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DEVELOPMENT IMPACT ASSESSMENT REPORT

'GRAYTHWAITE'
20 EDWARD STREET, NORTH SYDNEY

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1 INTRODUCTION

1.1.1 This report was commissioned by Tanner Architects on behalf of Sydney Church of England Grammar School (Shore) to assess the health and condition of approximately two-hundred and thirty (230) trees located within or immediately adjacent 'Graythwaite', 20 Edward Street, North Sydney. Graithwaite was purchased by Shore in 2009 with a view to conserving significant buildings and landscape and adapting the site for administrative and other school purposes.[1] The report has been prepared to aid in the assessment of a Development Application for the Master Plan development of the property.

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.

2 THE SITE

2.1.1 The subject property is a large allotment known as Lot 2 in DP 539853, being 20 Edward Street, North Sydney, also known as 'Graythwaite'. For the purposes of this report the subject allotment will be referred to as "the Site". The site contains an existing two storey stone mansion (Graythwaite), and former Coach House together with a former Convalescent Hospital and single storey brick building (original stables) in the north-east corner. An electrical substation is also located adjacent the south-western corner (near Union Street). The total area of the site is 2.69 hectares.

2.1.2 The north-eastern portion of the site has slight south-westerly gradient becoming steeply sloping in the central portion with a number of steep embankments and terraced open lawn areas. The steeper embankments are heavily vegetated and traversed by pedestrian pathways. A driveway runs alongside the eastern boundary then sweeps around the south side of the mansion to the Coach House providing vehicular access from Union Street. The main driveway has an avenue of Brushbox and Camphor Laurel trees, together with a mixture of other species including Black Locust. The southern, western and part of the northern boundary has a row of large Moreton Bay Figs, and some other *Ficus* species forming a substantial boundary planting. Small-leaf Figs are predominant along the southern side of the central terrace. There are also some isolated Figs (Small-leaf Fig, Port Jackson Fig and Moreton Bay Fig) in the vicinity of Graythwaite.

2.1.3 Soils of this area are typical of the Gymea Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of "shallow to moderately deep (300 – 1000 mm) *Yellow Earths* and *Earthy Sands* on crests and inside of benches and shallow (< 200 mm) *Siliceous Sands* on leading edges of benches; localised *Gleyed Podzolic Soils* and *Yellow Podzolic Soils* on shale lenses; and shallow to moderately deep (< 1000mm) *Siliceous Sands* and *Leached Sands* along Drainage Lines."[2] Soil materials are derived Hawkesbury Sandstone and may be discontinuous with localised rock outcrop.

2.1.4 The original vegetation of this area consisted of open forest & woodland typical of Hawkesbury Sandstone areas.[3] Locally-indigenous tree species formerly occurring in this area included *Angophora costata* (Sydney Red Gum), *Eucalyptus piperita* (Sydney Peppermint) and *Eucalyptus haemastoma* (Scribbly Gum). Other species occurring in this association may include *Pittosporum undulatum* (Native Daphne), *Allocasuarina littoralis* (Black She-Oak), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus globoidea* (White Stringybark), *Eucalyptus sieberi*, (Silvertop Ash) and *Banksia serrata* (Old Man Banksia). *Glochidion ferdinandi* (Cheese Tree) and *Ficus rubiginosa* (Port Jackson Fig) may also be found on sheltered sites on lower slopes.

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 9th April 2010. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey prepared by Rygate & Company Pty Ltd, Dwg. Ref No. 73949 dated 3rd February 2010. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**).

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.[4] 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 Breast Height (DBH) (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.

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 [5] 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 in Sydney, 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)

4.3 General Observations

4.3.1 A fill and rubble berm is located along the southern and western boundaries, which has been piled up around the trunks of many of the Moreton Bay Figs. It is understood that this may have been associated with a temporary ‘construction track’ created around the southern and western boundaries in the 1990’s.[7] The mound appears to be made-up of spoil and some construction refuse. The fill placed in direct contact with the trunks and over the main buttress has resulted in some adverse impact on these trees.

4.3.2 The central terrace areas and embankments are overgrown with a number of perennial woody weeds, including Broad-leaf Privet and African Olive and colonising native species such as Pittosporums. Some of the original Fig plantings are also located within this area. It is understood that the local community has been involved in an active plan of weed suppression over a number of years. An attempt has been made to eradicate and suppress the woody weeds, with evidence of dieback in the crown and vascular tissue caused by herbicide damage. These areas also contain a large number of seedlings and immature trees of rainforest origin, including *Alectryon tomentosum* (Rambutan) and *Cryptocarya obovata* (Pepperberry Tree) most of these appear to be self-sown, but it is also possible that there have been deliberate plantings of rainforest species within these areas.

4.3.3 A number of the Camphor Laurels and Brushbox along the main driveway from Union Street also show dieback in the vascular tissue that appears to be caused by previous herbicide damage. As a result, some of these trees are now in a state of decline. This may have been undertaken deliberately in an attempt to eradicate these trees, or it may have occurred accidentally due to herbicide flare. There is no obvious mechanical damage to the trunks of the trees indicating deliberate poisoning.

4.3.4 A number of the larger Figs contain extensive basal cavities (including T60, T68, T148, T185, T184 & T182). It is beyond the scope of this assessment to carry out detailed diagnostic testing of these trees. However, diagnostic testing using a Picus® Sonic Tomograph is recommended to ascertain the structural integrity of these trees and determine whether they can be retained with a degree of safety.

4.3.5 Tree 163 (Port Jackson Fig) has previously partially overturned. The tree has re-supported itself with a prop root and continued to grow upright. Stability appears to have been compromised by a large in-ground structure (possibly an old sub-surface tank or ornamental pond).

