



EARTHSCAPE HORTICULTURAL SERVICES
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ARBORICULTURAL IMPACT ASSESSMENT REPORT

PROPOSED CYCLEWAY

NEW SOUTH HEAD ROAD, ROSE BAY

March 2019

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1 INTRODUCTION

- 1.1.1 This report was commissioned by Complete Urban on behalf of Woollahra Council to assess the health and condition of twenty-six (26) trees located within New South Head Road, Rose Bay. The report has been prepared to aid in the assessment of a Development Application (DA)/Review of Environmental Factors (REF) for the reconfiguration of the existing public footpath and shared path alongside New South Head Road to provide a designated cycle path. The work forms part of a larger shared path network extending from Double Bay to Rose Bay (terminating at Lyne Park).
- 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 Woollahra Council's guidelines for preparation of Arborists Reports as outlined in Attachment 4 of Council's *Development Application Guide* 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 section of road reserve known as New South Head Road, Rose Bay. For the purposes of this report, the subject area will be referred to as 'the site'. The site is zoned Infrastructure (Classified Road) [SP2] under the *Woollahra Local Environmental Plan 2014* (WLEP). The site currently contains an existing shared footpath/cycleway forming an elevated promenade alongside the foreshore of Rose Bay, together with landscape areas, street trees and parallel street car parking bays. A masonry sea wall is located along the northern side of the promenade. An avenue of mature Hills Weeping Figs stand along New South Head Road, adjacent the promenade.
- 2.1.2 The landscape and soils of this area have been extensively disturbed and modified for urban development. Remnant soils of this area are typical of the Tuggerah Soil Landscape Group (as classified in the *Soil Landscapes of the Sydney 1:100,000 Sheet*), consisting of "deep (greater than 2000mm) *Podzols* on dunes and *Podzol/Humus Podzol* intergrades on swales." The landscape of the area was formerly gently undulating to rolling coastal dune fields with slope gradients of 1-10%.¹
- 2.1.3 Most of the locally-indigenous vegetation formerly found in this area has been cleared for residential development. The original vegetation of this area consisted of open woodland, Eastern Suburbs Banksia Scrub and coastal heath, with dominant locally-indigenous tree species including *Angophora costata* (Sydney Red Gum), *Eucalyptus haemastoma* (Scribbly Gum) and *Corymbia gummifera* (Red Bloodwood). Other species found in this vegetation community may include *Banksia integrifolia* (Coast Banksia), *Banksia aemula* (Wallum Banksia) and *Banksia serrata* (Old Man Banksia).² *Eucalyptus botryoides* (Bangalay), *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquenervia* (Broadleaved Paperbark) may also be found in low lying areas with poor drainage.

3 SUBJECT TREES

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 24th January 2019. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 6**), based on the site plan provided by Woollahra Council. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix**

4). Tree No.s T23, T24, T25 & T26 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 4**.

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy⁴ of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 4**.

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 Encroachments to Cyclist Design Envelope

- 4.3.1 Encroachments to the Cyclist Design Envelope (refer to **Figure 1**) were assessed using a metric surveyor's staff placed in a vertical alignment at the edge of the proposed cycleway, taken as an offset from the existing path as per the design drawings. Note that the Side Vertical Clearance extends beyond this alignment (500mm closer to the tree). Any portions of the subject trees encroaching into these envelopes have been recorded in the attached schedule (**Appendix 5**) along with the potential conflicts and implications for pruning to achieve the required clearances. Note that these assume a pavement placed at existing grade and do not account for any elevation in the pavement surface level. Where the trunk of the tree encroaches into the design envelope, the vertical distance from the pavement surface to the point at which the trunk encroaches has also measured and recorded in **Appendix 5**. Photographs of each tree have been shown in **Appendix 3**.

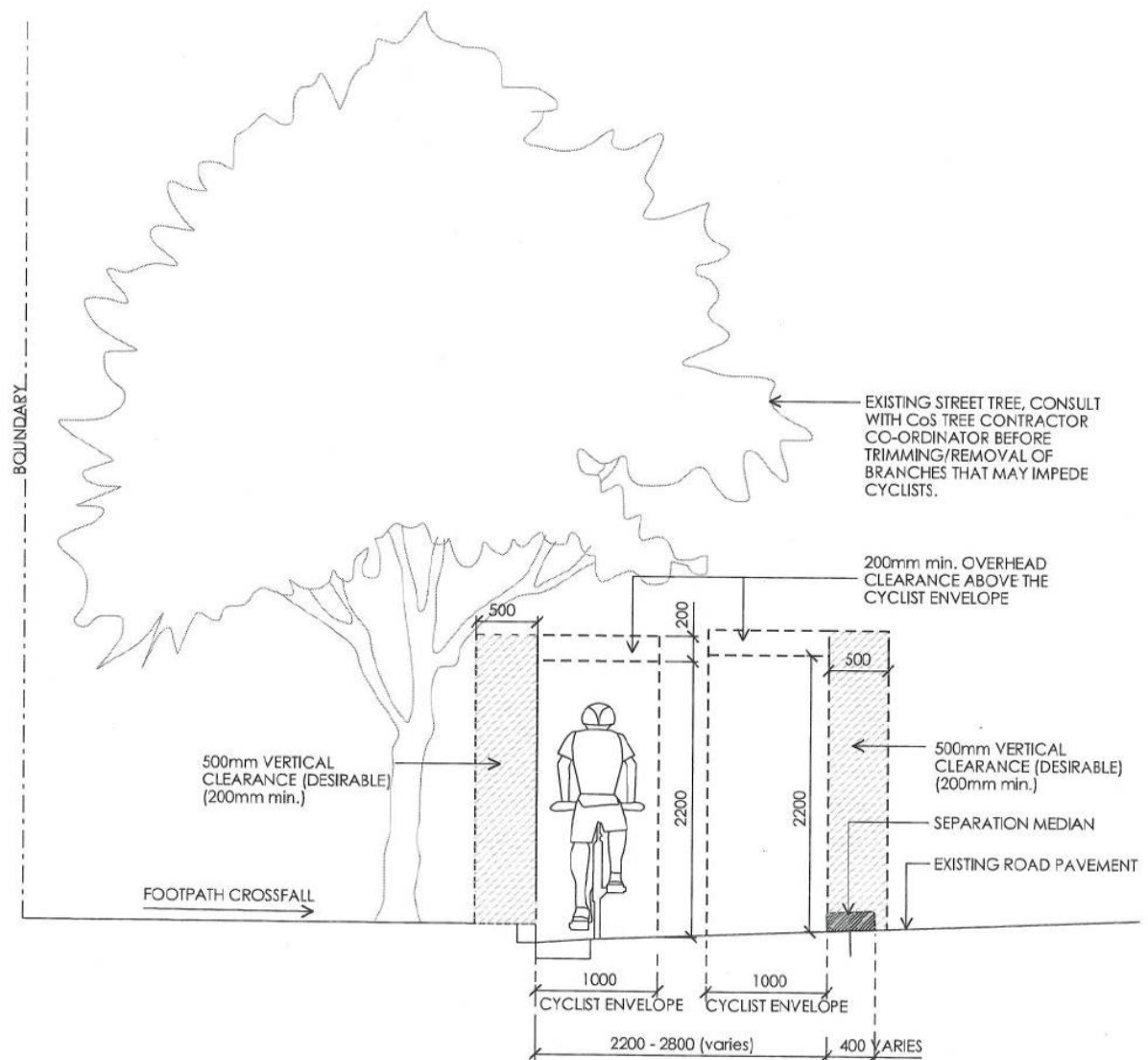


Figure 1 – Typical Cyclist Design Envelope – City of Sydney Council

4.4 General Observations

- 4.4.1 The majority of the subject trees are *Ficus macrocarpa* var. *hillii* (Hills Weeping Figs). Most are mature specimens forming part of the original plantings, but a number of the trees are semi-mature and immature (young) trees, being replacements for senescent trees, planted in a similar location to

the original layout. The majority of the mature trees exhibit multiple co-dominant primary limbs arising at 1-3 metres, forming broad umbellate crowns. The majority of these branch junctions exhibit included bark (bark inclusions) to varying degrees. Included bark forms a potential weakness at the branch junction, increasing the risk of branch failure under static (weight) or dynamic (wind) loading. This is exacerbated by the broad, extended lateral branching habit of the trees, with most branches exhibiting terminal loading (most of the foliage distributed toward the end third of the branch). Included bark is an inherent defect in this species. Despite the potential weakness, the subject trees exhibit few if any branch failures to date as a result of this defect.

- 4.4.2 The majority of the mature trees have also been lopped (all of the primary branches reduced) at about 4 to 5 metres from ground level). This was common practice from the 1950's to the 1980's and was probably undertaken in an attempt to produce a more compact form. This type of pruning produces multi-stemmed re-growth (epicormic growth) from the point of severance, eventually restoring the crown. However, the re-growth does not form a strong attachment to the parent branch and is often prone to failure. This type of pruning is no longer acceptable arboricultural practice for this reason.
- 4.4.3 A number of the trees, particularly in the central section of the Promenade, exhibit thinning crowns and dieback. This is possibly due to latent drought conditions from 2016 – 2018, which may have also led to lowering of the water table, leading reduced moisture availability and an overall decline in health. The areas around these trees is largely paved with little permeable area within the root zones. The decline could also be due to root damage during previous public domain upgrade works around the trees, (c. 2006-2007) which may have resulted in some root damage, salinity in the water table (given proximity to the harbour), or low or poor soil nutrient status (being typical of the natural soils of this area).
- 4.4.4 A few of the trees toward the western end of the Promenade [T19, T20 & T21] exhibit evidence of pathogenic fungal infections, affecting the lower trunk, butt and root crown area. Such disease creates significant structural weakness, which can lead to wholesale tree failure. The disease appears to be a *Phellinus species* (Bracket Fungus). This disease has led to many failures of similar size and age trees in Hyde Park and warrants further investigation and diagnostic testing (beyond the scope of this report).
- 4.4.5 Generally, the younger plantings are performing well, without the hinderances of poor management practices of the past, and do not appear to be developing the same inherent structural weaknesses (such as included bark) due to better stock selection and nursery stock management.

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 Municipality of Woollahra are protected under Section E.3.2.1 of the *Woollahra Development Control Plan 2015* (WDCP) made pursuant to Clause 9 of the *State Environmental Planning Policy (Vegetation in Non-rural Areas) 2017* (SEPP VNRA). The WDCP generally protects all trees and palms with a canopy spread of three (3) metres or greater or any tree or palm with a height of five (5) metres or greater (regardless of crown spread). The WDCP also protects any tree or palm listed on Council's Significant Tree Register or any tree located within a property listed as a Heritage Item in the WLEP or within a Heritage Conservation Area as listed in the in the WLEP. Some exemptions apply. However, all of the subject trees are protected under the provisions of the WDCP.

5.2.2 Wildlife Habitat

Eucalyptus pilularis (Blackbutt) [T23] and *Ficus rubiginosa* (Port Jackson Fig) [T26] are both 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 Woollahra LGA.

5.2.4 Threatened Species & Ecological Communities

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

5.3 Heritage Significance

5.3.1 Heritage Items

The Rose Bay Sea Wall (including the wall & balustrade), Promenade and its setting (lamp standards, concrete stairs, avenue of Hill's Weeping Figs and car parking bays) is listed as an Item of Environmental Heritage [Item 328] of Local Significance under Schedule 5, Part 1 of the *Woollahra Local Environmental Plan 2014* (WLEP).

This item is considered to be a good representative example of one of the earliest and largest twentieth century civic improvements for both pedestrians and motorists in Sydney. Constructed c. 1924-1926 in the Inter-War Free Classical Style, it was designed by Herbert Ross to maximise the view for both pedestrians and motorists over Rose Bay and vistas to Sydney Harbour beyond. The avenue of Hills Weeping Figs are thought to have been planted contemporary with the promenade, being typical of civic plantings of this era.⁵

5.3.2 Heritage Conservation Area

The site is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the WLEP 2014.

5.3.3 Significant Tree Register

None of the subject trees are listed on Council's *Register of Significant Trees Volume 3* (Significant Street Trees).⁶

Various trees located within Rose Bay Park (located at the western end of the Promenade) are listed on Council's *Register of Significant Trees Volume 4* (Significant Trees in Public Parks). This listing includes approximately 13 Moreton Bay Figs and four Port Jackson Figs, thought to have been planted c. 1870-1900, being typical of the species used in this era.⁷ T25 [*Ficus macrophylla* (Moreton Bay Fig)] and T26 [*Ficus rubiginosa* (Port Jackson Fig)] form part of this listing.

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

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).⁸

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.

8 PROPOSED DEVELOPMENT

- 8.1.1 The proposed development includes the construction of a shared cycle/pedestrian path extending from Double Bay to Rose Bay along New South Head Road. This includes a largely separated section (designated cycleway) along the length of the Rose Bay Promenade. The pavement construction methodology has not yet been determined. It has been assumed for the purpose of this assessment that the cycleway would be constructed using conventional pavement materials and methodology at or close to existing ground levels (at similar level to the existing Promenade pathway). However, there may be alternatives to conventional pavement design or levels that could be implemented where necessary to avoid or minimise the potential impact on existing trees. These options are discussed in **Sections 9 & 10**.

