Project No: RNSH/SCD/16 Report No: RNSH/SCD/AIA/D

ARBORICULTURAL IMPACT ASSESSMENT
TREE PROTECTION SPECIFICATION

St Leonards Health Organisations Relocation

Prepared for: SAVILLS AUSTRALIA

14th November 2017

Revision D

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1.0 INTRODUCTION

1.1 Background

1.1.1 This Arboricultural Impact Assessment Report and Tree Protection Specification was prepared for Savills Australia, on behalf of NSW Health Infrastructure, in relation to a State Significant Development Application for the St Leonards Health Organisations Relocation (SHOR) Project at the Royal North Shore Hospital (RNSH).

1.1.2 The purpose of this report is to undertake a Visual Tree Assessment[1] (VTA) of the trees, determine the impact of the proposed works on the trees, and where appropriate, recommend the use of sensitive construction methods to minimise adverse impacts. This report also includes a Transplant Method Statement.

1.1.3 This Revision D Arboricultural Impact Assessment & Tree Protection Specification has been amended to address an updated proposal and site description only (as provided by Savills). No additional plans have been assessed.

1.1.4 The author is aware of and has taken into account the objectives of the Willoughby City Council's *Tree & Bushland Preservation Order* and *Clause 5.9 (2) under the WLEP 2012 & WDCP C9*, *Australian Standard 4970 Protection of Trees on Development Sites (2009)*, *Australian Standard 4373 Pruning of Amenity Trees (2007)* and *Australian Standard 2303 Tree Stock for Landscape Use (2015).*

Refer to Methodology **(Appendix 1)**

1.1.5 This impact assessment is based on an assessment of the following supplied documentation/plans only:

- Landscape REF Masterplan Issue D – prepared by Arcadia Landscape Architecture (dated August 2016)
- Landscape REF Site 4A/4B Detail Issue D – prepared by Arcadia Landscape Architecture (dated August 2016) NOTE: Copy of plan amended by TreeiQ for use within this report (as requested by Savills Australia)
- Planting Plan REF Site 4A/4B Detail Issue D – prepared by Arcadia Landscape Architecture (dated August 2016)

Refer to Plans **(Appendix 2)**

1.2 The Proposal

1.2.1 This SSD Application seeks approval for works proposed to Precinct 4 (Site 4A and Site 4B) and some adjoining public domain grounds. Specifically, consent is sought for the following:

- Construction of a 10-storey building Construction of 2 basement levels with 115 car parking spaces and 1 car wash bay
- Subdivision of the existing land parcel into the following additional allotments
- Improved east-west connectivity of the 4A+4B precinct through an at grade pedestrian access way interconnecting Herbert Street (east) to Reserve street (west)
- Creation of an additional easement along the southern alignment of the site for unrestricted vehicular access; and
- Associated public domain and landscaping works

[1] Mattheck & Breloer (2003)

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2.0 RESULTS

2.1 The Site

2.1.1 The RNSH Campus is situated approximately 6.5 km north of Sydney CBD and 3 km south west of Chatswood. The RNSH precinct is located within Willoughby City Council LGA, less than 200 metres from St Leonards Station.

2.1.2 The subject site (Precinct 4) is located at the southern edge of the RNSH Campus with direct frontage to Reserve Road (west of the site).

2.1.3 The land is owned by the Health Administration Corporation. Precinct 4 currently forms a part of the Royal North Shore Hospital campus, legally described as Lot 210 under DP 1172133. Total site area of the existing campus is 11.38 hectares.

2.2 The Trees

2.2.1 Sixty eight (68) trees (including groups of trees) were surveyed as part of this assessment and consist of a mix of locally indigenous species, Australian native and exotic species. As required by Clause 2.3.2 of *Australian Standard 4970 Protection of Trees on Development Sites (2009)*, each of the trees assessed has been allocated a Retention Value. The Retention Value is based on the trees' Useful Life Expectancy and Landscape Significance with consideration to their health, structural condition and site suitability. The Retention Values do not take into account any proposed development works and are not a schedule for tree retention or removal. The trees have been allocated one of the following Retention Values:

- Priority for Retention
- Consider for Retention
- Consider for Removal
- Priority for Removal

2.2.2 Full results of the VTA are shown in the Tree Assessment Schedule **(Appendix 3)**.

2.2.3 Tree J (*Celtis sinesis* - Chinese Hackberry), Tree Y (*Olea europaea* subsp. *cuspidata* - African Olive) and Tree Z X*Cupressocyparis leylandii* (Leyland Cypress) are listed as Exempt Tree Species within Section 5 of Willoughby City Council's *Tree & Bushland Preservation Order* and *Clause 5.9 (2) under the WLEP 2012 & WDCP C9*.[2] Tree O (*Ligustrum* sp. (Privet) is listed as a Locally-Controlled Noxious Weed for the Willoughby Local Government Area by the Department of Primary Industries.[3]

2.2.4 Tree 219 (*Araucaria cunninghamii* - Hoop Pine) and Tree 220 (*Pinus* sp. - Pine species) are noted in the Tree Heritage Study (2005) as being associated with the original hospital building.[4] The avenue of *Phoenix canariensis* - Canary Island Date Palm (Trees 253-255, 258, 260, 273, 284, 286-290, A and 332) are also noted in the Tree Heritage Report as being a popular planting in the 1920's.

2.2.5 A search of the BioNet Atlas of NSW Wildlife Database was undertaken in February 2017. No individual threatened tree species that were listed within this database for the area were identified during the current field investigations of the site.[5]

[2] Willoughby City Council (2012), *WLEP 2012 Tree and Vegetation Preservation*
[3] NSW Government (2017), *Department of Primary Industries*
[4] Taylor Brammer (2005), *Tree Heritage Study*
[5] NSW Office of Environment and Heritage Atlas of NSW Wildlife (2011), *BioNet Atlas of NSW Wildlife*

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2.2.6 The species *Syncarpia glomulifera* – Turpentine (Trees 321, 326, 333, 339, 351 and 352) is represented in the Sydney Turpentine Ironbark Forest ecological community. Sydney Turpentine Ironbark Forest is listed as an endangered ecological community under the *Threatened Species Conservation Act* 1995 and *Environment Protection and Biodiversity Conservation Act 1999.*[6]

2.2.7 The ecological and heritage value of the trees has not been assessed and is beyond the scope of this report.

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees to be removed

3.1.1 Sixty (60) trees are proposed for removal as part of the development. This includes nineteen (19) trees with a Retention Value of *Priority for Retention,* twelve (12) trees with a Retention Value of *Consider for Retention,* fifteen (15) trees with a Retention Value of *Consider for Removal* and fourteen (14) trees with a Retention Value of *Priority for Removal*.

3.1.2 Table 1: Trees to be removed

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
219, 260, 275, 280, 281, 282, 284, 286, 287, 288, 289, 290, 320, 322, 326, A, 332, 333 & 335	220, 279, 293, 321, 323, V, 327, 328, 329, 330, 331 & 336	261, H, I, J, K, W, X, Z, 334, 337, 343, 344, 345, 347 & 349	296, 299, B, L, O, Y, 338, 339, 340, 341, 342, 346, 348 & 350

3.2 Trees to be retained

3.2.1 Eight (8) trees are proposed for retention as part of the development. This includes six (6) trees with a Retention Value of *Priority for Retention* and two (2) trees with a Retention Value of *Consider for Retention.* It should be noted that Trees 253, 254, 351, 352 and 353 are located outside of the site. However, as their Tree Protection Zone (TPZ) areas extend into the site, they have been included in this report (as required by *Australian Standard 4970 Protection of Trees on Development Sites 2009)*.

3.2.2 Table 2: Trees to be retained

Priority for Retention	Consider for Retention
253, 254, 255, 258, 273 & 351	352 & 353

3.2.3 Trees 255, 258 and 273 have been identified as good quality specimens which form part of an avenue planting of *Phoenix canariensis* (Canary Island Date Palm). It is understood it is the intention to retain these trees in-situ during development works. *Phoenix canariensis* (Canary Island Date Palm) are arborescent monocots and are generally tolerant of transplanting, even when of a large mature size. Therefore, Trees 255, 258 and 273 could be considered for transplanting in the event that their in-situ retention is problematic for development works.