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 amenity, environmental and heritage 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 in a consistent approach, the assessment criterion 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 A Tree Preservation Order (TPO) applies to all land within the North Sydney Local Government Area (LGA) made under Clause 7 of the North Sydney Local Environment Plan (LEP) 2001 by resolution of Council in 2006. The TPO generally protects all trees of a height of 10 metres or greater, or a crown spread of 10 metres or greater or with a trunk circumference exceeding 1.5 metres (i.e. 470 mm diameter). The TPO also protects any vegetation of a height greater than 5 metres in height on the site of a Heritage Item (as defined under Council's LEP). Port Jackson Figs,

Sydney Red Gums and Moreton Bay Figs with a height of 5 metres or greater, or a crown spread of 5 metres or greater and any tree listed on Council's Significant Tree Register are also protected under the TPO. Some exemptions apply. The following trees are exempt (not protected) under the provisions of North Sydney Council's Tree Preservation Order:-

Tree No.	Species	Exemption
122, 124, 128, 130, 133, 143, 149, 150, 150a	*Olea europea var. africana* (African Olive)	Environmental Weed Species
79	*Glochidion ferdinandi* (Cheese Tree)	Dead tree
65	*Populus alba* (Silver Poplar)	Dead tree

5.2.2 The remainder of the trees are protected under Council's TPO.

5.2.3 There are no remnant local-indigenous species within the site. All of the trees are non-local native or exotic species that would be of some benefit to native wildlife. All of the trees have been planted or self-sown within the site. Several trees (T115, T210 & T214) contain cavities that may be suitable as nesting hollows for arboreal mammals or birds. A number of trees show signs of regular foraging by Brushtail and Ringtail Possums. Typically these include all of the followings species:-

- *Cinnamomum camphora* (Camphor Laurel)
- *Robinia pseudoacacia* (Black Locust)
- *Sapium sebiferum* (Chinese Tallow tree)
- *Eriobotrya japonica* (Japanese Loquat).

5.2.4 There were no other visible signs of wildlife habitation.

5.2.5 *Ligustrum lucidum* (Large-leaved Privet) [T47, T152, T176 & T189] is scheduled as a Class 4 Noxious Weed under the meaning of the *Noxious Weeds Act* (NSW) 1993. The growth and spread of this plant must be controlled according to the measures specified in a management plan published by the local control authority and the plant may not be sold, propagated or knowingly distributed.

5.2.6 *Eriobotrya japonica* (Japanese Loquat) [T170], *Celtis sinensis* (Chinese Nettle Tree) [T88 & T172], *Cinnamomum camphora* (Camphor Laurel) [T8, T18, T30, T34, T37, T39, T43, T45, T50, T55 & T158], *Erythrina x sykesii* (Indian Coral Tree) [T91-98, T92a, T93a, T137, T137a, T137b & T138], *Morus nigra* (Mulberry) [T188 & T213], *Schefflera actinophylla* (Umbrella Tree) [T52], *Populus alba* (Silver Poplar) [T65, T67, T101, T102, T103, T111, T54 & T178] *Salix babylonica* (Weeping Willow) [T20] and *Acer negundo* (Box Elder) T187 whilst protected under Council's TPO, are considered Environment Weed Species in many Sydney LGA's.

5.2.7 *Eucalyptus nicolii* (New England Peppermint) [T7] is listed as Vulnerable Species in Schedule 2 of the *Threatened Species Conservation Act* 1995 (NSW) and listed as a Vulnerable Species under the *Environmental Protection and Biodiversity Conservation Act* 1999. Whilst this species is listed as vulnerable in its native habitat, it is a commonly planted ornamental tree in parks, gardens and streetscapes. The species is not endemic to this area and therefore does not have any ecological significance in this context.

5.2.8 None of the other trees are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.

5.3 Heritage Significance

5.3.1 'Graythwaite', including the outbuildings and grounds, is listed as a Heritage Item of State Significance under Schedule 3 of the North Sydney Local Environment Plan (LEP) 2001. The property is also listed as a Heritage Item on the State Heritage Register (*Heritage Act* 1977), has been nominated for inclusion on the Register of the National Estate (2005) and is classified on the National Trust of Australia Register (1981). The site is considered to contain the largest and most significant collections of 19th Century cultural plantings in the North Sydney area.[6]

5.3.2 The site was originally developed in the early-1830's by Thomas Walker (Deputy Commissary General) who constructed a two storey dwelling on the property known as 'Euroka' and the original Stables Building. The original dwelling was constructed on the elevated and flatter north-eastern portion of the site, taking advantage of the views over Sydney Harbour and beyond. The adjacent detached sandstone stables are the oldest examples of stables in North Sydney and were also believed to have been constructed about this time. The lower lawn area near Union Street was originally cultivated as an orchard c.1840 and the area between the house and orchard terraced and a vineyard established about the same time.[7]

5.3.3 During the ownership of Edwin Sayers (mid-1850's), Euroka was extended and subsequently called 'Euroka Villa'. Sayer also established formal gardens around the house and created the extensive terracing, which included a vineyard and orchard. The land is thought to have been used for grazing livestock following the failure of the orchard and vineyard.[7]

5.3.4 During the ownership of the property by Thomas Allwright Dibbs (c.1873), 'Euroka' was substantially altered and added to creating a new Victorian Italianate mansion that he renamed 'Graythwaite' Graythwaite was constructed in c.1875, together with substantial landscaping and tree planting. The boundary plantings of *Ficus macrophylla* (Moreton Bay Fig) were planted c. 1875, together with the other Fig plantings on the embankments.[7] These include *Ficus rubiginosa f. rubiginosa* & *f. glabrescens* (Port Jackson Fig), *Ficus obliqua* (Small-leaf Fig) and other *Ficus sp.* (Small leaf Fig) [T38]. Other rainforest trees such as the *Stenocarpus sinuatus* (Queensland Firewheel Tree) [T41] and *Cryptocarya obovata* (Pepperberry Tree) [T44] and the tall *Araucaria columnaris* (Cook's Pine) [T49] and the *Dendrocalamas giganteus* (Giant Bamboo) are also likely to have been planted about this time. Whilst the Pepperberry is rare tree in Sydney (a similar specimen is located in Prince Alfred Park constructed about the same time), the other species are fairly typical of the Victorian Era. Remnants of two old Monterey Pines [T210 and stump adjacent T62] are also located within the site. It is understood that Pines may have formed some of the original plantings within the site.[7]

5.3.5 In 1916, Graithwaite was converted to a convalescent hospital following its donation by Thomas Dibbs to the Crown to provide for returned soldiers from the First World War. In 1918, it was further converted to a Hostel for long term cases of disablement. A number of *Washingtonia robusta* (Washington Palms) [T61, T61a, T190, T191 & T202] are thought to have been planted on the south side of Graythwaite about this time. It continued use as a Convalescent Home by the Red Cross up until 1977, and later by the NSW Department of Health.[7] The avenue of Brushbox and Camphor Laurels lining the main driveway from Union street probably date back to the Inter-war period c.1915-1940, being fairly typical of this era. The original planting was alternate Brushbox then Camphor Laurel, again characteristic of this period and originally extended along the whole length of the driveway. Later some of these plantings south of the house were removed, possibly due to conflict with views over Sydney Harbour.[1] Two Lombardy Poplars appear to be the remnant of a more extensive row or avenue planting of Poplars. According to the Heritage Branch (DoP), new plantings of Chinese Poplar were planted in the late 1990's to replace Lombardy Poplars that succumbed to Poplar Rust.[7] Only a few of the Chinese Poplars remain.