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>Concept Design Plan – Option A (Sheets 9-17)</i> | Complete Urban | 01160 – 009 to 017 [B] | 23/07/2018 |

- 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.

9.2 Encroachments to the Root Zone

- 9.2.1 The new cycleway pavement is proposed to be installed within the TPZs of Trees T2 – T21 (all Hill's Weeping Figs of various maturity levels). Given the constraints imposed by the existing footpath along the promenade, in order to provide a segregated, designated cycleway in this section of the route (rather than a shared pathway), the pavement must be widened and extended closer to these trees than the present pathway. A portion of the existing pathway (approximately 1.2 metres of the eastern side of the path adjacent each trees) has been constructed as a permeable pavement system.
- 9.2.2 Consideration has been given to other options, such as placing the cycleway within a designated cycle lane in the road pavement or to the opposite side of the existing footpath to avoid potential conflicts between the pavement system and the root zone and branches and the cyclist envelope. However, neither of these options are considered acceptable in terms of the meeting the desired purpose to improve cyclist safety in this section of the route.
- 9.2.3 Widening the pavement will result in an encroachment to the TPZs and SRZs of Trees T2-T21. A conventional pavement system would require excavations and compaction for the pavement sub-grade within the soft landscape area between the existing footpath and the subject trees and over the existing permeable area of pavement. Given the nature of the root systems of these trees (some of which have large buttresses and above grade woody surface roots), excavations of this nature are highly likely to result in severance and damage to woody roots, leading to an adverse impact on these trees. As no suitable alternatives exist to relocate the pavement further from the trees, alternative construction methodologies should be adopted in order to avoid any adverse impact.
- 9.2.4 The most appropriate alternative pavement system may need to be considered on a case by case basis, as every tree situation and root arrangement may be slightly different. Essentially these options involve installing the pavement system either above grade with minimal sub-grade excavation, or installing the pavement system as an elevated decking and supporting it using isolated post or pier footings (which can be placed to avoid root severance and damage). The pavement system should preferably be permeable (to allow some moisture percolation to the root zone), as much of the root zones are already covered with non-permeable pavement systems. In some instances, local narrowing of the cycleway may be required, with suitable mitigation measures (such as signage, line marking, barriers or similar measures) installed to warn cyclists of any irregular conditions (obstacles, reduced clearances or other potential hazards), in accordance with Roads and Maritime Services (RMS) guidelines.⁹ It should be noted that raising the pavement surface level may have implications for designated clearances between trees and the cyclist envelope.

9.3 Exploratory Excavation

- 9.3.1 Prior to detailed design of the cycleway, exploratory excavation using non-destructive excavation techniques (refer **Section 10.6**) should be undertaken to a depth of 100mm below the pavement sub-grade (which may vary depending on the pavement system used) along the edge of the proposed pavement within the TPZs of Trees T2-T21 (within the existing soft landscape areas). Any potentially conflicting roots can then be identified. Once any conflicting roots are exposed, field survey can be used to establish the position and relative level at the top of each root. This information can then be used to guide the detailed design of the pavement system, defining the clearances required (and therefore the finished pavement level adjacent each tree) and the most appropriate pavement system depending on the constraints. A minimum of 100mm clearance should be provided between the lower edge or surface of any hard pavement (including any

required edge restraint) and the top or sides of any root to allow for future growth and development.

9.4 Conventional Pavement Systems

- 9.4.1 In situations where no conflicts between the path and woody roots are identified, it may be acceptable to install the cycleway pavement using a conventional pavement system (such as concrete or asphalt). Whilst permeable pavement systems would be more beneficial to the tree (by allowing greater aeration and moisture percolation to the root zone), these types of pavement systems usually require deeper pavement sections to accommodate the underlying drainage layer, and therefore require a greater depth of excavation. This implies a greater potential for root loss. As such, these type of permeable pavement systems may not be the most appropriate alternative in these instances.
- 9.4.2 In order to minimize the extent of excavation, a pavement section that has the least pavement thickness and still maintains the structural integrity of the pavement (and an acceptable surface quality for cyclists) is preferred as this will require the least excavation for the pavement sub-grade and minimize conflicts with underlying roots. Concrete is usually the most appropriate option, as it can be formed slightly above grade where required, requires no additional edge restraint and can be designed with minimal pavement thickness by integrating greater reinforcement. Slimline drainage products like Atlantis Drainage Cell can be placed beneath these pavement systems to provide some moisture penetration and aeration to the root zone, without compromising the structural integrity of the pavement (refer to typical detail shown in **Figure 2**).

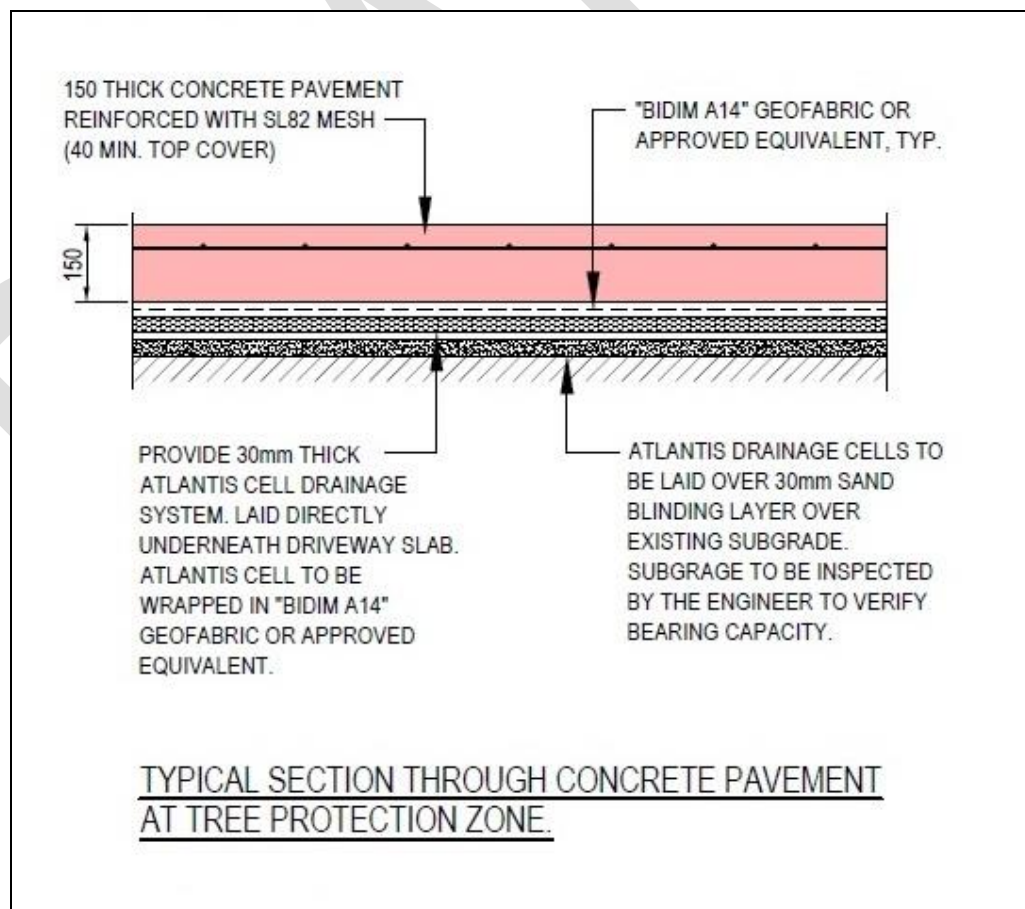


Figure 2 – Concrete pavement with Atlantis Drainage Cell beneath to permit some moisture percolation and aeration to the underlying root zone. [Ref: ACOR Consultants (Aust)].

- 9.4.3 It may be feasible to incorporate roots within the pavement sub-base material and retain them intact, provided that there is sufficient clearance to the pavement slab. Such roots should be carefully exposed and wrapped with a protective layer (such as paving sand or expansion joint foam material (e.g. 300mm wide Xcellon Expansion Joint Foam manufactured by Polycell or equivalent) (refer to **Figure 3**).



Figure 3 – Woody roots retained in the path sub-grade and protected prior to placement of sub-base material with Xcellon Expansion Joint Foam (Victoria Park, Sydney).

- 9.4.4 Root pruning of some conflicting roots may be acceptable depending on the size of the root, the proximity to the tree and the comparative size of the tree. In most instances, pruning of woody roots of less than 40mm in diameter is considered acceptable. However, the extent of root pruning required to accommodate a pathway at existing grade of conventional construction methodology would need to be considered on a case by case basis by a qualified consulting arborist following exploratory excavation adjacent each tree.

9.5 Alternative Pavement Systems

- 9.5.1 In situations where woody roots are encountered within the pavement zone and conflict with the pavement surface material an alternative pavement system will need to be adopted to ‘bridge-over’ underlying woody roots. This would involve raising the finished surface level and constructing the cycleway as a low ‘deck’, preferably with a permeable surface material. This can be supported with a galvanised steel sub-frame and posts, placed to avoid severance and damage to woody roots, with void beneath. If not constructed as one continuous length of the same material, transitions between raised platforms and conventional pavement systems (placed at existing grade) can be difficult to resolve. However, provided that these transitions are placed where no woody

roots will be affected (preferably outside TPZs) the excavations involved in making the ramp transition will not result in any adverse impact on the subject trees.

- 9.5.2 A variety of proprietary decking products are available on the market to suit this type of application. Developed principally for use in marine applications, such as pontoons and jetties, these materials are now used in a wide variety of applications, including elevated boardwalks, platforms and cycleways. The decking is usually fabricated from a composite material (fibreglass and resin) and is light, strong, uniform and corrosion resistant, with good slip resistance properties, making it ideal for this type of application. It is also fabricated in small interlocking units that can be easily fixed, repaired and replaced. The units are perforated, which also provides water percolation and aeration to the root zone, without compromising the surface safety for cyclists.



Figure 4 – Low boardwalk constructed using PermaStruct® RapidDeck

- 9.5.3 Proprietary products include Fibre Reinforced Plastic (FRP) Grating manufactured by PermaStruct® (which can be supplied in different colours and mech sizes, including Standard, Mini Mesh and Micro Mesh) [see <https://www.permastruct.com/products/grating-decking/frp-grating/>]. Products such as PermaStruct® RapidDeck incorporate FRP Grating with a suitable galvanised steel sub-frame and piers, for similar applications such as low boardwalks and viewing platforms (refer **Figure 4**). Dura Composites, GRP Australia and Treadwell manufacture similar products, principally used in marine and industrial applications. Similar pavement materials have been used in elevated sections of the Parramatta Valley Cycleway (refer to **Figure 5**) and the Bay Run (refer to **Figure 6**). An advantage of FRP mesh is that it only requires a relatively lightweight low profile sub-frame (compared with alternative prefabricated decking products such as Rocla PermaTrak®) and can be fixed seamlessly using proprietary stainless steel brackets (to avoid and surface hazards to cyclists).
- 9.5.4 A disadvantage to this pavement type is that raising the pavement surface sufficiently to clear woody surface roots may exacerbate conflicts between the branches and the cyclist envelope, so that the extent that the surface level can be raised would need to be considered on a case by case basis. Another disadvantage is that this type of structure potentially creates a level differential to the adjoining path (unless the whole width were constructed of the same material) and may also

create a trip hazard for pedestrians traversing the area between the roadway and the promenade pathway, depending on where on-grade transitions are located. The span of sub-frame members (beams and joists) must also have sufficient flexibility to permit pier positions to be relocated slightly (if and when required) to avoid damage to woody roots

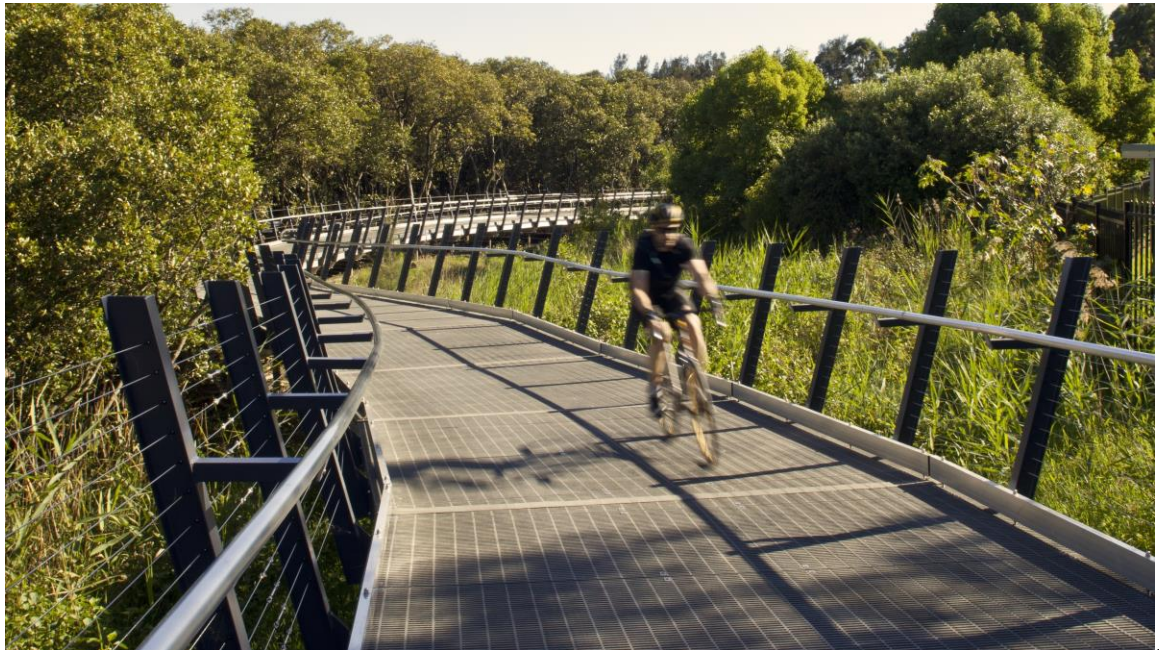


Figure 5 – Parramatta Valley Cycleway



Figure 6 – Bay Run pathway (FRP mesh on left) integrated with conventional pavement (right).

