EARTHSCAPE HORTICULTURAL SERVICES
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DEVELOPMENT IMPACT ASSESSMENT REPORT

SPECTATOR PRECINCT
ROYAL RANDWICK RACECOURSE
77-97 ALISON ROAD, RANDWICK

November 2011

Prepared for: Australian Turf Club Ltd
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1 INTRODUCTION

1.1.1 This report was commissioned by the Australian Turf Club Ltd (ATC) to assess the health and condition of forty (40) trees located within or immediately adjacent the 'Spectator Precinct' of the Royal Randwick Racecourse (RRR). This report has been prepared to aid in the assessment of an amended Development Proposal under Section 75W of the *Environmental Planning and Assessment Act* (1979) for the redevelopment of the precinct. This report follows a previous report dated September 2010 that was submitted together with the Part 3A Application.

1.1.1 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 (Tree Management Plan – **Appendix 2**) to ensure the long-term preservation of the trees to be retained where appropriate.

2 THE SITE

2.1.1 The subject property is known as the Royal Randwick Racecourse, 77-97 Alison Road, Randwick. It is the oldest and longest continually operating racecourse in the Sydney metropolitan area. The racecourse has evolved over time, focusing on racing, spectator and training facilities. The Racecourse is considered to be an important cultural landscape and forms part of Sydney's Regional Open Space System.

2.1.2 The 'Spectator Precinct' is located in the north-western portion of the property, near the main vehicular entry off Alison Road. For the purposes of this report the subject precinct will be referred to as "the Site". The site contains a number of buildings comprising the main spectator facilities, grandstands and other buildings, together with open space areas.

2.1.3 The landscape and soils of this area have been extensively disturbed and modified. Remnant soils within the site are typical of the Tuggerah Soil Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of "deep (greater than 2000mm) *Podzols* on dunes and *Podzol/Humus Podzol* intergrades on swales." The landscape of the area was formerly gently undulating to rolling coastal dune fields with slope gradients of 1-10%. [1]

2.1.4 Most of the locally-indigenous vegetation has been cleared from surrounding areas for residential, recreational and institutional development. The original vegetation of this area consisted of low swamp woodland & Eastern Suburbs Banksia Scrub,[1] with dominant locally-indigenous tree species including *Angophora costata* (Sydney Red Gum), *Eucalyptus piperita* (Sydney Peppermint) and *Banksia aemula* (Wallum Banksia) on higher areas and *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquenervia* (Broadleaved Paperbark) occurring in low lying areas. [2] There is no remnant locally-indigenous species within this precinct.

2.1.5 The existing plantings consist of a range of exotic and non-local native species, including single specimen and row plantings, with dominant plantings of Moreton Bay Figs, Port Jackson Figs and Brushbox. The groupings have been identified by number on Map 4 of the Royal Randwick Racecourse Development Control Plan (DCP), based on the Draft Conservation Management Plan prepared by Godden Mackay Logan (2006). These include the following:-

- Group 17 – a row of *Lophostemon confertus* (Brushbox) [T39-T45] inter-planted with *Phoenix roebelenii* (Dwarf Date Palm) adjacent the car park;
- Group 47 – a row of *Lophostemon confertus* (Brushbox) [T47-T57] adjacent the main administration building (north side adjacent Alison Road) together with a single Brushbox [T46] in the centre of the car park, on the south side of the administration building (Group 25);

- Group 21 & 22 – two *Ficus macrophylla* (Moreton Bay Figs) [T84 & T85] on the south-western side of the Randwick Pavilion (transplanted to this location c.1999 and installed in raised masonry planter boxes);
- Group 32 & 33 – two *Ficus rubiginosa* (Port Jackson Figs) [T68 & T69] on the north-eastern side of the Randwick Pavilion (Betting Pavilion) (also transplanted to this location c.1999 and installed in raised masonry planter boxes);
- Group 26, 27, 28 & 30 – a former row of *Ficus rubiginosa* (Port Jackson Figs) [T61, T62 & T64]. T63, (Group 28) originally forming part of this row, has been removed since the original survey;
- Group 19, a single specimen *Ficus obliqua* (Small-leaf Fig) [T58], is also located in this area. This appears to be the remaining one of a former pair of trees;
- Groups 41, 42 & 45 – three (3) *Ficus rubiginosa* (Port Jackson Figs) [T77, T78 & T81] on the northern side of the temporary marquee;
- Group 43 a solitary specimen of *Grevillea robusta* (Silky Oak) also on the northern side of the temporary marquee;
- Group 51 – a mixed row of *Ficus macrocarpa var hillii* (Hill's Figs) and *Platanus x hybrida* (London Plane trees) on the north-eastern side of the race track. T82 & T83 form part of this group, which continues eastward alongside Alison Road;
- Group 7 – a large specimen of *Ficus macrophylla* (Moreton Bay Fig) located in the lawn area south of the Tea House.
- Group 13 & 14 – originally a pair of *Cupressus torulosa* (Bhutan Cypress), only one now remains [T100] on the south side of the Tramway Turnstile Building;
- Group 18 – a single *Eucalyptus ficifolia* (WA Flowering Gum) [T87] adjacent the Tramway Turnstile Building (east side); and
- Group 83 – a single specimen of *Ficus rubiginosa* (Port Jackson Figs) [T102], one of an original pair of trees on the north side of the ARF building (T101 now removed).

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 27th August 2010. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 6**), based on the survey prepared by Rygate & Company Pty Ltd, Dwg. Ref No. RRC 020910_REVA_SPECTATOR PRECINCT dated 2nd September 2010. The tree identification numbers used in this report follow that of a previous arboricultural report prepared by Landscape Matrix dated December 2007. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 4**).

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 in four cardinal directions 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.

This information is presented in a tabulated form in **Appendix 4.**

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life 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 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 4.**

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

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

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 City of Randwick, made under Clause 28 of the Randwick Local Environment Plan 1998 by resolution of Council of 26th July 2005. The TPO generally protects all trees of a height of six (6) metres or greater or with a canopy spread of four (4) metres or greater, or trunk circumference of 1000 mm (320 mm in diameter) or greater. The TPO also protects all palms, tree ferns, cycads and any tree situated on public land or

in bushland, regardless of their size. Some exemptions apply, however, all of the trees assessed within this Precinct are protected under Council's TPO.

