EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

ARBORICULTURAL IMPACT ASSESSMENT REPORT

TRANSPORT ACCESS PROGRAM (TAP) 3

WOLLSTONECRAFT (RAILWAY) STATION
SHIRLEY ROAD, WOLLSTONECRAFT

April 2020

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

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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 thirty-five (35) trees located in the vicinity of proposed works at Wollstonecraft Station, Shirley Road, Wollstonecraft. 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 2 new lifts connecting to Platform 1 and 2
- reconfiguration of station building to accommodate one unisex family accessible toilet, two unisex ambulant toilets, maintaining cleaners' room and construction of new Main Switch Room
- modification of waiting area on both platforms for accessible entry and level access
- construction of new canopy at boarding assistance zones on Platform 1 and 2
- raising, stabilisation and regrading of station platforms for compliance
- modification of the Shirley Road Overbridge by widening and regrading the northern footpath along with new compliant handrails and accessible entry points
- creation of level access to the retail shops on Platform 2 as well as a new accessible ramp and stairs
- one new kiss and ride bay and one DSAPT compliant car parking space on Shirley Road.

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 located in the vicinity of Wollstonecraft Station and the Shirley Road Overbridge. For the purposes of this report, the subject area will be referred to as 'the site'. The site is zoned Infrastructure [SP2] under the *North Sydney Local Environmental Plan 2013* (NSLEP). The site contains open lawns and gardens with a variety of non-local native and exotic (introduced) mature and semi-mature exotic trees, typical of most railway station gardens along the North Shore Railway Line. The site contains several pathways and ramps leading from Shirley Road, providing pedestrian access to the Station platforms. Steep embankments are located on the east and west side of the railway line in the vicinity of the overbridge.

2.1.2 The soils in the vicinity of the site have been extensively disturbed and modified for urban development, particularly the cutting for the railway line and associated terracing and level transitions. The original soils of this area are typical of the Blacktown Soil Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of shallow to moderately deep (less than 1000 mm) *Red & Brown Podzolic Soils* on crests, upper slopes and well drained areas. Soils on lower slopes and areas of poor drainage consist of deep (1500-3000 mm) *Yellow Podzolic Soils and Soloth Soils* derived Wianamatta Group & Hawkesbury Shales.[1] The landscape generally consists of undulating rises with slopes ranging usually less than 5% grade.

2.1.3 The original vegetation of this area consisted of tall open forest (Blue Gum High Forest) which was progressively logged for timber-getting from early in the nineteenth century then cleared for agricultural use (mainly orchards and market gardens) and later for residential development.[2] The dominant locally-indigenous tree species formerly found in this area include *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus pilularis* (Blackbutt). Other species occurring in this vegetation community may include *Syncarpia glomulifera* (Turpentine), *Eucalyptus paniculata* (Grey Ironbark), *Angophora floribunda* (Rough Barked Apple), *Eucalyptus acmenoides* (White Mahogany), *Angophora costata* (Sydney Red Gum), *Eucalyptus resinifera* (Red Mahogany) and *Allocasuarina torulosa* (Forest Oak). There are no remnant locally-indigenous trees remaining within the site.

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 30th January 2020. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the architectural site plan provided by TfNSW, Dwg. Ref No. 150315-WLS-AR-DRG-00501 [1] (undated). The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Trees T7-T15 and T22 were not shown on the site plan. These trees have been plotted on the drawing in their approximate position by taking offsets from existing site features.

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.[3] 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[4] 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 North Sydney Local Government Area (LGA) are protected under Part B, Section 16 of the *North Sydney Development Control Plan* (NSDCP) made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The NSDCP generally protects any tree on public land, regardless of size, all trees with a height of ten (10) metres or greater or with a crown spread of ten (10) metres or greater or a trunk circumference of 1500 mm (i.e. 475 mm diameter) on private land and all trees with a height of five (5) metres or greater on any land identified as a Heritage Item. Some exemptions apply. However, all of the subject trees are protected under Council's Tree Management Controls, being located on public land or within the site of a heritage item.

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

Pittosporum undulatum (Sweet Pittosporum) [T16, T18, T19, T20, T30 & T31] 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 be self-sown within the site.

5.2.3 Noxious Plants & Environmental Weeds

Celtis sinensis (Chinese Nettle Tree or Chinese Hackberry) [T28] and *Olea europaea subsp. africana* (African Olive) [T17 & T22] are regulated with a General Biosecurity Duty to prevent, eliminate or minimise any biosecurity risk they pose within all of NSW under the *Biosecurity Act 2015.* These plants should be eradicated if possible. Alternatively the growth of these plants should be managed in a manner that continuously inhibits the ability of the plant to spread so far as is reasonably practicable and the plants must not be sold, propagated or knowingly distributed. Note that T22 is located within the adjoining property. The approval of the property owner should be sought prior to the removal of this tree.

Cotoneaster sp. (Cotoneaster) [T21] and *Syagrus romanzoffianum* (Cocos Palm) [T8, T9, T10, T11, T13, T14 & T15] are generally considered to be Environmental Weed Species within most Local Government Areas (LGAs) within the Sydney Metropolitan Area.

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*

Pittosporum undulatum (Sweet Pittosporum) [T16, T18, T19, T20, T30 & T31] whilst typical of the species assemblage of Blue Gum High Forest (BGHF) is also widespread and occurs commonly throughout the North Shore. These trees are young and semi-mature self-sown specimens and are therefore *not* considered to form part of the BGHF EEC.

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 *North Sydney Local Environmental Plan 2013* (NSLEP).

The Wollstonecraft Station sign is listed as a Heritage Item on the RailCorp NSW State Agency Heritage Register (version 8.1 dated 30 June 2019) made under the provisions of Section 170 (Heritage and Conservation Register) of the *Heritage Act 1977*. The sign is typical of the style materials and workmanship of c. 1930's railway signage.

The residential property adjacent to the south-western boundary (Lot 1 in DP1035886, being 1 Telopea Street, Wollstonecraft) is listed as an item of Environmental Heritage under Schedule 5, Part 1 of the NSLEP 2013. This item is described as the Former Stationmasters Residence, being the only remaining structure from Wollstonecraft Station and one of the earliest buildings constructed in this area.[5] Note that this property contains Trees T7-T15. None of these trees were planted contemporary with this building.

5.3.2 Heritage Conservation Area

The site is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the NSLEP 2013.

The residential properties adjacent to the south-western boundary (Lot 1 in DP 1035886, being 1 Telopea Street, Wollstonecraft and SP 67743, being 1A and 1B Telopea Street, Wollstonecraft) are located within a Heritage Conservation Area [Area CA25 – Wollstonecraft] under Schedule 5, Part 2 of the NSLEP 2013. Note that these properties contain Trees T7-T15 and T22.

5.3.1 Significant Tree Register

None of the subject trees are listed on North Sydney Council's *Register of Significant Trees*.

5.3.2 General

None of the trees have any known or suspected heritage significance. The majority of the trees are fairly recent plantings (post-1970) or self-sown.

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. Note that this assessment does not relate to the other measures of amenity as defined in the Visual Impact Assessment.

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).[6]

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 2 new lifts connecting to Platform 1 and 2
- reconfiguration of station building to accommodate one unisex family accessible toilet, two unisex ambulant toilets, maintaining cleaners' room and construction of new Main Switch Room
- modification of waiting area on both platforms for accessible entry and level access
- construction of new canopy at boarding assistance zones on Platform 1 and 2
- raising, stabilisation and regrading of station platforms for compliance
- modification of the Shirley Road Overbridge by widening and regrading the northern footpath along with new compliant handrails and accessible entry points
- one new kiss and ride bay and one DSAPT compliant car parking space on Shirley Road.

8.1.2 The proposed development includes the following scope of works:

Lifts and accessibility

- construction of a new lift on Platform 1 connecting the Shirley Road entry
- accessible return ramp from Shirley Road and the Shirley Road Overbridge to Platform 1 lift
- construction of a new lift on Platform 2 connecting Telopea Road and the Shirley Road Overbridge
- accessible footbridge ramp from Shirley Road Overbridge to Platform 2 lift accessible path.

