EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

ARBORICULTURAL IMPACT ASSESSMENT REPORT

TRANSPORT ACCESS PROGRAM (TAP)3

FAULCONBRIDGE (RAILWAY) STATION
GREAT WESTERN HIGHWAY, FAULCONBRIDGE

September 2019

Prepared for: Transport for NSW
c/- WSP Australia Pty Ltd
Level 27, 680 George Street
SYDNEY NSW 2000

T:- 02 9272 1426

Prepared by: Andrew Morton
Dip. (Arboriculture) [AQF Level 5]
B. App. Sci. (Horticulture)
A. Dip. App. Sci. (Landscape)

EARTHSCAPE HORTICULTURAL SERVICES

M: - 0402 947 296

Member of Arboriculture Australia
Member International Society of Arboriculture - Australian Chapter (ISAAC)
Member Local Government Tree Resources Association (LGTRA)

PO Box 364, BEROWRA NSW 2081
Ph: (02) 9456 4787 Mobile: 0402 947 296 Fax: (02) 9456 5757
Email: earthscape@iinet.net.au

TABLE OF CONTENTS

1 INTRODUCTION

1.1.1 This report was commissioned by WSP Australia on behalf of Transport for NSW (TfNSW) to assess the health and condition of twenty-eight (28) trees located in the vicinity of Faulconbridge Station, Great Western Highway, Faulconbridge. The report has been prepared to aid in the assessment of a *Review of Environmental Factors* (REF) for proposed upgrade works at the Station associated with the Transport Access Program 3 (TAP3). TAP3 is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

1.1.2 The proposed development includes the following key elements:

- construction of a new lift on the platform to connect to the existing footbridge
- construction of a new lift off the Great Western Highway to connect to the existing footbridge
- upgrade of the existing pedestrian footbridge over the Great Western Highway and all stairs including new handrails, tactile ground surface indicators (TGSIs), nosings and modifying the existing balustrade
- internal station building works including:
    - reconfiguration of the existing station waiting room, door widening, and allocated spaces for wheelchairs and persons with disability
    - reconfiguration of the existing toilets to accommodate one new unisex family accessible toilet and one new unisex Ambulant toilet.
- modifications to the commuter car park and kiss and ride including:
    - upgrade of the two existing DDA parking spaces, and upgrade of the existing kiss-and-ride bay
    - construction of a new DSAPT compliant ramp (including demolition of existing non-complaint path) from the existing pedestrian footbridge to the commuter car park
    - provision of a new rest area with seating at the western entrance of the existing footbridge.
- upgrade of existing platform and access paths to include TGSIs and safety zone markings;
- provision of access paths and circulation spaces to connect all customer facilities at the station (e.g. lifts, kiss-and-ride, DDA car space, family fccessible toilet etc.)
- ancillary works including adjustments to lighting, relocation or replacement of existing customer facilities (drinking fountain, seating, telephone booth, guard indicators, Opal card readers, fencing etc.), improvement to station communications (including CCTV cameras, LED lighting, Public Address (PA) system, and hearing loops), wayfinding signage, yellow lines, bike rack etc.

1.1.3 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

1.1.4 This report has been prepared in accordance with Sections 2.3.2-2.3.5 of the Australian Standard for *Protection of Trees on Development Sites* (AS 4970:2009).

2 THE SITE

2.1.1 The trees included in this assessment are principally located to the west of the Faulconbridge Station and the Great Western Highway in the vicinity of an existing pedestrian footbridge and access path and an associated commuter car park. The commuter car park is located within a Public Reserve located on the corner of the Great Western Highway and Railway Avenue. The Reserve is zoned Public Recreation [RE1] under the *Blue Mountains Local Environmental Plan 2015* (BMLEP). The Reserve is comprised of Lots 30, 31 & 32 in DP 1083259, also known as 606-620 Great Western Highway, Faulconbridge. For the purposes of this report, the subject allotments will be referred to as 'the site'. A portion of the site is zoned Infrastructure [SP2] (Classified Road) under the *Blue Mountains Local Environmental Plan 2015* (BMLEP). This includes a portion of road reserve encompassing of the pedestrian access path and the Great Western Highway. In addition to the commuter car park and access path, the site contains open lawn areas and gardens with a variety of exotic (introduced) plant species and many mature and semi-mature exotic trees. The northern portion of the site contains a stand of native trees and understorey vegetation, with numerous locally-indigenous species. Many mature, semi-mature and young locally indigenous species are also scattered around the periphery of the car park within lawn areas, giving it a typical parkland appearance.

2.1.2 Soils of this area are typical of the Faulconbridge Soil Landscape Group (as classified in the *Soil Landscapes of the Penrith 1:100,000 Sheet*), consisting of "shallow (less than 500 mm) *Earthy Sands* and *Yellow Earths;* and some *Lithosols* and *Siliceous Sands* associated with rock outcrop."[1] The landscape of this area generally consists level to gently undulating broad crests and ridges on plateau surfaces of Hawkesbury Sandstone, with infrequent rock outcrop.

2.1.3 The original vegetation of this area consisted of open woodland typical of Hawkesbury sandstone ridges (Sandstone Ridgetop Woodland). The dominant locally-indigenous tree species found in this area include *Corymbia gummifera* (Red Bloodwood), *Eucalyptus sieberi* (Silvertop Ash) and *Eucalyptus haemastoma* (Scribbly Gum). Other species occurring in this vegetation community may include *Eucalyptus punctata* (Grey Gum), *Eucalyptus globoidea* (White Stringybark), *Eucalyptus racemosa* (Scribbly Gum), *Allocasuarina littoralis* (Black She-Oak), *Banksia serrata* (Old Man Banksia) and *Angophora costata* (Sydney Red Gum).

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 28th August 2019. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the aerial image obtained from NearMap (under licence to WSP Australia). This has been integrated with the survey prepared by Degotardi, Smith & Partners, Dwg. Ref No. 31578A01.DWG dated 30/06/2017. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). None of the subject trees were shown on the original survey drawing. Each tree has been plotted on the drawing in its approximate position by superimposing the aerial image.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.[2] All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

- Tree Species (Botanical & Common Name)

- Approximate height
- Canopy spread, measured using a metric tape and an average taken.
- Trunk diameter (measured at 1.4 metres from ground level)
- Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres)
- Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators
- Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

4.1.3 This information is presented in a tabulated form in **Appendix 3**.

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy[3] of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 3.**

4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)
- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

4.2.1 SULE ratings are intended to provide a general overview of the long-term sustainability of the trees within the site in consideration of these factors. The allocated ranges are not intended to be absolute. This information is useful in guiding future planning by highlighting the probable lifespan of individual trees, for which a clear pattern may emerge. This information may be helpful in forecasting likely tree senescence and planning for replacement planting to ensure continuity in tree canopy across the site. It should be noted that SULEs *may* be extended or reduced depending on the way trees are managed. Intervention and remedial works may extend the SULE of some trees.