5.3.6 The gardens have endured a long period of neglect, with much of terraced embankments overgrown with a variety of weed species and other colonising trees including *Ligustrum lucidum* (Large-leaved Privet), *Olea europea var. africana* (African Olive) and *Pittosporum undulatum*

(Native Daphne). This now forms a densely vegetated area. A number of weed species have also infested the gardens on the eastern side of the driveway including *Salix babylonica* (Weeping Willow), *Robinia pseudoacacia* (Black Locust) and some semi-mature *Cinnamomum camphora* (Camphor Laurel) which are likely to be progeny of the Inter-war avenue plantings. Regrowth of *Erythrina x sykesii* (Indian Coral Tree) and *Populus alba* (Silver Poplar) at the edges of the terrace areas may reflect earlier plantings of these species.[7]

5.3.7 A number of fairly recent native plantings have been undertaken on the site (since the late 1990's), particularly alongside the main driveway. Most of the species used are indigenous to the Sydney Basin, but are not necessarily locally-indigenous to this site. It is understood that these plantings have been undertaken by local community gardening and 'bush regeneration' groups.[7] These new plantings are completely unsympathetic with the original Victorian plantings and landscape.

5.3.8 A Significant Tree Register also exists within the North Sydney LGA. Trees listed on the register are afforded the same level of protection as the Tree Preservation Order.

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 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 In order to provide adequate protection for trees nominated as suitable for preservation, Tree Protection Zones (TPZ) are required to provide adequate setbacks from buildings and other infrastructure to minimise adverse impact. The Tree Protection Zone is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. The intention of the Tree Protection Zone is to minimise incursions to the root system and canopy to ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to 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. Tree Protection Zones for each tree are shown in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[8]

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. Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may lead to the destabilisation and/or demise of the tree. The SRZ for each tree has been shown in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).

7.3 Acceptable Incursions 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. 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.

8 PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the progressive development of the site in three main stages. The first stage will include the conservation and refurbishment of Graythwaite House and the Coach House and adaptive re-use for school administration and meeting rooms. The Tom O'Neill Building will also be refurbished for multipurpose student activities, together with associated landscape works, stormwater drainage and earthworks on the lower and middle terraces. Site access, parking facilities and fencing will also be improved. The existing masonry wall, steps, fence and gates on the Union Street frontage will be replaced with a new sandstone wall ('plinth'), timber picket fence and gates in a similar position. The existing driveway / roadway from Union Street will be preserved, but a reinforced grass verge may be constructed on the western edge of the driveway to permit vehicle passing. The second stage will include the development of a new education/administration building to the north of Graythwaite House, demolition of the Ward Building and construction of two new buildings to the east of the House for classrooms and other educational facilities, integrated with existing buildings within Shore. Stage 3 will involve the construction of new buildings to the west of the Graythwaite House for classrooms and other educational facilities.

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
Cover Page and Staging Diagram	PD Mayoh Architects	0910 / A.000 P3	22/09/2010
Proposed Site Plan	PD Mayoh Architects	0910 / A.002 P3	22/09/2010
Vehicle Access Plan	PD Mayoh Architects	0910 / A.003 P3	22/09/2010
Floor Plans	PD Mayoh Architects	0910 / A.100-104 P3	22/09/2010
East-West Section	PD Mayoh Architects	0910 / A.160 P3	22/09/2010
Construction Management Plan	WSP Environment & Energy	2015_Graythwate_CMP	September 2010
Conservation Management Plan	Tanner Architects	09 0821 / P3	August 2010
Landscape Plans	Taylor Brammer Landscape Architects	LA DA 001/A, 002/A, 003/A, 004/A, 005/A,	24/11/2010
Proposed Front Fence	Tanner Architects	AR.DA.5001 / P1	28/08/2010
Concept Stormwater Management Plan	ACOR Appleyard	SY100450 / C1.02 /D	06/10/2010

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 4**. The following criteria have been examined as part of this assessment:-

- Relative Level (R.L.) at base of tree;
- Optimum Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);
- Incursions to the TPZ, SRZ and tree canopy, including estimated cut & fill and offset from the tree;
- Assessment of the likely impact of the works;
- Recommendations for retention or removal.

9.1.3 The proposed development will necessitate the removal of eighty-two (82) trees of low and very low retention value. These include Tree No.s T2, T6, T10, T11, T12, T13, T14, T15, T16, T17, T19, T20, T21, T23, T27, T28, T29, T31, T32, T33, T35, T36, T47, T50, T52, T59, T62, T64, T65, T66, T67, T68a, T69, T70, T70a, T91, T92, T92a, T93, T94, T95, T96, T97, T98, T101, T102, T103, T111, T122, T124, T128, T130, T133, T137, T137b, T37c, T138, T139, T143, T149, T150 T152, T153a, T154, T158, T169, T170, T172, T173, T176, T178, T187, T188, T189, T203, T204, T205, T206, T207, T208, T210 & T213. None of these trees are considered significant or worthy of special measures to ensure their preservation. Most of these trees are Environmental Weed Species and are proposed to be removed to make way for more appropriate plantings. It should be noted that T2 (Chinese Tallow) is located on Council's nature strip. T122, T124, T128, T130, T133, T143, T149, T150 & T153a (African Olive) is exempt from Council's Tree Preservation Order. It should be noted that whilst T32 (a Port Jackson Fig) is considered to be of High Landscape Significance, it has been destabilised and is only supported by a large prop root. As such, the removal of this tree to accommodate the proposed development is considered warranted.

9.1.4 The proposed development will necessitate the removal of a further eight (8) trees of moderate retention value. These include Trees T63 (Woolly Rambutan) T53, T54, T55, T56, T57, T58,

(Leyland Cypress) and T171 (Carob Bean). These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties. Most of these trees are relatively small and could be replaced in the short term with new tree planting elsewhere within the site.

9.1.5 A further seven (7) trees are proposed to be relocated (transplanted) elsewhere within the site. These include Trees T42, T61, T61a, T190, T191 & T201 (all Cotton Palms) and T200 (Frangipani). All of these trees are feasible to transplant with a low risk of fatality provided that the work is undertaken in accordance with proper horticultural practice.