Platform Works

- upgrading of the Boarding Assistance Zone on Platform 1 and 2 including new sheltered and wheelchair waiting areas
- stabilising and grading Platform 1 and 2 including new TGSIs and yellow line marking.

Station building works including

- reconfiguration of Platform 1 existing store room and toilets to accommodate one unisex family accessible toilet, two unisex ambulant toilets and maintaining the cleaners storeroom on Platform 1
- construction of a new Mains Switch Room at the southern end of the Platform 1 station building
- minor modification to upgrade the ventilation for the existing communications equipment room
- modifications to the Platform 1 waiting area to provide level access entry to the station
- floor levelling of the existing waiting room on Platform 2 to provide accessible entry.

Shirley Road and Overbridge works

- widening and regrading of the footpath on the Shirley Road Overbridge into the carriageway
- removal of existing billboard advertisements
- reconfiguration and reduction in size of the existing overbridge traffic lanes and medians
- installation of new compliant handrails to the roadside of the footpath
- modifications to eastern and western access points on Shirley Road Overbridge approaches with ramps.

Intermodal upgrades

- provision of one new compliant accessible car parking space and one kiss and ride bay on Shirley Road
- relocation of existing mail zone further east two car spaces from current location
- provision of new direct accessible path from the new kiss and ride bay and DDA car parking space to the proposed lifts
- relocation of the existing bike racks on the Platform 1 side of the station to accommodate a new Mains Switch Board and enclosure.

Ancillary works including:

- provision of new TGSIs, safety zone markings, line marking and handrails
- provision of accessible seating on the eastern station entrance
- installation of additional CCTV cameras, hearing loops and upgrading of Public Address system to accommodate the new works
- new wayfinding signage, Opal card readers, public telephones and rubbish bins
- provision of electrical upgrade to support the operation of the new lifts and station operations with installation of AusGrid transformer (about 3600 square metres) near Shirley Road entrance of Platform 1.

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 - Site Plan	Jacobs	150315-WLS-AR-DRG-00501 [A]	09/04/2020

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 nine (9) trees of very low retention value. These include Tree No.s T2 (Maidenhair Tree), T20, T30 & T31 (Sweet Pittosporum), T26 (Cabbage Tree Palm), T27 (five in a row of six Lillypillys), T28 (Chinese Hackberry), T29 (Silky Oak) and T32 (Black She-oak). 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 T28 is classified as a Noxious Weed (refer **Section 5.2.3**).

9.1.4 The proposed development will also necessitate the removal of three (3) trees of moderate retention value. These include Tree No.s T1 (Golden Brunnings Cypress), T5 (Jacaranda) and T35 (Crepe Myrtle). These trees are not considered significant, but are in good health and fair condition and make a fair contribution to the amenity of the site and streetscape.

9.1.5 The proposed development will also necessitate the removal of one (1) tree of high retention value, being T23 (Cabbage Tree Palm). This tree has no special ecological or heritage significance, but is in good health and condition and makes a positive contribution to the amenity of the site and streetscape. There are no feasible options that can be recommended to preserve or mitigate adverse impact on this tree in this instance given the imperative to provide separate dual pedestrian ingress and egress to the site at this point.

9.1.6 All trees required to be removed to accommodate the proposed development should be replaced with an appropriate number of new trees as specified in the TfNSW *Vegetation Offset Guideline* (2019) (refer **Section 11)**.

9.1.7 A proposed new pathway/pedestrian ramp is located within the TPZs of T7 (Liquidambar), T8, T9, T10, T11, T13, T14 & T15 (Cocos Palms) and T12 (Mugga Ironbark), [all located within the adjoining property to the south-west] and T16, T18 & T19 (Sweet Pittosporum). The new pathway is located in the same footprint as an existing pathway. At this stage, the existing path levels relative to the proposed new path levels are not known. Assuming than the new pathway is constructed above or at the same level and grade as the existing path within the TPZs, the proposed works will not result in any adverse impact on these trees. However, if the new pathway is substantially lower in elevation compared to the existing path, excavations for the new pathway

sub-grade and any associated retaining wall or kerb may result in a significant adverse impact on these trees. In order to *minimise* any adverse impact, demolition of the existing pathway (where required) within the TPZs of these trees should be undertaken in accordance with **Section 10.8**. Any required excavations for the new path sub-grade and any associated retaining wall or kerb footing within the TPZs should be undertaken in accordance with **Section 10.9**.

9.1.8 No other trees will be adversely affected by the proposed development.

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 [**T1, T2, T5, T20, T23, T26, T27, T28, T29, T30, T31, T32 & T35**] 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 [**T3 & T4**] 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.

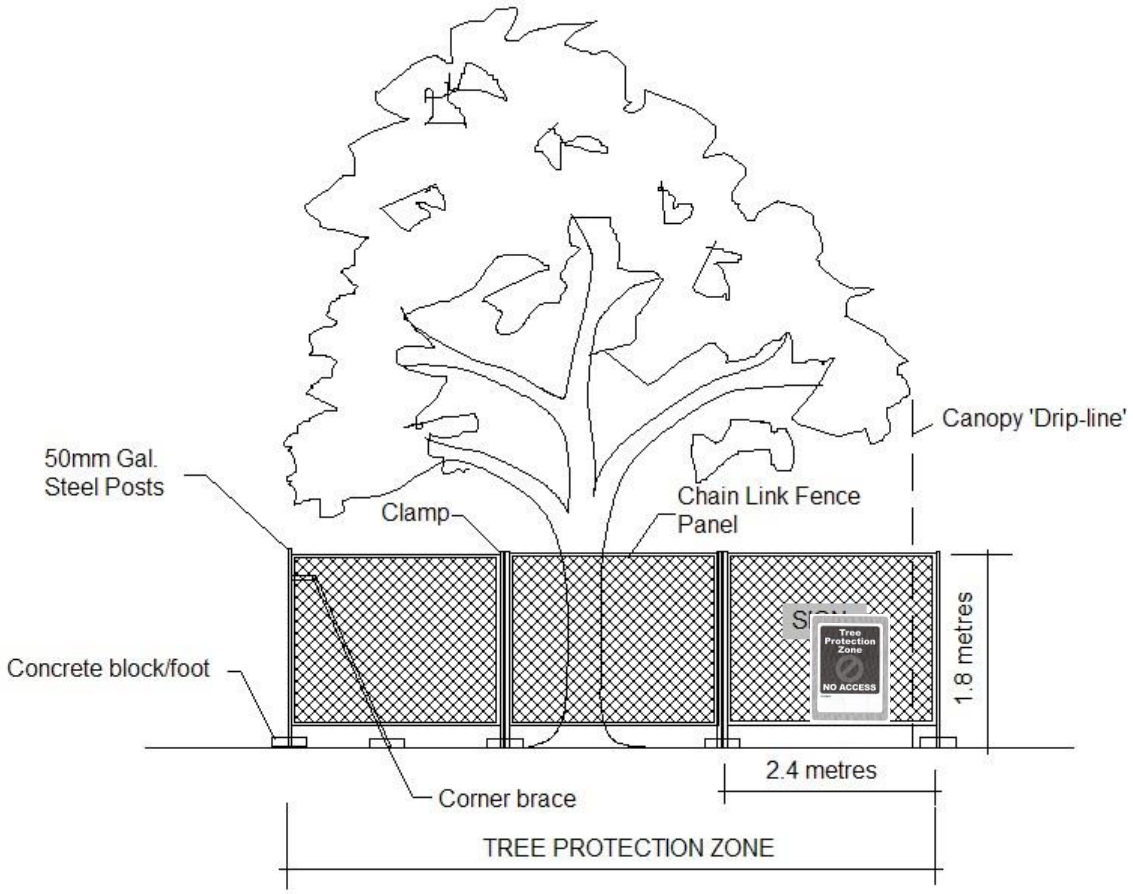

Figure 1 – Detail of Tree Protection Fence

10.5.2 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**.

