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ARBORICULTURAL IMPACT ASSESSMENT REPORT

TRANSPORT ACCESS PROGRAM (TAP) 3

NORTH STRATHFIELD RAILWAY STATION
QUEEN STREET, NORTH STRATHFIELD

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1 INTRODUCTION

1.1.1 This report was commissioned by WSP Australia on behalf of Transport for NSW (TfNSW) to assess the health and condition of thirty-two (32) trees located in the vicinity of North Strathfield Railway Station, Queen Street, North Strathfield. The report has been prepared to aid in the assessment of a *Review of Environmental Factors* (REF) for proposed works at 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 the City of Canada Bay Council's guidelines for *Preparation of Arborists Reports* (Fact Sheet) 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 50 in DP 1219136, being North Strathfield Station, Queen Street, North Strathfield. 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 *Canada Bay Local Environmental Plan 2013* (CBLEP). The site contains the North Strathfield Station building located on a central island platform and outer platforms within the Main Northern [railway] Line together with associated infrastructure, including pedestrian overbridge. The eastern side of the site contains a linear park with a number of mature trees. These include a variety of non-local native and exotic (introduced) species.

2.1.2 Soils of this area are typical of the Blacktown Soil Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of shallow to moderately deep (less than 1000 mm) *Red & Brown Podzolic Soils* on crests, upper slopes and well drained areas. Soils on lower slopes and areas of poor drainage consist of deep (1500-3000 mm) *Yellow Podzolic Soils and Soloth Soils* derived Wianamatta Group & Hawkesbury Shales.[1] The landscape generally consists of undulating rises with slopes ranging usually less than 5% grade.

2.1.3 The original vegetation community of this area was classified as Turpentine-Ironbark Forest, most of which was cleared for agriculture and timber getting early in the nineteenth century then later for residential development.[2] The dominant locally-indigenous tree species formerly found in this area included *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark). Other species occurring in this vegetation community may include *Eucalyptus resinifera* (Red Mahogany), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus longifolia* (Woollybutt) and *Eucalyptus globoidea* (White Stringybark).

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 31st 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 drawing. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No.s T9a, T10, T11, T12, T13, T13a, T14, T15, T16, T19a & T24a were not shown on the original survey and have been plotted on the drawing in their approximate positions.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.[3] All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

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

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

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy[4] of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 3.**

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

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

4.2.1 SULE ratings are intended to provide a general overview of the long term sustainability of the trees within the site in consideration of these factors. The allocated ranges are not intended to be absolute. This information is useful in guiding future planning by highlighting the probable lifespan of individual trees, for which a clear pattern may emerge. This information may be helpful

in forecasting likely tree senescence and planning for replacement planting to ensure continuity in tree canopy across the site. It should be noted that SULEs *may* be extended or reduced depending on the way trees are managed. Intervention and remedial works may extend the SULE of some trees.

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. 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 City of Canada Bay Local Government Area (LGA) are protected under Section C5 of the *Canada Bay Development Control Plan 2017* (CBDCP) made pursuant to made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The CBDCP generally protects all trees with a height of four (4) metres or greater or with a trunk circumference exceeding 500 mm (i.e. 160mm diameter) and any cycad or mangrove, regardless of their dimensions. Some exemptions apply, however, all of the subject trees are protected under the provisions of the CBDCP.

5.2.2 Wildlife Habitat

All of the trees are exotic (introduced) or non-local native species 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) [T20] 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. Note that this species is still protected under the CBDCP.

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 *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 there are no remnant native vegetation communities within or in the vicinity of the site.

5.2.5 Biodiversity, Bushfire & Riparian Lands

The site does *not* contain any 'Terrestrial Biodiversity' as indicated on Council's Terrestrial Biodiversity Map forming part of the CBLEP 2013.

5.3 Heritage Significance

5.3.1 Heritage Items

The site is *not* listed as an item of Environmental Heritage under Schedule 5, Part 1 of the *Canada Bay Local Environmental Plan* (CBLEP) 2013. However, the site is listed as a Heritage Item on the *NSW State Agency Heritage Register* and the RailCorp *Section 170 Heritage and Conservation Register* (Item 4801029). This item is described as the 'North Strathfield Railway Station Group', which includes the Station Building and platforms. North Strathfield Station was established in 1918 following the construction of the railway line in c.1886.The street trees in Queen Street on the eastern side of the railway station are listed as an item of Environmental Heritage [Item 397] of local significance under Schedule 5, Part 1 of the CBLEP 2013. This item is described as a row of mature Brushbox trees (to c. 13 metres in height) on the west side of Queen Street that form a significant element in the streetscape.[6] This includes Trees T1, T2, T3, T4, T5, T6, T7, T8 & T9. These trees are believed to have been planted prior to 1943.

5.3.2 Heritage Conservation Area

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

5.3.3 Significant Tree Register

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

5.3.4 General

It is likely that trees T1, T2, T3, T4, T5, T6, T7, T8 & T9 (all Brushbox on the eastern side of the Station) and Trees T21, T22 & T23 (Brushbox on the western side of the Station) were all planted in the Inter-War Period (c. 1919-1939) (probably soon after the construction of the railway station) being typical of public plantings of this era.

5.4 Amenity Value

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

6 TREE RETENTION VALUES

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

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

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

6.1.2 **Table 2** describes the implications of the retention values on site layout and design.

TABLE 2 – TREE RETENTION PRIORITES

RETENTION VALUE	RECOMMENDED ACTION
"High"	These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. Proposed site design and placement of buildings and infrastructure should consider the recommended setbacks as discussed in the following section (refer also **Appendix 2 & 4**) to avoid any adverse impact on these trees. In addition to Tree Protection Zones, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
"Moderate"	The retention of these trees is desirable, but not essential. These trees should be retained as part of any proposed development if possible. However, these trees are considered less critical for retention. If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replenishment Policy to compensate for loss of amenity (refer also **Section 9**).
"Low"	These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. These trees should not be considered as a constraint to the future development of the site.
"Very Low"	These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. The removal of these trees is therefore recommended regardless of the implications of any proposed development.

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[7]

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels,

(either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

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

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

7.3 Acceptable Encroachments to the Tree Protection Zone.

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

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

7.4 Acceptable Encroachments to the Canopy

7.4.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. 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 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
Site Plan	Design Inc.	TAP -150088-NS-AR-1120 [3]	13/08/2018
Existing & Demolition Plan	Design Inc.	TAP -150088-NS-AR-1130 [3]	13/08/2018
Lift 1 & 2 - Platform Level	Design Inc.	TAP -150088-NS-AR-1250 [3]	13/08/2018
Hamilton Street Entry & Lift 3	Design Inc.	TAP -150088-NS-AR-1251 [3]	13/08/2018
Lift 1 & 2 Bridge Level	Design Inc.	TAP -150088-NS-AR-1252 [3]	13/08/2018
Elevations Sheet 1	Design Inc.	TAP -150088-NS-AR-1300 [3]	13/08/2018
Elevations Sheet 2	Design Inc.	TAP -150088-NS-AR-1301 [3]	13/08/2018

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 one (1) tree of moderate retention value, being T13 (Queensland Pittosporum). This tree has no special ecological or heritage significance, but is in good health and condition and makes a fair contribution to the amenity of the site. 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 elsewhere within the site in accordance with **Section 11** of this document.

