L&Co
CONSULTANCY
ARBORICULTURE
PLANT PATHOLOGY

ARBORICULTURAL IMPACT ASSESSMENT
&
TREE PROTECTION SPECIFICATION

REF: L&Co192028 | 22 April 2021 | v3
SITE ADDRESS | Bondi Surf Bathers' Life Saving Club
PREPARED FOR | Lockhart-Krause Architects
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1.0 EXECUTIVE SUMMARY |

1.1.1 The proposal, outlined in the supplied plans, show the conservation and upgrade of the Bondi Surf Bathers' Life Saving Club adjacent to Bondi Surf Pavilion, containing changerooms, a Surf Museum and Heritage Hall, courtyard, and associated landscaping.

1.2 The landscaping works are the source for the majority of the direct tree impacts along with the proposed basement.

1.3 Indirect impacts from the demolition and construction works are a risk to the tree population and a staged approach is recommended for the tree sensitive construction methods and protection measures.

1.4 A total of eighteen (18) trees were assessed that were a mix of Australian native and exotic species. Trees 15, 16, 17 & 18 are scheduled for removal as part of a separate Development Application (Bondi Pavilion) since the site inspection conducted for the current report (16.03.2020) and are no longer relevant to the current proposal.

1.5 The proposed turf and landscaping works are within the SRZs of Trees 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 & 11 and represents a *Major Encroachment* (as defined by AS4970). However, the proposed encroachment is at or above the existing grade and negative impacts can be avoided if the tree sensitive construction methods and protection measures outlined in this report are implemented and be acceptable under the Australian Standard AS4970, Clause 3.3.4.

1.6 The proposed building works are also within the SRZs of Trees 1 & 12 and represent a *Major Encroachment* (as defined by AS4970). These trees will need to be removed as the TPZ encroachment is too large for their long-term viability, based on a consideration of their health, structure and the size of the encroachment. These trees were assigned Moderate Landscape Significance Values.

1.7 Trees 13 & 14 are within the proposed building or driveway footprint and will need to be removed. Trees 13 & 14 were assigned Low Landscape Significance Values.

1.8 The location of the underground services was not detailed in the supplied plans. The installation of underground services should be located outside of the TPZs detailed in this report. Where this is not possible, they should be installed around or below roots (>25mm∅) using either hydrovac or hand excavation and supervised by the Project Arborist.

2.0 INTRODUCTION |

2.1 Background

2.1.1 This Arboricultural Impact Assessment and Tree Protection Specification Report was prepared for Lockhart-Krause Architects in relation to the proposed development of Bondi Surf Bathers' Life Saving Club, Bondi Beach. This report has determined the impact of the proposed works on the trees at the Bondi Surf Bathers' Life Saving Club and neighbouring properties and where appropriate, has provided tree sensitive construction methods to minimise negative impacts to the trees.

2.1.2 In preparing this report, the author is aware of and has considered the objectives of the Waverley Council's- *Development Control Plan 2012 (Amendment No. 8), Section B5, Australian Standard: 4970 Protection of Trees on Development Sites (2009)*, *Australian Standard 4373 Pruning of Amenity Trees (2007)* and *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

2.1.3 Further methodology used in the preparation of this report is detailed in Appendix 1.

2.1.4 This Arboricultural Impact Assessment was based on an assessment of the following supplied documentation/plans only (Appendix 4):

- Roof & Basement Plan, Proposed (RevA). Prepared by Lockhart-Krause Architects. Dated 14.04.2021.
- Site Plan, Existing (Rev. A). Prepared by Lockhart-Krause Architects. Dated 14.04.2021.
- Site Plan, Proposed (Rev. A). Prepared by Lockhart-Krause Architects. Dated 14.04.2021.
- Plan Showing Topographical Detail of Bondi Beach, Park and Pavillion (Dwg. No.PR114644-DET Rev. E). Prepared by RPS. Date of Plan 27.08.2020.

2.2 The Proposal

2.2.1 The supplied plans show the conservation and upgrade of the Bondi Surf Bathers' Life Saving Club adjacent to Bondi Surf Pavillion, containing changerooms, a Surf Museum and Heritage Hall, courtyard and associated landscaping.

2.3 The Site

2.3.1 The site is an irregular block with a total area stated in the plans as 3000m^2 . The site has a fall from west to east.

2.3.2 The site is bounded by Campbell Parade to the north and west, parkland to the south and Bondi Beach to the east.

2.4 The Trees

2.4.1 A Visual Tree Assessment (VTA) (Mattheck & Breloer, 2003) has been undertaken on trees growing within the site to determine their health and structural condition (Appendix 2). A full VTA of trees located outside of the site boundaries was not undertaken due to limited access. The species and trunk diameter were recorded for the purposes of determining Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) calculations only. The distance of each tree from the site boundary is an approximation due to limited access.

2.4.2 The Australian Standard 4970: *Protection of Trees on Development Sites* (2009) Clause 2.3.2, requires the allocation of a Tree Retention Value. This value is based on the Useful Life Expectancy (ULE) and Landscape Significance, which considers the tree's health, structural condition and site suitability. The Retention Value does not consider any proposed development works and is 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

2.4.3 The Australian Standard 4970: *Protection of Trees on Development Sites* (2009) also requires the calculation of the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) for each tree (Appendix 1).

2.4.4 A total of eighteen (18) trees were assessed which were a mix of Australian native and exotic species. This included Trees 15, 16, 17 & 18 that are scheduled for removal as part of a separate Development Application.

2.4.5 A search of the BioNet Atlas of NSW Wildlife Database was undertaken during September 2020. No individual threatened tree species that were listed within this database for the area were identified during the current field investigations of the site. The ecological significance and habitat value of the trees has not been assessed and is beyond the scope of this report.

2.4.6 All trees were within the site boundary and are covered by the council's tree management controls.

3.0 ARBORICULTURAL IMPACT ASSESSMENT |

3.1 Tree 1

3.1.1 Tree 1 was identified as *Araucaria heterophylla* (Norfolk Island Pine) and was allocated a Moderate Landscape Significance Value and a Retention Value of *Consider for Retention*.

3.1.2 The tree was in good physiological condition as indicated by the full crown density, normal leaf colour and low volumes of dead wood and epicormic growth.

3.1.3 The supplied plans show the proposed ramp, basement, turfing and paving works are within the SRZ of Tree 1 and represents 84.2% of the total TPZ area. Works within the SRZ represent a *Major Encroachment* as defined by AS-4970 as root severance within the SRZ can lead to the destabilisation of the tree.

3.1.4 The proposed basement will result in the loss of approximately 50% of the structural roots and the tree will need to be removed to accommodate the works.

3.1.5 Refer to Appendix 5 for details.

3.2 Trees 2, 4, 5, 6, 9, 10 & 11

3.2.1 Trees 2, 4, 5, 6, & 10 were identified as *Araucaria heterophylla* (Norfolk Island Pine) and were allocated Moderate Landscape Significance Values and Retention Values of *Consider for Retention*. Trees 9 & 11 were identified as *Banksia integrifolia* (Coastal Banksia) and were allocated Moderate Landscape Significance Values and Retention Values of *Consider for Retention* and *Priority for Removal,* respectively.

3.2.2 The supplied plans show the proposed turf works are within the SRZ of Trees 2, 4, 5, 6, 9, 10 & 11 with existing paving removal within the SRZ of Tree 2. Works within the SRZ represent a *Major Encroachment* as defined by AS-4970 as root severance within the SRZ can lead to the destabilisation of the tree. These works all represented TPZ encroachments greater than 40%, which also represents a *Major Encroachment* as defined by AS-4970. However, Clause 3.3.4 of AS-4970 does allow for major encroachments if design factors (e.g. tree sensitive construction methods) are used to minimise negative impacts from the proposed development.

3.2.3 Given these trees were mostly in good physiological condition, the proposed turf works can be accommodated without affecting the long term structural and physiological viability of the trees if the following tree sensitive construction methods and protection measures are carefully implemented under the supervision of the Project Arborist.

3.2.4 The tree sensitive construction methods and protection measures will require a staged approach to prevent indirect impacts from the demolition and construction processes.

3.2.5 TPZ fencing should be installed prior to any site works and remain in place for the duration of the demolition and construction phases associated with the building works. Strictly no materials, waste storage and temporary services should not be located within the TPZ fenced area.

3.2.6 Refer to Appendices 5, 6 & 7 for details.

3.2.7 On completion of the main demolition and construction works the TPZ fencing can be removed for the turfing and existing paving removal in the TPZ of Tree 2.

3.2.8 Ideally the existing turf should remain in place. However, if removal and replacement is required, then tree sensitive methods should be used for the removal of existing grass within the TPZ areas. The grass should be removed by hand to prevent root damage.

3.2.9 New turf (including sub-soil materials) should be installed above or at the existing grade.

3.2.10 The existing paving in Tree 2's TPZ should be removed by hand and under supervision of the Project Arborist to minimise root disturbance.

3.2.11 If roots (>25mm∅) are encountered during the removal, these roots must be retained undamaged and advice sought from the Project Arborist if root pruning is required.

3.2.12 Roots >25mm∅ should be pruned by the Project Arborist only. Roots <25mm∅ may be pruned by the Principle Contractor. Root pruning should be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears.

3.3 Trees 3, 7 & 8

3.3.1 Trees 3, 7 & 8 were identified as *Banksia integrifolia* (Coastal Banksia) and were allocated Low Landscape Significance Values and Retention Values of *Priority for Removal.*

3.3.2 Trees 3 & 8 were in poor physiological condition as indicated by reduced crown density and localised death of the upper crown. The crown density was estimated to be 50-75% of an idealised example of this species. The localised crown death included small and large diameter branches (<50mm to 100mm∅) and was estimated to represent approximately 20% of the total crown volume.

3.3.3 Tree 7 was a young specimen (<3m height) with poor form due to congested branches.

3.3.4 Refer to Appendix 9 Plates.

3.3.5 The supplied plans show turf works within the TPZ of Trees 3, 7 & 8 as per Trees 2, 4, 5, 6, 9, 10 & 11. However, given the poor physiological condition, the long-term viability of Trees 3 & 8 is highly likely to be compromised by the proposed encroachment and tree removal should be considered. Removal and replacement of Tree 7 should be considered from a small size and structural form perspective.