5.2.2 All of the trees within this precinct are exotic or non-local native species that would be of some benefit to native wildlife. However, none of the trees contain cavities suitable as nesting hollows for arboreal mammals or birds or other visible signs of wildlife habitation. There are no remnant locally-indigenous species within this precinct.

5.2.3 None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993.

5.2.4 None of the trees in this precinct 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 The site has been associated with horse racing since 1833. The Australian Jockey Club (AJC) was established in 1842, and has the responsibility of care, control and management of the Royal Randwick Racecourse. The site has had successive overlays of landscaping and tree planting since this time, including important specimen trees, informal groupings, row plantings and avenues across the site. The Royal Randwick Racecourse contains one of the largest collections of Fig plantings in the Randwick LGA, many dating back to the mid to late 1800's and are considered important cultural plantings of local and regional significance. The Members' Stand (Official Stand), constructed c. 1910, is listed as a Heritage Item of Local Significance under Schedule 3 of the Randwick Local Environment Plan (LEP), 1998 (December 2008). However, none of the trees within the site are specifically listed on the LEP.

5.3.2 Map 4 of the Royal Randwick Racecourse DCP, based on the Draft Conservation Management Plan prepared by Godden Mackay Logan (2006) also indicates the relative heritage significance of cultural plantings within the site.

5.3.3 A Significant Tree Register (STR) exists within the City of Randwick, adopted by Council in August 2007. All trees listed on the register are protected Tree Preservation Order, regardless of their species or dimensions. Trees T84 & T85, two (2) *Ficus macrophylla* (Moreton Bay Figs) and T68 & T69, two (2) *Ficus rubiginosa* (Port Jackson Figs), T61, T62, T64, T77, T78 & T81 six (6) *Ficus rubiginosa* (Port Jackson Figs), T58, a *Ficus obliqua* (Small-leaf Fig), T91 & T102 *Ficus macrophylla* (Moreton Bay Fig) are all listed on Council's Register of Significant Trees Volume 3 (Significant Trees under the control and management of other Government Authorities, Institutional, religious and Non-government Organisations).[5]

5.3.4 The specimen and row plantings of various Fig species around the main lawn and open space areas north-west of the stands (including all those listed above) are thought to have been planted in the mid to late 1800's, being typical of the late Victorian era. Photos of the Racecourse from the 1860's show a group of semi-mature trees in this general area which appear to be Figs (refer Plate 1). These trees are all considered of 'Exceptional Significance' under the Royal Randwick Racecourse DCP. These trees are of variable health and condition, most having been previously pollarded (severely lopped) at 5-6 metres from ground level. The crowns are now completely restored, though this type of pruning creates wounds that inevitably lead to decay and formation of branching defects. Four of the trees T68, T69, T84 & T85 were transplanted in c.1999 to either side of the Randwick Pavilion (Betting Pavilion) and are sited in raised masonry planters. With exception of T84, which has a large basal cavity and exhibits signs of decline, the remaining three trees display good health and vigour.

Plate 1 – Royal Randwick Racecourse c.1863 – note semi-mature trees on the rear right hand side of the stands. Ref: State Library of NSW

5.3.5 The alternate row planting of *Ficus macrocarpa var. hillii* (Hill's Fig) and *Platanus x hybrida* (London Plane Trees) along the north-eastern side of the race track, near Alison Road (of which T82 & T83 form a part) are thought to have been planted in the early Inter-war Period (1915-1940) being fairly typical of this area. These trees are also considered of 'Exceptional Significance' under the Royal Randwick Racecourse DCP. This row has also been previously pollarded, but T82 & T83 exhibit good health and vigour with no significant branching defects.

5.3.6 The individual specimens [T46 & T70] and row plantings [T47-T57 and T39-T45] of *Lophostemon confertus* (Brushbox) are fairly typical of the Federation Period and were probably planted c. 1900-1920. These trees are considered of 'High Significance' under the Royal Randwick Racecourse DCP. These trees exhibit varying degrees of dieback throughout the crowns, probably related to latent drought stress, but most are generally in fair health and condition. Many of the group north of the administration building have either trunk or primary limbs in contact with the masonry boundary fence and have adaptive growth at the contact points.

5.3.7 The remaining miscellaneous plantings [T86, T87, T100 & T105] are not considered significant under the Royal Randwick Racecourse DCP.

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 4** and **Appendix 6** 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 5**. 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 excavation, 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 5**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[6]

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 5**. 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 3**. 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.

7.4 Acceptable Incursions 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.

7.5 Legal Protection

7.5.1 Notwithstanding the above recommendations, Council may require a greater setback from certain types of structures to ensure the on-going legal protection of the tree (i.e. its legal status under Council's Tree Preservation Order). In Randwick City LGA, a tree located within two (2) metres of a dwelling or approved building is not protected under the Tree Preservation Order (TPO). The measurement is taken from the closes point of the trunk of the tree to the closest vertical alignment of the building. As such, if a tree is considered worthy of preservation, Council is unlikely to approve the construction of a building or structure within two (2) metres of a tree, regardless of whether this can be undertaken without having an adverse impact on its health or longevity.

PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the demolition of the Tea House & Betting Pavilion, construction of a new Parade Ring and redevelopment of the open space and pedestrian areas surrounding the main spectator 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**
Landscape Master Plan – Spectator Precinct Stage 1 & Stage 2	Aspect Design Studios	11024_S75W C	October 2011
Landscape Design Report – Spectator Precinct	Aspect Design Studios	Revision A	20/10/2011

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

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

9.1.3 The proposed development will necessitate the removal of a one (1) tree of moderate retention value (T86, a Bullbay Magnolia). This tree is not considered significant, but is in good health and

condition and makes a fair contribution to the amenity of the site. This tree is a relatively small specimen and could be replaced in the short term with new tree planting elsewhere within the site. Alternatively, it would be feasible to transplant this tree elsewhere within the site.