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. While these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure a consistent approach, the assessment criteria shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. Significant

2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

5.2 Environmental Significance

5.2.1 Tree Management Controls

Prescribed Trees within the Blue Mountains Local Government Area (LGA) are protected under the provisions of Part C5 (Tree and Vegetation Preservation) of the *Blue Mountains Development Control Plan 2015* (BMDCP) [Amendment 2, December 2018] made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The BMDCP generally protects all trees of a height of four (4) metres or greater and/or with a crown spread of four (4) metres or greater, or any Mallee type Eucalypt (irrespective of size). Some exemptions apply. The following trees are exempt (not protected) under the provisions of the BMDCP:-

Tree No.	Species	Exemption
T9	*Pittosporum undulatum* (Sweet Pittosporum)	Less than the prescribed dimensions
T14 & T25	*Acer palmatum* (Japanese Maple)	Less than the prescribed dimensions

The remainder of the trees are protected under the BMDCP 2013.

It should be noted that the works are proposed to be undertaken under the provisions of the SEPP (Infrastructure) 2007, which takes precedent over the local Tree Management Controls. Removal of any trees to facilitate the proposed works is therefore permissible under the SEPP (Infrastructure).

5.2.2 Wildlife Habitat

Corymbia gummifera (Red Bloodwood) [T18, T19, T21 & T22], *Acacia sp.* [*decurrens*] (Black Wattle) [T10], *Eucalyptus sp.* [*sclerophylla*] (Hard-leaved Scribbly Gum), [T20, T23, T24], *Eucalyptus haemastoma* (Scribbly Gum) [T27 & T28] and *Pittosporum undulatum* (Sweet Pittosporum) [T9] are all locally-indigenous species, representative of the original vegetation of the area and would be of benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds. It should be noted that all of these trees appear to have been planted within the site. Tree T21 (Red Bloodwood) exhibits multiple concentric wounds on primary limbs consistent with the feeding pattern of Sugar Gliders. There were no other visible signs of wildlife habitation.

The site does *not* contain any 'Fauna Corridors' as indicated on Council's Environment Biodiversity Map forming part of the BMLEP 2015.

5.2.3 Noxious Plants & Environmental Weeds

None of the subject trees are scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW under the provisions of the *Biosecurity Act 2015*

None of the subject trees are considered to be Environmental Weed Species within the Blue Mountains LGA.

5.2.4 Threatened Species & Ecological Communities

None of the subject trees are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities (EECs) under the provisions of the *Biodiversity Conservation Act 2016* (NSW) or the *Environment Protection and Biodiversity Conservation Act 1999*.

5.2.5 Biodiversity, Bushfire & Riparian Lands

The site does *not* contain any ecologically significant 'Terrestrial Biodiversity' (Vegetation Constraint Area or Ecological Buffer Area) as indicated on Council's Environment Biodiversity Map forming part of the BMLEP 2015.

The majority of the site is classified as 'Vegetation Buffer' as indicated on Council's Brushfire Prone Areas Map.

The site does *not* contain any Riparian Land as indicated on Council's Riparian Land Map forming part of the BMLEP 2015.

5.3 Heritage Significance

5.3.1 Heritage Items

The site is *not* listed as an item of Environmental Heritage under Schedule 5, Part 1 of the *Blue Mountains Local Environmental Plan 2015* (BMLEP).

The Railway Station platform and building adjacent to the site is listed as an item of Environmental Heritage [Item FB005] under Schedule 5, Part 1 of the BMLEP. This item is described as a good, intact example of a typical island platform and station building, forming an important part of the Faulconbridge historic township. The Station was constructed in direct association with former Premier of NSW, Sir Henry Parkes. The Station has been operating since the 1877 following the opening of the western railway line in 1867, but the present brick platform and station building were constructed c.1902 in typical Federation style design, following the duplication of the western railway line.[4] The Station Group is also listed as a Heritage Item on the *NSW State Agency Heritage Register* (State Rail Authority of NSW) [under Section 170 of the *Heritage Act 1977*]. None of the subject trees are associated with this item.

5.3.2 Heritage Conservation Area

The site is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the BMLEP 2015.

5.3.3 Significant Tree Register

None of the subject trees are listed on the Blue Mountains City Council *Register of Significant Trees* as detailed in Development Control Plan No.9 adopted 21st June 1988.

5.3.4 General

None of the trees have any known or suspected heritage significance. The majority of the trees are fairly recent plantings (post-2000).

5.4 Amenity Value

5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 TREE RETENTION VALUES

6.1.1 The Retention Values shown in **Appendix 3** and **Appendix 5** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table 1**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

	Landscape Significance Rating						
Estimated Life Expectancy	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Long - Greater than 40 Years	High Retention Value						
Medium- 15 to 40 Years			Moderate Retention Value				
Short - 5 to 15 years				Low Ret. Value			
Transient - Less than 5 Years				Very Low Retention Value			
Dead or Potentially Hazardous							

6.1.2 The following table describes the implications of the retention values on site layout and design.

TABLE 2 – TREE RETENTION PRIORITES.

RETENTION VALUE	**RECOMMENDED ACTION**
"High"	These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. Proposed site design and placement of buildings and infrastructure should consider the recommended setbacks as discussed in the following section (refer also **Appendix 2**) to avoid any adverse impact on these trees. In addition to Tree Protection Zones, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
"Moderate"	The retention of these trees is desirable, but not essential. These trees should be retained as part of any proposed development if possible. However, these trees are considered less critical for retention. If these trees must be removed, replacement planting should be considered in accordance with TfNSW *Vegetation Offset Guide* (2019) to compensate for loss of amenity (refer also **Section 9**).
"Low"	These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. These trees should not be considered as a constraint to the future development of the site.
"Very Low"	These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. The removal of these trees is therefore recommended regardless of the implications of any proposed development.