3.3.6 Removal and replacement with a healthy advanced size specimen would replace the loss of amenity within a short to medium timeframe.

3.3.7 Refer to Appendix 5, 6 & 7 for detail.

3.4 Tree 12

3.4.1 Tree 12 was identified as *Banksia integrifolia* (Coastal Banksia) and was allocated a Moderate Landscape Significance Value and a Retention Value of *Priority for Removal.*

3.4.2 Tree 12 was in poor physiological condition as indicated by reduced crown density and localised death of the upper crown and central leader. The crown density was estimated to be 50-75% of an idealised example of this species. The localised crown death included small and large diameter branches (<50mm to 100mm∅).

3.4.3 The Tree was also allocated a poor structural rating due to a cavity observed in the main trunk and crown. The column of decay associated with the cavity is likely to extend above and below the opening. However, internal investigations on the extent of the decay column were beyond the scope of this Report.

3.4.4 A cavity of this size is unlikely to fully occlude, and the prognosis is for further decay over the medium term. Furthermore, compartmentalisation of the decay cavity is likely to be compromised by the poor tree vigour and as this species is generally regarded to poorly compartmentalise decay (Lonsdale et al. 1999).

3.4.5 The supplied plans show the proposed ramp and turf works are within the SRZ of Tree 12. Works within the SRZ represent a *Major Encroachment* as defined by AS-4970 as root severance within the SRZ can lead to the destabilisation of the tree. The overall TPZ encroachment was estimated to be 72%, which also represents a *Major Encroachment* as defined by AS-4970. Tree 12 is highly likely to be compromised by the proposed encroachment and the tree will need to be removed to accommodate the works.

3.4.6 Given the poor physiological and structural condition, removal and replacement with a healthy advanced size specimen would replace the loss of amenity within a short timeframe.

3.4.7 Refer to Appendices 5 & Plates (e) and (h).

3.5 Trees 13 & 14

3.5.1 Tree 13 was identified as *Banksia integrifolia* (Coastal Banksia) and was allocated a Low Landscape Significance Value and a Retention Value of *Priority for Removal*. Tree 14 was identified as *Lagunaria patersonia* (Norfolk Island Hibiscus) and was allocated a Low Landscape Significance Value and a Retention Value of *Consider for Removal*.

3.5.2 Trees 13 & 14 are within the footprint of the proposed development and will need to be removed. Given their poor physiological condition, structural ratings and short ULE, removal and replacement with a healthy advanced size specimen would replace the loss of amenity within a short timeframe.

3.5.3 Refer to Appendix 5 & Plates (e) and (i).

3.6 **Trees 15, 16, 17 & 18**

3.6.1 Trees 15, 16, 17 & 18 were identified *Araucaria columnaris* (Cook Island Pine), *Lagunaria patersonia* (Norfolk Island Hibiscus), *Banksia integrifolia* (Coastal Banksia) and *Metrosideros excelsa* (New Zealand Christmas Tree) and were allocated High, Low, Moderate and Low Landscape Significance Values and Retention Values of *Priority for Retention, Consider for Removal*, *Consider for Retention* and *Priority for Removal,* respectively.

3.6.2 The supplied plans show that Trees 15, 16, 17 & 18 are within the footprint of the proposed development and will need to be removed.

3.6.3 Trees 15, 16, 17 & 18 are scheduled for removal as part of a separate Development Application (Bondi Pavilion) since the site inspection conducted for the current report (16.03.2020) and are therefore not relevant to the current proposal.

3.6.4 Refer to Appendix 5 & Plate (f & k).

3.7 **Removal and Replacement Planting**

3.7.1 Removal works should be carried out by a practising arborist. The practising arborist should hold a minimum qualification equivalent (using Australian Qualifications Framework) of Level 3 or above in arboriculture or its recognised equivalent. The practising arborist should have a minimum of 3 years of practical experience. Removal works should be undertaken in accordance with the Australian Standard 4373: Pruning of Amenity Trees (2007), Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016) and other applicable legislation and codes.

3.7.2 Replacement tree planting should be provided when trees are removed. Replacement trees should be supplied as advanced size stock to help offset the loss of amenity resultant from the tree removals.

3.7.3 Replacement planting should be supplied in accordance with Australian Standard 2303: Tree Stock for Landscape Use (2015).

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4.0 REFERENCES |

Mattheck & Breloer (2003), *The Body Language of Trees – A Handbook for Failure Analysis*.

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

Standards Australia (2009) Protection of Trees on Development Sites AS4970.

Standards Australia (2007) Pruning of Amenity Trees AS4373.

Standards Australia (2015) Tree Stock for Landscape Use AS2303.

5.0 APPENDIX 1 | METHODOLOGY

5.1 This report was based on data from a site inspection conducted on the 16.03.2020. The recommendations in this report are based on and limited to observations from these site inspections.

5.2 The subject tree(s) was assessed using the Visual Tree Assessment methodology described in *The Body Language of Trees – A Handbook for Failure Analysis* (Mattheck et al., 2003). Subject trees were assessed from the ground only to provide an Arboricultural Impact Assessment and Tree Protection Specification report. No internal diagnostic testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.

5.3 The dimensions of the subject tree(s) are an approximation only.

5.4 The location of the subject tree(s) was determined from the location plan provided. Trees not shown on this plan have been plotted in their approximate location only.

5.5 Tree Protection Zones & Structural Root Zones for the subject tree(s) was based on methods outlined in Australian Standard 4970: *Protection of Trees on Development Sites* (2009).

5.6 The health of the subject tree(s) was determined by assessing:

- Foliage size and colour
- Pest and disease infestation
- Extension growth
- Crown density
- Deadwood size and volume
- Presence of epicormic growth

5.7 The structural condition of the subject tree(s) was assessed by:

- Visible evidence of structural defects or instability
- Evidence of previous pruning or physical damage

5.8 The Useful Life Expectancy (ULE) is used to estimate a tree's longevity in its growing environment. The ULE is based on a tree's species, health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (modified from Barrell, 2001):

- 40 years +
- 15-40 years
- 5-15 years
- Less than 5 years

5.9 The Landscape Significance is based on a qualitative assessment of a tree's cultural, environmental and aesthetic value. This provides a relative measure of a tree's Landscape Significance and can be used to determine its Retention Value. Trees are rated under the following categories:

- Very High
- High
- Moderate
- Low
- Insignificant

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.
	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.

The above table was provided by Anna Hopwood of TreeIQ™ and was modified from the Earthscape Criteria for Assessment of Landscape Significance.

5.10 The Retention Value is based on a tree's ULE and Landscape Significance. The subject tree(s) has been allocated one of the following Retention Values:

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

<table>
<tr><th rowspan="2">ULE</th><th colspan="5">LANDSCAPE SIGNIFICANCE</th></tr>
<tr><th>VERY HIGH</th><th>HIGH</th><th>MODERATE</th><th>LOW</th><th>INSIGNIFICANT</th></tr>
<tr><td>40 years +</td><td rowspan="2">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="3">Consider for Retention</td></tr>
<tr><td>Less than 5 years</td><td>Consider for Removal</td><td colspan="3">Priority for Removal</td></tr>
</table>

The above table was provided by Anna Hopwood of TreeIQ™

5.11 The Tree Protection Zone (TPZ) is the area above and below ground required to preserve the vigour and long-term viability of the tree. The TPZ is based on scientific research and is generally considered by the arboricultural industry as the area required to provide adequate tree protection during construction. The TPZ is the primary means of protecting trees on development sites (Australian Standard 4970: *Protection of Trees on Development Sites*, 2009).

5.12 Works within the TPZ should be avoided. However, *Minor Encroachments,* defined in AS4970 as less than 10% of the TPZ area, are considered acceptable when it is compensated for elsewhere and contiguous within the TPZ. A *Major Encroachment*, defined in AS4970 as greater than 10% of the TPZ area or within the Structural Root Zone (SRZ), may require root investigations by non-destructive methods and tree sensitive construction methods.

5.13 The TPZ is the area within a circle that is centred on the trunk. The radius of the TPZ is calculated by the following formula:

TPZ= DBH x 12

where

DBH= Diameter at Breast Height (1.4m)

5.14 The SRZ is the minimum area around the base of the tree required for the tree's stability. The SRZ only relates to tree stability and not the vigour and long-term viability of the tree.

5.15 The SRZ is the area within a circle that is centred on the trunk. The radius of the SRZ is calculated by the following formula:

$$SRZ = (Dx50)^{0.42} \times 0.64$$

where

D= Trunk diameter (m) above the root buttress

5.16 Encroachment into SRZ (i.e. severance of structural roots >25mmØ) may lead to the destabilisation of the tree and the long-term viability must be demonstrated in such cases. This may require root investigations by non-destructive methods.

5.17 For further details on the TPZ and SRZ please refer to Australian Standard 4970: *Protection of Trees on Development Sites* (2009).