9.1.6 The removal of a further eight (8) trees T88 (Chinese Hackberry), T122, T128, T130, T133, T143 T149 & T150 (all African Olives) is recommended. All of these trees are all Environmental Weed Species and are not considered worthy of preservation. T122, T128, T130, T133, T143 T149 & T150 are exempt from Council's TPO

9.1.7 Demolition of the boundary fence and low masonry wall and steps on the Union Street frontage and replacement with a new fence incorporating a sandstone plinth and timber picket fence (together with sandstone piers and automatic gates) is located within the TPZ, of Trees T1, T3, T5 (Chinese Tallow trees on the nature strip), T4 (Brushbox), T7a (Bangalay) and T8 (Camphor laurel). As the new fence is being installed in approximately the same location as the existing fence, the proposed works should not result in any adverse impact on these trees. As a precautionary measure, demolition of the existing fence, wall and steps should be undertaken in accordance with Section 13.18 and any excavations for the footings of the proposed fence and gates should be undertaken in accordance with Section 13.19.

9.1.8 A proposed reinforced turf verge is proposed to be installed along the western side of the existing driveway to permit sufficient clearance for two vehicles approaching in opposite directions to pass one another. This work may involve the demolition of the existing kerb and some grading and levelling along the edge of the roadway within the TPZ/SRZ of Trees T8 (Camphor laurel) and T9, T25 & T26 (Brushbox). Grading and excavations for the sub-base of the reinforced turf may potentially result in some root damage to these trees leading to an adverse impact. In order to minimise any adverse impact on these trees demolition of the existing kerb (where required) should be undertaken in accordance with Section 13.18 and any excavations for the sub-grade of the reinforced turf should be undertaken in accordance with Section 13.19.

9.1.9 Re-grading of the middle and lower grassed terrace areas is located within the TPZ of a number of trees located around the periphery of these areas, with some trees located centrally within the terraces (T159, T160, T165 & T166). Exact new ground levels have not yet been determined, however, grading and removal of soil in these areas may potentially result in root damage to some of the trees in close proximity. In order to minimise any adverse impact on these trees, excavations (reduction in grade) should be limited to no more than 100mm below surface level within the TPZ of trees to be retained and placement of fill should not exceed 150mm above grade within the TPZ. Surface levels should be maintained as existing within the SRZ of all trees in proximity to the terraces. Imported soil materials should be clean friable material equivalent or coarser in texture than the existing site topsoil.

9.1.10 Trenching for the proposed stormwater drainage system is located within the Tree Protection Zones of Trees T8, T30, T34 & T37 (Camphor Laurel), T9, T24, T25, T26, T165, T166, T194 & T192 (Brushbox), T38 (Small-leaf Fig), T211 (Moreton Bay Fig), T214 (Tuckeroo) & T60 (Port Jackson Fig). In instances where the trenching passes within the SRZ (T8, T9, T24, T25, T26 & T38), consideration should given to installing the pipeline by thrust boring beneath the root plate as detailed in Section 13.20. The Invert level of the pipeline should be at least 1.0 metre below surface level to clear the root plate. Trenching within the TPZ's of the remaining trees should be undertaken in accordance with Section 13.20.

9.1.11 Further diagnostic testing of T60 has been recommended to ascertain the structural integrity of this tree. If the tree is severely defective, its removal may be warranted.

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

10 REPLACEMENT PLANTING

10.1.1 Where compromises to tree retention are proposed, consideration should be given to replanting new trees within the allotment to compensate for any loss of amenity. Replacement trees should preferably include species that are sympathetic with the original Victorian era of landscape design. These generally include broadleaved evergreen trees (such as Figs and evergreen Oaks), but may include a variety of Australian Native Rainforest trees (e.g. *Flindersia sp*., *Syzygium sp., Acmena sp*., *Stenocarpus sp*., *Waterhousea sp*.), Australian conifers (*Araucaria sp., Callitris sp.* & *Agathis sp.*) [particularly those with symetrical architectural form] and palms including *Washingtonia sp., Jubaea sp*. and *Kentia sp*.). Trees of unusual form or flowering display (e.g. *Brachychiton discolour, Stenocarpus sinuatus, Grevillea robusta* etc) were also favoured in Victorian landscapes and would be in keeping with the original design. This is consistent with Section 6.5.2 and Section 6.6.11 of the Conservation Management Plan.

11 CONCLUSIONS:-

11.1.1 A total of two hundred and thirty (230) trees stand within the site and in close proximity to the boundaries on adjoining properties. These are a mix of native and exotic species in fair to good health and condition. A number of the trees, mostly Figs, are remnant of the original gardens laid out by Thomas Dibbs in 1875. The older plantings are typical of the Victorian era and are considered to be significant. Plantings of Camphor Laurels, Brushbox and Lombardy Poplars are more likely to have occurred in the Inter-war period. Whilst not as significant as the older plantings they are still of heritage importance given the use of the site. The grounds have undergone a long period of neglect, possibly dating back to the 1960's. During this time perennial weeds species and Pittosporums have colonised large areas of the site forming dense thickets. Whilst some attempt has been made to eradicate weeds by the local community there are still densely wooded areas within the site particularly over the steep embankments in the central portion of the site. Some of these include species such as *Erythrina x sykessii, Populus alba* and *Robinia pseudoacacia* that may be progeny of original plantings (or inter-war period plantings) of the same species.

11.1.2 The proposed development will necessitate the removal of eighty-two (82) trees of low and very low retention value. None of these trees are considered significant or worthy of special measures to ensure their preservation. Most of these trees are Environmental Weed Species and are proposed to be removed to make way for more appropriate plantings. With exception of T163, which is unstable and T210, which is almost dead, all trees identified as being of heritage significance in the Conservation Management Plan are proposed to be retained as part of the development. Further diagnostic testing of T60 has been recommended to ascertain the structural integrity of this tree. If the tree is severely defective, its removal may be warranted.

11.1.3 The proposed development will necessitate the removal of a further eight (8) trees of moderate retention value. These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties. Most of these trees are relatively small and could be replaced in the short term with new tree planting elsewhere within the site.

11.1.4 A further seven (7) trees are proposed to be relocated (transplanted) elsewhere within the site. All of these trees are feasible to transplant with negligible risk provided that the work is undertaken in accordance with proper horticultural practice.

11.1.5 Demolition of the boundary fence and low masonry wall and steps on the Union Street frontage and replacement with a new fence should not result in any adverse impact on the adjacent trees provided that the trees are adequately protected during construction (as detailed following).

11.1.6 Grading and excavations for the sub-base of the reinforced turf verge be installed along the western side of the existing driveway may potentially result in some root damage to Trees T8, T9, T25 & T26, leading to an adverse impact on these trees. Avoiding ground level changes will minimise any adverse impact on these trees.

11.1.7 Re-grading of the middle and lower grassed terrace areas may potentially result in root damage to some of the trees in located around the periphery of these areas. However, any adverse impact can be avoided by undertaking these works as recommended.