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[5]

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 4**. The SRZ has been calculated in accordance with AS 4970-2009 (*Protection of Trees on Development Sites*).

7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.

7.3 Acceptable Encroachments to the Tree Protection Zone.

7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 2**. Greater incursions to the TPZ may result in an adverse impact on the tree.

7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable.

7.4 Acceptable Encroachments to the Canopy

7.4.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007 (*Pruning of Amenity Trees*). This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as "lopping" and is no longer an acceptable arboricultural practice. The minimum pruning as required to accommodate any proposed works is desirable. Excessive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.

7.4.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

8 PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the following key elements:

- construction of a new lift on the platform to connect to the existing footbridge
- construction of a new lift off the Great Western Highway to connect to the existing footbridge
- upgrade of the existing pedestrian footbridge over the Great Western Highway and all stairs including new handrails, tactile ground surface indicators (TGSIs), nosings and modifying the existing balustrade
- internal station building works including:
    - reconfiguration of the existing station waiting room, door widening, and allocated spaces for wheelchairs and persons with disability
    - reconfiguration of the existing toilets to accommodate one new unisex Family Accessible Toilet and one new unisex Ambulant toilet.
- modifications to the commuter car park and kiss and ride including:
    - upgrade of the two existing DDA parking spaces, and upgrade of the existing kiss-and-ride bay
    - construction of a new DSAPT compliant ramp (including demolition of existing non-complaint path) from the existing pedestrian footbridge to the commuter car park
    - provision of a new rest area with seating at the western entrance of the existing footbridge.
- upgrade of existing platform and access paths to include TGSIs and safety zone markings;
- provision of access paths and circulation spaces to connect all customer facilities at the station (e.g. lifts, kiss-and-ride, DDA car space, Family Accessible Toilet etc.)
- ancillary works including adjustments to lighting, relocation or replacement of existing customer facilities (drinking fountain, seating, telephone booth, guard indicators, Opal card readers, fencing etc.), improvement to station communications (including CCTV cameras, LED lighting, Public Address (PA) system, and hearing loops), wayfinding signage, yellow lines, bike rack etc.

8.1.2 It is understood that extensive excavation and regrading of the areas surrounding the access path will be required to achieve the required grades given the existing landform, notwithstanding the level of excavation indicated on the General Arrangement Plans, together with associated area adjacent to facilitate construction access.

9 IMPACT ASSESSMENT

9.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	Author	Dwg No.	Date
Architectural General Arrangement Footbridge Level Plan	DesignInc Pty Ltd	TAP-1500067-AR-1003 [5]	29/10/2018

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 5**. The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (R.L.);
- Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);

- Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
- Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
- Incursions to the tree canopy from the building envelope and temporary structures; and
- Assessment of the likely impact of the works on existing trees.

9.1.3 The proposed development will necessitate the removal of six (6) trees of low and very low retention value. These include Tree No.s T13, T14 & T25 (Japanese Maple), located within the Road Reserve and Trees T19 & T22 (Red Bloodwood) and T20 (Scribbly Gum) located within the Public Reserve. None of these trees are considered significant or worthy of special measures to ensure their preservation. The removal of these trees to accommodate the proposed development is therefore considered warranted in this instance. It should be noted that T14 & T25 are exempt from Council's Tree Management Controls (being less than the prescribed dimensions). All trees required to be removed to accommodate the proposed development are proposed to be replaced with an appropriate number of new trees in accordance with the TfNSW *Vegetation Offset Guideline* (2019) (refer **Section 11)**.

9.1.1 The proposed development will also necessitate the removal of five (5) trees of moderate retention value. These include Tree No.s T15, T16 & T17 (Pin Oak) located within the Road Reserve and Trees T18 & T21 (Red Bloodwood) located within the Public Reserve. These trees have no special ecological or heritage significance, but are all in good health and condition and make a positive contribution to the amenity of the site and streetscape. The removal of trees T15, T16 & T17 will have a detrimental impact on the amenity of the site. All trees required to be removed to accommodate the proposed development are proposed to be replaced with an appropriate number of new trees in accordance with the TfNSW *Vegetation Offset Guideline* (2019) (refer **Section 11)**.

9.1.2 No other trees will be adversely affected by the proposed development, assuming that any cut and fill batters associated with the regrading of the pedestrian access path do not encroach on the TPZs of adjacent trees (including Trees T23 & T24, both located in proximity to the access path). In order to avoid any encroachment to the TPZs, Tree Protection Fencing shall be erected in accordance with **Section 10.5.** In order to maintain Trees T27 & T28, these trees should be excluded from the area of the temporary site construction compound adjacent the western commuter car park.

10 RECOMMENDED TREE PROTECTION MEASURES

10.1 Tree Protection Plan

10.1.1 The following Tree Protection Measures should be read in accordance with the Tree Protection Plan (**Appendix 6**). The Tree Protection Plan (TPP) indicates the position of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained as part of the proposed development.

10.2 Prohibited Activities

10.2.1 The following activities should be avoided within specified Tree Protection Zones (refer **Appendix 4 & 6** for extent of the TPZ for each tree):-

- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
- Soil disturbance, surface grading, compaction, tyning, ripping or cultivation of soil;
- Mechanical removal of vegetation, including extraction of tree stumps;
- Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works)

- Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas);
- Erection of site sheds (except where approved by the site arborist);
- Affixing of signage, barricades or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Stockpiling of spoil or fill;
- Stockpiling of bulk materials, such as soil, sand, gravel, roadbase or the like;
- Stockpiling of demolition waste;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

10.3 Tree Damage

10.3.1 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.

10.3.2 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist [Australian Qualification Framework Level 5] shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

10.4 Tree Removal

10.4.1 The removal of Trees [**T13, T14, T15, T16, T17, T18, T19, T20, T21, T22 & T25**] shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.

10.4.2 Stumps located within the TPZs of trees to be retained shall be grubbed-out where required using a mechanical stump grinder (or by hand where less than 150mm in diameter) without damage to the root system of other trees. Where trees to be removed are within the SRZ of any trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained shall **not** be pulled out using excavation equipment or similar.