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6.0 APPENDIX 2 | TREE ASSESSMENT SCHEDULE

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH comb. (mm)	Radial TPZ (m)	TPZ Area (m^2)	Radial SRZ (m)	Health Rating	Structural Rating	Age Class	ULE (years)	L/Sign	Retention Value	Comments	TPZ Encroachment (%)
1	*Araucaria heterophylla* (Norfolk Island Pine)	21	5	525	6	125	2.6	Good	Good	Mature	15-40	Moderate	*Consider for Retention*	Raised bed 350mm above grade. Small (<25mmø) epicormic growth in low volumes. Wound(s), no visible sign of decay. Limited crown clearance. Structures within SRZ.	84.2% (Within SRZ)
2	*Araucaria heterophylla* (Norfolk Island Pine)	17	4	400	5	72	2.3	Good	Good	Mature	15-40	Moderate	*Consider for Retention*	Crown density 75-95%. Mechanical damage to exposed surface roots. Structures within SRZ.	73.2% (Within SRZ)
3	*Banksia integrifolia* (Coastal Banksia)	8	5	350	4	55	2.2	Fair	Poor	Late Mature	<5	Low	*Priority for Removal*	Localised crown death. Crown density 50-75%. Small (<25mmø) & medium (25-75mmø) deadwood in high volumes. Flush cuts. Co-dominant inclusions, major. Wound(s), early signs of decay. Trunk cavity(s), minor.	99.2% (Within SRZ)
4	*Araucaria heterophylla* (Norfolk Island Pine)	17	4	400	5	72	2.3	Good	Good	Mature	15-40	Moderate	*Consider for Retention*	Crown density 75-95%. Mechanical damage to exposed surface roots. Structures within SRZ.	76.0% (Within SRZ)
5	*Araucaria heterophylla* (Norfolk Island Pine)	17	4	475	6	102	2.5	Good	Good	Mature	15-40	Moderate	*Consider for Retention*	Crown density 75-95%. Mechanical damage to exposed surface roots. Structures within SRZ.	69.6% (Within SRZ)
6	*Araucaria heterophylla* (Norfolk Island Pine)	17	4	500	6	113	2.6	Good	Good	Mature	15-40	Moderate	*Consider for Retention*	Circular roots.	73.4% (Within SRZ)
7	*Banksia integrifolia* (Coastal Banksia)	3	2	50	2	13	1.5	Good	Fair	Young	5-15	Low	*Consider for Removal*	Poor form. Congested branches.	103.5% (Within SRZ)

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Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH comb. (mm)	Radial TPZ (m)	TPZ Area (m^2)	Radial SRZ (m)	Health Rating	Structural Rating	Age Class	ULE (years)	L/Sign	Retention Value	Comments	TPZ Encroachment (%)
8	*Banksia integrifolia* (Coastal Banksia)	9	5	400	5	72	2.3	Poor	Fair	Late Mature	<5	Moderate	*Priority for Removal*	Localised crown death. Crown density 50-75%. Small (<25mmø) & large (>75mmø) deadwood in high volumes. Wound(s), early signs of decay. Phototrophic lean, moderate.	99.5% (Within SRZ)
9	*Banksia integrifolia* (Coastal Banksia)	12	10	500	6	113	2.6	Poor	Fair	Late Mature	5-15	Moderate	*Consider for Retention*	Asymmetric crown. Crown density 50-75%. Small (<25mmø) & medium (25-75mmø) deadwood in high volumes. Mechanical damage to exposed surface roots. Order branch cavity, major. Limited crown clearance. Storm damage. Phototrophic lean, slight. Chlorotic foliage.	62.8% (Within SRZ)
10	*Araucaria heterophylla* (Norfolk Island Pine)	14	4	325	4	48	2.1	Good	Good	Semi-mature	15-40	Moderate	*Consider for Retention*	Crown conflict with Tree 11. Wound(s), no visible sign of decay.	100.5% (Within SRZ)
11	*Banksia integrifolia* (Coastal Banksia)	12	5	450	5	92	2.5	Poor	Poor	Late Mature	<5	Moderate	*Priority for Removal*	Localised crown death. Crown density 50-75%. Small (<25mmø) & medium (25-75mmø) deadwood in high volumes. Wound(s), early signs of decay. Trunk cavity(s), major. Structures within SRZ. Storm damage. Adaptive growth. Phototrophic lean, moderate.	68.8% (Within SRZ)

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Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH comb. (mm)	Radial TPZ (m)	TPZ Area (m^2)	Radial SRZ (m)	Health Rating	Structural Rating	Age Class	ULE (years)	L/Sign	Retention Value	Comments	TPZ Encroachment (%)
12	*Banksia integrifolia* (Coastal Banksia)	11	5	433	5	85	2.4	Poor	Poor	Late Mature	<5	Moderate	*Priority for Removal*	Localised crown death. Crack. Crown density 50-75%. Small (<25mmø) & medium (25-75mmø) deadwood in high volumes. Wound(s), early signs of decay. Trunk cavity(s), major. Order branch cavity, major. Structures within SRZ. Phototrophic lean, slight.	71.9% (Within SRZ)
13	*Banksia integrifolia* (Coastal Banksia)	6	5	175	2	14	1.7	Poor	Poor	Young	<5	Low	*Priority for Removal*	Crown density 0-25%. Small (<25mmø) & medium (25-75mmø) deadwood in high volumes. Wound(s), advanced stages of decay. Trunk cavity(s), major. Salt lean, severe.	Within Development Footprint
14	*Lagunaria patersonia* (Norfolk Island Hibiscus)	12	5	350	4	55	2.2	Fair	Fair	Mature	5-15	Low	*Consider for Removal*	Crown density 50-75%. Small (<25mmø) deadwood in moderate volumes. Small (<25mmø) epicormic growth in high volumes. Mechanical damage to exposed surface roots. Wound(s), early signs of decay. Order branch cavity, minor.	Within Development Footprint
15	*Araucaria columnaris* (Cook Island Pine)	18	4	600	7	163	2.8	Good	Good	Mature	15-40	High	*Priority for Retention*	Small (<25mmø) deadwood in low volumes. Structures within SRZ.	Within Development Footprint
16	*Lagunaria patersonia* (Norfolk Island Hibiscus)	8	4	200	2	18	1.8	Good	Good	Semi-mature	5-15	Low	*Consider for Removal*	Mechanical damage to exposed surface roots. Wound(s), early signs of decay. Trunk cavity(s), minor.	Within Development Footprint

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Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH comb. (mm)	Radial TPZ (m)	TPZ Area (m^2)	Radial SRZ (m)	Health Rating	Structural Rating	Age Class	ULE (years)	L/Sign	Retention Value	Comments	TPZ Encroachment (%)
17	*Banksia integrifolia* (Coastal Banksia)	12	6	566	7	145	2.7	Poor	Fair	Late Mature	5-15	Moderate	*Consider for Retention*	Localised crown death. Crown density 50-75%. Small (<25mmø) & medium (25-75mmø) deadwood in high volumes. Mechanical damage to exposed surface roots. Wound(s), early signs of decay. Structures within SRZ. Storm damage. Grade alteration, cut. Soil compaction.	Within Development Footprint
18	*Metrosideros excelsa* (New Zealand Christmas Tree)	3	3	90	2	13	1.5	Good	Fair	Mature	<5	Low	*Priority for Removal*	Co-dominant inclusions, minor. Wound(s), no visible sign of decay. Limited crown clearance. Structures within SRZ.	39.8% (Within SRZ)

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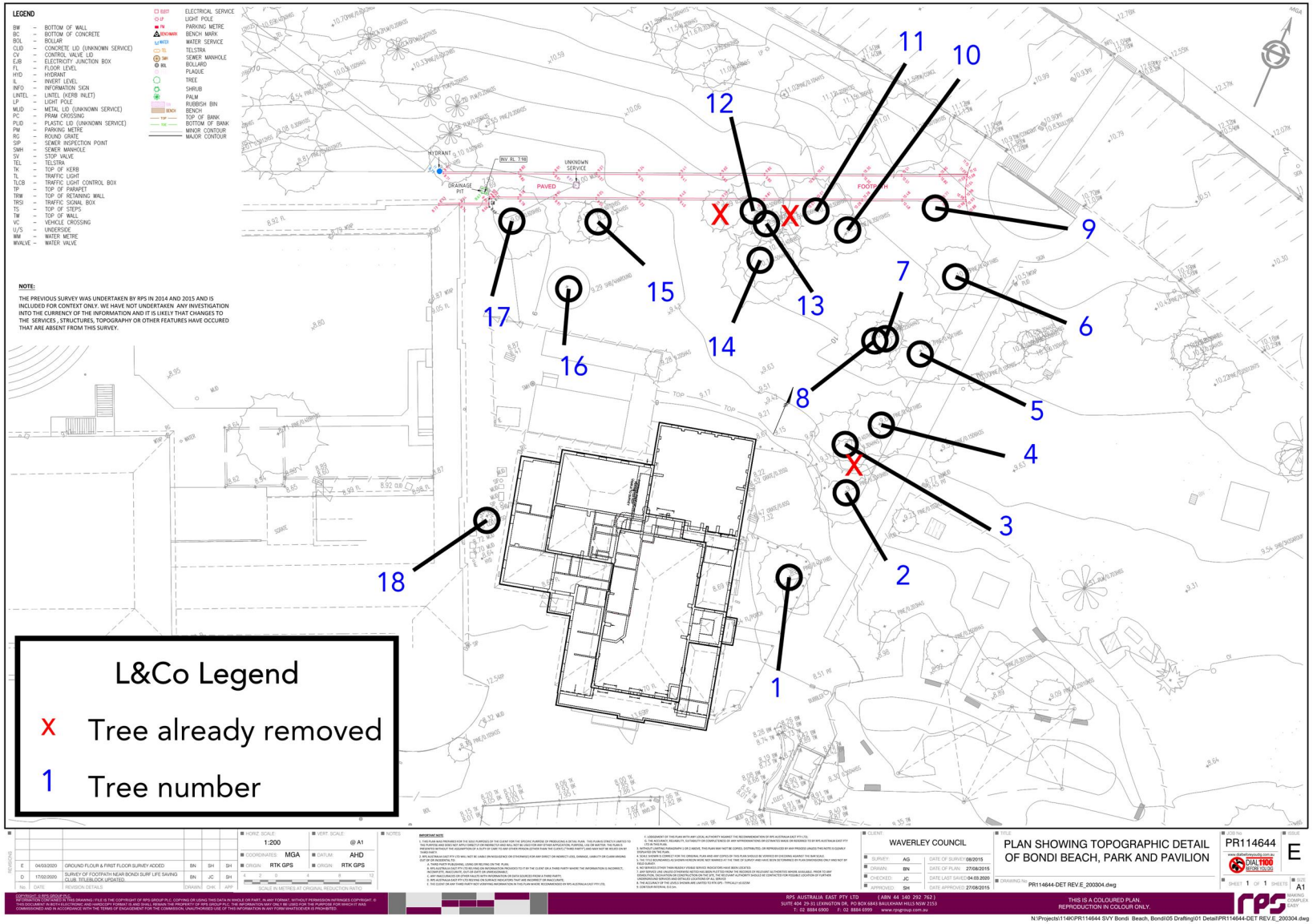
7.0 APPENDIX 3 | TREE LOCATION PLAN



8.0 APPENDIX 4| PROPOSED DEVELOPMENT PLANS

Project:

BONDI SURF BATHERS' LIFESAVING CLUB

Client:

WAVERLEY COUNCIL

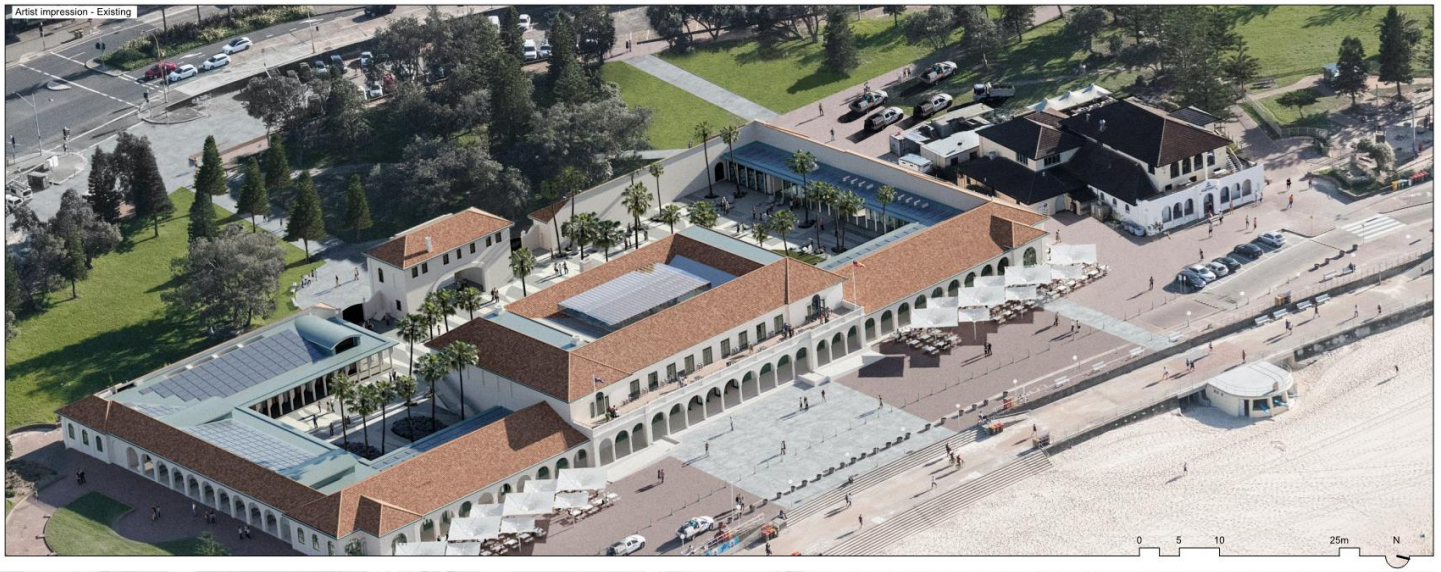
Architect:

Lockhart-Krause Architects

Legend:

CC - Courtyard Canopy
CT - Copper Trim
ER - Existing Render
FL - Flag
GB - Glass Balustrade
GL - Glazing
GP - Green Planter
GR - Green Roof
GU - Gutter
GW - Green Wall
HC - Heritage Conserved
HR - Heritage Reinstated
LA - Lightweight Arches
LI - Link
OP - Open
PE - Plant Equipment
SL - Skylight
SP - Solar Panel
TC - Tiles Cordova
TE - Tree Existing
TG - Tiles Cordova with Glass
TP - Tree Proposed
- Existing
- Proposed
- Parkland

Checked: JLK
Drawn: JL
Issued For: Consultants
Revision: A
Date: 14/04/2021
Scale: 1:500 at A3
Drawing Name: Site Plan, Existing
Drawing No: 04



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Project:

BONDI SURF BATHERS' LIFESAVING CLUB

Client:

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Architect:

Lockhart-Krause Architects

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- Existing
- Proposed
- Parkland

Checked:
JLK

Drawn:
JL

Issued For:
Consultants

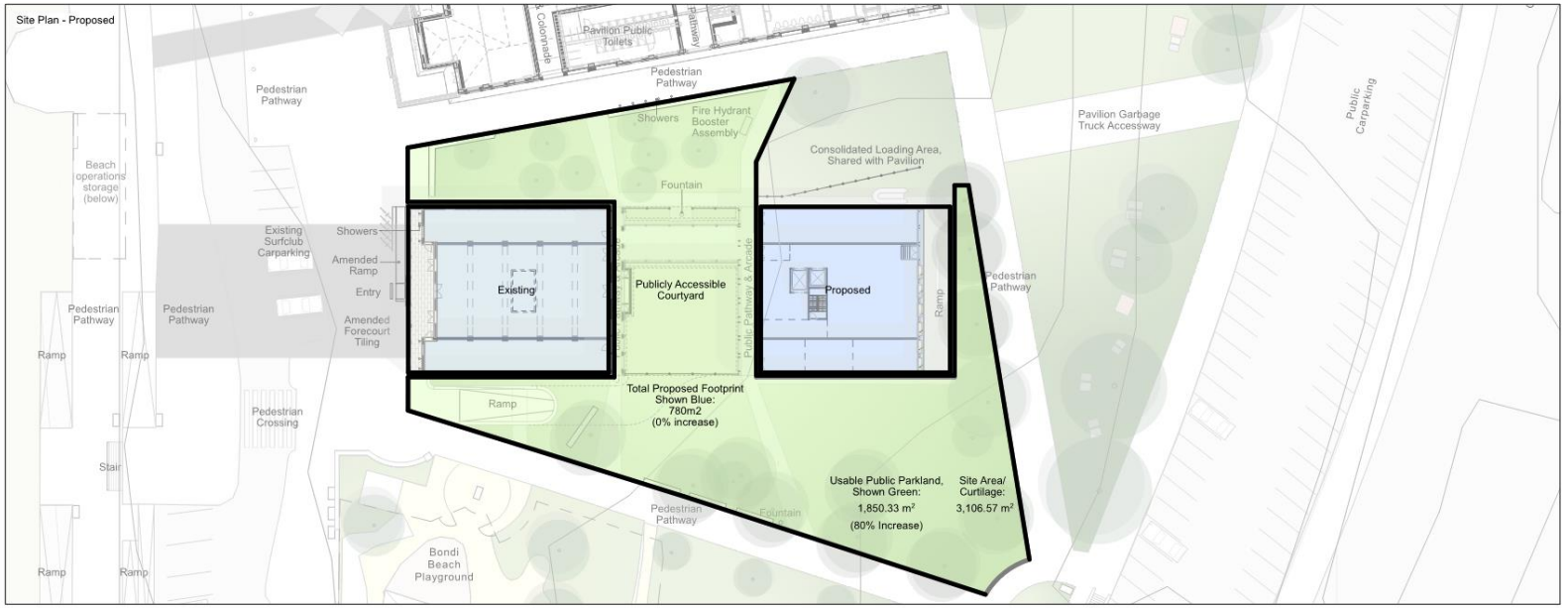
Revision:
A

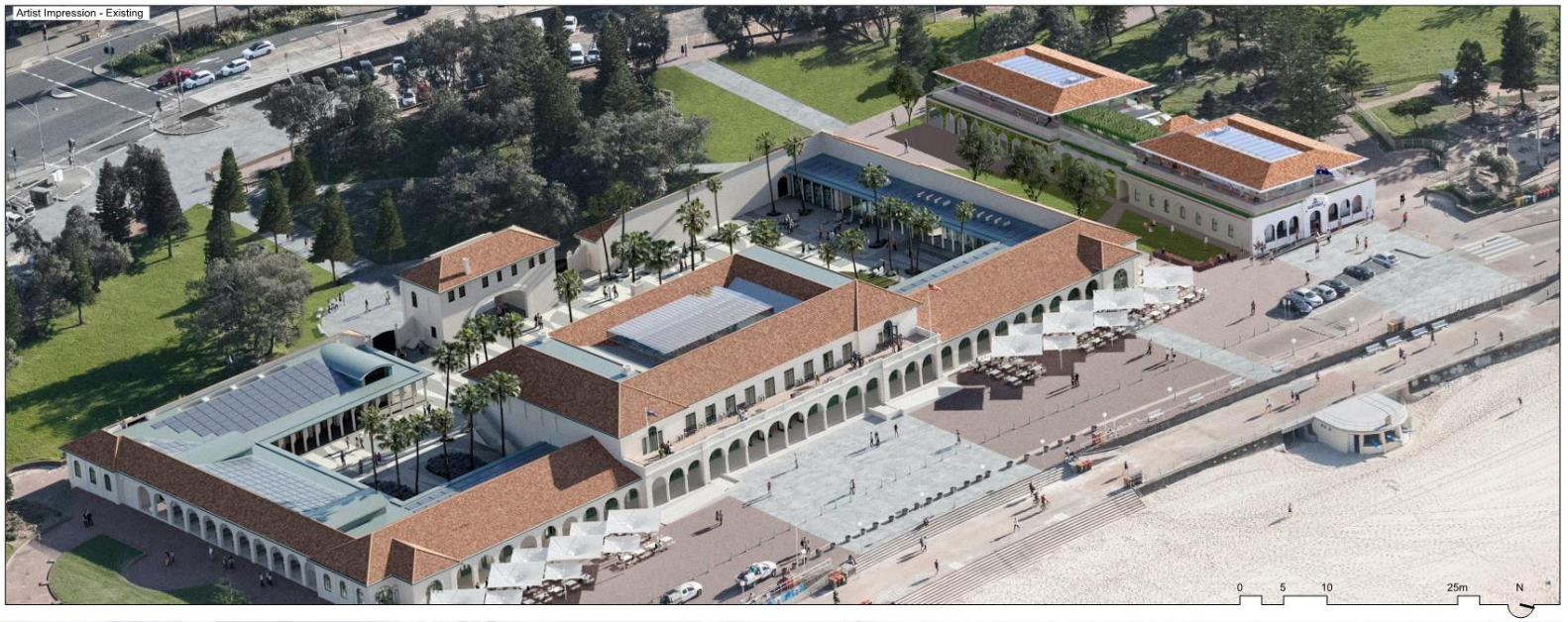
Date:
14/04/2021

Scale:
1:500 at A3

Drawing Name:
Site Plan, Proposed

Drawing No:
05





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Project:

BONDI SURF BATHERS' LIFESAVING CLUB

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Architect:

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Legend:

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TC - Tiles Cordova
TE - Tree Existing
TG - Tiles Cordova with Glass
TP - Tree Proposed
- Existing
- Proposed
- Parkland

Checked:
JLK

Drawn:
JL

Issued For:
Consultants

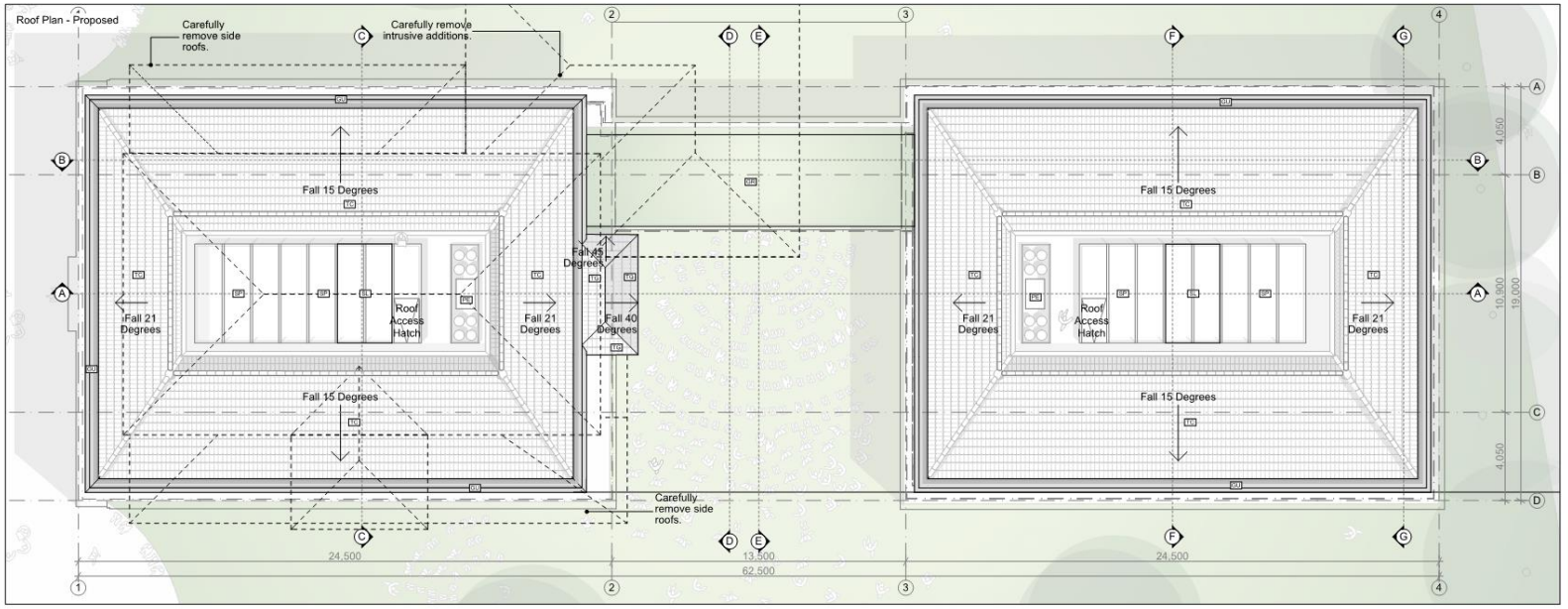
Revision:
A

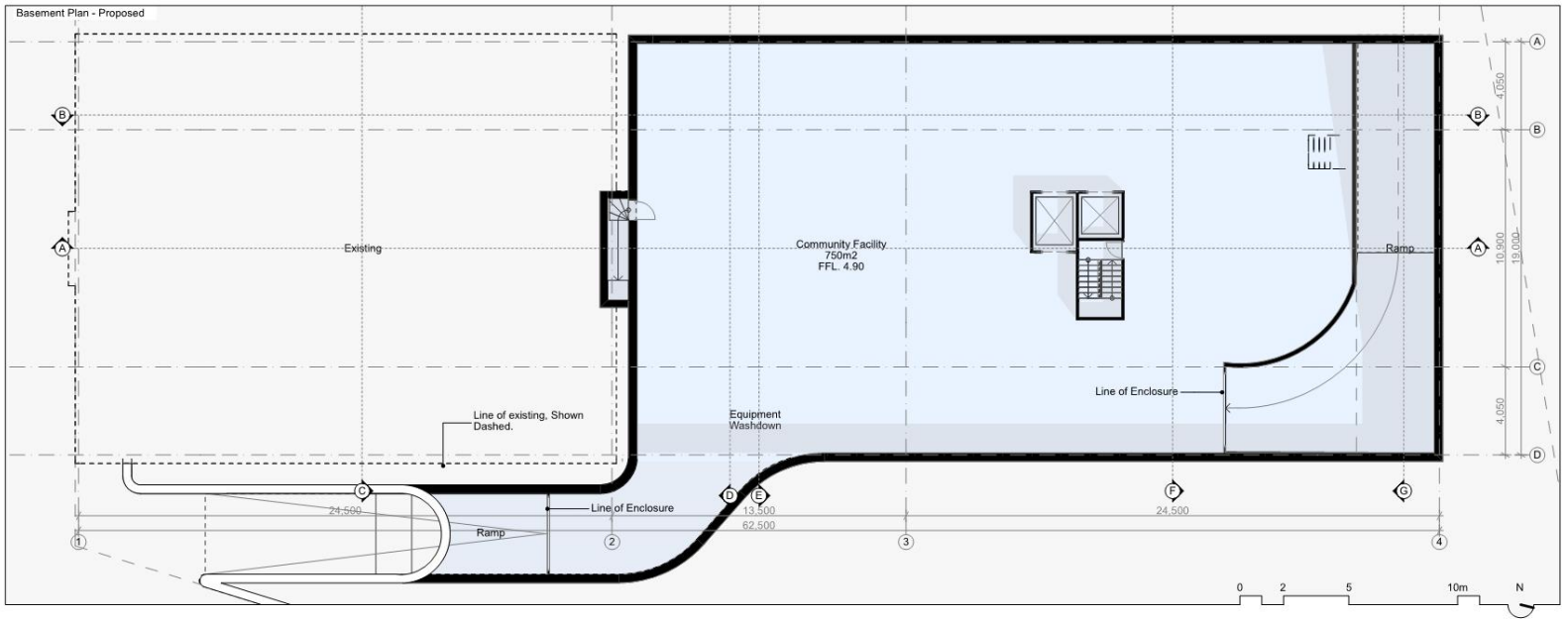
Date:
14/04/2021

Scale:
1:200 at A3

Drawing Name:
Roof & Basement Plan, Proposed

Drawing No:
09





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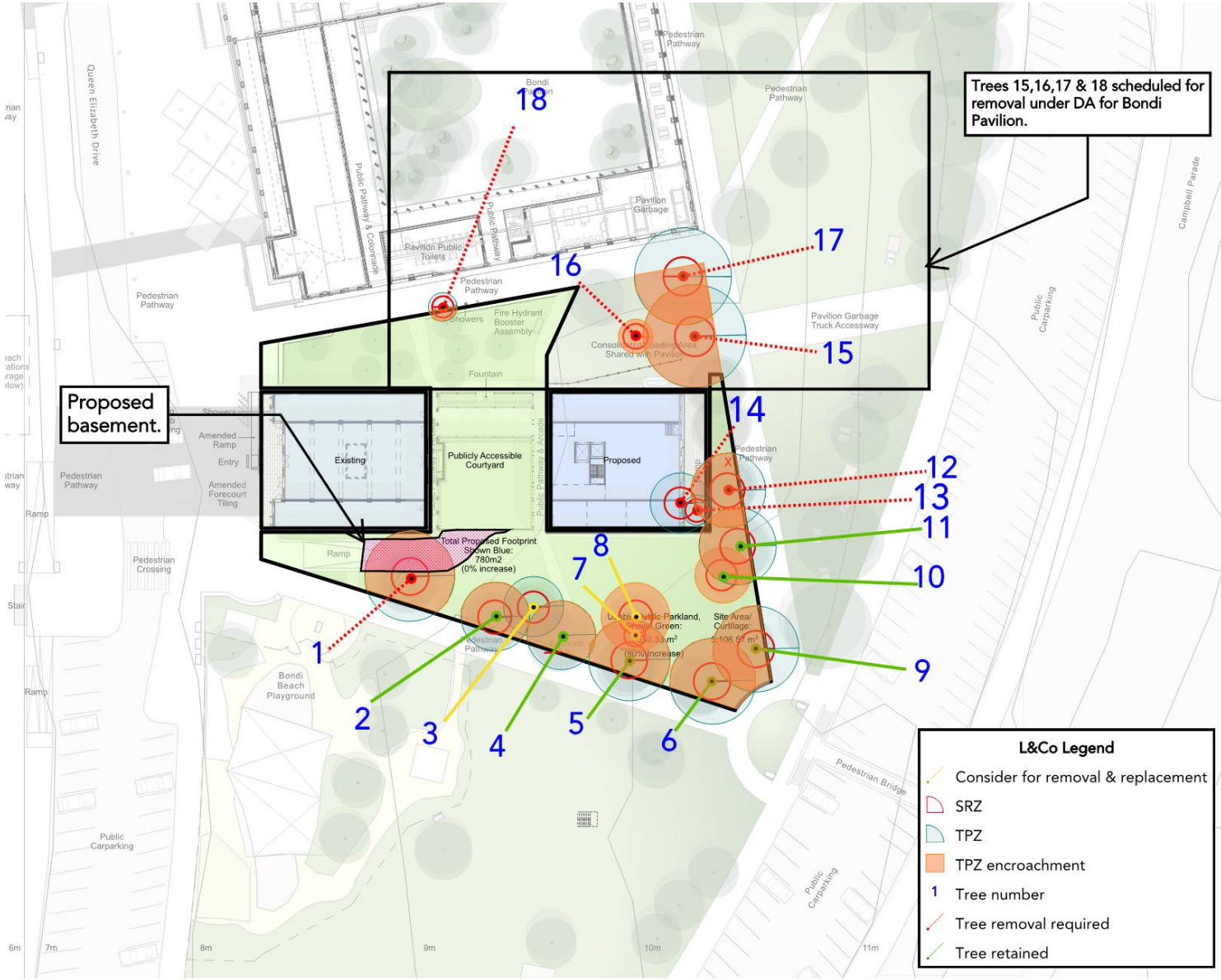
9.0 APPENDIX 5| ARBORICULTURAL IMPACT ASSESSMENT PLAN



