees No. 1-10 and 15-30

None of the proposed works conflict with the location of these trees or respective zones of protection. These trees can be retained without impact by the proposed design.

7.1.2 Trees providing a limited useful life expectancy

Trees No. 12, 14, 19, 23, 24 and 28

These trees provide low significance based on the species, habit and rating and could be removed due to the low amenity value and limited useful life expectancy.

7.1.3 Trees subject to a minor encroachment

Trees No. 13 and 14

Based on Assumption 2, these trees are estimated to be subject to a minor encroachment. That is, the proportion (<10%) of encroachment provided by design will not adversely impact on the tree. These trees could be retained relative to the design.

7.1.4 Trees subject to a major encroachment

Trees No. 11 and 12

These trees are not directly located in the footprint of the proposed design, however, are located close and adjacent to the footprint and subject to a *major encroachment*, that is, in excess of 10% of the TPZ. These encroachments have been based on the drawing no. TAP-WARA-15110-AR-DRAW-1101, Revision E. The extent and type of encroachment for each tree are discussed and the relative implications.

Tree No. 11: Based on Assumption 2, the actual encroachment is unable to be calculated, although is estimated to be approximately 20%. Also, the biased crown mass will impact on the lift well, and potentially the access point. This tree is unlikely to be retained based on the proposed design.

Tree No. 12: Based on Assumption 2, the actual encroachment is unable to be calculated, although is estimated to be less than 20%. Also, the biased crown mass may impact on the lift well. Although this tree could be retained, the work zone (based on Assumption 1) will likely conflict with this tree. Coupled with the poor rating (Section 7.1.2), and vicinity to the works, this tree will likely require removal.

7.2 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities. Any trenching, other than what has been allowed for should be avoided within the area of the TPZ's for any tree nominated for retention. Any proposed route shall be re-routed outside of the TPZ. Under boring may be required if a limitation for the route of a service is restricted to an that falls within the TPZ from any tree. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

7.3 Protection measures

The following protection measures are required to be implemented for the following trees before initiation of site works (including demolition/excavation) and retained until the landscaping works are required unless otherwise specified.

Trees No. 13-24

A protective fence is required to be installed to protect the TPZ from all site-related work and are recommended to be located in accordance with the requirements of the AS 4970, listed in Appendix B. The fence is required to be secured to the ground with pegs to avoid movement during construction. This must be installed prior to the commencement of any demolition, excavation or construction works and shall be maintained throughout the entire construction phase of the development, and until landscaping works and installation of the drive/cross-overs is required.

The location of the protective fence has been illustrated in Plan 2, Appendix B.

Site induction; All workers related to the construction process and before entering the site must be briefed about the requirements/conditions outlined in this report relative to the zone of protection, measures, and specifications before the initiation of work. This is required as part of the site induction process.

7.4 Compliance Documentation

The following stages will require assessment and documentation (report, letter, certification) by the project arborist or person responsible for the specific work type, and the related documentation is to be issued to Transport NSW.

7.4.1 Table 2; Assessment/Certification stages

Stage	Work type	Document required
Pre- works	Installation of the protection measures, Section 7.3	Certificate*
During construction	Any <u>further works</u> required within the area of the TPZ, or decline related to the trees that have not been covered by this report.	Report Brief
During construction	Any crown modification including pruning or root disturbance.	Report Brief

Construction refers to the time between the initiation of demolition and until an occupation certificate is issued.

***Mandatory**

8.0 Protection Specification

The retention and protection of trees provide for the requirement of the Tree Protection Zone (TPZ) to conform to the conditions outlined below. These conditions provide the limitations of work permitted within the area of the Tree Protection Zone (TPZ) and must be adhered to unless otherwise stated.