9.1.4 Demolition of existing paved areas and pathways are located within the TPZ's of tree No.s T58 (Small-leaf Fig), T64 & T77 (Port Jackson Figs) (nominated as 'Exceptional Significance' under the Royal Randwick Racecourse DCP) and T70 (Brushbox). An existing brick retaining wall, planter and stairway is also proposed to be demolished within the TPZ of T91 (Moreton Bay Fig). The proposed demolition work should not result in any adverse impact on these trees provided that the work is carried out in accordance with Section 14.18. Proposed new pavements within the TPZ's of these trees will necessitate some excavation and compaction within their root zones, but the proposed works are largely within the footprint of existing pavements and other structures. As such, the new pavement works should not result in any adverse impact on these trees provided that all excavations are undertaken in accordance with Section 14.19.

9.1.5 T84 (a Moreton Bay Fig) [nominated as 'Exceptional Significance' under the Royal Randwick Racecourse DCP], is proposed to be relocated (transplanted) to a new location adjacent T85. This tree is considered feasible to transplant (given that it has been previously transplanted), with low risk of fatality provided that the transplant work is undertaken in accordance with current horticultural best practice. In order to minimise adverse impact and ensure that the tree is transplanted in accordance with appropriate standards, the nominated transplant contractor should prepare a suitable method statement detailing the work to be undertaken and method to be adopted, including, but not limited to, preparation of the root plate, lifting, transport, preparation of the new planting site, soil preparation and backfilling, temporary cabling and guying (if required) and on-going maintenance and aftercare. The method statement should be reviewed and approved by a qualified arborist prior to commencement of transplanting.

9.1.6 Installation of new lighting poles within the canopy drip line of T58 (Small leaf Fig) and T84 (Moreton Bay Fig) may necessitate pruning of these trees leading to an adverse impact. In order to avoid any adverse impact, consideration should be given to relocating light poles outside the canopy dripline of these trees.

9.1.7 A portion of the canopy dripline of T64 (Port Jackson Fig) overhangs the roofline of a proposed new building to the south-east. Given the low hanging branches of this tree there may be potential conflict between the branches and the roof of the structure. In order to avoid pruning, conflicting branches should be temporarily tied back out of the way during the construction phase. Where pruning is absolutely necessary to clear the structure (i.e. where conflicting branches are not sufficiently flexible to tie out of the way or will result in continuing contact with the building), any required pruning should be kept to a minimum and undertaken in accordance with Section 14.17.

9.1.8 Existing paved areas and planter boxes located within the TPZ's of tree No.s T68 & T69 (Port Jackson Figs) and T85 (Moreton Bay Figs) are proposed to be demolished and replaced with new garden and paved areas. These trees are nominated as 'Exceptional Significance' under the Royal Randwick Racecourse DCP. As these trees have been previously transplanted into raised masonry planter boxes, demolition of the pavements outside the perimeter line of the planter boxes will not result in any adverse impact on these trees. However, proposed new pavements and gardens surrounding these trees currently indicate the increase in ground levels (placement of fill material) within the SRZ (within the area of the planter box). This may result in an adverse impact on these trees. In order to avoid any adverse impact on T68, T69 & T85, the existing ground levels within the area of the raised planter boxes must be kept at existing levels. The existing area occupied by the planters should be maintained as a landscaped or garden area without any new pavement. It is understood that this issue will be resolved during the detailed design stage by adjusting the levels and areas surrounding the trees accordingly to mitigate any adverse impact on them.

9.1.9 Proposed new pathways are located within the TPZ/SRZ of T91 (Moreton Bay Fig). This tree is nominated as 'Exceptional Significance' under the Royal Randwick Racecourse DCP. The proposed gravel pathway on the western side is located close to existing levels and therefore will require minimal excavation and will use a permeable surface material. This pathway will not result in any adverse impact on the subject tree. The proposed new paved pathway (providing a pedestrian link to the taxi rank) is located substantially within the footprint of an existing brick planter and concrete stairs. It is understood that this pathway will be close to the ground level of the existing lawn area surrounding the tree. The placement of a new pathway in this area should not result in any adverse impact on the subject tree as the footprint of the pathway is already substantially occupied by existing structures. Consideration should also be given to a permeable type pavement surface to maximise water infiltration to the underlying root zone. An open tunnel (to provide a link for horses to the 'Theatre of the Horse') is also proposed to be constructed within the TPZ of T91. This structure will be located beyond the existing retaining wall and ramp and in any case the extent of encroachment to the TPZ from this structure is less than 10% of the TPZ. This is considered within acceptable limits under AS4970-2009. As such, there should be no adverse impact on this tree.

9.1.10 A proposed new pedestrian pathway is located within the SRZ of T87 (a West Australian Flowering Gum). Excavations and compaction for the pavement sub-grade may result in an adverse impact on this tree. It should be noted that this tree is considered to be of low retention value. In order to minimise any adverse impact on this tree, all excavations for the new paved should be undertaken in accordance with Section 14.19.

9.1.11 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 in accordance with The Royal Randwick Racecourse Development Control Plan (DCP). Replacement trees should be sympathetic with the heritage context of the existing landscape, containing species typical of the late Victorian to Interwar periods.

10.1.2 Section 2.3.5 of the Royal Randwick Racecourse Development Control Plan (DCP) [May 2007] recognises the importance of the cultural heritage landscape and calls for the enhancement of the landscape qualities of the site, especially gardens and major trees both within the site and in the context of the broader landscape setting. In particular landscape components identified as exceptional or high significance should be conserved and managed. Removal of items of exceptional or high significance should be undertaken only where absolutely necessary based on their remaining SULE (RRR DCP Section 3.3.b).

11 CONCLUSIONS:-

11.1.1 A total of forty (40) trees stand within and adjacent the precinct. These are a mix of non-local native and exotic species in fair to good health and condition. The dominant species in this precinct are row and specimen plantings of Port Jackson Figs, Moreton Bay Figs and Brushbox.

11.1.2 Many of the trees within the site are important cultural plantings. In particular the specimen plantings of Port Jackson Figs and Moreton Bay Figs within the lawn and open space areas north-west of the stands are considered of exceptional significance under the RRR DCP and are listed on Randwick Council's Significant Tree Register. These trees are in the order of 150 years old being typical of Victoria era public plantings. The majority of these trees have been previously pollarded, however, most are in fair to good health and condition with varying SULEs. The alternate row planting of Hills Figs and London Planes on the north-east side of the race track, probably planted in the Interwar period, are also considered of Exceptional Significance under the RRR DCP.