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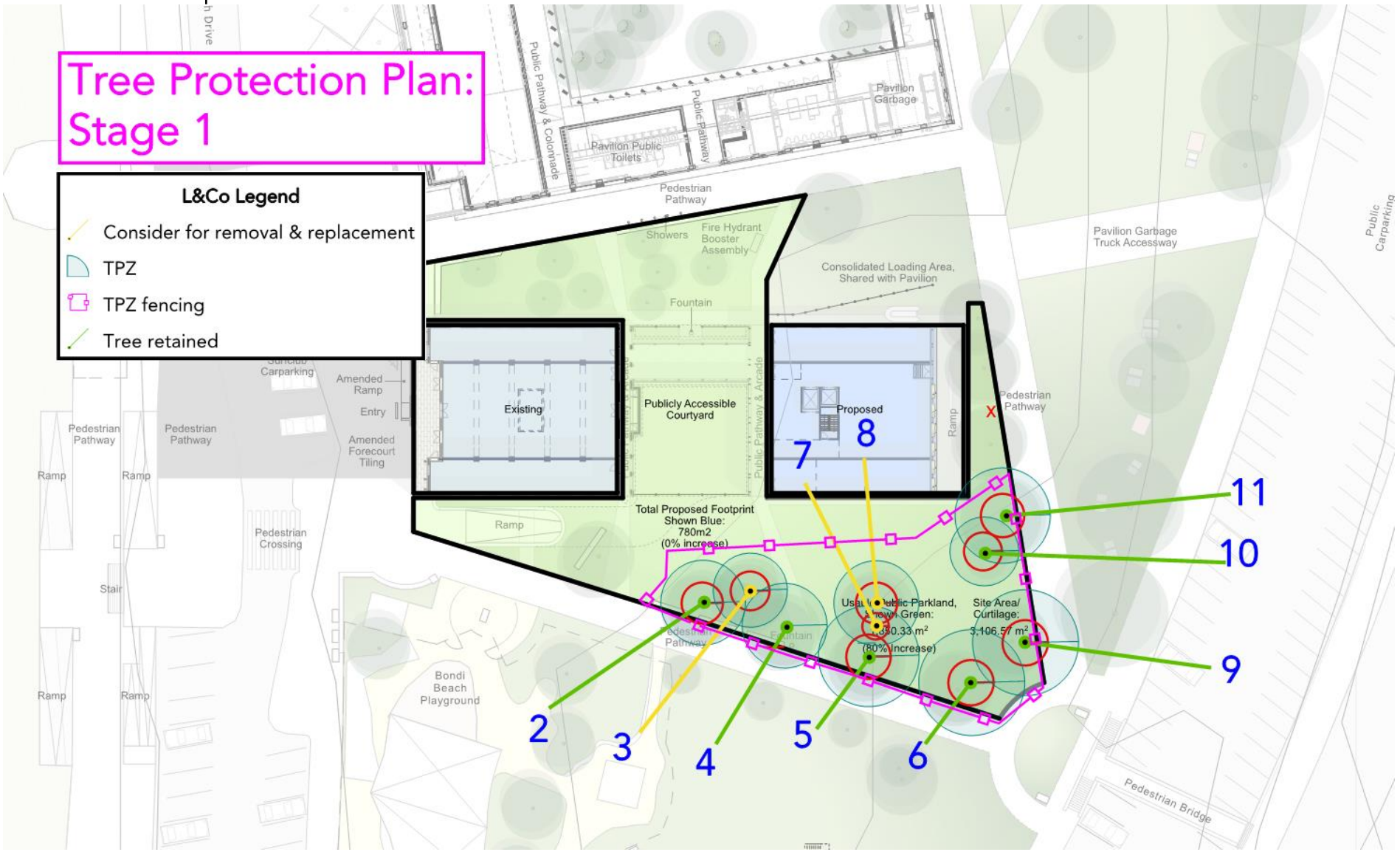
10.0 APPENDIX 6 | TREE PROTECTION PLANS



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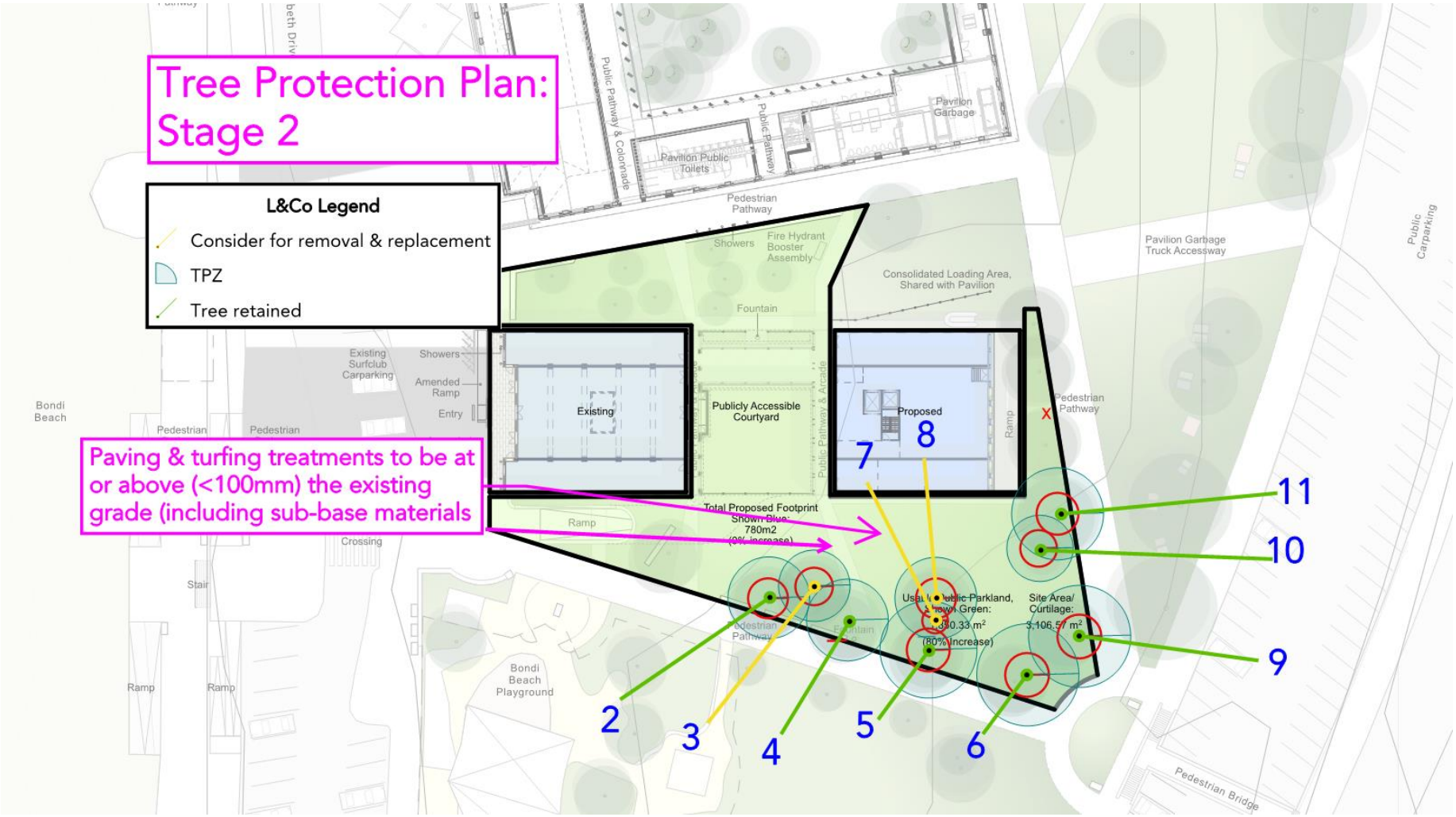
11.0 APPENDIX 7 | TYPICAL TREE PROTECTION DETAIL



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Tree Protection Detail - TPZ Fencing