11.1.8 Trenching for the proposed stormwater drainage system is located within the Tree Protection Zones of a number of trees. Any adverse impact on these trees can be avoided by installing the pipeline by thrust boring where is passes within the SRZ with a minimum of one metre cover in accordance with the following recommendations. Trenching within the TPZ, but outside the SRZ should be carried out in accordance with section 13.20.

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

12 RECOMMENDATIONS:-

12.1.1 The following Tree Management Plan (Section 13) should be implemented to ensure the long term survival of all trees within the site to be retained as part of the development

12.1.2 As a precautionary measure, demolition of the existing fence, wall and steps on the Union Street frontage should be undertaken in accordance with Section 13.18 and any excavations for the footings of the proposed fence and gates should be undertaken in accordance with Section 13.19.

12.1.3 In order to minimise any adverse impact on Trees T8, T9, T25 & T26, demolition of the existing kerb (where required) should be undertaken in accordance with Section 13.18 and any excavations for the sub-grade of the reinforced turf should be undertaken in accordance with Section 13.19.

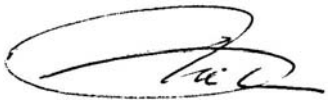
12.1.4 In order to minimise any adverse impact on trees located within and around the periphery of the middle and lower terrace areas, all excavations (reduction in grade) should be limited to no more than 100mm below surface level within the TPZ of trees to be retained and placement of fill should not exceed 150mm above grade within the TPZ. Surface levels should be maintained as existing within the SRZ of all trees in proximity to the terraces. Imported soil materials should be clean friable material, equivalent or coarser in texture than the existing site topsoil.

12.1.5 Proposed stormwater pipelines within the SRZ of trees T8, T9, T24, T25, T26 & T38 should be installed by thrust boring beneath the root plate as detailed in Section 13.20. The Invert level of the pipeline should be at least 1.0 metre below surface level to clear the root plate.

12.1.6 Trenching for the proposed stormwater drainage system within the Tree Protection Zones of Trees T8, T30, T34 & T37 (Camphor Laurel), T9, T24, T25, T26, T165, T166, T194 & T192 (Brushbox), T38 (Small-leaf Fig), T211 (Moreton Bay Fig), T214 (Tuckeroo) and T60 & T205 (Port Jackson Fig) should be undertaken in accordance with Section 13.20.

12.1.7 Further diagnostic testing of T60 is recommended to ascertain the structural integrity of this tree. If the tree is severely defective, its removal to accommodate the proposed development may be warranted.

12.1.8 T193, a Norfolk Island Hibiscus should be considered for retention. This tree is currently shown to be removed to accommodate new landscape works but is considered to be of High Retention Value.



Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
30th November 2010

13 TREE MANAGEMENT PLAN (TREE PROTECTION SPECIFICATIONS)

13.1 Introduction

13.1.1 This specification provides tree protection measures to be implemented prior to and during construction to ensure the long term health and preservation of trees to be retained as part of the site development.

13.2 Site Arborist

13.2.1 A qualified consulting arborist ('Site Arborist') should be appointed to undertake regular inspections of the site to ensure compliance with the specified tree protection measures and monitor tree health.

13.2.2 The Site Arborist should have the following minimum qualifications:-

- Minimum five (5) years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites; and
- Diploma level qualifications in arboriculture [Australian Qualification Framework (AQF) Level 5];

13.3 Site Management Plan

13.3.1 Prior to commencement of any work on site, the Traffic Management Plan and Site Management Plan should be submitted to the Site Arborist for review and comment in order to resolve any potential issues or conflicts between tree protection and site management & vehicle movements.

HOLD POINT – The Site Management Plan and Traffic Management Plan shall be submitted to the Site Arborist prior to commencement of any work on site.

13.4 Site Inspections

13.4.1 Inspections should be conducted by the Site Arborist in accordance with the following key milestones:-

- Prior to any work commencing on-site (including demolition, earthworks or site clearing) and following installation of tree protection fences or other specified tree protection devices (e.g. Trunk Protection, Ground Protection etc);
- During removal of pavements or demolition of any structure within the Tree Protection Zone of any tree to be retained & protected;
- During any excavation within the nominated Tree Protection Zone of any tree required to be retained & protected;
- At two-monthly intervals during the construction phase;
- Following completion of the building works and prior to commencement of any landscape works;
- During any landscape works within Tree Protection Zones; and
- At the completion of landscape works.

13.4.2 The Project Manager or Construction Manager shall be responsible to notify the Site Arborist prior to any works within the Tree Protection Zone with a minimum of 24 hours notice.

13.5 Certification/Reporting

13.5.1 Following each inspection the Site Arborist shall prepare a Statement of Compliance, certifying whether or not the works have been completed in compliance with this Plan and the conditions of development consent relating to tree protection. The Compliance Statements should contain

photographic evidence where required to demonstrate that the work has been carried out as specified. The Compliance Statements shall be submitted to the Planning NSW at the end of each month.

13.5.2 If conditions have been breached, remedial action shall be recommended to minimise any adverse impact on the subject trees.

13.6 Induction

13.6.1 All contractors, sub-contractors or other persons required to carry out work within Tree Protection Zones should be inducted prior to the commencement of that work. The induction should highlight the following requirements:-

- The requirement to protect trees within the site;
- The specific trees that are to be protected;
- The type of actions that could lead to potential damage (refer **Section 14.9**);
- Maintenance of any protective devices (fencing, trunk protection, ground protection etc) during the proposed works;
- Penalties imposed by Council for breach of Development Consent or breach of Council's Tree Preservation Order; and
- Contact details for the Site Arborist.

13.7 Tree Protection Zones

13.7.1 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).[9]

13.7.2 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.

13.8 Structural Root Zone (SRZ)

13.8.1 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). 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.

13.9 Acceptable Incursions to the Tree Protection Zone.

13.9.1 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.

13.9.2 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 (refer **Section 14.19**).

13.10 Tree Protection Fencing

13.10.1 All trees within the site to be retained shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence beneath the canopy in the positions indicated on the Tree Protection Plan (**Appendix 6**). The fence shall consist temporary chain wire panels 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement (refer to **Figure 1**). The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate.