3.2.4 Successful transplanting requires a period of post transplanting monitoring and maintenance. In addition, the transplanting equipment and machinery required to successfully transplant the trees can be large and may require a significant working area. If trees are to be transplanted, a tree transplanting contractor should be engaged and liaise with the Principal Contractor to assess the logistical practicalities for working on and moving around the site prior to the commencement of the development works. Any constraints to transplanting operations should be identified and discussed with the Principal Contractor and an appropriate management strategy developed. The removal of trees from their contextual setting and the resultant impact on heritage significance should also be assessed in accordance with heritage guidelines.

[6] NSW Environment & Heritage (2016), *Turpentine- Ironbark Forest in the Sydney Bioregion - Critically Endangered Ecological Community Listing*

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3.2.5 A typical Transplanting Method Statement is attached as **Appendix 5.** Minor adjustments to methods outlined may be required following the assessment of site conditions and constraints by the Transplanting Contractor.

3.2.6 It should also be noted that the fungal pathogen *Fusaruim oxysporum* is a major pathogen of palm species. Therefore, the *Phoenix canariensis* (Canary Island Date Palm) selected for retention (Trees 255, 258 and 273) should be tested for this disease prior to any tree removals being undertaken on the site. Where *Fusaruim oxysporum* is identified, alternative *Phoenix canariensis* (Canary Island Date Palm) growing within the site should be selected for retention and further testing of these trees also undertaken to ensure they are free of pathogens.

3.3 Tree Protection Zones & Structural Root Zones

3.3.1 *Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970)* outlines that a Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. It is an area isolated from construction disturbance so that the tree remains viable. The TPZ is calculated as a radial measurement based on twelve (12) times the tree's DBH.[7] For palms, other monocots, cycads and tree ferns, the TPZ should not be less than 1m outside the crown projection.[8] These formulas are based on extensive research and are generally accepted within the arboricultural industry as being suitable for calculating areas designed to maintain the long-term viability of trees on development sites.

3.3.2 AS-4970 also provides calculations to determine a tree's Structural Root Zone (SRZ). The SRZ is described in AS-4970 as the area around the base of a tree required for its stability in the ground. This zone considers a tree's structural stability only, not the root zone required for its vigour and long-term viability, which will usually be a much larger area. Severance of structural roots (>25mmØ) within the SRZ is generally not recommended as it may lead to the destabilisation and/or decline of the tree.

3.3.3 The TPZ and SRZ areas of the trees have been calculated in accordance with the AS-4970 and are included in the Tree Assessment Schedule **(Appendix 3)**.

3.3.4 In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the TPZ and is outside the SRZ. A *Minor Encroachment* is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. *Major Encroachments* generally require root investigations undertaken by non-destructive methods or the use of tree sensitive demolition/construction methods.

3.4 Crown Protection

3.4.1 AS-4970 outlines that the TPZ may need to be modified (extended) to provide additional protection to the above ground parts of the tree.

3.4.2 Where conflict between branches and structures/machinery could occur, branches may be protected with padding and timber battens, temporarily tied back or in some cases pruned, only where pruning would not impact the tree's health, structural condition, long-term viability or form.

3.4.3 Pruning works should be undertaken in accordance with *Australian Standard 437 Pruning of Amenity (2007) Trees* and the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

[7] Standards Australia (2009)
[8] Standards Australia (2009)

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3.5 Replacement Planting

3.5.1 Replacement tree planting is recommended where established trees are removed as part of development to help offset the loss of canopy cover. Replacement trees should be supplied as advanced-size stock to help offset the loss of amenity resultant from the tree removals. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use.*

3.5.2 Sufficient soil volumes should be provided for the new tree plantings to support healthy tree growth over a long-time frame. Wherever possible, isolated planting areas should be increased in size or linked below pavement surfaces to adjacent planting areas to maximize the available growing environment. Various products are available which can be used beneath pavement surfaces to provide adequate support for the pavement whilst providing a suitable growing environment for tree roots. It should be noted that based on typical root morphology of most tree species, a minimum soil depth of 700mm is required. Irrigation should be provided to aid in the establishment of the new tree plantings.

4.0 CONCLUSION

4.1 Sixty eight (68) trees (including groups of trees) were surveyed as part of this assessment and consist of a mix of locally indigenous species, Australian native and exotic species. Tree J, Y and Z are listed as Exempt Tree Species within Council's *Tree & Bushland Preservation Order* and *Clause 5.9 (2) under the WLEP 2012 & WDCP C9*.[9] Tree O is listed as a Locally-Controlled Noxious Weed.[10] Trees 219, 220, 253-255, 258, 260, 273, 284, 286-290, A and 332 are noted in the Tree Heritage Study (2005).[11]

4.2 The supplied plans show that the proposed works include demolition of existing structures and pavements, construction of a commercial building and pedestrian link, and associated works.

4.3 Sixty (60) trees are proposed for removal as part of the development. This includes Trees 219, 220, 260, 261, 275, 279-282, 284, 286-290, 293, 296, 299-323, 326, A, B, H-L, O, V-Z and 327-350.

4.4 Eight (8) trees are proposed for retention as part of the development. This includes Trees 253, 254, 255, 258, 273, 351, 352 and 353. TPZ fencing should be installed as per the TPZ setbacks outlined in the Tree Assessment Schedule **(Appendix 3)** as part of the site establishment works. TPZ fencing may be set back for access/approved demolition and construction works, only where approved by the Project Arborist and appropriate ground/trunk protection is installed. Tree sensitive demolition methods should be used within TPZ areas. Refer to Tree Protection Specification **(Appendix 6).**

4.5 It is recommended that replacement tree planting is undertaken where established trees are removed as part of development to help offset the loss of canopy cover. Replacement trees should be supplied as advanced-size stock to help offset the loss of amenity resultant from the tree removals. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use.*

[9] Willoughby City Council (2012), *WLEP 2012 Tree and Vegetation Preservation*
[10] NSW Government (2017), *Department of Primary Industries*
[11] Taylor Brammer (2005), *Tree Heritage Study*

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5.0 LIMITATIONS & DISCLAIMER

TreeiQ takes care to obtain information from reliable sources. However, TreeiQ can neither guarantee nor be responsible for the accuracy of information provided by others. Plans, diagrams, graphs and photographs in this Arboricultural Report are visual aids only and are not necessarily to scale. This Report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction/ecological/heritage etc issues.

This Report has been prepared for exclusive use by the client. This Report shall not be used by others or for any other reason outside its intended target or without the prior written consent of TreeiQ. Unauthorised alteration or separate use of any section of the Report invalidates the Report.

Many factors may contribute to tree failure and cannot always be predicted. TreeiQ takes care to accurately assess tree health and structural condition. However, a tree's internal structural condition may not always correlate to visible external indicators. There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the trees or site may not arise in the future. Information contained in this report covers only the trees assessed and reflects the condition of the trees at the time of inspection. Additional information regarding the methodology used in the preparation of this Report is attached as Appendix 1. A comprehensive tree risk assessment and management plan for the trees is beyond the scope of this Report.

Reference should be made to any relevant legislation including Tree Management Controls. All recommendations contained within this Report are subject to approval from the relevant Consent Authority and tree owner.

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6.0 BIBLIOGRAPHY & REFERENCES

Barrell (1995), 'Pre-development Tree Assessments', in *Trees & Building Sites, Proceedings of an International Conference Held in the Interest of Developing a Scientific Basis for Managing Trees in Proximity to Buildings*, International Society of Arboriculture, Illinois, USA, pp. 132-142.

Harris, Clark & Matheny (1999), *Arboriculture: Integrated Management of Landscape Trees, Shrubs And Vines*, Prentice Hall, New Jersey.

Matheny & Clark (1994), *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*, International Society of Arboriculture, USA.