9.1.4 A portion of the existing concrete footpath is proposed to be demolished within the TPZs of Trees T3, T5, T6 & T8 (all Brushbox). This work will not result in any adverse impact on these trees, provided that the pavement is demolished (where required) in accordance with **Section 10.5** of this document.

9.1.5 Existing pavements within the TPZ of T19a (Red Bloodwood located within the adjoining property) are proposed to be demolished and replaced with new paved areas in a similar footprint at a similar grade. It should be noted that these paved areas are located beyond an existing concrete retaining wall of approximately 700mm high located on the common boundary. This wall would form a barrier to root development to the south of the tree to an extent. As such, this work will not result in any adverse impact on this tree, provided that the existing pavements are demolished in accordance with **Section 10.5** of this document.

9.1.6 The existing asphalt pavement on the western platform is proposed to be demolished within the TPZs of Trees T20 (Camphor Laurel) and T21 & T22 (Brushbox). The existing pathway is also

proposed to be re-graded within the TPZ of T12 (Queensland Pittosporum) (which may require partial demolition of the existing pavement). This work will not result in any adverse impact on these trees, provided that the asphalt is demolished in accordance with **Section 10.5** of this document.

9.1.7 A proposed new accessible parking area and 'kiss and ride' parking area are located within the TPZ's of T3, T5 & T6 (Brushbox). This will necessitate the construction of a new (re-aligned) kerb and gutter and kerb ramp, requiring some excavations for the foundations of these structures within the TPZs of these trees. However, the majority of these excavations are located within the footprint of the existing concrete pavement (to be demolished). As such, the proposed works should not result in any actual incursion to the root zone and therefore the works will not result in any adverse impact on these trees. As a precautionary measure, all excavations for the foundations of the kerb and gutter and kerb ramp within the TPZs of these trees should be undertaken in accordance with **Section 10.6** of this document. Temporary Ground Protection should be installed on the western side of the path within the TPZs (as indicated on the Tree Protection Plan – **Appendix 6**) to prevent compaction and disturbance of the remainder of the TPZ during construction in accordance with **Section 10.11** of this document.

9.1.8 A proposed new (wider) footpath is located within the TPZ of T8 (Brushbox). This will require some excavation within the TPZ and SRZ of T8, which has the potential to result in severance and damage to woody roots of this tree, leading to an adverse impact. In order to avoid any adverse impact, all excavations for the pavement sub-grade within the TPZ should be undertaken in accordance with **Section 10.6** of this document.

9.1.9 Access for construction equipment (such as piling rigs etc) may be required from the existing NSRU compound to Lift 1. If construction access must traverse the TPZ of T13a (Crepe Myrtle), suitable ground protection should be installed in accordance with **Section 10.11** of this document [as indicated on the Tree Protection Plan (**Appendix 6**)].

9.1.10 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 [**T3, T5, T6, T8 & T12**] to avoid accidental damage, as indicated on the Tree Protection Plan (**Appendix 6**). The trunk protection shall consist of a layer of carpet underfelt (or similar) wrapped around the trunk, followed by 1.8 metre lengths of softwood timbers (90 x 45mm in section) aligned vertically and spaced evenly around the trunk at 150mm centres (i.e. with a 50mm gap) and secured together with 2mm galvanised wire or galvanised hoop strap as shown in **Figure 3**. Recycled timber (such as demolition waste) may be suitable for this purpose, subject to the approval of the Project Arborist. The timbers shall be wrapped around the trunk (over the carpet underfelt), but not fixed to the tree to avoid mechanical injury or damage to the trunk. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period. Carpet underfelt (alone) is sufficient for trees with a trunk diameter of less than 200mm. This shall be wrapped around the trunk in a double layer and held in place with heavy-duty fibre reinforced adhesive tape (e.g. Gaffer Tape).

Figure 3 – Detail of Trunk Protection

10.5 Demolition Works within Tree Protection Zones

10.5.1 Demolition of paved areas within the Tree Protection Zones (TPZs) of trees [**T3, T5, T6, T8 & T12**] 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 10.11** 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 [**T3, T5, T6, T8 & T12**] 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 building foundations or pavement sub-grade within the TPZs of Trees [**T3, T5, T6, T8 & T12**] 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 (e.g. 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 with 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 Where trenching for underground services and stormwater pipes within the TPZs of Trees [**any tree nominated for retention**] exceeds 10% of the TPZ, 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 [**T3, T5, T6, T8 & T12**] 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 Root Pruning

10.9.1 Where root pruning of [**T3, T5, T6, T8 & T12**] is required, such pruning 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]. Roots approved for pruning 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 Tree Removal

10.10.1 The removal of Trees [**T13**] 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.

10.10.2 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.

10.11 Ground Protection

10.11.1 20mm thick marine ply sheets, truck mats (such as Envirex Versadeck® access mats) (refer **Figure 6**) or rumble boards should be placed in nominated areas of TPZs of Trees [**T3, T5, T8 & T13a**] to prevent compaction and disturbance of the root zone during construction. 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.

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

- *Syzygium paniculatum* (Magenta Cherry)
- *Lophostemon confertus* (Brushbox)
- *Pittosporum rhombifolium* (Queensland Pittosporum)
- *Waterhousea floribunda* (Weeping Lillypilly)
- *Syncarpia glomulifera* (Turpentine)
- *Fraxinus griffithii* (Evergreen Ash)
- *Zelkova serrata* (Japanese Zelkova)
- *Fraxinus Raywood* (Claret Ash)
- *Jacaranda mimosifolia* (Jacaranda)
- *Magnolia grandiflora* (Bullbay Magnolia)

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
27th August 2018

12 REFERENCES

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[2] Benson, Doug & Howell, Jocelyn (1990)
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[3] Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)
The Body Language of Trees – A Handbook for Failure Analysis
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[4] Barrell, Jeremy (1996)
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Proceedings of the International Conference on Trees and Building Sites (Chicago)
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[5] National Parks and Wildlife Service of NSW (October 2002)
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Street Trees adjacent to North Strathfield Railway Station
State Heritage Register – Heritage Database.
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[7] Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

