

Blackwattle Bay
State Significant Precinct

Attachment 31:

Urban Forestry Strategy

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URBAN FORESTRY STRATEGY

Blackwattle Bay State Significant Precinct Study

Prepared for: INFRASTRUCTURE NSW

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Executive Summary

This Urban Forestry Strategy was prepared for Infrastructure NSW to form part of the Blackwattle Bay State Significant Precinct Study. This Study seeks a rezoning and new planning controls for the Blackwattle Bay Precinct. The purpose of this Urban Forestry Strategy is to address the State Significant Precinct Study Requirements 2017 (Section 15 Urban Forest).

The rezoning proposal is based on the Blackwattle Bay Precinct Plan which provides a conceptual layout to guide the development of planning controls for the precinct. The Precinct Plan provides overarching guidance about how the area should be developed based on community and stakeholder input, local character and place, current and future demographics, economic and social trends, cultural and environmental considerations, and urban renewal aspirations and needs regarding land use, community recreation, transportation, housing, and jobs.

The existing trees at the Blackwattle Bay Precinct include a mix of locally indigenous, Australian native and exotic species. None of the trees are listed in the *City of Sydney Register of Significant Trees 2013*. However, two (2) trees have been allocated a Retention Value of *Priority for Retention*, and ideally, these trees should be retained and protected.

The Urban Forestry Strategy demonstrates that new tree plantings can achieve the specific targets set in The State Significant Precinct Study Requirements 2017 (Section 15 Urban Forest) by providing:

- minimum canopy cover of 60% to streets, 30% to parks and 30% to private property
- minimum distribution of tree heights of 10% small trees, 45% medium trees, 35% large trees and 10% extra-large trees
- Indicative soil volumes and depths based on the *Apartment Design Guide (2015)*
- Street tree spacings based on the *City of Sydney Street Tree Masterplan Part D (2015)*

Future designs should be based on this framework and demonstrate capacity to meet the urban forestry targets.

Contents

1.0	INTRODUCTION	5
1.1	Background	5
1.2	Study Area	5
1.3	The Proposal	7
1.4	Study Requirements	7
2.0	PRELIMINARY ARBORICULTURAL REPORT	9
2.1	The Trees	9
2.2	Existing Tree Assessment	10
2.3	Development Works	12
3.0	ARBORICULTURAL IMPACT ASSESSMENT	13
3.1	Proposed Tree Removal	13
3.2	Proposed Tree Retention	13
4.0	TREE PLANTING MASTERPLAN	14
4.1	Canopy Cover	14
4.2	Tree Sizes	16
4.3	Street Tree Spacings	16
4.4	Soil Volumes & Depths	17
4.5	Urban Forest Capacity	17
4.6	Species Selection & Diversity	19
4.7	Stock Selection & Procurement	21
5.0	CONCLUSIONS	21
6.0	LIMITATIONS & DISCLAIMER	23
7.0	BIBLIOGRAPHY & REFERENCES	24
8.0	APPENDICES	25
	Appendix 1: Methodology	26
	Appendix 2: Tree Location Plan	28
	Appendix 3: Tree Assessment Schedule	29
	Appendix 4: Brief CV – Anna Hopwood	41

List of Figures

Figure 1: Final Precinct Plan	pg 6
Figure 2: Urban Forestry Strategy Plan	pg 15
Figure 3: Green Roof Plan	pg 16
Figure 4: Street Sections 1 & 2	pg 18

List of Tables

Table 1: SSP Response	pg 8
Table 2: Exempt Species	pg 9
Table 3: Tree Removal	pg 13
Table 4: Indicative Canopy Cover	pg 14
Table 5: Indicative Tree Sizes	pg 16
Table 6: Urban Forest Capacity	pg 17
Table 7: Potential Species for Study Area	pg 20
Table 8: Potential Species for Promenade	pg 20
Table 9: Growth Rates	pg 21

List of Charts

Chart 1: Retention Values	pg 10
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1.0 INTRODUCTION

1.1 Background

1.1.1 This Urban Forestry Strategy was prepared for Infrastructure NSW to form part of the Blackwattle Bay State Significant Precinct Study (SSP Study). The SSP Study seeks a rezoning and new planning controls for the Blackwattle Bay Precinct, located on the south-western side of Pyrmont. The purpose of this Strategy is to address the State Significant Precinct Study Requirements 2017 (Section 15 Urban Forest) and comprises of three (3) sections:

- Preliminary Arboricultural Report
- Arboricultural Impact Assessment
- Tree Planting Masterplan

1.1.2 In 2015 the NSW Government recognised The Bays Precinct as one of the highest potential urban transformation sites in Australia with the release of The Bays Precinct, Sydney Transformation Plan. Following this, the Minister for Planning identified the renewal of Blackwattle Bay and the broader Bays Precinct as a matter of State planning significance and to be investigated for rezoning through the State Significant Precinct (SSP) process. The outcome of the Blackwattle Bay SSP process will be a new planning framework that will enable further development applications for the renewal of the Precinct, connected to the harbour and centred around a rejuvenated SFM. The framework will also provide for new public open spaces including a continuous waterfront promenade, community facilities, and other compatible uses.

1.1.3 In preparing this Urban Forestry Strategy, the authors have considered the objectives of the following:

- *State Significant Precinct Study Requirements 2017 (Section 15 Urban Forest)*
- *Sydney Local Environmental Plan (2012)*
- *City of Sydney Urban Forest Strategy (2013)*
- *City of Sydney Street Tree Masterplan (2011)*
- *City of Sydney Register of Significant Trees (2013)*
- *City of Sydney Tree Guidelines for Pruning, Reporting and Using an Arborist (2020)*
- *Australian Standard 4970 Protection of Trees on Development Sites (2009)*
- *Australian Standard 4373 Pruning of Amenity Trees (2007)*
- *Australian Standard 2303 Tree Stock for Landscape Use (2015)*
- *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)*

1.2 Study Area

1.2.1 The Blackwattle Bay SSP Investigation Area ('Study Area') encompasses the land and water area, known as Blackwattle Bay, between Bank Street and the Glebe foreshore as shown in Figure 1. The land is located within the City of Sydney Local Government Area (LGA).