10.5 Tree Protection Fencing

10.5.1 Trees [**T23, T24, T27 & T28**] shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence in the positions as indicated on the Tree Protection Plan (**Appendix 6**). As a minimum, the fence shall consist of temporary chain wire panels of 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement using corner braces where required. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate. Existing site boundary fences may form part of the enclosure.

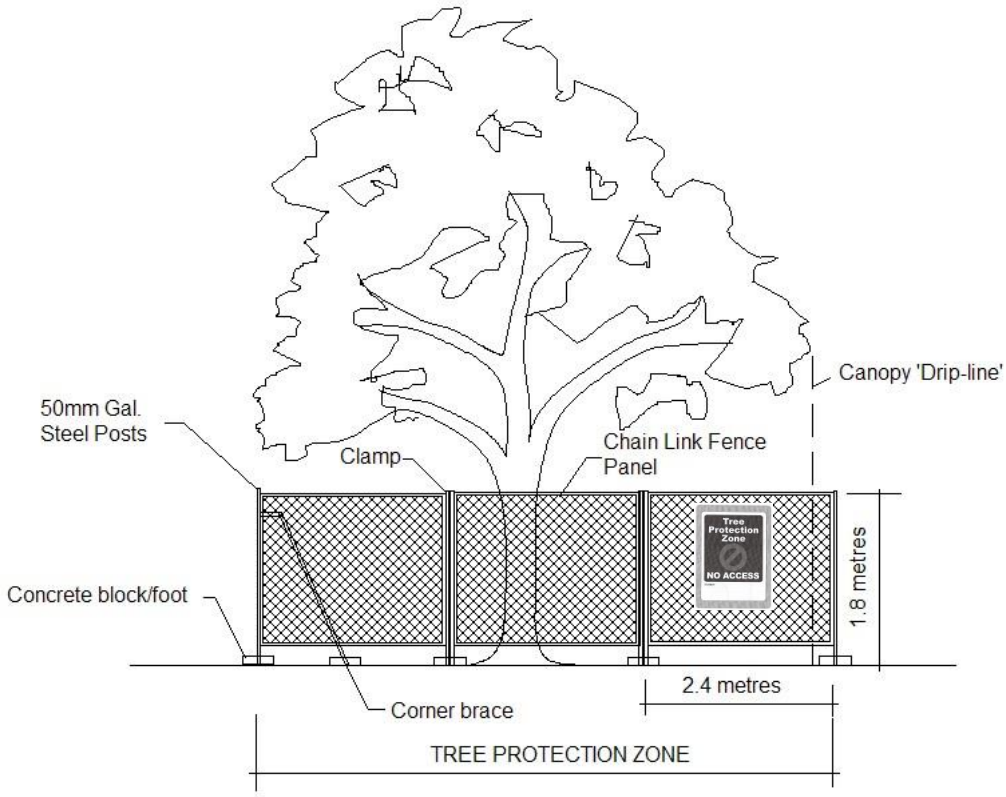


Figure 1 – Detail of Tree Protection Fence

10.6 Tree Protection Signs

10.6.1 Signs shall be installed on the Tree Protection Fence to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone. The signs shall be securely attached to the fence using cable ties or equivalent. Signs shall be placed at minimum 10 metre intervals. The wording and layout of the sign shall comply with AS 4970-2009 as shown in **Figure 2**.

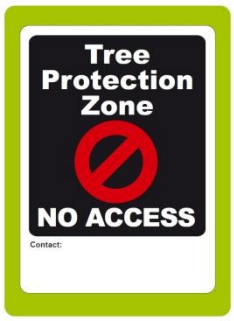


Figure 2 – Detail of Tree Protection Sign

10.7 Ground Protection

10.7.1 Construction haul routes shall be confined to existing paved areas wherever possible. Where this is not feasible and construction haul routes or access for plant and equipment must traverse soft landscape areas within TPZs of [**any tree nominated for retention**], 20mm thick marine ply sheets or truck mats (such as Envirex Versadeck® access mats) (refer **Figure 4** shall be placed over the top of the ground surface to minimise compaction and disturbance of the underlying soil profile and root zone.

Figure 4 – Showing typical detail for truck mats.

10.7.2 Ground protection shall be installed prior to any site works and maintained in good condition for the duration of the construction period. On completion of the works, ground protection shall be removed without damage or disturbance to the underlying soil profile.

10.8 Demolition Works within Tree Protection Zones

10.8.1 Demolition of paved areas within the Tree Protection Zones (TPZs) of trees [**any tree nominated for retention**] shall be undertaken under the supervision of a qualified Arborist [Australian Qualification Framework (AQF) Level 5].

10.8.1 Concrete pavements shall be demolished by breaking the slab into manageable sections (using a rock hammer or similar) and asphalt pavements shall be removed by breaking the topcoat into manageable pieces. The broken sections shall be carefully lifted and folded over the remaining paved surface to minimise disturbance and compaction of the underlying soil profile. Special care shall be taken where underlying woody roots have lifted or displaced the pavement. Any plant or equipment used in demolition work shall operate within the footprint of existing paved areas and avoid traversing soft landscape areas. Where this is unavoidable, suitable ground protection shall first be installed in accordance with **Section 10.7.**

10.8.2 The pavement sub-base within the TPZ shall be gradually removed (where required) in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid excessive disturbance and compaction of the underlying soil profile and damage to underlying roots and minimise. The machine shall work within the footprint of the existing path footprint to avoid compaction of the underlying soil. The final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and avoid damage to any underlying woody roots.

10.8.3 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels within new landscape areas. Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile. Where there is insufficient recovered site topsoil for this purpose, any imported material shall be free of rocks, vegetation, heavy clay or other extraneous matter and shall be a

well-drained friable material, equivalent in texture to the existing site topsoil material and complying with AS 4419:2003 (*Soils for Landscaping and Garden Use*).

10.8.4 Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the structures during demolition works, with special attention required during demolition of the footings and other sub-surface members to avoid damage to woody roots. An observer ('spotter') shall be employed to assist the plant operator in order to detect and avoid damage to underlying woody roots during demolition. Trunk and/or branch protection shall be installed where there is a potential risk of damage to trees in proximity or overhead of the work.