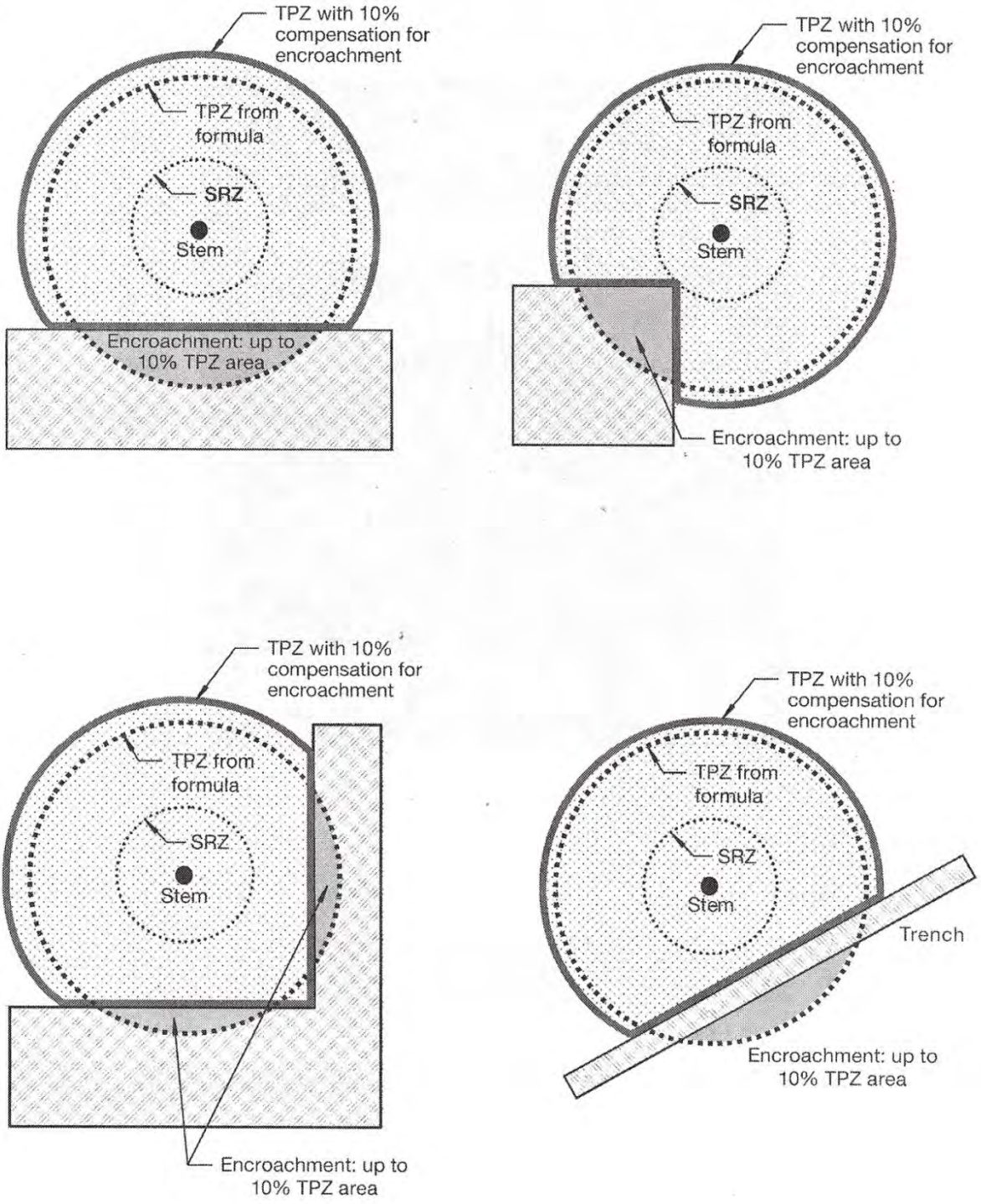
APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened 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 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m²;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of 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 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no 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	***Lophostemon confertus*** (Brushbox)	14	10	713	110	M	Appears stable with fair branching structure. Exhibits multiple PLs at 1.5 metres. Crown suppressed on west side due previous pruning. Multiple low bark inclusions at 1.5 metres. Moderate wound on lower trunk due mechanical injury.	SLs previously lopped at 3 metres and TLs at 6 metres (crown restored). Crown lifted to 3 metres	Good	No Evidence	Long - more than 40 years	2	**High**	On site (east side)
2	***Lophostemon confertus*** (Brushbox)	11	7	570	63	M	Appears stable with poor branching structure. Exhibits multiple PLs at 1.5 metres. Crown suppressed on west side & multiple epicormic sprouts due previous pruning with poor form and habit.	PLs previously lopped at 2 metres (crown restored). Crown lifted to 2 metres	Good	No Evidence	Short 5-15 Years	2	**Moderate**	On site (east side)
3	***Lophostemon confertus*** (Brushbox)	13	12	768	120	M	Appears stable with fair branching structure. Exhibits multiple PLs at 1.5 metres. Crown suppressed on west side due previous pruning.	SLs previously lopped at 3 metres and TLs at 6 metres (crown restored). Pruned west side to clear powerlines	Good	No Evidence	Medium 15-40 Years	2	**High**	On site (east side)
4	***Lophostemon confertus*** (Brushbox)	5	10	539	40	M	Appears stable with poor branching structure. Exhibits multiple co-dominant PLs at 1.5 metres. Crown suppressed on west side due previous pruning.	Gully cut at 2 & 3 metres to clear overhead powerlines.	Good	No Evidence	Short 5-15 Years	2	**Moderate**	On site (east side)
5	***Lophostemon confertus*** (Brushbox)	16	13	943	182	M	Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at 1.5 metres. Crown suppressed on west side due previous pruning.	SLs previously lopped at 3 metres and TLs at 6 metres (crown restored). Pruned west side to clear powerlines	Good	No Evidence	Medium 15-40 Years	2	**High**	On site (east side)

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

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
6	***Lophostemon confertus*** (Brushbox)	13	10	793	110	M	Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at 1.0 metre. Crown suppressed on west side due previous pruning.	SLs previously lopped at 3 metres and TLs at 6 metres (crown restored). Pruned west side to clear powerlines	Good	No Evidence	Medium 15-40 Years	2	**High**	On site (east side)
7	***Lophostemon confertus*** (Brushbox)	14	10	662	120	M	Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at 2.0 metres. Crown suppressed on east side due previous pruning.	SLs previously lopped at 3 metres and TLs at 6 metres (crown restored). Pruned east side to clear powerlines	Good	No Evidence	Medium 15-40 Years	2	**High**	On site (east side)
8	***Lophostemon confertus*** (Brushbox)	8	12	395 + 260 + 350	60	M	Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at GL with moderate included bark. Crown suppressed on west side due previous pruning.	Lopped at 5 metres to clear overhead powerlines.	Good	No Evidence	Medium 15-40 Years	2	**High**	On site (east side)
9	***Lophostemon confertus*** (Brushbox)	14	13	688	143	M	Appears stable with fair branching structure. Crown suppressed on east side due previous pruning. Exhibits multiple co-dominant PLs at 1.5 metres.	SLs previously lopped at 3 metres and TLs at 6 metres (crown restored). Pruned east side to clear powerlines	Good	No Evidence	Medium 15-40 Years	2	**High**	On site (east side)
9a	***Corymbia ficifolia*** (Red Flowering Gum)	15	9	250x2 + 220 +200x4	108	M	Appears stable with sound branching structure. Crown suppressed on the east side due to cowding. Multiple co-dominant trunks at GL.	May have been previously cut to GL, resulting in regeneration of multiple trunks	Good	No Evidence	Medium 15-40 Years	3	**High**	On site (east side)
10	***Lagerstroemia indica*** (Crepe Myrtle)	2	2	200	2	M	Appears stable with poor branching structure. Exhibits a moderate cavity in lower trunk. Multiple epicormic sprouts emanating from old pruning wounds.	Pollarded at 1.5 metres	Fair	No Evidence	Transient - less than 5 years	5	**Very Low**	On site (east side)