1. Foundation/footing types should not be strip type, but utilise footing types that are sympathetic towards retaining root system that is, screw, pier, etc. Slab on the ground can be accommodated in some circumstances and will be nominated by the project arborist. The extent of encroachment will be dependent upon the tree species, soil type (texture and profile) and gradients.
2. Subsurface utilities can extend through the TPZ and Structural Root Zone (SRZ), however, are limited to the method of installation. That is under boring is permitted, however trenching is limited and depends on the proposed route within the TPZ. No trenching is permitted within the area of the TPZ unless stipulated by the project arborist.
3. Crown pruning can be accommodated, however, must conform to the AS 4373; *Pruning of Amenity Trees*, and not misshape the crown nor remove in excess of 10-15% of the existing crown, pending on the species, and

- vigour. The opportunity for, type and proportion of pruning will be required to be nominated by the project arborist.
4. Soil levels within the TPZ must remain the same. Any excavation within the TPZ must have been previously specified and allowed for by the project arborist:
 - a) So it does not to alter the drainage to the tree.
 - b) Under specified circumstances,
 - o Added fill soil does not exceed 100mm in depth over the natural grade. Construction methodologies exist that can allow grade increases in excess of 100mm, via the use of an impervious cover, an approved permeable material or permanent aeration system or other approved methods.
 - o Excavation cannot exceed a depth of more than 50mm within the area of the TPZ, not including the SRZ. The grade within the SRZ cannot be reduced without the consent from a project arborist.
 5. No form of material or structure, solid or liquid, is to be stored or disposed of within the TPZ.
 6. No lighting of fires is permitted within the TPZ.
 7. All drainage runoff, sediment, concrete, mortar slurry, paints, washings, toilet effluent, petroleum products, and any other toxic wastes must be prevented from entering the TPZ.
 8. No activity that will cause excessive soil compaction is permitted within the TPZ. That is, machinery, excavators, etc. must refrain from entering the area of the TPZ unless measures have been taken, and with consultation with the project, arborist to protect the root zone.
 9. No site sheds, amenities or similar site structures are permitted to be located or extend into the area of the TPZ unless the project arborist provides prior consent.
 10. No form of construction work or related activity such as the mixing of concrete, cutting, grinding, generator storage or cleaning of tools is permitted within the TPZ.
 11. No part of any tree may be used as an anchorage point, nor should any noticeboard, telephone cable, rope, guy, framework, etc. be attached to any part of a tree.

12. (a) All excavation work within the TPZ will utilise methods to preserve root systems intact and undamaged. Examples of methods permitted are by hand tools, hydraulic, or pneumatic air excavation technology.
- (b) Any root unearthed which is less than 50mm in diameter must be cleanly cut and dusted with a fungicide, and not allowed to dry out, with minimum exposure to the air as possible.
- (c) Any root unearthed which is greater than 50mm in diameter must be located regarding their directional spread and potential impact. A project arborist will be required to assess the situation and determine future action regarding retaining the tree in a healthy state.

Project Arborist: person nominated as responsible for the provision of the tree assessment, arborist report, consultation with stakeholders, and certification for the development project. This person will be adequately experienced and qualified with a minimum of a level 5 (AQF); Diploma in Horticulture (Arboriculture)⁷.

⁷ Based upon the definition of a 'consulting arborist' from the AS 4970; Protection of trees on development sites; 2009, section 1.4.4, p 6.

9.0 Summary of tree impact

Based on the design supplied, the following summary provides the impacts imposed on the trees included in this report.

The tree location illustrated in the Drawing set is considered to be inaccurate. Based on the discussion presented in Section 4.5.1 and Assumption 2, Section 7.1, the extent of encroachment, that is impact onto trees No. 11 to 16 has been estimated. Therefore the extent of impact presented in this report may not represent the actual impact provided by the proposed design.

9.1 Trees no. 1-10 and 13-30

These trees can be retained relative to the nominated zones of protection (TPZ, SRZ) and based on the requirements of the Protection Specification, Section 8.0. The proposed design does not adversely affect these trees.

9.2 Trees no. 11 and 12

The proposed design will require the removal of these trees.