10.9 Excavations within Tree Protection Zones

10.9.1 Prior to any mechanical excavations for building foundations or pavement sub-grade within the TPZs of Trees [**any tree nominated for retention**] exploratory excavation using non-destructive techniques shall be taken along the perimeter of the structure or pavement within the TPZ. Non-destructive excavation techniques may include the use of hand-held implements, air pressure (using an Air-spade® device) or water pressure (hydro-excavation in combination with a vacuum extraction unit). The exploratory excavation shall be undertaken along the perimeter of the foundation or pavement (within the TPZ) to the depth of the foundation or to a maximum of 800mm from surface levels, to locate and expose any woody roots prior to any mechanical excavation.

10.9.2 All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. Any roots encountered of less than 40mm in diameter may be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise moisture stress on the tree. Where large woody roots (greater than 40mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance.

10.10 Underground Services

10.10.1 All proposed stormwater lines and other underground services should be located outside TPZs of trees proposed to be retained wherever possible or installed by alternative measures. Alternative measures include Horizontal Directional Drilling (HDD) to avoid open trenching. Where the installation of service lines within TPZs is unavoidable, the pipelines or conduits should be installed as follows.

10.10.2 Trenching for underground services and stormwater pipes within the TPZs of Trees [**any tree nominated for retention**], shall be undertaken using non-destructive excavation in accordance with **Section 10.9**. Where large woody roots are encountered during excavation or trenching (root diameter greater than 40mm), these shall be retained intact wherever possible (e.g. by tunnelling beneath roots and inserting the pipeline or conduit beneath or re-routing the service etc). Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by a qualified arborist [AQF 5] to evaluate the potential impact on the health and stability of the subject tree.

10.10.3 Installation of underground services and stormwater pipes within the SRZs of Trees [**any tree nominated for retention**], shall only be undertaken by Horizontal Directional Drilling (HDD) (also referred to as sub-surface boring or Micro-tunnelling for large diameter pipes). The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. At this site a minimum depth of 1 metre to the invert level of the pipe is specified.

10.11 Root Pruning

10.11.1 Where root pruning of [**any tree nominated for retention**] is required to facilitate construction, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

10.11.2 Any required root pruning shall be carried out in accordance with Australian Standard 4373-2007 – *Pruning of Amenity Trees* by a qualified and experienced arborist or tree surgeon [Australian Qualification Framework Level 3] in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). No roots of greater than 40mm in diameter should be removed or pruned without further advice from a Consulting Arborist [Australian Qualification Framework

11 REPLACEMENT PLANTING

11.1.1 In order to compensate for loss of amenity resulting from the removal of trees to accommodate the proposed development, new trees shall be planted elsewhere within appropriate areas in accordance with the TfNSW *Vegetation Offset Guideline* (2019) [DMS-SD-087 v.2.1]. **Table 1** in Section 5.2 of the *Vegetation Offset Guideline* specifies the ratio of trees to be replaced in relation to trees to be removed as follows:-

Table 1 - Offsetting for Individual Tree Removal

Tree Type	Offset
Large tree (DBH greater than 60 cm)	Plant minimum 8 trees
Medium tree (DBH greater than 15 cm, but less than 60 cm)	Plant minimum 4 trees
Small young tree (DBH less than 15 cm)	Plant minimum 2 trees

Ref: Extract from *Vegetation Offset Guideline* (2019) [DMS-SD-087 v.2.1].

11.1.2 In accordance with Table 1, a minimum number of forty (40) new trees must be planted within appropriate areas of the site. The following species are appropriate to the site conditions and could be considered for replacement planting:-

- *Quercus palustris* (Pin Oak)
- *Corymbia gummifera* (Red Bloodwood)
- *Eucalyptus sieberi* (Silvertop Ash)
- *Eucalyptus haemastoma* (Scribbly Gum)
- *Eucalyptus punctata* (Grey Gum)
- *Eucalyptus globoidea* (White Stringybark)
- *Eucalyptus racemosa* (Scribbly Gum)
- *Angophora costata* (Sydney Red Gum)

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
26th September 2019

REFERENCES

[1] Bannerman S.M. & Hazelton P.A. (1990)
Soil Landscapes of the Penrith 1:100,000 Sheet
Soil Conservation Service of NSW, Sydney.

[2] Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)
The Body Language of Trees – A Handbook for Failure Analysis
The Stationery Office, London, England

[3] Barrell, Jeremy (1996)
Pre-development Tree Assessment
Proceedings of the International Conference on Trees and Building Sites (Chicago)
International Society of arboriculture, Illinois, USA

[4] Office of Environment and Heritage (March 2009)
Faulconbridge Railway Station Group
State Heritage Inventory (Heritage Database)
https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=4801064