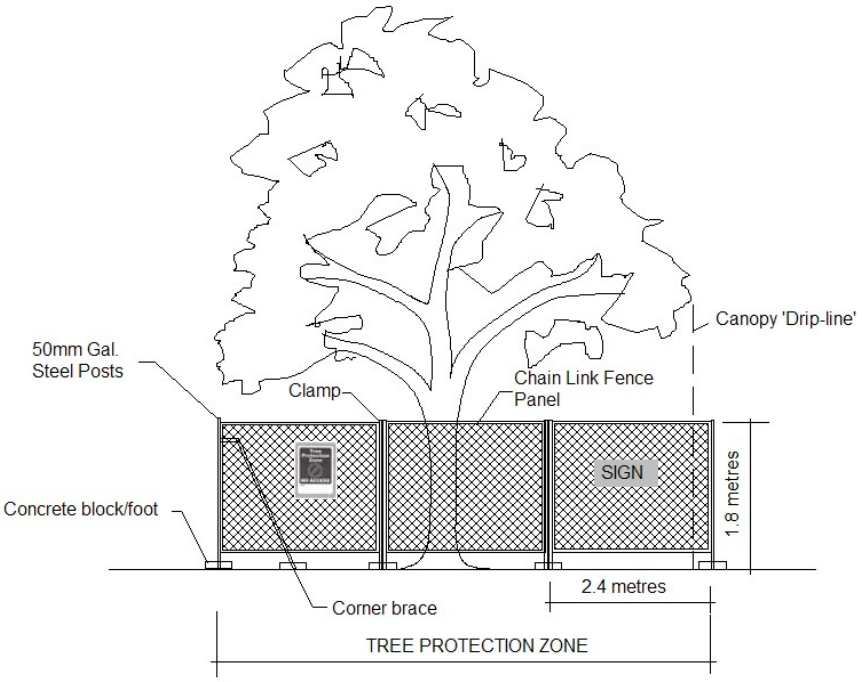


Figure 1 – Detail of Tree Protection Fence

13.11 Prohibited Activities

13.11.1 The following activities should be avoided within specified Tree Protection Zones:-

- Excavations and trenching (with exception of the approved foundations and approved underground services);
- Ripping or cultivation of soil;
- Mechanical removal of vegetation;
- Soil disturbance or movement of natural rock;
- Soil level changes including the placement of fill material (excluding that associated with the approved works);
- Stockpiling of spoil;
- Stockpiling of bulk materials such as soil, gravel, sand or similar materials;
- Storage or stockpiling of building materials, demolition waste, other waste and waste receptacles;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Movement and storage of plant, equipment & vehicles;
- Erection of site sheds;

- Affixing of signage or hoardings to trees;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

13.11.2 In some instances, proposed building footprints, roadways, services and other infrastructure may overlap with the recommended Tree Protection Zones. Details of the potential issues and recommendations are shown in the attached Impact Assessment Schedule (**Appendix 4**). In these cases, special provisions must be made for the protection of those trees, as per the recommendations column.

13.12 Signage

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

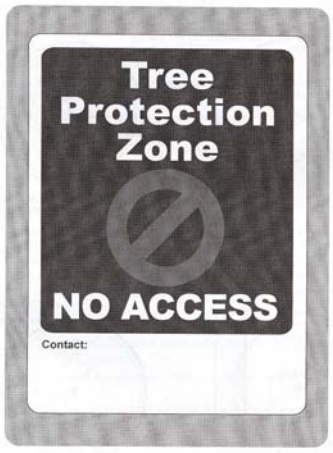


Figure 2 – Detail of Tree Protection Sign

13.13 Ground Protection

13.13.1 A 100mm layer of woodchip mulch shall be installed within designated areas of the Tree Protection Zone of nominated trees as indicated on the Tree Protection Plan (**Appendix 6**) to minimise compaction of the underlying soil profile. A Geotextile fabric, such as Geotex® 'ST' Series manufactured by Synthetic Industries or an equivalent product, shall be installed beneath the mulch layer to minimise compaction to the underlying soil profile and limit migration of mulch into the underlying soil profile. Mulch shall be installed and spread by hand to avoid soil disturbance and compaction within the root zone. Ground protection should 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 should be removed without damage or disturbance to the underlying soil profile.

13.14 Trunk Protection

13.14.1 Where provision of tree protection fencing is in impractical due to its proximity to the proposed building footprint, trunk protection shall be erected around nominated trees to avoid accidental damage (**Appendix 6**). The trunk protection shall consist of two (2) metre lengths of softwood timbers (90 x 45mm in section) spaced at 100-150mm centres around the trunk and secured together with 2mm galvanised wire or galvanised hoop strap as shown in Figure 3. Recycled timber

(such as demolition waste) may be suitable for this purpose, subject to the approval of the Site Arborist. The timbers shall be wrapped around the trunk, 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.

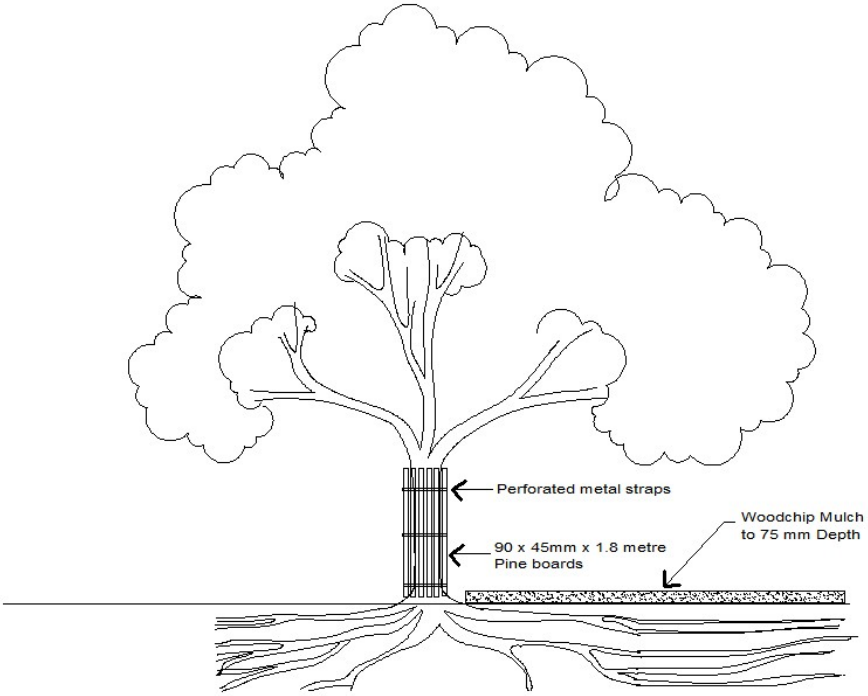


Figure 3 – Detail of Tree Protection Fence

HOLD POINT – The Site Arborist shall inspect Tree Protection Fences, Trunk Protection, Ground Protection and any other specified tree protection devices following their installation and prior to commencement of any other work on site.