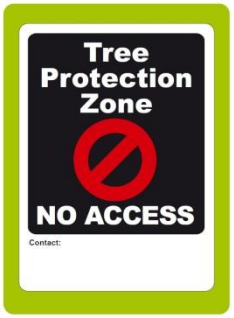

Figure 2 – Detail of Tree Protection Sign

10.6 Trunk Protection

10.6.1 Trunk protection boarding shall be erected around Trees [**T6**] to avoid accidental damage, as indicated on the Tree Protection Plan (**Appendix 6**). The trunk protection shall consist of a layer of carpet underfelt (or similar) wrapped around the trunk, followed by 1.8 metre lengths of softwood timbers (90 x 45mm in section) aligned vertically and spaced evenly around the trunk at 150mm centres (i.e. with a 50mm gap) and secured together with 2mm galvanised wire or galvanised hoop strap as shown in **Figure 3**. Recycled timber (such as demolition waste) may be suitable for this purpose, subject to the approval of the Project Arborist. The timbers shall be wrapped around the trunk (over the carpet underfelt), but not fixed to the tree to avoid mechanical injury or damage to the trunk. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period. Carpet underfelt (alone) is sufficient for trees with a trunk diameter of less than 200mm. This shall be wrapped around the trunk in a double layer and held in place with heavy-duty fibre reinforced adhesive tape (e.g. Gaffer Tape).

Figure 3 – Detail of Trunk Protection

10.7 Ground Protection

10.7.1 A 100mm layer of woodchip mulch shall be installed within fenced areas of the TPZs of trees [**T3 & T4**] to minimise moisture stress during construction.

10.7.2 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.

10.7.3 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 [**T6, T7, T8, T9, T10, T11, T12, T13, T14 & T15**] 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 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 [**T6, T7, T8, T9, T10, T11, T12, T13, T14 & T15**] 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 Pavements

10.11.1 Proposed paved areas within the TPZs of Trees [**T6, T7, T8, T9, T10, T11, T12, T13 & T14**] shall be placed at or slightly above grade where possible to minimise excavations within the root zone and avoid severance and damage of woody roots.

10.12 Root Pruning

10.12.1 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.

10.12.2 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 Level 5].

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 (trunk diameter greater than 60 cm)	Plant minimum 8 trees
Medium tree (trunk diameter greater than 15 cm, but less than 60 cm)	Plant minimum 4 trees
Small young tree (trunk diameter 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-two (42) 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:-

- *Tristaniopsis laurina* (Water Gum)
- *Elaocarpus reticulatus* (Blueberry Ash)
- *Magnolia grandiflora* (Bullbay Magnolia)
- *Jacaranda mimosifolia* (Jacaranda).
- *Syncarpia glomulifera* (Turpentine)

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
17th April 2020

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[2] Benson, Doug & Howell, Jocelyn (1990)
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[5] NSW Office of Environment and Heritage (October 1998)
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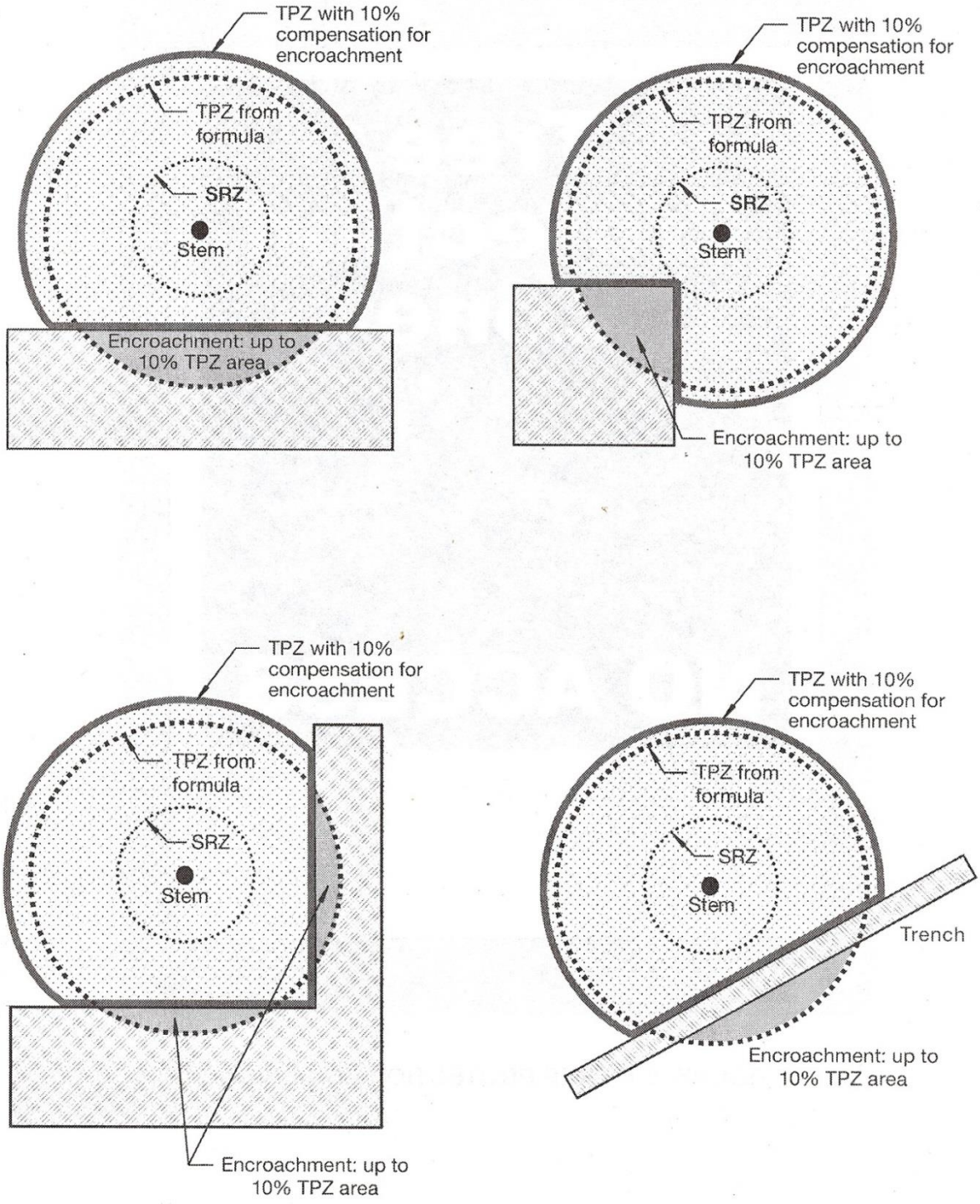
[6] Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

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	***Cupressus macrocarpa* 'Brunniana Aurea'** (Golden Brunnings Cypress)	13	8	700	104	M	Appears stable with fair branching structure. Exhibits a prominent lean to the north. Multiple moderate bark inclusions at 2-3 metres. Growing close to edge of rail embankment and retaining wall. Multiple small wounds due to branch loss (storm damage).	No Evidence	Good	No Evidence	Short 5-15 Years	3	**Moderate**	On-site
2	***Ginko biloba*** (Maidenhair Tree)	5	4	170	20	I	Appears stable with poor branching structure. Upper crown suppressed due to overshadowing. Moderate dieback in upper crown with 50% deadwood. Multiple moderate wound to trunk and PLs/SLs due borer damage.	No Evidence	Fair with thinning crown	High borer infestation.	Transient (less than 5 years)	5	**Very Low**	On-site
3	***Buckinghamia celsissima*** (Ivory Curl Flower)	3.5	3	80	10.5	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	**Moderate**	On-site
4	***Tristaniopsis laurina*** (Water Gum)	3.5	3.5	100	12.25	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	On-site
5	***Jacaranda mimosifolia*** (Jacaranda)	7	10	306	60	SM	Appears stable with fair branching structure. Upper crown suppressed west side due to overshadowing. Exhibits multiple moderate axial wounds due to branch loss. Located close to edge of rail embankment (offset 1.4 metres).	No Evidence	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
6	***Lophostemon confertus*** (Brushbox)	6	9	439	36	M	Appears stable with fair branching structure. Contorted branching habit.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**Moderate**	Nature strip
7	***Liquidambar styraciflua*** (Liquidambar)	14	14	550	168	M	Appears stable with sound branching structure. Located close to existing footpath. Woody surface roots located at edge of path (running parrallel).	Selectively pruned.	Good	Low Mistletoe infestation.	Long - more than 40 years	3	**High**	Adjoining property
8	***Syagrus romanzoffianum*** (Cocos Palm)	13	5	250	20	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	**Low**	Adjoining property

