



**EARTHSCAPE HORTICULTURAL SERVICES**  
Arboricultural, Horticultural and Landscape Consultants

**ABN 36 082 126 027**

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**ARBORICULTURAL IMPACT  
ASSESSMENT REPORT**

**TRANSPORT ACCESS PROGRAM  
(TAP) 3**

**BEXLEY NORTH (RAILWAY) STATION  
KINGSGROVE AVENUE, BEXLEY NORTH**

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

Ph:- 02 9272 1426

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

EARTHSCAPE HORTICULTURAL SERVICES  
Ph: - 0402 947 296

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



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PO Box 364, BEROWRA NSW 2081  
Ph: (02) 9456 4787 Mobile: 0402 947 296 Fax: (02) 9456 5757  
Email: [earthscape@iinet.net.au](mailto: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 twelve (12) trees located in the vicinity of Bexley North Railway Station, Kingsgrove Avenue, Bexley North. 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. The upgrade to Bexley North Station as part of TAP3 will include the following key elements:-

- provision of a new station entrance from the Bexley Road overbridge. The new station entrance would include:
  - demolition of the existing stairs and the eastern platform canopy in order to accommodate the new stairs, lift and entrance landing;
  - construction of a new station entrance landing area;
  - construction of a new lift between Bexley Road and the station platform;
  - construction of new stairs between the landing and the station platform; and
  - construction of a replacement stair and platform canopy.
- internal station building works including:
  - construction of a new family accessible toilet in the location of the existing male toilets;
  - construction of a new unisex ambulant toilet at the location of the existing female toilets; and
  - other minor building modifications required to accommodate new electrical equipment including a main switchboard, and new or upgraded station communications equipment.
- upgrade of existing platform surfaces (re-grading/re-surfacing) at locations across platforms to provide compliant accessible paths and ramps to station amenities;
- upgrade of the existing commuter carpark on Kingsgrove Avenue including:
  - reconfiguration of the existing car park to allow for 22 parking spaces, including two accessible parking spaces. Note this would result in a net loss of 11 parking spaces from the existing configuration;
  - an accessible ramp from the commuter carpark to the Bexley Road overbridge; and
  - increased car park aisle width and turning vehicle area.
- landscaping and planting works within the station precinct;
- upgrade of the existing footpaths to the north and south of the station entrance along the Bexley Road overbridge, including minor re-grading of footpaths and installation of landings;
- power supply upgrades including modification to the existing station 11kV padmount transformer, construction of a new containment and submain cable including an underline crossing, and connection to the new main switchboard in the station building; and
- ancillary works including adjustments to fencing, retaining walls, crash barriers, lighting, electrical upgrades, electronic ticketing, new seating, relocation of rubbish bins, improvement to station communications and security systems (including CCTV cameras), public address system, hearing induction loops, station passenger information, wayfinding signage and installation of tactile ground surface indicators (TGSIs).

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 Bayside Council's guidelines for preparation of Arborists Reports as outlined in Section 4 of the former Rockdale Council's *Development Application Guide* dated September 2012, Section 5.4 of the *Rockdale Development Control Plan 71* (RDCP) (Landscape Design Principles and Guidelines) 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 11 in DP 1177194, being Bexley North Station, Kingsgrove Avenue, Bexley North. For the purposes of this report, the subject property will be referred to as 'the site'. The site is zoned Infrastructure [SP2] (Railway) under the *Rockdale Local Environmental Plan* (RLEP) 2011. The adjoining commuter carpark to the north, together with Kingsgrove Avenue, is zoned Public Recreation [RE1] under the RLEP 2011. The site contains the Bexley North Station building located on a central island platform within the East Hills [railway] Line together with associated infrastructure. The northern side of the site contains a small commuter car park with a number of mature trees. These include a variety of locally-indigenous, non-local native and exotic (introduced) species.
- 2.1.2 Soils of this area are typical of the Gynea Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of "shallow to moderately deep (300 – 1000 mm) *Yellow Earths* and *Earthy Sands* on crests and inside of benches and shallow (< 200 mm) *Siliceous Sands* on leading edges of benches; localised *Gleyed Podzolic Soils* and *Yellow Podzolic Soils* on shale lenses; and shallow to moderately deep (< 1000mm) *Siliceous Sands* and *Leached Sands* along Drainage Lines."<sup>1</sup> Soil materials are derived Hawkesbury Sandstone and may be discontinuous with localised rock outcrop.
- 2.1.3 The original vegetation of this area consisted of open forest & woodland typical of Hawkesbury Sandstone areas.<sup>2</sup> The dominant locally-indigenous tree species occurring in this area include *Angophora costata* (Sydney Red Gum), *Corymbia gummifera* (Red Bloodwood) and *Eucalyptus haemastoma* (Scribbly Gum). Other species occurring in this vegetation community may include *Allocasuarina littoralis* (Black She-Oak), *Eucalyptus pilularis* (Blackbutt), *Eucalyptus punctata* (Grey Gum), *Eucalyptus globoidea* (White Stringybark), *Eucalyptus capitellata* (Brown Stringybark), *Eucalyptus pilularis* (Blackbutt) and *Banksia serrata* (Old Man Banksia).

## 3 SUBJECT TREES

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 22<sup>nd</sup> November 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 Degotardi, Smith & Partners, Dwg. Ref No. 34088 [B] dated 16/06/2015. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No. T4a was not shown on the original survey and has been plotted on the drawing in its approximate position 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.<sup>3</sup> 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<sup>4</sup> 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.

## 4.3 General Observations

4.3.1 Trees T1-T4 (all Lasiandras) form a row along the northern side of the commuter car park. All of these trees have been crown lifted on the southern side to provide adequate vehicular clearance. Several of the trees exhibit signs of moisture stress probably resulting from the recent extended dry conditions (2017 to mid-2018) evidenced by interior crown dieback and some cambial dieback.

4.3.2 Trees T4a – T11 (a row of Casuarinas along the southern side of the car park) have all been severely pruned (with exception of T9) to clear the overhead High Voltage powerlines. Most of these exhibit poor form and habit as a result of previous pruning.

## 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 Bayside Local Government Area (LGA) are protected under the provisions of Part 4, Section 4.1.7 of the *Rockdale Development Control Plan 2011* (RDCP) made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The RDCP generally protects all trees with a height of greater than three (3) metres or with a trunk circumference of greater than 300mm (95mm in diameter) measured at one (1) metre above Ground Level. Some exemptions apply, however, all of the subject trees are protected under the RDCP 2011.

