



EARTHSCAPE HORTICULTURAL SERVICES
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**ARBORICULTURAL IMPACT
ASSESSMENT REPORT**

**TRANSPORT ACCESS PROGRAM
(TAP) 3**

**BEECROFT RAILWAY STATION
WONGALA CRESCENT, BEECROFT**

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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 twenty-two (22) trees located in the vicinity of Beecroft Railway Station, Wongala Crescent, Beecroft. The report has been prepared to aid in the assessment of a *Review of Environmental Factors* (REF) for proposed works to the Station associated with the Transport Access Program (TAP). The TAP is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. Key benefits of the TAP include:
- Stations that are accessible to people with a disability, limited mobility and parents with prams;
 - Modern buildings and facilities for all modes that meet the needs of a growing population; and
 - Modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers.
- 1.1.2 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.
- 1.1.3 This report has been prepared in accordance with Hornsby Council's *Arboricultural (Tree) Report Guidelines* (March 2016) and 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 subject property is known as Lot 1 in DP 869477, being Beecroft Station, Wongala Crescent, Beecroft. For the purposes of this report, the subject property will be referred to as 'the site'. The site is zoned Infrastructure [SP2] (Rail Infrastructure Facility) under the *Hornsby Local Environmental Plan 2013* (HLEP). The site contains the Beecroft Station building located on a central island platform within the Main Northern [railway] Line together with associated infrastructure. The site contains on-grade commuter car parks to the south-east (Sutherland Road) and north-west (Wongala Crescent) of the Station. The western side of the site contains a linear park and playground with a number of mature trees. These include a variety of non-local native and exotic (introduced) species. Some locally-indigenous species are located on the eastern side of the Station in the vicinity of the car park.
- 2.1.2 The soils of this area are typical of the Glenorie Soil Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of "shallow to moderately deep (less than 1000mm) *Red Podzolic Soils* on crests, moderately deep (700 – 1500 mm) *Red & Brown Podzolic Soils* on upper slopes and deep (greater than 2000mm) *Yellow Podzolic Soils* on lower slopes". Soil materials are derived from Wianamatta shales. The landscape of the area generally consists of undulating to rolling low hills with slopes of 5-20%.¹
- 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 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 locally-indigenous tree species remaining within the site.

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 25th July 2018. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey prepared by Cardno Hard & Forester, Dwg. Ref No. 80015015 dated 07/01/2015. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No.s T11a, T12a & T18a were not shown on the original survey and have been plotted on the drawing in their approximate positions by taking offsets from existing 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 Expectancy⁴ 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. Whilst 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 Hornsby Local Government Area (LGA) are protected under the provisions of Part 1, Section B.6 of the *Hornsby Development Control Plan 2013* (HDCP) [revised March 2018] made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The HDCP generally protects all tree species with the potential to grow to a height of more than three (3) metres, all trees growing within a Heritage Conservation Area (regardless of their species) and all trees growing within land listed as a Heritage Item under the HLEP. Some exemptions apply, however, all of the subject trees are protected under the provisions of the HDCP, due to the site being located within a Heritage Conservation Area (refer to **Section 5.3.2**).

5.2.2 *Wildlife Habitat*

Syncarpia glomulifera (Turpentine) [T21], *Eucalyptus saligna* (Sydney Blue Gum) [T22] *Elaeocarpus reticulatus* (Blueberry Ash) [T12a] and *Pittosporum undulatum* (Native Daphne) [T7] are all locally-indigenous species, representative of the original vegetation community of this area that would be of some benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds. There were no other visible signs of wildlife habitation.

5.2.3 *Noxious Plants & Environmental Weeds*

Cinnamomum camphora (Camphor Laurel) [T4, T8, T9 & T10] is scheduled as a potential 'Biosecurity Risk' ('Priority Weed' – formerly 'Noxious Weed') within NSW under the provisions of the *Biosecurity Act 2015*. The growth of this plant species must be managed in a manner that

continuously inhibits the ability of the plant to spread (so far as is reasonably practicable) and the plant must not be sold, propagated or knowingly distributed.

5.2.4 *Threatened Species & Ecological Communities*

None of the subject trees are listed as Threatened or Vulnerable Species under the provisions of the *Threatened Species Conservation Act 1995* (NSW) or the *Environment Protection and Biodiversity Conservation Act 1999*.

The National Parks and Wildlife Service (NPWS) 1:25000 Mapping Series (Native Vegetation of the Cumberland Plain)⁵ indicates that the dominant native vegetation community within the site (in the vicinity of the 'Bushland Corridor') is classified as Blue Gum High Forest (BGHF). BGHF is listed as a Critically Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995* (NSW) and the *Environment Protection and Biodiversity Conservation Act 1999*. The NSW Scientific Community has determined that highly modified relics of this vegetation community may persist as small clumps of trees without a native understorey. As such, small groups and individual remnants of locally-indigenous trees may form part of this EEC even if they are not contiguous with any bushland area or larger stand of trees.

Eucalyptus saligna (Sydney Blue Gum) [T22] is a Positive Diagnostic Species of BGHF.⁶ *Syncarpia glomulifera* (Turpentine) [T21] is an associated canopy species, occurring less frequently in this EEC. These trees are likely to be self-sown progeny of the original forest and therefore are considered to form part of the BGHF EEC.

5.2.5 *Biodiversity, Bushfire & Riparian Lands*

The site does *not* contain any ecologically significant 'Terrestrial Biodiversity as indicated on Council's Natural Resources Biodiversity Map forming part of the HLEP 2013.

The site does *not* contain any Bushfire Prone areas as indicated on Council's Bushfire Prone Areas Map forming part of the HLEP 2013.

5.3 Heritage Significance

5.3.1 *Heritage Items*

The site is listed as an item of Environmental Heritage [Item 142] of local significance under Schedule 5, Part 1 of the *Hornsby Local Environmental Plan (HLEP) 2013*. This item is described as the 'Beecroft Railway Station and garden'. The site is also listed as a Heritage Item on the *NSW State Agency Heritage Register* and the *RailCorp Section 170 Heritage and Conservation Register* (Item 4801062). This item is described as the 'Beecroft Railway Station Group and Bushland Corridor'. Beecroft Station is described as two late Victorian buildings (Station Building and former Booking Office) being typical examples of the period, constructed c. 1914. The original platform was constructed c. 1895 to coincide with the opening of the Great Northern Line c. 1886.⁷ The platform was re-constructed c. 1913 following duplication of the railway line. The Item includes the park on the western side of the station including plantings of Bunya Pine [T15 & T17], Hoop Pine [T14 & T18], Brushbox [T13], Camphor Laurels [T4, T8, T9 & T10] and Jacarandas [T11, T12 & T18a].⁸ The listing also includes the bushland corridor, predominantly on the eastern side of the Station, which includes a number of locally indigenous tree species typical of the original vegetation of the area, including Sydney Blue Gum [T22] and Turpentine [T21].