1.2.2 The land within the Study Area is approximately 10.4 hectares in size. It is largely government-owned land containing the existing Sydney Fish Markets (SFM), recreation and boating operations and facilities. There are three (3) privately-owned sites including a concrete batching plant operated by Hymix, seafood wholesaler Poulos Brothers and private developer Celestino which owns further wholesaling facilities. The Blackwattle Bay land area wraps around the southern and eastern edges of Blackwattle Bay and is bounded by Bridge Road to the south and Bank Street to the east. The Western Distributor Motorway/Anzac Bridge Viaduct is located adjacent to the eastern boundary before traversing over the northern section of the site. The water area of Blackwattle Bay is approximately 21 hectares.

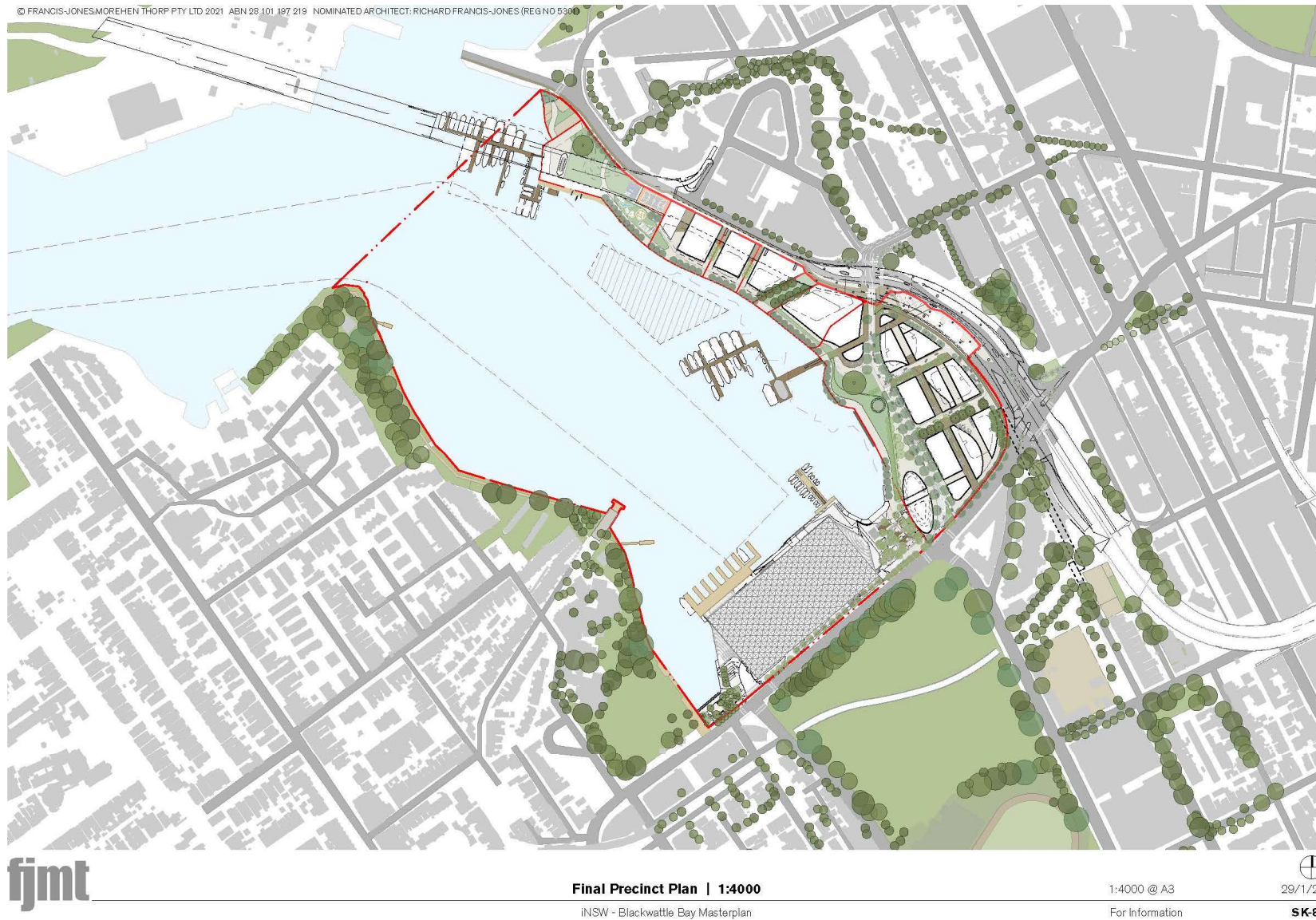


Figure 1: Final Precinct Plan

1.3 The Proposal

1.3.1 The SSP Study is proposing to rezone Blackwattle Bay with a new planning framework and planning controls to enable its future urban renewal. The rezoning proposal is based on the Blackwattle Bay Precinct Plan ('Precinct Plan') which provides a conceptual layout to guide the development of planning controls for the precinct. The Precinct Plan provides overarching guidance about how the area should be developed based on community and stakeholder input, local character and place, current and future demographics, economic and social trends, cultural and environmental considerations, and urban renewal aspirations and needs regarding land use, community recreation, transportation, housing, and jobs.

1.3.2 Key characteristics of the Precinct Plan include:

- New homes, jobs and services close to the CBD including:
 - 5,636 jobs / or approximately 5,600 jobs
 - 2,795 residents /or approximately 2,800 residents
 - 1546 dwellings
- A continuous waterfront promenade – the missing link in an otherwise 15km foreshore walk from Woolloomooloo to Rozelle
- New active transport connections to bring the neighbourhood closer to the harbour through new and improved pedestrian and cycling links
- Improved public transport options and minimised vehicle usage strategies including:
 - Minimising car parking spaces with limited on-street parking
 - Ferry wharf
 - Opportunity for buses to service through site link
 - Connections to the existing light rail
 - Access to a future Sydney Metro West Station in Pyrmont
- New parks and green space with 30,000 m² of new open space
- New SFM at the heart of Blackwattle Bay

1.3.3 Once the Study Area is rezoned and the new planning controls are in place, future development will need to seek development approval through the relevant approval pathway. This will include detailed development proposals and further associated environmental, social and economic assessments.

1.4 Study Requirements

1.4.1 The SSP Study responds to the Study Requirements issued for Blackwattle Bay (formerly Bays Market District) by the Department of Planning and Environment in April 2017. Table 1 outlines how the criteria of the SSP Study Requirements (Section 15 Urban Forest) have been addressed within the Urban Forestry Strategy.