Mattheck & Breloer (1994), *The Body Language of Trees: A Handbook for Failure Analysis*, The Stationary Office, London.

NSW Office of Environment and Heritage's Atlas of NSW Wildlife (2011), *BioNet Atlas of NSW Wildlife*.

NSW Environment & Heritage (2016), *Turpentine- Ironbark Forest in the Sydney Bioregion - Critically Endangered Ecological Community Listing.*

Simon, Dormer &Hartshorne (1973), *Lowson's Botany*, Bell & Hyman, London.

Standards Australia (2009), *Protection of Trees on Development Sites AS-4970.*

Standards Australia (2007), *Pruning of Amenity Trees AS-4373.*

Standards Australia (22015), *Tree Stock for Landscape Use AS-2303.*

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7.0 APPENDICES

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Appendix 1: Methodology

1.1 **Site Inspection**: This report was determined as a result of a comprehensive site inspection during June 2016 and January 2017. The comments and recommendations in this report are based on findings from this site inspection.

1.2 **Visual Tree Assessment (VTA)**: The subject tree(s) was assessed using the Visual Tree Assessment criteria and notes as described in *The Body Language of Trees – A Handbook for Failure Analysis.*[12] The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic or tissue testing was undertaken as part of this assessment.

1.3 **Tree Dimensions**: The dimensions of the subject tree(s) are approximate only.

1.4 **Tree Locations:** The location of the subject tree(s) was determined from the supplied plans.

1.5 **Trees & Development**: Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

The *Tree Protection Zone* (TPZ) is described in AS-4970 as a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The *Structural Root Zone* (SRZ) is described in AS-4970 as the area around the base of a tree required for the tree's stability in the ground. Severance of structural roots within the SRZ is not recommended as it may lead to the destabilisation and/or demise of the tree.

In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the area of the TPZ and is outside the SRZ. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. In this situation the Project Arborist must demonstrate that the tree would remain viable. This may require root investigation by non-destructive methods or the use of sensitive construction methods.

1.6 **Tree Health**: The health of the subject tree(s) was determined by assessing:

I. Foliage size and colour
II. Pest and disease infestation
III. Extension growth
IV. Crown density
V. Deadwood size and volume
VI. Presence of epicormic growth

1.7 **Tree Structural Condition**: The structural condition of the subject tree(s) was assessed by:

I. Assessment of branching structure
(i.e co-dominant/bark inclusions, crossing branches, branch taper, terminal loading, previous branch failures)
II. Visible evidence of structural defects or instability
(i.e root plate movement, wounds, decay, cavities, fungal brackets, adaptive growth)
III. Evidence of previous pruning or physical damage
(root severance/damage, lopping, flush-cutting, lions tailing, mechanical damage)

1.8 **Useful Life Expectancy (ULE)**: The ULE is an estimate of the longevity of the subject tree(s) in its growing environment. The ULE is modified where necessary to take in consideration tree(s) health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (Modified from Barrell, 2001):

I. 40 years +
II. 15-40 years
III. 5-15 years
IV. Less than 5 years

[12] Mattheck & Breloer (2003)

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1.9 **Landscape Significance**: Landscape Significance was determined by assessing the combination of the cultural, environmental and aesthetic values of the subject tree(s). Whilst these values are subjective, a rating of high, moderate, low or insignificant has been allocated to the tree(s). This provides a relative value of the tree's Landscape Significance which may aid in determining its Retention Value. If the tree(s) can be categorized into more than one value, the higher value has been allocated.

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the *Local Environmental Plan* with a local or state level of significance.
	The subject tree is listed on Council's Significant Tree Register or is considered to meet the criteria for significance assessment of trees and/or landscapes by a suitably qualified professional. The criteria are based on general principles outlines in the Burra Charter and on criteria from the Register of the National Estate.
	The subject tree is a remnant tree.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species or forms part of an Endangered Ecological Community associated with the subject site, as defined under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.
	The subject tree is known to provide habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Management Controls
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.
Insignificant	The subject tree is declared a Noxious Weed under the Noxious Weeds Act

1.10 **Retention Value**: Retention Value was based on the subject tree's Useful Life Expectancy and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structural condition and site suitability. The subject tree(s) has been allocated one of the following Retention Values:

I. Priority for Retention
II. Consider for Retention
III. Consider for Removal
IV. Priority for Removal

<table>
<tr><th>ULE</th><th></th><th colspan="4">Landscape Significance</th></tr>
<tr><td></td><td>Very High</td><td colspan="2">High</td><td>Moderate</td><td>Low</td><td>Insignificant</td></tr>
<tr><td>40 years +</td><td rowspan="3">Priority for Retention</td><td colspan="2">Priority for Retention</td><td rowspan="3">Consider for Removal</td><td rowspan="3">Priority for Removal</td></tr>
<tr><td>15-40 years</td><td>Priority for Retention</td><td>Consider for Retention</td></tr>
<tr><td>5-15 years</td><td colspan="2">Consider for Retention</td></tr>
<tr><td>Less than 5 years</td><td>Consider for Removal</td><td colspan="4">Priority for Removal</td></tr>
</table>

The above table has been modified from the Footprint Green Tree Significance and Retention Value Matrix.

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Appendix 2: Plans

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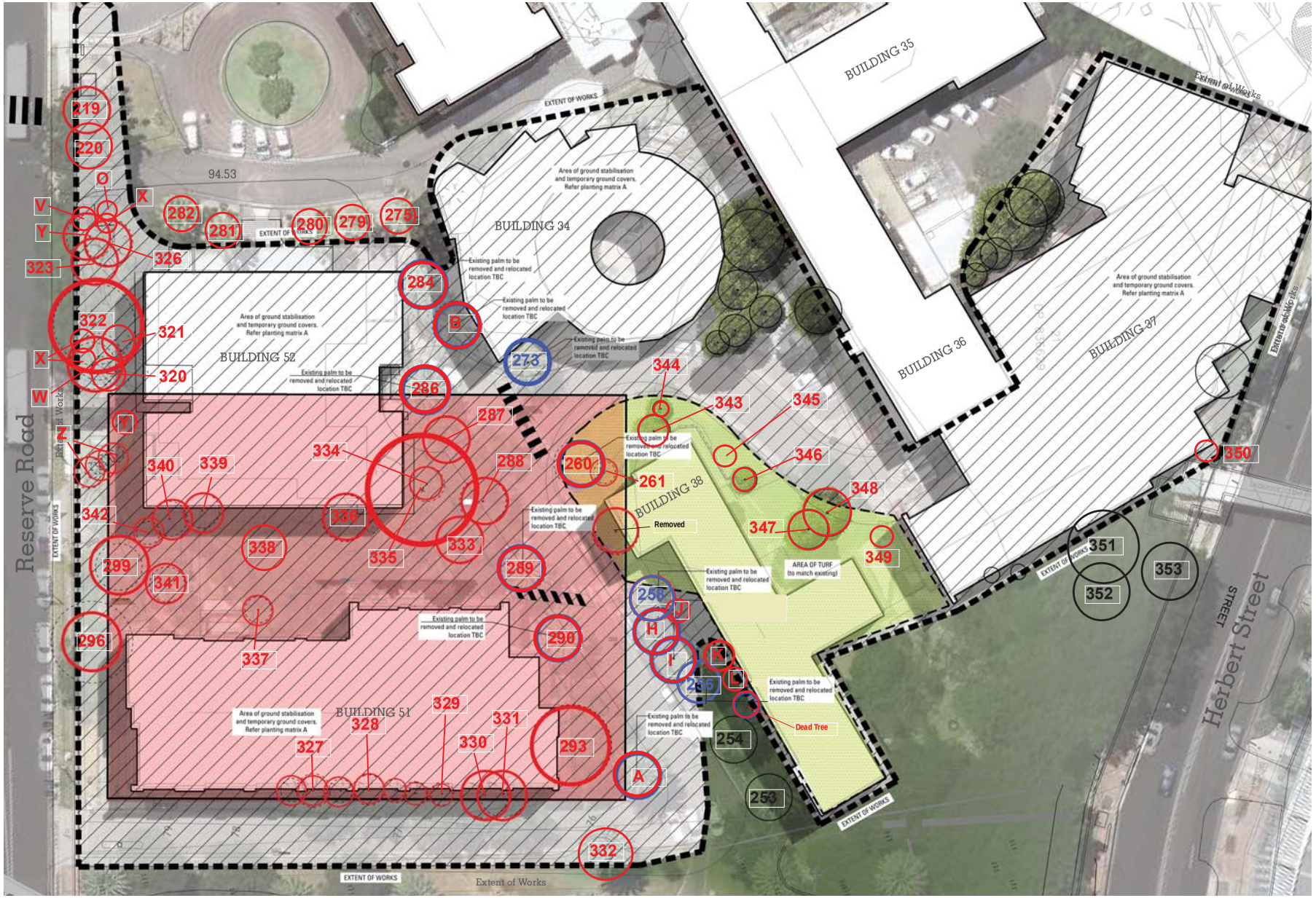
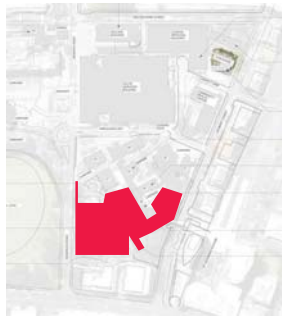