9.3 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities. Any trenching, other than what has been allowed for should be avoided within the area of the TPZ's for any tree nominated for retention. Any proposed route shall be re-routed outside of the TPZ. Under boring may be required if a limitation for the route of a service is restricted to an that falls within the TPZ from any tree. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

9.4 Protection measures

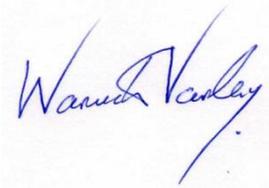
Protection measures (outlined in Section 7.3 and 7.4) are required to be implemented for the trees nominated for retention (referenced in Section 9.1) and installed before initiation of site works (including demolition/excavation) and retained until the landscaping works are required unless otherwise specified.

All workers related to the construction process and before entering the site must be briefed about the requirements/conditions outlined in this report relative to the zone of protection, measures, and specifications before the initiation of work.

A project arborist is required to be nominated, and the stages and related certification or similar documentation is to be issued to the principal certifying agent.

The opinions expressed in this report by the author have been provided within the capacity of a Consulting Arborist. Any further explanation or details can be provided by contacting the author.

DATED: 30th October 2018



Warwick Varley
Consulting Arborist
Level 5 and 8; Arboriculture
MIACA; Reg. #18
MISA
MIAH; Reg. # 32



10.0 Appendix A- Terminology Defined

Height

Is a measure of the vertical distance from the average ground level around the root crown to the top surface of the crown, and on palms - to the apical growth point.

DBH

Diameter at Breast Height – being the stem diameter in metres, measured at 1.4m from ground level, including the thickness of the bark.; Mult. refers to multiple stems, that is in excess of 4 stems.

Crown Spread

A two dimension linear measurement (in metres) of the crown plan. The first figure being the north-south span, the second being the east-west measurement.

Age

Is the estimate of the specimen's age based upon the expected life span of the species. This is divided into three stages.

Young (Y)	Trees less than 20% of life expectancy.
Mature (M)	Trees aged between 20% to 80% life expectancy.
Over-mature (O)	Trees aged over 80% of life expectancy with probably symptoms of senescence.

Crown Aspect

In relation to the root crown, this refers to the aspect the majority of the crown resides in. This will be either termed Symmetrical (Sym.) where the centre of the crown resides over the root crown, or the cardinal direction the centre of the crown is biased towards, being either North (N), South (S), East (E) or West (W).

Vitality Rating

Is a rating of the trees health, irrespective and independent of the structural integrity, and defined by the 'ability for a tree to sustain its life processes' ((Draper, Richards, 2009). This is divided between three variables, and based on the assessment of symptoms including, but not limited to; leaf size, colour, crown density, woundwood development, adaptive growth formation and epicormic growth.

A: Normal vitality, typical for the species

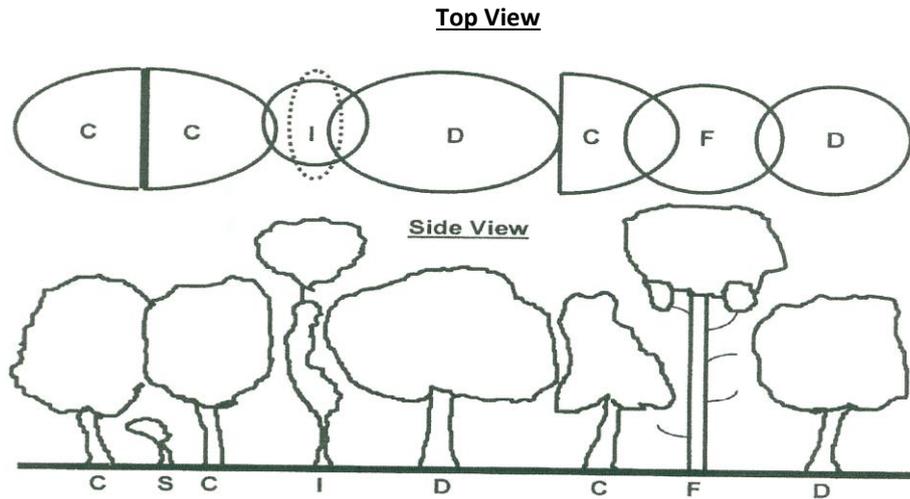
B: Below average vitality, possibly temporary loss of health, partial symptoms.