11.1.3 The Brushbox row and specimen plantings located mostly in the vicinity of the administration building and car park were probably planted in the Federation period c. 1900-1920 being fairly typical of this period. These trees are listed considered of High Significance under the RRR DCP, but are not listed on Council's Significant Tree Register. These trees are in variable health and condition, most exhibiting some degree of dieback probably due to latent drought stress. These trees will not be adversely affected by the proposed works.

11.1.4 Miscellaneous plantings of other species have also been planted within the precinct, but these have no special ecological or heritage significance. They are not considered significant under the RRR DCP and are not listed on Council's STR.

11.1.5 The proposed development will necessitate the removal of a one (1) tree of moderate retention value (T86). This tree is not considered significant, but is in good health and condition and makes a fair contribution to the amenity of the site.

11.1.6 Demolition of existing paved areas and pathways are located within the TPZ's of tree No.s T58, T64, T70 & T77. An existing brick retaining wall, planter and stairway is also proposed to be demolished within the TPZ of T91. The proposed demolition work should not result in any adverse impact on these trees provided that the work is carried out in accordance with Section 14.18.

11.1.7 Proposed new pavements within the TPZ's of trees T58, T64, T70, T77 & T91 will necessitate some excavation and compaction within their root zones, but as the proposed works are largely within the footprint of existing pavements and other structures, there should be no adverse impact on these trees provided that the work is undertaken as recommended.

11.1.8 The transplanting of T84 is considered feasible with low risk of fatality provided that the transplant work is undertaken in accordance with current horticultural best practice. A transplant contractor should confirm the proposed method of transplanting prior to commencement of work as recommended.

11.1.9 Installation of new lighting poles within the canopy drip line of T58 and T84 may necessitate pruning of these trees leading to an adverse impact. This can be avoided by relocating light poles outside the canopy driplines as recommended.

11.1.10 A portion of the canopy dripline of T64 overhangs the roofline of a proposed new building to the south-east and may conflict with the structure. Any adverse impact on this tree can be avoided by temporarily tying back branches or where necessary undertaking pruning in accordance with the following recommendations.

11.1.11 Proposed new pavements and gardens surrounding tree No.s T68, T69 & T85 currently indicate an increase in ground levels within the area of the existing raised planter boxes, which would result in a significant adverse impact on these trees. However, it is understood that this issue will be resolved during the detailed design stage by adjusting the surrounding levels as required to ensure that the existing levels within the planter box areas are maintained at existing levels.

11.1.12 An open tunnel is proposed to be constructed within the TPZ of T91. The extent of encroachment to the root zone from this structure is less than 10% of the TPZ, which is considered within acceptable limits under AS4970-2009. As such, there should be no adverse impact on this tree.

11.1.13 A proposed new pedestrian pathway may result in an adverse impact on T87. This can be avoided if the excavations for the pathway subgrade are undertaken as recommended. It should be noted that this tree is considered to be of low retention value.

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

12 RECOMMENDATIONS:-

12.1.1 The following Tree Protection Specifications (**Appendix 2**) and Tree Protection Plan (**Appendix 7**) 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 In order to minimise adverse impact on T84 and ensure that the tree is transplanted in accordance with appropriate horticultural standards, the nominated transplant contractor should prepare a suitable method statement detailing the work to be undertaken and method to be adopted, including, but not limited to, preparation of the root plate, lifting, transport, preparation of the new planting site, soil preparation and backfilling, temporary cabling and guying (if required) and on-going maintenance and aftercare. The method statement should be reviewed and approved by a qualified arborist prior to commencement of transplanting.

12.1.3 In order to avoid any adverse impact on T58 & T84, consideration should be given to relocating light poles outside the canopy dripline of these trees.

12.1.4 In order to avoid pruning of T64, any conflicting branches should be temporarily tied back out of the way of the roof of the proposed building during the construction phase. Where pruning is absolutely necessary to clear the structure (i.e. where conflicting branches are not sufficiently flexible to tie out of the way or will result in continuing contact with the building), any required pruning should be kept to a minimum and undertaken in accordance with Section 14.17.

12.1.5 Demolition of existing paved areas and pathways located within the TPZ's of tree No.s T58, T61, T62, T64, T77 & T78 should be undertaken in accordance with Section 14.18.

12.1.6 Excavations for new pavement sub-grade within the TPZ's of tree No.s T58, T61, T62, T64, T77 & T78 should be undertaken in accordance with Section 14.19.

12.1.7 Consideration should also be given to the use of a permeable type pavement surface for the pedestrian pathway between the Theatre of the Horse and the Taxi Rank within the TPZ of T91 in order to maximise water infiltration to the underlying root zone.

12.1.8 In order to avoid any adverse impact on trees T68, T69, T84 & T85, the existing ground levels within the raised planter box areas surrounding each tree should be retained as existing. The existing area occupied by the planters should be maintained as a landscaped or garden area without any new pavement.

12.1.9 In order to minimise any adverse impact on T87, all excavations for the new paved should be undertaken in accordance with Section 14.19.

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
2nd November 2011

REFERENCES:-

[1] GA Chapman & CL Murphy (1989)
Soil Landscapes of the Sydney 1:100,000 Sheet
Soil Conservation Service of NSW. Sydney

[2] Benson, Doug & Howell, Jocelyn (1990)
Taken for Granted: the Bushland of Sydney and its Suburbs.
Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW

[3] Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)
The Body Language of Trees – A Handbook for Failure Analysis
The Stationery Office, London, England

[4] Barrell, Jeremy (1996)
Pre-development Tree Assessment
Proceedings of the International Conference on Trees and Building Sites (Chicago)
International Society of arboriculture, Illinois, USA

[5] Ruting, Noel (August 2007)
Register of Significant Trees (Randwick City Council LGA) - Volume 3 of 4 – Significant Trees under the control and management of other Government Authorities, Institutional, Religious and Non-government Organisations.
Landarc Pty Ltd, Sydney NSW

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

13 APPENDIX ONE - 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.

14 APPENDIX TWO - TREE MANAGEMENT PLAN (TREE PROTECTION SPECIFICATIONS)

14.1 Site Arborist

14.1.1 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.

14.1.2 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];

14.2 Site Management Plan

14.2.1 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.

14.3 Site Inspections

14.3.1 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 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.

14.3.2 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.

14.4 Certification/Reporting

14.4.1 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.