Table 1: SSP Response

SSP Study Requirements	Urban Forestry Strategy
This study requires a Project Arborist qualified in arboriculture to Australian Qualifications Framework (AQF) level 5 or above and have at least 5 years demonstrated experience in managing trees within complex development sites	Brief CV (Appendix 5)
Provide a preliminary arboricultural report that identifies tree location, condition, quality, life expectancy and indicative Tree Protection Zones to enable the urban design to minimise impacts to trees.	2.1 The Trees 2.2 Tree Assessment 2.3 Development Works Tree Location Plan (Appendix 2) Tree Assessment Schedule (Appendix 3)
Undertake an arboricultural impact assessment for the proposal outlining trees to be removed or retained and the possible impacts on the trees to be retained including allowing for future construction methodology.	3.1 Tree Removal 3.2 Tree Retention Tree Location Plan (Appendix 2)
<p>The plan for the retention of existing and provision of new trees is to consider:</p> <ul style="list-style-type: none"> ▪ The capacity of the public domain and urban design approach to protect existing trees and allow for the growth of new trees ▪ Species selection that maximises solar access during winter within new streets and private domain ▪ Species selection that complements existing park planting themes in Wentworth Park and Glebe foreshore parks ▪ The provision of sufficient soil volumes and quality (including within the private domain) provide for long term tree health ▪ Canopy design concepts that consider expanded verges and central verges (through setbacks, reduced carriageway or widened reservation) to increase planting, incorporation of landmark large-scale trees in key locations and street gardens and low plantings to improve streetscape amenity ▪ Coordinate outcomes of the Public Domain Design, Urban Design, Utilities (ensure overground utilities are undergrounded), Wind (ensuring that trees are not expected to be the wind mitigation device) and transport parts of this study 	3.2 Tree Retention 4.1 Canopy Cover 4.2 Tree Sizes 4.3 Street Tree Spacings 4.4 Soil Volumes & Depths 4.5 Urban Forest Capacity 4.6 Species Selection & Diversity 4.7 Stock Selection & Procurement Urban Forest Strategy Plan (Figure 2) Sections 1 & 2 (Figure 4)
<p>Provide an indicative tree and planting strategy across the site, accounting for biodiversity and habitat considerations that includes:</p> <ul style="list-style-type: none"> ▪ a tree sensitive public domain and that protects existing trees, and allows for the growth of new trees ▪ species selection that maximises solar access during winter, within new streets and private domain ▪ species selection that complements existing park planting themes in Wentworth Park and Glebe foreshore parks and is tolerant to the foreshore site conditions ▪ sufficient soil volumes and quality are provided for long term tree health 	3.2 Tree Retention 4.1 Canopy Cover 4.2 Tree Sizes 4.3 Street Tree Spacings 4.4 Soil Volumes & Depths 4.5 Urban Forest Capacity 4.6 Species Selection & Diversity 4.7 Stock Selection & Procurement Urban Forest Strategy Plan (Figure 2) Sections 1 & 2 (Figure 4)
Demonstrate that all relevant Council policies, strategies and master plans are considered including SLEP 2012, SDCP 2012, Urban Forest Strategy, Tree Management Policy, Street Tree Master Plan, Urban Ecology Strategic Action Plan and the Landscape Code.	Whole document

2.0 PRELIMINARY ARBORICULTURAL REPORT

2.1 The Trees

2.1.1 A Visual Tree Assessment (VTA) was undertaken on trees growing within the Study Area to determine their health and structural condition based on the methodology provided in Appendix 1. A total of sixty (60) trees and groups of trees were assessed as shown in the Tree Location Plan attached as Appendix 2. The ecological value and heritage significance of the trees has not been assessed and is beyond the scope of this Report.

2.1.2 The trees include a mix of locally indigenous, Australian native and exotic species. The trees listed in Table 2 are not covered by the tree management controls within Section 3.5 Urban Ecology of the *Sydney Development Control Plan (2012)* due to their weed status. Tree 69 is dead.

Table 2: Exempt Trees

Tree Number	Species/Condition
10, 13, 14, 17, 25, 40, 80 & 82	<i>Celtis sinensis</i> (Chinese Nettle Tree)
18	<i>Cinnamomum camphora</i> (Camphor Laurel)
78	<i>Cotoneaster</i> sp. (Cotoneaster)
7	<i>Syagrus romanzoffianum</i> (Cocos Palm)
69	Dead

2.1.3 None of the trees within the Study Area are listed in the *City of Sydney Register of Significant Trees 2013* based their historical, cultural, social, ecological or outstanding visual and aesthetic appeal.¹

2.1.4 A search of the BioNet Atlas of NSW Wildlife Database was undertaken in August 2017. No individual threatened tree species listed within this database for the locality were identified during the field investigations of the site.² In addition, an ecological assessment was conducted by Ecological in September 2017 and determined that no threatened flora species or endangered ecological communities exist within the site.³

2.1.5 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. Retention Value categories are based on a combination of Landscape Significance and Useful Life Expectancy (ULE). The assessment of Landscape Significance and ULE involves a degree of subjectivity and there will be a range of tree quality and value within each of the four Retention Value categories. The Retention Values do not consider the 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