9.6 Potential Conflicts with the Cyclist Envelope

- 9.6.1 The potential conflicts with the Cyclist Envelope (CE) and Side Vertical Clearance (SVC) have been highlighted in blue text in **Appendix 5** (Impact Assessment Schedule). Photographs of each tree, with a survey staff placed at the edge of the proposed cycleway are also included at **Appendix 3**.
- 9.6.2 Potential conflicts between the branches of Trees T2, T7, T8, T9, T10, T12, T13, T14, T15, T16, T17, T18, T19, T20 & T21 (all Hill's Weeping Figs) and the Cyclist Envelope have been identified, assuming a pavement system placed at existing grade. In the case of trees T2, T8, T9 & T14, the potential conflicts can be addressed by selective pruning, resulting in minimal crown loss of less than 15% of the overall canopy volume. This extent of crown loss is considered within acceptable limits under AS 4373:2007 (*Pruning of Amenity Trees*) and will not result in any adverse impact on health or diminish the amenity value of the trees, provided that such pruning work is executed in accordance with **Section 10.10**.
- 9.6.3 In the case of trees T7, T10, T12, T13, T15, T16, T17, T18, T19, T20 & T21, the potential conflicts are more substantial and difficult to resolve. Selective pruning to eliminate the potential conflicts would result in loss of substantial primary and or secondary branches and crown loss of between 20% and 50% of the overall canopy volume, which exceeds acceptable limits under AS 4373:2007. This extent of crown loss would result in unacceptable impacts on the health of the trees and diminish their amenity value. In some instances, the conflicts are only to Side Vertical or Overhead Clearances (e.g. Trees T19 & T20) and some tolerance to incursions within this zone may be acceptable if suitable safety measures (warning signs and the like) are implemented. In other instances, it may be feasible to avoid the potential conflicts by slight adjustment to the path position or width (as noted in the recommendations column). In the remaining cases, the potential conflicts cannot be satisfactorily resolved without either significant detrimental pruning, compromising the cycle path position or width or tolerating the potential incursion. Each of these cases may need to be addressed on a case by case basis to find an acceptable compromise between cyclist safety and the long-term health of the trees. Suitable mitigation measures (such as signage, line marking, barriers or similar measures) installed to warn cyclists of any irregular conditions (obstacles, reduced clearances or other potential hazards) may be the only acceptable solution in these instances.
- 9.6.4 It should be noted that potential conflicts between tree branches and the Cyclist Envelope will need to be reviewed in light of any adjustments to the finished level of the path (such as constructing the path as a raised deck above existing grade).

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 5 & 7** for extent of the TPZ for each tree):-
- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
 - Soil disturbance, surface grading, compaction, tyning, ripping or cultivation of soil;

- Mechanical removal of vegetation, including extraction of tree stumps;
- Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill or pavement sub-base 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 Trunk Protection

10.3.1 Trunk protection boarding shall be erected around Trees [T1-T21] to avoid accidental damage, as indicated on the Tree Protection Plan (**Appendix 7**). 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 7**. 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 7 – Detail of Trunk Protection

10.4 Tree Damage

- 10.4.1 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.
- 10.4.2 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.

10.5 Demolition Works within Tree Protection Zones

- 10.5.1 Demolition of paved areas within the Tree Protection Zones (TPZs) of trees [**T1 – T21**] shall be undertaken under the supervision of a qualified Arborist [Australian Qualification Framework (AQF) Level 5].
- 10.5.1 Concrete pavements shall be demolished by breaking the slab into manageable sections (using a rock hammer or similar) and asphalt pavements shall be removed by breaking the topcoat into manageable pieces. The broken sections shall be carefully lifted and folded over the remaining paved surface to minimise disturbance and compaction of the underlying soil profile. Special care shall be taken where underlying woody roots have lifted or displaced the pavement. Any plant or equipment used in demolition work shall operate within the footprint of existing paved areas and avoid traversing soft landscape areas. Where this is unavoidable, suitable ground protection shall first be installed in accordance with **Section 10.11**.
- 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 [**T1-T21**] 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 [**T1-T21**] exploratory excavation using non-destructive techniques shall be taken along the perimeter of the structure or pavement within the TPZ. Non-destructive excavation techniques may include the use of hand-held implements, air pressure (using an Air-spade® device) or water pressure. The exploratory excavation shall be undertaken along the perimeter of

the foundation or pavement (within the TPZ) to the depth of the foundation or to a maximum of 800mm from surface levels, to locate and expose any woody roots prior to any mechanical excavation.

- 10.6.2 All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. Any roots encountered of less than 50mm in diameter may be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise moisture stress on the tree. Where large woody roots (greater than 40mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance.
- 10.6.3 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 elevated floor or deck supported on piers, cantilevered slab, up-turned edge beam etc) in preference to structures requiring a deep edge beam, continuous perimeter strip footing or deep excavation for pavement subgrade or drainage materials. The beam section of any pier and beam footing or any decking sub-frame (bearers/joists etc) shall be placed **above** grade to bridge over woody roots minimise excavation within the SRZ. Pier footings intersecting large woody roots should be slightly offset where necessary to avoid root severance. This may require sub-frame members to be sized to permit greater or lesser spans where required to allow limited flexibility in positioning piers. All pavement surface materials, sub-frame member or footing shall be sited to provide a minimum of 100mm clearance between the top or sides of any root to allow for future growth and development of the root without causing damage to the structure in the future.
- 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 Trenching for underground services and stormwater pipes within the TPZs of Trees [**any tree nominated for retention**], shall be undertaken using non-destructive excavation in accordance with **Section 10.6**. Where large woody roots are encountered during excavation or trenching (root diameter greater than 40mm), these shall be retained intact wherever possible (e.g. by tunnelling beneath roots and inserting the pipeline or conduit beneath or re-routing the service etc). Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by a qualified arborist [AQF 5] to evaluate the potential impact on the health and stability of the subject tree.
- 10.7.3 Installation of underground services and stormwater pipes within the SRZs of Trees [**any tree nominated for retention**], shall only be undertaken by Horizontal Directional Drilling (HDD) (also referred to as sub-surface boring or Micro-tunnelling for large diameter pipes). The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. At this site a minimum depth of 1 metre to the invert level of the pipe is specified.

10.8 Pavements

- 10.8.1 Proposed paved areas within the TPZs of Trees **[T1-T21]** shall be placed at or slightly above grade where required to minimise excavations within the root zone and avoid severance and damage of woody roots. The pavement sub-base material should be supplied and installed in accordance with **Section 10.9**. A minimum of 100mm clearance shall be provided between any woody root of greater than 40mm in diameter and the pavement surface material.

10.9 Pavement Sub-base

- 10.9.1 Pavement sub-base material within TPZs of trees **[T1-T21]** shall be a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal), paving sand (as a blinding layer – Refer to Figure 2) or equivalent no-fines gravel material to provide some aeration and moisture permeation to the root zone. Note that road base or crushed sandstone or other similar material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated using a non-vibrating roller or similar to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade and provide greater load capacity. A linear drainage cell (such as Atlantis Drainage cell) shall be placed beneath the pavement surface (refer to **Figure 2**) to facilitate some aeration and moisture permeation to the root zone.

10.10 Canopy & Root Pruning

- 10.10.1 Canopy pruning of Trees **[T1-T21]** (that essential to clear the Cyclist Envelope) 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 branches of greater than 100mm in diameter should be removed or pruned without further advice from a Consulting Arborist [Australian Qualification Framework Level 5].
- 10.10.2 Where root pruning of **[any tree nominated for retention]** is required to facilitate construction, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system. All root 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].

10.11 Ground Protection

- 10.11.1 Construction haul routes shall be confined to existing paved areas wherever possible. Where this is not feasible and construction haul routes or access for plant and equipment must traverse soft landscape areas within TPZs of **[any tree nominated for retention]**, 20mm thick marine ply sheets or truck mats (such as Envirex Versadeck® access mats) (refer **Figure 8** shall be placed over the top of the ground surface to minimise compaction and disturbance of the underlying soil profile and root zone.



Figure 8 – Showing typical detail for truck mats.

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.



Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
19th March 2019

11 REFERENCES

¹ Chapman, G.A. & Murphy, C.L. (1989)

Soil Landscapes of the Sydney 1:100,000 Sheet

Soil Conservation Service of NSW. Sydney

² Benson, Doug & Howell, Jocelyn (1990)

Taken for Granted: the Bushland of Sydney and its Suburbs.

Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW

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

The Body Language of Trees – A Handbook for Failure Analysis

The Stationery Office, London, England

⁴ Barrell, Jeremy (1996)

Pre-development Tree Assessment

Proceedings of the International Conference on Trees and Building Sites (Chicago)

International Society of arboriculture, Illinois, USA

⁵ Office of Environment and Heritage (January 2004)

Rose Bay Sea Wall, Promenade and its setting

NSW State Heritage Register - Heritage Database

OEH (Sydney)

<https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5055617>

⁶ Ruting, Noel (November 2005)

Register of Significant Trees – Volume 3 of 4; Significant Street Trees

Landarc Pty Ltd & Woollahra Municipal Council, Sydney NSW

⁷ Ruting, Noel (November 2005)

Register of Significant Trees – Volume 4 of 4; Significant Trees in Public Parks

Landarc Pty Ltd & Woollahra Municipal Council, Sydney NSW

⁸ Council of Standards Australia (August 2009)

AS 4970 – 2009 – Protection of Trees on Development Sites

Standards Australia, Sydney

⁹ Veith, Gary (October 2009)