5.3.2 *Heritage Conservation Area*

The site is located within a Heritage Conservation Area (Area C2 – Beecroft-Cheltenham Heritage Conservation Area) under Schedule 5, Part 2 of the HLEP 2013.

5.3.3 *Significant Tree Register*

Hornsby Council does not currently maintain a Register of Significant Trees

5.3.4 *General*

Early photographs of Beecroft Station (c.1910) show what appear to be young Bunya Pines on the western side of the platform (refer to **Plate 1**). This indicates that the Bunya Pines [T15 & T17], Hoop Pines [T14 & T18] are likely to have been planted in the late Victorian or early Federation Era contemporary with the establishment of the railway station. These trees are of a size and estimated age consistent with this time frame and the species are typical of those use in public plantings in the late Victorian era. The 1943 Aerial Photo of Sydney also indicates the Hoop Pines and Bunya Pines were present as mature specimens at this time.



Plate 1 – Beecroft Station c. 1910 (source: Hornsby Shire Council)⁹. Note the young Bunya Pine on the far left of the frame.

5.3.5 The Brushbox [T13], Camphor Laurels [T4, T8, T9 & T10] and Jacarandas [T11, T12 & T18a] do not appear to have been planted contemporary with the early development of the railway station and are more typical of the Inter-War Period (1919-1939).

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

Estimated Life Expectancy	Landscape Significance Rating						
	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 **Table 2** describes the implications of the retention values on site layout and design.

TABLE 2 – TREE RETENTION PRIORITIES

RETENTION VALUE	RECOMMENDED ACTION
“High”	<p>These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority.</p> <p>Proposed site design and placement of buildings and infrastructure should consider the recommended setbacks as discussed in the following section (refer also Appendix 2 & 4) to avoid any adverse impact on these trees.</p> <p>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.</p>
“Moderate”	<p>The retention of these trees is desirable, but not essential.</p> <p>These trees should be retained as part of any proposed development if possible. However, these trees are considered less critical for retention.</p> <p>If these trees must be removed, replacement planting should be considered in accordance with Council’s Tree Replenishment Policy to compensate for loss of amenity (refer also Section 9).</p>
“Low”	<p>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.</p> <p>These trees should not be considered as a constraint to the future development of the site.</p>
“Very Low”	<p>These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds.</p> <p>The removal of these trees is therefore recommended regardless of the implications of any proposed development.</p>

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).¹⁰

- 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 of 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. 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. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive 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.

7.5 Legal Protection

- 7.5.1 Notwithstanding the above recommendations, Council may require a greater setback from certain types of structures to ensure the on-going legal protection of the tree (i.e. its legal status under Council’s Tree Management Controls). In Hornsby Shire, a tree located within three (3) metres of the foundation of an approved building (excluding detached garages, carports and other ancillary buildings) is *not* protected under the HDCP. The measurement is taken from the trunk of the tree at ground level to the foundation of the building. As such, if a tree is considered worthy of

preservation, Council is unlikely to approve the construction of a dwelling or building within three (3) metres of the tree (regardless of whether this can be undertaken without having an adverse impact on its health or longevity).

8 PROPOSED DEVELOPMENT

8.1.1 The Transport Access Program (TAP) is an initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure. Key benefits of the TAP include:

- Stations that are accessible to people with a disability, limited mobility and parents with prams;
- Modern buildings and facilities for all modes that meet the needs of a growing population; and
- Modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers.

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
<i>Platform Level Proposed Works</i>	CCG Architects	TAP -150052-AR-0002 [G]	26/03/2018
<i>Roof Level Proposed Works</i>	CCG Architects	TAP -150052-AR-0003 [F]	19/04/2018
<i>Subway Level</i>	CCG Architects	TAP -150052-AR-0004 [G]	19/04/2018
<i>Platform Level</i>	CCG Architects	TAP -150052-AR-0022 [E]	12/02/2018
<i>Station Entry Plaza</i>	CCG Architects	TAP -150052-AR-0023 [G]	25/03/2018
<i>Interchange Area</i>	CCG Architects	TAP -150052-AR-0024 [F]	19/04/2018
<i>Elevations</i>	CCG Architects	TAP -150052-AR-0101 [G]	26/03/2018
<i>Sections</i>	CCG Architects	TAP -150052-AR-0201 [G] - TAP-150052-AR-0204 [D]	19/04/2018

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 two (2) trees of low retention value. These include T11a (Weeping Bottlebrush) and T12a (Blueberry Ash). These trees are not considered significant or worthy of any special measures to ensure their preservation. The removal

of these trees to accommodate the proposed works is therefore considered warranted in this instance. In order to compensate for loss of amenity resulting from the removal of these trees to accommodate the proposed development, consideration should be given to replacement planting elsewhere within the site in accordance with **Section 11** of this document.

- 9.1.4 The existing pedestrian ramp and associated retaining wall is proposed to be demolished within the TPZs of Trees T4 (Camphor Laurel) and T5 & T6 (London Plane Trees). This work will not result in any adverse impact on these trees, provided that the existing concrete retaining wall is demolished in accordance with **Section 10.5** of this document.
- 9.1.5 The existing stairway to the east of T4 (Camphor Laurel) is proposed to be 'upgraded'. This work will not result in any adverse impact on this tree provided that the existing integrated retaining wall on the western side of the stairway is maintained intact. This wall would form a barrier to root growth to the east of the tree to some extent.
- 9.1.6 A new pedestrian ramp, stairs and associated retaining wall is proposed to be constructed within the TPZs of Trees T4 (Camphor Laurel) and T5 & T6 (London Plane Trees). Excavations for the foundations of the new wall should not result in any actual incursion to the root zone of these trees, since the existing retaining wall (located closer to the trees, proposed to be demolished) would form a barrier to root development of these trees to the east. As precautionary measure in order to avoid any adverse impact, all excavations for the new retaining wall foundations within the TPZs of these trees should be undertaken in accordance with **Section 10.6** of this document. As part of this work, the existing sloping bank within the TPZs of trees T4, T5 & T6 is proposed to be filled to RL136.45-136.65 varies between 1.2 metres to 200mm above grade. A tree grade is proposed to be installed around T6 to avoid fill material placed in direct contact with the trunk. Placement of fill above the existing ground level at the trunks of these trees is likely to result in an adverse impact. Excavations for the footings of the tree grate is also likely to result in severance of woody roots of T6, resulting in an adverse impact on this tree. In order to avoid any adverse impact on these trees, the fill material should not be placed any higher than the existing ground level at the base of the Trees (RL 136.35). Placement of fill to the remainder of the slope will not result in any adverse impact on these trees, provided that a non-engineered soil material is supplied and placed in accordance with **Section 10.11** of this document.
- 9.1.7 The existing asphalt and concrete footpath to the west of Trees T4 (Camphor Laurel) and T5 & T6 (London Plane Trees) is proposed to be demolished and re-graded from RL 136.45 at the northern end (close to existing grade) to 136.80 at the southern end (300-400mm above grade). Demolition of the existing path will not result in any adverse impact on these trees, provided that all such demolition work is undertaken in accordance with **Section 10.5** of this document. Raising the path level at the southern end will require placement of engineered fill (within the footprint of the existing path) and require non-engineered fill to be placed in the adjacent areas to finish flush with the level of the new path. The path will also require a new edge treatment on the east side. Raising the path level and placement of non-engineered fill on the west side of the path will not have any adverse impact on these trees. However, construction of any edge treatment on the east side of the path supported by any edge treatment (or low retaining wall) requiring the support of a continuous strip footing is likely to necessitate severance of woody roots of these trees, resulting in an adverse impact. In order to avoid any adverse impact, the edge treatment should be constructed using peg or post footings (in lieu of any continuous strip footing). All excavations for such edge treatment shall be carried out in accordance with **Section 10.6** of this document. No fill material shall be placed on the east side of the path to a level higher than the ground level at the trunks (RL 136.35)
- 9.1.8 The existing asphalt and concrete footpath to the west of Trees T7 (Sweet Pittosporum) and Trees T8, T9 & T10 (Camphor Laurel) is proposed to be 'upgrade and re-graded' within the TPZs. The proposed levels have not been defined, but it has been assumed new levels will be similar to existing levels. The present footpath contains shallow recesses around the trunks of the trees (the