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				
9	***Syagrus romanzoffianum*** (Cocos Palm)	9	5	250	20	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	Low	Adjoining property
10	***Syagrus romanzoffianum*** (Cocos Palm)	11	4	280	12	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	Low	Adjoining property
11	***Syagrus romanzoffianum*** (Cocos Palm)	11	3	250	6	M	Appears stable with sound branching structure. Uppercrown conflicting and suppressed due overshadowing by T12.	No Evidence	Good	No Evidence	Medium 15-40 Years	6	Low	Adjoining property
12	***Eucalyptus sideroxylon*** (Mugga Ironbark)	15	12	500	120	M	Appears stable with sound branching structure. Exhibits 10% interior crown deadwood.	No Evidence	Good	No Evidence	Long - more than 40 years	3	High	Adjoining property
13	***Syagrus romanzoffianum*** (Cocos Palm)	8	5	320	15	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	Low	Adjoining property
14	***Syagrus romanzoffianum*** (Cocos Palm)	11	6	300	30	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	Low	Adjoining property
15	***Syagrus romanzoffianum*** (Cocos Palm)	9	5	250	20	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	Low	Adjoining property
16	***Pittosporum undulatum*** (Sweet Pittosporum)	7	6	120	36	SM	Appears stable with fair branching structure.	No Evidence	Fair with slightly thinning crown	Moderate vine infestation (Climbing Fig)	Transient (less than 5 years)	5	Very Low	On-site
17	***Olea europaea subsp. africana*** (African Olive)	5	5	120+80	25	SM	Appears stable with fair branching structure.	No Evidence	Fair with slightly thinning crown	Severe vine infestation (Climbing Fig)	Transient (less than 5 years)	7	Very Low	On-site
18	***Pittosporum undulatum*** (Sweet Pittosporum)	4	5	80x2	20	SM	Appears stable with fair branching structure.	No Evidence	Fair with thinning crown	Severe vine infestation (Climbing Fig)	Transient (less than 5 years)	5	Very Low	On-site
19	***Pittosporum undulatum*** (Sweet Pittosporum)	6	5	120	25	SM	Appears stable with fair branching structure. Growing on face of steep embankment.	No Evidence	Fair with thinning crown	No Evidence	Transient (less than 5 years)	5	Very Low	On-site

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				
20	***Pittosporum undulatum*** (Sweet Pittosporum)	5	4	80x3	16	SM	Appears stable with fair branching structure. Growing on face of steep embankment.	No Evidence	.Fair	No Evidence	Transient (less than 5 years)	5	Very Low	On-site
21	***Cotoneaster sp.*** (Cotoneaster)	3	3	50x4	9	SM	Appears stable with fair branching structure. Growing on edge of steep embankment.	No Evidence	.Fair	No Evidence	Transient (less than 5 years)	6	Very Low	On-site
22	***Olea europaea subsp. africana*** (African Olive)	7	7	300	49	M	Appears stable with fair branching structure.	Selectively pruned.	Good	No Evidence	Medium 15-40 Years	7	Very Low	Adjoining property
23	***Livistona australis*** (Cabbage Tree Palm)	7	5	274	17.5	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	3	High	Nature strip
24	***Livistona australis*** (Cabbage Tree Palm)	3	3	300	4.5	I	Appears stable with sound branching structure.	Crown lifted to 1 metre	Very Good	No Evidence	Long - more than 40 years	5	Moderate	On-site
25	***Livistona australis*** (Cabbage Tree Palm)	3	3	300	6	I	Stability suspect with sound branching structure. Exhibits a very prominent lean to the north. Located within raised planter with confined root zone.	Crown lifted to 1 metre	Very Good	No Evidence	Short 5-15 Years	5	Low	On-site
26	***Livistona australis*** (Cabbage Tree Palm)	3	3	300	6	I	Stability suspect with sound branching structure. Exhibits a very prominent lean to the north. Located within raised planter with confined root zone.	Crown lifted to 1 metre	Very Good	No Evidence	Short 5-15 Years	5	Low	On-site
27	Row of 6 x ***Syzygium sp.*** (Lillypilly)	2 to 5	2	50	10	I	Appears stable with sound branching structure.	Clipped to form informal hedge	Very Good	No Evidence	Medium 15-40 Years	5	Low	On-site
28	***Celtis sinensis*** (Chinese Hackberry)	4	4	70	16	I	Appears stable with fair branching structure.	No Evidence	Very Good	No Evidence	Short 5-15 Years	7	Very Low	On-site
29	***Grevillea robusta*** (Silky Oak)	4	3	50	12	I	Appears stable with sound branching structure. Growing out of steep embankment.	No Evidence	Good	No Evidence	Short 5-15 Years	6	Very Low	On-site
30	***Pittosporum undulatum*** (Sweet Pittosporum)	4	4	120	16	SM	Appears stable with fair branching structure.	No Evidence	Good	No Evidence	Transient (less than 5 years)	5	Very Low	On-site

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				
31	***Pittosporum undulatum*** (Sweet Pittosporum)	5	5	120	25	SM	Appears stable with fair branching structure.	No Evidence	Fair with thinning crown	No Evidence	Transient (less than 5 years)	5	Very Low	On-site
32	***Allocasuarina littoralis*** (Black She-oak)	6	4	120	24	SM	Appears stable with fair branching structure. Exhibits a prominent lean to the west.	No Evidence	Good	No Evidence	Short 5-15 Years	5	Low	On-site
33	***Allocasuarina littoralis*** (Black She-oak)	6	4	120	24	SM	Appears stable with poor branching structure. Exhibits a prominent lean to the east. Obtuse bend in trunk at 0.3 metres.	Previously cut close to GL (crown restored)	Good	No Evidence	Short 5-15 Years	5	Low	On-site
34	***Chamaecyparis obtusa* 'Crippsii'** (Golden Hinoki Cypress)	10	8	400	80	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 1.5 metres.	No Evidence	Very Good	No Evidence	Long - more than 40 years	3	High	On-site
35	***Lagerstroemia indica*** (Crepe Myrtle)	8	7	100x10	49	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	Moderate	On-site

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	***Cupressus macrocarpa* 'Brunniana Aurea'** (Golden Brunnings Cypress)	M	7.0	2.8	153.9	Existing low retaining wall and embankment offset 0.6 metres north to be demolished within TPZ/SRZ. Proposed elevated walkway offset 2.1 metres north at RL? (beyond existing embankment and retaining wall to be demolished). Proposed new ramp offset 1.4 metres south-east (in footprint of existing path). Proposed path/ramp offset 1.0 metres west at RL? Excavations for ramp foundations within SRZ.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
2	***Ginko biloba*** (Maidenhair Tree)	M	3.0	1.6	28.3	Located within footprint of proposed pathway.	Proposed works will necessitate removal.	Remove tree.
3	***Buckinghamia celsissima*** (Ivory Curl Flower)	M	2.0	1.1	12.6	No proposed works within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Tree Protection Fence in accordance with Section 10.5. Install ground protection mulch within TPZ in accordance with Section 10.7.
4	***Tristaniopsis laurina*** (Water Gum)	M	2.2	1.3	15.2	No proposed works within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Tree Protection Fence in accordance with Section 10.5. Install ground protection mulch within TPZ in accordance with Section 10.7.