Guide to Road Design – Part 6A: Pedestrian and Cyclist Paths

Austroads Publication No AGRD06A/09

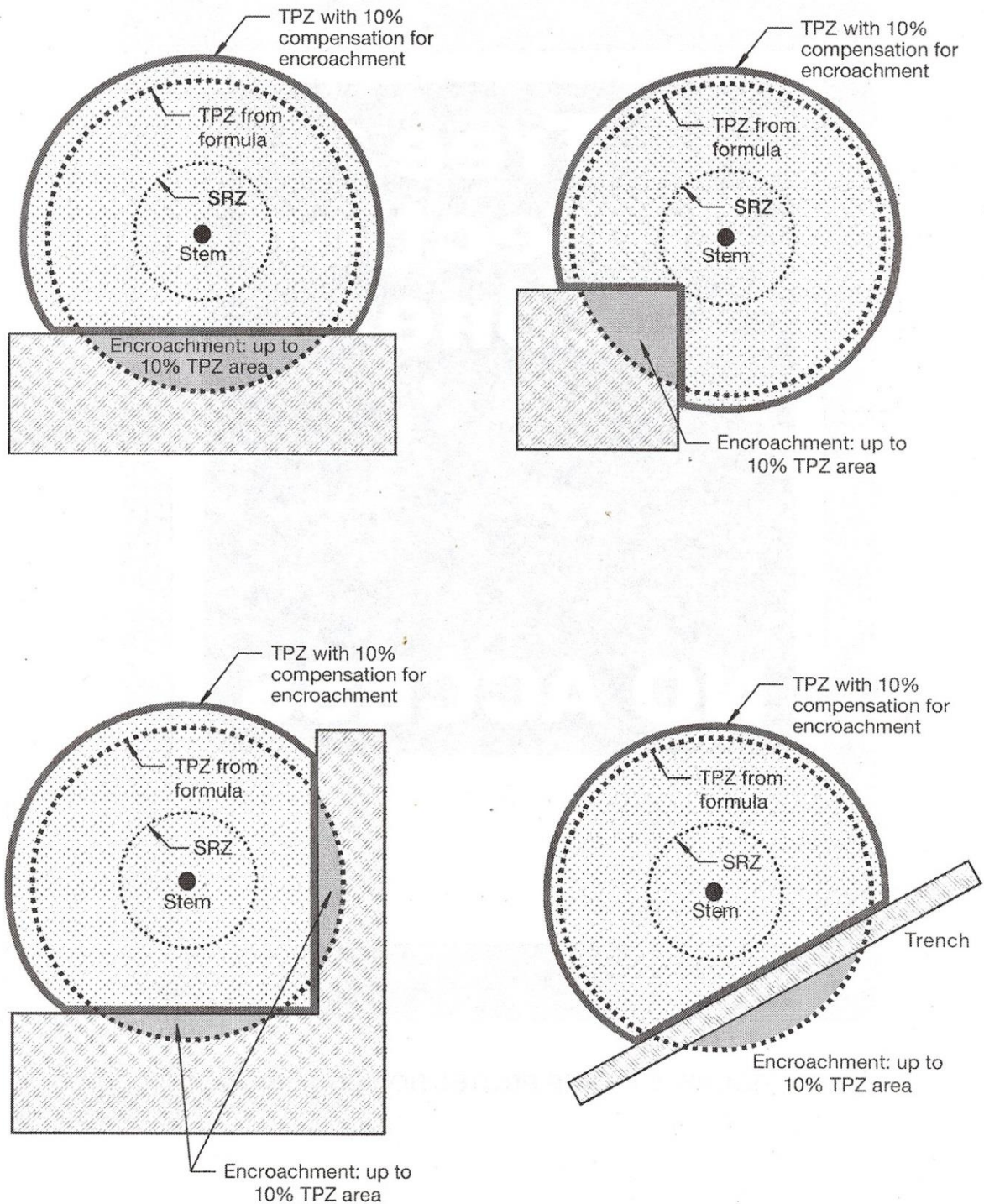
Austroads Incorporated, Sydney

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 300m ² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species |
| | The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item | The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species | The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity |
| | The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event | The subject tree is a Remnant Tree, being a tree in existence prior to development of the area | The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance. |
| 2. VERY HIGH | The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site. | The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site. | The subject tree has a very large live crown size exceeding 200m ² ; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area |
| 3. HIGH | The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence | The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value | The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area |
| 4. MODERATE | The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting. | The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP. | The subject tree has a medium live crown size exceeding 40m ² ; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and |
| | | | The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area. |
| 5. LOW | The subject tree detracts from heritage values or diminishes the value of a heritage item | The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures. | The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5-10 years) with new tree planting |
| 6. VERY LOW | The subject tree is causing significant damage to a heritage Item. | The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species. | The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse). |
| 7. INSIGNIFICANT | The tree is completely dead and has no visible habitat value | The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area. | The tree is completely dead and represents a potential hazard. |

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

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



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

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

APPENDIX 3 – POTENTIAL CONFLICTS BETWEEN TREES AND CYCLIST DESIGN ENVELOPE



Plate 1 – T2



Plate 2 – T3



Plate 3 – T4

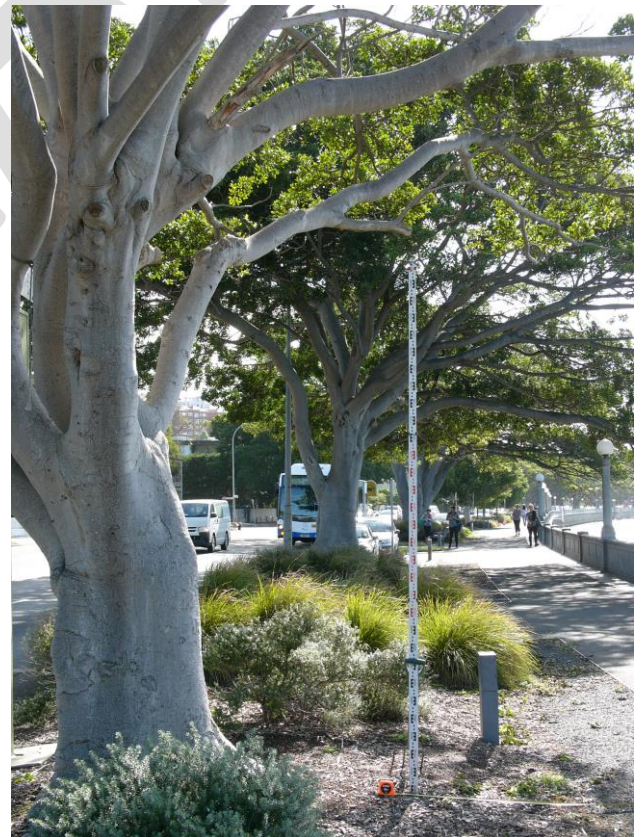


Plate 4 – T5



Plate 5 – T6



Plate 6 – T7



Plate 7 – T8



Plate 8 – T9



Plate 9 – T10



Plate 10 – T11



Plate 11 – T12



Plate 12 – T13



Plate 13 – T14

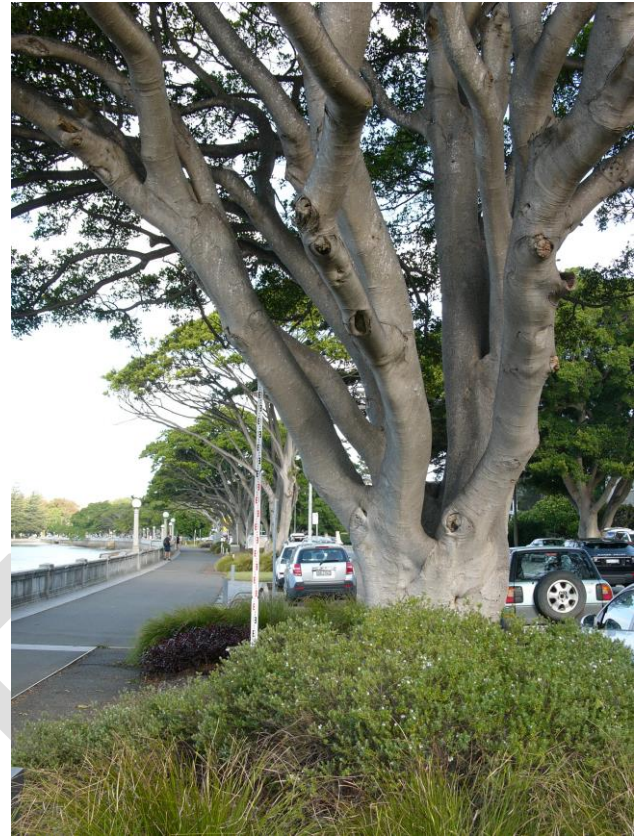


Plate 14 – T15



Plate 15 – T16



Plate 16 – T17



Plate 17 – T18



Plate 18 – T19



Plate 19 – T20

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Height (m) | Spread (m) | Trunk Diameter (mm) | Live Crown Size (m²) | Maturity Class | Condition | Previous Pruning | Health | | Remaining Safe Useful Life Expectancy (SULE) | Landscape Significance Rating | Retention Value | Location |
|-------------------------|---|------------|------------|---------------------|----------------------|----------------|---|--|-----------------------------------|---|--|-------------------------------|-----------------|--------------|
| | | | | | | | | | Vigour | Pest & Disease | | | | |
| 1 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 4 | 3 | 170 | 12 | I | Appears stable with sound branching structure. | No Evidence | Fair with slightly thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 5 | Moderate | Road reserve |
| 2 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 6 | 9 | 322 | 36 | SM | Appears stable with sound branching structure. Exhibits multiple low bark inclusions at 2-3 metres at junctions of PLs. | Crown lifted to 2 metres | Good | Low foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 4 | Moderate | Road reserve |
| 3 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 14 | 23 | 1280 | 230 | M | Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at 2-3 metres with multiple moderate bark inclusions at junctions of PLs & SLs. | Previously lopped at 5-6 metres (crown restored). Selectively pruned SE to clear power pole. Crown lifted to 5 metres south side | Good | Moderate foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 1 | High | Road reserve |
| 4 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 13 | 20 | 1166 | 160 | M | Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at 1-2 metres with multiple moderate bark inclusions at junctions of PLs & SLs. Some dieback with 15% deadwood. | Previously lopped at 5 metres (crown restored). Selectively pruned SE to clear power pole. Crown lifted to 5 metres. | Fair with slightly thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 1 | High | Road reserve |
| 5 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 12 | 17 | 752 | 119 | M | Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 2 metres. High bark inclusion at junction of PL to south. Prominent lean to the south-east. Moderate dieback with 25% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Short 5-15 Years | 1 | High | Road reserve |
| 6 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 14 | 20 | 898 | 220 | M | Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 5 metres at junctions of SLs. Some dieback with 10% deadwood. | Previously lopped at 5 metres (crown restored). Selectively pruned to clear power pole. Crown lifted to 5 metres. | Fair with slightly thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Medium 15-40 Years | 1 | High | Road reserve |

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Height (m) | Spread (m) | Trunk Diameter (mm) | Live Crown Size (m ²) | Maturity Class | Condition | Previous Pruning | Health | | Remaining Safe Useful Life Expectancy (SULE) | Landscape Significance Rating | Retention Value | Location |
|-------------------------|---|------------|------------|---------------------|-----------------------------------|----------------|--|--|-----------------------------------|---|--|-------------------------------|-----------------|--------------|
| | | | | | | | | | Vigour | Pest & Disease | | | | |
| 7 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 13 | 20 | 1124 | 200 | M | Appears stable with poor branching structure. Exhibits multiple sever bark inclusions at 1-2 metres at junctions of co-dominant PLs (x5). Some dieback with 15% deadwood. Multiple small wounds to woody surface roots. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Short 5-15 Years | 1 | High | Road reserve |
| 8 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 7 | 11 | 392 | 66 | SM | Appears stable with sound branching structure. Exhibits a low bark inclusion at 1.5 metres. | No Evidence | Very Good | Low foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 4 | Moderate | Road reserve |
| 9 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 7 | 7 | 260 | 38.5 | I | Appears stable with sound branching structure. Exhibits a large woody surface root emanating | No Evidence | Very Good | Low foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 4 | Moderate | Road reserve |
| 10 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 6 | 7 | 239 | 35 | I | Appears stable with sound branching structure. Exhibits a small wound at three metres due branch loss (storm damage) - main leader. | No Evidence | Very Good | Low foliar insect infestation (Thrips) + sooty mould | Long - more than 40 years | 5 | Moderate | Road reserve |
| 11 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 9 | 18 | 863 | 108 | M | Appears stable with poor branching structure. Exhibits a severe bark inclusion at GL to 1 metre. Large buttress and burl at base. Large axial wound on trunk at 0.5 to 2 metres with decay evident. Substantial crown dieback with 50% deadwood. | Previously lopped at 3 metres (crown restored). Crown lifted to 4 metres. | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Short 5-15 Years | 1 | High | Road reserve |
| 12 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 13 | 20 | 879 | 160 | M | Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 2 metres at junctions of PLs. 10% deadwood. | Previously lopped at 5 metres (crown restored). Crown lifted to 5 metres. Selectively pruned & deadwooded. | Fair with slightly thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Medium 15-40 Years | 1 | High | Road reserve |
| 13 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 14 | 20 | 949 | 180 | M | Appears stable with fair branching structure. Exhibits multiple co-dominant PLs at 1.5 metres with high bark inclusions at junctions of PL. Exhibits some dieback with 15% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. | Fair with slightly thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Medium 15-40 Years | 1 | High | Road reserve |

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Height (m) | Spread (m) | Trunk Diameter (mm) | Live Crown Size (m ²) | Maturity Class | Condition | Previous Pruning | Health | | Remaining Safe Useful Life Expectancy (SULE) | Landscape Significance Rating | Retention Value | Location |
|-------------------------|---|------------|------------|---------------------|-----------------------------------|----------------|--|--|-----------------------------------|---|--|-------------------------------|-----------------|--------------|
| | | | | | | | | | Vigour | Pest & Disease | | | | |
| 14 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 16 | 20 | 1124 | 160 | M | Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 2-3 metres at junctions of PLs. 15% deadwood. Large woody surface roots adjacent kerb. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 7-8 metres. | Fair with slightly thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Medium 15-40 Years | 1 | High | Road reserve |
| 15 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 11 | 20 | 876 | 160 | M | Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 1.5 metres at junctions of PLs. 15% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. Deadwooded | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Medium 15-40 Years | 1 | High | Road reserve |
| 16 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 13 | 20 | 701 | 160 | M | Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 2 metres at junctions of PLs. 15% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. Deadwooded | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Short 5-15 Years | 1 | High | Road reserve |
| 17 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 12 | 20 | 764 | 140 | M | Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 1.5 metres at junctions of PLs. 15% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. Deadwooded | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Short 5-15 Years | 1 | High | Road reserve |
| 18 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 13 | 24 | 1019 | 216 | M | Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 1.5 metres at junctions of PLs. Exhibits a moderate wound to the lower trunk/butress (dieback to vascular tissue). 20% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. Deadwooded | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould | Short 5-15 Years | 1 | High | Road reserve |