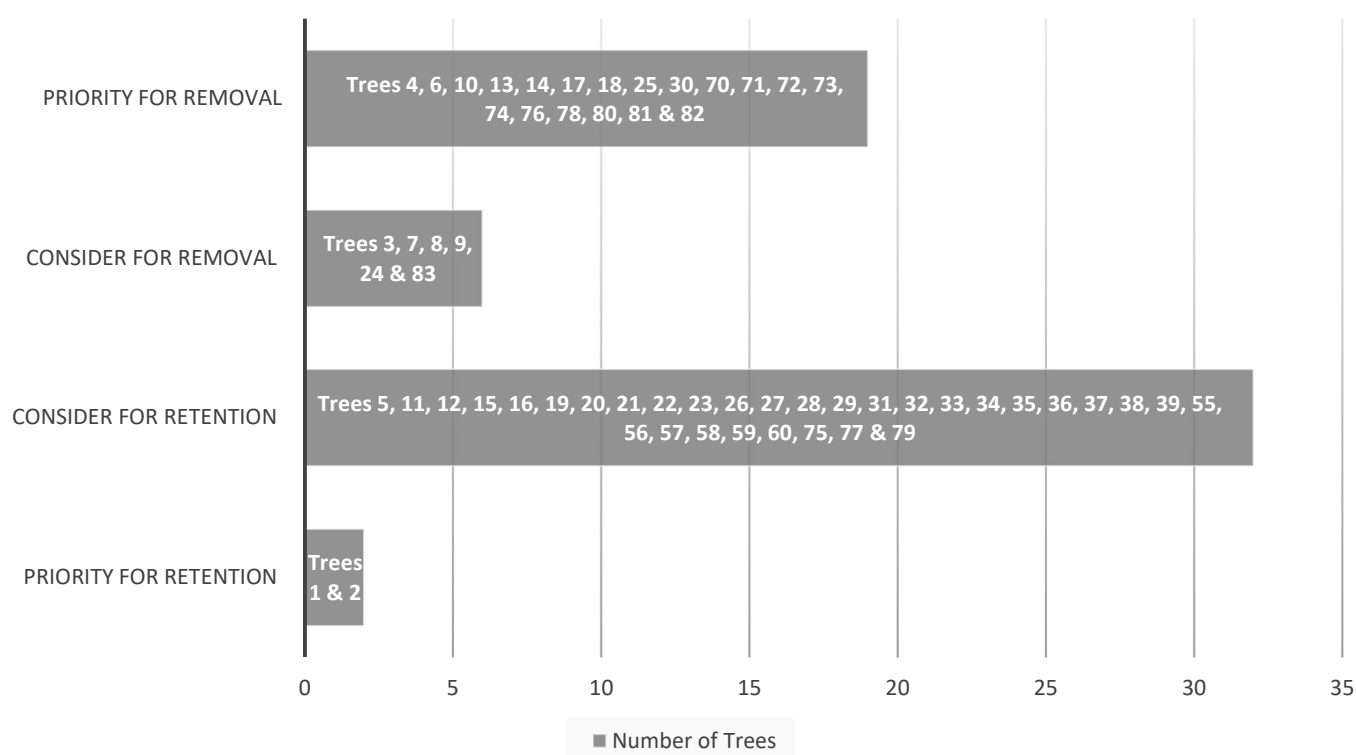
¹ City of Sydney (2013)

² NSW Office of Environment and Heritage (2011)

³ Ecological (2017)

2.1.6 In general, the trees within the Study Area are of low to moderate value with 54% of the population being allocated a Retention Value of *Consider for Retention*. Trees with a Retention Value of *Priority for Removal* represent the second largest percentage at 32%. These trees have a Useful Life Expectancy (ULE) of less than 5 years and should be removed regardless of future development works. Trees with a Retention Value of *Consider for Removal* represent 10% of the population and are generally of low Landscape Significance with a short (5-15) ULE. The removal of these trees would provide space for the planting of better-quality specimens which should provide a positive contribution to the Study Area in the medium to long term. Trees with a Retention Value of *Priority for Retention* represent the lowest percentage of trees within the Study Area at 3%. Ideally, these trees should be accommodated within future development works. The Retention Value of the existing trees are identified in Chart 1.

Chart 1: Retention Values



2.2 Existing Tree Assessment

2.2.1 Trees 1 & 2

Trees 1 and 2 were identified as *Ficus microcarpa* var. *hilli* (Hills Weeping Fig) and are located to the north of the Study Area, near the entrance to Pyrmont Bridge. The trees were allocated a high Landscape Significance and Retention Value of *Priority for Retention*. Trees 1 and 2 are the best quality trees assessed and should be retained and protected as part of the future development of the Study Area.

2.2.2 Tree 3

Tree 3 has been identified as *Lophostemon confertus* (Brush Box) and is located to the north of the Study Area, near the entrance to Pyrmont Bridge. This tree was allocated a low Landscape Significance and Retention Value of *Consider for Removal*. Tree 3 should not be considered a constraint to the future development of the Study Area, and its removal should have a low visual impact due to its small size.

2.2.3 Trees 4-11

Trees 4-11 are a mix of species located at the northern end of the Study Area, near the eastern pylon of the Anzac Bridge. The trees have been allocated a low to moderate Landscape Significance and Retention Values of *Consider for Retention*, *Consider for Removal* and *Priority for Removal*. Trees 4-11 should not be considered a constraint to the future development of the Study Area, and their removal should have a low visual impact due to their relatively small size and location.

2.2.4 Trees 12-22

Trees 12-22 are a mix of species located at the north end of the Study Area, near the Poulos Bros property on Bank Street. The trees have been allocated a low to moderate Landscape Significance and Retention Values of *Consider for Retention*, *Consider for Removal* and *Priority for Removal*. Trees 13-22 should not be considered a constraint to the future development of the Study Area, and their removal should have a low visual impact due to their relatively small size and location.

2.2.5 Tree 12, *Ficus rubiginosa* (Port Jackson Fig), growing on top of the existing seawall, is the best quality specimen within this group of trees and should be retained if possible. However, the potential long-term impacts of the tree's root system on the seawall would need to be considered.

2.2.6 Tree Group 23

Tree Group 23 is a group of six (6) *Phoenix canariensis* (Canary Island Date Palm) located near the Poulos Bros property on Bank Street. This group of trees has been allocated a moderate Landscape Significance and Retention Value of *Consider for Retention*. In general, palm species including *Phoenix canariensis* (Canary Island Date Palm) transplant easily. However, the environmental benefits (e.g. shade and capture of rainfall and pollutants) of palm trees can be limited due to their relatively small crown size.

2.2.7 *Phoenix canariensis* (Canary Island Date Palm) provide an attractive habitat for vermin. This group of trees should not be considered a constraint to the future development of the Study Area, and their removal should have a low visual impact due to their small size.

2.2.8 Tree Group 24

Tree 24 is a group of two (2) *Syzygium luehmannii* (Small Leaf Lillypilly) located near the Poulos Bros property on Bank Street. This group of trees has been allocated a low Landscape Significance and Retention Value of *Consider for Removal*. These trees should not be considered a constraint to the future development of the Study Area, and their removal should have a low visual impact due to their small size and location.

2.2.9 Trees 25, 40, 61, 80 & 82

Trees 25, 40, 61, 80 and 82 have been identified as *Celtis sinensis* (Chinese Nettle Tree) and are self-seeded specimens. These trees have been allocated a low Landscape Significance and Retention Value of *Priority for Removal*. *Celtis sinensis* (Chinese Nettle Tree) are considered environmental weed species and are not covered by the City of Sydney's tree management controls. Therefore, Trees 25, 40, 61, 80 and 82 should be removed and replaced as part of the future development of the Study Area.

