



# Transport Access Program

# **Pymble Station Upgrade**

## Supporting Studies



*Artist's impression of the proposed Pymble Station Upgrade, subject to detailed design*



Level 5 and 8 Arboriculturist

## **Arboricultural Impact Assessment Report**

For the site address  
Pymble Station, PYMBLE, NSW

Prepared for  
Transport for NSW  
Level 5, Tower A, Zenith Centre  
CHATSWOOD, NSW 2067

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## 1.0 Introduction

**1.1** *Allied Tree Consultancy (ATC)* has been commissioned by *RPS* on behalf of *Transport for NSW (TfNSW)* to prepare an Arboricultural Impact Assessment for the Pymble Station Upgrade. This proposal includes work related to upgrading the station infrastructure to meet requirements of the Commonwealth *Disability Discrimination Act 1992*. This report includes thirty trees located on and adjacent to the site and discusses the viability of these trees based on the proposed work.

**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 work on each tree;
- tree protection zones and protection specifications for trees recommended for retention.

## 2.0 Standards

**2.1** ATC 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 work for the protection of trees can be accommodated.

**2.3** **It is the responsibility of the project manager 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 Work<sup>1</sup>.
- all tree work must be carried out at a tertiary level (minimum Certificate-level 3) qualified and experienced (minimum five years) arboriculturist.
- for any work 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).

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

**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 (Ku-ring-gai Council) and Section 2.4.

**2.6** Any tree stock subject to conditions for work carried out in this report must be supplied by a registered Nursery that adheres to the AS 2303; 2015<sup>2</sup>.

- All tree stock must be of at least 'Advanced' size (minimum 75 litre) 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 one square metre 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;

**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 Zone<sup>3</sup> ;TPZ and Structural Root

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<sup>2</sup> Australian Standard; 2015, AS2303, Tree stock for landscape use, Australia

<sup>3</sup> Australian Standard, 4970; 2009 – Protection of Trees on Development Sites, Australia

Zone; SRZ) for each tree illustrated in Plan 1, Section 5.0. All measurements are in metres.

#### **4.2.3 Discussion relating to the site assessment and proposed work regarding the trees.**

**4.2.4 Protection Specification;** 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 26 August 2020 using the method of the Visual Tree Assessment<sup>4</sup>. This has included a Level 2 risk assessment, being a *Basic Assessment*<sup>5</sup>. The assessment has been conducted by Warwick Varley<sup>6</sup> on behalf of ATC. This meeting has included staff from RPS including a tour throughout the site for the intent of identifying areas and trees requested for inclusion, as well as a description of prospective work.

**4.3.2** Trees included in this report are those that conform to the description of a prescribed tree by the local government policy.

**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, were compiled by the use of a diameter tape, height clinometer, angle finder, compass, steel probes, Teflon hammer, binoculars, and recording instruments.

#### **4.4 Documentation provided**

The following documentation has been provided to ATC and utilised within the report.

##### **4.4.1 Design**

Drawn by *Design Inc. Sydney P/L*

Date: 20 November 2018

Reference: TAP-150094

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

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

<sup>6</sup> Consulting Arborist, Graduate Certificate and Diploma of Arboriculture (level 8 and 5)

Drawing No: 17 Sheets, Revision 7

Note 1: See Section 4.5.1

#### **4.4.2 Document**

Scoping Design Report: Pymble Station

Author: *Stantec P/L*

Date: 15 February 2019,

Reference: 150118-PYM-GN-RPT-00001

Page Number: 579 Pages

#### **4.5 Limitations of the assessment/discussion process**

**4.5.1** Trees No. 2, 10, and 12-28 have been omitted from the plans provided, however, are required for inclusion because they conform to the definition of a prescribed tree within the local government tree policy. The tree location has been plotted onto the Plan 1 by ATC. The tree location was established by using survey points included on the plan. ATC is not a registered surveyor and, however, the accuracy of the survey 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.