key plan



LEGEND

- 4A — Proposed Building (approximate building footprint)
- 4B — Area of Turf (1084m²) (to match existing)
- Date Palms to be Relocated Location TBC - refer arborist report for transplanting requirements
- Trees to be Retained
- Trees to be Removed
- Area of Ground Stabilisation and Temp Groundcovers (9796m²)

ARCADIA LANDSCAPE ARCHITECTURE

RNSH SOUTH CAMPUS DECANT
REVIEW OF ENVIRONMENTAL FACTORS

PREPARED BY Arcadia Landscape Architecture
CLIENT NSW Health Infrastructure

DATE August 2016
SCALE 1:250 @ A1
ISSUE D

Appendix 3: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
219	*Araucaria cunninghamii* (Hoop Pine)	650 350	16	7	Good	Good	Crown density 75-95%.	15-40	Very High	Priority for Retention	8.9	3	Remove.
220	*Pinus* sp. (Pine species)	900	15	8	Good	Good	Crown density 75-100%. Adaptive growth. Crown lifted to 6m, wound/s with early stages of decay.	5-15	Very High	Consider for Retention	10.8	3.2	Remove.
253	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Retain & protect.
254	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good	No access to base.	15-40	Very High	Priority for Retention	n/a	4	Retain & protect.
255	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Retain & protect.
258	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Retain & protect.
260	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Remove.
261	*Franklinia axillaris* (Fried Egg Plant)	300@ grade	4	3	Good	Good		15-40	Low	Consider for Removal	3.6	2	Remove.
273	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Retain & protect.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
275	*Washingtonia robusta* (Mexican Fan Palm)	700	20	2	Good	Good		15-40	High	Priority for Retention	n/a	3	Remove.
279	*Washingtonia robusta* (Mexican Fan Palm)	650	18	2	Good	Fair	Phototropic lean, slight. Previous adjacent tree removed.	5-15	Very High	Consider for Retention	n/a	3	Remove.
280	*Washingtonia robusta* (Mexican Fan Palm)	650	18	2	Good	Good		15-40	Very High	Priority for Retention	n/a	3	Remove.
281	*Washingtonia robusta* (Mexican Fan Palm)	650	18	2	Good	Good		15-40	Very High	Priority for Retention	n/a	3	Remove.
282	*Washingtonia robusta* (Mexican Fan Palm)	650	18	2	Good	Good		15-40	Very High	Priority for Retention	n/a	3	Remove.
284	*Phoenix canariensis* (Canary Island Date Palm)	600	14	4	Good	Good	Asphaltic surface in root zone.	15-40	Very High	Priority for Retention	n/a	5	Remove.
286	*Phoenix canariensis* (Canary Island Date Palm)	600	14	4	Good	Good	Asphaltic surface in root zone.	15-40	Very High	Priority for Retention	n/a	5	Remove.
287	*Phoenix canariensis* (Canary Island Date Palm)	650	13	3	Good	Good	Asphaltic surface in root zone.	15-40	Very High	Priority for Retention	n/a	4	Remove.
288	*Phoenix canariensis* (Canary Island Date Palm)	650	14	3	Good	Good	Asphaltic surface in root zone. Partially suppressed.	15-40	Very High	Priority for Retention	n/a	4	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
289	*Phoenix canariensis* (Canary Island Date Palm)	700	14	4	Good	Good	Asphaltic surface in root zone. Bees nest.	15-40	Very High	Priority for Retention	n/a	5	Remove.
290	*Phoenix canariensis* (Canary Island Date Palm)	650	14	4	Good	Good	Asphaltic surface in root zone.	15-40	Very High	Priority for Retention	n/a	5	Remove.
293	*Pittosporum undulatum* (Sweet Pittosporum)	600 400 300	12	6	Fair	Good	Group of 3. Crown density 25-50%. Small (<25mm), medium (25-75mm) & large (>75mm) diameter deadwood in moderate volumes. Wound/s, early stages of decay.	5-15	Moderate	Consider for Retention	9.5	3	Remove.
296	*Eucalyptus saligna* x *E. botryoides* (Wollongong Woolleybutt)	450	15	10	Poor	Poor	Crown density 50-75%. Small (<25mm) diameter deadwood at tips. Large (>75mm) diameter deadwood low volumes over path. Sap sucking leaf damage. Previous co-dominant stem removed. Wound/s, advanced stages of decay. Wound/s with fungal bracket.	<5	Moderate	Priority for Removal	5.4	2.4	Remove.
299	*Eucalyptus saligna* x *E. botryoides* (Wollongong Woolleybutt)	350	8	6	Fair	Poor	Crown density 50-75%. Large (>75mm) diameter deadwood in low volumes. Basal wound with Phellinus bracket. Sap sucking leaf damage.	<5	Low	Priority for Removal	4.2	2.2	Remove.
320	*Washingtonia robusta* (Mexican Fan Palm)	600	15	3	Good	Good		15-40	High	Priority for Retention	n/a	4	Remove.
321	*Syncarpia glomulifera* (Turpentine)	600	20	8	Good	Good	Partially suppressed. Medium (25-75mm) & large (>75mm) diameter deadwood in moderate volumes. Bark inclusion/s, minor.	15-40	Moderate	Consider for Retention	7.2	2.7	Remove.
322	*Eucalyptus saligna* x *E. botryoides* (Wollongong Woolleybutt)	500 500	20	10	Good	Good	Large (>75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	15-40	High	Priority for Retention	8.5	2.9	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
323	*Jacaranda mimosifolia* (Jacaranda)	400 200	12	10	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Cavities, minor.	15-40	Moderate	Consider for Retention	5.4	2.4	Remove.
326	*Syncarpia glomulifera* (Turpentine)	650 350	16	6	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. 2x stems removed leaving decaying stumps.	15-40	High	Priority for Retention	8.9	3	Remove.
A	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Remove.
B	*Cupressus* sp. (Cypress)	450	10	5	Poor	Fair	Crown density 25-50%. Small (<25mm), medium (25-75mm) & large (>75mm) diameter deadwood in moderate volumes. Co-dominant inclusion, minor.	<5	Low	Priority for Removal	5.4	2.4	Remove.
H	*Callistemon viminalis* (Weeping Bottlebrush)	100 100 100 100 100	6	5	Fair	Good	Heavily suppressed. Crown density 50-75%. Small (<25mm) diameter epicormic growth in moderate volumes.	5-15	Low	Consider for Removal	2.4	1.7	Remove.
I	*Callistemon viminalis* (Weeping Bottlebrush)	250 200	6	5	Fair	Fair	Crown density 50-75%. Small (<25mm) & medium (25-75mm) diameter deadwood in moderate volumes. Co-dominant inclusion, major.	5-15	Low	Consider for Removal	4	2.1	Remove.
J	*Celtis sinensis* (Chinese Hackberry)	450	9	11	Good	Good	Branch rubbing on Tree D. Overhangs building. Structures in SRZ.	15-40	Low	Consider for Removal	5.4	2.4	Remove.
