EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

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ARBORICULTURAL IMPACT ASSESSMENT REPORT

PROPOSED COMMERCIAL DEVELOPMENT

24-26 RAILWAY PARADE, WESTMEAD

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1 INTRODUCTION

1.1.1 This report was commissioned by Sissons Architects to assess the health and condition of five trees located immediately adjacent to 24-26 Railway Parade, Westmead. The report has been prepared to aid in the assessment of a Development Application (DA) for the demolition of the existing commercial building and construction of a new Mixed-use development within the property, consisting of a supermarket, retail shops, hotel and residential apartments.

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 Parramatta Council's guidelines for preparation of Arborists Reports as outlined in Section 2.3 & 5.4 of the *Parramatta Development Control Plan 2011* (PDCP), Council's Pre-Lodgement Advice 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 consists of three commercial allotments known as Lot 1 in DP 952720, Lot 1 in DP 972068 and Lot 10 in DP 605684, being 24-26 Railway Parade, Westmead. For the purposes of this report, the subject allotments will be referred to as "the Site". The total area of the site is approximately 2,512.5 m². The site is zoned Mixed Use [B4] under the *Parramatta Local Environmental Plan 2011* (PLEP). The site is located on the corner of Railway Parade and Ashley Lane. The site contains an existing multi-storey commercial building known as the "Westmead Shopping Village" located in the southern portion of the site, together with an on-grade car parking area in the northern portion of the site. The site has a moderate south-easterly gradient. The majority of the site is built upon with exception of a few raised garden areas (planter boxes) on the southern side of the building along the Railway Parade frontage. Two Brushbox trees [T1 & T2] stand on the nature strip near the southern corner of the site, one Himalayan Cedar [T3] stands on the adjoining property near the western corner of the site and one small Sasanqua Camellia [T4] stands on the adjoining property near the northern corner of the site.

2.1.2 The original soils of this area are typical of the Blacktown Soil Landscape Group (as classified in the *Soil Landscapes of the Penrith 1:100,000 Sheet)*, consisting of shallow to moderately deep (less than 1000 mm) hardsetting mottled contrast soils, *Red & Brown Podzolic Soils* on crests grading to *Yellow Podzolic Soils* on lower slopes and in drainage lines derived Wianamatta Group Shales.[1] The landscape generally consists of undulating rises with slopes ranging usually less than 5% grade, but ranging up to 10%.

2.1.3 The original vegetation of this area consisted of woodland typical of the Cumberland Plain (Shale Plains Woodland).[2] Most of the locally indigenous vegetation has been cleared from surrounding areas for urban development. The dominant locally-indigenous tree species formerly occurring in this area included *Eucalyptus moluccana*, (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus fibrosa ssp. fibrosa* (Broad-leaved Ironbark) & *Eucalyptus crebra* (Narrow-leaved Ironbark). Other species found in this vegetation community may include *Eucalyptus globoidea* (White Stringybark) and *Eucalyptus longifolia* (Woolybutt) with *Melaleuca decora* (Paperbark) and *Casuarina glauca* (Swamp Oak) found in low lying areas or along drainage lines.

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 19th September 2017. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey drawings prepared by Proust and Gardner Consulting, Dwg. Ref No. 20746/DET/2 dated 08/2001 and Matthew Freeburn Dwg. Ref No. CC7 - SURVEY 5- DWG33005 18-7-13A2 dated 25/07/2013. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No. T4 was not shown on the original surveys and has been plotted on the drawing in its approximate position by taking offsets from existing features.

Plate 1 – Showing T1 & T2 (Brushbox trees) on the Railway Parade road reserve adjacent to the site.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

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

4.1.2 The following information was collected for each tree:-

- Tree Species (Botanical & Common Name);
- Approximate height;
- Canopy spread; measured using a metric tape and an average taken.
- Trunk diameter (measured at 1.4 metres from ground level);
- Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres).

- Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators,
- Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

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

4.2 Safe Useful Life Expectancy (SULE)

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

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

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

4.2.1 SULE ratings are intended to provide a general overview of the long term sustainability of the trees within the site in consideration of these factors. The allocated ranges are not intended to be absolute. This information is useful in guiding future planning by highlighting the probable lifespan of individual trees, for which a clear pattern may emerge. This information may be helpful in forecasting likely tree senescence and planning for replacement planting to ensure continuity in tree canopy across the site. It should be noted that SULEs *may* be extended or reduced depending on the way trees are managed. Intervention and remedial works may extend the SULE of some trees.

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure a consistent approach, the assessment criteria shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**

7. Insignificant

5.2 Environmental Significance

5.2.1 Tree Management Controls

Prescribed trees within the within the City of Parramatta Local Government Area (LGA) are protected under Part 5.4 of the *Parramatta Development Control Plan 2011* (PDCP) made pursuant to Section 5.9 of the *Parramatta Local Environmental Plan 2011* (PLEP). The PDCP generally protects:-

- all trees and palms with a height of five (5) metres or greater;
- any tree or mangrove vegetation on Public Land (irrespective of size);
- all trees listed in Council's Register of Significant or Heritage Trees;
- any tree within land designated as a Heritage Item under the PLEP 2011;
- any tree located within a designated Heritage Conservation Area under the PLEP 2011; and
- any tree that forms part of an Aboriginal Object or that is within and Aboriginal Place of Heritage Significance.