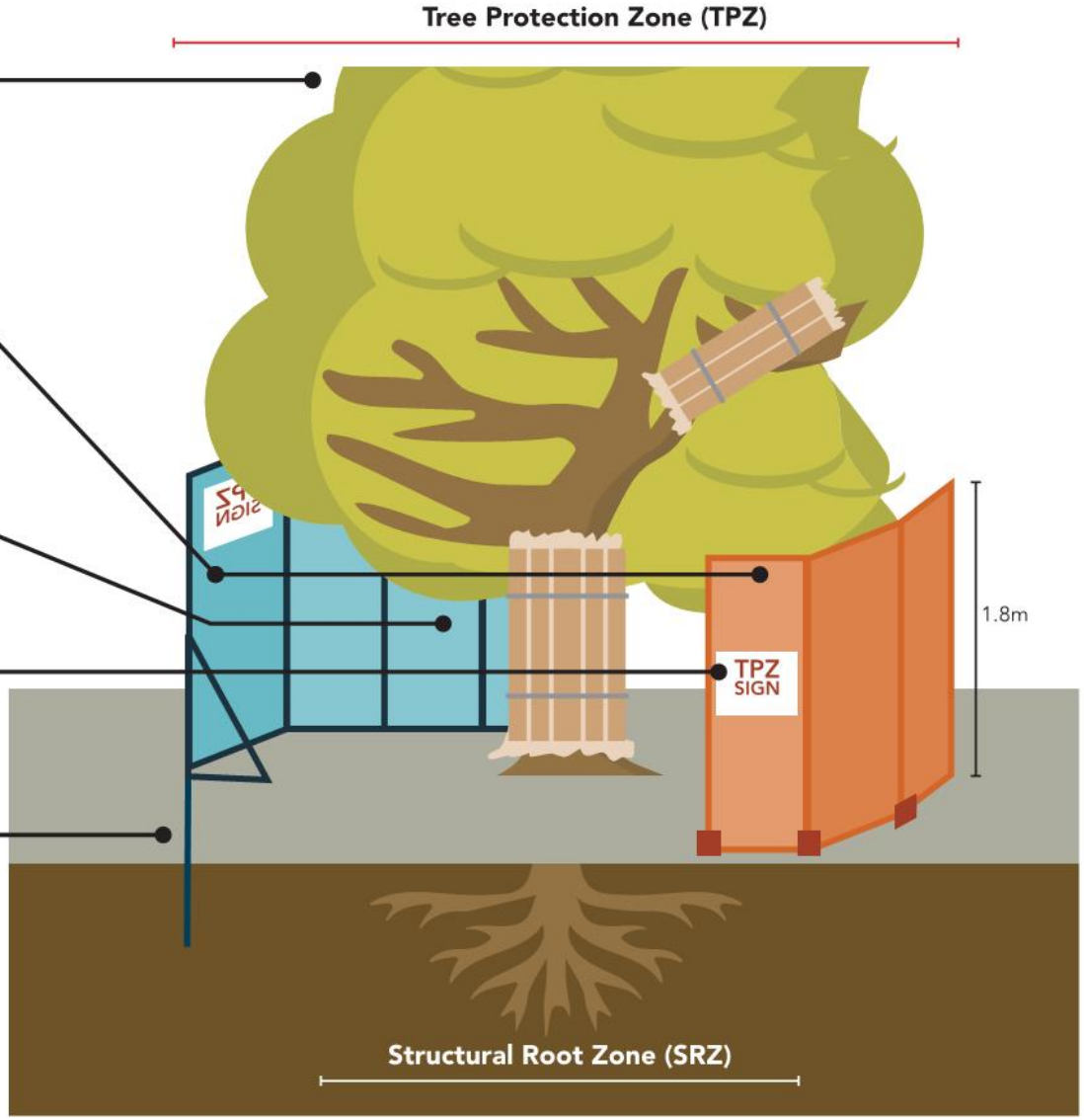
TPZ
No excavation, construction, storage of building materials, grade changes within the TPZ.
Bracing is permitted but must not damage roots.

TPZ FENCING
Paling, plywood or chain wire fencing panels 1.8m. Fence panels on concrete feet located at or above existing grade. Wire fence panels can be covered with shade cloth if required.

LOWER BRANCHES
Damage to lower branches must be avoided during the installation of the TPZ fencing.

TPZ SIGN
TPZ signage fixed to multiple locations and detailing the contact details of the Project Arborist or Council Tree Officer.

BRACING
Bracing is permitted within the TPZ area but must be placed around structural roots (>25mm diameter).



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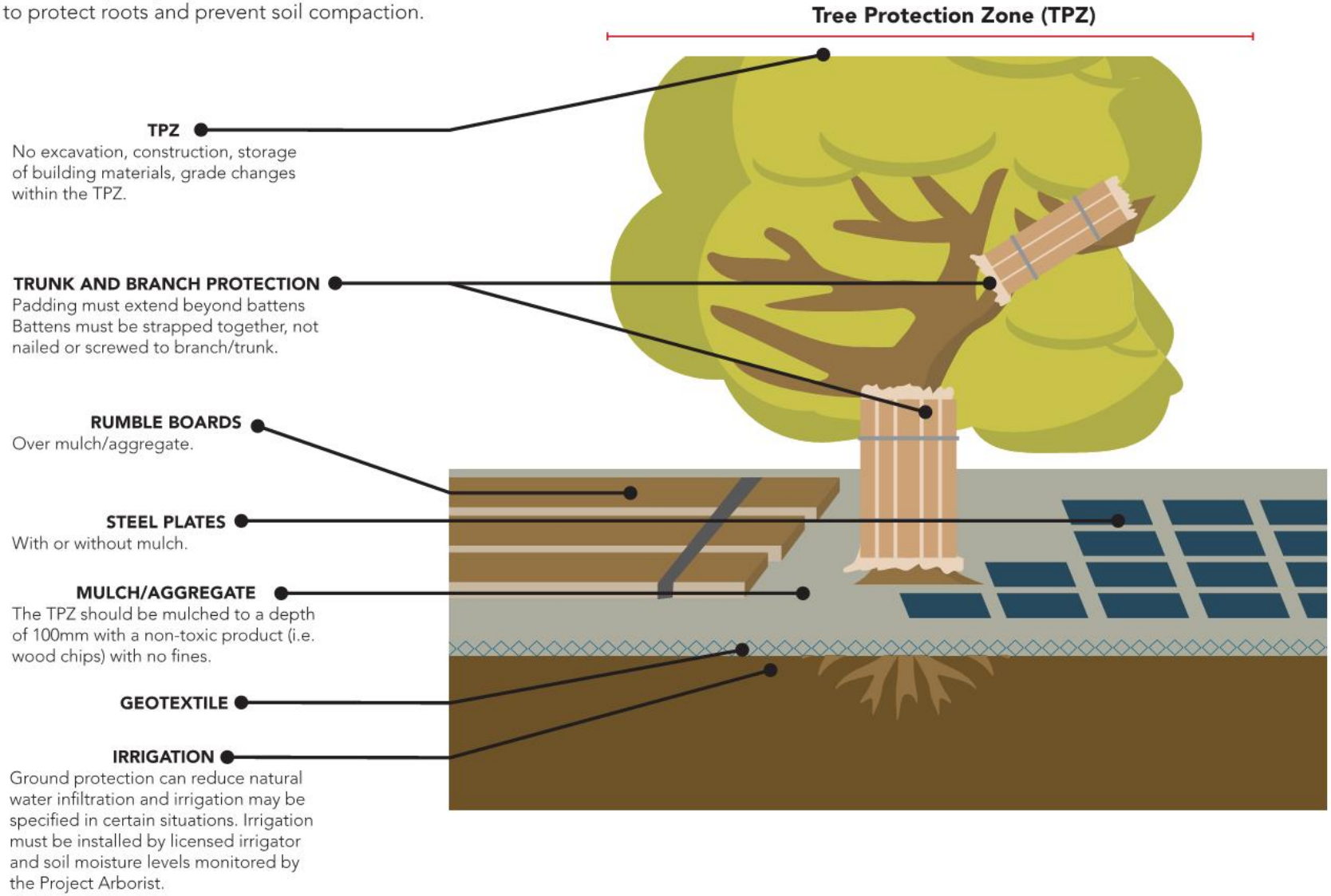
Tree Protection Detail - Ground Protection

Required if temporary access for machinery is required within the TPZ to protect roots and prevent soil compaction.



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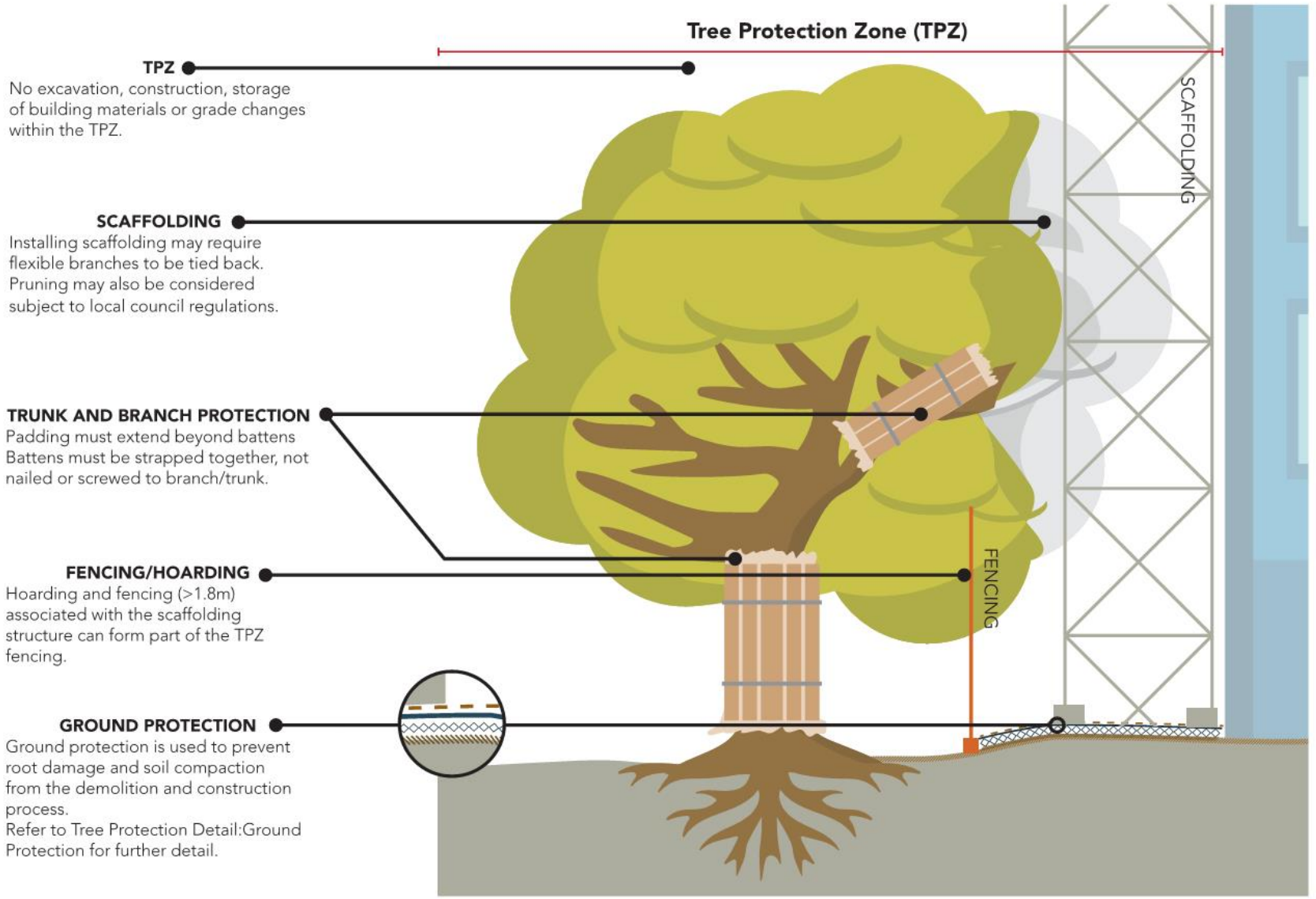
Tree Protection Detail - Scaffolding within TPZ



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12.0 APPENDIX 8 | TREE PROTECTION SPECIFICATION

12.1 Appointment of Project Arborist

Prior to commencement of works a Project Arborist should be engaged to monitor compliance with the protection measures. The Project Arborist will inspect tree protection measures and prepare a compliance certification for the principal certifying authority prior to the release of compliance certification. Contractors and site workers are to receive these specifications at least 3 days prior to commencing works. Contractors and site workers working within the TPZ should sign the site log confirming they have read and understood these specifications prior to commencing works.