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Height (m) | Spread (m) | Trunk Diameter (mm) | Live Crown Size (m ²) | Maturity Class | Condition | Previous Pruning | Health | | Remaining Safe Useful Life Expectancy (SULE) | Landscape Significance Rating | Retention Value | Location |
|-------------------------|---|------------|------------|---------------------|-----------------------------------|----------------|--|--|--------------------------|---|--|-------------------------------|-----------------|--------------|
| | | | | | | | | | Vigour | Pest & Disease | | | | |
| 19 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 16 | 24 | 1076 | 288 | M | Stability suspect with fair branching structure. Exhibits multiple high bark inclusions at 1.5 metres at junctions of PLs. Exhibits a moderate wound to the lower trunk/butress (dieback to vascular tissue) with decay evident. 20% deadwood. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. Deadwooded | Fair with thinning crown | Moderate foliar insect infestation (Thrips) + sooty mould. Pathogenic fungal infection (butt Rot/Root Rot disease). Large fruiting bodies (possibly <i>Phellinus</i> sp.) at GL | Transient (less than 5 years) | 1 | Moderate | Road reserve |
| 20 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 16 | 24 | 955 | 288 | M | Stability suspect with fair branching structure. Exhibits a large axial wound and cavity from GL to 2 metres with decay in lower trunk and root crown. | Previously lopped at 4-5 metres (crown restored). Crown lifted to 5 metres. Deadwooded | Good | Low foliar insect infestation (Thrips) + sooty mould. Suspected pathogenic fungal infection (butt Rot/Root Rot disease) | Transient (less than 5 years) | 1 | Moderate | Road reserve |
| 21 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 5 | 4 | 200 | 20 | I | Appears stable with sound branching structure. Exhibits a moderate wound to the lower trunk (dieback to vascular tissue) from GL to 0.8 metres. | No Evidence | Fair | Suspected pathogenic fungal infection (butt Rot/Root Rot disease) | Short 5-15 Years | 5 | Low | Road reserve |
| 22 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 18 | 30 | 1561 | 420 | M | Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 2 metres at junctions of PLs. | Crown lifted to 5 metres over road. Selectively pruned & deadwooded. | Very Good | Low foliar insect infestation (Thrips) + sooty mould. | Long - more than 40 years | 1 | High | Road reserve |
| 23 | <i>Eucalyptus pilularis</i> (Blackbutt) | 15 | 20 | 560 | 220 | M | Appears stable with poor branching structure. Exhibits multiple extended lateral PLs. Large axial wound on trunk from GL to 6 metres to some PLs due previous lightning strike). 5% deadwood and 35% epicormic growth. | Selectively pruned & deadwooded. | Fair | Moderate borer infestation. | Transient (less than 5 years) | 3 | Low | Road reserve |

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Height (m) | Spread (m) | Trunk Diameter (mm) | Live Crown Size (m²) | Maturity Class | Condition | Previous Pruning | Health | | Remaining Safe Useful Life Expectancy (SULE) | Landscape Significance Rating | Retention Value | Location |
|-------------------------|---|------------|------------|---------------------|----------------------|----------------|--|--|-----------|-----------------------------|--|-------------------------------|-----------------|--------------|
| | | | | | | | | | Vigour | Pest & Disease | | | | |
| 24 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | 18 | 30 | 1436 | 450 | M | Appears stable with fair branching structure. Exhibits multiple high bark inclusions at 2-3 metres at junctions of PLs. | Crown lifted to 5 metres over road. Selectively pruned & deadwooded. | Very Good | No Evidence | Long - more than 40 years | 1 | High | Road reserve |
| 25 | <i>Ficus macrophylla</i> (Moreton Bay Fig) | 16 | 30 | 1800 | 390 | M | Appears stable with fair branching structure. Exhibits multiple moderate wounds to PLs due to branch loss with decay evident in some branch collars. | Selectively pruned & deadwooded. | Fair | Low Fig Psyllid infestation | Long - more than 40 years | 1 | High | Road reserve |
| 26 | <i>Ficus rubiginosa</i> (Port Jackson Fig) | 20 | 20 | 900 | 320 | M | Appears stable with sound branching structure. | Selectively pruned & deadwooded. | Good | No Evidence | Long - more than 40 years | 1 | High | Road reserve |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|--|---|---|
| 1 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 2.0 | 1.6 | 13.1 | No proposed works within TPZ. No canopy pruning required. | No adverse impact. | Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. |
| 2 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 5.0 | 2.1 | 78.5 | Proposed cycleway offset 0.6 metres north at RL? (assumed below existing grade) Note that the tree pit is approx 200mm higher than the existing pathway). Excavations for pavement sub-grade within SRZ. Removal of 1 x lower PL (120mmØ) will be required to clear cyclist envelope, resulting in 15% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. However, this tree will tolerate the extent of pruning required. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |
| 3 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 15.4 | 3.7 | 741.1 | Proposed cycleway offset 2 metres north at RL? (assumed below existing grade). Note: large woody buttress roots immediately adjacent existing pathway. Excavations for pavement sub-grade within SRZ. No canopy pruning required to clear Cyclist Envelope (CE) or Side Vertical Clearance (SVC). However, buttress roots in conflict with CE & SVC from GL to 0.5 metres. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. | Consider relocating cycleway further from tree to avoid incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|---|--|---|
| 4 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 14.0 | 3.5 | 614.3 | Proposed cycleway offset 2 metres north at RL? (assumed close to existing grade). Excavations for pavement sub-grade within SRZ. No canopy pruning required to clear Cyclist Envelope (CE) or Side Vertical Clearance (SVC). | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. |
| 5 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 9.0 | 2.9 | 255.4 | Proposed cycleway offset 1.4 metres north at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. No canopy pruning required to clear Cyclist Envelope (CE) or Side Vertical Clearance (SVC). | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. |
| 6 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 10.8 | 3.2 | 364.7 | Proposed cycleway offset 1.3 metres north at RL? (assumed below existing grade). Note that the tree pit is approx 100mm higher than the existing pathway with exposed woody roots in footprint of cycleway. Excavations for pavement sub-grade within SRZ. No canopy pruning required to clear Cyclist Envelope (CE) or Side Vertical Clearance (SVC). | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|--|---|---|
| 7 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 13.5 | 3.5 | 571.5 | Proposed cycleway offset 1.1 metres north-east at RL? (assumed below existing grade). Note that the tree pit is approx 200mm higher than the existing pathway with exposed woody roots in footprint of cycleway. Excavations for pavement sub-grade within SRZ. Conflict between 1 x PL 460mmØ and Cyclist Envelope, resulting in 20% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum 700mm north) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |
| 8 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 5.5 | 2.2 | 95.0 | Proposed cycleway offset 1.1 metres north-east at RL? (assumed close to existing grade). Note exposed woody surface roots within area of proposed cycleway. Excavations for pavement sub-grade within SRZ. Conflict between two lower SLs 120mmØ and several TLs (30-50mmØ) and Cyclist Envelope, resulting in 15% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade will result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. However, this tree will tolerate the extent of pruning required. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform.. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

APPENDIX 5 - 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 |
|-------------------------|---|------------------------|----------------------------|----------------------------|-----------------------|---|--|---|
| 9 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 4.0 | 1.9 | 50.2 | Proposed cycleway offset 1.0 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway with exposed woody root (120mmØ) in footprint of cycleway. Excavations for pavement sub-grade within SRZ. Conflict between two lower SLs 80mmØ and several TLs (20-30mmØ) and Cyclist Envelope, resulting in 10% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required is within acceptable limits under AS 4373:2007. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |
| 10 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 4.0 | 1.8 | 50.2 | Proposed cycleway offset 1.3 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway with exposed woody roots. Excavations for pavement sub-grade within SRZ. Conflict between 3 x PLs 70-90mmØ and Cyclist Envelope, resulting in 25-30% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|--|---|---|
| 11 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 10.4 | 3.1 | 336.8 | Proposed cycleway offset 1.4 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 200mm higher than the existing pathway with exposed woody roots & buttress in footprint of cycleway. Excavations for pavement sub-grade within SRZ. No conflict between canopy and cyclist envelope. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. | Consider relocating cycleway further from tree to avoid incursion to root zone (minimum 600mm north) or alternatively constructing as an elevated platform.. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. |
| 12 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 10.5 | 3.1 | 349.3 | Proposed cycleway offset 0.7 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 200mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. Conflict between several 2 x large lower PLs (400mmØ) and cyclist envelope at 1.8-2.4 metres, plus trunk and PLs in SVC. Pruning to achieve required clearance would result in 40% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform.. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|--|--|---|
| 13 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 11.4 | 3.2 | 407.3 | Proposed cycleway offset 1.1 metres north-east at RL? (assumed close to existing grade). Excavations for pavement sub-grade within SRZ. Conflict between large lower PL (550mmØ) and Cyclist Envelope (1.9-2.4 metres). Plus conflict with PL to SVC (1.4-2.4 metres). Pruning to achieve required clearance would result in 40% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum 700mm north) or alternatively constructing as an elevated platform.. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |
| 14 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 13.5 | 3.5 | 571.5 | Proposed cycleway offset 1.1 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 200mm higher than the existing pathway with exposed woody roots & buttress in footprint of cycleway (plus CE & SVC). Excavations for pavement sub-grade within SRZ. Conflict between 1 x lower PL 250mmØ and SVC at 1.6-2.4m. Pruning to achieve required clearance would result in 5% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required is within acceptable limits under AS 4373:2007. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|---|--|--|
| 15 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 10.5 | 3.1 | 346.8 | Proposed cycleway offset 1.2 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 200mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. Conflict between 1 x lower PL 300mmØ and SVC at 1.5-2.4m and 1 x SL 150mmØ and SVC. Pruning to achieve required clearance would result in 30% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |
| 16 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 8.4 | 2.9 | 222.0 | Proposed cycleway offset 1.2 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. Conflict between 1 x lower PL 500mmØ (dividing 2 x SLs 350+270mm) and CE at 2.2-2.4 and SVC at 1.8-2.4m. Pruning to achieve required clearance would result in 50% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform.. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

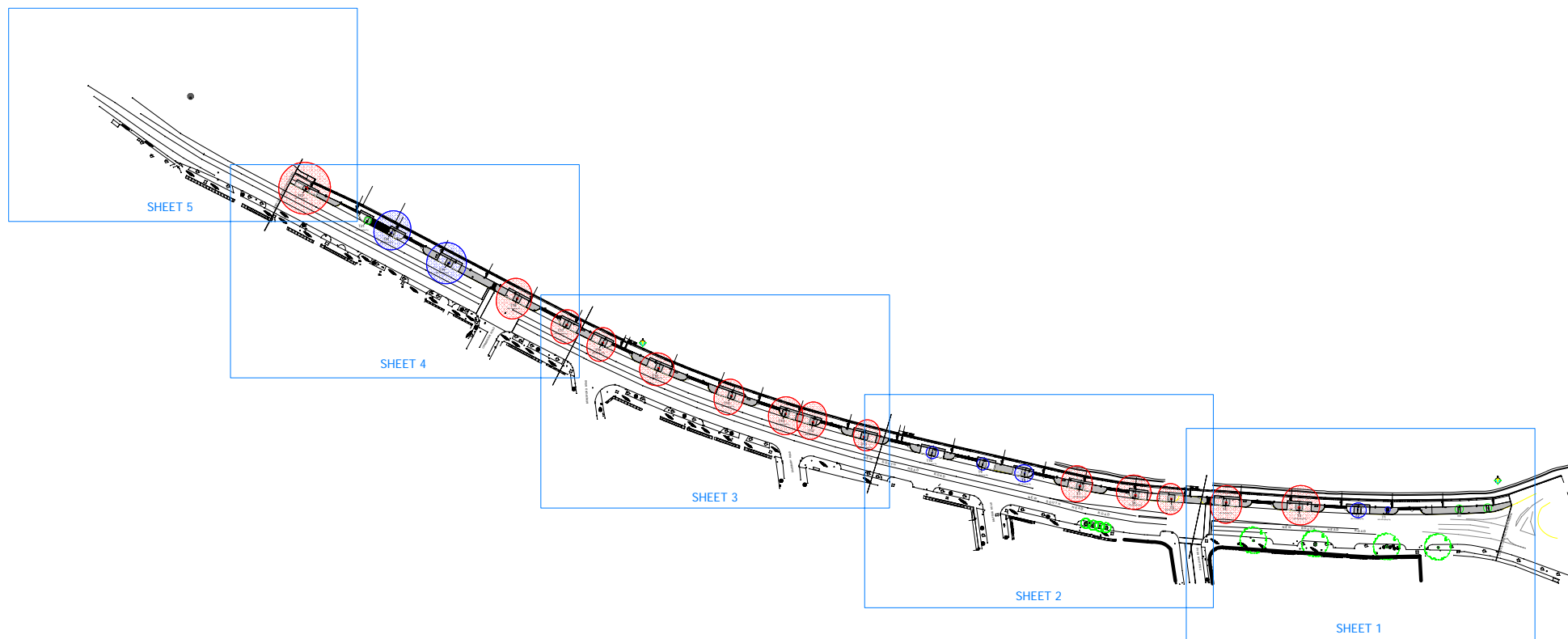
APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|---|--|---|
| 17 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 9.2 | 3.0 | 264.2 | Proposed cycleway offset 1.3 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. Conflict between 1 x lower SL 250mmØ and CE at 2.1-2.4 and SVC at 1.7-2.4m. Plus conflict with 1 x SL 250mmØ and SVC at 1.8-2.4metres. Pruning to achieve required clearance would result in 30% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |
| 18 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 12.2 | 3.3 | 469.6 | Proposed cycleway offset 0.7 metres north-east at RL? (assumed close to existing grade). Exposed woody roots (buttress) in footprint of cycleway. Excavations for pavement sub-grade within SRZ. Conflict between 3 x lower PLs 350mm-400mmØ and CE at 2.0-2.4 and SVC at 1.0-2.4m. Plus conflict with trunk & buttress roots. Pruning to achieve required clearance would result in 40% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum to edge of existing path) or alternatively constructing as an elevated platform. Retain in accordance with recommended Tree Protection Measures (Section 10). Install Tree Protection Fence in accordance with Section 10.3. Undertake all excavations for pavement sub-grade within TPZ/SRZ in accordance with Section 10.6. Undertake all required pruning to clear cyclist envelope in accordance with Section 10.10. |