2.2.10 Trees 26-39

Trees 26-39 have been identified as *Ficus microcarpa* var. *hilli* (Hills Weeping Fig) and are located along an internal access road to the east of the existing SFM. From street level, the trees have moderate Landscape Significance only. However, as the trees are highly visible from Anzac Bridge they have been allocated a high Landscape Significance. The trees have a number of significant structural defects (e.g. branch inclusions, wounds with decay and asymmetric root plates) and the root systems of many of the trees have caused significant damage to adjacent kerbs and pavements. Trees 26-29 and 31-39 have been allocated a Retention Value of *Consider for Retention*, and Tree 30 has been allocated a Retention Value of *Priority for Removal*. Tree 30 is recommended for removal due to its poor overall condition.

- 2.2.11 An area of decayed tissue and included bark is present between co-dominant branches at the base of Tree 32. Internal diagnostic testing (Resistograph or Tomograph) should be undertaken to establish the extent of internal decay and determine the significance of this structural defect.

2.2.12 Trees 55-60

Trees 55-60 are a group of six (6) *Phoenix canariensis* (Canary Island Date Palm) located in small masonry planters within the outdoor dining area at the existing SFM. This group of trees has been allocated a moderate Landscape Significance and Retention Value of *Consider for Retention*.

- 2.2.13 As discussed in Section 2.2.6-2.2.7, the environmental benefits of palm trees can be limited and this group of trees should not be considered a constraint to the future development of the Study Area.

2.2.14 Trees 69-74

Trees 69-74 have been identified as *Eucalyptus* spp. (Eucalypt species) and are located within the Hymix site on Bank Street. These trees are poor quality specimens in fair health as indicated by their reduced crown densities of 50-75%. The hard surfaces which cover their entire root zone areas are likely to be a major contributing factor in the trees' decline. These trees have been allocated a moderate Landscape Significance and Retention Value of *Priority for Removal*. Trees 70-74 should be removed and replaced as part of future development of the Study Area. Tree 69 is dead.

2.2.15 Trees 75-79, 81 & 83

Trees 75-79, 81 and 83 are a group of trees located at the north end of the Study Area, near the entrance to Pyrmont Bridge. The trees have been allocated a low to moderate Landscape Significance and Retention Values of *Consider for Retention*, *Consider for Removal* and *Priority for Removal*. Trees 75-79, 81 and 83 should not be considered a constraint to the future development of the Study Area, and their removal should have a low visual impact due to their location.

2.3 Development Works

- 2.3.1 *Australian Standard 4970 (2009) Protection of Trees on Development Sites* describes the best practices for the planning and protection of trees on developments. The procedures described are based on plant biology and current best practices as covered in recently published literature.
- 2.3.2 *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 Diameter at Breast Height (DBH). For palms, other monocots, cycads and tree ferns, the TPZ should not be less than 1m outside the crown projection. 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.

- 2.3.3 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 the tree's stability in the ground. This zone considers a tree's structural stability only, not the root zone required for its vigor 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.
- 2.3.4 The TPZ and SRZ of the trees is outlined within the Tree Assessment Schedule provided as Appendix 3. Ideally, works should be avoided within the 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 construction methods.
- 2.3.5 AS-4970 outlines that the TPZ may need to be modified (extended) to provide additional protection to the above ground parts of the tree. 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.

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Proposed Tree Removal

- 3.1.1 The supplied plans show that forty-eight (48) trees are proposed for removal as shown in Table 3. This includes twenty-three (23) trees with a Retention Value of *Consider for Retention*, six (6) trees with a Retention Value of *Consider for Removal* and nineteen (19) trees with a Retention Value of *Priority for Removal*.

Table 3: Tree Removal

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
	5, 11, 12, 15, 16, 19, 20, 21, 22, 23, 26, 29, 31, 32, 33, 38, 39, 55, 56, 57, 58, 59 & 60	3, 7, 8, 9, 24 & 83	4, 6, 10, 13, 14, 17, 18, 25, 30, 70, 71, 72, 73, 74, 76, 78, 80, 81 & 82

- 3.1.2 It should be noted that the proposed tree removals are based on the current level of design at the master planning stage and will continue to be refined.

3.2 Proposed Tree Retention

- 3.2.1 The supplied plans show that eleven (11) trees can be potentially retained. These are Trees 1, 2, 27, 28, 34-37, 75, 77 and 79.

3.2.2 Trees 1, 2, 75, 77 & 79

Trees 1 and 2 were identified as *Ficus microcarpa* var. 'hilli' (Hills Weeping Fig) and appear to be located outside of the site boundaries. However, their TPZ areas extend into the Study area. Trees 75, 77 and 79 were identified as *Eucalyptus saligna* (Sydney Blue Gum) and are located at the north end of the Study Area. Future development works should maintain existing ground levels within TPZ areas and tree sensitive design and construction methods used to minimise adverse impacts.

3.2.3 Trees 27-28 and 34-37

Trees 27-28 and 34-37 were identified as *Ficus microcarpa* var. 'hilli' (Hills Weeping Fig). The footings of the existing SFM buildings may have restricted root development beneath the buildings and the existing SFM footprints may not need to be included within TPZ setbacks. However, existing inground structures within the SRZ areas should be retained in-situ.

3.2.4 It should be noted that the retention of these trees may be complex and will require the creation of large garden areas to accommodate the exposed surface roots and minimise potential 'targets' beneath the crowns of the trees in the event of branch or tree failure. In addition, the potential for altered wind impacts resulting from the construction of new buildings will need to be considered.

3.2.5 If retained, the design of new buildings will need to accommodate the crowns of the trees and major pruning works should be avoided. However, minor pruning works up to 10% (approx.) of a tree's total crown volume may be achievable depending on the tree's crown structure and overall tree condition. Pruning works should comply with *Australian Standard 4373 (2007) Pruning of Amenity Trees (AS-4373)*.

3.2.6 A detailed Arboricultural Impact Assessment should be prepared for all subsequent Development Applications where works are proposed within the TPZ areas of trees to be retained. The Arboricultural Impact Assessment should examine the potential impact of any proposed works on the trees and recommend tree sensitive methods and tree protection measures as required.