Some exemptions apply. However, all of the subject trees are protected under the provisions of the PDCP 2011.

5.2.2 Wildlife Habitat

All of the trees are exotic (introduced) or non-local native species that would be of some benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds or other visible signs of wildlife habitation.

5.2.3 Noxious Plants & Environmental Weeds

None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993. None of the subject trees are considered to be Environmental Weed Species with the Parramatta Local Government Area (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 *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999. The National Parks and Wildlife Service (NPWS) 1:25000 Mapping Series (Native Vegetation of the Cumberland Plain) [5] indicates that there are no remnant native vegetation communities within or in the vicinity of the site

5.2.5 Biodiversity & Riparian Lands

The site does *not* contain any 'Areas of Biodiversity Significance' as indicated on Council's Natural Resources Biodiversity Map forming part of the PLEP 2011. The site does *not* contain any 'Riparian Land' as indicated on Council's Natural Resources Riparian Land and Waterways Map forming part of the PLEP 2011.

5.3 Heritage Significance

5.3.1 Heritage Items

The subject property is *not* listed as an item of Environmental Heritage under Schedule 5, Part 1 of the *Parramatta Local Environmental Plan* (PLEP) 2011.

T3, a *Cedrus deodara* (Himalayan Cedar) is one of a pair of the same species located on the adjoining property to the west (SP 31330, 27 Railway Parade, Westmead). These trees were probably planted in the Inter-War Period (1919-1939) being visible as semi-mature specimens in the 1943 Aerial Photo of Sydney (SIX Maps). The trees appear to have been planted in association with a former residential dwelling on that property at that time.

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

5.3.3 Significant Tree Register
Parramatta City Council does *not* currently maintain a Register of Significant Trees.

5.4 Amenity Value

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

6 TREE RETENTION VALUES

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

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

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

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[6]

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

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

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

7.3 Acceptable Encroachments to the Tree Protection Zone.

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

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

7.4 Acceptable Encroachments to the Canopy

7.4.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as “lopping” and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.

7.4.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

8 PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the demolition of the existing commercial building and construction of a new Mixed Used commercial (supermarket and shops), hotel and residential apartments within the property, together with basement car parking facilities. The development will include upgrade of the streetscape areas adjacent to the site within Railway Parade and Ashley Lane.

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
Basement Plans B4 to B1	Sissons Architects	16-021 DA111 – DA114 [A]	12/2017
Lower Ground Floor Plan	Sissons Architects	16-021 DA115 [A]	12/2017
Upper Ground Floor Plan	Sissons Architects	16-021 DA116 [A]	12/2017
Level 01 to Level 14 Plans	Sissons Architects	16-021 DA 117 to DA123 [A]	12/2017
Roof Plan	Sissons Architects	16-021 DA124 [A]	12/2017
Elevations	Sissons Architects	16-021 DA151 to DA154 [A]	12/2017
Landscape Design Report	Urbis	ND1765 [C]	28/11/2017
Landscape Layout Plans	Urbis	ND1765 L000-L106 [C]	28/11/2017

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 5**. The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (R.L.);
- Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);
- Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
- Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
- Incursions to the tree canopy from the building envelope and temporary structures; and
- Assessment of the likely impact of the works on existing trees.

9.1.3 The proposed development will also necessitate the removal of one tree of moderate retention value, being T5, an Old Man Banksia. This tree is not considered significant, but is in good health and condition and makes a fair contribution to the amenity of the streetscape. It should be noted that this tree is located within the road reserve. In order to compensate for loss of amenity resulting from the removal of this tree to accommodate the proposed development, consideration should be given to replacement planting elsewhere within the road reserve in accordance with Section 11.

9.1.4 The proposed basement is located within the TPZs of T1 (Brushbox) and T4 (Camellia). It is understood that the basement wall is proposed to be constructed using soldier piles with infill shotcrete panels. This type of wall construction will require minimum excavation beyond the footprint of the basement. In both instances, the encroachment from the basement excavation to the TPZs of these trees is minor (less than 10% of the TPZ), which is within acceptable limits under AS 4970:2009. In the case of T4, the excavation for the basement is located beyond an existing masonry wall located close to the common boundary. The proposed works would not result in any actual incursion to the root zone of this tree, due to the barrier created by the wall and footing. As such, this work will not result in any adverse impact on these trees.

9.1.5 The existing concrete pavement is proposed to be demolished within the TPZs of T1 & T2 (Brushbox) & T3 (Himalayan Cedar) and replaced with a new unit type granite paver at a similar level and grade. In the case of T3, the pavement upgrade is located beyond an existing masonry retaining wall. The proposed works would not result in any actual incursion to the root zone of this tree, due to the barrier created by the wall and footing. As such, this work will not result in any adverse impact on this tree. Demolition of the existing pavement will require some disturbance within the TPZ's of T1 & T2. However, this work should not result in any adverse impact on these trees provided that the demolition is undertaken in accordance with **Section 10.5**. The new pavers are approximately 50mm thick over a 100mm concrete slab. As such, the new pavement section

should be similar to that of the existing pavement, requiring minimal sub-grade excavation. Therefore, this work will not result in any adverse impact on these trees, provided that all excavation for the pavement sub-grade and edge restraint within the TPZs of T1 & T2 is undertaken in accordance with Section 10.6. To avoid root damage or severance to Trees T1 & T2, the overall shape and size of the existing pavement openings should be maintained (or enlarged where necessary). The pavement openings are proposed to be filled with the FilterPave (poly-bond porous aggregate pavement). This should not result in any adverse impact provided that all excavation for the pavement sub-grade within the TPZs of T1 & T2 is undertaken in accordance with **Section 10.6**.