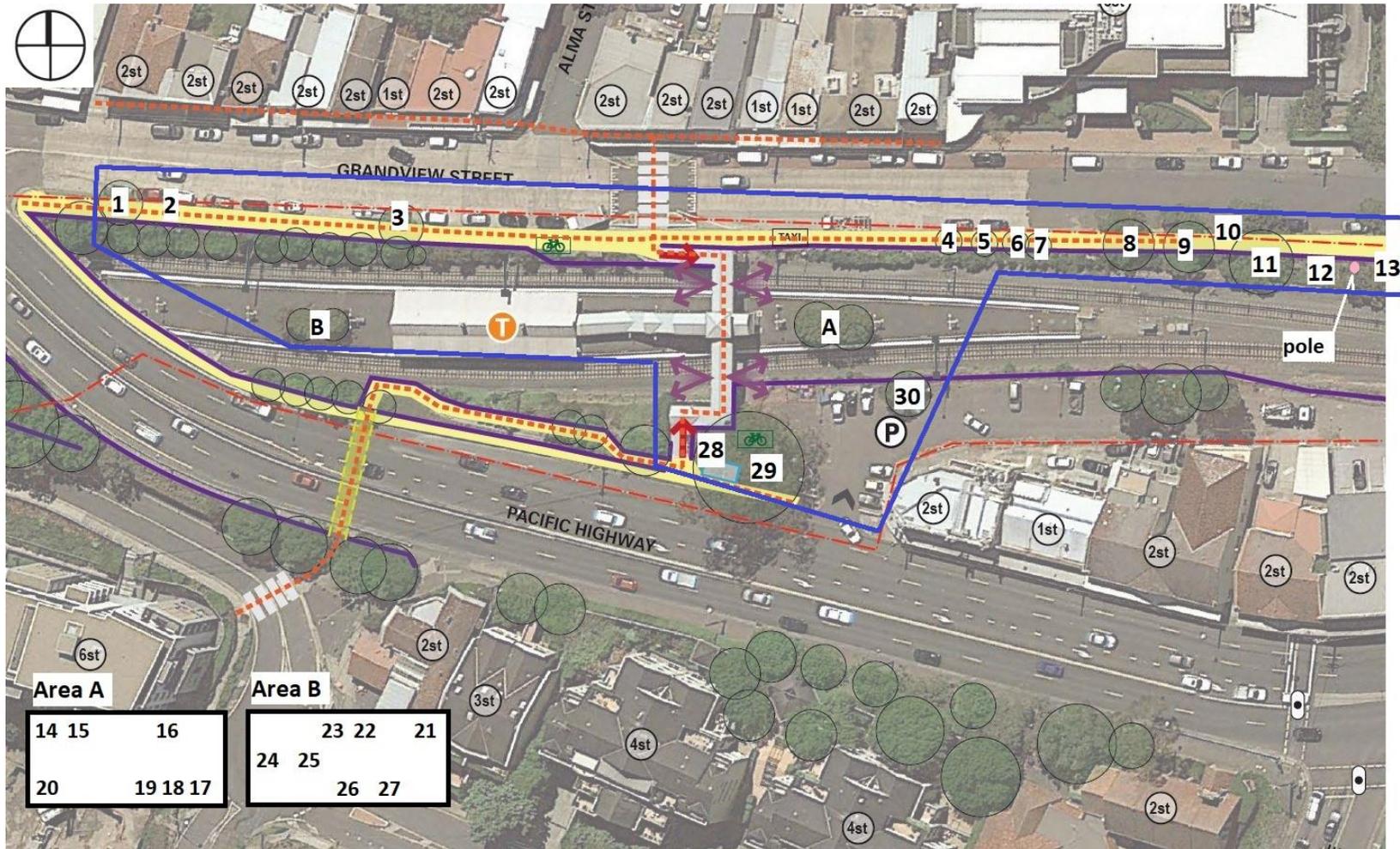
**4.5.2** The scope of work requested for inclusion for the tree assessment has been illustrated in Plan 1 (Section 5.0) by the dark blue outline. This has been confirmed at the time of assessment (Section 4.3.1). Based on the station upgrade work, this provides the trees that fall within the area of work related to the proposed lifts connecting to the footbridge. In addition, the platform trees have been requested for inclusion (Areas A and B on Plan 1) and the trees on the southern side of the Grandview Street. These public street trees will be subject to installation work for electrical conduit.

**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  
 Areas labelled A and B contain trees No. 14-27 within the planting arrangement illustrated in the inset diagrams.  
 Scope of work (Dark blue outline) See Section 4.5.2  
 Source: Adapted from *Design Inc. Sydney P/L*, Figure 3, Page 401, see Section 4.4.2