K	*Archontophoenix cunninghamii* (Bangalow Palm)	200	8	4	Good	Good	Heavily suppressed. Limited building clearance.	5-15	Low	Consider for Removal	n/a	5	Remove.
L	*Morus nigra* (Mulberry)	400	9	9	Good	Fair	Trunk in contact with building.	<5	Low	Priority for Removal	4.8	2.3	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
O	*Ligustrum* sp. (Privet)								Insignificant	Priority for Removal			Remove.
V	*Jacaranda mimosifolia* (Jacaranda)	400	12	7	Good	Good	Heavily suppressed. Small (<25mm) diameter epicormic growth in low volumes. Crossing branches at 4m with abrasion wound.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove.
W	*Washingtonia robusta* (Mexican Fan Palm)	650	6	3	Good	Fair	No access to trunk due to skirt of dead fronds.	15-40	Low	Consider for Removal	n/a	4	Remove.
X	*Pittosporum undulatum* (Sweet Pittosporum)	200 max	6 max	3	Fair	Fair	Group of 2. Partially suppressed. Larger tree crown density 50-75%. Smaller tree comprised of coppice stool.	5-15	Low	Consider for Removal			Remove.
Y	*Olea europaea* subsp. *cuspidata* (African Olive)							<5	Insignificant	Priority for Removal			Remove.
Z	X*Cupressocyparis leylandii* (Leyland Cypress)	450 max	8	3	Good	Good	Group of 5. Partially suppressed. Bark inclusion/s, minor. Small (<25mm) diameter deadwood, normal for species. Structures in SRZ.	5-15	Low	Consider for Removal	5.4	2.4	Remove.
327	*Melaleuca quinquenervia* (Broad Leaved Paperbark)	200 200 200 300	9	5	Good	Good	Limited building clearance. Partially suppressed. Minor bark inclusions (typical of species)	5-15	Moderate	Consider for Retention	5.4	2.4	Remove.
328	*Melaleuca quinquenervia* (Broad Leaved Paperbark)	350	9	4	Good	Good	Limited building clearance. Partially suppressed. Minor bark inclusions (typical of species)	5-15	Moderate	Consider for Retention	4.2	2.2	Remove.
329	*Melaleuca quinquenervia* (Broad Leaved Paperbark)	350 150	10	7	Good	Good	Limited building clearance. Partially suppressed. Minor bark inclusions (typical of species)	5-15	Moderate	Consider for Retention	4.8	2.3	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
330	*Melaleuca quinquenervia* (Broad Leaved Paperbark)	350	11	3	Good	Good	Limited building clearance. Partially suppressed. Minor bark inclusions (typical of species)	5-15	Moderate	Consider for Retention	4.2	2.2	Remove.
331	*Melaleuca quinquenervia* (Broad Leaved Paperbark)	250 300	9	4	Good	Good	Limited building clearance. Partially suppressed. Minor bark inclusions (typical of species)	5-15	Moderate	Consider for Retention	4.8	2.3	Remove.
332	*Phoenix canariensis* (Canary Island Date Palm)	600	15	3	Good	Good		15-40	Very High	Priority for Retention	n/a	4	Remove.
333	*Syncarpia glomulifera* (Turpentine)	800	14	4	Good	Good	Co-dominant inclusion. Wounds advanced stages of decay.	15-40	High	Priority for Retention	9.6	3.1	Remove.
334	*Melia azedarach* (White Cedar)	300	10	5	Good	No access to base	Heavily suppressed. Branch abrasion with adjacent tree.	5-15	Low	Consider for Removal	3.6	2	Remove.
335	*Eucalyptus saligna* (Sydney Blue Gum)	750	18	8	Good	No access to base	Large (>75mm) diameter deadwood in low volumes.	15-40	High	Priority for Retention	9	3	Remove.
336	*Paulownia tormentosa* (Foxglove Tree)	600	14	9	Good	Good	Branch contact with adjacent building. Wounds early stages of decay.	15-40	Moderate	Consider for Retention	7.2	2.7	Remove.
337	*Ulmus glabra* 'Luteo Varigata' (Wyche Elm)	250 150 100	11	5	Good	Good	Wounds early stages of decay.	15-40	Low	Consider for Removal	3.6	2	Remove.
338	*Eucalyptus saligna* x *E. botryoides* (Wollongong Woolleybutt)	900	20	10	Fair	Poor	Crown density 75-95%. Trunk wound with Phellinus bracket. Medium diameter deadwood in moderate volumes.	<5	High	Priority for Removal	10.8	3.2	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
339	*Syncarpia glomulifera* (Turpentine)	500	13	4	Fair	Poor	Co-dominant inclusion that is splitting apart.	<5	Moderate	Priority for Removal	6	2.5	Remove.
340	*Melaleuca quinquenervia* (Broad Leaved Paperbark)	200 100	6	3	Poor	Fair	Crown density 0-25%. Small diameter deadwood in high volumes.	<5	Low	Priority for Removal	2.4	1.7	Remove.
341	*Eucalyptus saligna* (Sydney Blue Gum)	200	7	3	Poor	Fair	Crown density 0-25%. Small diameter deadwood in high volumes. Crown overhangs building entry.	<5	Low	Priority for Removal	2.4	1.7	Remove.
342	*Eucalyptus saligna* x *E. botryoides* (Wollongong Woolleybutt)	300	12	6	Fair	Fair	Crown density 50-75%. Splitting and delaminating bark.	<5	Moderate	Priority for Removal	3.6	2	Remove.
343	*Callistemon citrinus* (Bottlebrush)	200 100	5	2	Good	Good		5-15	Low	Consider for Removal	3	1.9	Remove.
344	*Franklinia axillaris* (Fried Egg Plant)	300@ grade	3	3	Good	Good		5-15	Low	Consider for Removal	3.6	2	Remove.
345	*Franklinia axillaris* (Fried Egg Plant)	250@ grade	3	3	Good	Good		5-15	Low	Consider for Removal	3	1.9	Remove.
346	*Cupressus* sp. (Cypress)	300@ grade	5	2	Poor	Fair	Crown density 0-25%.	<5	Low	Priority for Removal	3.6	2	Remove.
347	*Gleditsia triacanthos* (Locust)	300	5	4	Fair	No access to base	Crown density 75-95%.	5-15	Low	Consider for Removal	3.6	2	Remove.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial SRZ (m)	Radial TPZ (m)	Implication
348	*Pittosporum undulatum* (Sweet Pittosporum)	250 100 100 100	5	5	Poor	Good	Crown density 0-25%.	<5	Low	Priority for Removal	3.6	2	Remove.
349	*Cupressus sempervirens* (Italian Cypress)	100 max.	6	1	Good	Good	Group of 4 trees. Partially suppressed.	5-15	Low	Consider for Removal	2	1.5	Remove.
350	*Ficus macrophylla* (Moreton Bay Fig)	200 200	6	2	Good	Good	Self sown specimen with limited clearance from bridge and building.	<5	Low	Priority for Removal	3.6	2	Remove.
351	*Syncarpia glomulifera* (Turpentine)	800 (est)	20	7	Good	No access to base.		15-40	High	Priority for Retention	9.6	3.1	Retain & protect.
352	*Syncarpia glomulifera* (Turpentine)	400 (est)	11	5	Good	No access to base.	Partially suppressed.	15-40	Moderate	Consider for Retention	4.8	2.3	Retain & protect.
353	*Liquidambar styraciflua* (Liquidambar)	400 (est)	18	5	Good	No access to base.	Partially suppressed.	15-40	Moderate	Consider for Retention	4.8	2.3	Retain & protect.