9.1.6 The canopy of T2 is located close to the proposed new building envelope. Some canopy pruning is likely to be required to clear any temporary scaffolding or hoarding erected to facilitate construction of the building, depending on the height and width of the hoarding/scaffolding. Minor canopy pruning may also be required to clear an awning projecting from the southern façade of the building (refer **Plate 2**). The required pruning should not result in any adverse impact on this tree, provided that all such canopy pruning (that essential to clear any hoarding, scaffolding and the awning) is undertaken in accordance with **Section 10.10** and all temporary scaffolding is erected in accordance with **Section 10.12.**

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

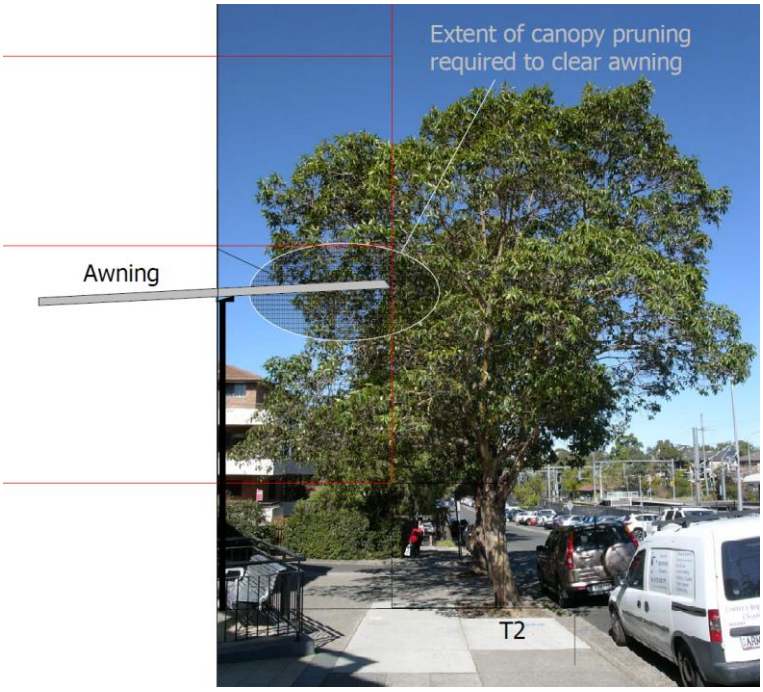


Plate 2 – Showing extent of canopy pruning of T2 (Brushbox) required to clear the proposed awning.

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**) and Impact Assessment Schedule (**Appendix 4**). The Tree Protection Plan (TPP) indicates the position of tree protection devices and other recommended protection measures to ensure the protection of trees within the site to be retained as part of the proposed

development. The Impact Assessment Schedule details the site specific Tree Protection Measures to be implemented in relation to each tree.

10.2 Prohibited Activities

10.2.1 The following activities should be avoided within specified Tree Protection Zones (refer **Appendix 4 & 6** for extent of the TPZ for each tree):-

- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
- Soil disturbance, surface grading, compaction, tyning, ripping or cultivation of soil;
- Mechanical removal of vegetation, including extraction of tree stumps;
- Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works)
- Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas);
- Erection of site sheds (except where approved by the site arborist);
- Affixing of signage, barricades or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Stockpiling of spoil or fill;
- Stockpiling of bulk materials, such as soil, sand, gravel, roadbase or the like;
- Stockpiling of demolition waste;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

10.3 Tree Damage

10.3.1 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.

10.3.2 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist [Australian Qualification Framework Level 5] shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

10.4 Trunk Protection

10.4.1 Trunk Protection shall be erected around the trunks of **T1** & **T2** (Brushbox) to avoid accidental damage, as indicated on the Tree Protection Plan (**Appendix 6**). The trunk protection shall consist of a layer of carpet underfelt (or similar) wrapped around the trunk, followed by 1.8 metre lengths of softwood timbers (90 x 45mm in section) aligned vertically and spaced evenly around the trunk at 150mm centres (i.e. with a 50mm gap) and secured together with galvanised hoop strap fixed to the boards with screws as shown in **Figure 3**. Recycled timber (such as demolition waste) may be suitable for this purpose, subject to the approval of the Project Arborist. The timbers shall be wrapped around the trunk (over the carpet underfelt), but not fixed to the tree to avoid mechanical injury or damage to the trunk. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period. Carpet underfelt (alone) is sufficient for trees with a trunk diameter of less than 200mm.