## 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 Rating	SULE Rating	STARS Rating	TPZ	SRZ
1	<i>Agonis flexuosa</i> Willow Myrtle	5	0.52 <sup>B</sup>	4 x 4	M	D	N	B	3D	Low	6.24	2.51
<b>Assessment</b> Street tree planting, displaying the habit typical for the species and composed of several leaders that share a common root crown. Pruned for power line clearance, an active bracket fungus ( <i>Phellinus</i> sp.) exists on a leader. This indicates an active white-rot decay pathogen exists; however, the risk related to the decay is unknown without a level 3 assessment. Dieback exists.											<b>Development Impact</b> See Section 7.1.1 and 7.1.2	
2	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5	0.21 0.17	3 x 5	M	D	Sym.	A	2A	Medium	3.24	1.91
<b>Assessment</b> Street tree planting, displaying the habit typical for the species, and initially composed of three leaders (one removed), although composed of two leaders that share a common root crown. Pruned for power line clearance. Wounding to leaders from vehicle impact.											<b>Development Impact</b> See Section 7.1.1	
3	<i>Agonis flexuosa</i> Willow Myrtle	4	0.53	5 x 5	M	D	Sym.	A	2A	Medium	6.36	2.53
<b>Assessment</b> Street tree planting, displaying the habit typical for the species and composed of several leaders that initiate from a small stem (1.5m high). Pruned for power line clearance.											<b>Development Impact</b> See Section 7.1.1	
4	<i>Tristaniopsis laurina</i> Water Gum	3	0.16 <sup>C</sup>	3 x 3	Y	D	Sym.	A	1A	Medium	1.92	1.53
<b>Assessment</b> This tree presents typical habit for the species and age.											<b>Development Impact</b> See Section 7.1.1	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
5	<i>Tristaniopsis laurina</i> Water Gum	3	0.10 <sup>C</sup>	2 x 2	Y	D	Sym.	B	2A	Low	1.20	1.26
<b>Assessment</b> This tree presents typical habit for the species and age, although the vitality is poor, supported by the depleted crown density and chlorotic foliage. No apparent reason exists for this.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
6	<i>Tristaniopsis laurina</i> Water Gum	3	0.13 <sup>C</sup>	3 x 3	Y	D	Sym.	A	1A	Medium	1.56	1.40
<b>Assessment</b> This tree presents typical habit for the species and age.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
7	<i>Tristaniopsis laurina</i> Water Gum	4	0.17 <sup>C</sup>	4 x 4	Y	D	Sym.	A	1A	Medium	2.04	1.57
<b>Assessment</b> This tree presents typical habit for the species and age.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
8	<i>Lophostemon confertus</i> Brush Box	6	0.68	7 x 7	M	D	Sym.	A	2D	Medium	8.16	2.81
<b>Assessment</b> This tree presents the typical habit for the urban grown species and age, although has succumbed to lopping for powerline clearance.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
9	<i>Lophostemon confertus</i> Brush Box	6	0.64	6 x 6	M	I	Sym.	A	2D	Medium	7.68	2.74
<b>Assessment</b> This tree presents the typical habit for the urban grown species and age, although has succumbed to lopping for powerline clearance.											<b>Development Impact</b> <b>See Section 7.1.1</b>	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
10	<i>Lophostemon confertus</i> Brush Box	5	0.18	4 x 5	Y	I	Sym.	A	2D	Medium	2.16	1.61
<b>Assessment</b> This tree presents the typical habit for the species and age, although the young age has removed any adverse pruning.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
11	<i>Lophostemon confertus</i> Brush Box	8	0.94	12 x 8	M	I	Sym.	A	2D	Medium	11.28	3.22
<b>Assessment</b> This tree presents the typical habit for the urban grown species and age, although has succumbed to lopping for powerline clearance.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
12	<i>Lophostemon confertus</i> Brush Box	5	0.20	4 x 4	M	D	Sym.	A	2D	Medium	2.40	1.68
<b>Assessment</b> This tree presents the typical habit for the species and age, although the young age has removed any adverse pruning.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
13	<i>Lophostemon confertus</i> Brush Box	10	0.72	14 x 10	M	D	Sym.	A	2D	Medium	8.64	2.88
<b>Assessment</b> This tree presents the typical habit for the urban grown species and age, although has succumbed to lopping for powerline clearance.											<b>Development Impact</b> <b>See Section 7.1.1</b>	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
14	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.18	2 x 2	M	C	W	A	2A	Medium	2.16	1.61
<b>Assessment</b> Located in a platform island garden bed identified as A, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
15	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.21 0.17	2 x 2	M	I	Sym.	A	2A	Medium	3.24	1.91
<b>Assessment</b> Located in a platform island garden bed identified as A, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
16	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.20	2 x 2	M	I	Sym.	A	2A	Medium	2.40	1.68
<b>Assessment</b> Located in a platform island garden bed identified as A, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
17	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.32	3 x 3	M	C	E	A	2A	Medium	3.84	2.05
<b>Assessment</b> Located in a platform island garden bed identified as A, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
18	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	3 <sup>F</sup>	0.11	2 x 1	M	I	SW	A	2A	Medium	1.32	1.31
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
19	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.20	3 x 2	M	C	S	A	2A	Medium	2.40	1.68
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
20	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.18	3 x 3	M	C	SW	A	2A	Medium	2.16	1.61
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
21	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.17 0.16 0.13	3 x 3	M	C	NE	A	2A	Medium	3.21	1.90
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
22	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	4 <sup>F</sup>	0.11	2 x 2	M	I	N	A	2A	Medium	1.32	1.31
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
23	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.14	2 x 3	M	C	N	A	2A	Medium	1.68	1.45
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
24	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.25	5 x 3	M	C	W	A	2A	Medium	3.00	1.85
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
25	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	4 <sup>F</sup>	0.14	2 x 1	M	I	Sym.	A	2A	Medium	1.68	1.45
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
26	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.18	3 x 2	M	I	Sym.	A	2A	Medium	2.16	1.61
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
27	<i>Callistemon viminalis</i> Weeping Red Bottlebrush	5 <sup>F</sup>	0.14 0.14	4 x 2	M	I	Sym.	A	2A	Medium	2.38	1.68
<b>Assessment</b> Located in a platform island garden bed identified as B, this tree has been consistently lopped and represents a standard, although with a biased crown mass due to the surrounding plantings within the bed. The habit is controlled and shrub-like.											<b>Development Impact</b> <b>See Section 7.1.1</b>	
28	<i>Banksia integrifolia</i> Coastal Banksia	6	0.10	5 x 5	Y	I	W	A	2D	Low	1.20	1.26
<b>Assessment</b> This tree provides a slender biased habit, although typical for the species, the growth response is a result of the over planted area.											<b>Development Impact</b> <b>See Section 7.1.3</b>	
29	<i>Eucalyptus scoparia</i> Wallangarra White Gum	22	1.09	22 x 19	M	D	Sym.	A	3D <sup>E</sup>	Medium	13.08	3.43
<b>Assessment</b> A large native tree which offers high amenity value to the area and streetscape. The habit is composed of four leaders that initiate from a 2 metre high stem. Each leader is approximately 0.5m in diameter. A collection of risk-related issues exist throughout the crown structure. In brief, these are summarised as follows; <ul style="list-style-type: none"> <li>- Leader on the northeastern side has failed and has initiated epicormic growth</li> <li>- Leader on northern side has failed, and a cavity is apparent</li> <li>- Leader (0.4m in diameter) on southern side has failed,</li> </ul>											<b>Development Impact</b> <b>See Section 7.1.2 and 7.1.3</b>	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality Rating	SULE Rating	STARS Rating	TPZ	SRZ
<p>- Leader (0.7m in diameter) on southern side has two active bracket fungus (<i>Phellinus</i> sp.) on a wound on the lower portion. This indicates active white-rot pathogen exists,</p> <p>- Pruning (lopping) for powerline clearance on southern side.</p> <p>The tree has active decay and a history of failure, where cavities are apparent. Although the risk for further failure is unknown and a level 3, internal diagnostic and aerial assessment (see Appendix A) would be required to determine the risk. Based on the high use target zone, being the Pacific Highway, car park, station entrance stairs and electrical infrastructure, the useful life expectancy is dubious. The cavities within this tree may present nesting hollows for arboreal fauna.</p>												
30	<i>Melaleuca salignus</i> Syn. <i>Callistemon</i> Willow Bottlebrush	6	0.35 <sup>C</sup>	6 x 8	M	D	Sym.	A	2A <sup>C</sup>	Medium	4.20	2.13
<p><b>Assessment</b> Growing from the rail embankment close to the tracks, the habit is typical for the species.</p>											<p><b>Development Impact</b> <b>See Section 7.1.3</b></p>	

- 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 the overgrown area and/or limited access
- D. Deciduous species, void of foliage at the time of assessment
- E. Level 3 assessment required to determine the accurate rating
- F. Height measured from platform

## 7.0 Site Assessment

The area of assessment comprises the roadways either side of Pymble Station, being Grandview Street and the Pacific Highway, and plantings that occur within the station. All trees included in this report are planted and none are remnant. The tree species are all native and provide common use within the landscape industry. A description for each of the areas containing these trees is discussed separately.