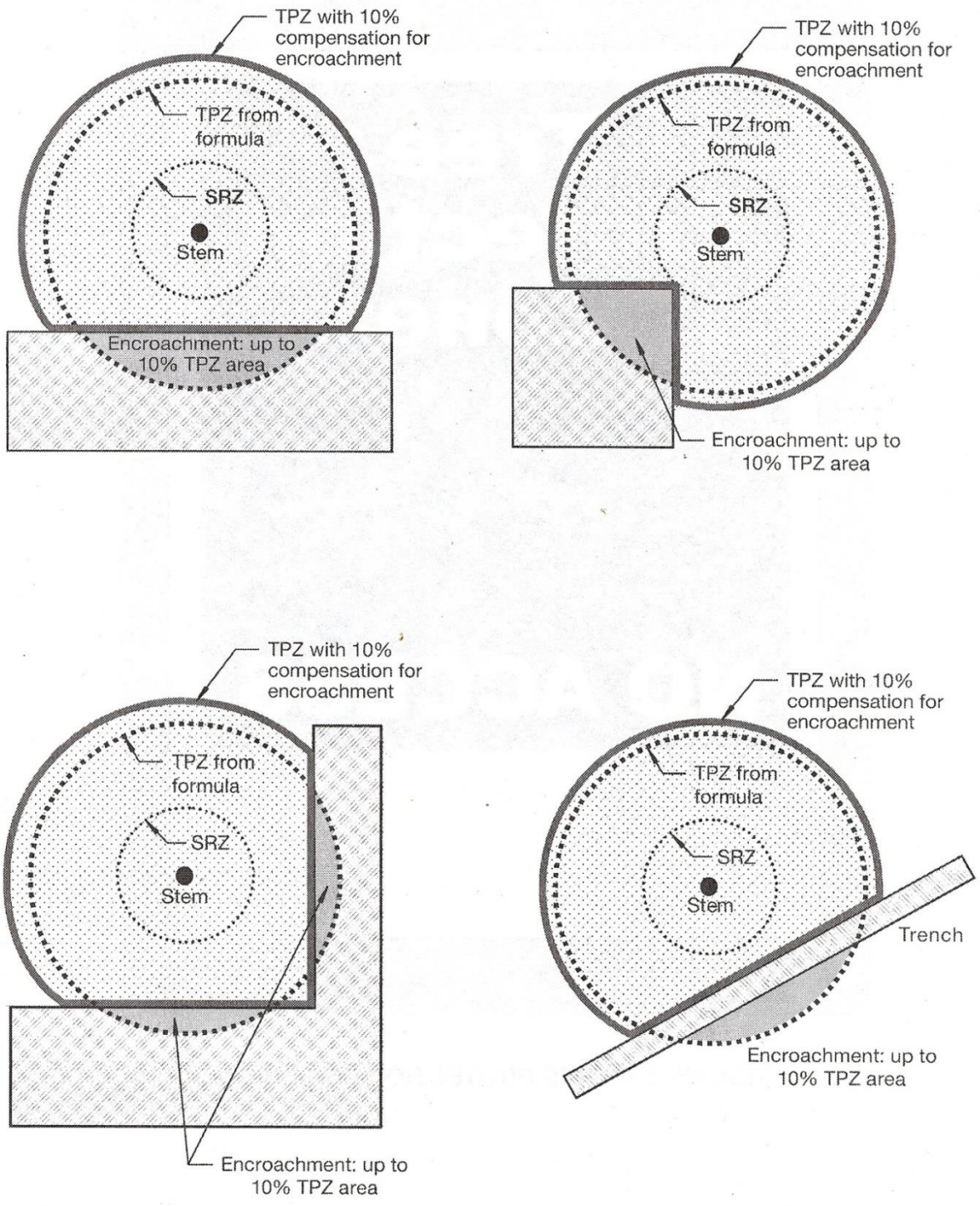
[5] Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened or Vulnerable Species as defined under the provisions of the *Biodiversity Conservation Act 2016* (NSW) or the *Environment Protection and Biodiversity Conservation Act 1999*.	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of the local or state planning controls (Development Control Plan etc).	The subject tree has a medium live crown size exceeding 40m²; the tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of the local or state planning controls (DCP etc) due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no known heritage value (or any habitat value)	The tree is scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW or within the relevant Local Government Area under the provisions of the *Biosecurity Act 2015*	The tree is completely dead and represents a potential hazard.

Ref:- Morton, A (2006) **Determining the Retention Value of Trees on Development Sites**
TreeNet - Proceedings of the 7th National Street Tree Symposium 2006 Government of South Australia Department for Transport, Energy and Infrastructure

APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

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

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	6	2.5	130	15	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
2	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	5.5	4	137	18	SM	Appears stable with sound branching structure.	Crown lifted to 1 metre.	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
3	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	5.5	2.5	130	13.75	SM	Appears stable with sound branching structure. Growing in narrow garden area between footpath and cliff face (sandstone cutting)	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
4	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	5	3	120	15	SM	Appears stable with sound branching structure. Growing in narrow garden area between footpath and cliff face (sandstone cutting)	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
5	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	6	2	150	12	SM	Appears stable with sound branching structure. Growing in narrow garden area between footpath and cliff face (sandstone cutting)	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
6	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	7	2	150	14	SM	Appears stable with sound branching structure. Growing in narrow garden area between footpath and cliff face (sandstone cutting)	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
7	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	5	2	130	10	SM	Appears stable with fair branching structure. Exhibits a slightly contorted branching habit. Growing in narrow garden area between footpath and cliff face (sandstone cutting)	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**Low**	Road reserve
8	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	7	2.5	130	17.5	SM	Appears stable with sound branching structure. Growing in narrow garden area between footpath and cliff face (sandstone cutting)	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
9	***Pittosporum undulatum*** (Sweet Pittosporum)	2	2.5	40	5	I	Stability suspect with sound branching structure. Growing atop cliff and immediately adjacent path.	No Evidence	Good	No Evidence	Transient (less than 5 years)	6	**Very Low**	Road reserve

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
10	***Acacia sp. [decurrens]*** (Black Wattle)	4	4	50x2	16	SM	Appears stable with sound branching structure. Growing on shallow soil (1-200mm) atop rock shelf. Prominent lean to the south-east.	No Evidence	Fair	Moderate borer infestation	Transient (less than 5 years)	5	Very Low	Road reserve
11	***Quercus palustris*** (Pin Oak)	5	5	150	25	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	Moderate	Public Reserve
12	***Quercus palustris*** (Pin Oak)	7	8	250	56	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	Moderate	Public Reserve
13	***Acer palmatum*** (Japanese Maple)	4	4	170	12	SM	Stability suspect with poor branching structure. Exhibist a large wound on lower trunk from GL to 0.5 metres due mechanical injury with decay evident.	Selectively pruned.	Fair with thinning crown	Moderate fungal infection on lower trunk	Transient (less than 5 years)	5	Very Low	Road reserve
14	***Acer palmatum*** (Japanese Maple)	2	3	100	6	I	Appears stable with fair branching structure. Exhibits a large partly occluded wound on lower trunk from GL to 0.5 metres due to mechinical injury.	No Evidence	Fair	No Evidence	Short 5-15 Years	6	Low	Road reserve
15	***Quercus palustris*** (Pin Oak)	7	7	191	38.5	SM	Appears stable with sound branching structure.	Crown lifted to 2 metres.	Very Good	No Evidence	Long - more than 40 years	4	Moderate	Road reserve
16	***Quercus palustris*** (Pin Oak)	7	6	182	33	SM	Appears stable with sound branching structure. Exhibits multiple small wounds to exposed woody roots due to mechanical injuries (grass-cutting).	Crown lifted to 2 metres.	Very Good	No Evidence	Long - more than 40 years	4	Moderate	Road reserve
17	***Quercus palustris*** (Pin Oak)	7	8	191	44	SM	Appears stable with sound branching structure. Exhibits multiple small wounds to exposed woody roots due to mechanical injuries (grass-cutting).	Crown lifted to 2 metres.	Very Good	No Evidence	Long - more than 40 years	4	Moderate	Road reserve
18	***Corymbia gummifera*** (Red Bloodwood)	7.5	5	207	27.5	SM	Appears stable with sound branching structure. Exhibits co-dominant PLs at 0.5 metres.	No Evidence	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	Moderate	Public Reserve