Figure 3 – Detail of Trunk Protection

10.5 Demolition Works within Tree Protection Zones

10.5.1 Demolition of the existing concrete pavement within the TPZs of **T1 & T2** shall be undertaken under the supervision of a qualified Arborist (AQF Level 5). The pavement surface within the TPZ shall be broken up into manageable sections using a rock hammer mounted on a small excavator or equivalent approved method. Sections shall be lifted carefully to avoid compaction and disturbance within the TPZ. Any remaining sub-base material (underlying roadbase etc) shall be gradually removed in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and minimise disturbance and compaction of the underlying soil profile. The machine shall work within the footprint of the existing paved surfaces 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 damage to woody roots.

10.5.2 Demolition of existing walls, kerbs and other structures within the TPZs of **T1, T2** & **T4** 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. 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.

10.6 Excavations within Tree Protection Zones

10.6.1 Prior to any mechanical excavations for the pavement sub-grade or structural footings (street furniture, new pram ramp etc) within the TPZs of **T1 & T2**, 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 (Water Knife). 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. All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. All woody roots encountered of 30mm in diameter or greater shall be maintained intact.

10.6.2 Where large woody roots (greater than 30mm diameter) are encountered during exploratory excavations and severance is required to accommodate the proposed works, further advice from a qualified arborist (AQF Level 5) shall be sought prior to severance. Any root pruning required shall be undertaken in accordance with **Section 10.10**.

10.6.3 The size and shape of the existing pavement openings surrounding trees **T1 & T2** shall be maintained (not made any smaller). Any required excavations for the sub-grade of the filter pave shall only be undertaken using non-destructive excavation methods under the direct supervision of a qualified arborist (AQF Level 5).

10.7 Underground Services

10.7.1 All proposed stormwater lines and other underground services should be located outside TPZs of trees proposed to be retained wherever possible or installed by alternative measures. Alternative measures include suspending pipelines beneath the floor of a building or structure (to avoid excavation with the TPZ), non-destructive excavation methods or Horizontal Directional Drilling (HDD). Where the installation of service lines within TPZs is unavoidable, the pipelines or conduits should be installed as follows.

10.7.2 Where the extent of the incursion to the root zone is less than 10% of the TPZ including any excavations for benching and shoring the trench, the pipeline or conduit may be installed by open trenching using standard construction methods (excavator or trenching machine). 10% of the TPZ is equivalent to one-third of the TPZ radius on one side (refer to **Appendix 2**). Refer to **Appendix 4** for radial distances of TPZs for each tree.

10.7.3 Where the extent of the incursion to the root zone exceeds 10% of the TPZ, but is outside the SRZ, non-destructive excavation methods must be adopted in accordance with **Section 10.6**. Where large woody roots are encountered during excavation or trenching (root diameter greater than 30mm), these shall be retained intact wherever possible (e.g. by tunnelling beneath roots and inserting the pipeline or conduit beneath or re-routing the service etc). Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by a qualified arborist [AQF 5] to evaluate the potential impact on the health and stability of the subject tree.

10.7.4 Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring (Horizontal Directional Drilling). 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 Tree Protection Zone (TPZ) of **T1 & T2** be placed at or slightly above grade where possible to minimise excavations within the root zone/TPZ and avoid severance and damage of woody roots. All excavations for the pavement sub-grade within the TPZ's of T1 & T2 shall be carried out in accordance with **Section 10.6**.

10.9 Pavement Sub-base

10.9.1 Pavement sub-base material used in association with the Filter Pave pavement shall be a coarse, gap-graded material such as 5-10mm diameter crushed basalt (Blue Metal) 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.

10.10 Canopy & Root Pruning

10.10.1 Canopy pruning of **T2** required to clear the awning and temporary scaffolds and hoardings shall be carried out in accordance with Australian Standard 4373-2007 – Pruning of Amenity Trees. Pruning should be limited to that acceptable to provide the minimum acceptable clearances from these structure. Canopy pruning to clear temporary scaffolding should be avoided where possible by installing the scaffolding in accordance with **Section 10.12**. 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).

10.10.2 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].

10.10.3 Where root pruning is required, roots shall be severed with clean, sharp pruning implements by a qualified Arborist (AQF5) and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