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

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
11	***Lagerstroemia indica*** (Crepe Myrtle)	2.5	3	320	3	M	Appears stable with poor branching structure. Exhibits a prominent lean to the south. Multiple epicormic sprouts emanating from old pruning wounds.	Pollarded at 2 metres	Fair	No Evidence	Short 5-15 Years	5	**Low**	On site (east side)
12	***Pittosporum rhombifolium*** (Queenland Pittosporum)	7	6	274	30	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On site (east side)
13	***Pittosporum rhombifolium*** (Queenland Pittosporum)	8	6	290	36	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	**Moderate**	On site (east side)
13a	***Lagerstroemia indica*** (Crepe Myrtle)	5	5	150	15	SM	Appears stable with sound branching structure. Crown suppressed south side due crowding.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**Moderate**	On site (east side)
14	***Lagerstroemia indica*** (Crepe Myrtle)	5	5	150	15	SM	Appears stable with sound branching structure. Crown suppressed on the north side due to crowding.	Crown lifted to 2 metres	Good	No Evidence	Medium 15-40 Years	5	**Moderate**	On site (east side)
15	***Grevillea robusta*** (Silky Oak)	10	3.5	150	24.5	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	**Low**	On site (east side)
16	***Brachychiton acerifolius*** (Illawarra Flame Tree)	10	8	395	64	M	Appears stable with sound branching structure.	TLs selectively pruned east side to clear overhead powerlines	Very Good	No Evidence	Long - more than 40 years	3	**High**	On site (east side)
17	***Lophostemon confertus*** (Brushbox)	7	6	320	30	SM	Appears stable with fair branching structure. Crown suppressed east side due to previous pruning with poor form and habit.	SLs lopped east side to clear overhead powerlines	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	5	**Low**	On site (east side)
17a	***Angophora floribunda*** (Rough-barked Apple)	12	13	360	130	M	Appears stable with poor branching structure. Crown suppressed west due to previous pruning with poor form and habit. Extended lateral PLs over roadway.	Gully cut at 3-5 metres to clear overhead powerlines	Very Good	No Evidence	Short 5-15 Years	3	**Moderate**	On site (east side)

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

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
17b	***Angophora floribunda*** (Rough-barked Apple)	14	18	650	180	M	Appears stable with poor branching structure. Upper crown suppressed due to previous pruning with poor form and habit. Multiple extended lateral PLs over roadway. Prominent lean to the north.	Gully cut at 3-5 metres to clear overhead powerlines	Very Good	No Evidence	Short 5-15 Years	3	**Moderate**	On site (east side)
19a	***Corymbia gummifera*** (Red Bloodwood)	15	16	800	208	M	Appears stable with sound branching structure. Closed to existing masonry wall on common boundary (700mm high).	Selectively pruned east side to clear rail corridor.	Very Good	No Evidence	Long - more than 40 years	2	**High**	Adjoining property
20	***Cinnamomum camphora*** (Camphor Laurel)	12	13	600	130	M	Appears stable with sound branching structure. Exhibits moderate dieback with 10% deadwood.	Deadwooded	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	3	**Moderate**	On site (west side)
21	***Lophostemon confertus*** (Brushbox)	13	13	900	130	M	Appears stable with sound branching structure.	Crown lifted to 3 metres	Very Good	No Evidence	Long - more than 40 years	3	**High**	On site (west side)
22	***Lophostemon confertus*** (Brushbox)	12	10	400x2	80	M	Appears stable with sound branching structure. Crown suppressed on the south side due crowding.	Crown lifted to 3 metres	Good	No Evidence	Long - more than 40 years	3	**High**	On site (west side)
23	***Lophostemon confertus*** (Brushbox)	12	10	600	100	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	3	**High**	On site (west side)
24	***Lophostemon confertus*** (Brushbox)	12	8	200 +250	80	SM	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 0.5 metres	Crown lifted to 2 metres	Fair with slightly thinning crown	No Evidence	Long - more than 40 years	4	**Moderate**	On site (west side)
24a	***Lophostemon confertus*** (Brushbox)	7	8	200x2	56	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	On site (west side)
25	***Lophostemon confertus*** (Brushbox)	8	11	400	66	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	On site (west side)
26	***Lophostemon confertus*** (Brushbox)	8	6	180 +220	42	SM	Appears stable with fair branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	On site (west side)

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

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
27	***Fraxinus graffithii*** (Evergreen Ash)	4.5	5	200	15	SM	Appears stable with fair branching structure.	PLs previously lopped at 1.5 metres (crown restored).	Very Good	No Evidence	Medium 15-40 Years	5	**Low**	On site (centre platform)
28	***Fraxinus graffithii*** (Evergreen Ash)	4	4	180	10	SM	Appears stable with fair branching structure.	PLs previously lopped at 1.5 metres (crown restored).	Very Good	No Evidence	Medium 15-40 Years	5	**Low**	On site (centre platform)