trunks project into the line of the footpath). The path is shown widened at these points within the SRZs to remove these recesses. Demolition of the existing pavement surface treatment and re-grading to slightly higher levels with new pavement will not result in any adverse impact on these trees provided that this work is undertaken in accordance with **Section 10.5**. However, widening of the footpath within the present recesses will necessitate excavations for the new pavement sub-grade within the SRZs. This will result in damage to woody roots of these trees, leading to an adverse impact. In order to avoid any adverse impact, the existing recesses should be maintained and a minimum of 200mm clearance should be provided between the trunks/buttruss and the edge of the new path. Any excavation (where required) for the new pavement sub-grade within the TPZs should be undertaken in accordance with **Section 10.6** of this document.

- 9.1.1 The existing concrete footpath within the TPZs Trees T13 (Brushbox), T14 (Hoop Pine) and T17 (Hoop Pine) is proposed to be ‘upgrade and re-graded’. The proposed levels have not been defined, but it has been assumed new levels will be similar to existing levels. Demolition of the existing pavement surface treatment and replacement to the same or re-grading or slightly higher levels with new pavement will not result in any adverse impact on these trees provided that this work is undertaken in accordance with **Section 10.5** of this document. Any excavation (where required) for the new pavement sub-grade within the TPZs should be undertaken in accordance with **Section 10.6** of this document.
- 9.1.2 The existing asphalt parking area within the TPZ of T21 (Turpentine) is proposed to be ‘upgraded’ to provide for new accessible car parking areas. It is assumed that this may require resurfacing of the existing asphalt surface, but will not require regrading or changes to existing levels within the TPZ. Demolition of the existing pavement surface treatment and replacement to the same or re-grading or slightly higher levels with new pavement will not result in any adverse impact on this tree provided that this work is undertaken in accordance with **Section 10.5** of this document. Any excavation (where required) for the new pavement sub-grade within the TPZs should be undertaken in accordance with **Section 10.6** of this document.
- 9.1.3 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, 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 Trunk Protection

- 10.4.1 Trunk protection boarding shall be erected around Trees [**T4, T5, T6, T8, T9, T10 & T21**] 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.
- 10.4.2 Trunk protection shall 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

10.5 Demolition Works within Tree Protection Zones

- 10.5.1 Demolition of paved areas within the Tree Protection Zones (TPZs) of trees [T4, T5, T6, T7, T8, T9, T10, T13, T14, T17 & T21] shall be undertaken under the supervision of a qualified Arborist [Australian Qualification Framework (AQF) Level 5].
- 10.5.1 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 10.12** of this document.
- 10.5.2 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.
- 10.5.3 Demolition of existing walls, kerbs and other structures within the TPZ of trees [T4, T5 & T6] shall be undertaken under the supervision of a qualified Arborist [AQF level 5]. The structures shall be demolished using equipment on stationed outside the TPZ where possible or within the footprint of existing hardstand areas.
- 10.5.4 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.

10.6 Excavations within Tree Protection Zones

- 10.6.1 Prior to any mechanical excavations for structural foundations or pavement sub-grade within the TPZs of Trees [T4, T5, T6, T7, T8, T9, T10, T13, T14, T17 & T21] 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. 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.
- 10.6.2 All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. Any roots encountered of less than 50mm 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.
- 10.6.3 Where large woody roots (greater than 50mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor supported on piers, cantilevered slab, up-turned edge beam etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the SRZ. Pier footings intersecting large woody roots should be slightly offset where necessary to avoid root severance.
- 10.6.4 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (eg steel or timber pickets, lattice etc) fixed to pillars. For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation where large woody roots are found within the sub-base.

10.7 Underground Services

- 10.7.1 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 suspending pipelines beneath the floor of a building or structure (to avoid excavation within the TPZ), non-destructive excavation methods or Horizontal Directional Drilling (HDD). Where the installation of service lines within TPZs is unavoidable, the pipelines or conduits should be installed as follows.
- 10.7.2 Where the extent of the incursion to the root zone is less than 10% of the TPZ including any excavations for benching and shoring the trench, the pipeline or conduit may be installed by open trenching using standard construction methods (excavator or trenching machine). 10% of the TPZ is equivalent to one-third of the TPZ radius on one side (refer to **Appendix 2**). Refer to **Appendix 4** for radial distances of TPZs for each tree.
- 10.7.3 Trenching for underground services and stormwater pipes within the TPZs of Trees [**any tree nominated for retention**], non-destructive excavation methods must be adopted in accordance with **Section 10.6** of this document. Where large woody roots are encountered during excavation or trenching (root diameter greater than 50mm), 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.

10.7.4 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.

10.8 Pavements

10.8.1 Proposed paved areas within the TPZs of Trees [**T4, T5, T6, T7, T8, T9, T10, T13, T14, T17 & T21**] 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.