Appendix 4: Transplant Method Statement

1.0 Preliminaries

1.1 Appointment of Transplanting Contractor

A Transplanting Contractor shall be engaged prior the commencement of the tree transplanting operation. The Transplanting Contractor shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture. The Transplanting Contractor shall have a minimum of 5 years experience in practical tree transplanting.

The Transplanting Contractor shall meet with the Building Contractor prior to the commencement of works on-site to discuss the transplanting process including factors which may influence transplanting success or failure.

Prior to the commencement of the tree transplanting operation, the Transplanting Contractor shall outline/determine the following for both the tree removal and relocation site:

- Location and protection of services (above and below ground)
- Impediments to transplanting/excavation e.g. soil type, sub surface rock or other impervious materials
- Protection measures for adjacent plant material/landscape structures
- Constraints to site access
- Transplant timing
- Rootball size calculations
- Tree weight
- Equipment/machinery requirements
- Lifting methods

2.0 Preparation

2.1 Fusarium Testing

The Transplanting Contractor shall arrange for any *Phoenix canariensis* (Canary Island Date Palm) proposed for transplanting to be tested for *Fusaruim oxysporum* at a registered laboratory. In the event that testing returns positive results the infected tree shall not be transplanted.

2.2 Labelling

The tree to be transplanted shall be labelled with the following information prior to the commencement of the transplanting works:

- Tree number
- Relocation position
- North side of the trunk

2.3 Pre-Transplant Preparation

The Transplanting Contractor shall determine and undertake pre-transplanting preparation works as necessary to ensure the successful reestablishment of the tree, such as:

- Irrigation
- Fertiliser application
- Staged root pruning (where required)
- Pest and disease treatment
- Wetting agent application

2.4 Crown Preparation

The tree's lower fronds shall be removed prior to the commencement of the transplanting works. When removing fronds, complete whorls of fronds shall be removed. Only the lower 50% of whorls of fronds shall be removed in total, with the upper 50% of whorls of fronds to be retained. The remaining fronds shall be bunched and tied/wrapped together before tree removal to prevent damage and assist with handling prior to the commencement of the transplanting works.

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Works to the tree's crown shall be carried out by an experienced and qualified Arborist. The Arborist should hold a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 3 or above, in Arboriculture and a NSW TAFE Tree Surgery Certificate or its recognised equivalent. The Arborist should have a minimum of 3 years experience in practical Arboriculture including demonstrated experience in tree surgery. Pruning work should be undertaken in accordance with *AS4373: Pruning of Amenity Trees* (2007) and the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

Where deemed necessary by the Transplanting Contractor, tree foliage shall be treated with an anti-transpirant prior to the commencement of the transplanting works.

2.5 Trunk Protection

Where deemed necessary by the Transplanting Contractor, trunk protection shall be installed by wrapping sufficient padding/protection around the trunk to prevent trunk damage. Straps/slings used for lifting shall be placed over the padding.

3.0 Transplant Works

3.1 Excavation

The rootball radius and depth shall be determined by the Transplanting Contractor prior to the commencement of the tree transplanting operation. Adequate rootball volumes shall be retained to preserve the Root Initiation Zone.

The rootball of the tree shall be cut vertically using a high-pressure water jet or other similar approved technique. Bulk excavation shall be undertaken using excavation machinery. The rootball base shall be cut horizontally using a high-pressure water jet or other similar approved technique. Following excavation the rootball shall be immediately wrapped in hessian material or boxed and secured with sufficient strapping to maintain the integrity of the rootball.

3.2 Lifting, Handling & Transportation

Lifting requirements shall be determined by the Transplanting Contractor prior to the commencement of the tree transplanting operation.

The tree shall be appropriately protected, handled and transported in such a manner so as to avoid damage.

It shall be the responsibility of the Transplanting Contractor to check access requirements for tree lifting and transportation equipment and machinery including load bearing capacity of surface materials and overhead power line clearances.

3.3 Temporary Storage

If temporary storage prior to replanting is required, the tree shall be maintained in a healthy condition for the duration of the temporary storage period. Irrigation shall be provided to the rootball to maintain adequate soil moisture levels. The tree shall be monitored weekly by the Transplanting Contractor whilst in temporary storage.

4.0 Replanting at Relocation Site

4.1 Preparation

Prior to replanting, boxing and strapping materials shall be removed from the rootball.

4.2 Excavation

The finished landscape levels of the planting area shall be established. Plantings pits shall be excavated to no greater than the depth of the rootball and a minimum of 1.5 times the width of the rootball of tree being transplanted.

4.3 Positioning

The tree shall be positioned in its new location in identical orientation and vertical alignment.

4.4 Stabilising

Where deemed necessary by the Transplanting Contractor, a system of above or below ground guying shall be installed to provide adequate support to maintain the stability to the tree during the establishment phase. Where guys pose a hazard to the public, appropriate protection shall be installed.

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4.5 Backfilling

The planting pit shall be backfilled with a Type B soil mix to a depth of 300mm below the top of the rootball, in layers no greater than 100mm. Each layer shall be lightly consolidated before the next layer is added to prevent excessive settlement after planting. Ensure all voids around and under rootball are filled and that no large air pockets are retained.

Type B soil mix

- 40% screened topsoil
- 60% coarse sand

The planting pit shall be backfilled with a Type A soil mix to level with the top of the rootball (maximum depth 300mm), in layers not greater than 100mm. Each layer shall be lightly consolidated before the next layer is added to prevent excessive settlement after planting. Ensure all voids around and under rootballs are filled and that no large air pockets are retained.

The soil mix shall not be placed over the top of the rootball. The top of the rootball and tree stem should be level with the top of the backfill.

Type A soil mix

- 30% screened topsoil
- 60% coarse sand
- 10% organic matter

Coarse sand shall mean washed, coarse river sand 0.25 to 2.0mm diameter, free from weeds, debris or other deleterious material. Imported topsoil shall mean commercially available premium grade sandy loam conforming to AS4419: Soils for Landscaping and Garden Use. Organic matter shall mean commercially available aged and composted green waste or cow manure, free from debris or other deleterious material.

4.6 Irrigation

A watering basin shall be formed at the perimeter of the tree's rootball. An automatic dripline irrigation system shall be installed within the watering basin to maintain adequate soil moisture levels for the duration of the tree establishment period. Where an automatic drip line irrigation system cannot be installed, hand watering shall be undertaken at regular intervals. The volume and frequency of water required to maintain adequate soil moisture levels shall be determined by the Transplanting Contractor

4.7 Mulching

The area within the watering basin shall be mulched with Horticultural Grade Pine Bark as certified to AS4454: Composts, Soil Conditioners and Mulches (1997) to a depth of 70mm, with mulch pulled back from the base of the trunk. The mulch shall be spread by hand to avoid soil disturbance and compaction.

5.0 Post-Transplant Maintenance

5.1 Inspections

Upon the completion of the transplanting works, fortnightly inspections by the Transplanting Contractor shall be undertaken during the tree establishment period. The length of the tree establishment period will vary depending upon the response to transplanting of the tree and the trees growing environment. The inspections shall determine the requirements for post-transplant maintenance works such as:

- Irrigation requirements
- Pruning requirements
- Fungicide application
- Wetting agent application
- Fertilizer application
- Mulch application
- Pest and disease management
- Removal of tree stabilization infrastructure (where required).
- Tree health and structural condition assessment