Grandview Street caters to an inconsistent avenue planting of natives, where three distinct ages of plantings occur. The western end, past the station entrance, caters to a sparse and inconsistent planting (Trees No. 1-3), which is likely related to tree removal due to the limited life expectancy of the species used, being predominately the Willow Myrtle. These are mature and planted in a narrow (less than 1000 millimetres wide) lawn strip that resides flush with the kerb on the northern side and bounded by a 1200 millimetres wide concrete footpath on the northern side, which abuts against the fence separating the rail corridor.

A small tightly planted linear planting of Water Gum (trees No. 4-7) occurs immediately to the east of the station entrance. These four trees are young and constitute the most recent plantings. They each reside within a brick header course that surrounds an approximately 1000 millimeters square planter with a cage surrounding. This has removed the opportunity for measuring the stem diameter (Dbh) for each tree.

The Brushbox trees (trees No. 9-13) are the oldest plantings and appear to present the primary species on the avenue. They are planted at approximately 10 metre increments. Each tree presents the habit typical for the urban species and have all (but two recent plantings, Trees No. 10 and 12) been subject to varying degrees of power line clearance that offers the primary impact for each tree and has distorted the habit. They would likely exceed an A1 rating other than the close vicinity of the kerb/footpath and powerline clearance, which has limited the SULE rating based on potential issues related to these utilities.

The station plantings are two island garden beds located on the platform and either side of the station buildings. Each garden bed presents the same structure, tree species, and age. The island planter is a brick structure (eight courses high), 9 metres long and 2.5 metres wide. The planting arrangement has initially consisted of three rows of Bottlebrush, although the over planting and natural attrition, predominately from competition due to the limited water/nutrients available for the mature size, has led to several removals and an inconsistent planting arrangement. This is illustrated in the inset diagrams on

Plan 1, Section 5.0. Each tree has been routinely lopped/hedged, so the natural form no longer exists, and each garden bed is representative of a single meshed crown mass forming a screen.

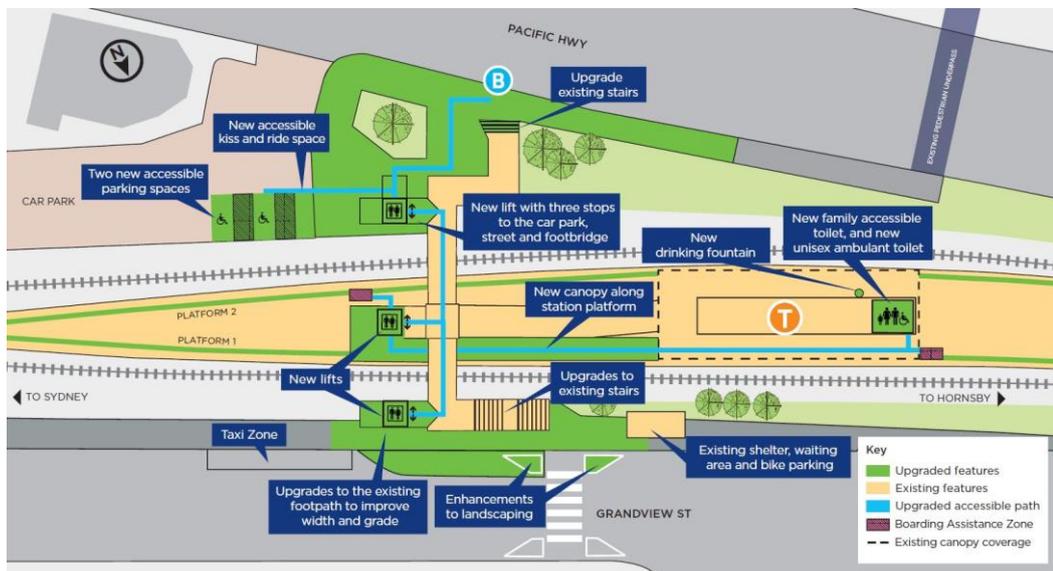
The southern side of the station fronting the Pacific Highway includes two garden beds divided between the stairs servicing the station. The western side of these stairs contains shrubs. These are a composite of weed species and *Camellia*, where the *Camellia* has been poorly pruned to the point that they should be removed and replaced. The eastern side caters to a group planting of eight trees located within an area of 3 metres by 2 metres of which tree No. 28 forms part of and is the dominant tree. The remaining trees are the same species *Banksia*, but for a single weed species, African Olive (*Olea europaea* subsp. *cuspidata*) and are less than 3 metres in height, therefore have not been included. This tree group bows west as a result of the co-dominant class with tree No. 29. Tree No. 29 resides in an isolated garden bed, which is supported by a dry-stacked stone wall dividing an asphalt car park. This garden bed is near level with the concrete footpath that surrounds the remaining southern side.

### 7.1 Proposed development

The proposed development consists of the upgrading of the station infrastructure to meet requirements of the *Disability Discrimination Act 1992* and is shown in Figure 1. A list of the scope follows.

- three new lifts connecting the existing footbridge to the Grandview Street station entrance, the Pacific Highway Station entrance and the Station platform
- upgrades to the Grandview Street station entrance including a widened footpath to allow for a new lift landing with a canopy
- modifications to the existing taxi rank and no parking zone to accommodate the widened footpath on Grandview Street
- two new accessible parking spaces and one accessible kiss and ride space at the Pacific Highway station entrance car park
- upgrades to the Pacific Highway station entrance including:
  - a three stop lift connecting the car park / accessible parking, the bus stop at street level and the footbridge
  - a new accessible path to the lift landing with a new canopy at car park level
  - a new lift landing at street level with footpath upgrades
  - a new widened stair entrance with canopy upgrades.
- upgrades to the existing footbridge including canopy extensions and anti-throw screens, and the conversion of the vacant kiosk to allow for a new lift landing
- canopy extension at platform level from the lift to the boarding assistance zone

- a new family accessible toilet and unisex ambulant toilet within the station building
- upgrade work to the existing stairs including replacement of treads and handrails
- improvements to station lighting and CCTV to improve safety and security
- improvements to customer information and communication systems including wayfinding modifications, public address (PA) system upgrade and new hearing induction loops
- modifications to the rail corridor fencing at the Grandview Street and Pacific Highway station entrances
- electrical upgrades for the new infrastructure, including a new padmount substation.