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

14.5 Induction

14.5.1 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.

14.6 Tree Protection Zones

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

14.6.2 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.

14.7 Structural Root Zone (SRZ)

14.7.1 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.

14.8 Acceptable Incursions to the Tree Protection Zone.

14.8.1 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 3**. Greater incursions to the TPZ may result in an adverse impact on the tree.

14.8.2 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**).

14.9 Prohibited Activities

14.9.1 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.

14.9.2 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.

14.10 Tree Protection Fencing

14.10.1 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 7**). 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.

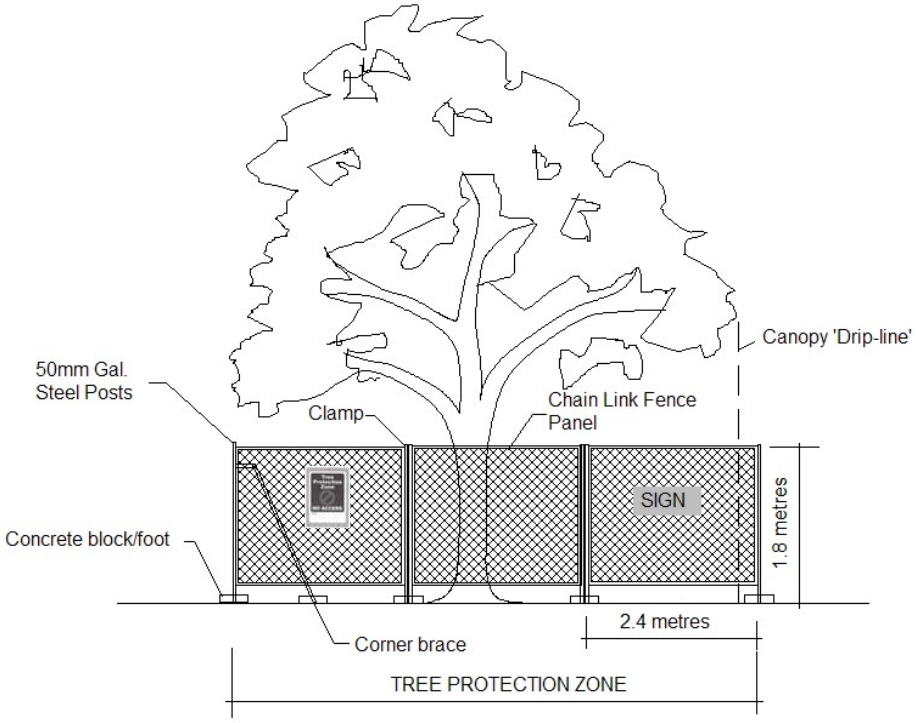


Figure 1 – Detail of Tree Protection Fence

14.11 Signage

14.11.1 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

14.12 Ground Protection

14.12.1 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 7**) 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.

14.13 Trunk Protection

14.13.1 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 7**). 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.

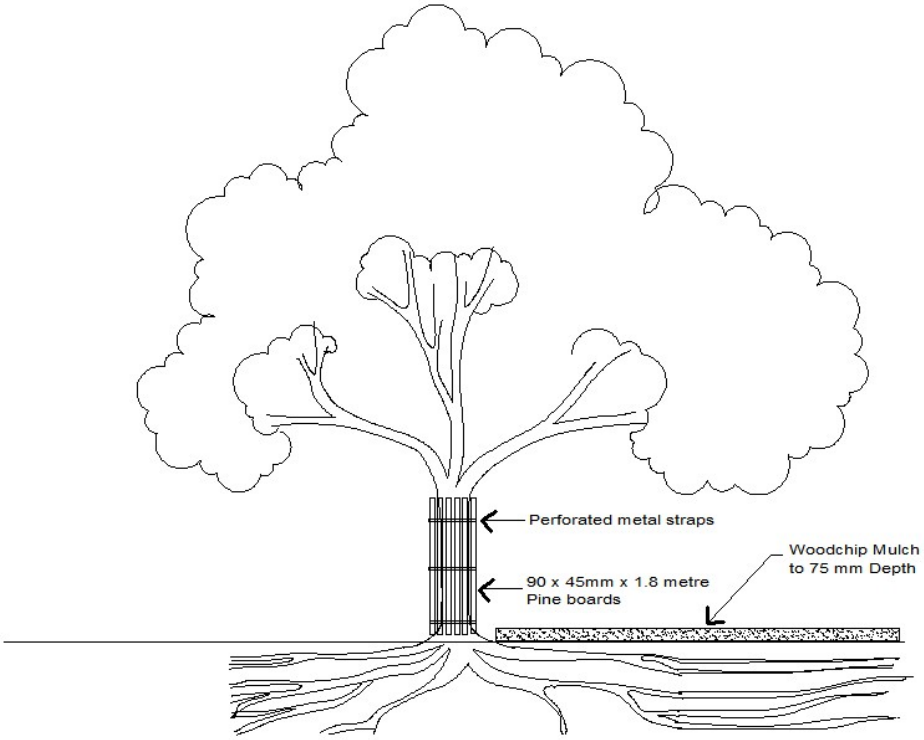


Figure 3 – Detail of Tree Protection Fence

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.

14.14 Site Establishment

14.14.1 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 14.12**. Gravel, roadbase or crushed concrete is *not* suitable for this purpose.

14.14.2 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.

14.14.3 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.

14.14.4 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.

14.15 Site Clearing & Tree Removal

14.15.1 Trees to be removed as part of the proposal are nominated in the attached schedule (**Appendix 5**) and indicated on the Tree Protection Plan (**Appendix 7**) with a dashed line. All trees within the Site are protected under Council's Tree Preservation Order. The approval of the Randwick City Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.

14.16 Temporary Construction/Demolition Haul Roads

14.16.1 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 7**). 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.

14.16.2 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.

14.17 Tree Pruning

14.17.1 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.

14.17.2 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 Randwick City Council.

14.18 Demolition Works

14.18.1 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. The 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.

14.18.2 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.

14.18.3 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 14.12**. 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.

14.18.4 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 structural footings or pavements, the Site Arborist shall inspect the site and verify whether any damage to trees has occurred during demolition works.

14.19 Excavations within Tree Protection Zones

14.19.1 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 (refer **Appendix 5**). 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.

14.19.2 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.