10.9 Placement of Fill Material

10.9.1 Placement of fill material within the TPZs of Trees [**T4, T5 & T6**] to be retained should be avoided wherever possible. Where placement of fill is unavoidable, the material shall be a well-drained friable material, equivalent in texture to the existing site topsoil material. The fill should be free from rocks, vegetation and other extraneous material complying with AS 4419:2003 (*Soils for Landscaping and Garden Use*).

10.9.2 The fill may be lightly consolidated, but shall not be compacted to engineering standards. No fill material should be placed in direct contact with the trunk of any tree.

10.9.3 Plant and equipment used to place and spread fill material should be stationed outside the TPZ where possible. Where not possible, suitable ground protection should be installed in accordance with **Section 10.12** of this document to avoid compaction of the underlying soil profile and root zone.

10.10 Canopy & Root Pruning

10.10.1 Where root pruning of [**any tree nominated for retention**], is required, 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

10.10.2 Root pruning (where required to accommodate the approved works) shall be carried out in accordance with Australian Standard 4373-2007 – *Pruning of Amenity Trees*. All pruning work shall be carried out 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].

10.11 Tree Removal

10.11.1 The removal of Trees [**T11a & T12a**] 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.

10.11.2 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.

10.12 Ground Protection

10.12.1 Where temporary construction haul routes are required through TPZs, existing hard stand areas shall be used to avoid traversing soft landscape areas. Where traversing soft landscape area within TPZs is unavoidable, appropriate ground protection shall be installed (based on the number and type of plant and equipment movements proposed) to minimise compaction of the underlying soil profile during construction activity and haulage.

10.12.2 Ground protection shall as a minimum consist of a Geotextile fabric, (such as Geotex® ‘ST’ Series manufactured by Synthetic Industries or an equivalent product), shall be installed beneath the A 100mm layer of woodchip mulch to minimise compaction to the underlying soil profile and limit migration of mulch into the underlying soil profile. Mulch shall be installed and spread by hand to avoid soil disturbance and compaction within the root zone.

10.12.3 To minimise displacement of woodchip in highly trafficked areas, 20mm thick marine ply sheets, truck mats (such as Envirex Versadeck® access mats) (refer **Figure 6**) or rumble boards should be placed over the top of the woodchip/sand. Rumble boards can be constructed with timber sleepers or similar spaced with no more than 200mm gaps between boards and held together with galvanised hoop strap or similar (refer **Figure 7**).



Figure 6 – Showing typical detail for truck mats.



Figure 7 – Showing typical detail for rumble boards.

10.12.4 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.

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, a minimum number of four (4) new trees capable of attaining a height of at least ten (10) metres at maturity should be planted within an appropriate area of the site in accordance with Table 1 in Section 5.2 of the TfNSW *Vegetation Offset Guideline* (2016) [9TP-SD087/1.0].

11.1.2 Replacement trees should preferably include some locally indigenous species. These will be most appropriate to the site conditions and be most valuable in terms of preserving the landscape character and wildlife habitat of the area. The following species are appropriate to the site conditions and could be considered for replacement planting:-

- *Syzygium paniculatum* (Magenta Cherry)
- *Elaeocarpus reticulatus* (Blueberry Ash)
- *Glochidion ferdinandi* (Cheese Tree)
- *Syncarpia glomulifera* (Turpentine)
- *Angophora floribunda* (Rough barked Apple)
- *Angophora costata* (Sydney Red Gum),
- *Corymbia maculata* (Spotted Gum)
- *Allocasuarina torulosa* (Forest Oak).

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
11th October 2018

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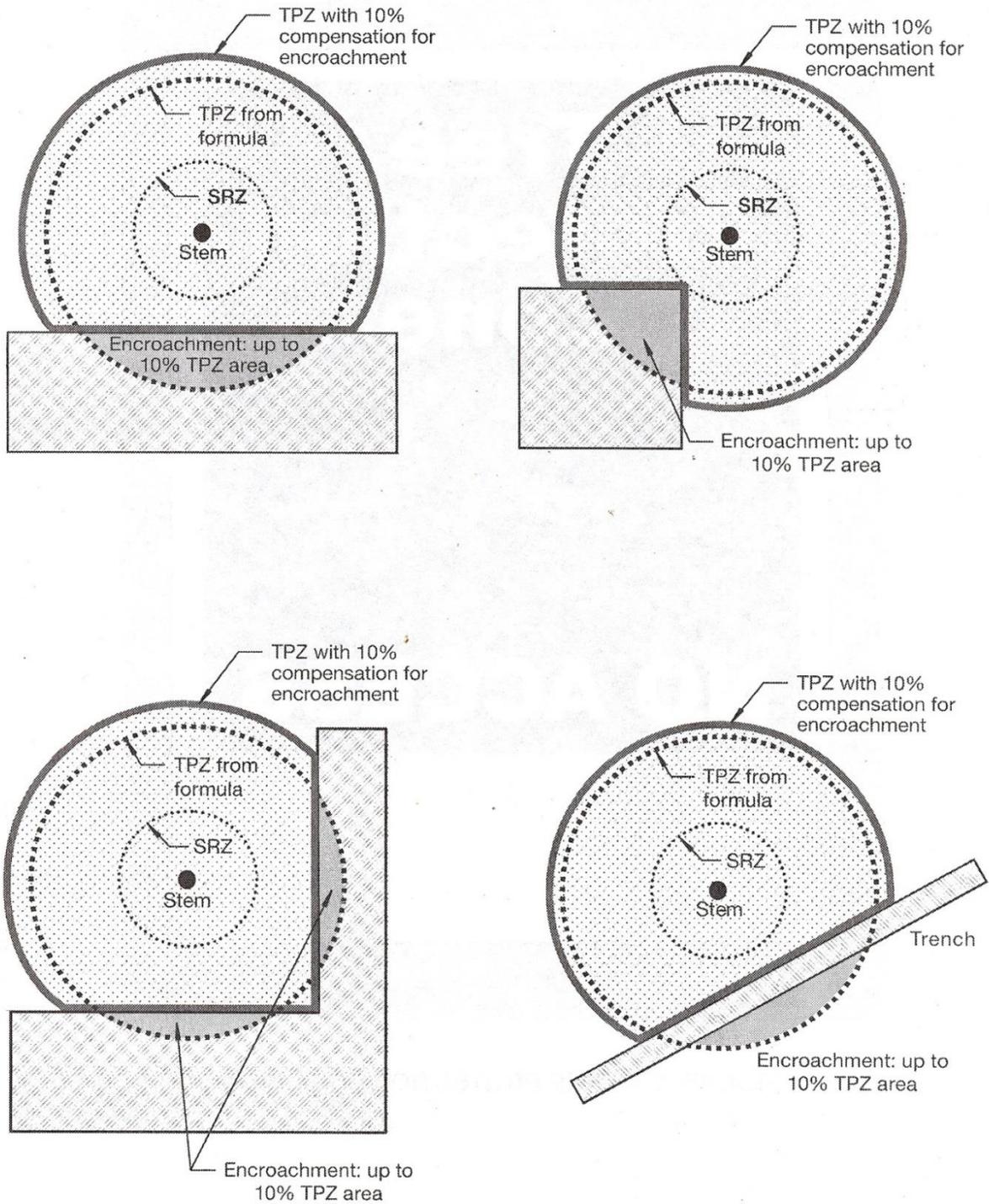
APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