13.15 Site Establishment

13.15.1 Where site sheds are required as part of the project, these should be located on existing hardstand areas where possible. Subject to approval of the Site Arborist, site sheds may be located within Tree Protection Zones, provided that they can be installed and removed without disturbance to the ground levels and without damage or pruning of the foliage and branches. Where all-weather surfaces are required beneath or around the site sheds, ground protection shall be installed as per **Section 13.13**. Gravel, roadbase or crushed concrete is *not* suitable for this purpose.

13.15.2 Where temporary services are required, these shall be installed above ground within TPZ's. Where in-ground utilities are required, these shall be installed outside designated Tree Protection Zones. If trenching is required within Tree Protection Zones, the prior approval of the Site Arborist must be sought.

13.15.3 Compounds for storage of equipment and materials shall be located outside designated Tree Protection Zones. No storage or stockpiling of materials is permitted within Tree Protection Zones.

13.15.4 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.

13.16 Site Clearing & Tree Removal

13.16.1 Trees to be removed as part of the proposal are nominated in the attached schedule (**Appendix 4**) and indicated on the Tree Protection Plan (**Appendix 6**) with a dashed line. All trees within the Site are protected under Council's Tree Preservation Order. The approval of the North Sydney Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.

13.17 Temporary Construction/Demolition Haul Roads

13.17.1 Temporary construction haul roads shall be limited to the existing site roadways and pathways to avoid soil disturbance and compaction within Tree Protection Zones, as shown on the Tree Protection Plan (**Appendix 6**). If deviation from the designated haul routes and site access points is required for any reason, the approval of the Site Arborist must be obtained.

13.17.2 Where haul roads transect Tree Protection Zones and there is no existing paved surface, temporary ground protection shall be installed. Ground protection shall consist of temporary rumble boards (steel or plywood sheets) underlain by sand or no-fines aggregate (e.g. blue metal) underlain by a suitable geotextile material. The existing topsoil and ground vegetation layer shall be retained intact and undisturbed. Upon completion of demolition and construction works, the rumble boards underlying sub-base material and geotextile material shall be removed without disturbance of the underlying soil profile.

13.18 Demolition Works

13.18.1 Demolition of pathways and paved areas within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. Any asphalt pavement surface and sub-base shall be stripped-off 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 soil disturbance. The machine shall work within the footprint of the existing paved area 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.

13.18.2 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels (where necessary). Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile.

13.18.3 Demolition of the existing retaining walls or other structures, concrete slabs or footings within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. Equipment used in demolition works within Tree Protection Zones shall work only within areas that suitable ground protection has been installed in accordance with **Section 13.12**. Light weight equipment such as small rubber tracked excavators and small 2-3 tonne tipper trucks should be used for demolition works within TPZ's to minimise compaction and ground disturbance.

13.18.4 Care shall be taken during demolition works to avoid damage to the root systems, trunks and lower branches of trees in the vicinity of existing buildings, particularly when using cranes, excavators drilling rigs and the like near or beneath the canopy.

HOLD POINT – Following demolition and prior to excavation of stuctural footings or pavements, the Site Arborist shall inspect the site and verify whether any damage to trees has occurred during demolition works.

13.19 Excavations within Tree Protection Zones

13.19.1 Prior to excavations for foundations of new structures or buildings within Tree Protection Zones, exploratory excavation shall be undertaken by hand or using an Air-spade® device to locate and expose roots along the perimeter of the foundation prior to any mechanical excavation taking place. All care shall be undertaken to preserve root systems intact and undamaged. Any roots less than 50mm in diameter shall 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 stress on the tree.

13.19.2 Where large woody roots (greater than 50mm diameter) are encountered during excavations, further advice from the Site Arborist shall be sought prior to severance.

HOLD POINT – Following any exploratory excavation and prior to any mechanical excavations for the building footings, the Site Arborist shall inspect and undertake any required root pruning or provide further advise on methods to protect tree roots during construction.

13.20 Underground Services

13.20.1 All proposed stormwater lines and other underground services should be located as far away as practicable from trees to be retained to avoid excavation or trenching within the Tree Protection Zones.

13.20.2 Where the incursion to the Tree Protection Zone is less than 10% of the total TPZ (refer Appendix 4), a chain trenching device may be used for open trenching works. A backhoe or skid steer loader is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact. If necessary, the service line should be re-routed or conduits inserted beneath woody roots to avoid root severance.

13.20.3 Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring. The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root plate (minimum 1.5 metres below ground surface level). Where this is not practical and open trenching is the only alternative, proposed root pruning should be assessed by the arborist to determine continued health and stability of the subject tree.

13.21 Canopy Pruning

13.21.1 All pruning works shall be carried out in accordance with Australian Standard No 4373-2007 – Pruning of Amenity Trees. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998) under the supervision of the Site Arborist.

13.21.2 Where pruning of any tree is required due to unforeseen circumstances, including site access or to facilitate materials handling or construction processes, prior approval for pruning works shall be obtained from North Sydney Council.

13.22 Root Pruning

13.22.1 All root pruning work shall be carried out in accordance with Australian Standard No 4373-2007 – Pruning of Amenity Trees. Written approval from Council may be required under the Tree Preservation Order prior to undertaking this work. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).

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

13.23 Tree Damage & Remedial Action

13.23.1 In the event of any tree becoming damaged for any reason during the construction period a the Site Arborist shall be notified 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

13.24 Temporary Scaffolding

Temporary scaffolding shall be erected where required without pruning or removal of branches to accommodate the scaffold. Where foliage or branches project through the scaffold and create a safety hazard, such 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, or alternatively temporarily tying back branches where required.

Where scaffold is required to be erected within the Tree Protection Zone of any tree to be retained, suitable ground protection shall be installed to prevent contamination, disturbance and compaction of the soil profile as shown in **Figure 5**.