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

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	***Lophostemon confertus*** (Brushbox)	M	8.6	2.9	230.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
2	***Lophostemon confertus*** (Brushbox)	M	6.8	2.6	146.9	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
3	***Lophostemon confertus*** (Brushbox)	M	9.2	3.0	266.4	Portion of existing concrete footpath offset 3.4 metres east to be demolished within TPZ. Portion of existing kerb and gutter offset 5.9 metres north-east to be demolished within TPZ. Proposed new layback/kerb and gutter offset 5.2 metres east to accomodate new parking areas (within footprint of existing pavement). New path offset 3.4 metres east and kerb ramp 6.3 metres north-east (within footprint of existing footpath) Encroachment to TPZ = 16%.	No adverse impact from demolition works provided that all such works are undertaken as recommended. Extent of encroachment from new works to TPZ exceeds acceptable limits under AS 4970:2009. However, this tree will tolerate the extent of encroachment give that the majority of the works are located within the footprint of the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Trunk Protection boarding in accordance with Section 10.4. Install ground Protection in accordance with Section 10.11. Demolish existing concrete pathway in accordance with Section 10.5. Undertake all excavations for the sub-grade of the new pavement and foundations of the new kerb and gutter and kerb ramp within the TPZ in accordance with Section 10.6.
4	***Lophostemon confertus*** (Brushbox)	M	6.5	2.6	131.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
5	***Lophostemon confertus*** (Brushbox)	M	11.3	3.2	401.8	Portion of existing concrete footpath offset 2.4 metres east to be demolished within TPZ. Portion of existing kerb and gutter offset 5.0 metres east to be demolished within TPZ. Proposed new layback/kerb and gutter offset 4.1 metres east to accomodate new parking areas. New path offset 2.4 metres east and kerb ramp 4.2 metres south-east. Excavations for foundations within TPZ (partially within footprint of existing footpath). Encroachment to TPZ = 32% (majority covered by existing path and road pavement).	No adverse impact from demolition works provided that all such works are undertaken as recommended. Extent of encroachment from new works to TPZ exceeds acceptable limits under AS 4970:2009. However, this tree will tolerate the extent of encroachment give that the majority of the works are located within the footprint of the existing path.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Trunk Protection boarding in accordance with Section 10.4. Install ground Protection in accordance with Section 10.11. Demolish existing concrete pathway in accordance with Section 10.5. Undertake all excavations for the sub-grade of the new pavement and foundations of the new kerb and gutter and kerb ramp within the TPZ in accordance with Section 10.6.
6	***Lophostemon confertus*** (Brushbox)	M	9.5	3.0	284.3	Portion of existing concrete footpath offset 6.6 metres south-east to be demolished within TPZ.	No adverse impact from demolition works provided that all such works are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing concrete pathway in accordance with Section 10.5.
7	***Lophostemon confertus*** (Brushbox)	M	7.9	2.8	198.4	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
8	***Lophostemon confertus*** (Brushbox)	M	8.4	2.8	221.6	Portion of existing concrete footpath offset 3.5 metres east to be demolished within TPZ. Proposed new concrete path offset 2.9 metres east at RL? (assumed close to existing grade). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 8%.	No adverse impact from demolition works provided that all such works are undertaken as recommended. Excavations for the extended path sub-grade have the potential to result in severance and damage to woody roots. Proposed works may result in an adverse impact	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Trunk Protection boarding in accordance with Section 10.4. Install ground Protection in accordance with Section 10.11. Demolish existing concrete pathway in accordance with Section 10.5. Undertake all excavations for the sub-grade of the new pavement subgrade within the TPZ in accordance with Section 10.6.
9	***Lophostemon confertus*** (Brushbox)	M	8.3	2.8	214.0	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
9a	***Corymbia ficifolia*** (Red Flowering Gum)	P	7.2	2.7	162.8	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
10	***Lagerstroemia indica*** (Crepe Myrtle)	M	2.4	1.7	18.1	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
11	***Lagerstroemia indica*** (Crepe Myrtle)	M	3.8	2.1	46.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
12	***Pittosporum rhombifolium*** (Queenland Pittosporum)	M	3.3	1.9	33.9	Existing pathway offset 1.1 metres north to be re-graded within TPZ.	No adverse impact from pavement works provided that all such works are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install temporary Trunk Protection boarding in accordance with Section 10.4. Demolish existing asphalt pathway (where required) in accordance with Section 10.5
13	***Pittosporum rhombifolium*** (Queenland Pittosporum)	M	3.5	2.0	38.0	Located within footprint of proposed lift entry and upgraded entry path.	Proposed works will necessitate removal.	Undertake replacement planting elswhere within the site with a new tree to compensate for loss of amenity in accordance with Section 11.
13a	***Lagerstroemia indica*** (Crepe Myrtle)	M	3.0	1.5	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
14	***Lagerstroemia indica*** (Crepe Myrtle)	M	3.0	1.5	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
15	***Grevillea robusta*** (Silky Oak)	M	2.0	1.5	12.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
16	***Brachychiton acerifolius*** (Illawarra Flame Tree)	M	4.7	2.2	70.5	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
17	***Lophostemon confertus*** (Brushbox)	M	3.8	2.1	46.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
17a	***Angophora floribunda*** (Rough-barked Apple)	P	4.3	2.2	58.6	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
17b	***Angophora floribunda*** (Rough-barked Apple)	P	7.8	2.8	191.0	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
19a	***Corymbia gummifera*** (Red Bloodwood)	P	9.6	3.0	289.4	Existing pavements offset 1.9 metres south to be demolished within TPZ (beyond existing masonry retaining wall on common boundary).	No actual incursion to root zone due to barrier created by existing retaining wall. No adverse impact.	To be retained - no special tree protection measures required.
20	***Cinnamomum camphora*** (Camphor Laurel)	M	7.2	2.7	162.8	Asphalt pavement to platform offset 5.5 metres east to be demolished within TPZ. New asphalt pavement to be installed to platform in same footprint.	No adverse impact.	To be retained - no special tree protection measures required.
21	***Lophostemon confertus*** (Brushbox)	M	10.8	3.2	366.2	Asphalt pavement to platform offset 4.6 metres east to be demolished within TPZ. New asphalt pavement to be installed to platform in same footprint.	No adverse impact.	To be retained - no special tree protection measures required.
22	***Lophostemon confertus*** (Brushbox)	M	7.2	2.7	162.8	Asphalt pavement to platform offset 6.1 metres east to be demolished within TPZ. New asphalt pavement to be installed to platform in same footprint.	No adverse impact.	To be retained - no special tree protection measures required.
23	***Lophostemon confertus*** (Brushbox)	M	7.2	2.7	162.8	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
24	***Lophostemon confertus*** (Brushbox)	M	4.0	2.1	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
24a	***Lophostemon confertus*** (Brushbox)	M	4.0	2.0	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
25	***Lophostemon confertus*** (Brushbox)	M	5.5	2.3	95.0	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
26	***Lophostemon confertus*** (Brushbox)	M	4.0	2.0	50.2	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.
27	***Fraxinus graffithii*** (Evergreen Ash)	M	3.0	1.7	28.3	Asphalt pavement to platform offset 2.4 metres south to be demolished within TPZ. New asphalt pavement to be installed to platform in same footprint.	No adverse impact.	To be retained - no special tree protection measures required.
28	***Fraxinus graffithii*** (Evergreen Ash)	M	3.0	1.6	28.3	No proposed works within TPZ.	No adverse impact.	To be retained - no special tree protection measures required.

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

LEGEND
TREE RETENTION VALUES

HIGH

MODERATE

LOW

VERY LOW

SHEET 1

SHEET 2

SHEET 3

SHEET 4

HAMILTON STREET EAST

QUEEN STREET

POMEROY STREET

WATER SUPPLY PIPELINE OLB

BERONGA STREET

NORTH STRATHFIELD STATION

T1 T2 T3 T4 T5 T6 T7 T8 T9a T9 T10 T11 T12 T13 T13a T14 T15 T16 T17 T17a T17b T19a T20 T21 T22 T23 T24 T24a T25 T26 T27 T28

APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
Strathfield Railway Station
Queen Street, NORTH STRATHFIELD, NSW

Earthscape Horticultural Services
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Based on the Survey Drawing
prepared by
Dwg Ref No.
Dated

DWG No. T18-080801 [A]