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
5	***Jacaranda mimosifolia*** (Jacaranda)	M	5.0	2.0	78.5	Existing low retaining wall and embankment offset 0.7 metres north to be demolished within TPZ/SRZ. Proposed new pathway offset 1.4 metres south-west at RL58.45 (within footprint of existing pathway, assumed close to existing grade). Proposed new pathway offset 1.4 metres north (beyond existing retaining wall and shotcrete bank). No actual incursion to root zone. Pruning of several lower PLs & SLs extending to the north may be required to clear pedestrian access.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
6	***Lophostemon confertus*** (Brushbox)	M	5.3	2.3	87.3	No proposed works within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Trunk Protection boarding in accordance with Section 10.6.
7	***Liquidambar styraciflua*** (Liquidambar)	M	7.0	2.6	153.9	Proposed new pathway offset 0.8 metres south-east ramping from RL58.52 to RL59.01 (within footprint of existing pathway, assumed following existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
8	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.5	1.8	38.5	Proposed new pathway offset 0.8 metres south-east ramping from RL58.52 to RL59.01 (within footprint of existing pathway, assumed following existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9

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APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
9	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.0	1.8	28.3	Proposed new pathway offset 1.0 metres south-east at RL59.01 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
10	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.4	1.9	35.4	Proposed new pathway offset 0.8 metres south-east at RL59.01 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
11	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.0	1.8	28.3	Proposed new pathway offset 1.0 metres south-east at RL59.00 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
12	***Eucalyptus sideroxylon*** (Mugga Ironbark)	P	6.0	2.5	113.0	Proposed new pathway offset 1.0 metres south-east at RL59.00 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
13	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.8	2.1	46.3	Proposed new pathway offset 1.0 metres south-east at RL59.00 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9

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APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
14	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.6	2.0	40.7	Proposed new pathway offset 0.7 metres south-east at RL59.00 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
15	***Syagrus romanzoffianum*** (Cocos Palm)	G	3.0	1.8	28.3	Proposed new pathway offset 1.0 metres south-east at RL59.00 (within footprint of existing pathway, assumed close to existing grade). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
16	***Pittosporum undulatum*** (Sweet Pittosporum)	M	3.2	1.4	32.2	Proposed new pathway & associated retaining wall offset 1.1 metres north-west at RL59.00 (with footprint of existing pathway). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
17	***Olea europaea subsp. africana*** (African Olive)	M	3.0	1.5	28.3	Proposed new pathway & associated retaining wall offset 0.8 metres north-west at RL59.00 (with footprint of existing pathway). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
18	***Pittosporum undulatum*** (Sweet Pittosporum)	M	3.0	1.4	28.3	Proposed new pathway & associated retaining wall offset 0.4 metres north-west at RL59.00 (with footprint of existing pathway). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9

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
19	***Pittosporum undulatum*** (Sweet Pittosporum)	M	3.0	1.4	28.3	Proposed new pathway & associated retaining wall offset 0.9 metres north-west at RL59.00 (with footprint of existing pathway). Excavations for pavement subgrade within SRZ. Demolition of existing asphalt pavement within SRZ/TPZ.	No adverse impact from pathway, assuming new path to the north-east is at the same level and grade as the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing pathway (where required) within TPZ in accordance with Section 10.8. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.9
20	***Pittosporum undulatum*** (Sweet Pittosporum)	M	2.2	1.5	15.2	Located within footprint of proposed walkway/pedestrian ramp/bridge (to new lift).	Proposed works will necessitate removal.	Remove tree.
21	***Cotoneaster sp.*** (Cotoneaster)	M	2.0	1.3	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
22	***Olea europaea subsp. africana*** (African Olive)	M	4.0	2.0	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
23	***Livistona australis*** (Cabbage Tree Palm)	G	3.3	1.9	33.9	Located within footprint of proposed pedestrian ramp and footpath.	Proposed works will necessitate removal (high retention value). There are no feasible options that can be recommended to mitigate adverse impact given the imperative to provide separate dual access and egress to the station at this point.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
24	***Livistona australis*** (Cabbage Tree Palm)	G	2.5	2.0	19.6	New paved area offset 1 metre south at RL58.94 (within footprint of existing pavement, beyond existing retaining wall).	No actual incursion to root zone due to barrier to root development created by existing retaining wall. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10).
25	***Livistona australis*** (Cabbage Tree Palm)	G	2.5	2.0	19.6	New paved area offset 1.5 metres south-west at RL58.94 (within footprint of existing pavement, beyond existing retaining wall). New Ausgrid transformer offset 1.2 metres north-west (beyond existing retaining wall). No actual incursion to root zone.	No actual incursion to root zone due to barrier to root development created by existing retaining wall. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10).
26	***Livistona australis*** (Cabbage Tree Palm)	G	2.5	2.0	19.6	Located within footprint of proposed new Ausgrid transformer.	Proposed works will necessitate removal.	Remove tree.

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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
27	Row of 6 x ***Syzygium sp.*** (Lillypilly)	M	2.0	0.9	12.6	Located within footprint of proposed new Ausgrid transformer.	Proposed works will necessitate removal.	Remove tree.
28	***Celtis sinensis*** (Chinese Hackberry)	M	2.5	1.1	19.6	Proposed new pedestrian ramp & associated retaining wall offset 0.8 metres north-east, ramping from RL59.79 - RL59.37 (below existing grade). Excavations for pavement subgrade & retaining wall foundations within TPZ. Encroachment to TPZ = 25%.	Extent of encroachment to TPZ exceeds acceptable limits under AS4970:2009. Proposed works will necessitate removal.	Remove tree - Noxious Weed
29	***Grevillea robusta*** (Silky Oak)	M	2.0	0.9	12.6	Proposed new pedestrian ramp & associated retaining wall offset 0.8 metres north-east, ramping from RL59.79 - RL59.37 (below existing grade). Excavations for pavement subgrade & retaining wall foundations within TPZ. Encroachment to TPZ = 23%.	Extent of encroachment to TPZ exceeds acceptable limits under AS4970:2009. Proposed works will necessitate removal.	Remove tree.
30	***Pittosporum undulatum*** (Sweet Pittosporum)	M	2.2	1.4	15.2	Located within footprint of proposed walkway/pedestrian ramp/ lift.	Proposed works will necessitate removal.	Remove tree.
31	***Pittosporum undulatum*** (Sweet Pittosporum)	M	3.0	1.4	28.3	Located within footprint of proposed walkway/pedestrian ramp/ lift.	Proposed works will necessitate removal.	Remove tree.
32	***Allocasuarina littoralis*** (Black She-oak)	M	2.5	1.4	19.6	Proposed new paved area offset 0.3 metres south-east at RL 54.39. Excavations for pavement sub-grade within SRZ. Encroachment to TPZ = 45%	Excavation for the pavement sub-grade for the pathway to the south-west is likely to result in severance and damage to woody roots, leading to a significant adverse impact.	Remove tree.
33	***Allocasuarina littoralis*** (Black She-oak)	M	2.5	1.4	19.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
34	***Chamaecyparis obtusa* 'Crippsii'** (Golden Hinoki Cypress)	M	4.8	2.3	72.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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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
35	***Lagerstroemia indica*** (Crepe Myrtle)	M	3.6	2.0	40.7	Located within footprint of proposed new shelter	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.