C: Poor vitality; obvious decline, potentially irreversible

Crown Class

Is the differing crown habits as influenced by the external variables within the surrounding environment. They are:

D – <i>Dominant</i>	Crown is receiving uninterrupted light from above and sides, also known as emergent.
C – <i>Codominant</i>	Crown is receiving light from above and one side of the crown.
I – <i>Intermediate</i>	Crown is receiving light from above but not the sides of the crown.
S – <i>Suppressed</i>	Crown has been shadowed by the surrounding elements and receives no light from above or sides.
F – <i>Forest</i>	Characterised by an erect, straight stem (usually excurrent) with little stem taper and virtually no branching over the majority of the stem except for the top of the tree which has a small concentrated branch structure making up the crown.



D C, I & S and side view, after (Matheny, N. & Clark, J. R. 1998, Trees Development, Published by International Society of Arboriculture, P.O. Box 3129, Champaign IL 61826-3129 USA, p.20, adapted from the Hazard Tree Assessment Program, Recreation and Park Department, City of San Francisco, California).

Levels of assessment

Level 1: Limited visual: a visual tree assessment for the purpose of managing large populations of trees within a limited time span and in order to identify obvious faults which would be considered imminent.

Level 2: Basic assessment: a standard performed assessment providing for a detailed visual assessment including all parts of the tree and surrounding environment and via the use of simple tools.

Level 3: Advanced assessment: specific type assessments conducted by either arborists whom specialise with specific areas of assessment or via the use of specialised equipment. For example, aerial assessment by use of an EWP or rope/harness, or decay detection equipment.

All other definitions are referenced from;

Draper D.B., Richards P.A., 2009, Dictionary for Managing Trees in Urban Environments CSIRO Pub., Australia

Significance Rating, Significance of a Tree Assessment Rating System (S.T.A.R.S), IACA, 2010⁸

Tree Significance – Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vitality;
- 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.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vitality;
- 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.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vitality;
- 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,

⁸ IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

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.

Table 3; Tree Retention Value – Priority Matrix.

		Significance				
		1. High Significance in Landscape	2. Medium Significance in Landscape	3. Low Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
Legend for Matrix Assessment						
	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc 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 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 - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.					

Safe Useful Life Expectancy – S.U.L.E (Barell 1995)

	1. Long	2. Medium	3. Short	4. Removal	5. Moved or Replaced
	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 15 – 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 5 – 15 years with an acceptable level of risk.	Trees that should be removed within the next 5 years.	Trees which can be reliably moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 years.	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small trees less than 5m in height.
B	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through instability on recent loss of adjacent trees.	Young trees less than 15 years old but over 5m in heights
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.	Trees that may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Damaged trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings.	
F				Trees that are damaging or may cause damage to existing structures within 5 years.	
G				Trees that will become dangerous after removal of other trees for reasons given in (A) to (F).	

TPZ; Tree Protection Zone

Is an area of protection required for maintaining the trees vigour and long term viability. Measured in metres as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to, unless otherwise stated.

The size of the Tree Protection Zone (TPZ) has been calculated from the *Australian Standard, 4970; 2009 – Protection of Trees on Development Sites*

The TPZ does not provide the limit of root extension, however offers an area of the root zone that requires predominate protection from development works. The allocated TPZ can be modified by some circumstances; however will require compensation equivalent to the area loss, elsewhere and adjacent to the TPZ.