4.0 TREE PLANTING MASTERPLAN

4.1 Canopy Cover

4.1.1 Canopy cover is a measure of the physical coverage of the combined tree canopy over the land. It represents a way of expressing, as a percentage, how much of any given area is shaded by trees.⁴ Table 4 and Figure 2 show the indicative canopy cover targets for the Study Area of 60% to streets, 30% to parks and 30% to private property based on the *City of Sydney Urban Forest Strategy (2013)* and as outlined within the *Study Requirements (2017)*.

Table 4: Indicative Canopy Cover

Location	Canopy Cover Targets
Indicative Street	60%
Indicative Laneway	60%
Indicative Laneway over Basement	60%
Indicative Promenade	45%
Indicative Bank Street Park	30%
Indicative Promenade + Open Space	30%
Miller Street Reserve	30%

4.1.2 Figure 3 indicates opportunities for green roofs. Where possible, green roofs should be encouraged, balanced with other competing sustainability and operational objectives such as solar PV.

⁴ City of Melbourne (2013)

Figure 2: Urban Forestry Strategy Plan

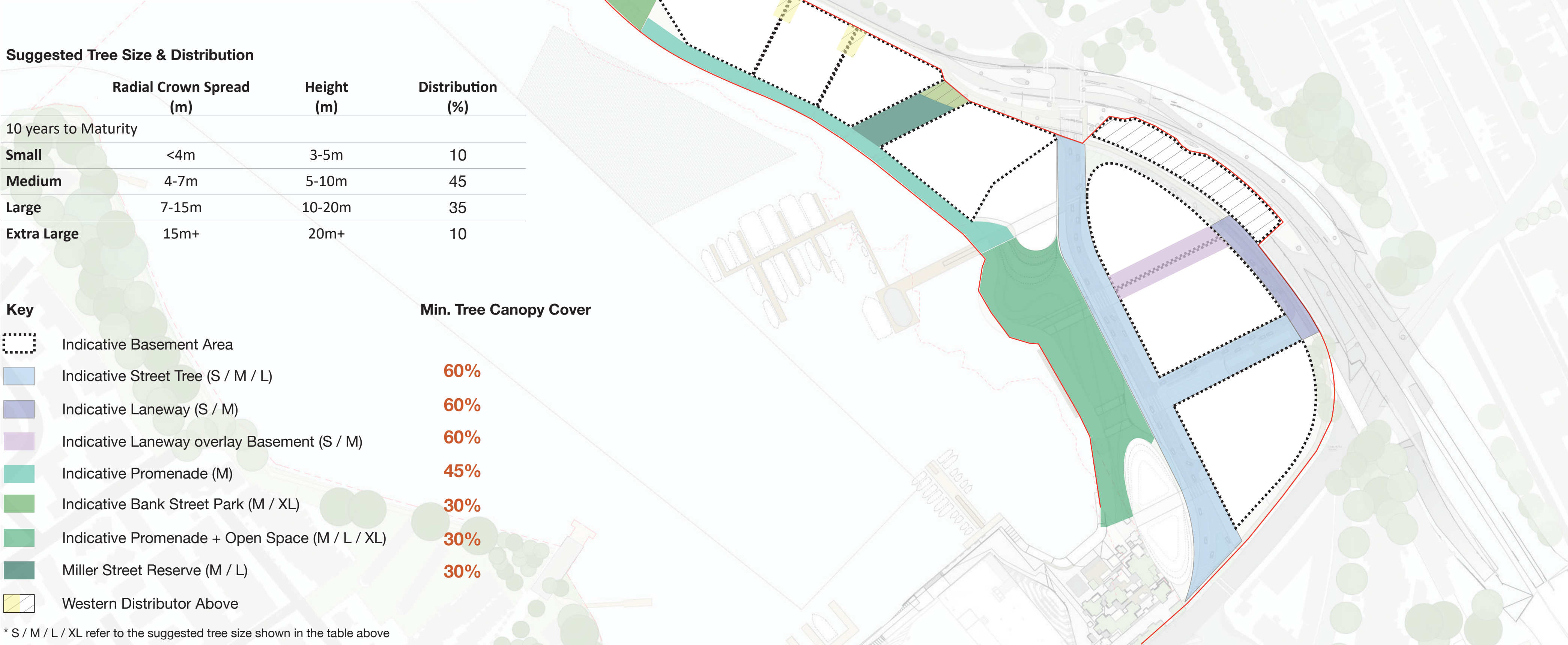


Figure 3: Green Roof Plan

The street wall / podium buildings present opportunities for green roofs that could be used as communal spaces for office workers below or residential users above.

 Green Roof

4.2 Tree Sizes

- 4.2.1 Within a tree population, a range of tree sizes and habits adds a level of structure and complexity which when used effectively can complement and enhance the surrounding built environment. Small and upright, columnar and fastigate trees can be utilised in restricted growing environments to provide the greening of a space while minimising ongoing maintenance requirements and conflict with adjacent structures.⁵
- 4.2.2 Although small tree species can be important design elements in the landscape, their contribution to the canopy cover is minimal. Research shows the cost benefits provided by large trees to be proportionately much greater than that of small trees due to their ability to shade, screen, absorb greater volumes of carbon dioxide and pollutants, and help reduce the scale of large buildings.
- 4.2.3 Table 5 shows the indicative tree sizes for the Study Area which will include a diverse range of tree sizes and are based on the *Study Requirements (2017)*.

Table 5: Indicative Tree Sizes

Tree Size	Percentage
Small	10%
Medium	45%
Large	35%
Extra Large	10%

4.3 Street Tree Spacings

- 4.3.1 The correct spacing of trees to promote the development of good quality specimens in maturity is essential. Whilst overplanting can initially enhance the greening of a space and increase canopy cover percentages, in the long term, the overall quality and Useful Life Expectancy of the tree population will be reduced due to suppression. A single, well-developed tree is likely to provide a greater contribution to the amenity and canopy cover in the long term than multiple closely-spaced, suppressed trees.
- 4.3.2 New street tree spacings within the Study Area are based on the *City of Sydney Street Tree Masterplan Part D (2015)* as outlined below.
- Medium trees – 8.5m linear spacing and 7m setback from trees in adjacent row
 - Large trees – 12.7m linear spacings and 9m setback from trees in adjacent row
- 4.3.3 It should be noted that for the double row configuration, the crown habit of the species should be considered to minimise suppression.