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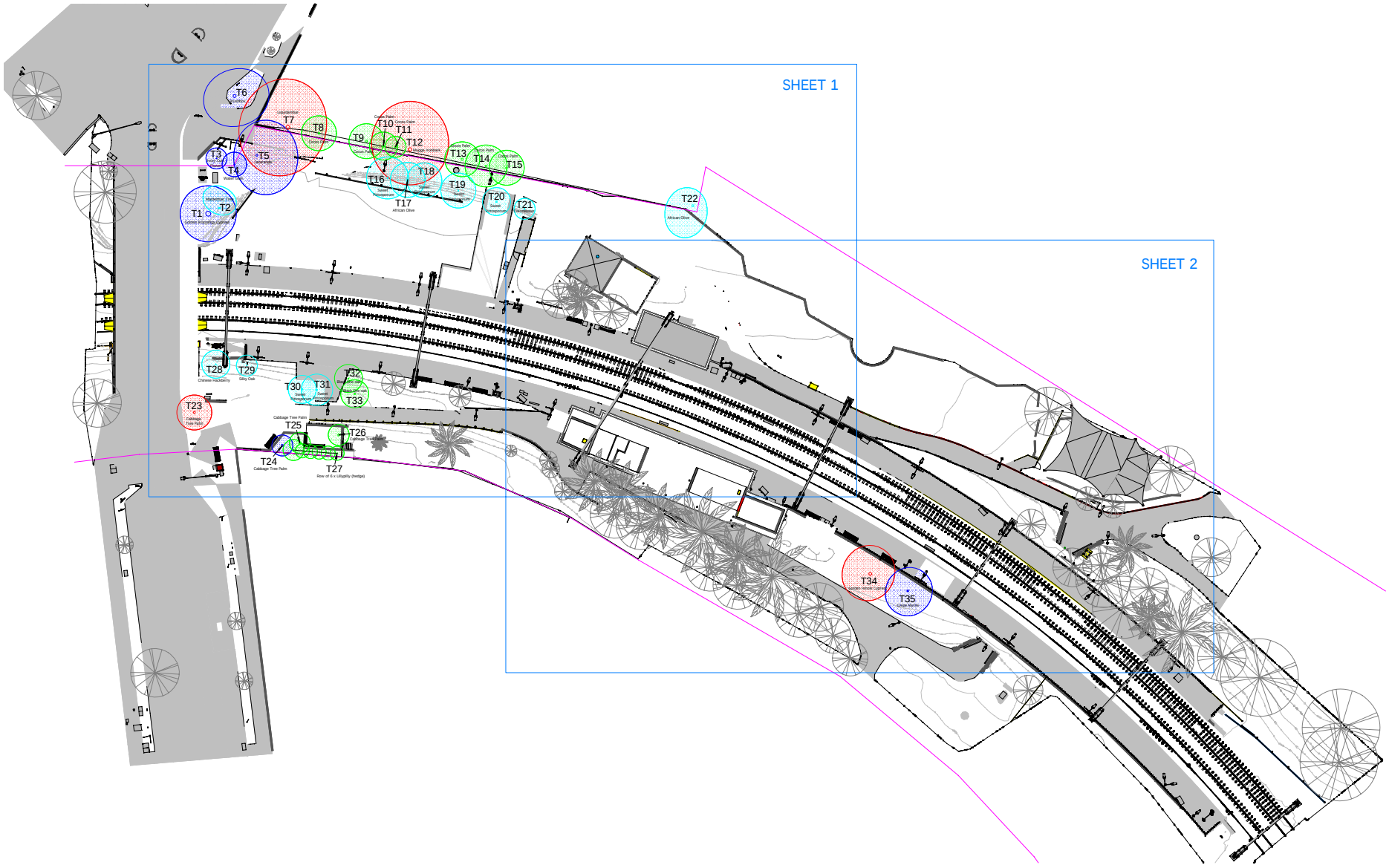


APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
Wollstonecraft Station
Shirley Road, WOLLSTONECRAFT

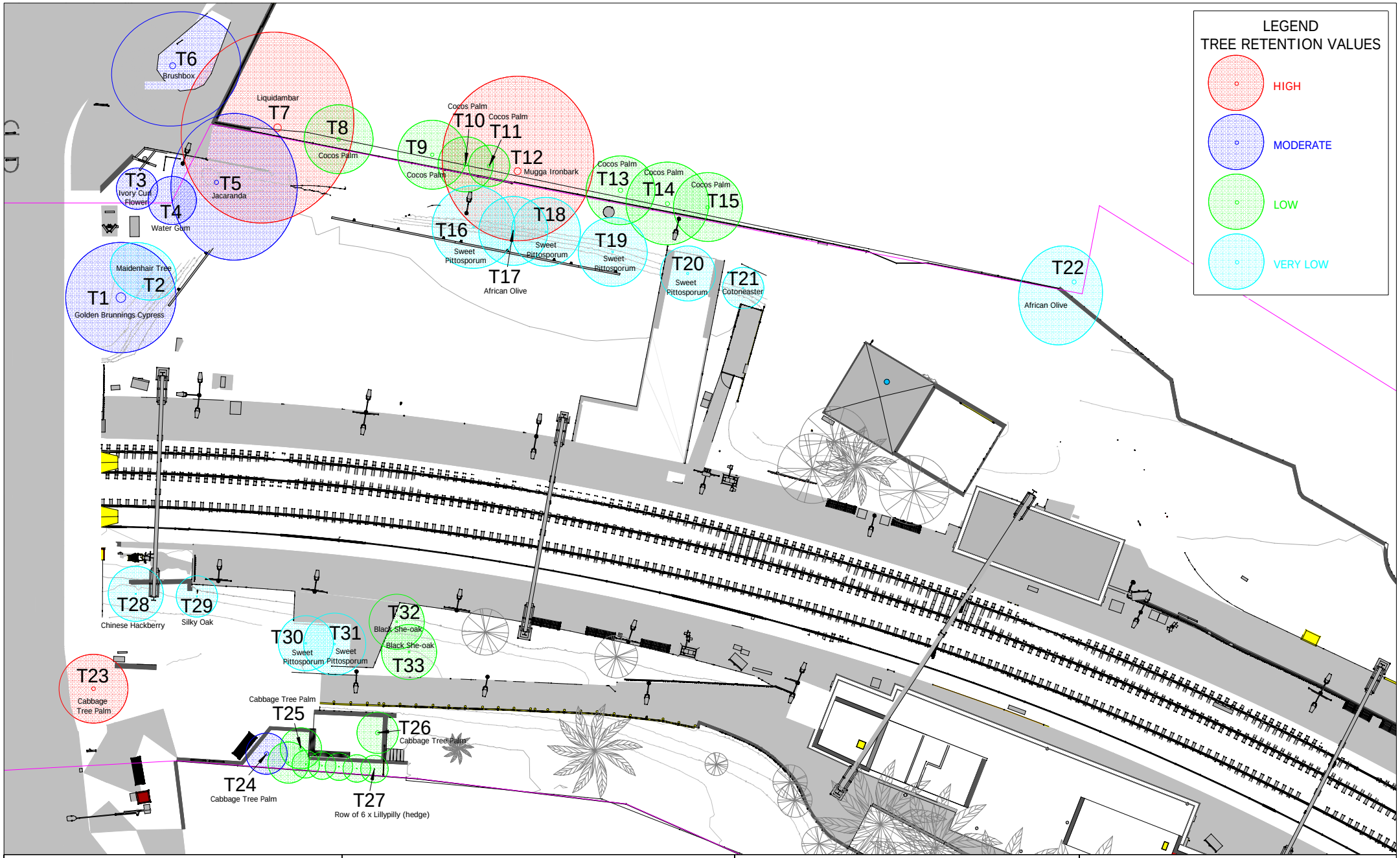
Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Architectural Site Plan
prepared by TfNSW
Dwg Ref No. 150315-WLS-AR-DRG-00501 [1]
Dated

DWG No. T20-020301 [A]

KEY PLAN

DATE: 03/02/2020



APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
Wollstonecraft Station
Shirley Road, WOLLSTONECRAFT