10.11 Tree Removal

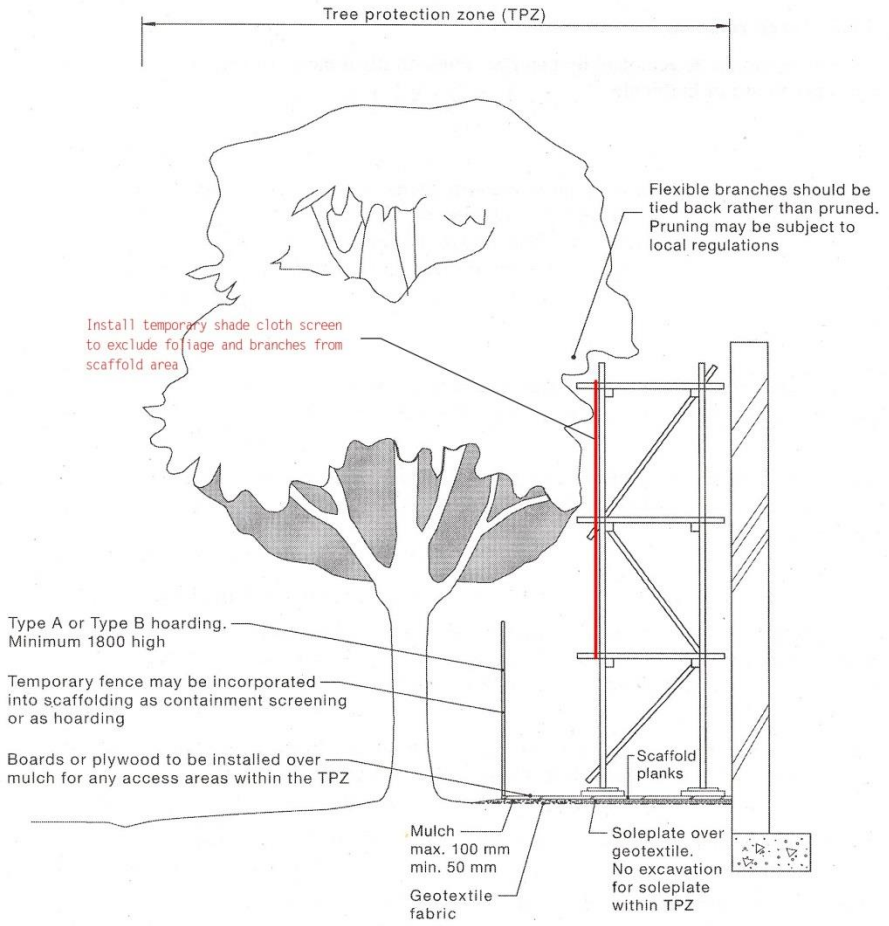
10.11.1 The approval of Parramatta City Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.

10.11.2 Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.

10.11.3 Stumps located within the TPZs of trees to be retained shall be grubbed-out where required using a mechanical stump grinder (or by hand where less than 150mm in diameter) without damage to the root system of other trees. Where trees to be removed are within the SRZ of any trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained shall **not** be pulled out using excavation equipment or similar.

10.12 Temporary Scaffolding

10.12.1 If temporary hoardings or scaffolding must be erected within the TPZ of **T1, T2** or **T3** (as indicated in **Appendix 6**), the scaffold shall be erected in accordance with **Figure 5**. Where foliage or branches project through the scaffold and create a safety hazard, these foliage and branches shall be temporarily excluded from the inner part of the scaffold by affixing a shade cloth screen on the outside of the scaffold **(**refer to **Figure 5)**, or alternatively temporarily tying back branches where required. The pruning or removal of branches to accommodate the scaffold should be avoided wherever possible. Suitable ground protection shall be installed beneath the scaffold as shown in **Figure 5** to prevent contamination, disturbance and compaction of the soil profile within the scaffold zone during construction.



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

Figure 5 - Detail of Temporary scaffolding within a Tree Protection Zone

10.12.2 Where pruning or removal of branches to accommodate temporary scaffolding is unavoidable, all such pruning work shall be undertaken in accordance with **Section 10.10**.

11 REPLACEMENT PLANTING

11.1.1 In order to compensate for loss of amenity resulting from the removal of trees to accommodate the proposed development, a minimum number of one new trees capable of attaining a height of at least ten (10) metres at maturity should be planted within the allotment. Replacement trees should preferably include some locally indigenous species. These will be most appropriate to the site conditions and be most valuable in terms of preserving the landscape character and wildlife habitat of the area. The following species are appropriate to the site conditions and could be considered for replacement planting:-

- *Ficus rubiginosa* (Port Jackson Fig)
- *Syzygium paniculatum* (Magenta Cherry)
- *Glochidion ferdinandi* (Cheese Tree)
- *Syncarpia glomulifera* (Turpentine)
- *Eucalyptus umbra* (Bastard Mahogany),
- *Angophora floribunda* (Rough barked Apple)
- *Angophora costata* (Sydney Red Gum),
- *Corymbia maculata* (Spotted Gum)
- *Allocasuarina torulosa* (Forest Oak).

11.1.2 In order to replace the tree on the nature strip, a minimum of one (1) new tree should be planted elsewhere on the nature strip. The species should be selected in accordance with Council's Street Tree Masterplan.