14.20 Underground Services

14.20.1 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.

14.20.2 Where the incursion to the Tree Protection Zone is less than 10% of the total TPZ (refer Appendix 2), 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.

14.20.3 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.

14.21 Root Pruning

14.21.1 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).

14.21.2 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.

14.22 Tree Damage & Remedial Action

14.22.1 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

15 TRANSPLANTING OF T84

15.1.1 Transplanting of T84 shall not commence until a Transplant Method Statement, prepared by the nominated Tree Transplanting Contractor, has been reviewed and approved by the Site Arborist.

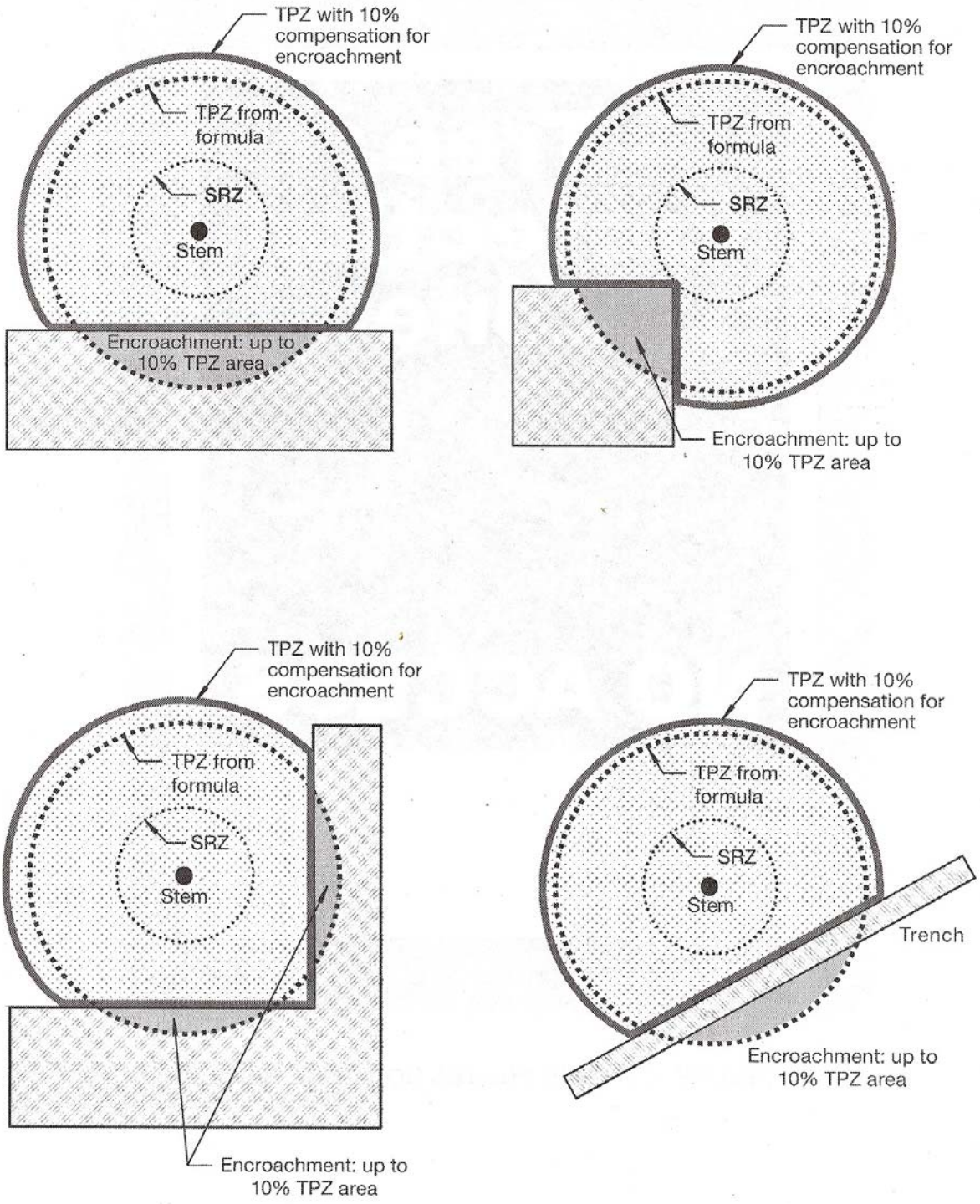
15.2 Inspection and Monitoring

15.2.1 Give 48 hours notice to the Site Arborist prior to the following hold points:-

- Following excavation of the sides of the root plate and root pruning and prior to burlaping and undercutting of the root plate;
- Following undercutting and burlaping of the root plate and prior to lifting;
- Following excavation of the new planting holes and drainage and prior to planting;
- During lifting and relocation to the new planting holes;
- Following planting and prior to backfilling of the planting holes; and
- After backfilling of the planting holes.

15.2.2 Works shall not proceed until such time as the Site Arborist (or their nominated representative) has inspected the site at each of the above hold points and given verbal approval to proceed.