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 Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m ² 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 200m ² ; 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 100m ² ; 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 this DCP.	The subject tree has a medium live crown size exceeding 40m ² ;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 this DCP 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 40m ² 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 visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	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	<i>Pyrus calleryana</i> (Callery Pear)	7	7	255	35	SM	Appears stable with fair branching structure. Located within 'blister' traffic island.	SLs lopped to clear overhead powerlines. Crown lifted to 2 metres	Good	No Evidence	Medium 15-40 Years	4	Moderate	Road reserve (Hannah Street)
2	<i>Pyrus calleryana</i> (Callery Pear)	8	9	293	54	SM	Appears stable with fair branching structure. Located within 'blister' traffic island. Exhibits multiple moderate bark inclusions at 1-2 metres. Crown suppressed north-west side to clear powerlines	SLs lopped to clear overhead powerlines. Crown lifted to 2 metres	Good	No Evidence	Medium 15-40 Years	4	Moderate	Road reserve (Hannah Street)
3	<i>Pyrus calleryana</i> (Callery Pear)	5	6	248	21	SM	Appears stable with poor branching structure. Located within 'blister' traffic island. Exhibits multiple high bark inclusions at 1-2 metres.	All SLs lopped to clear overhead powerlines at 3-4 metres.	Good	No Evidence	Short 5-15 Years	5	Low	Road reserve (Hannah Street)
4	<i>Cinnamomum camphora</i> (Camphor Laurel)	14	15	1029	180	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 1.2 metres (welded junction).	Secondary leader lopped at 4 metres. Selectively pruned west side to clear powerlines. Deadwooded & selectively crown thinned.	Good	no Evidence	Long - more than 40 years	6	Moderate	On site
5	<i>Platanus x hybrida</i> (London Plane)	22	14	503	294	M	Appears stable with sound branching structure. Exhibits a prominent lean to the south.	Lower SLs lopped west side to clear powerlines.	Good	Low foliar insect infestation (Sycamore Lace Bug)	Long - more than 40 years	3	High	On site
6	<i>Platanus x hybrida</i> (London Plane)	20	14	420	252	M	Appears stable with sound branching structure. Crown suppressed on the north side due to crowding.	Lower SLs lopped west side to clear powerlines.	Good	Low foliar insect infestation (Sycamore Lace Bug). Moderate Botryosphaeria sp. infection (lower trunk)	Long - more than 40 years	3	High	On site

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				
7	<i>Pittosporum undulatum</i> (Native Daphne)	8	9	341	54	M	Appears stable with fair branching structure. Upper crown suppressed west side due to overshadowing. Moderate dieback with 25% deadwood.	Selectively pruned.	Fair with thinning crown	No Evidence	Short 5-15 Years	4	Low	On site
8	<i>Cinnamomum camphora</i> (Camphor Laurel)	16	13	847	169	M	Appears stable with fair branching structure. Exhibits a small basal wound and cavity due suspected previous termite infestation.	Selectively pruned lower crown west side to clear powerlines.	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	6	Moderate	On site
9	<i>Cinnamomum camphora</i> (Camphor Laurel)	13	10	446	100	SM	Appears stable with fair branching structure. Crown suppressed on south side due to crowding.	Selectively pruned lower crown west side to clear powerlines.	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	6	Low	On site
10	<i>Cinnamomum camphora</i> (Camphor Laurel)	14	15	380 + 480	180	M	Appears stable with fair branching structure. Exhibits a high bark inclusion at junction of SLs at 8 metres.	Selectively pruned lower crown west side to clear powerlines.	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	6	Moderate	On site
11	<i>Jacaranda mimosifolia</i> (Jacaranda)	12	12	430 + 360	120	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 0.5 metres at junction of co-dominant PLs (partly welded junction). Very prominent lean to the north-west.	Lower limbs selectively pruned	Good	No Evidence	Medium 15-40 Years	3	Moderate	On site
11a	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	6	6	150x2 + 120	24	SM	Appears stable with fair branching structure.	Lower limbs lopped west side to clear powerlines.	Good	No Evidence	Short 5-15 Years	5	Low	On site
12	<i>Jacaranda mimosifolia</i> (Jacaranda)	11	13	452	104	M	Appears stable with sound branching structure.	Crown lifted to 3 metres	Good	No Evidence	Medium 15-40 Years	3	Moderate	On site
12a	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	5	4	90	20	I	Appears stable with fair branching structure. Upper crown suppressed due to overshadowing.	No Evidence	Good	No Evidence	Short 5-15 Years	5	Low	On site
13	<i>Lophostemon confertus</i> (Brushbox)	12	12	500	120	M	Appears stable with sound branching structure.	Selectively pruned lower crown west side to clear powerlines (ABCs).	Good	No Evidence	Long - more than 40 years	3	High	On site

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				
14	<i>Araucaria cunninghamii</i> (Hoop Pine)	35	10	750	330	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	2	High	On site
15	<i>Araucaria bidwillii</i> (Bunya-bunya Pine)	25	13	800	299	M	Appears stable with sound branching structure.	No Evidence	Fair	No Evidence	Long - more than 40 years	2	High	On site
17	<i>Araucaria bidwillii</i> (Bunya-bunya Pine)	25	11	800	253	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	2	High	On site
18	<i>Araucaria cunninghamii</i> (Hoop Pine)	30	11	650	308	M	Appears stable with sound branching structure.	No Evidence	Fair	No Evidence	Medium 15-40 Years	2	High	On site
18a	<i>Jacaranda mimosifolia</i> (Jacaranda)	8	9	170 + 180	45	SM	Appears stable with fair branching structure. Exhibits a prominent lean to the west. Moderate bark inclusion at GL.	Crown lifted to 3 metres	Good	No Evidence	Medium 15-40 Years	4	Moderate	On site
21	<i>Syncarpia glomulifera</i> (Turpentine)	11	9	497	72	M	Appears stable with fair branching structure. Exhibits a prominent lean to the west. Trunk/root zone surrounded by asphalt pavement. Moderate wound on lower trunk due mechanical injury. Moderate wound at 4 metres due branch loss.	Crown lifted to 3 metres	Good	No Evidence	Short 5-15 Years	2	High	On site
22	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	16	14	550	140	SM	Stability suspect with sound branching structure. Exhibits a very prominent lean to the east - self-corrected with adaptive growth to trunk and PLs. Growing on near vertical rockface.	No Evidence	Good	No Evidence	Transient (less than 5 years)	2	Moderate	Road reserve (Sutherland Road)