**Figure 1; Key features of the Proposal.**

This report discusses the potential impact of on-site trees (contained in Table 1, Section 6.0), and specifically work to the verge of Grandview Street and the Pacific Highway. No stormwater drawings have been included as part of the document set. The calculations included in the following discussion has not considered subsurface utilities that have not been included in the design. These may also increase the encroachment and impact on the opportunity for tree retention.

**Public trees**

Trees No. 1-13 are located in the adjacent areas outside of the station lot, therefore constitute ownership by a second party, being Ku-ring-gai Council. Any proposed work within the zones of protection for these trees must not adversely impact these zones, and the trees shall be retained and protected from any site work unless permission for removal is granted by Ku-ring-gai Council.

The calculations included in the following discussion have not considered;

- subsurface utilities that have not been included in the design,

- Work methods related to subsurface utilities, for example, concrete encasing or replacement of existing lines
- or work methods related to construction (stockpiling, site sheds, scaffolding) unless otherwise specified.

These may also increase the encroachment and tree impact and, therefore, the opportunity for tree retention.

### **Assumption 1: Zones of protection (TPZ, SRZ)**

The calculations of the zones of protection (TPZ, SRZ) contained in Table 1 are based on the arbitrary formulae provided in the AS 4970, and this document provides scope for modifying this zone, however, with supporting evidence.

#### Regarding trees No. 1-13 and 29

The kerb/road provides an area that does not commonly support strong root growth and can act as a barrier or partial barrier. This would act as a barrier and reduce root extension into the area where the TPZ/SRZ appears to extend into. Therefore suggesting an asymmetrical root zone can exist, which to compensate, would result in increased root extension and biomass along the verge and into the rail corridor. Therefore any work that encroach on the area of the TPZ that exists within the verge and adjacent rail corridor would likely have more impact than the calculated radius of the zones of protection.

#### Regarding trees No. 14-27

The elevated brick planter boxes provide an area that will likely contain all root system from these trees. The height of this structure is based on the natural depth where roots will proliferate, and will limit root extension outside of this contained area. Therefore any work that encroach up to the base of these planter boxes are not considered to pose an adverse impact on these trees, although the calculated zones of protection extend outside of these planters.

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 proposed work. This has included predominately street trees where any part of the zones of protection; Tree Protection Zone (TPZ), and Structural Root Zone (SRZ) to 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, follow.

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

#### Trees No. 1-27

Based on the drawing set, and the assumed root zones for trees No. 14-27, none of the proposed work conflict with the location of these trees or

respective zones of protection. These trees can be retained without impact by the proposed design.

Although, at the time of assessment, the street trees (No. 1-13) located on Grandview Street have been nominated to be potentially subject to the installation of electrical conduit. Other services also extend within this area, and the means or route of installation had not been confirmed at the time of assessment.

The trees No. 1-3 offer minimal significance, and based on discussion with the tree owner, Ku-ring-gai Council, an opportunity for removing these trees based on compensatory planting may exist. Therefore allowing trenching through this area. Alternatively, the installation adjacent to these trees will either require under boring or excavation methods that are sympathetic towards root retention. Trees No. 4-13 offer increased significance, and any work adjacent to these trees shall allow for tree retention and protection.

This will likely be limited to under boring, where the entry and exit pits can avoid the SRZ for any tree. Pending the vicinity of these pits, root mapping, or excavation measures that are sympathetic towards root retention will need to be employed. Based on the size and number of trees (No. 4-13) within a limited area, it is unlikely that trench type excavation will be viable without adversely affecting these trees. The project arborist will require to provide a work methodology for the installation of this conduit once a design has been confirmed.

### **7.1.2 Trees providing a limited useful life expectancy**

#### Trees No. 1 and 29

These trees provide potential risk for failure based on the existing structures and active decay pathogens. Therefore irrespective of design work, risk mitigation will be required based on the target zones that surround each tree. This will require the duty of care for each tree owner. That is;

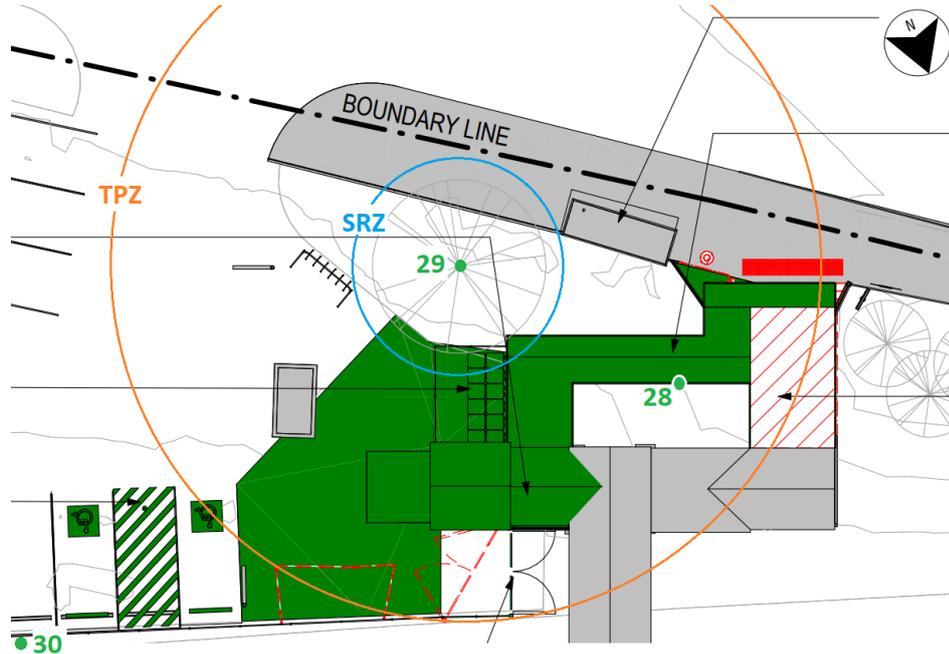
Tree No. 1: Ku-ring-gai Council

Tree No. 29: Transport Asset Holding Entity (previously RailCorp) and managed by Sydney Trains

### **7.1.3 Trees subject to encroachment by design**

The following trees have proposed work that extend into the zones of protection (i.e. TPZ/SRZ). These are discussed relative to the tree

significance and potential impact imposed by the design work. The tree location and proposed work have been illustrated in Figure 2.