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
|-------------------------|---|------------------------|----------------------------|----------------------------|----------|--|---|--|
| 19 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 12.9 | 3.4 | 523.9 | Proposed cycleway offset 1.2 metres north-east at RL? (assumed close to existing grade). Note exposed woody roots (buttress) in footprint of cycleway. Excavations for pavement sub-grade within SRZ. Slight incursion from lower PL to SVC at 2.2-2.4 metres. Conflict with buttress roots to CE and SVC. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. | Consider diagnostic testing to confirm extent of decay in lower trunk and root crown. Consider removal if recommended by diagnostic testing and replacement with a new tree. Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum 400mm north). |
| 20 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 11.5 | 3.2 | 412.7 | Proposed cycleway offset 1.5 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. Conflict between one lower PL and SVC at 2-2.4 metres. Pruning to achieve required clearance would result in 40% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider diagnostic testing to confirm extent of decay in lower trunk and root crown. Consider removal if recommended by diagnostic testing and replacement with a new tree. Consider relocating cycleway further from tree to avoid canopy pruning and incursion to root zone (minimum 500mm north). |
| 21 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 2.4 | 1.7 | 18.1 | Proposed cycleway offset 0.8 metres north-east at RL? (assumed close to existing grade). Note that the tree pit is approx 100mm higher than the existing pathway. Excavations for pavement sub-grade within SRZ. Conflict between several lower PLs and cyclist envelope, resulting in 20% crown loss. | Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Excavations for pavement sub-grade are likely to result in severance of woody roots, leading to a significant adverse impact. Extent of pruning required exceeds acceptable limits under AS 4373:2007. Extent of crown loss is likely to result in an adverse impact and diminish amenity value. | Consider diagnostic testing to confirm extent of decay in lower trunk and root crown. Consider removal if recommended by diagnostic testing and replacement with a new tree |
| 22 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 18.7 | 4.0 | 1101.1 | No proposed works within TPZ. No canopy pruning required. | No adverse impact. | To be retained - no special tree protection measures required. |

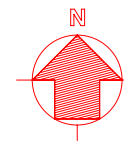
| APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE | | | | | | | | |
|---|---|------------------------|----------------------------|----------------------------|-----------------------|---|--------------------|--|
| Tree Identification No. | Species | Construction Tolerance | Tree Protection Zone (m R) | Structural Root Zone (m R) | TPZ (m ²) | Incursions To Root Zone &/or Canopy | Likely Impact | Recommendation |
| 23 | <i>Eucalyptus pilularis</i> (Blackbutt) | P | 6.7 | 2.6 | 141.8 | No proposed works within TPZ. No canopy pruning required. | No adverse impact. | To be retained - no special tree protection measures required. |
| 24 | <i>Ficus microcarpa</i> var. <i>hillii</i> (Hill's Weeping Fig) | M | 17.2 | 3.9 | 932.8 | No proposed works within TPZ. No canopy pruning required. | No adverse impact. | To be retained - no special tree protection measures required. |
| 25 | <i>Ficus macrophylla</i> (Moreton Bay Fig) | M | 21.6 | 4.2 | 1465.0 | No proposed works within TPZ. No canopy pruning required. | No adverse impact. | To be retained - no special tree protection measures required. |
| 26 | <i>Ficus rubiginosa</i> (Port Jackson Fig) | M | 10.8 | 3.2 | 366.2 | No proposed works within TPZ. No canopy pruning required. | No adverse impact. | To be retained - no special tree protection measures required. |



APPENDIX 6
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 New South Head Road, ROSE BAY, NSW



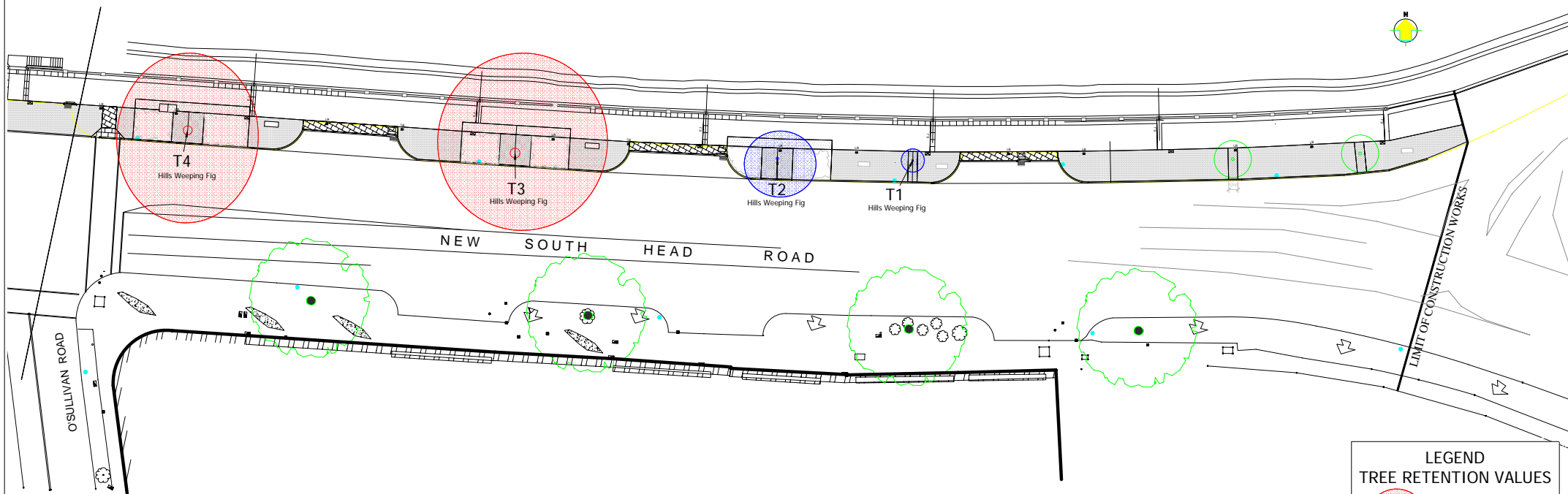
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DWG No. T19-013101 [C]

KEY PLAN

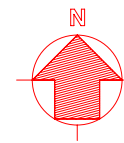
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TREE RETENTION VALUES
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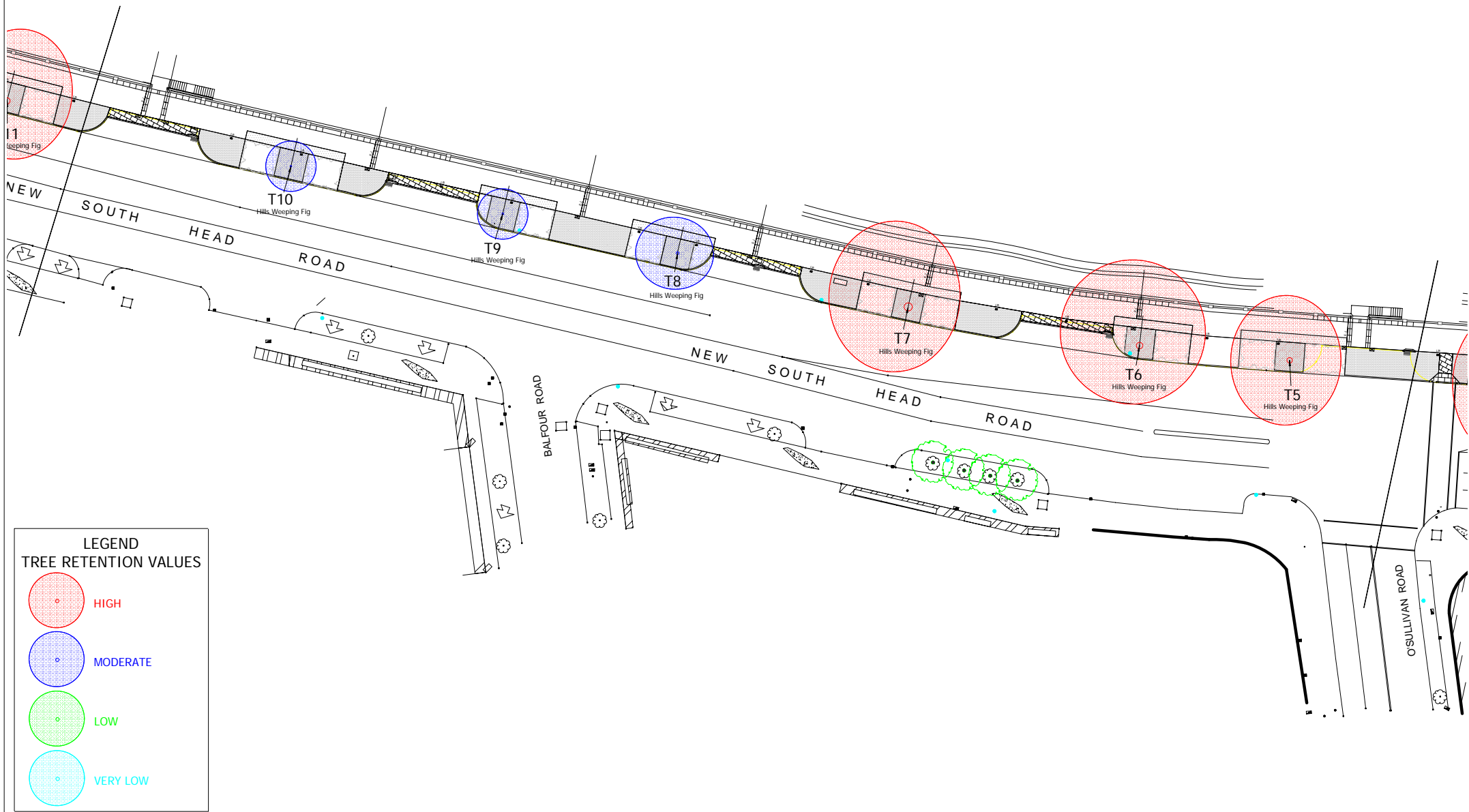
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SHEET 1

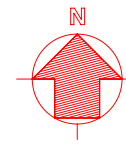
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TREE RETENTION VALUES
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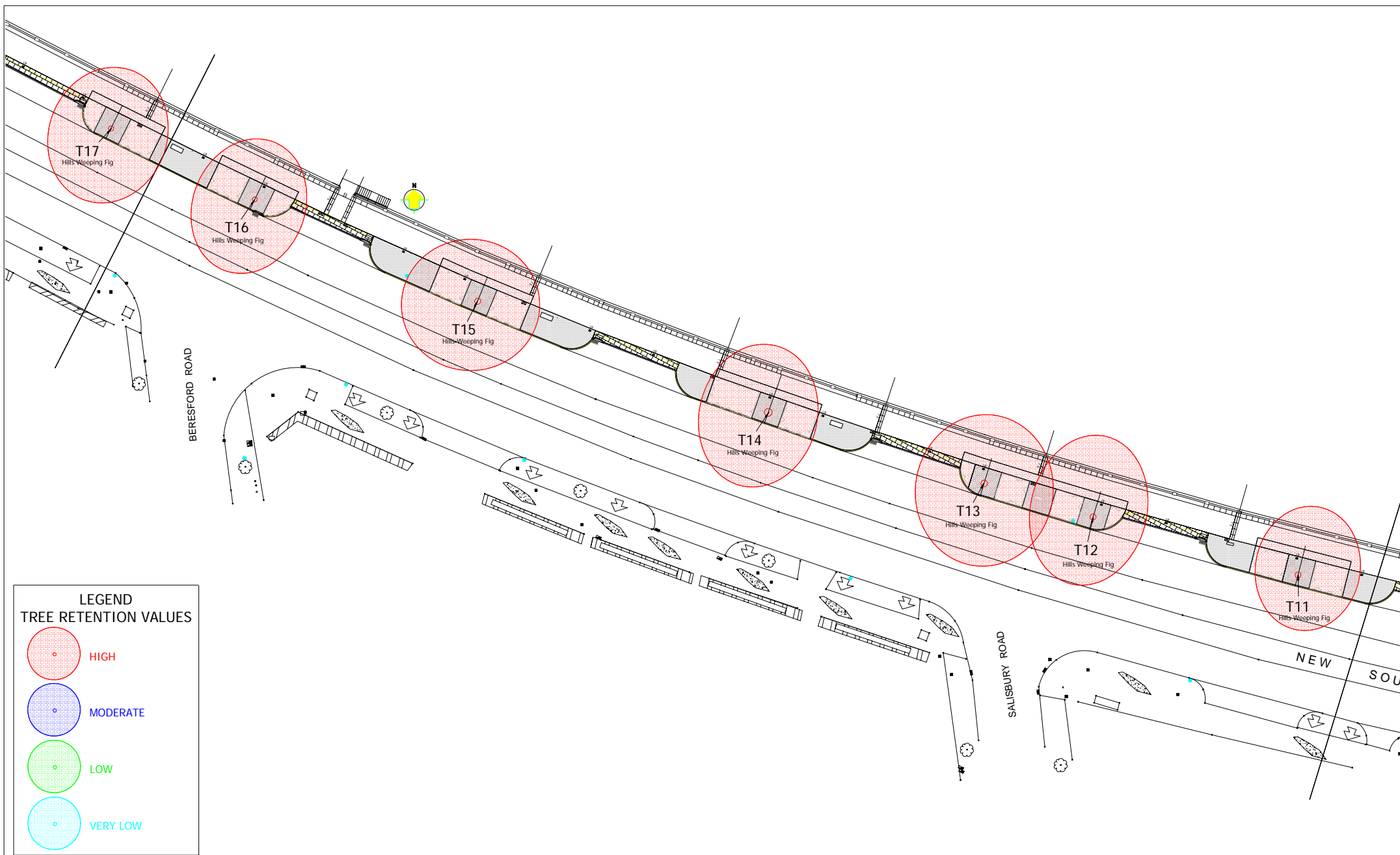
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SHEET 2