#### 5.2.2 *Wildlife Habitat*

*Allocasuarina littoralis* (Black She-oak) [T9], is a 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. There were no other visible signs of wildlife habitation.

#### 5.2.3 *Noxious Plants & Environmental Weeds*

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

#### 5.2.4 *Threatened Species & Ecological Communities*

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

The National Parks and Wildlife Service (NPWS) 1:25000 Mapping Series (Native Vegetation of the Cumberland Plain)<sup>5</sup> indicates that there are no remnant native vegetation communities in the vicinity of the site. The native vegetation to the north of the site (along Wolli Creek) is nominated as 'unclassified'. The species assemblage within this area is most typical of Western Sandstone Gully Forest (WSGF), which is not listed as an EEC.

5.2.5 *Biodiversity*

The site does *not* contain any Environmentally Sensitive Land (Biodiversity, Terrestrial Biodiversity or Wetlands) as indicated on Council's Natural Resources Biodiversity, Terrestrial Biodiversity or Natural Resource Wetlands Maps forming part of the RLEP 2011.

**5.3 Heritage Significance**

5.3.1 *Heritage Items*

The subject property is *not* listed as an item of Environmental Heritage under Schedule 5, Part 1 of the RLEP 2011.

5.3.2 *Heritage Conservation Area*

The site is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the RLEP 2011.

5.3.3 *Significant Tree Register*

Bayside Council does *not* currently maintain a Register of Significant Trees.

5.3.4 *General*

Trees T1-T4 (row of four Lasiandras) form a backdrop to a display garden at the gateway to the LGA planted c.2000-2005. Trees T4a – T11 (row of mixed Casuarina species) are fairly recent plantings (c.2000-2010). There is no known or suspected heritage significance of any of the subject trees.

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

**TABLE 2 – TREE RETENTION PRIORITIES.**

RETENTION VALUE	RECOMMENDED ACTION
<b>“High”</b>	<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 <b>Appendix 2</b>) 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>
<b>“Moderate”</b>	<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 <b>Section 9</b>).</p>
<b>“Low”</b>	<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>
<b>“Very Low”</b>	<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).<sup>6</sup>

- 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.

## **8 PROPOSED DEVELOPMENT**

- 8.1.1 The proposed development includes the upgrade to Bexley North Station as part of TAP3 (refer detailed summary in **Section 1.1.1** of this report).

## 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>Site Plan Proposed</i>	AECOM	TAP-150054 AR-1001 [B]	27/04/2018
<i>Commuter Car Parking Plan</i>	AECOM	TAP-150054 AR-1101 [B]	27/04/2018

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 seven (7) trees of low retention value. These include Tree No.s T4a, T5, T6, T7, T10 & T11 (Swamp Oak) & T8 (River 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. 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 with new trees in accordance with TfNSW *Vegetation Offset Guideline* (2017) as detailed in **Section 11**.

9.1.4 The proposed development will also necessitate the removal of one (1) tree of moderate retention value, being T9 (Black She-oak). This tree is not considered significant, but is in good health and condition and makes a fair contribution to the amenity of the site and streetscape area. In order to compensate for loss of amenity resulting from the removal of this tree to accommodate the proposed development, consideration should be given to replacement planting with new trees in accordance with TfNSW *Vegetation Offset Guideline* (2017) as detailed in **Section 11**.

9.1.5 It is understood that the northern side of the commuter car park is proposed to be retained intact with new wheel stops installed. Provided that the existing asphalt pavement surface is retained (and not widened to the north), the proposed works will not result in any adverse impact on Trees T1, T2, T3 & T4 (Lasiandra). In order to avoid any adverse impact on these trees, Tree Protection Fencing should be erected within the TPZs as indicated in **Appendix 6** in accordance with **Section 10.3** of this report.

9.1.6 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.

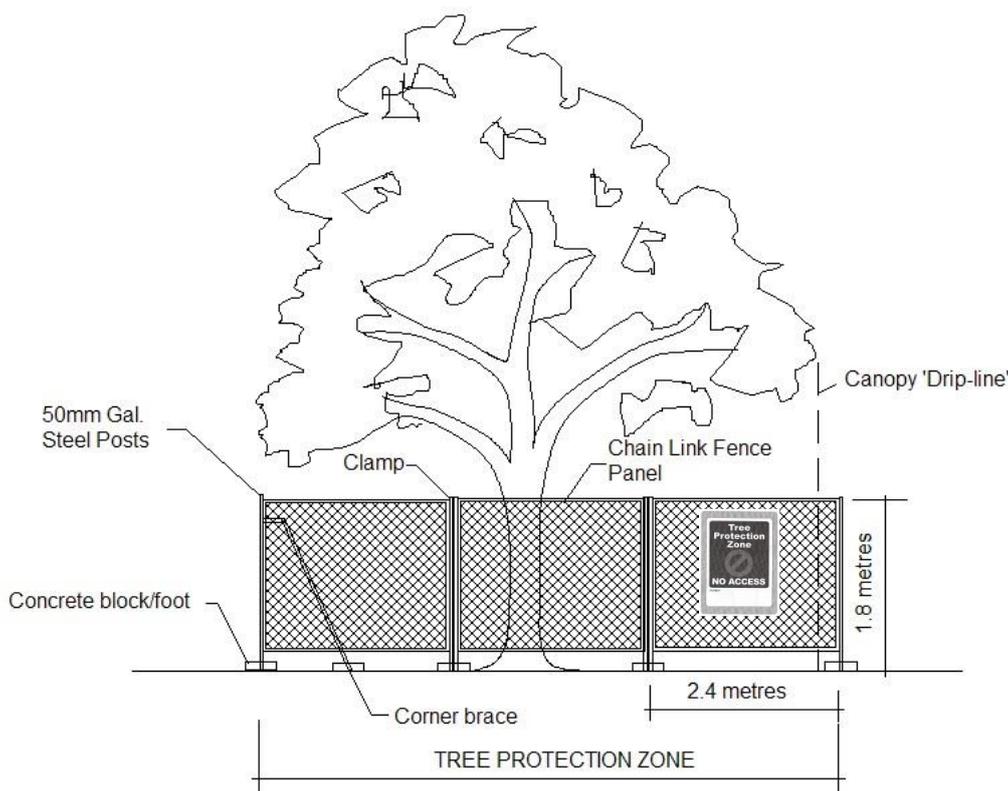
### 10.2 Prohibited Activities

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 Protection Fencing

10.3.1 Trees [**T1, T2, 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 position as indicated on the Tree Protection Plan (**Appendix 6**). 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. Water filled barriers or concrete jersey kerbs may be used as an alternative to chain wire fencing (where appropriate), subject to the approval of a qualified arborist. 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.