**Figure 2; Location of trees No. 28-30 in relation to the proposed work, including the zones of protection for tree No. 29.**

Tree No. 28: tree location estimated, see Section 4.5.1.

Source: Adapted from *DesignInc*, Drawing No. TAP-150094-AR-MODAR-1202, see Section 4.4.1.

Tree No. 28

This tree is small and young and offers limited significance or visual amenity. This tree is directly located in the footprint of the proposed design and will require removal to allow for the design. The conflict consists of the new path connecting the bus stop to the lift.

Tree No. 29

This tree is not directly located in the footprint of the proposed design, however subject to a major encroachment. The extent for these work illustrated on the drawings will include the lift (being the foundation), excavation (i.e. retaining wall realignment) for the relocated bin enclosure, resurfacing of the car park (and this may require grade changes) and new path connecting the bus stop to the lift. These are illustrated in Figure 2 in relation to the zones of protection.

In addition, the discussion at the time of assessment referred to the,

- work for the car park including new foundations for kerb and gutter, and stormwater.
- Realignment/ replacement of the dry-stacked retaining wall supporting the garden bed containing tree No. 29.

All these work occur within both the TPZ and some within the SRZ. Both the lift foundation and pathway will require excavation. The type of footing (strip or pier) used for the pathway will determine the extent of encroachment, that is, impact on the root zone, where a strip type excavation will offer the greatest impact. The realignment of the dry stack retaining wall will likely require excavation into the root zone (SRZ) that exists behind this wall. This area is likely to contain a greater root density than typical for this distance from the tree because roots have accumulated against the back of the wall. Pending the structural integrity of this wall, it may also require replacement. Based on the height of this wall, it will likely require an engineered design, therefore incorporating a foundation that is certain to require excavation within the SRZ where an impact to the root system will occur. This will be an impact to the tree.

The extent for these work will provide varying impact on this tree, and likely an accumulative impact. The primary issue foremost is the risk related to the existing tree structure and high use target zones. The intended design will increase the use and location of these target zones because the lift well is beneath the dripline. That is, the consequence for tree failure increases with the design completion.

Tree No. 29, although posing high amenity value based on the size, this tree is an introduced species. It is indigenous to a small area in northern New South Wales and is not local. The tree has been subject to failure of large branches/leaders and contains active decay, and the life expectancy is dubious. Although the existing risk is unknown without further specialist assessment, the symptoms and signs contained in the structure will limit the useful life expectancy. The primary issue at the time of assessment is that a risk for failure exists, although no time can be assigned to this without further assessment. The likelihood of impacting a target is 'very likely', and these target zones range from moderate to high use. The consequence for failure is 'Significant' and therefore assigns a risk rating between MODERATE to EXTREME<sup>7</sup>. The introduction of the design components increases these variables and rating.

Accounting for risk mitigation and the retention of this tree, the impact by a design that has been amended to be sympathetic to the tree will still offer an impact. Any work around this tree will offer an impact, and this affects the vitality (i.e., health) and therefore reflects on the tree's ability to occlude wounds and compartmentalise decay infection. That is, any

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<sup>7</sup> Based on the TRAQ tree risk rating model, International Society of Arboriculture, 2017

design work will pose an impact on this tree, which will indirectly result in an increasing risk for tree failure.

This introduced native tree, although providing high amenity value, offers limited ecological value other than potential use of wildlife hollows. The tree presents a risk, where irrespective of further specialist assessment (which will assign time to the risk and mitigation), provides a limited useful life expectancy. Any surrounding work will offer an impact to the tree, and the extent of the surrounding work will be correlated with the tree's demise.

Accounting for the amenity value, the consideration for tree removal should be supported by additional assessment measures. That is a Level 3 internal diagnostic assessment coupled with an aerial assessment to determine the risk, respective mitigation, and useful life expectancy. The outcome of this assessment can confirm tree removal or otherwise tree retention and changes to the design to allow for reducing the impact on the root system.

#### Tree No. 30

This tree is not directly located in the footprint of the proposed design, however subject to a major encroachment. The extent for these work within the scoping design report includes resurfacing of the carpark, although potential grade changes for the excavation required as part of the new surface have not been specified. However, based on discussion at the time of assessment, additional work also consist of new foundations for kerb and gutter, and stormwater. These work could occur within both the SRZ and TPZ. Therefore an opportunity exists where an impact could occur to the root zone. Within the worst scenario, these work could impact upon the root system supporting the southern side of the tree, therefore increasing a risk for failure where the rail tracks present the target zone. The extent of work will be required to determine the impact and related risk. Based on tree retention, measures for protection relating to the work compound proposed adjacent to this tree are required.

## **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 shall be avoided within the area of the TPZ. 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 area that falls within the TPZ. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

**7.3 Protection measures**

Tree protection measures will be required during the demolition and construction stage. However, the design of these will be pending the work methodology and final design. The project arborist shall be contracted after the completion/confirmation of design work for the instruction of the protection measures implementation, that is the Arboricultural Method Statement. Examples of the protection measures are contained in Appendix B.

**7.3.1 Conditions for compliance**

The following conditions are required before any work proceed on site.

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.

Project Arborist; A project arborist who conforms to the requirements of the AS 4970 is required to be nominated immediately after a *Notice of Determination* is issued, and they are to be provided with all related site documents.

**7.4 Compliance Documentation**

The following stages would 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 the principal certifying agent.