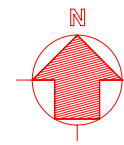
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TREE RETENTION VALUES
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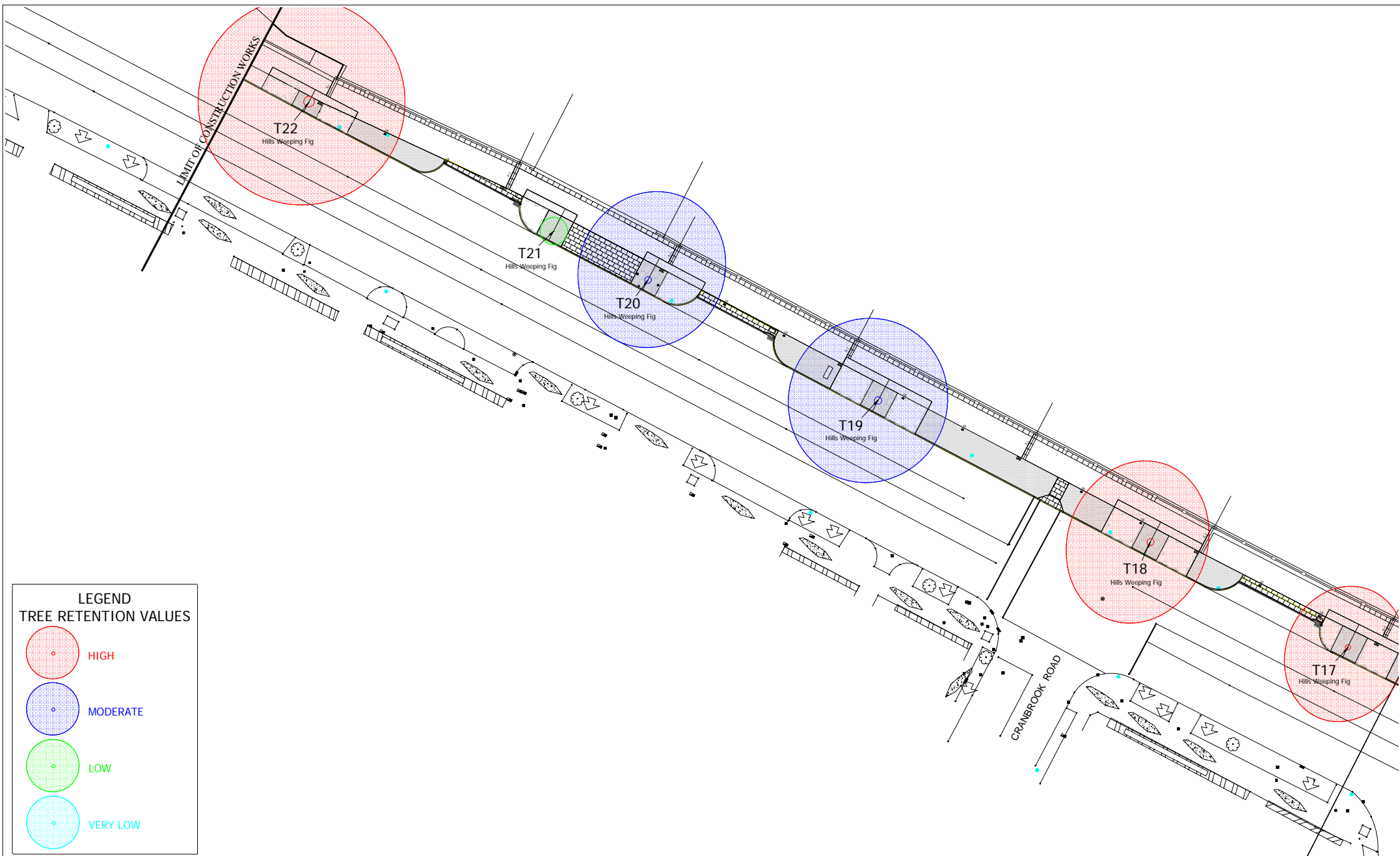
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SHEET 3

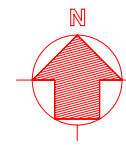
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TREE RETENTION VALUES
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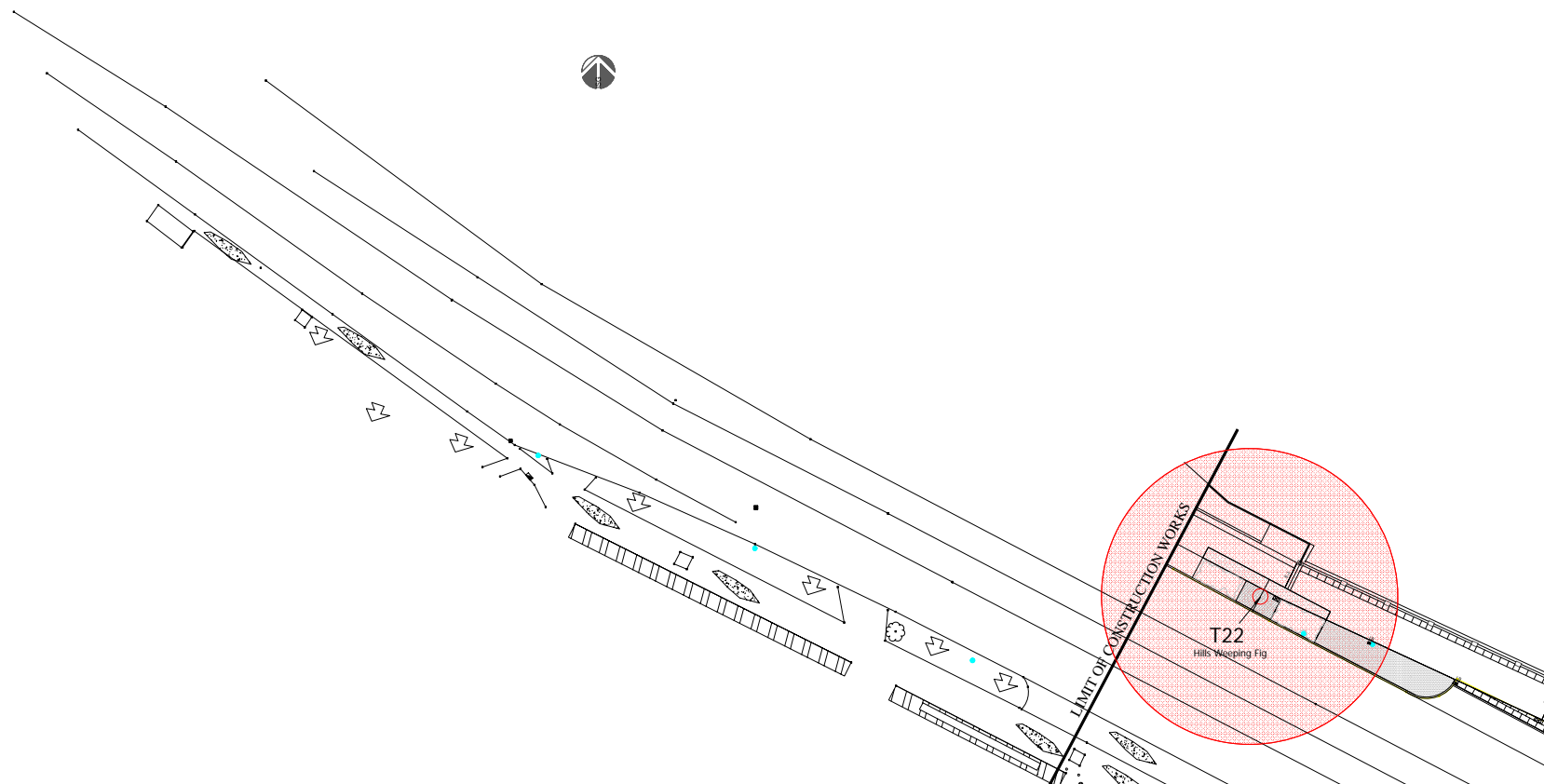
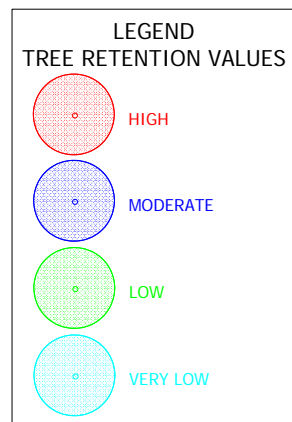
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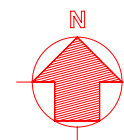
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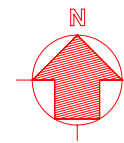


APPENDIX 7 TREE PROTECTION PLAN

Proposed Cycleway
New South Head Road, ROSE BAY, NSW



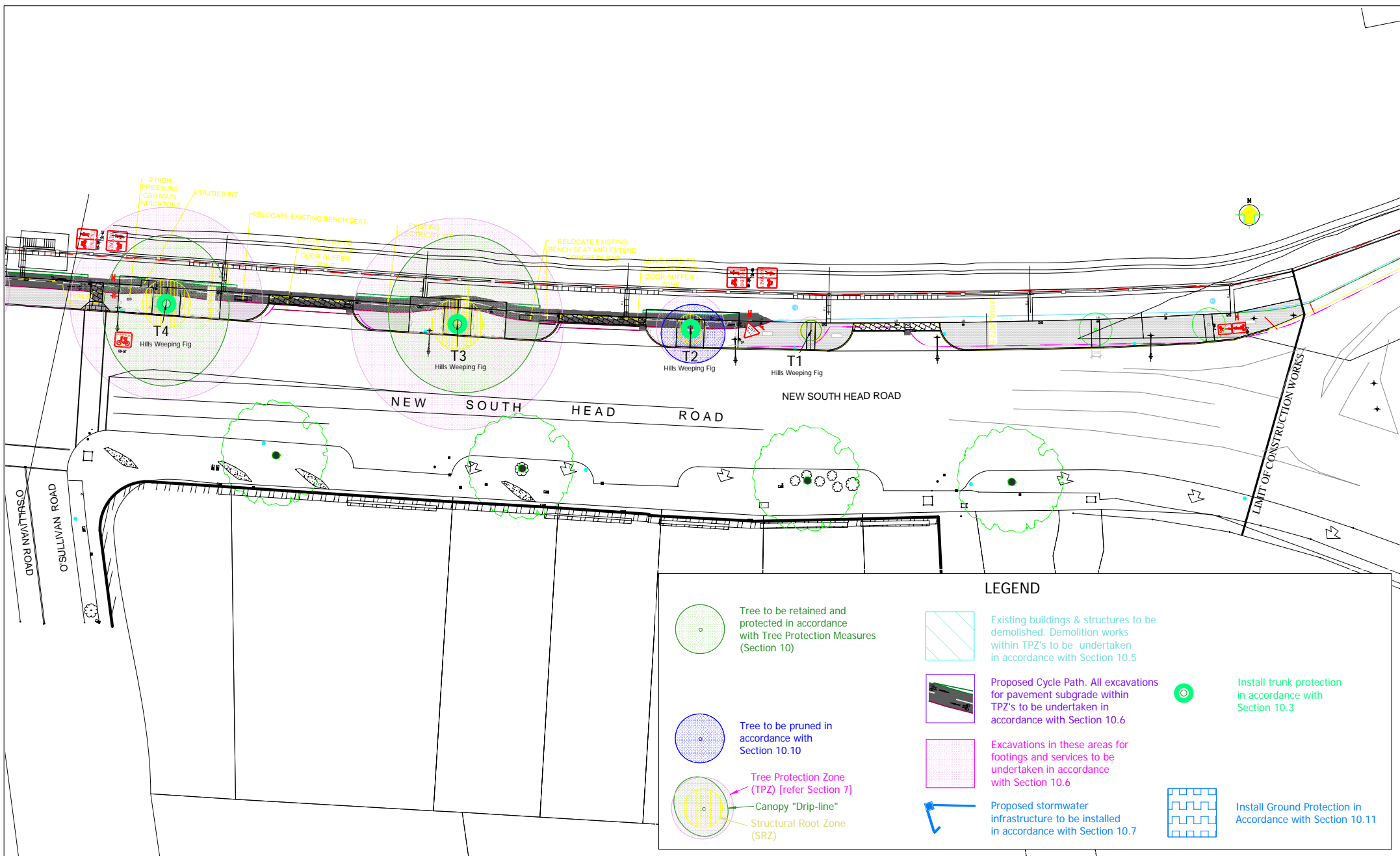
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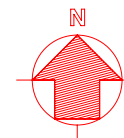