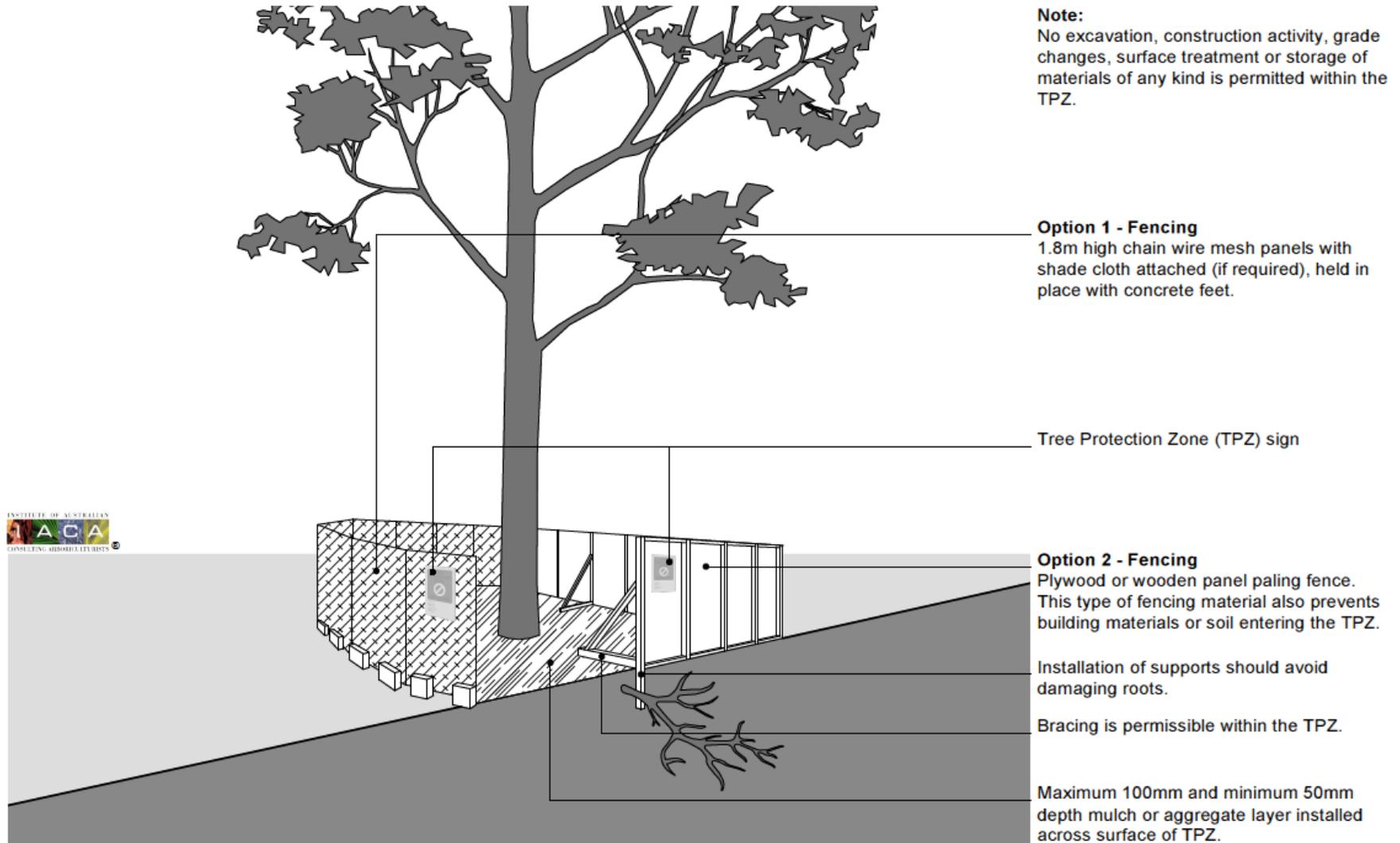
SRZ; Structural Root Zone

Is the area around the tree containing the woody roots necessary for stability. Measured in metres as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to, unless otherwise stated.

Protection Measures

These are required for the protection of trees during demolition/construction activities. Protective barriers are required to be installed before the initiation of demolition and/or construction, and are to be maintained up to the time of landscaping. Samples of the recommended protection measures are illustrated in Appendix B.

**Appendix B- Protection measures;
Protective fence**



Tree protection zone sign; requirements



Stem and Ground protection