**7.4.1 Table 2; Assessment/Certification hold points**

Hold points	Work type	Document required
Pre-demolition	Installation of the protection measures, Section 7.3	Certificate
Excavation within TPZ's	Project arborist on-site during excavation	Certificate
During construction	Any <u>further work</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.

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)<sup>8</sup>.

## 8.0 Protection Specification

The retention and protection of these trees requires the remaining Tree Protection Zone (TPZ) not subject to encroachment 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. 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 per cent of the existing crown, pending on the species, and vitality. The opportunity for, type and proportion of pruning will be required to be nominated by the project arborist.
2. 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 alter the drainage to the tree.
  - b) Under specified circumstances,
    - Added fill soil does not exceed 100 millimetres in depth over the natural grade. Construction methodologies exist that can allow grade increases in excess of 100 millimetres, via the use of an impervious cover, an approved permeable material or permanent aeration system or other approved methods.
    - Excavation cannot exceed a depth of more than 50 millimetres 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.
3. No form of material or structure, solid or liquid, is to be stored or disposed of within the TPZ.
4. No lighting of fires is permitted within the TPZ.

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<sup>8</sup> 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.

5. 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.
6. 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.
7. 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.
8. 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.
9. 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 50 millimetres 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 50 millimetres 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.

## 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.

### 9.1 Trees No. 1-27

These trees are not adversely impacted by the design, that is, they conform to a minor encroachment or less and the nominated zones of protection (TPZ, SRZ) based on the requirements of the Protection Specification, Section 8.0. The proposed design does not adversely affect these trees, although potential electrical service installation may.

#### Tree No. 1

Presents signs of risk, and the tree owner (Ku-ring-gai Council) shall be contacted to allow for risk mitigation.

#### Trees No. 1-13

Electrical infrastructure has been proposed to extend beneath these trees, although the route or means of installation has not been nominated. Options may exist for the extent of trenching available and based on discussion with Ku-ring-gai Council, regarding the viability of trees No. 1, 2 and 3 (i.e. removal or retention). Although trees No. 4-13 will be likely limited to installation by under boring. The project arborist will require to provide a work methodology for the installation of this conduit once a design has been confirmed.

### 9.2 Tree No. 28-30

These trees are subject to a major encroachment, and the viability in relation to the design is summarised as follows.

#### Tree No. 28

This tree provides limited amenity value and will require removal due to conflict with the design.

#### Tree No. 29

Accounting for the amenity value, the consideration for tree removal should be supported by additional assessment measures. That is a Level 3 internal diagnostic assessment coupled with an aerial assessment to determine the risk, respective mitigation, and useful life expectancy. The outcome of this assessment can confirm tree removal or otherwise tree retention and changes to the design to allow for reducing the impact on the root system.

**Tree No. 30**

This tree provides moderate amenity value and has the opportunity to be retained. The extent of design work surrounding this tree (being the grades and surface type for the carpark and whether stormwater and kerb/gutter work are to be included) require to be determined to confirm the useful life expectancy. Based on tree retention, measures for protection relating to the work compound proposed adjacent to this tree are required.

**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 service is restricted to an area 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.

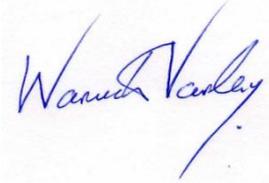
**9.4 Protection measures**

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 work (including demolition/excavation) and retained until the landscaping work 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.



Warwick Varley  
Consulting Arborist  
Level 5 and 8; Arboriculture  
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MISA  
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## 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 meters, 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 is the north-south span, the second being the east-west measurement.

### Age

Is the estimate of the specimen's age based upon the expected lifespan 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 probable 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 health of the tree, 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

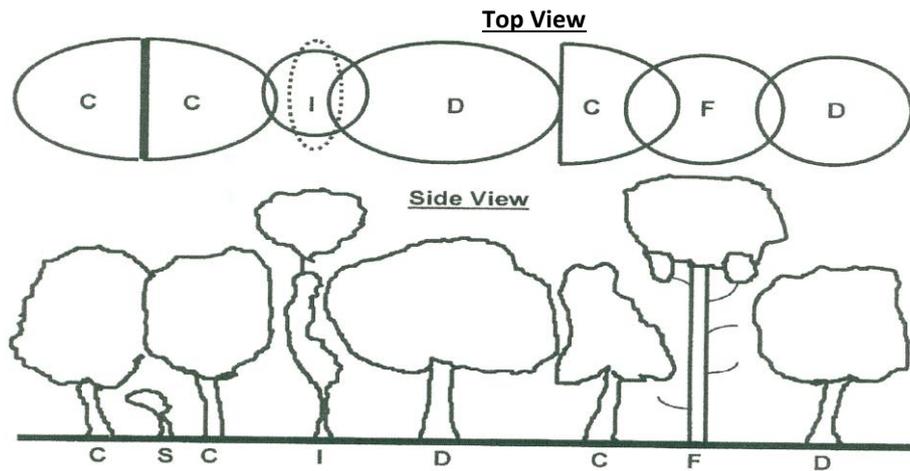
**B:** Below average vitality, possibly temporary loss of health, partial symptoms.

**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:

<b>D</b> – <i>Dominant</i>	Crown is receiving uninterrupted light from above and sides, also known as emergent.
<b>C</b> – <i>Codominant</i>	Crown is receiving light from above and one side of the crown.
<b>I</b> – <i>Intermediate</i>	Crown is receiving light from above but not the sides of the crown.
<b>S</b> – <i>Suppressed</i>	Crown has been shadowed by the surrounding elements and receives no light from above or sides.
<b>F</b> – <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 to manage large populations of trees within a limited period 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 arborist who 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.

#### TPZ; Tree Protection Zone

Is an area of protection required for maintaining the trees vitality and long-term viability. Measured in meters 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 work. 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 meters 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.