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	<i>Pyrus calleryana</i> (Callery Pear)	M	4.0	1.9	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
2	<i>Pyrus calleryana</i> (Callery Pear)	M	4.5	2.0	63.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
3	<i>Pyrus calleryana</i> (Callery Pear)	L	3.5	1.8	38.5	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
4	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	12.3	3.3	478.5	Existing stairs offset 1.4 metres north-east to be retained and 'upgraded'. Existing concrete retaining wall offset 3 to 4 metres south-east to be demolished within TPZ. Proposed new ramp, stairs and associated retaining wall offset 3.5-5.5 metres south-east at RL 134.27 (150mm below grade) to 136.06 (1 metre above grade). Excavations for new retaining wall foundations within TPZ (beyond line of existing wall). Existing sloping garden bank to be raised to 136.45-136.65 (1.2 - 0.25 metres above grade). Non-engineered fill within TPZ. Existing pathway offset 0.7 metres north-west to be re-surfaced and slightly raised (100mm) to accommodate new grade.	No adverse impact from the stairs provided that the existing retaining wall on the western side of the stairs (forming part of the stairway) is maintained intact. No adverse impact from new retaining wall due to barrier to root growth created by existing wall (no actual incursion to root zone). Proposed Fill should not result in any adverse impact, provided non-engineered fill is used as recommended. No impact from resurfaced path, provided no edge treatment is used.	Retain in accordance with recommended Tree Protection Measures (Section 10). Trunk Protection boarding in accordance with Section 10.4. Demolish existing concrete retaining wall to south-east and path to north west in accordance Section 10.5. Maintain existing integrated wall to stairway intact. Place any fill over existing garden bank in accordance with Section 10.9. No fill to be placed in direct contact with trunk. Undertake any required excavations for resurfaced path to north-west in accordance with Section 10.6. Any required edge treatment to path to exclude a continuous strip footing (timber or steel edge with peg type footings acceptable).

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	<i>Platanus x hybrida</i> (London Plane)	H	7.0	2.5	153.9	Existing concrete retaining wall offset 2.1 metres east to be demolished within TPZ. Proposed new ramp, stairs and associated retaining wall offset 3.1 metres east at RL 134.27 (150mm below grade) to 136.06 (1 metre above grade). Excavations for new retaining wall foundations within TPZ (beyond line of existing wall). Existing sloping garden bank to be raised to 136.45-136.65 (0.45 - 0.25 metres above grade). Non-engineered fill within TPZ. Existing pathway offset 1.0 metre north-west to be re-surfaced and raised to approx. RL 136.55 (200mm above grade) to accommodate new grade. Edge treatment required (TBC)	No adverse impact from the new retaining wall due to barrier to root growth created by existing wall (no actual incursion to root zone). Proposed fill placed around trunk may result in an adverse impact. No impact from resurfaced path. Excavations for any continuous strip footing for any required edge treatment is likely to result in severance of woody roots, which will result in an adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Trunk Protection boarding in accordance with Section 10.4. Demolish existing concrete retaining wall to south-east and path to north west in accordance Section 10.5. Place any fill over existing garden bank in accordance with Section 10.9, level of fill not to exceed RL136.35. No fill to be placed in direct contact with trunk. Undertake any required excavations for resurfaced path and edge treatment to north-west in accordance with Section 10.6. Any required edge treatment to path to exclude a continuous strip footing (timber or steel edge with peg or post type footings acceptable).
6	<i>Platanus x hybrida</i> (London Plane)	H	7.0	2.3	153.9	Existing concrete retaining wall offset 1.8 metres east to be demolished within TPZ. Proposed new ramp, stairs and associated retaining wall offset 3.2 metres east at RL 136.06 (1 metre above grade) to 136.60 (200mm above grade). Excavations for new retaining wall foundations within TPZ (beyond line of existing wall). Existing sloping garden bank to be raised to 136.45-136.65 (0.45 - 0.25 metres above grade). Non-engineered fill within TPZ. Tree grate to be installed around trunk. Existing pathway offset 1.0 metre north-west to be re-surfaced and raised to approx. RL 136.65 (300mm above grade) to accommodate new grade. Edge treatment required (TBC)	No adverse impact from the new retaining wall due to barrier to root growth created by existing wall (no actual incursion to root zone). Proposed fill and tree grate placed around trunk may result in an adverse impact. No impact from resurfaced path. Excavations for any continuous strip footing for any required edge treatment is likely to result in severance of woody roots, which will result in an adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install trunk Protection boarding in accordance with Section 10.4. Demolish existing concrete retaining wall to south-east and path to north west in accordance Section 10.5. Place any fill over existing garden bank in accordance with Section 10.9, level of fill not to exceed RL136.35). Eliminate tree grate and maintain existing ground levels around trunk. Undertake any required excavations for resurfaced path and edge treatment to north-west in accordance with Section 10.6. Any required edge treatment to path to exclude a continuous strip footing (timber or steel edge with peg or post type footings acceptable).

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
7	<i>Pittosporum undulatum</i> (Native Daphne)	L	5.0	2.1	78.5	Existing concrete footpath offset 1.5 metres north-west to be demolished within TPZ and new footpath to be constructed in approximately the same position and level. Encroachment to TPZ = 32% (slight increase from present situation).	No adverse impact provided that all demolition works within TPZ and all excavations for new pavement subgrade (where required) are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing concrete pathway to north-west in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade in accordance with Section 10.6.
8	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	10.2	3.1	324.5	Existing concrete footpath offset 0.5 metres north-west to be demolished within TPZ and new footpath to be constructed 2-300mm closer to trunk at similar level (TBC). Encroachment to TPZ = 32% (slight increase from present situation).	Excavations for slight path widening within TPZ may result in damage to woody roots, leading to an adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Trunk Protection boarding in accordance with Section 10.4. Demolish existing concrete pathway to north-west in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade in accordance with Section 10.6. Maintain existing path footprint within SRZ. Maintain a minimum of 200mm clearance between the trunk/buttress and the edge of the proposed pathway.
9	<i>Cinnamomum camphora</i> (Camphor Laurel)	L	6.0	2.4	113.0	Existing asphalt footpath offset 0.5 metres north-west to be demolished within TPZ and new footpath to be constructed 2-300mm closer to trunk at similar level (TBC). Encroachment to TPZ = 47% (slight increase from present situation). Proposed new kerb ramp and layback for 'kiss and ride' offset 2.4 metres west. Excavations for kerb ramp & layback foundations within TPZ/SRZ.	Excavations for slight path widening within SRZ may result in damage to woody roots, leading to an adverse impact. Excavations for new kerb ramp and layback are likely to result in severance and damage to woody roots, leading to an adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Trunk Protection boarding in accordance with Section 10.4. Demolish existing concrete pathway to north-west in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade in accordance with Section 10.6. Maintain existing path footprint within SRZ. Maintain a minimum of 200mm clearance between the trunk/buttress and the edge of the proposed pathway. Consider relocating kerb ramp 5 metres south (within existing layback area).