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Appendix 5: Plates

Plate 1: Showing Tree 220

Plate 2: Showing Trees 297-282

Plate 3: Showing Trees 327-331

Plate 4: Showing Tree 336

Plate 5: Showing Tree 341

Plate 6: Showing Trees 344-348

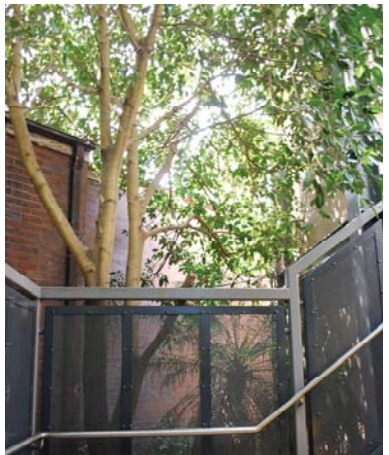

Plate 7: Showing Tree 350

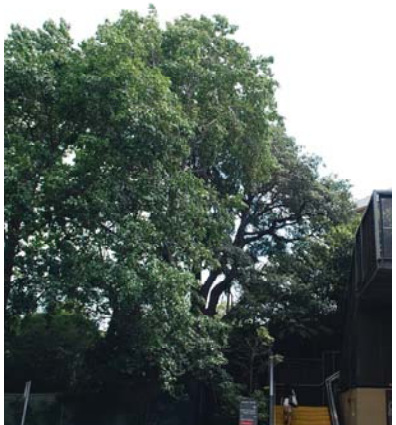

Plate 8: Showing Trees 351-353

Appendix 6: Tree Protection Specification

1.0 Appointment of Project Arborist

A Project Arborist shall be engaged prior the commencement of work on-site and monitor compliance with the protection measures. The Project Arborist shall inspect the tree protection measures and Compliance Certification shall be prepared by the Project Arborist for review by the Principal Certifying Authority prior to the release of the Compliance Certificate.

The Project Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture.

1.1 Compliance

Contractors and site workers shall receive a copy of these specifications a minimum of 3 working days prior to commencing work on-site. Contractors and site workers undertaking works within the Tree Protection Zone shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

The Project Arborist shall undertake regular site inspections and certify that the works are being undertaken in accordance with this specification.

Compliance Documentation shall be prepared by the Project Arborist following each site inspection. The Compliance Documentation shall include documentary evidence of compliance with the tree protection measures and methods as outlined within this Specification. Upon the completion of the works, a final assessment of the trees shall be undertaken by the Project Arborist and future recommended management strategies implemented as required.

1.2 Tree & Vegetation Removal

The trees to be removed shall be removed prior to the establishment of the tree protection measures. Tree removal works shall be undertaken in accordance with the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

Tree and vegetation removal shall not damage the trees to be retained.

1.3 Tree Protection Zone

The trees to be retained shall be protected prior and during construction from activities that may result in an adverse effect on their health or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, unless otherwise stated:-

- Modification of existing soil levels, excavations and trenching
- Mechanical removal of vegetation
- Movement of natural rock
- Storage of materials, plant or equipment or erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials, refueling or disposal of waste materials and chemicals
- Lighting fires
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Any other activities that may cause damage to the tree

NOTE: If access, encroachment or incursion into the TPZ is deemed essential, prior authorisation is required by the Project Arborist.

1.4 Tree Protection Fencing

TPZ fencing shall be located at the perimeter of the TPZ. Where TPZ areas overlap, TPZ fencing may be combined to form a single larger TPZ area. The exact location of the fencing shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works. Fencing may be setback to allow for demolition/construction access and for the installation of pavements only where appropriate ground protection is installed and approved by the Project Arborist.

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As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Panels shall be fastened together and supported to prevent sideways movement. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) **(Appendix 7)**.

1.5 Site Management

Materials, waste storage, and temporary services shall not be located within the TPZ.

1.6 Scaffolding

Where possible, scaffolding shall not be located within the TPZ. Scaffolding shall not be in contact with the tree. As necessary, this shall be achieved by erecting scaffolding around branches. Branches shall be tied back and protected as deemed necessary by the Project Arborist. Refer to Typical Tree Protection Details (5) **(Appendix 7)**.

1.7 Works within the Tree Protection Zones

In some cases works within the TPZ may be authorized by the determining authority. **These works shall be supervised by the Project Arborist**. When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

If roots (>25mmø) are encountered during the demolition, excavation and construction works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of roots (>25mmø) where deemed necessary by the Project Arborist.

Drilling/piling machinery shall be of a suitable size to not damage the tree's roots, trunk, branches and crown. No clearance pruning is permitted to allow for machinery access. Machinery shall work in conjunction with an observer to ensure that adequate clearance from trees is maintained at all times.

1.8 Ground Protection

Where deemed necessary by the Project Arborist, machinery movements shall be restricted to areas of existing pavement or from areas of temporary ground protection such as ground mats or steel road plates. Refer to Typical Tree Protection Details (3) **(Appendix 7).**

1.9 Trunk Protection

Where required by the Project Arborist, trunk protection shall be installed. Trunk protection shall be installed by wrapping padding (either carpet underlay or 10mm thick jute geotextile mat) around the trunk and first order branches to a minimum height of 2m. Timber battens (90 x 45mm) spaced at 150mm centres shall be strapped together and placed over the padding. Timber battens must not be fixed to the trees. Refer to Typical Tree Protection Details (3) **(Appendix 7)**.

Branch protection shall be installed as deemed necessary by the Project Arborist.

1.10 Structure & Pavement Demolition

Demolition of existing structures/pavement within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs, pavements or areas of ground protection (refer to Section 1.8). Machinery should not contact the tree's roots, trunk, branches and crown.

The existing pavement shall be carefully lifted to minimise damage to the underlying soil profile (or sub-base materials) and to prevent damage to tree roots. Wherever possible, existing sub-base materials shall remain in-situ.

When removing slab sections within TPZ, machinery shall work backwards out of the TPZ to ensure machinery remains on un-demolished sections of slab at all times. Wherever possible, footings or elements below grade shall be retained to minimise disturbance to the tree's roots.

Where deemed necessary by the Project Arborist, the structures shall be shattered prior to removal with a hand-operated pneumatic/electric breaker.

If roots (>25mmø) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Where the Project Arborist determines that the tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

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1.11 Underground Services

Underground service installation within the TPZ shall be supervised by the Project Arborist.

The installation of underground services shall be located outside of the TPZ. Where this is not possible, they shall be installed using either hydrovac or hand excavation methods with the services installed around/below roots (>25mmø, or as determined by the Project Arborist).

Alternatively, boring methods may be used for underground service installation where the installation depth is greater than 1500mm below existing grade. Excavations for starting and receiving pits for boring equipment shall be located outside of the TPZ or located to avoid roots (>25mmø, or as determined by the Project Arborist).

1.12 Excavations, Root Protection & Root Pruning

Excavations and root pruning within the TPZ shall be supervised by the Project Arborist. Excavations within the TPZ shall be avoided wherever possible.

Excavations within the TPZ shall be undertaken by hand or using hydro vacuum excavation methods (or similar approved device) to protect tree roots. If there is any delay between excavation works and backfilling, exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times.

Hand excavation and root pruning shall be undertaken along the excavation line prior to the commencement of mechanical excavation to prevent tearing and shattering damage to the roots from excavation equipment. Roots (>25mmø) shall be pruned by the Project Arborist only. Roots (<25mmø) may be pruned by the Principal Contractor. Root pruning shall be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears.

No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the Project Arborist.

Damaged roots shall be pruned behind the damaged tissues with the final cut made to an undamaged part of the root.