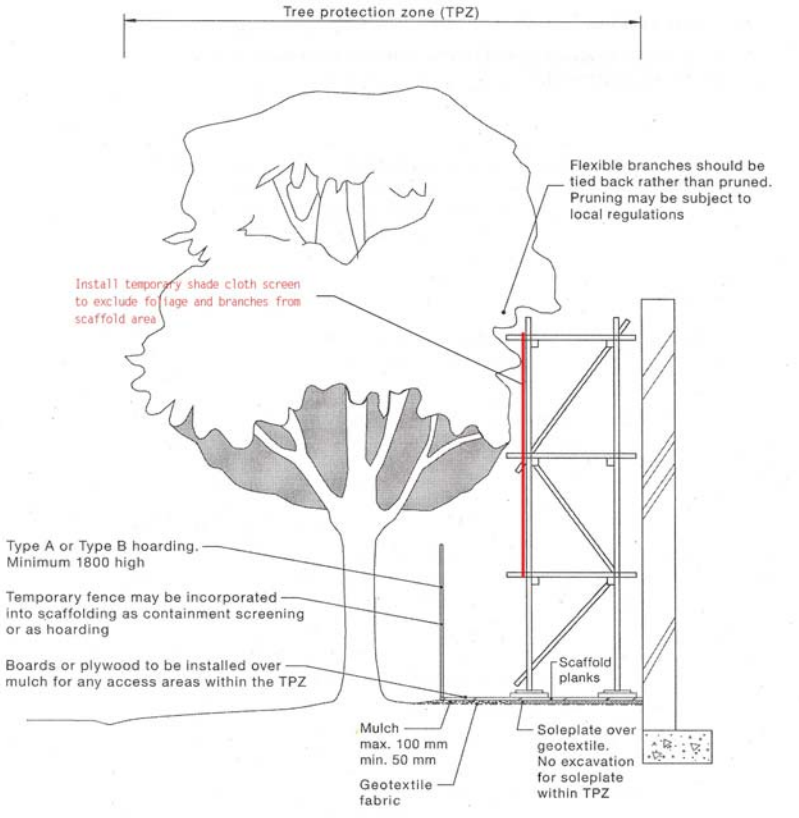


Figure 5 - Detail of Temporary scaffolding within a Tree Protection Zone

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[9] Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
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14 APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

The level of landscape significance has been determined using the following key criteria as a guide:

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
- 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; or
- The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event; or
- 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; or
- 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; or
- The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
- The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent in the landscape, exhibits very good form and habit typical of the species and 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; or
- 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; or
- The subject tree is listed on Council's Significant Tree Register; or
- The tree is a locally-indigenous species, representative of the original vegetation of the area and forms part of the assemblage of species of an Endangered Ecological Community;
- The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% Crown Cover (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; or
- 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; and
- The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (eg crown distortion/suppression) with a crown density of at least 70% Crown Cover (normal); and
- 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 subject tree has a medium live crown size exceeding 40m²; and
- 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% Crown Cover (thinning to normal); and
- The tree makes a fair contribution to the visual character and amenity of the area; 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 has no known or suspected historical association

5. LOW

- The subject tree has a small live crown size of less than 40m² and can be replaced within the short term with new tree planting; or
- 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% Crown Cover (sparse); and
- 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.

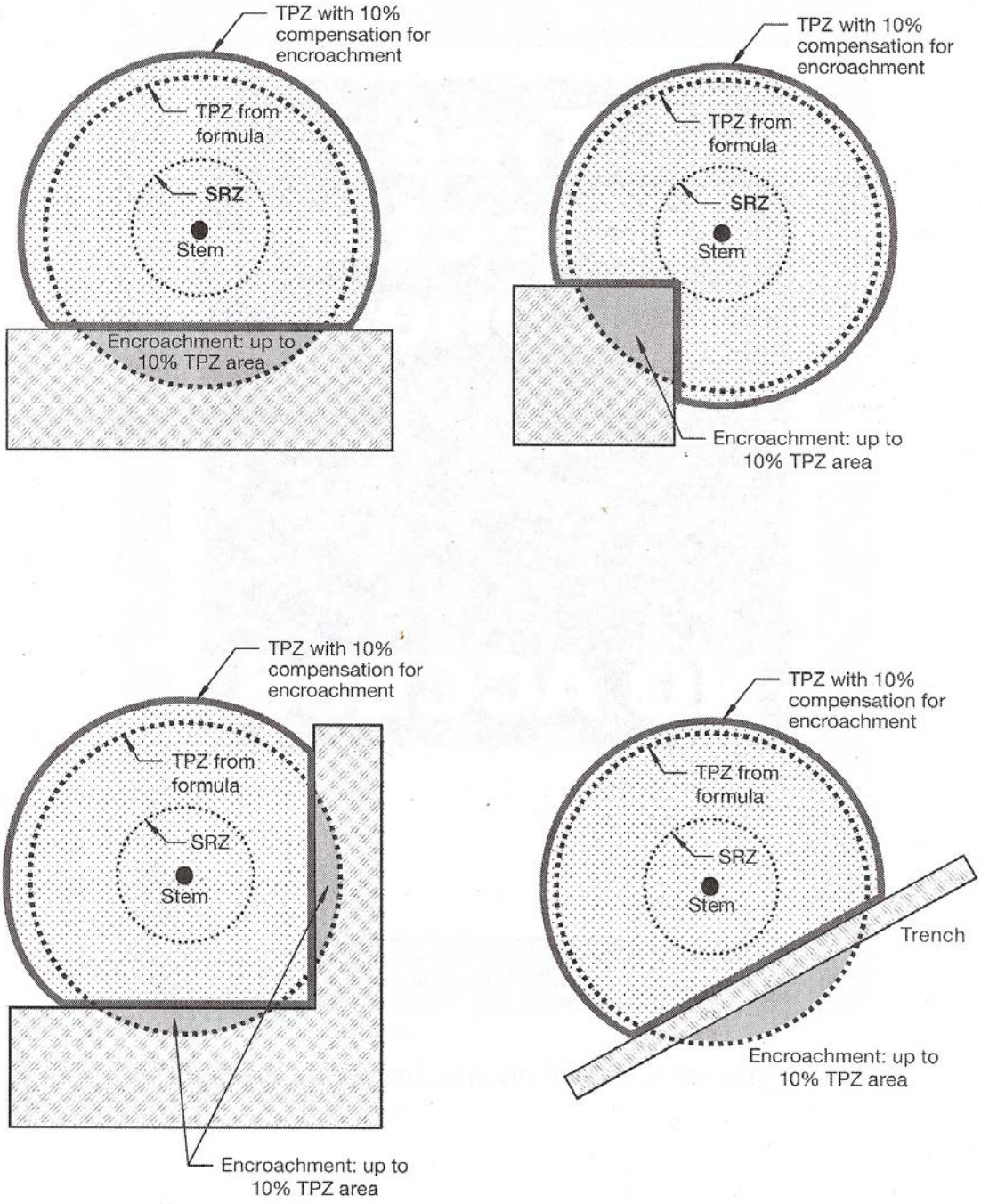
6. VERY LOW

- 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 scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. INSIGNIFICANT

- The tree is a declared Noxious Weed under the *Noxious Weeds Act* (NSW) 1993; or
- The tree is completely dead and has no visible habitat value.

15 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