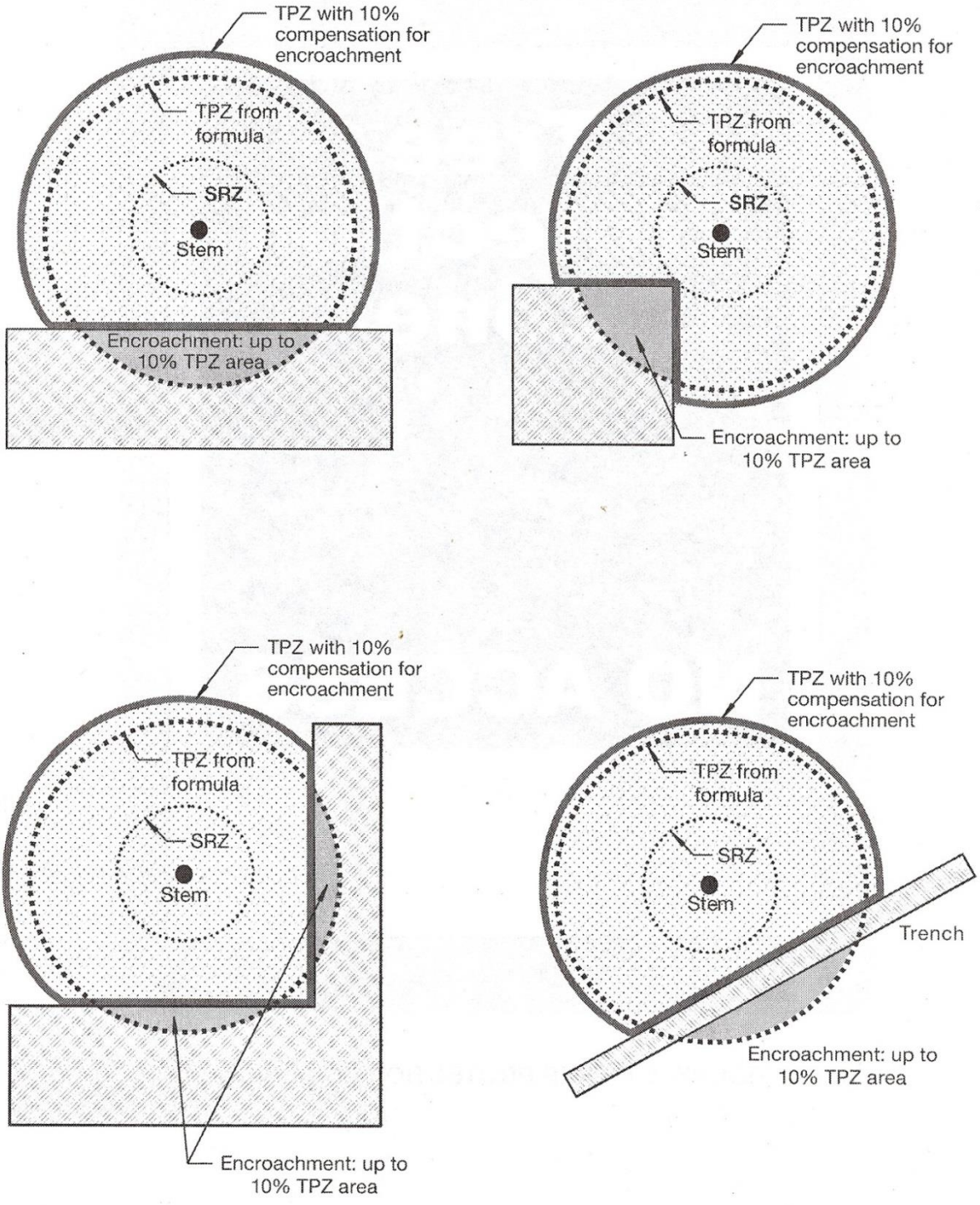
Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
30th November 2017

APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m²;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

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

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



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

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

REFERENCES:-

[1] Bannerman S.M. & Hazelton P.A. (1990)
Soil Landscapes of the Penrith 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] National Parks and Wildlife Service of NSW (October 2002)
Native Vegetation of the Cumberland Plain - 1:25000 Mapping Series (Map 10 of 16)
NPWS, Sydney NSW

[6] Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	***Lophostemon confertus*** (Brushbox)	9	9	459	54	M	Appears stable with fair branching structure. Exhibits a small wound at 3 metres due branch loss (vehicle damage). Multiple wounds due previous pruning with multiple epicormics arisiing from old pruning points (crown restored). 5% interior crown deadwood.	Crown lifted to 3 metres. Previously lopped at 3-4 metres	Good	No Evidence	Long - more than 40 years	4	**Moderate**	Nature strip
2	***Lophostemon confertus*** (Brushbox)	9	9	408	54	M	Appears stable with fair branching structure. Prominent lean to the north (self-corrected). Exhibits a low bark inclusion at 2 metres at junction of PLs. 5% interior crown deadwood.	Crown lifted to 3 metres.	Good	No Evidence	Long - more than 40 years	4	**Moderate**	Nature strip
3	***Cedrus deodara*** (Himalayan Cedar)	15	14	580	168	M	Appears stable with sound branching structure. Co-dominant PL arising from lower trunk. 15% interior crown deadwood.	Crown lifted to 3 metres & selectively pruned.	Very Good	No Evidence	Long - more than 40 years	3	**High**	Adjoining property
4	***Camellia sasanqua*** (Sasanqua)	5	5	200	25	SM	Appears stable with sound branching structure.	Clipped on east side to clear pedestrian access to ramp.	Very Good	No Evidence	Long - more than 40 years	5	**Moderate**	Adjoining property