⁵ TreeiQ (2013)

4.4 Soil Volumes & Depths

- 4.4.1 Contamination testing has been carried out across the Study Area and the Site Audit Report recommends a regime for further analysis on a site-specific basis when redevelopment is contemplated.⁶ Nonetheless, it is expected that artificial soil profiles will need to be installed across the Study Area with the new trees being planted on-structure, below paving or in areas where the existing site soil is unsuitable for plant growth. Limited soil volumes, especially in paved areas and over structures, can be a major limitation to tree health and development.
- 4.4.2 Indicative soil volumes for the Study Area are based on the *Apartment Design Guide (2015)* of 35m³ for medium trees and 80m³ for large trees. Planting pits below the pavements are to be linked to form continuous trenches in order to meet these volumes. Indicative soil depths for the Study Area are based on the *Apartment Design Guide (2015)* of 800mm + drainage layers for small trees, 1000mm + drainage layers for medium trees and 1200mm + drainage layers for large trees.
- 4.4.3 Further investigations in relation to soil and engineering requirements for the tree planting pits (including location of underground services) should be undertaken as part of subsequent design development and underground tree anchoring systems such as Platipus D-Man (or similar approved product) and irrigation should be included in the designs as required.

4.5 Urban Forest Capacity

- 4.5.1 Figure 4 and Table 6 shows how the streets and promenade have been designed to meet the urban forestry targets for canopy cover, tree sizes and spacings, and soil volumes as outlined within the *Study Requirements (2017)*. This plan/table will be subject to further refinement during design development.

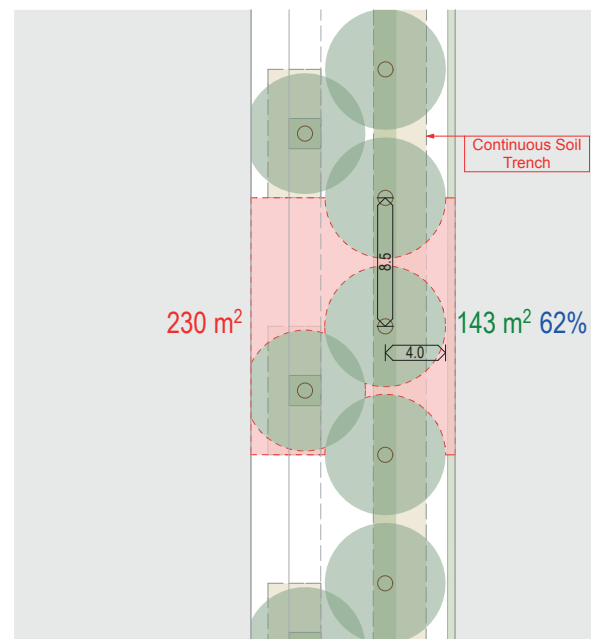
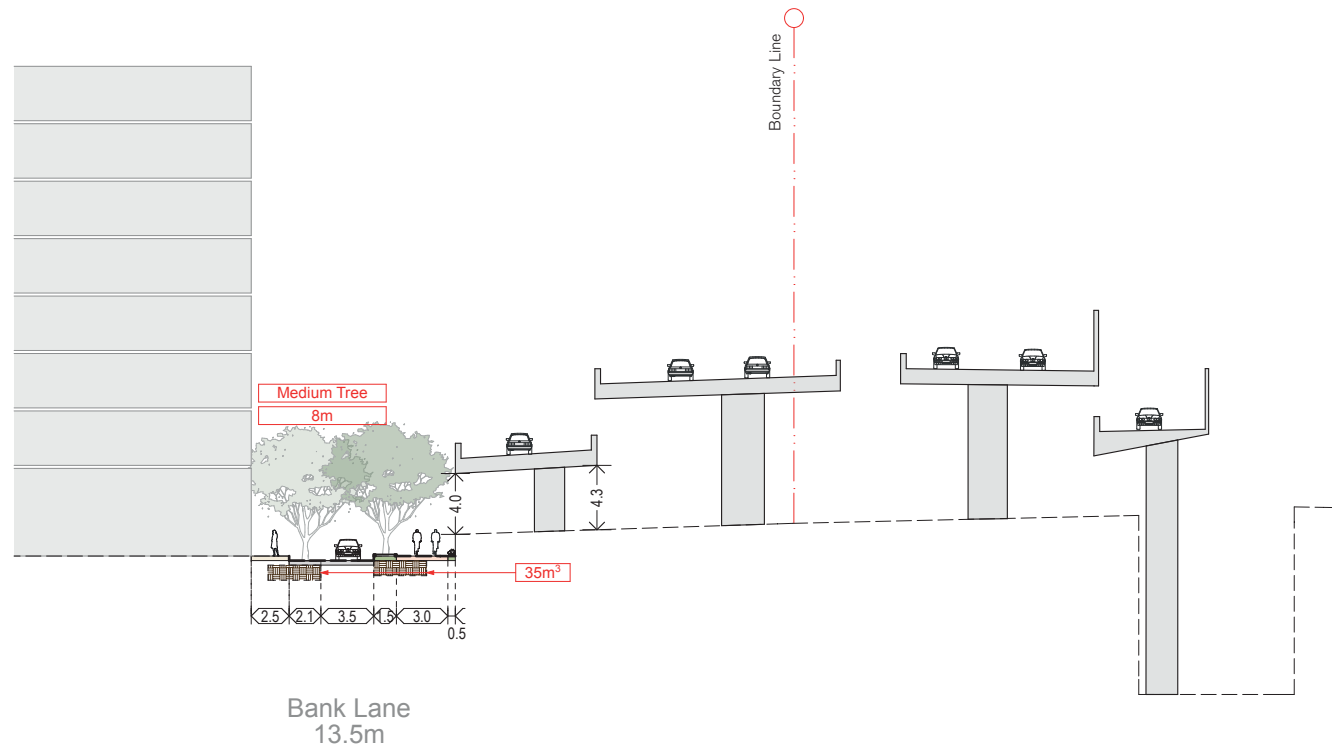
Table 6: Urban Forest Capacity

Typology	Tree Size	Nominal Radial Crown Width (m)	Spacings	Soil Volume	Canopy Cover
Promenade	Medium	4.5m	8.5m	35m ³	71%
Gipps Lane	Medium Large	4m 7m	8.5m	35m ³ 80m ³	78%
Gipps Street	Large Medium	7m 4m	12.7m	80m ³ 35m ³	70%
Bank Lane	Medium	4m	8.5m	35m ³	62%
Park Street	Medium Large	4m 7m	8.5m 13.5m	35m ³ 80m ³ +	84%