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

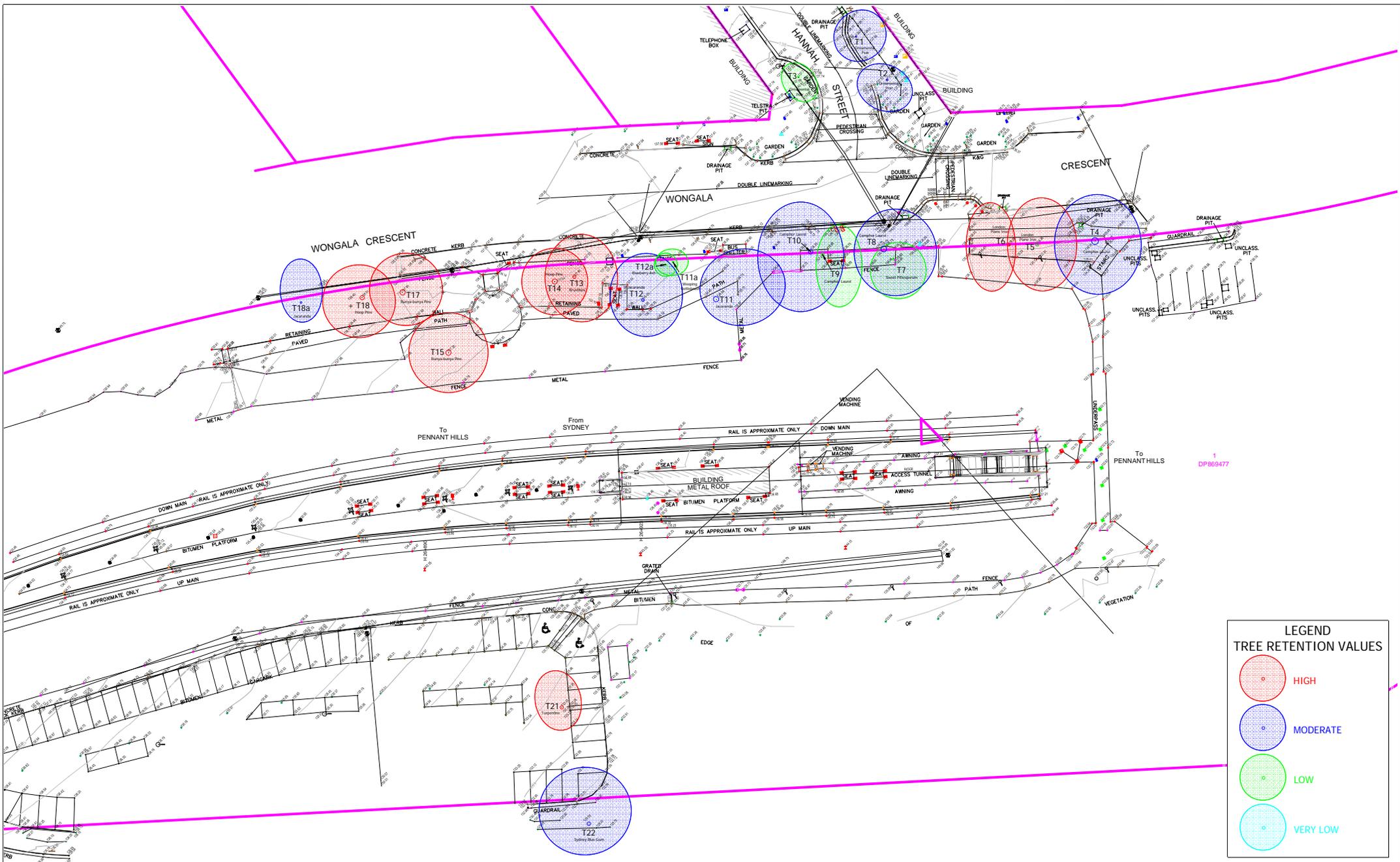
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
10	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	7.8	2.8	191.0	Existing asphalt footpath offset 0.1 metres north-west to be demolished within TPZ and new footpath to be constructed 2-300mm closer to trunk at similar level (TBC). Encroachment to TPZ = 47% (slight increase from present situation). Proposed new kerb ramp and layback for 'kiss and ride' offset 2.0 metres north-west. Excavations for kerb ramp & layback foundations within TPZ/SRZ.	Excavations for slight path widening within SRZ may result in damage to woody roots, leading to an adverse impact. Excavations for new kerb ramp and layback are likely to result in severance and damage to woody roots, leading to an adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Trunk Protection boarding in accordance with Section 10.4. Demolish existing concrete pathway to north-west in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade in accordance with Section 10.6. Maintain existing path footprint within SRZ. Maintain a minimum of 200mm clearance between the trunk/buttress and the edge of the proposed pathway. Consider relocating kerb ramp 5 metres south (within existing layback area).
11	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	7.2	2.7	162.8	Existing concrete footpath offset 0.5 metres north-west to be demolished within TPZ and new footpath to be constructed 500mm closer to trunk at similar level (TBC). Encroachment to TPZ = 3% (slight increase from present situation).	Extent of encroachment to the root zone is less than 10% of the TPZ, which is considered within acceptable limits under AS 4970:2009. No adverse impact.	To be retained - no special tree protection measures required.
11a	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	M	3.0	1.8	28.3	Existing concrete footpath offset 0.5 metres north-west to be demolished within TPZ and new footpath to be constructed 500mm closer to trunk at similar level (TBC). Encroachment to TPZ = 39%.	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Excavations for path sub-grade within SRZ are likely to result in a significant adverse impact.	Remove tree.
12	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	6.0	2.4	113.0	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
12a	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	M	2.0	1.2	12.6	Existing concrete footpath offset 1.4 metres north-west to be demolished within TPZ and new footpath to be constructed offset 0.7 metres north-west trunk at similar level (TBC). Encroachment to TPZ = 24%.	Extent of encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. Excavations for path sub-grade within SRZ are likely to result in a significant adverse impact.	Undertake replacement planting elsewhere within the site with a new tree to compensate for loss of amenity in accordance with Section 11.