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Appendix 7: Typical Tree Protection Details

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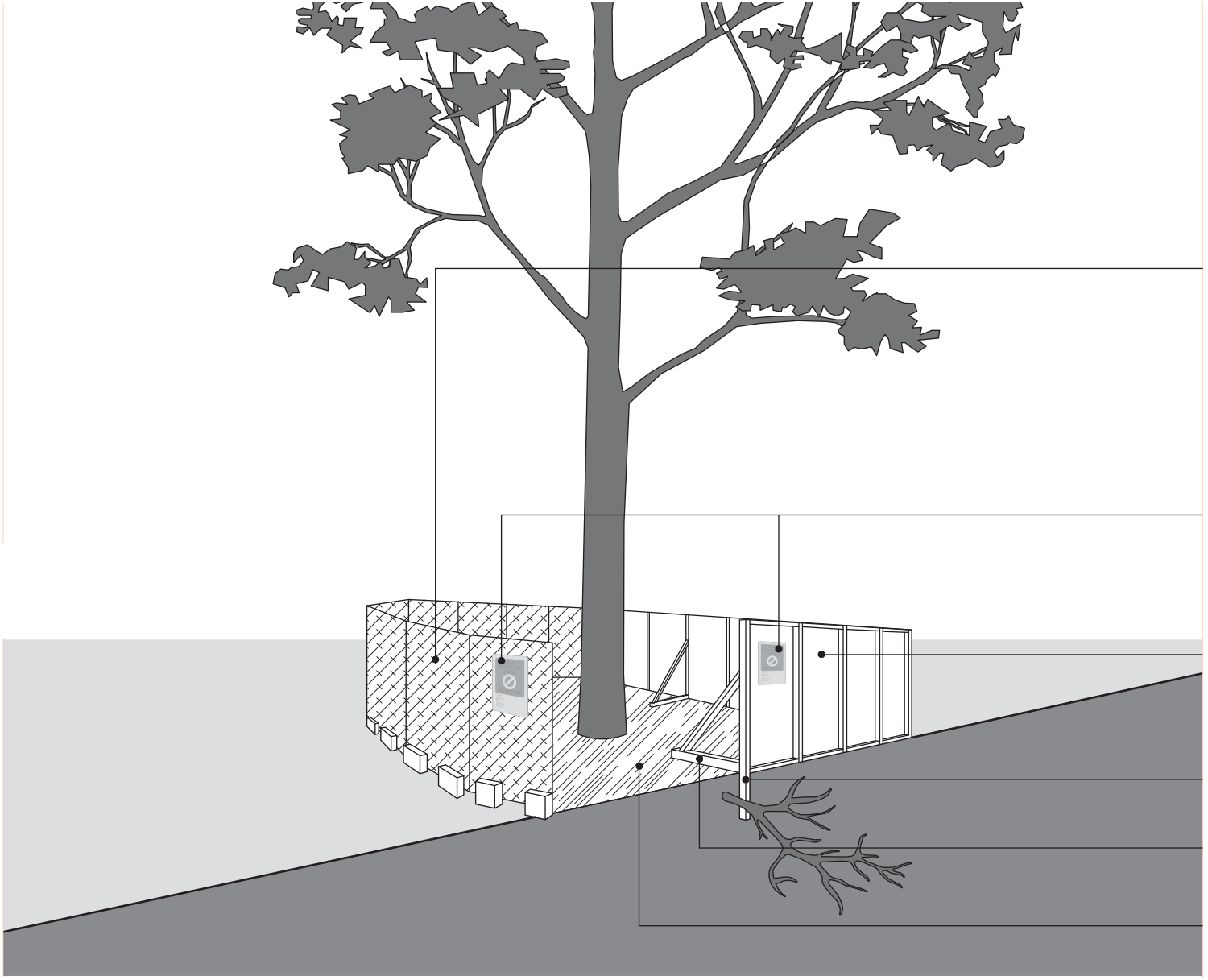


Note:
No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

Option 1 - Fencing
1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

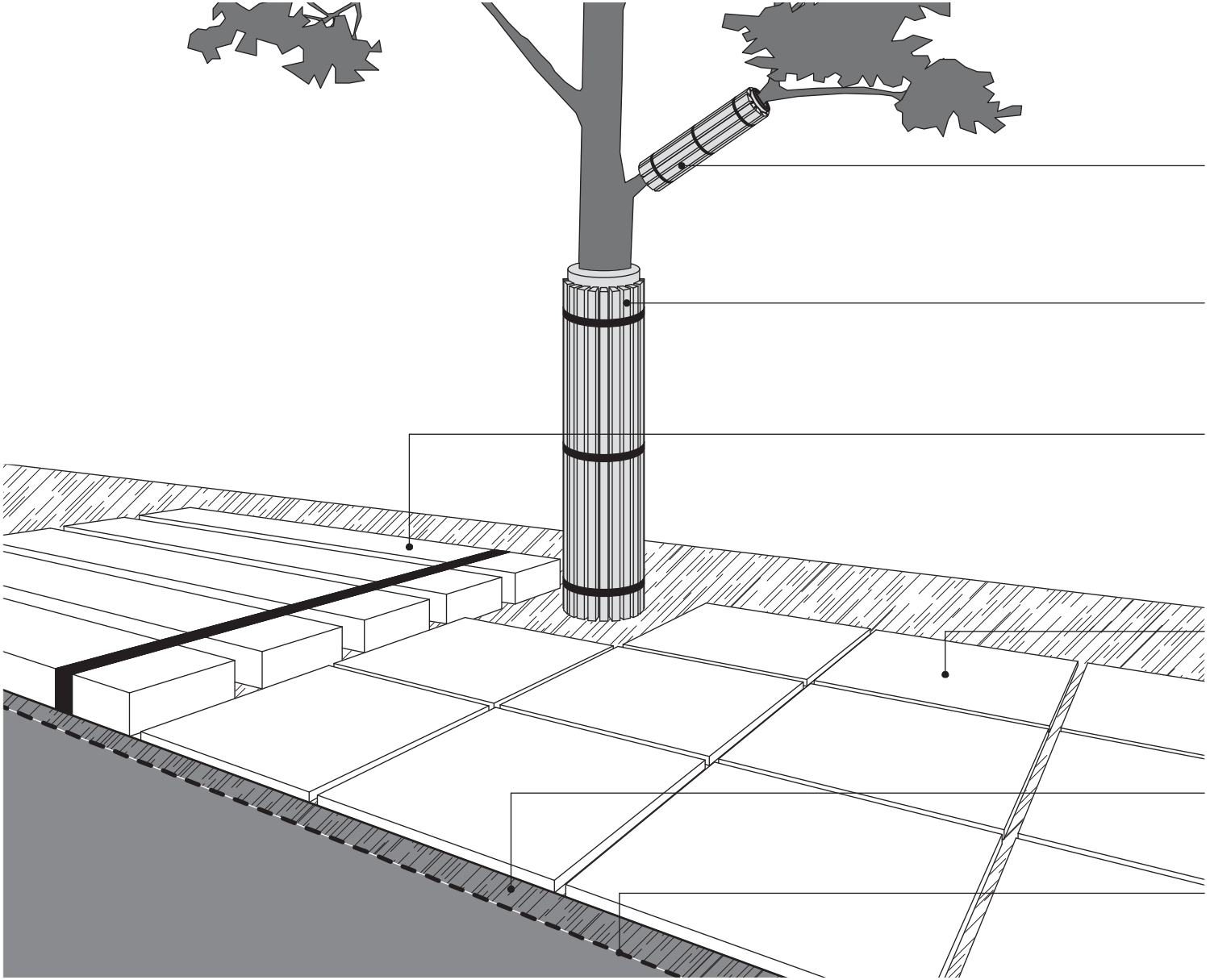
Installation of supports should avoid damaging roots.

Bracing is permissible within the TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TPZ.

03 Tree Protection Fencing

Not to Scale



Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.

Trunk Protection - use boards and padding to prevent damage to bark (minimum 2m). Boards are to be strapped, not screwed or nailed to the trunk.

Ground Protection - use device strapped over mulch or aggregate layer. Ground protection device should be of a suitable thickness to prevent soil compaction and root damage.

Steel plates (or approved equivalent) with or without mulch or aggregate layer below.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer.

Geotextile fabric underneath mulch or aggregate layer.

04 Examples of Branch, Trunk and Ground Protection

Not to Scale

Branches may require pruning to erect scaffolding. Pruning may be subject to local regulations. Flexible branches should be tied back in preference to pruning.

Minimum 1.8m high hoarding. Temporary fencing may be incorporated into scaffolding as either containment screening or as hoarding.

Note:
If excavation is required for installation of support post for fencing, the Project Arborist should assess any pruning of roots greater than 20mm diameter.

Scaffold planks

Boards or plywood to be installed over mulch or aggregate layer for any areas requiring access within the TPZ.

Soleplate over geotextile. No excavation for soleplate within TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer within TPZ.

Geotextile fabric

05 Indicative Scaffolding within a Tree Protection Zone (TPZ) Not to Scale