KEY PLAN

DATE: 08/08/2018

LEGEND
TREE RETENTION VALUES

HIGH

MODERATE

LOW

VERY LOW

15

18

0.70ø
14SP
15H

0.50ø
6SP
10H

0.60ø
8SP
10H

T1
Brushbox

T2
Brushbox

T3
Brushbox

T4
Brushbox

T5
Brushbox

T6
Brushbox

T7
Brushbox

T8
Brushbox

T9
Brushbox

T9a
Red Flowering Gum

T10
Crepe Myrtle

T11
Crepe Myrtle

T12
Queensland Pittosporum

T13
Queensland Pittosporum

T13a
Crepe Myrtle

T14
Crepe Myrtle

T16
Illawarra F

TIMBER

& BOTTOM

CONCRETE

FOOTPATH

BITUMEN

CONCRETE

BITUMEN

BIKE LOCKUP

RETAINING WALL

BOUNDARY FENCE

FOOTPATH

TOE BOTTOM

STAIRS TO OVERBRIDGE

BOTTOM TOP OF BANK

BOUNDARY FENCE

BITUMEN

GARDEN

FOOTPATH

BITUMEN

GARDEN

FOOTPATH

TIMBER CROSS ARM

CONCRETE

TELSTRA PIT

TOP & INVERT OF KERB

TOP & INVERT

QUEEN STREET

APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
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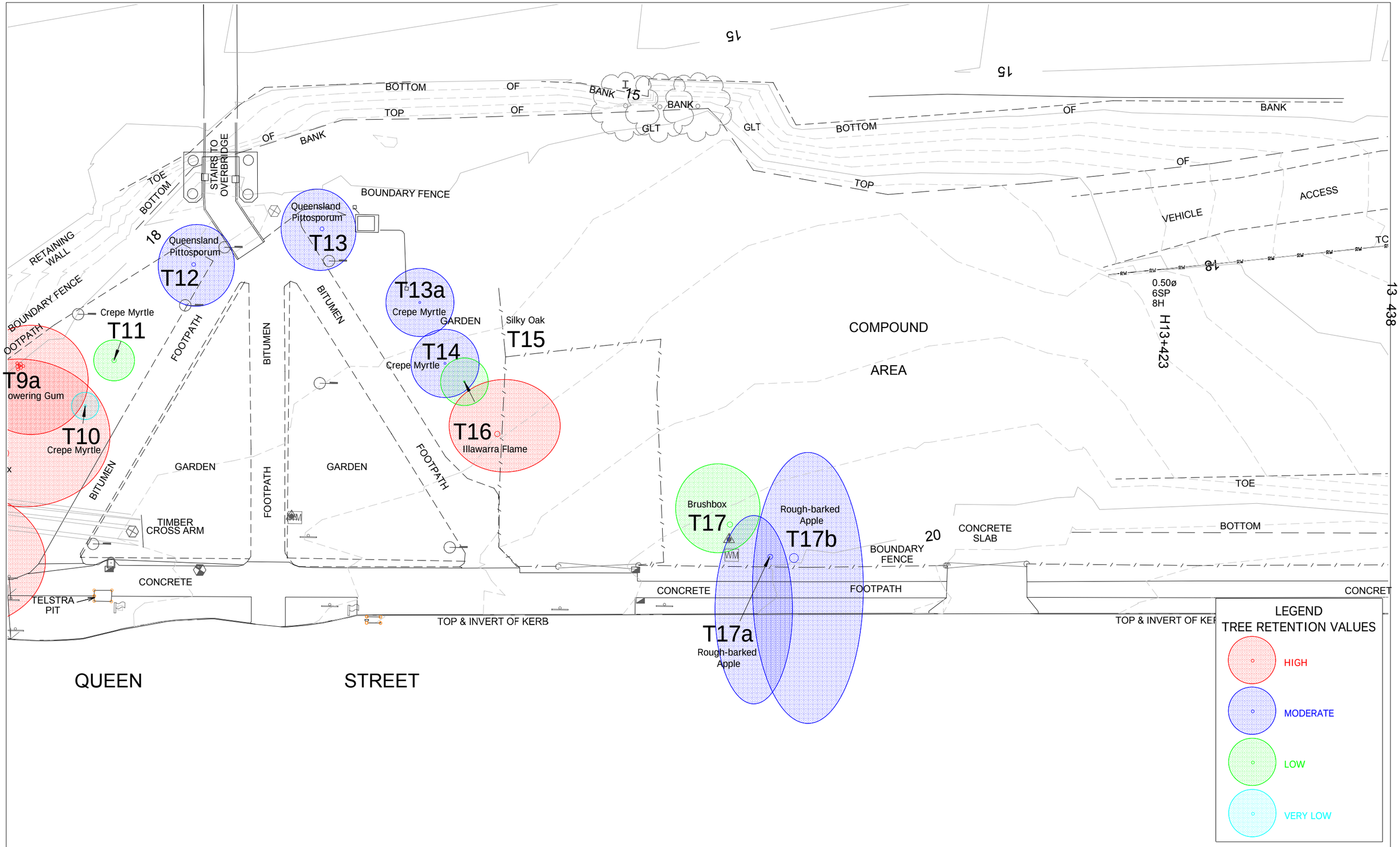
SHEET 1

DATE: 08/08/2018



APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
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SHEET 2

DATE: 08/08/2018

LEGEND
TREE RETENTION VALUES

HIGH

MODERATE

LOW

VERY LOW

CONCRETE KE

T19a

Red Bloodwood

H13+381

H13+320

FENCE

STAIRS

EDGE OF AWNING

CONCRETE FOOTPATH

FENCE

RETAINING WALL

EDGE

OF

BT15088

BALLAST

BALLAST

15

EDGE

OF

COPING

T28

Evergreen Ash

COLUMN

COLUMN

NORTH STRATHFIELD STATION

STAIRS

TICKET MACHINE

AWNING

EDGE

FENCE

GATE

EDGE

OF

COPING

EDGE

EGDE

OF

AWNING

OF

15

BOTTOM

OF

BANK

15

APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES

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SHEET 3

DATE: 08/08/2018

LEGEND
TREE RETENTION VALUES

HIGH

MODERATE

LOW

VERY LOW

81

FENCE

CONCRETE FOOTPATH

FENCE

CONCRETE SLAB

CONCRETE FOOTPATH

T20
Camphor Laurel

T21
Brushbox

T22
Brushbox

T23
Brushbox

H13+423

H13+438

T24
Brushbox

TOP

OF

T24a
Brushbox

FENCE

BANK

T25
Brushbox

TOP

Brushbox
T26

F

OF

DOWN

15

COPING

RELIEF

BT14183

EDGE

15

DOWN

OF

MAIN

COPING

T27
Evergreen Ash
GARDEN AREA

GARDEN AREA

NORTH STRATHFIELD STATION

PM57022

GATE

FENCE

15

TO BOTTO

EGDE OF AWNING

OF

COPING

TOP

UP

MAIN

15

RELIEF

TOP

BOTTOM

OF

OF

BALLAST

BALLAST

TOP

BOTTOM

BANK

15

15

APPENDIX 5
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SHEET 4

DATE: 08/08/2018

LEGEND

- Tree to be retained and protected in accordance with Tree Protection Measures (Section 10)
- Tree to be removed in accordance with Section 10.10
- Install trunk protection in accordance with Section 10.4
- Tree Protection Zone (TPZ) [refer Section 7]
  - Canopy "Drip-line"
  - Structural Root Zone (SRZ)
- Existing buildings & structures to be demolished. Demolition works within TPZ's to be undertaken in accordance with Section 10.5
- New Building works. All excavations for building foundations within TPZ's to be undertaken in accordance with Section 10.6
- Excavations in these areas for footings and services to be undertaken in accordance with Section 10.6
- Install Ground Protection in Accordance with Section 10.11