APPENDIX 3 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



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

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

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
58	***Ficus obliqua*** (Small-leaf Fig)	13	20	1500	220	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 2-3 metres. Multiple primary limbs at 3 metres. Multiple aerial roots around trunk. Multiple elite epicormic sprouts arising from old pruning wounds.	Previously lopped at 5-6 metres. Selectively crown thinned and deadwooded. Crown lifted to 3-4 metres.	Very Good	No Evidence	Long - more than 40 years	1	**High**	On-site
61	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	14	20	1400	220	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at 1 metre. Multiple small wounds due previous pruning. Multiple elite epicormic sprouts arising from old pruning wounds. Exhibits 5% deadwood and 15% epicormic growth.	Previously lopped at 5-6 metres.	Fair with thinning crown	No Evidence	Short 5-15 Years	1	**High**	On-site
62	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	13	20	1800	220	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at 0.5 - 1 metre. Multiple elite epicormic sprouts arising from old pruning wounds	Previously lopped at 5-6 metres. Selectively crown thinned and deadwooded.	Good	No Evidence	Long - more than 40 years	1	**High**	On-site
64	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	12	18	1300	180	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at 1 metre.	Selectively crown thinned and deadwooded.	Good	No Evidence	Long - more than 40 years	1	**High**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
68	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	12	16	803	144	M	Appears stable with sound branching structure. Moderate wounds on lower trunk due to previous pruning. Cabled to soil anchors following transplanting (c.1999). Located within raised masonry planter box.	Selectively crown thinned and deadwooded	Fair with slight thinning crown	No Evidence	Medium 15-40 Years	1	**High**	On-site
69	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	13	18	950	180	M	Appears stable with sound branching structure. Multiple elite epicormic sprouts arising from old pruning wounds. Located within raised masonry planter box.	Previously lopped at 4 metres. Selectively crown thinned and deadwooded	Fair with slight thinning crown	No Evidence	Medium 15-40 Years	1	**High**	On-site
70	***Lophostemon confertus*** (Brushbox)	14	14	774	154	M	Appears stable with fair branching structure. Multiple elite epicormic sprouts emanating from old pruning wounds. 5% deadwood.	Previously lopped at 5 metres and selectively pruned to clear building.	Fair with slight thinning crown	No Evidence	Medium 15-40 Years	2	**High**	On-site
77	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	16	25	1700	325	M	Appears stable with sound branching structure. Located within raised planter box surrounded by asphalt. Multiple elite epicormic sprouts arising from old pruning wounds.	Previously lopped at 6-7 metres. Selectively crown thinned and deadwooded	Very Good	No Evidence	Long - more than 40 years	1	**High**	On-site
78	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	14	20	1500	240	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at 1-2 metres. Multiple elite epicormic sprouts arising from old pruning wounds	Previously lopped at 5-6 metres. Selectively crown thinned and deadwooded.	Good	No Evidence	Long - more than 40 years	1	**High**	On-site (outside precinct)

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
79	***Grevillea robusta*** (Silky Oak)	13	9	522	90	M	Appears stable with sound branching structure. 5% deadwood	Crown lifted to 4 metres`	Fair with slight thinning crown	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site (outside precinct)
81	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	15	20	1300	260	M	Appears stable with sound branching structure. Surrounded by asphalt pavement.	Selectively crown thinned and deadwooded.	Very Good	No Evidence	Long - more than 40 years	1	**High**	On-site (outside precinct)
82	***Ficus microcarpa var. hillii*** (Hill's Weeping Fig)	17	22	1300	330	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 1.5 metres. Multiple elite epicormic sprouts arising from old pruning wounds. Root zone compacted by temp road.	Crown lifted to 3 metres. Previously lopped at 6-7 metres	Very Good	No Evidence	Long - more than 40 years	2	**High**	On-site (outside precinct)
83	***Platanus x hybrida*** (London Plane)	14	14	631	112	M	Appears stable with sound branching structure. Multiple elite epicormic sprouts arising from old pruning wounds.	Previously lopped at 3 & 7 metres.	Good	Moderate Mistletoe infestation	Long - more than 40 years	2	**High**	On-site (outside precinct)
84	***Ficus macrophylla*** (Moreton Bay Fig)	13	16	1500	144	M	Stability suspect with fair branching structure. Cabled to soil anchors following transplanting (c.1999). Located within raised masonry planter box. Exhibits a large basal cavity. Multiple moderate wound due to previous pruning. 30% epicormic growth.	Previously lopped at 5-6 metres. Secondary limbs reduced (Lopped).	Fair with thinning crown	No Evidence	Short 5-15 Years	1	**High**	On-site
85	***Ficus macrophylla*** (Moreton Bay Fig)	16	20	900	240	M	Appears stable with fair branching structure. 10% epicormic growth. Cabled to soil anchors following transplanting (c.1999). Located within raised masonry planter box.	Previously lopped at 5-6 metres. Selectively crown thinned and deadwooded.	Very Good	No Evidence	Long - more than 40 years	1	**High**	On-site
86	***Magnolia grandiflora*** (Bullbay Magnolia)	5	5	190	15	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	**Moderate**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
87	***Corymbia ficifolia*** (Flowering Gum)	7	10	449	40	M	Appears stable with sound branching structure. Exhibits a prominent lean to the NW. Exhibits substantial dieback with 50% deadwood & 50% epicormic growth.	Deadwooded	Poor with sparse crown	No Evidence	Short 5-15 Years	4	**Low**	On-site
91	***Ficus macrophylla*** (Moreton Bay Fig)	22	35	3000	665	M	Appears stable with fair branching structure. Exhibits multiple moderate wounds due to previous pruning. Small basal cavity on western side. Multiple elite epicormic sprouts arising from old pruning wounds (crown restored).	Previously topped at 2 metres and lopped at 6-7 metres. Selectively crown thinned and deadwooded.	Fair with slight thinning crown	No Evidence	Medium 15-40 Years	1	**High**	On-site
100	***Cupressus torulosa*** (Bhutan Cypress)	9	4	370	28	M	Appears stable with sound branching structure.	No Evidence	Fair with thinning crown	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site (outside precinct)

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
58	***Ficus obliqua*** (Small-leaf Fig)	M	15.0	3.9	10.2	Existing pavement surrounding tree to be demolished. Demolition works ithin SRZ/TPZ. Proposed new pavement offset 3.9 metres SW & 8.0 metres NW (within footprint of existing pavement). Excavations and compaction for pavement sub-grade within SRZ/TPZ. Proposed lightpole offset 6.5 metres NW (within canopy dripline). Pruning may be required to clear light standard.	Demolition of existing pavement and excavations and compaction of new pavement sub-grade should not result in any adverse impact if undertaken as recommended. Pruning may result in any adverse impact.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Demolish existing pavement in accordance with Section 14.18. Excavate sub-grade for new pavement in accordance with Section 14.19. Install Tree Protection Fence in accordance with Section 14.10. Consider relocating lightpole outside canopy dripline or positioning to avoid canopy pruning.
61	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	M	15.0	3.8	10.2	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Management Plan (Appendix 2). . Install Tree Protection Fence in accordance with Section 14.10
62	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	M	15.0	4.1	10.2	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Management Plan (Appendix 2). . Install Tree Protection Fence in accordance with Section 14.10
64	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	M	15.0	3.75	10.2	Proposed new building offset 10.5 metres SE at RL x (close to existing grade). Proposed awning/roofline offset 7.6 metres SE at RL ?. Canopy pruning may be required to clear height of awning (canopy extends 2 metres over roofline). Proposed new pavement offset 6.2 metres SE (within footprint of existing asphalt pavement.	Extent of incursion to root zone (from new building) is less than 10% of the TPZ, which is within acceptable limits. Pavement should not result in any adverse impact provided existing pavement is demolished & new pavement constructed as recommended. Pruning may result in any adverse impact.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Demolish existing pavement in accordance with Section 14.18. Excavate sub-grade for new pavement in accordance with Section 14.19. Install Tree Protection Fence in accordance with Section 14.10. Avoid canopy pruning by temporarily tying back conflicting branches during construction.