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

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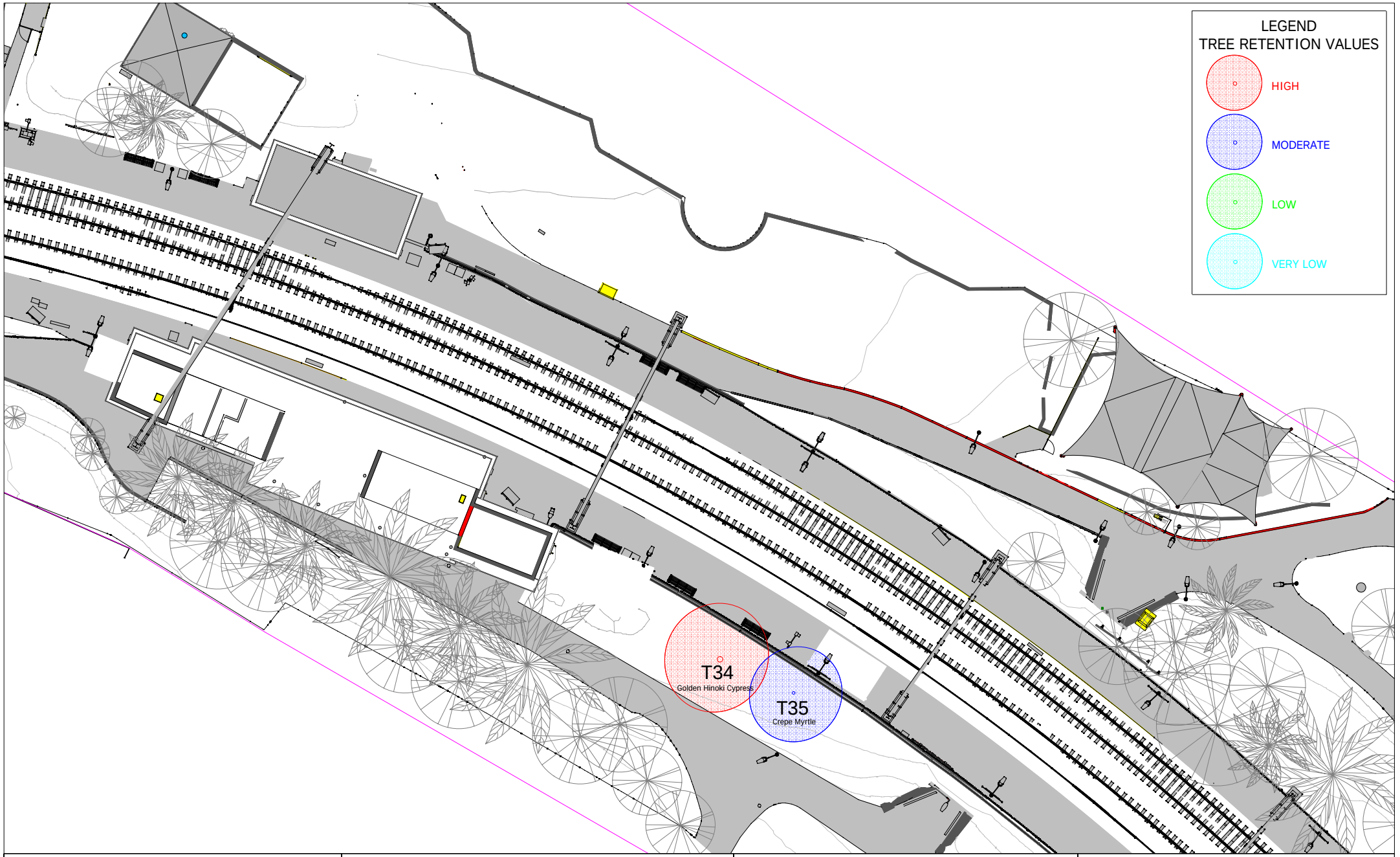
SHEET 1
DATE: 03/02/2020



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TREE RETENTION VALUES
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Arboricultural and Horticultural Consultants
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BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

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DWG No. T20-020301 [A]
SHEET 2
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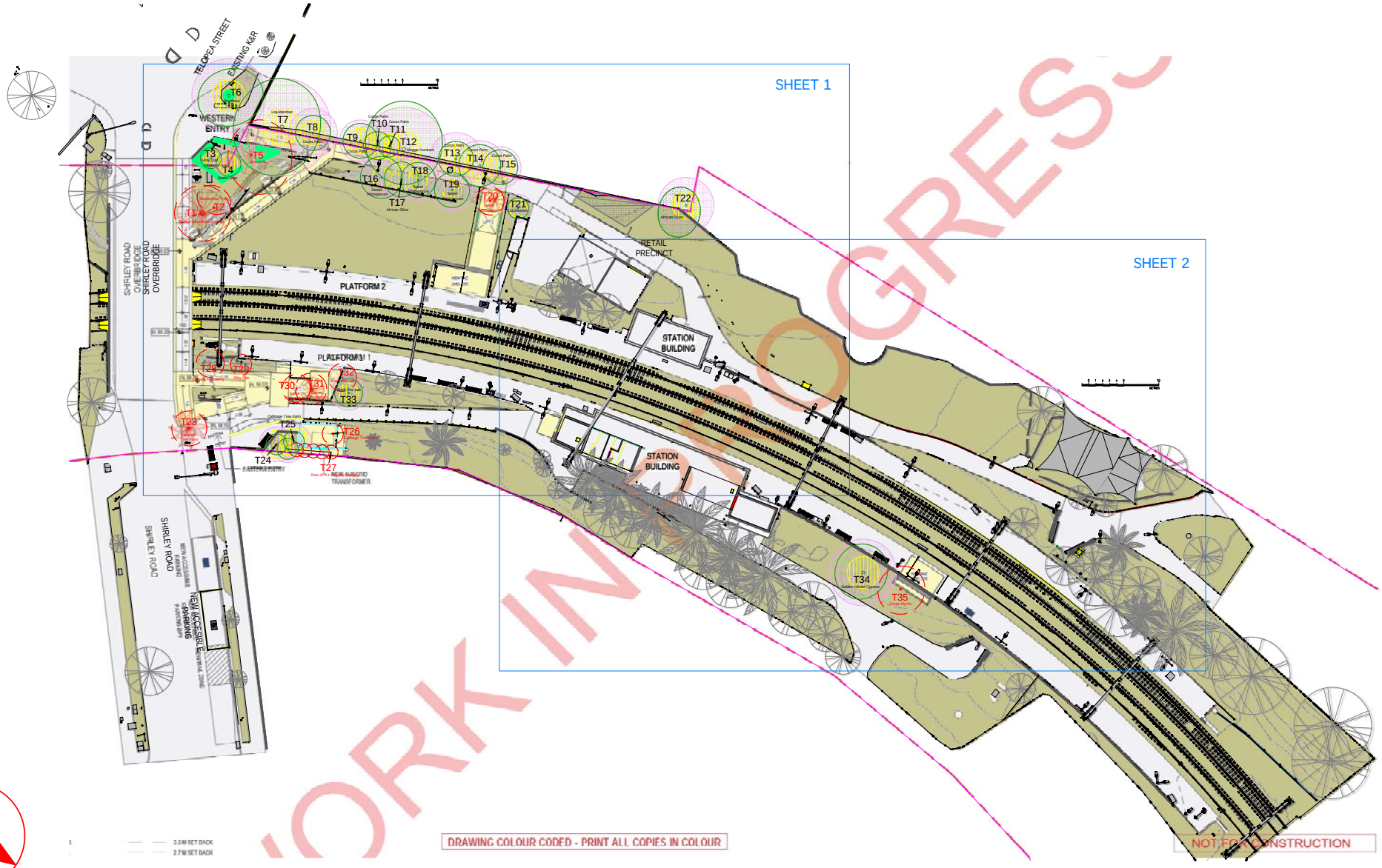

APPENDIX 6

TREE PROTECTION PLAN

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Shirley Road, WOLLSTONECRAFT