ACHIEVE DDA COMPLIANCE
NEW LIFT LANDING
BOTTOM
TOP
FALL
OF BANK
FALL
LIFT 1
STAIRS TO OVERBRIDGE
TOE
BOTTOM
BOUNDARY FENCE
Queensland Pittosporum
T13
EX. STAIR
RETAINING WALL
1300
BOUNDARY FENCE
18
Queensland Pittosporum
T12
2
T13a
Crepe Myrtle
GARDEN
T14
Crepe Myrtle
T16
Illawarra F
BITUMEN
EX. FOOTPATH
FOOTPATH
BITUMEN
EX. FOOTPATH
FOOTPATH
Crepe Myrtle
T11
T9a
Red Flowering Gum
T10
Crepe Myrtle
T9
Brushbox
GARDEN
GARDEN
TRADE WATER FACILITY
15
0.70ø
14SP
15H
TIMBER
& BOTTOM
Brushbox
T2
T4
Brushbox
Brushbox
T7
CONCRETE
Brushbox
T8
0.50ø
6SP
10H
0.60ø
8SP
10H
T1
Brushbox
Brushbox
T3
Brushbox
T5
18
BITUMEN
T6
Brushbox
EX. BIKE RACK AND LOCKER
BIKE LOCKUP
TIMBER CROSS ARM
RETAIN EX. LANDSCAPING
RETAIN EX. LANDSCAPING
CONCRETE
CONCRETE
FOOTPATH
EX. SHELTER
TELSTRA PIT
TOP & INVERT OF KERB
DDA ACCESSIBLE PARKING
DDA ACCESSIBLE K&R
KISS & RIDE
TOP & INVERT
EX. PAVED SPEED HUMP
EX. PEDESTRIAN CROSSING
QUEEN STREET
BANK

APPENDIX 6

TREE PROTECTION PLAN

Strathfield Railway Station
Queen Street, NORTH STRATHFIELD, NSW

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Based on the Survey Drawing
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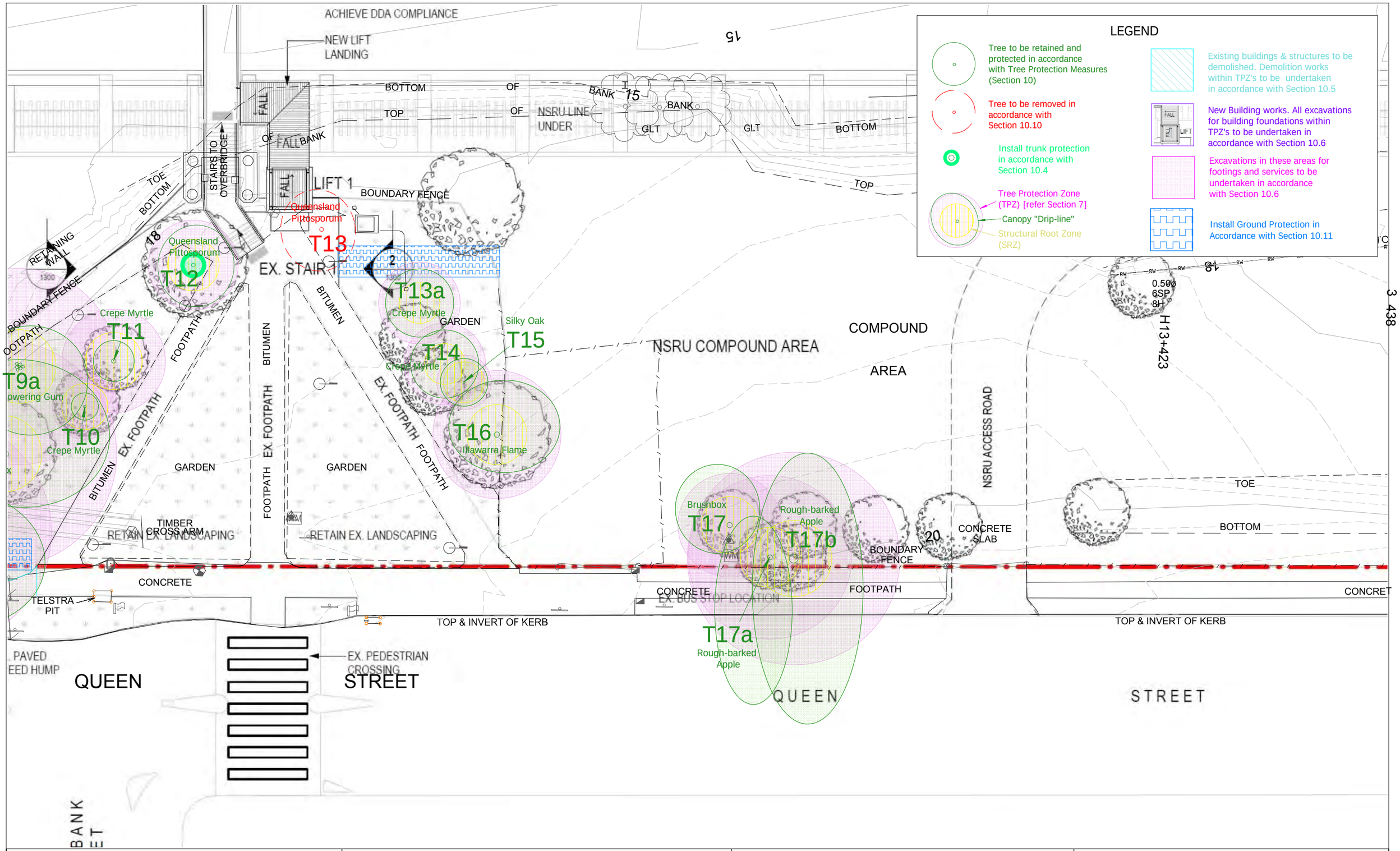
Dated

DWG No. T18-080802 [D]

SHEET 1

DATE: 27/08/2018



APPENDIX 6

TREE PROTECTION PLAN

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Dwg Ref No.

Dated

DWG No. T18-080802 [D]

SHEET 2

DATE: 27/08/2018

LEGEND

Tree to be retained and protected in accordance with Tree Protection Measures (Section 10)

Tree to be removed in accordance with Section 10.10

Install trunk protection in accordance with Section 10.4

Tree Protection Zone (TPZ) [refer Section 7]

Canopy "Drip-line"