**Figure 1 – Detail of Tree Protection Fence**

#### 10.4 Tree Protection Signs

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



**Figure 2 – Example detail of Tree Protection Sign**

#### 10.5 Tree Damage

10.5.1 Care shall be taken when operating cranes, drilling rigs, excavators and similar plant & 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.

10.5.2 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.

## 10.6 Tree Removal

10.6.1 The removal of Trees [T4a, T5, T6, T7, T8, T9, T10 & T11] 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.

## 10.7 Ground Protection

10.7.1 Construction haul routes shall be confined to existing paved areas wherever possible. Where this is not feasible and construction haul routes or access for plant and equipment must traverse soft landscape areas within TPZs of [T1, T2, T3 & T4], 20mm thick marine ply sheets or truck mats (such as Envirex Versadeck® access mats) (refer **Figure 6** shall be placed over the top of the ground surface to minimise compaction and disturbance of the underlying soil profile and root zone.



**Figure 6** – Showing typical detail for truck mats.

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

## 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 thirty-two (32) 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 (or adjoining Public Reserve in consultation with Bayside Council). The number of new trees to be planted has been calculated in accordance with Table 1 in Section 5.2 of the TfNSW *Vegetation Offset Guideline* (2017) [9TP-SD087/1.0], being an offset ratio of 4:1 for trees to be removed of between 150mm and 600mm in trunk diameter.

11.1.2 The following species are appropriate to the site conditions and could be considered for replacement planting:-

- *Angophora costata* (Sydney Red Gum);
- *Corymbia gummifera* (Red Bloodwood);

- *Eucalyptus haemastoma* (Scribbly Gum);
- *Eucalyptus pilularis* (Blackbutt);
- *Eucalyptus punctata* (Grey Gum);
- *Eucalyptus globoidea* (White Stringybark);
- *Eucalyptus capitellata* (Brown Stringybark);
- *Eucalyptus pilularis* (Blackbutt).

11.1.3 Careful consideration should be given to new planting locations to avoid the existing overhead High Voltage powerlines on the south side of the existing commuter car park and the existing Aerial Bundled Conductor on the north side of the existing commuter car park.

11.1.4 New plantings shall be maintained for a minimum period of twelve (12) months from the date of installation to ensure successful establishment. The maintenance regime shall include regular watering, replenishment of mulch, weed control, adjustment of any stakes or ties used for temporary support and monitoring of the general health and condition of the trees. Any of the trees that fail within the first 12 months shall be replaced with new tree stock of equivalent species. Replacement trees shall be maintained for a further 12 months from planting to ensure successful establishment.



**Andrew Morton**  
EARTHSCAPE HORTICULTURAL SERVICES  
19<sup>th</sup> December 2018

## 12 REFERENCES

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Soil Conservation Service of NSW. Sydney

<sup>2</sup> Benson, Doug & Howell, Jocelyn (1990)

**Taken for Granted: the Bushland of Sydney and its Suburbs.**  
Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW

<sup>3</sup> Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)

**The Body Language of Trees – A Handbook for Failure Analysis**  
The Stationery Office, London, England

<sup>4</sup> Barrell, Jeremy (1996)

**Pre-development Tree Assessment**

Proceedings of the International Conference on Trees and Building Sites (Chicago)  
International Society of arboriculture, Illinois, USA

<sup>5</sup> National Parks and Wildlife Service of NSW (October 2002)

**Native Vegetation of the Cumberland Plain - 1:25000 Mapping Series (Map 10 of 16)**  
NPWS, Sydney NSW

<sup>6</sup> Council of Standards Australia (August 2009)

**AS 4970 – 2009 – Protection of Trees on Development Sites**  
Standards Australia, Sydney

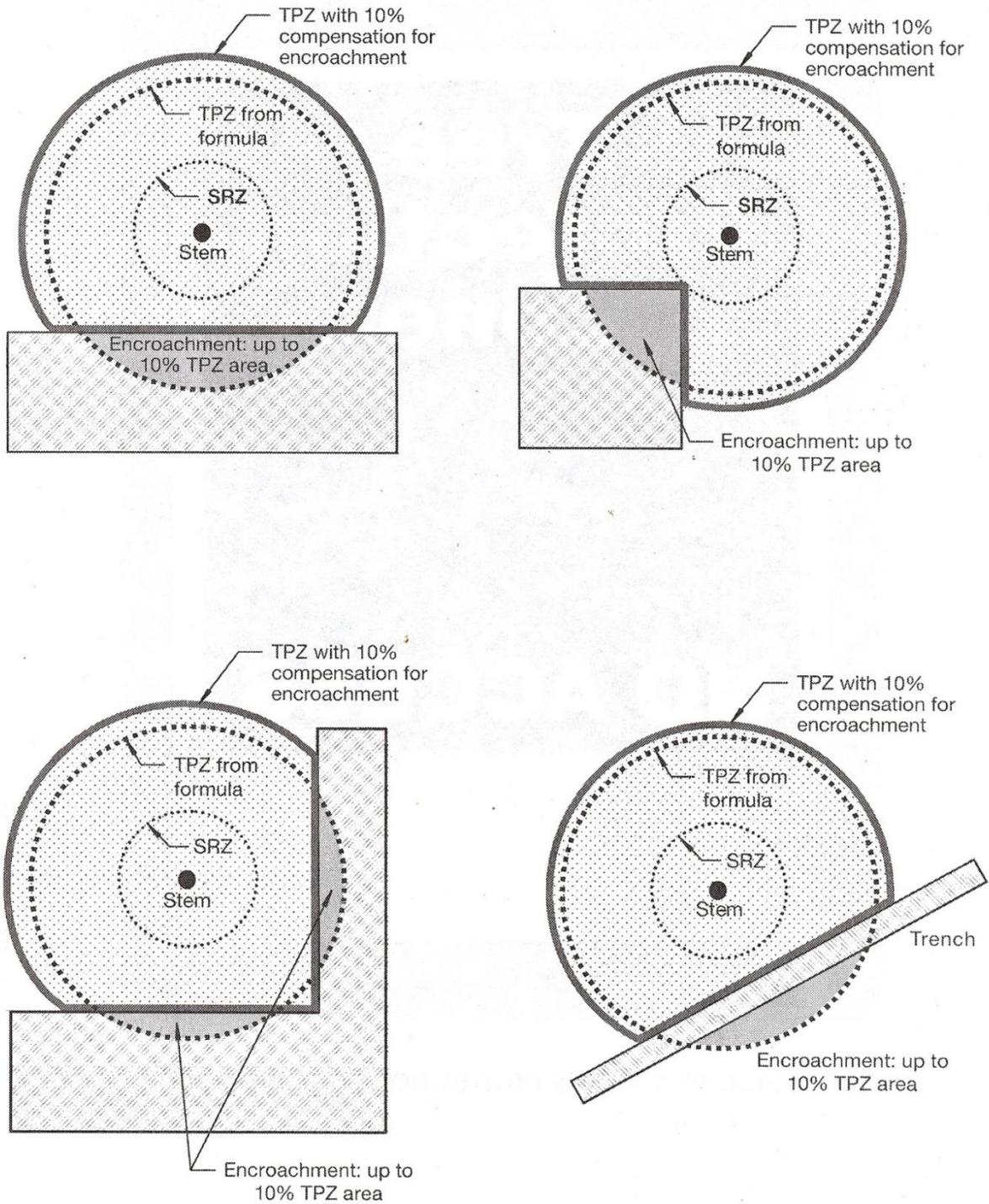
**APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE**