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
19	***Corymbia gummifera*** (Red Bloodwood)	4.5	6	137	15	I	Appears stable with fair branching structure. Crown suppressed on the west side. Exhibits contorted branching habit. Large wound on lower trunk due to mechanical injury (affecting 60% circumference).	No Evidence	Fair	No Evidence	Transient (less than 5 years)	5	**Low**	Public Reserve
20	***Eucalyptus sp. [sclerophylla]*** (Scribbly Gum)	8	3	153	9	I	Appears stable with sound branching structure. Exhibits a large basal wound (necrosis to vascular tissue) from GL to 0.5 metres due suspected canker and secondary borer damage.	No Evidence	Very Good	Suspected canker infection and secondary borer infestation.	Short 5-15 Years	5	**Low**	Public Reserve
21	***Corymbia gummifera*** (Red Bloodwood)	8	5	207	20	SM	Appears stable with sound branching structure. Exhibits a very prominent lean to the east. Multiple small wounds to PLs due Sugar Glider damage. High bark inclusion at 2.5 metres at junction of co-dominant PLs.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**Moderate**	Public Reserve
22	***Corymbia gummifera*** (Red Bloodwood)	8	4	166	8	SM	Appears stable with fair branching structure. Exhibits a large basal wound due to mechanical injury (grass-cutting). Prominent lean to the east. High bark inclusion at 2.0 metres at junction of co-dominant PLs. Substantial dieback with 50% deadwood.	No Evidence	Poor with sparse crown	No Evidence	Short 5-15 Years	5	**Low**	Public Reserve
23	***Eucalyptus sp. [sclerophylla]*** (Scribbly Gum)	8	5	226	20	SM	Appears stable with sound branching structure. Exhibits a high bark inclusion at 2.0 metres at junction of co-dominant PLs.	No Evidence	Very Good	No Evidence	Medium 15-40 Years	4	**Moderate**	Public Reserve
24	***Eucalyptus sp. [sclerophylla]*** (Scribbly Gum)	9	5	232	15	SM	Appears stable with poor branching structure. Prominent lean to the east. Exhibits a severe bark inclusion at 1.5 - 2.0 metres at junction of co-dominant PLs, with suspected fracture at junction (adaptive growth evident). Small wound on lower trunk due to mechanical injury.	No Evidence	Very Good	No Evidence	Short 5-15 Years	4	**Low**	Public Reserve
25	***Acer palmatum*** (Japanese Maple)	3	3	150	9	SM	Appears stable with sound branching structure. Exhibits multiple small axial wounds on SLs due sunburn. Moderate wound on lower trunk due to mechanical injury.	No Evidence	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	5	**Low**	Road reserve

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
26	***Acer palmatum*** (Japanese Maple)	4.5	4	130	18	SM	Appears stable with fair branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	Road reserve
27	***Eucalyptus haemastoma*** (Scribbly Gum)	7	4	150	12	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	Public Reserve
28	***Eucalyptus haemastoma*** (Scribbly Gum)	4.5	3	60 + 80	7.5	I	Appears stable with poor branching structure. Exhibits co-dominant leaders at 0.5 metres due previous branch loss. Large wound on lower trunk due to mechanical injury.	No Evidence	Good	No Evidence	Transient (less than 5 years)	5	**Very Low**	Public Reserve

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.4	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
2	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.4	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
3	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.4	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
4	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.4	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
5	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.5	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
6	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.5	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
7	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.4	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
8	***Quercus robur* 'Fastigiata'** (Columnar English Oak)	M	2.0	1.4	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
9	***Pittosporum undulatum*** (Sweet Pittosporum)	M	1.5	0.9	7.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
10	***Acacia sp. [decurrens]*** (Black Wattle)	M	2.0	1.1	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
11	***Quercus palustris*** (Pin Oak)	M	3.0	1.5	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
12	***Quercus palustris*** (Pin Oak)	M	4.2	1.8	55.4	Existing accessible carparking bays offset 2.4 metres north-west to be modified (new line marking and signage). Existing asphalt pavement and kerbs to be retained intact.	No adverse impact.	To be retained - no special Tree Protection Measures required.
13	***Acer palmatum*** (Japanese Maple)	M	2.0	1.6	13.1	Proposed new paved area (widened path to accessible parking bays) offset 900mm south-west. Excavations for pavement sub-grade within SRZ. Canopy pruning required to clear pedestrian access.	Excavations for pavement sub-grade will result in severance and damage to woody roots, leading to a significant adverse impact.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
14	***Acer palmatum*** (Japanese Maple)	M	2.0	1.3	12.6	Proposed new paved area (widened path) offset 1.5 metres south-west. Proposed new pedestrian ramp offset 500mm north-east. Excavations for pavement sub-grade within SRZ. Canopy pruning required to clear pedestrian access.	Excavations for pavement sub-grade will result in severance and damage to woody roots, leading to a significant adverse impact.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
15	***Quercus palustris*** (Pin Oak)	M	4.0	1.7	50.2	Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal. Removal of this tree will result in a detrimental impact on the amenity of the place.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
16	***Quercus palustris*** (Pin Oak)	M	4.0	1.6	50.2	Existing pedestrian ramp offset 3.1 metres west to be demolished within TPZ. Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal. Removal of this tree will result in a detrimental impact on the amenity of the place.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
17	***Quercus palustris*** (Pin Oak)	M	4.5	1.7	63.6	Portion of existing pedestrian ramp offset 3.8 metres north-east to be demolished within TPZ. New foopath/ramp offset 3.8 metres north-east (within footprint of existing path, at similar finished level). Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal. Removal of this tree will result in a detrimental impact on the amenity of the place.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
18	***Corymbia gummifera*** (Red Bloodwood)	P	3.0	1.7	28.3	Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
19	***Corymbia gummifera*** (Red Bloodwood)	P	3.0	1.4	28.3	Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
20	***Eucalyptus sp. [sclerophylla]*** (Scribbly Gum)	P	2.5	1.5	19.6	Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
21	***Corymbia gummifera*** (Red Bloodwood)	P	3.0	1.7	28.3	Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
22	***Corymbia gummifera*** (Red Bloodwood)	P	2.5	1.6	19.6	Located within footprint of constructed batters associated with re-grading of the new acess path. Excavation and filling for batters within TPZ.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
23	***Eucalyptus sp. [sclerophylla]*** (Scribbly Gum)	P	3.0	1.8	28.3	No proposed works within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Erect Tree Protection fencing in accordance with Section 10.5. Any batter associated with re-grading works for pedestrian ramp to be located outside TPZ.
24	***Eucalyptus sp. [sclerophylla]*** (Scribbly Gum)	P	3.0	1.8	28.3	No proposed works within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Erect Tree Protection fencing in accordance with Section 10.5. Any batter associated with re-grading works for pedestrian ramp to be located outside TPZ.
25	***Acer palmatum*** (Japanese Maple)	M	2.0	1.5	12.6	Proposed new paved area associated with new seating offset 1.4 metres south-west at RL? (close to existing grade). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 10%.	Excavations for pavement sub-grade may result in severance and damage to woody roots, leading to an adverse impact.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
26	***Acer palmatum*** (Japanese Maple)	M	2.5	1.4	19.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special Tree Protection Measures required.
27	***Eucalyptus haemastoma*** (Scribbly Gum)	P	3.0	1.5	28.3	Located on periphery of site construction compound (materials storage and stockpiling area).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Erect Tree Protection fencing in accordance with Section 10.5. Exclude TPZ from Temporary Construction Compound.
28	***Eucalyptus haemastoma*** (Scribbly Gum)	P	2.0	1.3	12.6	Located on periphery of site construction compound (materials storage and stockpiling area).	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Erect Tree Protection fencing in accordance with Section 10.5. Exclude TPZ from Temporary Construction Compound.