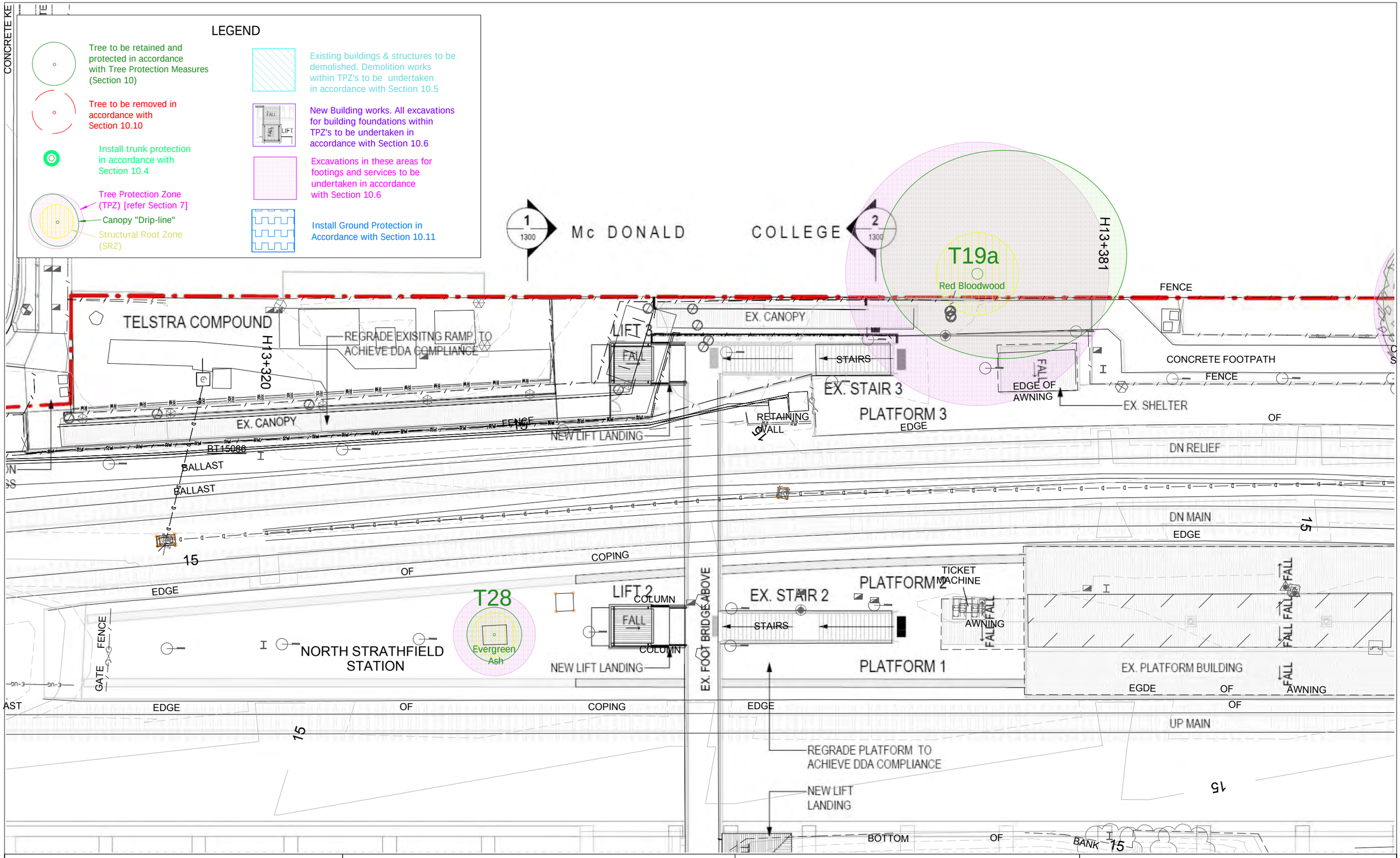
Structural Root Zone (SRZ)

Existing buildings & structures to be demolished. Demolition works within TPZ's to be undertaken in accordance with Section 10.5

New Building works. All excavations for building foundations within TPZ's to be undertaken in accordance with Section 10.6

Excavations in these areas for footings and services to be undertaken in accordance with Section 10.6

Install Ground Protection in Accordance with Section 10.11



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TREE PROTECTION PLAN

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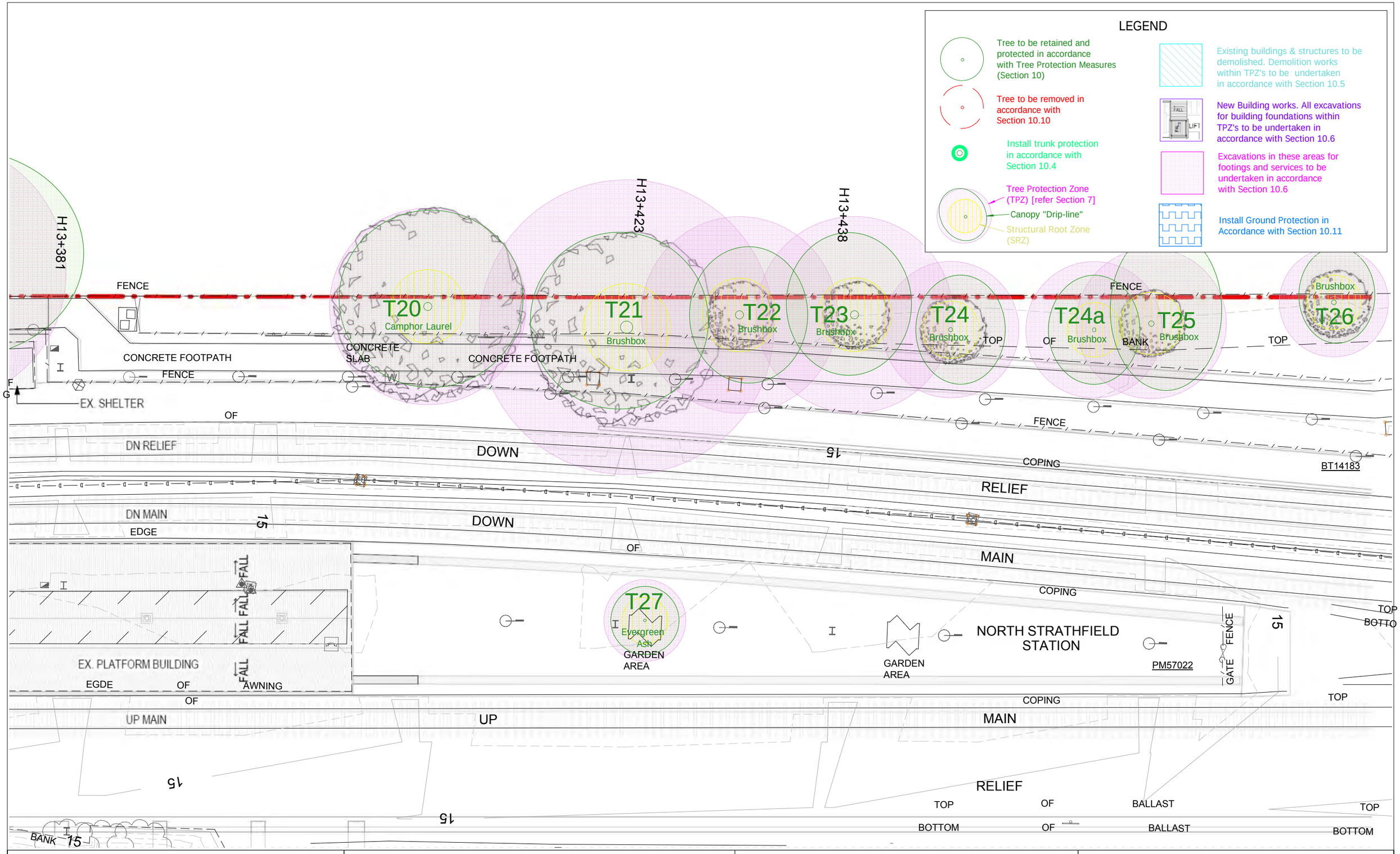
SHEET 3

DATE: 27/08/2018



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DATE: 27/08/2018