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
13	<i>Lophostemon confertus</i> (Brushbox)	H	7.0	2.5	153.9	Existing concrete footpath offset 2.5 metres north-west to be demolished within TPZ and new footpath (upgraded/regraded) to be constructed in similar position and at similar level (TBC). No increase in present encroachment.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing concrete pathway to north-west within TPZ in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.6.
14	<i>Araucaria cunninghamii</i> (Hoop Pine)	H	9.0	2.9	254.3	Existing concrete footpath offset 3.0 metres north-west to be demolished within TPZ and new footpath (upgraded/regraded) to be constructed in similar position and at similar level (TBC). No increase in present encroachment.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing concrete pathway to north-west within TPZ in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.6.
15	<i>Araucaria bidwillii</i> (Bunya-bunya Pine)	H	9.6	3.0	289.4	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
17	<i>Araucaria bidwillii</i> (Bunya-bunya Pine)	M	9.6	3.0	289.4	Existing concrete footpath offset 3.7 metres north to be demolished within TPZ and new footpath (upgraded/regraded) to be constructed in similar position and at similar level (TBC). No increase in present encroachment.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing concrete pathway to north-west within TPZ in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.6.
18	<i>Araucaria cunninghamii</i> (Hoop Pine)	M	7.8	2.8	191.0	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
18a	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	5.0	1.8	78.5	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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
21	<i>Syncarpia glomulifera</i> (Turpentine)	M	6.0	2.5	111.6	Existing asphalt pavement offset 0.7 metres north to be demolished within TPZ and new pavement (upgraded/regraded to accommodate new parking bays) to be constructed in similar position and at similar level (TBC). No increase in present encroachment.	No adverse impact, provided that all proposed works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install trunk Protection boarding in accordance with Section 10.4. Demolish existing asphalt pavement to north within TPZ (if required) in accordance Section 10.5. Undertake any required excavations for new pavement sub-grade within TPZ in accordance with Section 10.6.
22	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	P	7.5	2.6	176.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.



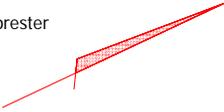
LEGEND	
TREE RETENTION VALUES	
	HIGH
	MODERATE
	LOW
	VERY LOW

APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 Beecroft Railway Station
 Wongala Crescent, BEECROFT, NSW

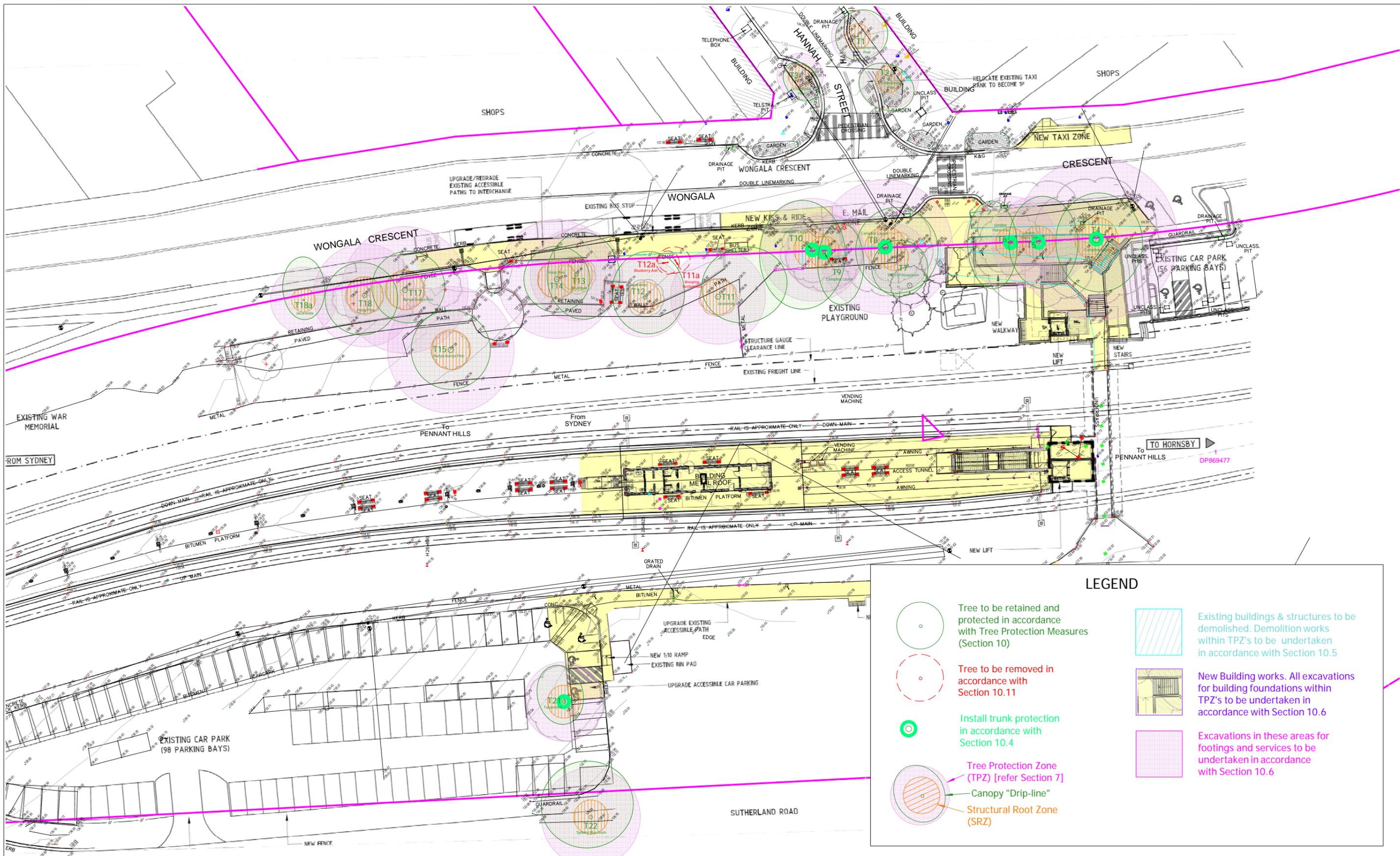


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Based on the Survey Drawing
 prepared by Cardno Hard & Forester
 Dwg Ref No. 80015015 [01]
 Dated 07/01/2015



DWG No. T18-072801 [A]
 DATE: 28/07/2018



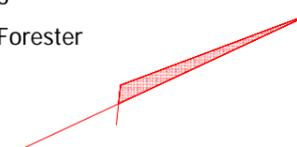
**APPENDIX 6
TREE PROTECTION PLAN**

Beecroft Railway Station
Wongala Crescent, BEECROFT, NSW



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Based on the Survey Drawing
prepared by Cardno Hard & Forester
Dwg Ref No. 80015015 [01]
Dated 07/01/2015



DWG No. T18-072802 [B]

DATE: 09/08/2018