PL = Primary Limb; SL = Secondary Limb; TL = Tertiary Limb. GL = Ground Level

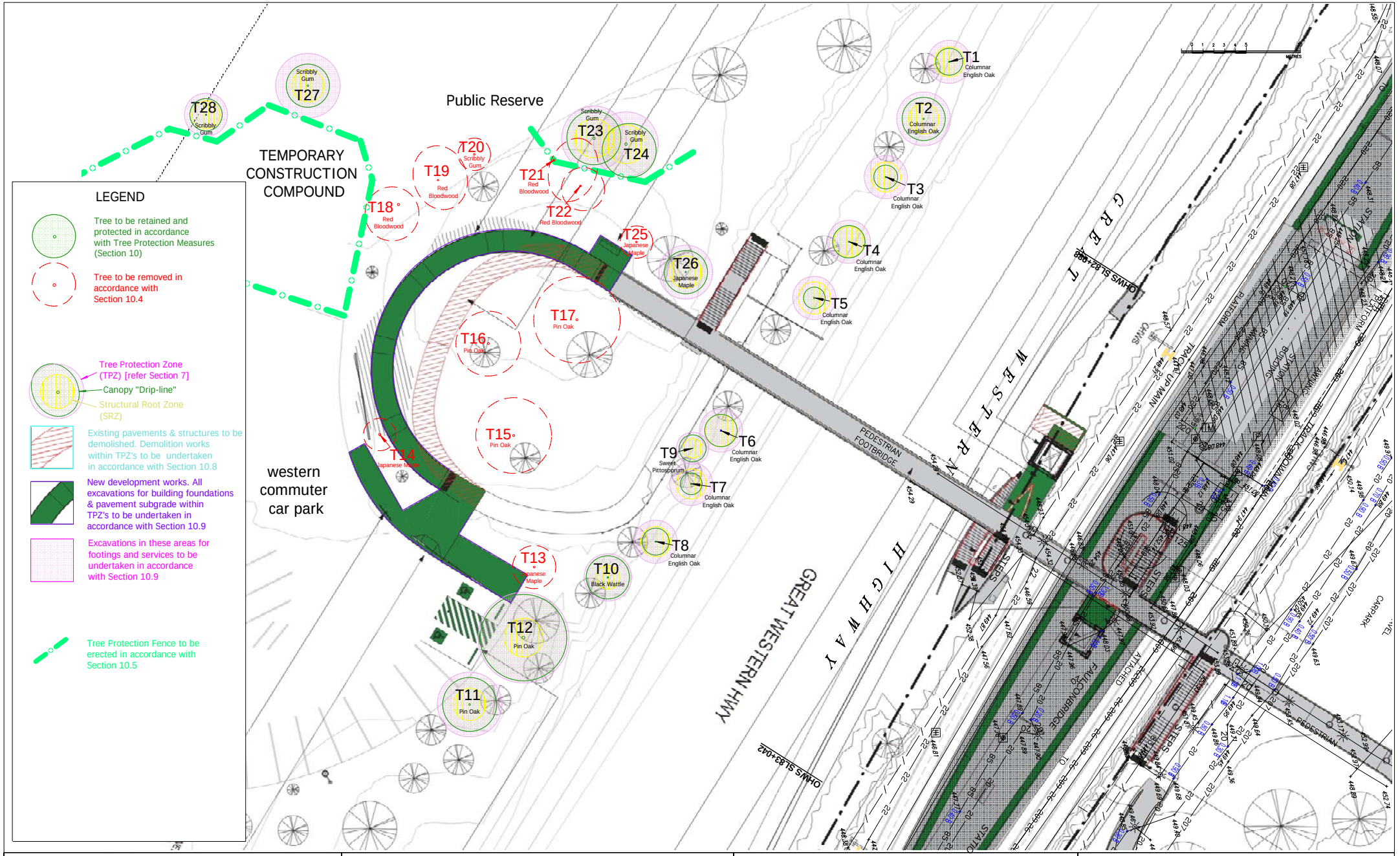
APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
Faulconbridge Station
Great Western Highway, FAULCONBRIDGE

Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
prepared by Degotardi Smith & Partners
Dwg Ref No. 31578A01.DWG
Dated Sept.2015
and Aerial Image obtained from NearMap
(under Licence to WSP)

DWG No. T19-082901 [C]

DATE: 23/09/2019



APPENDIX 6

TREE PROTECTION PLAN

Faulconbridge Station
Great Western Highway, FAULCONBRIDGE

Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
prepared by Degotardi Smith & Partners
Dwg Ref No. 31578A01.DWG
Dated Sept.2015
and Aerial Image obtained from NearMap
(under Licence to WSP)

DWG No. T19-082902 [C]

DATE: 23/09/2019