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

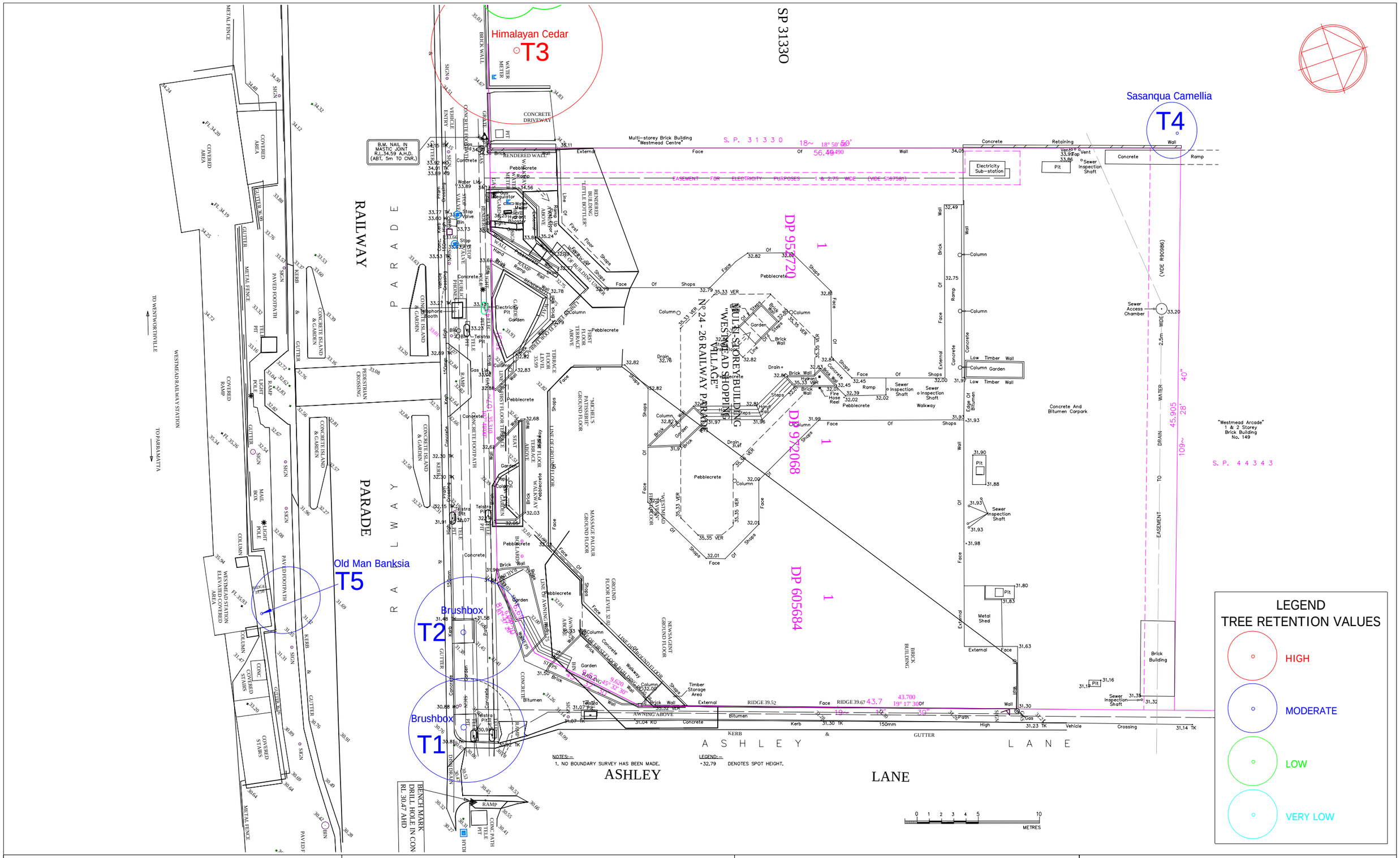
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	***Lophostemon confertus*** (Brushbox)	M	5.5	2.4	95.1	Existing concrete pavement to be demolished within SRZ/TPZ. New unit pavement (50mm thick Granite Flagstone over concrete slab) to be installed at similar level and grade, with 'Filter Pave' (poly-bond porous aggregate pavement) infill to existing tree pit openings. Minor excavations for new pavement sub-grade and edge restraint within TPZ/SRZ. Existing pram ramp offset 2.9 metres north to be demolished and new pram ramp to be constructed within a similar footprint. Excavations for ramp foundations within SRZ (within footprint of existing ramp. Proposed seat offset 3.1 metres west. Excavations for seat footings (post footings) within TPZ	No adverse impact provided that all demolition and pavement works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Trunk Protection Boarding in accordance with Section 10.4. Demolish existing concrete pavement in accordance with Section 10.5. Undertake any required excavations for the pavement sub-grade and edge restraint for the new granite pavement and filter pave in accordance with Section 10.6. Maintain existing pavement opening size and shape surrounding trunk. Increase pavement opening size surrounding trunk if required to avoid severance or damage to woody roots for new pavement or associated edge retstraint.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
2	***Lophostemon confertus*** (Brushbox)	M	4.9	2.3	75.1	Proposed basement offset 4.8 metres north-east at RL18.85 (12 to 13 metres below grade, within footprint of existing concrete steps). Excavations for basement wall within TPZ (soldier pier with shotcrete infill panels). Minor encroachment to TPZ (less than 5%), assuming minimal over-excavation to facilitate construction. Proposed building offset 5.6 metres north to RL45.18 (14 to 15 metres above grade). No encroachment to TPZ. Proposed awning offset 2.0 metres north to RL38.00 (about 6.0 metres above grade). Some canopy pruning may be required to clear temporary scaffolding and awning. Existing concrete pavement to be demolished within SRZ/TPZ. New unit pavement (50mm thick Granite Flagstone) to be installed at similar level and grade, with 'Filter Pave' (poly-bond porous aggregate pavement) infill to existing tree pit openings. Minor excavations for new pavement sub-grade and edge restraint within TPZ/SRZ. Proposed seat offset 2.5 metres east. Excavations for seat footings (post footings) within TPZ. Existing kerb and gutter to south to be maintained intact.	No adverse impact, provided that temporary scaffolding is erected in accordance with the following recommendations. No adverse impact provided that all demolition and pavement works within TPZ are undertaken as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Install Trunk Protection Boarding in accordance with Section 10.4. Erect temporary scaffolding in accordance with Section 10.12. Undertake any required canopy pruning (that essential to clear the temporary scaffolding and awning) in accordance with Section 10.10.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
3	***Cedrus deodara*** (Himalayan Cedar)	M	7.0	2.6	152.1	Proposed basement offset 7.9 metres east at RL18.85 (16 metres below grade, within footprint of existing concrete retaining wall). No encroachment to TPZ. Basement wall to be constructed using soldier pier with shotcrete infill panels (minimal excavation beyond basement footprint). Existing concrete pavement to be demolished within SRZ/TPZ. New unit pavement (50mm thick Granite Flagstone) to be installed at similar level and grade (beyond existing retaining wall). No actual incursion to root zone due to barrier created by existing wall.	No adverse impact, provided that temporary scaffolding is erected in accordance with the following recommendations.	Retain in accordance with recommended Tree Protection Measures (Section 10). Erect temporary scaffolding in accordance with Section 10.12. Exclude any foliage or small branches projecting into the scaffold zone with a scaffold screen as shown in Figure 5.
4	***Camellia sasanqua*** (Sasanqua)	M	2.5	1.7	19.6	Proposed basement offset 1.2 metres east at RL18.85 (15 to 16 metres below grade, within footprint of existing concrete ramp, beyond existing retaining wall). No actual incursion to root zone due to barrier created by existing retaining wall.	No adverse impact. Basement wall to be constructed using soldier pier with shotcrete infill panels (minimal excavation beyond basement footprint).	Retain in accordance with recommended Tree Protection Measures (Section 10). Demolish existing concrete ramp within TPZ in accordance with Section 10.5.
5	***Banksia serrata*** (Old Man Banksia)	P	3.0	1.7	28.3	Located within footprint of proposed pathway (to be widened). Excavations for pavement subgrade within SRZ. Severe pruning required to clear pedestrian access due to trunk lean to the north.	Proposed works will necessitate removal.	Remove tree. Undertake reploacement planting elsewhere within the road reserve with a new tree to compensate for loss of amenity in accordance with Section 11.