APPENDIX 7 TREE PROTECTION PLAN

Proposed Cycleway
New South Head Road, ROSE BAY, NSW



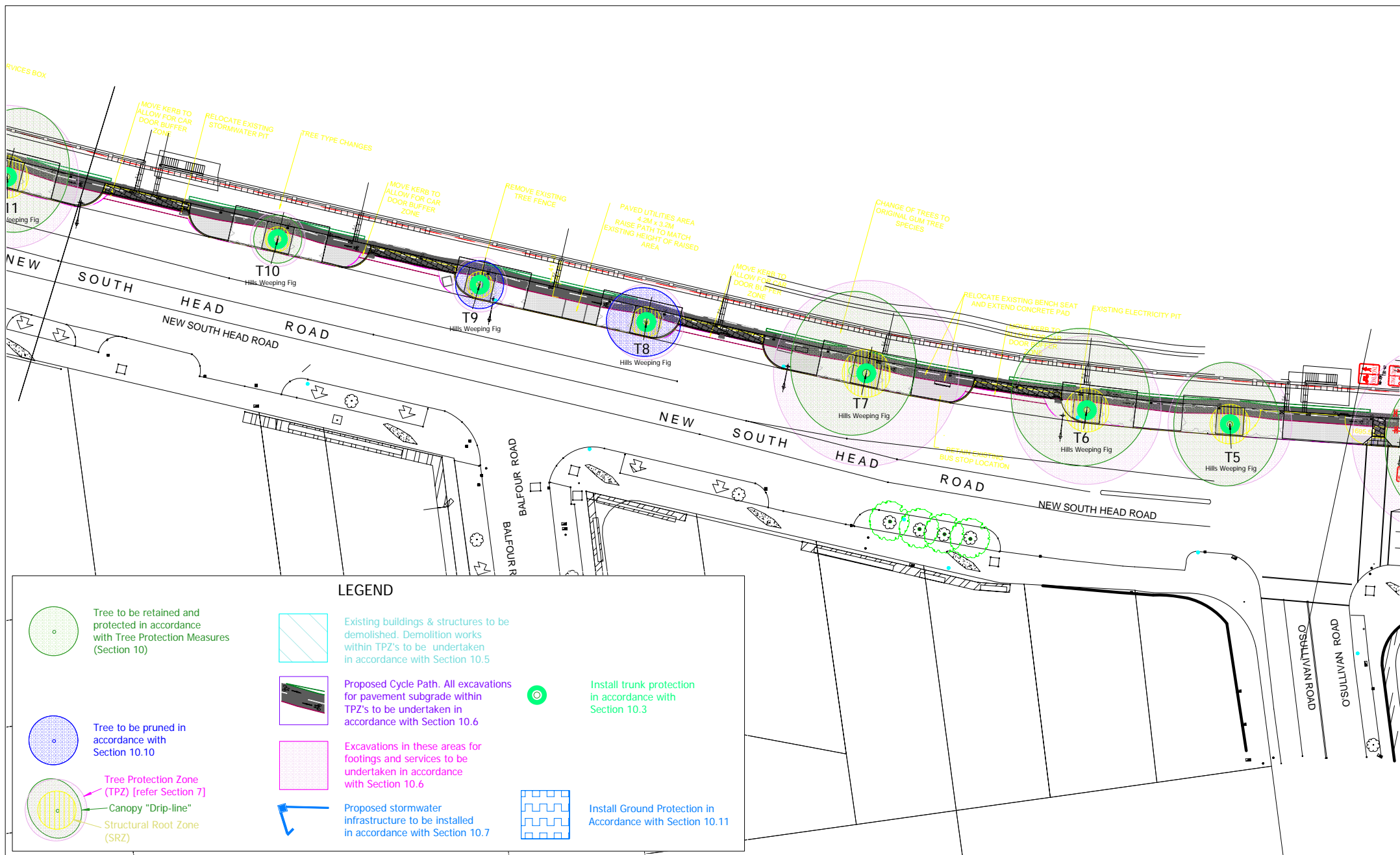
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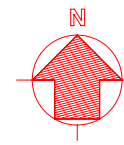


APPENDIX 7 TREE PROTECTION PLAN

Proposed Cycleway
New South Head Road, ROSE BAY, NSW



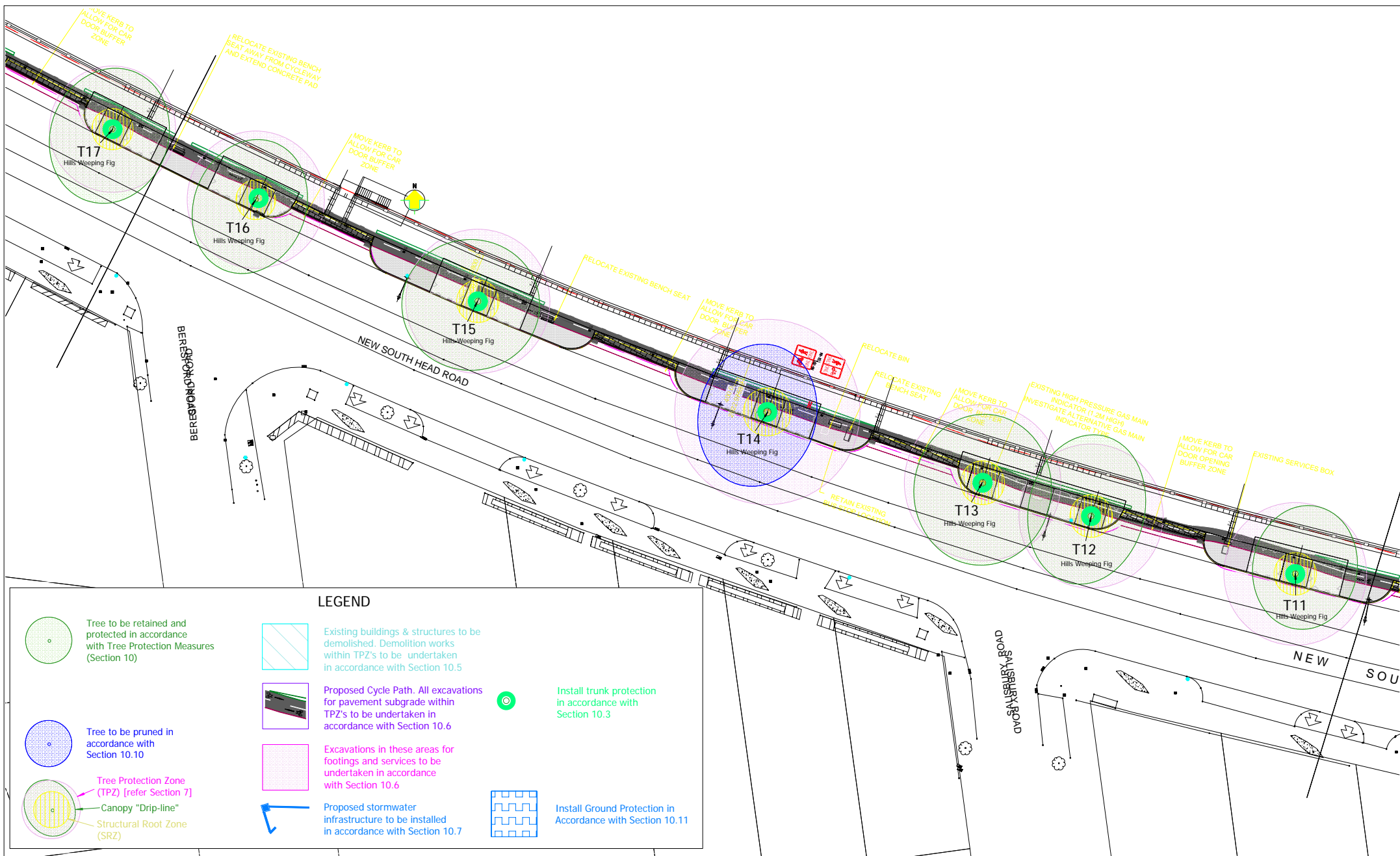
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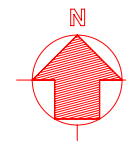


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Proposed Cycleway
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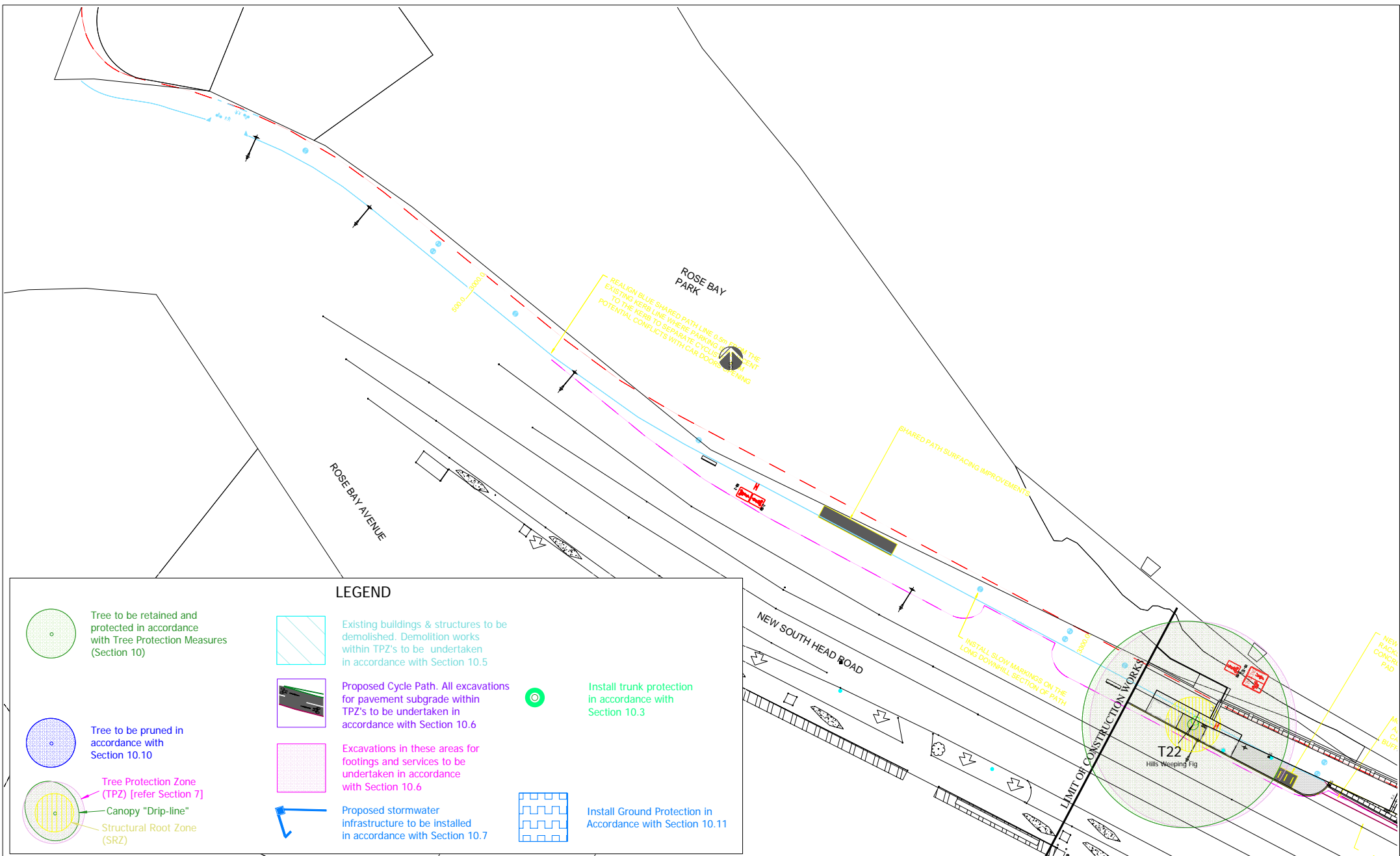
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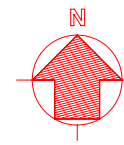


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