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

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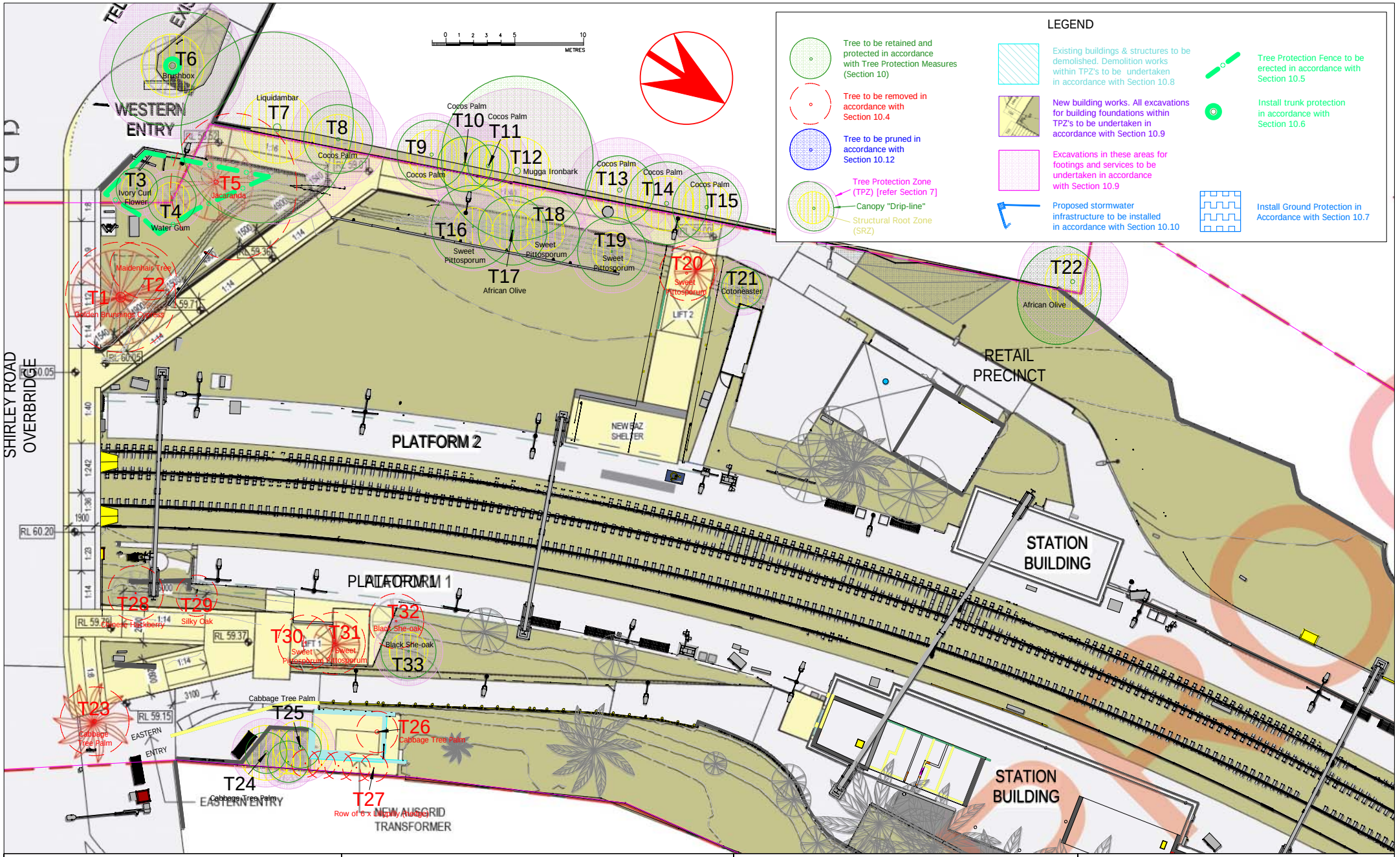
DWG No. T20-020302 [D]

KEY PLAN

DATE: 16/04/2020



APPENDIX 6

TREE PROTECTION PLAN

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Shirley Road, WOLLSTONECRAFT

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

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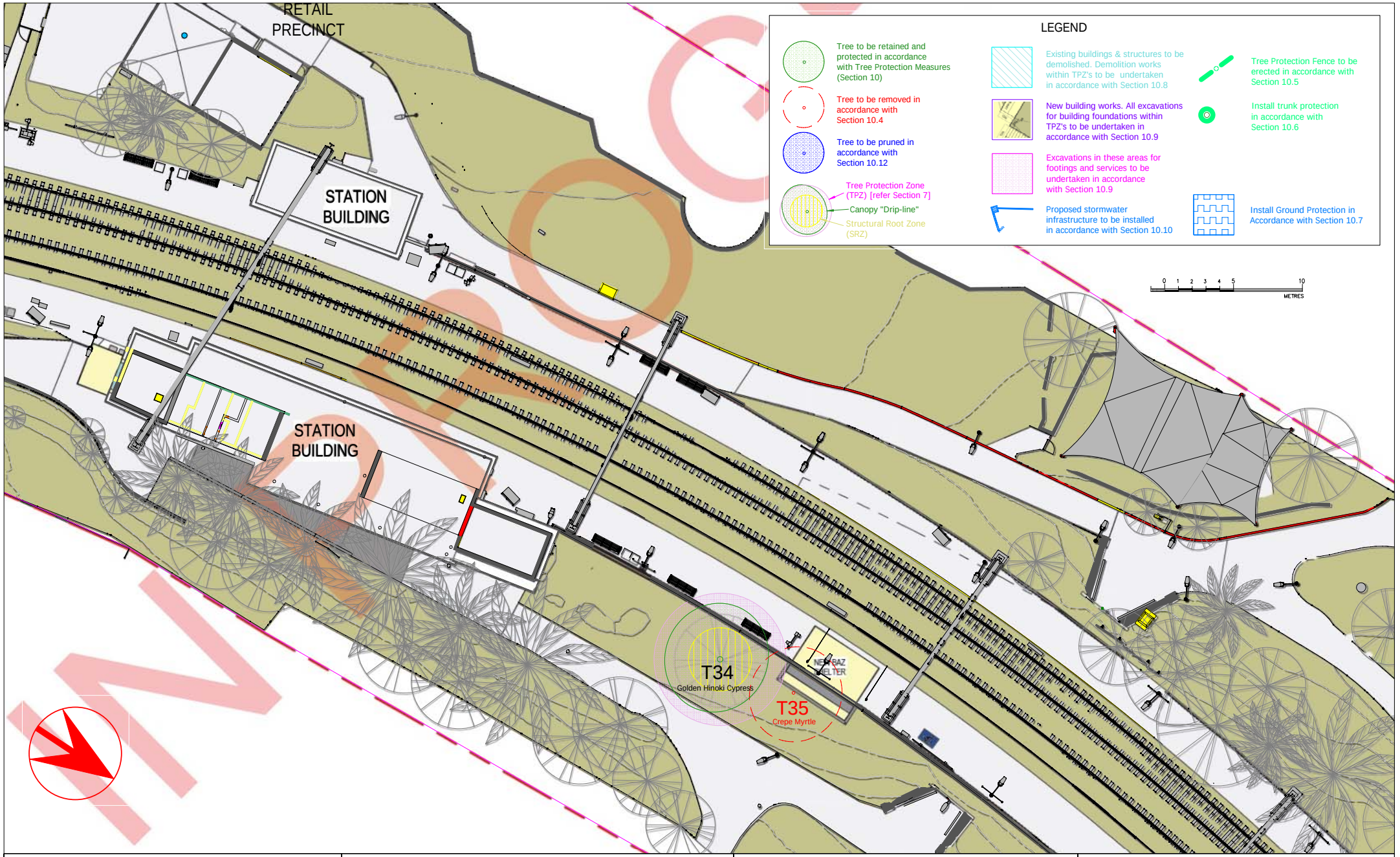
DWG No. T20-020302 [D]

SHEET 1

DATE: 16/04/2020



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Fax: 02 9456 5757 e: earthscape@iinet.net.au

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SHEET 2

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