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
68	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	M	9.6	3.1	6.5	Existing building (betting pavilion) offset 9.5 metres SW to be demolished within TPZ. New landscape area (planting/paving) at RL 31.89 (100-400mm above grade). Existing raised planter box to be demolished.	Demolition of existing planter box and excavations will not result in any adverse impact provided that the demolition work is undertaken as recommended.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Maintain existing ground levels within planter box area (do not excavate or fill). Install Tree Protection Fence in accordance with Section 14.10. Demolish existing planter box walls in accordance with Section 14.18.
69	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	M	11.4	3.3	7.8	Existing building (betting pavilion) offset 11.5 metres SW to be demolished within TPZ. New landscape area (planting/paving) at RL 31.41 (100-300mm above grade). Existing raised planter box to be demolished.	Demolition of existing planter box and excavations will not result in any adverse impact provided that the demolition work is undertaken as recommended.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Maintain existing ground levels within planter box area (do not excavate or fill). Install Tree Protection Fence in accordance with Section 14.10. Demolish existing planter box walls in accordance with Section 14.18.
70	***Lophostemon confertus*** (Brushbox)	M	9.3	3.1	6.3	Existing building offset 3.4 metres SW to be demolished within TPZ. Existing pavements surrounding tree to be removed and replaced with new paved area and garden/lawn areas.	Demolition of existing pavement & building and construction of new pavement and landscape areas should not result in any adverse impact provided existing pavement is demolished & new pavement constructed as recommended.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Demolish existing pavement in accordance with Section 14.18. Excavate sub-grade for new pavement in accordance with Section 14.19. Install Tree Protection Fence in accordance with Section 14.10. Maintain existing ground levels within TPZ (do not excavate or fill).
77	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	M	15.0	4	10.2	Existing paved area in NW sector of TPZ to be demolished and replaced with new paved area within TPZ.	Demolition of existing planter box and excavations will not result in any adverse impact provided that the demolition work is undertaken as recommended.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Demolish existing pavement in accordance with Section 14.18. Excavate sub-grade for new pavement in accordance with Section 14.19. Install Tree Protection Fence in accordance with Section 14.10.
78	***Ficus rubiginosa f. glabrescens*** (Port Jackson Fig)	M	15.0	3.9	10.2	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
79	***Grevillea robusta*** (Silky Oak)	M	6.3	2.7	4.3	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
81	***Ficus rubiginosa f. rubiginosa*** (Port Jackson Fig)	M	15.0	3.75	10.2	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
82	***Ficus microcarpa var. hillii*** (Hill's Weeping Fig)	M	15.0	3.75	10.2	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
83	***Platanus x hybrida*** (London Plane)	M	7.6	2.85	5.1	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
84	***Ficus macrophylla*** (Moreton Bay Fig)	M	15.0	3.9	10.2	Proposed new Parade Ring offset 2.1 metres west (outside raised planter box) below existing ground level. Located within new paved area.	Proposed works will necessitate removal. Proposed to be transplanted elsewhere within the site (adjacent T85).	Retain in accordance with recommended Tree Management Plan (Appendix 2). . Undertake transplanting in accordance with Section 14.23. Consider relocating lightpole outside canopy dripline or positioning to avoid canopy pruning (new tree position).
85	***Ficus macrophylla*** (Moreton Bay Fig)	M	10.8	3.25	7.3	Proposed new Parade Ring offset 6.5 metres NW (outside raised planter box) below existing ground level. Proposed new garden and paved areas surrounding tree at RL 31.33 (300-400mm below soil level in planter box).	Demolition of existing planter box and excavations for new landscape (reduction in existing soil level within planter box) will necessitate severance of woody roots, leading to an adverse impact.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Demolish existing planter box in accordance with Section 14.18. Install Tree Protection Fence in accordance with Section 14.10. Maintain existing ground levels within planter box area (do not excavate or fill).
86	***Magnolia grandiflora*** (Bullbay Magnolia)	M	2.9	1.65	2.0	Located within footprint of proposed paved area.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site to compensate for loss of amenity.

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
87	***Corymbia ficifolia*** (Flowering Gum)	M	5.4	2.5	3.7	Proposed pathway offset 1.9 metres south at RL ? (close to existing grade). Excavations for pavement sub-grade within SRZ	Excavations and compaction for new pavement sub-grade may necessitate severance of woody roots, leading to an adverse impact.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Undertake excavations for pavement sub-grade in accordance with Section 14.19.
91	***Ficus macrophylla*** (Moreton Bay Fig)	M	18.0	5.25	12.2	Proposed gravel pathway offset 5.6 metres south and west. Excavations for pavement sub-grade within TPZ. Proposed paved footpath offset 9.6 metres south (within footprint of existing raised planter). Proposed horse tunnel offset 14 metres south. Excavations for horse tunnel within TPZ.	Excavations and compaction for new pavements may result in some root disturbance, leading to an adverse impact. Extent of incursion to TPZ from Horse tunnel is less than 10% of the TPZ, which is within acceptable limits under AS4970-2009. Note that this is beyond the alignment of an existing retaining wall. No adverse impact from proposed gravel pathway.	Retain in accordance with recommended Tree Management Plan (Appendix 2). Undertake excavations for pavement sub-grade in accordance with Section 14.19. Demolish existing planter box and stairs in accordance with Section 14.18. Install Tree Protection Fence in accordance with Section 14.10. Consider relocation proposed stairs outside TPZ (further east). Maintain existing ground levels within the existing lawn area surrounding the tree. New path to be installed at same level as existing lawn area using permeable pavement.
100	***Cupressus torulosa*** (Bhutan Cypress)	M	4.4	2.4	3.0	No proposed worrks within TPZ	No adverse impact	To be retained - no special protection measures required.