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
<b>1. SIGNIFICANT</b>	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 <i>Biodiversity Conservation Act 2016</i> or the <i>Environmental Protection and Biodiversity Conservation Act 1999</i>	The subject tree has a very large live crown size exceeding 300m <sup>2</sup> 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.
<b>2. VERY HIGH</b>	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 <sup>2</sup> ; 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
<b>3. HIGH</b>	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 <sup>2</sup> ; 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
<b>4. MODERATE</b>	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 relevant DCP.	The subject tree has a medium live crown size exceeding 40m <sup>2</sup> ;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.
<b>5. LOW</b>	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 relevant 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 <sup>2</sup> and can be replaced within the short term (5-10 years) with new tree planting
<b>6. VERY LOW</b>	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).
<b>7. INSIGNIFICANT</b>	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the <i>Biosecurity Act 2015</i> 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 7<sup>th</sup> 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 <sup>2</sup> )	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	<i>Tibouchina macrantha</i> (Lasiandra)	5	7	130x6	35	M	Appears stable with sound branching structure. Exhibits some interior crown dieback with 10% deadwood and 10% epicormic growth.	Selectively pruned and crown lifted to 3 metres south side to clear car park	Good	No Evidence	Medium 15-40 Years	4	Moderate	Adjacent reserve
2	<i>Tibouchina macrantha</i> (Lasiandra)	5	6	180+ 150 + 100x2	24	M	Appears stable with fair branching structure. Exhibits moderate dieback with 25% deadwood and 15% epicormic growth. Cambial dieback on main stem due moisture stress.	Selectively pruned and crown lifted to 3 metres south side to clear car park	Fair with thinning crown	No Evidence	Short 5-15 Years	4	Low	Adjacent reserve
3	<i>Tibouchina macrantha</i> (Lasiandra)	6	8	180x2	40	M	Appears stable with fair branching structure. Exhibits some interior crown dieback with 20% deadwood and 15% epicormic growth.	Selectively pruned and crown lifted to 3 metres south side to clear car park	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	4	Low	Adjacent reserve
4	<i>Tibouchina macrantha</i> (Lasiandra)	5	6	180x3	30	M	Appears stable with fair branching structure. Exhibits some interior crown dieback with 5% deadwood and 25% epicormic growth. Large axial wound on PL from 1-3 metres.	Selectively pruned and crown lifted to 3 metres south side to clear car park & power pole	Fair	No Evidence	Medium 15-40 Years	4	Moderate	Adjacent reserve
4a	<i>Casuarina glauca</i> (Swamp Oak)	5	4	170	20	I	Appears stable with sound branching structure.	Topped to clear HV overhead powerlines at 4-5 metres	Fair	No Evidence	Short 5-15 Years	5	Low	On-site
5	<i>Casuarina glauca</i> (Swamp Oak)	5	6	250	30	SM	Appears stable with poor branching structure. Poor form and habit due previous pruning.	Topped to clear HV overhead powerlines at 4-5 metres	Fair	No Evidence	Short 5-15 Years	5	Low	On-site
6	<i>Casuarina glauca</i> (Swamp Oak)	4	5	250	15	SM	Appears stable with poor branching structure. Poor form and habit due previous pruning. Exhibits a prominent lean to the south-west. Multiple moderate bark inclusions at 1 metre at junction of co-dominant PLs.	Topped to clear HV overhead powerlines at 4-5 metres	Fair	No Evidence	Short 5-15 Years	5	Low	On-site
7	<i>Casuarina glauca</i> (Swamp Oak)	5	5	250	20	SM	Appears stable with poor branching structure. Poor form and habit due previous pruning. Exhibits a very prominent lean to the west.	Topped to clear HV overhead powerlines at 4-5 metres	Good	No Evidence	Short 5-15 Years	5	Low	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 <sup>2</sup> )	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
8	<i>Casuarina cunninghamiana</i> (River Oak)	6	10	320	50	M	Appears stable with poor branching structure. Poor form and habit due previous pruning.	Topped to clear HV overhead powerlines at 4-5 metres	Very Good	No Evidence	Short 5-15 Years	4	Low	On-site
9	<i>Allocasuarina littoralis</i> (Black She-oak)	6	5	250	30	M	Appears stable with fair branching structure. Exhibits a prominent lean to the east.	No Evidence	Good	No Evidence	Medium 15-40 Years	4	Moderate	On-site
10	<i>Casuarina glauca</i> (Swamp Oak)	7	6	250	36	SM	Appears stable with poor branching structure. Poor form and habit due previous pruning.	Topped to clear HV overhead powerlines at 7 metres	Good	No Evidence	Short 5-15 Years	4	Low	On-site
11	<i>Casuarina glauca</i> (Swamp Oak)	7	8	350	48	M	Appears stable with poor branching structure. Poor form and habit due previous pruning. Exhibits a moderate bark inclusion at 1.8 metres at junction of co-dominant leaders.	Topped to clear HV overhead powerlines at 7 metres	Good	No Evidence	Short 5-15 Years	4	Low	On-site

**APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE**

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	<i>Melaleuca armillaris</i> (Bracelet Honey Myrtle)	P	4.8	2.3	72.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
2a	<i>Brachychiton acerifolius</i> (Illawarra Flame Tree)	M	2.2	1.6	14.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
3	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.6	1.8	21.9	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
4	<i>Strelitzia nicolai</i> (Giant White Bird of Paradise)	G	4.8	2.3	72.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
4a	<i>Casuarina cunninghamiana</i> (River Oak)	M	3.5	1.7	38.5	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
5	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	3.0	1.8	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
6	<i>Pittosporum undulatum</i> (Native Daphne)	M	3.0	1.8	28.3	No proposed works within TPZ.	To be removed to accommodate new landscape works (dead tree).	Remove tree.
7	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	1.8	1.5	10.2	No proposed works within TPZ.	To be removed to accommodate new landscape works (dead tree).	Remove tree.
8	<i>Pittosporum undulatum</i> (Native Daphne)	M	1.5	1.1	7.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
9	<i>Syncarpia glomulifera</i> (Turpentine)	M	5.4	2.4	91.6	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 <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
9a	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	3.0	1.7	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
10	<i>Casuarina cunninghamiana</i> (River Oak)	M	4.2	2.1	55.4	No proposed works within TPZ.	To be removed to accommodate new landscape works (dead tree).	Remove tree.
11a	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	2.4	1.7	18.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
11b	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	2.4	1.7	18.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
12	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
13	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.6	1.8	21.9	Proposed pool surround (& associated retaining wall) offset 1.9 metres south-east at RL58.50 (800mm above grade). Excavations for wall foundations within TPZ. Minor encroachment to TPZ = 6%.	Extent of encroachment to root zone is less than 10% of the TPZ, which is considered within acceptable limits under AS 4970:2009. No adverse impact. To be removed to accommodate new landscape works (dead tree).	Remove tree.
14	<i>Macrozamia communis</i> (Burrawang)	G	2.4	1.7	18.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
15	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.2	1.6	14.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
16	<i>Cupressus macrocarpa 'Aurea'</i> (Golden Monterey Cypress)	M	7.2	2.7	162.8	Located within footprint of proposed pool/pool surround.	Proposed work will necessitate removal.	Remove tree.

**APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE**

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
17	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	3.6	2.0	40.7	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
18	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	3.8	2.0	45.9	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
19	<i>Podocarpus elatus</i> (Brown Pine)	M	3.0	1.6	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
19a	<i>Ficus rubiginosa</i> (Port Jackson Fig)	M	2.9	1.8	26.0	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
20	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	3.0	1.4	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
20a	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	3.0	1.6	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
21	<i>Banksia serrata</i> (Old Man Banksia)	M	2.5	1.7	19.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
21a	<i>Cotoneaster sp.</i> (Cotoneaster)	M	3.6	2.0	40.7	Proposed pool surround (& associated retaining wall) offset 1.7 metres west at RL58.50 (3.5 metres above grade). Excavations for wall foundations within TPZ. Minor encroachment to TPZ = 20%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. To be removed to accommodate new landscape works (dead tree).	Remove tree.

**APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE**

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
22	<i>Allocasuarina littoralis</i> (Black She-oak)	M	2.5	1.7	19.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
23	<i>Allocasuarina littoralis</i> (Black She-oak)	M	2.4	1.7	18.1	No proposed works within TPZ.	To be removed to accommodate new landscape works (dead tree).	Remove tree.
24	<i>Cupressus macrocarpa</i> 'Brunniana Aurea' (Golden Brunnings Cypress)	M	4.2	2.1	55.4	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
24a	<i>Cotoneaster sp.</i> (Cotoneaster)	M	3.0	1.7	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
25	<i>Syncarpia glomulifera</i> (Turpentine)	M	4.8	2.3	72.3	Proposed patio/paved terrace (& associated retaining wall) offset 2.1 metres south-east at RL 57.000 (1 metre above grade to 1 metre below grade). Excavations for retaining wall foundations within SRZ/TPZ (Encroachment to TPZ = 15%). Proposed new retaining wall offset 2.1 metres west (within footprint of existing wall). Excavations for retaining wall foundations within SRZ/TPZ.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact. Given the position of tree within the site and the extent of work proposed within the TPZ, there are no feasible option that can be recommended that would permit the retention of this tree.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
26	<i>Syncarpia glomulifera</i> (Turpentine)	M	3.5	1.8	38.5	No proposed works within TPZ.	No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3.

**APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE**

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
27	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	P	9.0	2.6	254.3	Proposed dwelling offset 5.7 metres south-east at RL 57.00 (1.8 metres below grade). Excavations for building foundations within TPZ (beyond existing rock outcrop). Encroachment to TPZ = 3% (no actual incursion to root zone). Proposed pool surround offset 3.1 metres north-east at RL 58.50 (300mm below grade). Excavations for pavement sub-grade within TPZ (beyond existing rock outcrop). Encroachment to TPZ = 14% (no incursion to root zone).	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. However the proposed works will not result in any actual incursion to the root zone due to the presence of existing rock outcrop that limit root zone in these areas.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for the building foundations and pavement sub-grade for the pool surround within the TPZ in accordance with Section 10.6.
28	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	3.6	2.0	40.7	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
29	<i>Agonis flexuosa</i> (WA Willow Myrtle)	P	4.0	1.9	50.2	Located within footprint of proposed dwelling (Level 2).	Proposed work will necessitate removal.	Remove tree.
29a	<i>Acacia floribunda</i> (Sally Wattle)	M	3.0	1.4	28.3	Located within footprint of proposed dwelling (Level 2).	Proposed work will necessitate removal.	Remove tree.
29b	<i>Acacia floribunda</i> (Sally Wattle)	M	3.0	1.4	28.3	Located within footprint of proposed dwelling (Level 2).	Proposed work will necessitate removal.	Remove tree.
30	<i>Casuarina cunninghamiana</i> (River Oak)	M	6.6	2.6	136.8	Proposed new pathway (& associated retaining wall) offset 5.7 metres south-west at ≈ RL55.00 (1.5 metres above grade). Excavations for retaining wall foundations within TPZ (beyond existing rock outcrop). No actual incursion to root zone.	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 <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
31	<i>Eucalyptus scias</i> (Large-fruited Red Mahogany)	P	7.0	2.3	153.9	proposed new pathway (& associated retaining wall) offset 0.6 metres south-west at ≈ RL55.50 (2metres above grade). Excavations for retaining wall foundations within SRZ. Proposed basement offset 3.1 metres south-east at RL 46.50 (6.5 metres below grade). Excavations for basement within TPZ. Encroachment to TPZ = 16%. Proposed terrace 3.4 metres west and 4.9 metres south-west at RL 57.00 (1 to 1.3 metres above grade (within footprint of proposed paved area). Encroachment to TPZ = 32%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact. Given the position of tree within the site and the extent of work proposed within the TPZ, there are no feasible option that can be recommended that would permit the retention of this tree.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
31a	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	4.0	1.8	50.2	proposed new pathway (& associated retaining wall) offset 1.4 metres south-west at ≈ RL55.50 (2 metres above grade). Excavations for retaining wall foundations within SRZ. Proposed basement offset 2.5 metres south-east at RL 46.50 (6.5 metres below grade). Excavations for basement within TPZ. Encroachment to TPZ = 27%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
32	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.5	1.6	19.6	Located within footprint of proposed pathway.	Proposed work will necessitate removal.	Remove tree.
33	<i>Casuarina cunninghamiana</i> (River Oak)	M	4.0	2.1	49.2	Located within footprint of proposed dwelling.	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
34	<i>Casuarina cunninghamiana</i> (River Oak)	M	3.1	1.9	29.4	Located within footprint of proposed dwelling.	Proposed work will necessitate removal.	Remove tree.
34a	<i>Ficus rubiginosa</i> (Port Jackson Fig)	G	2.0	1.5	12.6	Located within footprint of proposed dwelling.	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.

**APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE**

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
34b	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	3.0	1.6	28.3	Located within footprint of proposed dwelling.	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
34c	<i>Banksia integrifolia</i> (Coast Banksia)	P	2.5	1.5	19.6	Located within footprint of proposed dwelling.	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
35	<i>Strelitzia nicolai</i> (Giant White Bird of Paradise)	G	4.0	2.3	50.2	Located within footprint of proposed dwelling.	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
36	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	6.0	2.0	113.0	Located within footprint of proposed paved terrace area.	Proposed work will necessitate removal.	Remove tree.
37	<i>Pittosporum undulatum</i> (Native Daphne)	M	3.0	1.4	28.3	No proposed works within TPZ.	To be removed to accommodate new landscape works (poor specimen)	Remove tree.
38	<i>Allocasuarina torulosa</i> (Forest Oak)	M	4.4	2.2	60.6	Located within footprint of proposed dwelling (external access Level 2).	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
39	<i>Banksia integrifolia</i> (Coast Banksia)	P	4.0	2.0	50.2	Located within footprint of proposed dwelling (external access Level 2).	Proposed work will necessitate removal.	Remove tree.
40	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	3.0	1.8	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

**APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE**

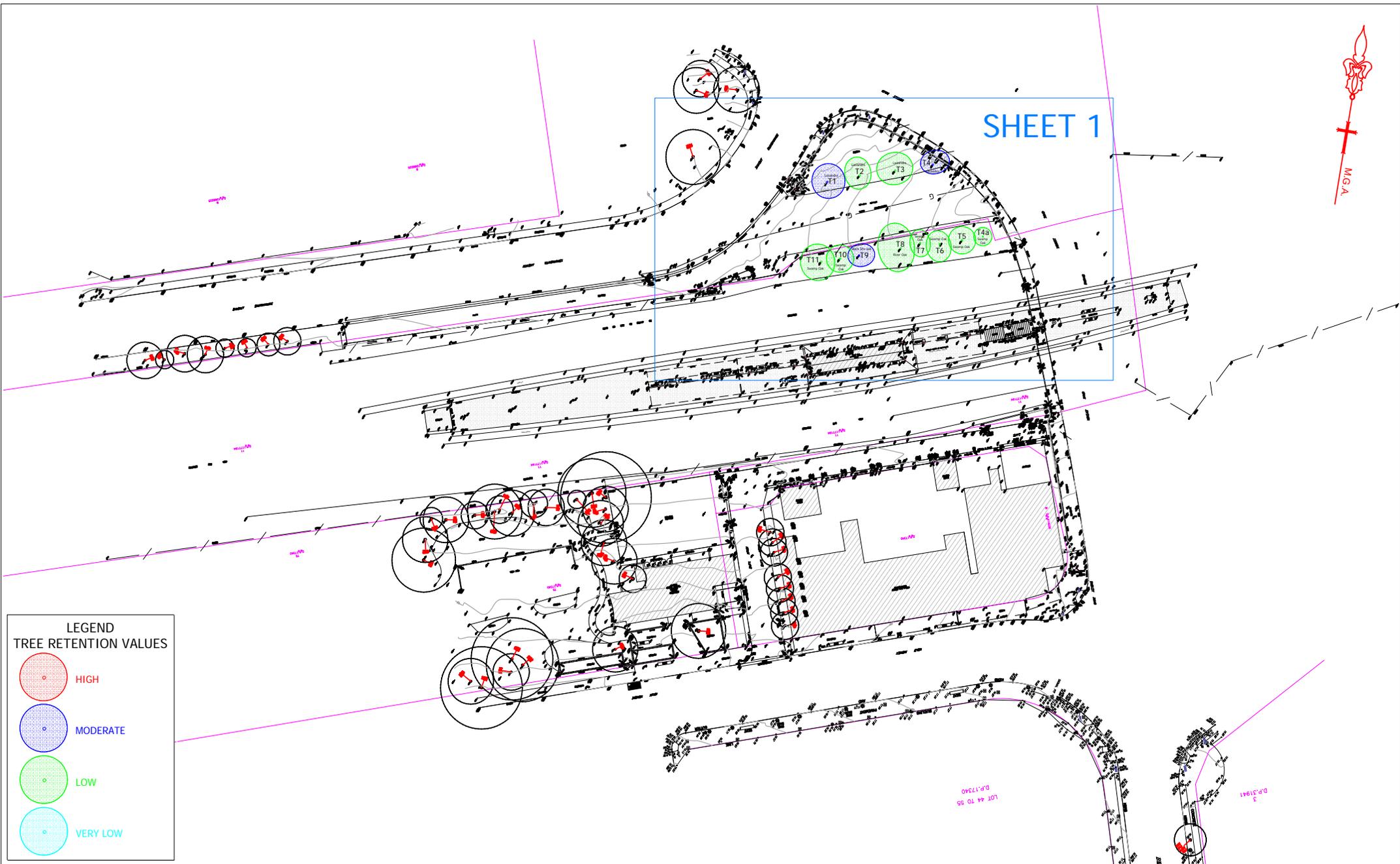
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
43	<i>Banksia serrata</i> (Old Man Banksia)	P	3.0	1.8	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
44	<i>Banksia serrata</i> (Old Man Banksia)	M	3.6	2.0	40.7	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
45	<i>Banksia serrata</i> (Old Man Banksia)	P	3.0	1.7	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
46	<i>Banksia serrata</i> (Old Man Banksia)	P	3.0	1.7	28.3	Proposed paved area and stairs offset 1.4 metres north-west at RL? Excavations for pavement sub-grade and stair foundations within TPZ/SRZ. Encroachment to TPZ = 21%	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact.	Remove tree.
47	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	2.5	1.5	19.6	Proposed paved area and stairs offset 1.4 metres north-west at RL? Excavations for pavement sub-grade and stair foundations within TPZ/SRZ. Encroachment to TPZ = 18%. Proposed stairs offset 0.7 metres west. Excavations for stair foundations within SRZ.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact.	Remove tree.
48	<i>Banksia serrata</i> (Old Man Banksia)	P	2.4	1.7	18.1	Located within footprint of proposed paved terrace area.	Proposed work will necessitate removal.	Remove tree.
49	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	M	1.8	1.5	10.2	Located within footprint of proposed paved terrace area.	Proposed work will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the site to compensate for loss of amenity in accordance with Section 11.
50	<i>Acacia sp. [melanoxyton]</i> (Blackwood)	M	2.0	1.4	12.6	Proposed stairs offset 0.9 metres north. Excavations for stair foundations within SRZ.	No adverse impact, assuming stairs are constructed using elevated treads and stringers supported by post footings.	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 <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
51	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	2.0	1.1	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
52	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.0	1.3	12.6	Proposed stairs offset 1.2 metres north. Excavations for stair foundations within SRZ.	No adverse impact, assuming stairs are constructed using elevated treads and stringers supported by post footings.	To be retained - no special tree protection measures required.
53	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.0	1.3	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
54	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.0	1.3	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
55	<i>Ficus rubiginosa</i> (Port Jackson Fig)	M	3.5	1.7	38.5	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
56	<i>Eucalyptus sp.</i> (Gum)	M	4.0	1.8	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
57	<i>Eucalyptus umbra</i> (Bastard Mahogany)	P	4.0	1.8	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
58	<i>Acacia sp.</i> (Wattle)	M	3.0	1.6	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
58a	<i>Pittosporum undulatum</i> (Native Daphne)	M	2.0	1.5	12.6	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 <sup>2</sup> )	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
59	<i>Cyathea cooperi</i> (Rough Tree Fern)	G	1.5	1.3	7.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
60	<i>Glochidion ferdinandi</i> (Cheese Tree)	M	2.0	1.3	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
61	<i>Acacia sp.</i> (Wattle)	M	2.0	1.3	12.6	Proposed driveway and associated retaining wall offset 0.5 metres north. Excavations for pavement foundations within SRZ.	Proposed work will necessitate removal.	Remove tree.
62	<i>Banksia serrata</i> (Old Man Banksia)	M	3.6	2.0	40.7	Located within footprint of proposed driveway and associated kerb/retaining wall.	Proposed work will necessitate removal.	Remove tree.



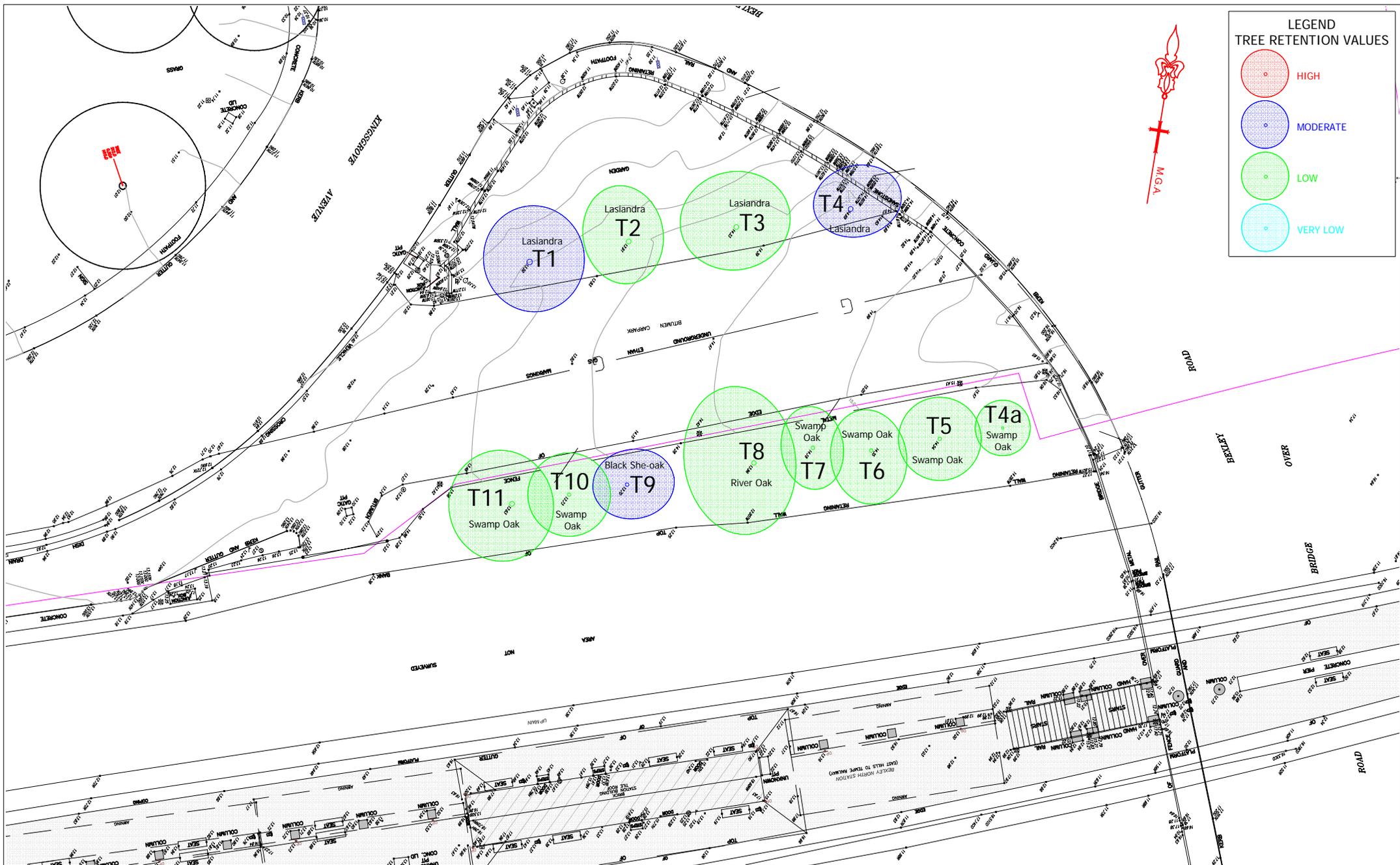
**APPENDIX 5**  
**TREE LOCATION PLAN SHOWING**  
**TREE RETENTION VALUES**  
 Bexley North Railway Station -  
 Bexley Road, BEXLEY NORTH