#### All other definitions are referenced from;

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

**Internal Diagnostic Testing**

Cavities and loss of supporting wood by decay can compromise the stability of a tree, and the risk for failure will be based on the extent of the wood loss. This often cannot be assessed without specialty equipment for diagnosing the internal structure of a tree. Methodologies exist for determining the extent of wood loss (be it from decay or termites), and based on industry standards, the risk of failure can be determined. This methodology is a specialised area of arboriculture and limited to consulting arborists who are equipped with the technology (internal diagnostic devices) to assess this area. The two most common forms of internal diagnostic testing consist of the 'Resistograph,' and 'Sonic Tomography.' This technology is not recommended for all trees; however, only those trees that are considered to present significant specimens. This is based on the size, species, amenity value, and use by native wildlife. Within most situations, the cost of tree removal far outweighs the cost related to the specialty assessment.

**Aerial assessment**

An aerial assessment consists of an arborist branching the tree, to assess an anomaly with the branch structure that is not able to be assessed confidently from the ground. The climbing technique must not use climbing spikes. The arborist must contain a minimum qualification of a level 5 in arboriculture, and a risk assessment qualification (e.g., QTRA, TRAQ) and not be involved with any school utility work.

## **Significance Rating, Significance of a Tree Assessment Rating System (S.T.A.R.S), IACA, 2010<sup>9</sup>**

### 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, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions,

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<sup>9</sup> IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, [www.iaca.org.au](http://www.iaca.org.au)

- 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.

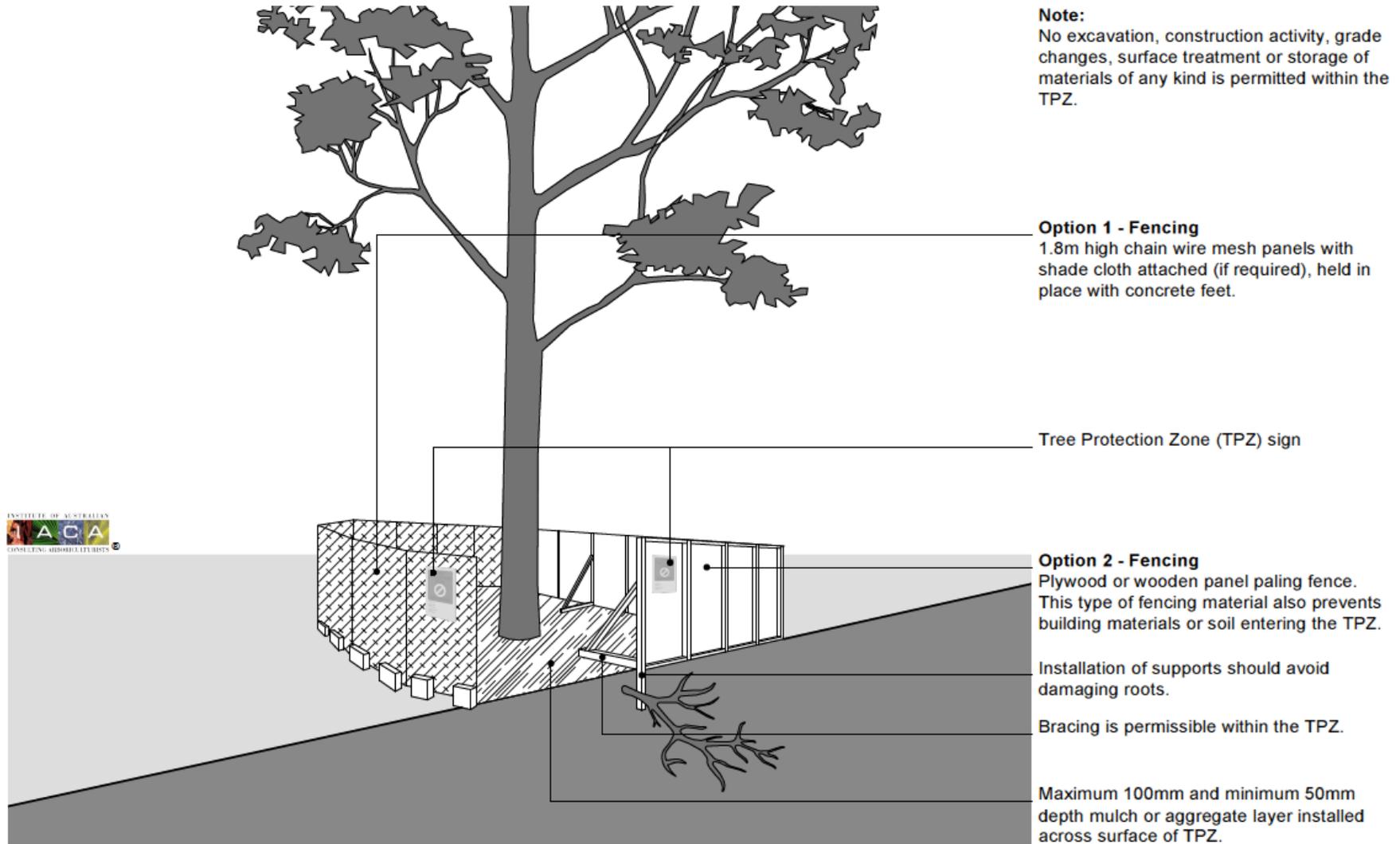
**Table 3; Tree Retention Value – Priority Matrix.**

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	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					
<p>Legend for Matrix Assessment</p>						
	<p><b>Priority for Retention (High)</b> - 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.</p>					
	<p><b>Consider for Retention (Medium)</b> - 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.</p>					
	<p><b>Consider for Removal (Low)</b> - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.</p>					
	<p><b>Priority for Removal</b> - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>					

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

	<b>1. Long</b>	<b>2. Medium</b>	<b>3. Short</b>	<b>4. Removal</b>	<b>5. Moved or Replaced</b>
	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.
<b>A</b>	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>B</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
<b>C</b>	Trees of special significance for historical, commorative 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.
<b>D</b>		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.	
<b>E</b>				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.	
<b>F</b>				Trees that are damaging or may cause damage to existing structures within 5 years.	
<b>G</b>				Trees that will become dangerous after removal of other trees for reasons given in (A) to (F).	

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



### Stem and Ground protection