LEGEND
TREE RETENTION VALUES

- HIGH
- MODERATE
- LOW
- VERY LOW

APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES

24-26 Railway Parade, WESTMEAD, NSW

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

Based on the Survey Drawings (conglomerate) prepared by:-

Proust and Gardner Consulting
Dwg Ref No. 20746/DET/2
Dated 8/2001

Matthew Freeburn
Dwg Ref No. CC7 - SURVEY 5 - DWG33005 18-7-13A
Dated 25/07/2013

DWG No. T17-092003

DATE: 05/10/2017

Himalayan Cedar
T3

Sasanqua Camellia
T4

Old Man Banksia
T5

Brushbox
T2

Brushbox
T1

SP 31330

DP 952720

DP 972068

DP 605684

EXTENT OF WORKS

PROPERTY BOUNDARY

RAILWAY PARADE

ASHLEY LANE

REFER INSET A-L102

REFER INSET A-L102?

TO NEWCASTLE

TO PARRAMATTA

WESTMEAD RAILWAY STATION

NOTES:–
1. NO BOUNDARY SURVEY HAS BEEN MADE.

LEGEND:– 32.79 DENOTES SPOT HEIGHT.

0 1 2 3 4 5 10 METRES

LEGEND

- Tree to be retained and protected in accordance with Tree Protection Measures (Section 10)
- Tree to be removed in accordance with Section 10.11
- Tree to be pruned in accordance with Section 10.10
- Tree Protection Zone (TPZ) [refer Section 7]
  - Canopy "Drip-line"
  - Structural Root Zone (SRZ)
- Existing buildings & structures to be demolished. Demolition works within TPZ's to be undertaken in accordance with Section 10.5
- New Building works. All excavations for building foundations within TPZ's to be undertaken in accordance with Section 10.6
- Excavations in these areas for footings and services to be undertaken in accordance with Section 10.6
- Proposed stormwater infrastructure to be installed in accordance with Section 10.7
- Basement footprint (Basement walls to be installed using soldier piles & shotcrete panels)
- Install trunk protection in accordance with Section 10.4
- Erect any required temporary scaffolding in these areas in accordance with Section 10.12
- Install Ground Protection in Accordance with Section 10.13

APPENDIX 6

TREE PROTECTION PLAN

24-26 Railway Parade, WESTMEAD, NSW

Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
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Dated 8/2001

Matthew Freeburn
Dwg Ref No. CC7 - SURVEY 5 - DWG33005 18-7-13A
Dated 25/07/2013

DWG No. T17-092004 [D]

DATE: 30/11/2017