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

Based on the Survey Drawing  
 prepared by Degotardi Smith & Partners  
 Dwg Ref No. 34088A01 [B]  
 Dated 16/06/2015

DWG No. T18-112601 [A]  
**KEY PLAN**  
 DATE: 26/11/2018



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 Bexley North Railway Station -  
 Bexley Road, BEXLEY NORTH



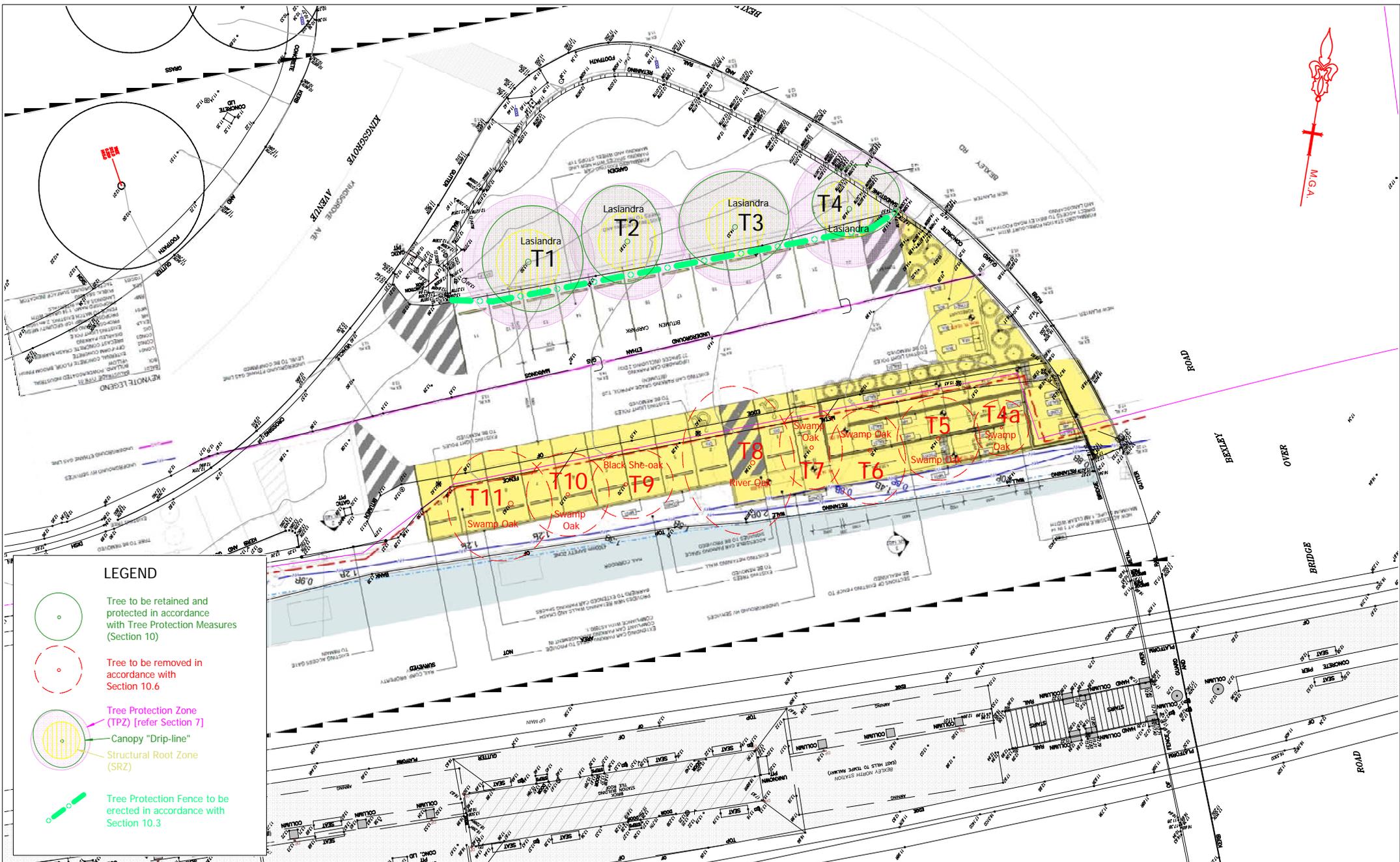
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**KEY PLAN**

DATE: 26/11/2018



**APPENDIX 6  
TREE PROTECTION PLAN**

Bexley North Railway Station -  
Bexley Road, BEXLEY NORTH



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: 03/12/2018