12.2 Compliance

The Project Arborist will conduct regular site visits to certify the works are compliant with this specification. A compliance document will be prepared by the Project Arborist following each site inspection. The compliance document will include evidence of compliance with the tree protection measures detailed in this specification.

12.3 Tree & Vegetation Removal

Tree and vegetation removal will be undertaken prior to installation of tree protection measures. Tree removal works should be undertaken in accordance with the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work* (2016).

Tree and vegetation removal must not damage trees to be retained.

12.4 Tree Protection Zone

Trees that are to be retained must be protected prior to and during construction from works that could negatively impact their health and structural integrity. The following works should not occur within the TPZ unless authorised by the Project Arborist:

- Modification of existing soil levels, excavations and trenching
- Mechanical removal of vegetation
- Movement of naturally occurring rock
- Storage of materials, plant/equipment and building of sheds
- No signage or hoarding shall be fixed to the trees
- Preparation of building materials, refuelling or disposal of waste materials and chemicals
- No lighting of fires
- No pedestrian or vehicular traffic
- Temporary or permanent location of services, or works required for their installation
- Any other activities that may damage the tree

12.6 Tree Protection Fencing

The TPZ fencing must be positioned at the perimeter of the TPZ and may be combined to form a single area where the TPZs of multiple trees overlap. The approximate location of the TPZ fencing is outlined in the Arboricultural Impact Assessment with the exact location determined by consultation between the Principle 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. The TPZ fencing must be at least 1.8m above grade and made of wire mesh panels that are supported by concrete feet and fastened together to prevent sideways movement. Tree damage, including any low branches, must be avoided during the installation of the tree protection fencing. The TPZ fencing must include signage to identify the TPZ fencing and include the Project Arborist contact details.

12.7 Site Management

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

12.8 Works within the Tree Protection Zones

In certain situations, works within the TPZ may be authorised by the determining authority. These works must be supervised by the Project Arborist. When working within the TPZ, special care should be taken to avoid damage to the tree's root system, trunks and lower branches.

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

12.9 Ground Protection

The movement of machinery should be restricted to existing paved areas or in areas with temporary ground protection (i.e. steel road plates, ground mats) when deemed necessary by the Project Arborist.

Ground protection should be installed as per AS4970 and Appendix 7- *Typical Tree Protection Detail*.

If irrigation is considered necessary, it should be installed first and by a licensed irrigator under the supervision of the Project Arborist with no trenching.

The irrigation should be covered with a layer of geotextile and mulched to a depth of 100mm with a non-toxic product (i.e. woodchips) with no fines.

Once the irrigation, geotextile and mulch are in place then the ground protection boards (steel plates or rumble boards) can in be installed.

Boards should remain in place for the entire build.

12.10 Trunk & Branch Protection

If trunk protection is required it should be installed by wrapping the trunk and first order branching with padding (i.e. carpet underlay or 10mm thick geotextile) to a minimum height of 2m. Timber battens (90 x 45mm), spaced at 150mm centres should be strapped together and placed over the padding (Refer to AS4970 for further details).

Branch protection should be installed when considered necessary by the Project Arborist.

Branches should be wrapped with padding (i.e. Ableflex) to provide protection. Where possible, branches should be tied back and construction works to take place around branches (with appropriate branch protection installed as required). If pruning is unavoidable it should be in accordance with AS4373 and supervised by the Project Arborist.

12.11 Structure & Pavement Demolition

The Project Arborist should supervise the demolition of existing structures/pavement within the TPZ. Machinery is to be excluded from the TPZ unless operating from existing slabs, pavements or areas of ground protection. Machinery should not contact the tree's roots, trunks, branches and crown.

Existing pavement should be hand lifted to minimise disturbance to the existing sub-base and to prevent damage to tree roots. Wherever possible, the existing sub-base material should remain in situ.

When removing slab sections within the TPZ, machinery must work from the tree outwards to ensure the machinery always remains on the un-demolished section of slab. Wherever possible, footings or elements below grade should be retained to minimise disturbance to the tree's roots. Structures must be shattered with hand-operated pneumatic/electric breaker before removal when considered necessary by the Project Arborist.

If roots (>25mm∅) are encountered during excavation, demolition and construction works these roots must be retained undamaged and advice sought from the Project Arborist. Exposed roots must be protected from direct sunlight, drying out and extremes of temperature by using 10mm thick jute geotextile fabric. This fabric should be kept moist at all times.
Where the Project Arborist determines that the tree is using underground elements (i.e. footings, pipes, rocks etc.) for support, these elements should be left *in situ*.

12.12 Pavement/Kerb Installation

Installation of pavements and sub-base within the TPZ must be supervised by the Project Arborist. New surfaces and sub-base materials should be placed above grade to minimise excavations and retain roots (unless prior root mapping has determined that there are no roots within the area of construction).
If roots (>25mm∅) are encountered during the installation of the new sub-base and surfaces these roots must be retained undamaged and advice sought from the Project Arborist. The design and final levels must remain flexible to enable the retention of roots >25mm∅ where deemed necessary by the Project Arborist.
Compaction of the ground prior to the installation of fill is not permitted.
New sub-base material should be a 20mm no-fines road base (i.e. Benedict Sand & Gravel-Product Code 20NF/RB or similar). Recycled concrete aggregates should not be used to avoid raising soil pH levels.
If required, bedding sand should be washed river sand (no crushed paving blends). The bedding sand should be consolidated with a pedestrian operated plate compactor only. If possible, pavement material should be permeable.
Kerbs within the TPZ should be modified to bridge roots (>25mm∅) unless root pruning is approved and undertaken by the Project Arborist.

12.13 Underground Services

The installation of underground services should be located outside of the TPZ. Where this is not possible they should be installed around or below roots (>25mm∅) using either hydrovac or hand excavation and supervised by the Project Arborist.
Boring methods may be used for the installation of services 800mm below grade. Excavations for starting and receiving pits for the boring equipment should be located outside of the TPZ or located to avoid roots (>25mm∅, or determined by the Project Arborist).

12.14 Excavations, Root Protection & Root Pruning

Excavations and root pruning within the TPZ must be supervised by the Project Arborist and should be avoided where possible.
No over-excavation, battering, or benching should be undertaken beyond the footprint of any structure unless approved by the Project Arborist. Hand excavation and root pruning along the excavation line should be completed prior to the commencement of mechanical excavation to prevent tearing and shattering damage to the roots.
Roots >25mm∅ should be pruned by the Project Arborist only. Roots <25mm∅ may be pruned by the Principle Contractor. Root pruning should be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears.
Damaged roots should be pruned behind the damaged tissues with the final cut made to the undamaged part of the root.

13.0 APPENDIX 9 | PLATES

a) Showing current building at site and Tree 1. b) Showing Tree 1 and raised bed. c) Showing Trees 2, 4 & 5. d) Showing Trees 2, 4, 5. 6, 7 & 8 e) Showing Trees 11, 12 & 14. f) Showing Trees 15 & 16.

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g-i) Showing Trees displaying poor physiological health and poor form that will need to be removed to accommodate the proposed works. (k) Showing trees 15, 16 & 17. Showing Tree 18. According to Lockhart-Krause Architects, Trees 15, 16, 17 & 18 have been removed as part of a separate Development Application since the site inspection conducted for the current report (16.03.2020)

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14.0 APPENDIX 10 | LIMITATIONS & DISCLAIMERS

14.1 Subject trees were assessed from the ground only and for providing an Arboricultural Impact Assessment and Tree Protection Specification.

14.2 All recommendations in this Arboricultural Impact Assessment and Tree Protection Specification report are based on the observations made on the day of inspection (16.03.2020). There is no warranty, expressed or implied, that problems or deficiencies relating to the subject trees, or the subject site may not arise in the future.

14.3 Laurence & Co Consultancy takes care to obtain information from reliable sources. However, Laurence & Co Consultancy can neither guarantee nor be responsible for the accuracy of information provided by others. Plans, diagrams, graphs and photographs in this Arboricultural Impact Assessment and Tree Protection Specification 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.

14.4 This report has been prepared for exclusive use by the client. This report should not be viewed by others or for any other reason outside its intended target or without the prior written consent of Laurence & Co Consultancy. Unauthorised alteration or separate use of any section of the report invalidates the report.

14.5 Many factors may contribute to tree failure and cannot always be predicted. Laurence & Co Consultancy 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.

14.6 Limitation of Liability. Laurence & Co Consultancy shall be liable only for direct damages that result from negligence or wilful misconduct in the performance of its services. Under no circumstances shall Laurence & Co Consultancy be liable for indirect, consequential, special, or punitive damages, or for damages caused by the client's failure to perform its obligations under law or contract. Laurence & Co Consultancy shall not be liable for and Client shall indemnify Laurence & Co Consultancy from and against all claims, demands, liabilities and costs (including attorneys' and expert fees) arising out of or in any way related to our performance or non-performance of services, including all on-site activities except to the extent caused by Laurence & Co Consultancy's negligence or wilful misconduct. In no event shall Laurence & Co Consultancy's liability exceed the amount paid to Laurence & Co Consultancy by the Client for our professional services (net of reimbursable expenses) and Client specifically releases Laurence & Co Consultancy for any damages, claims, liabilities and costs in excess of that amount.

14.7 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.

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