⁶ JBS&G & Ramboll (2020)

Figure 4: Street Section 1

4



5

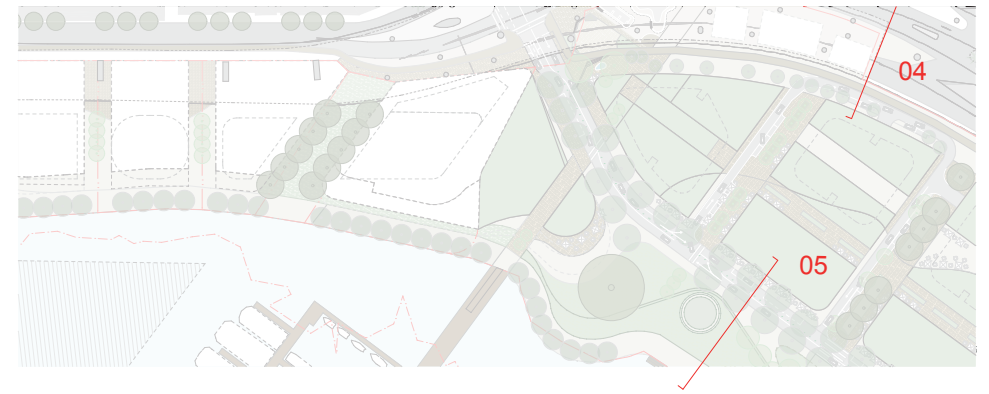
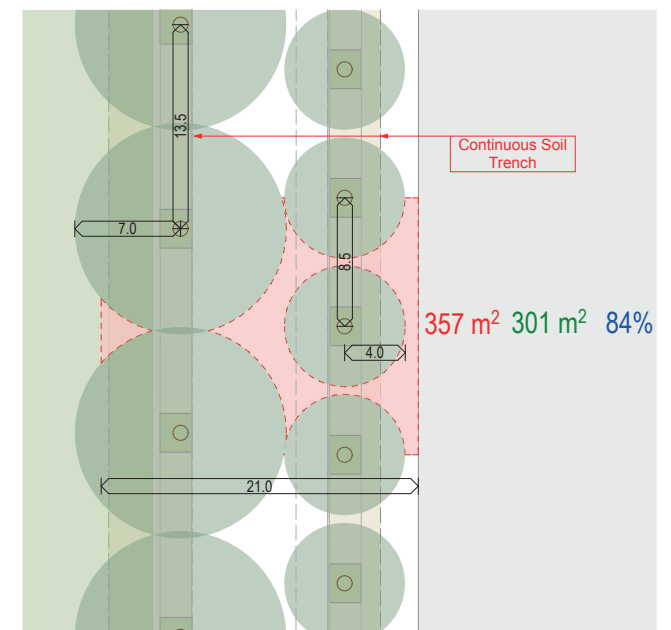
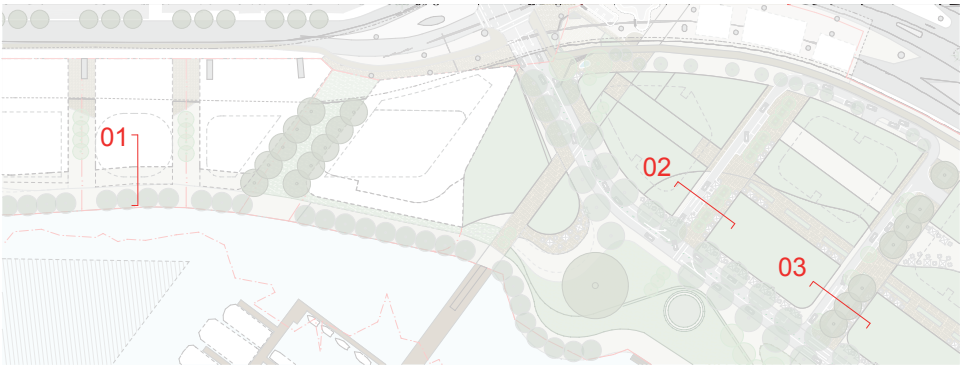
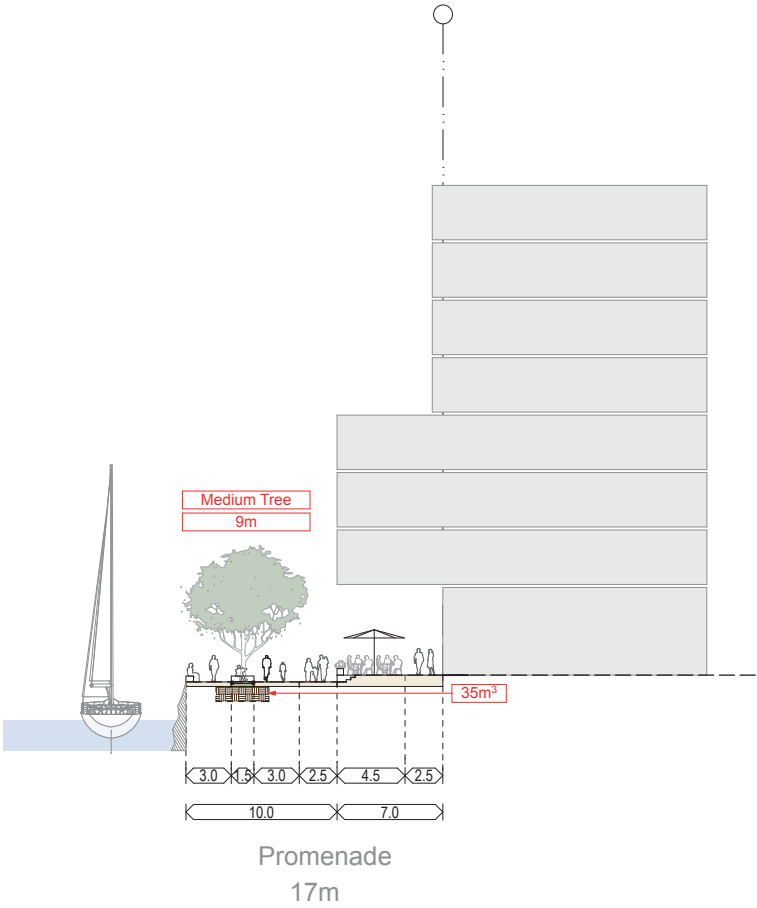


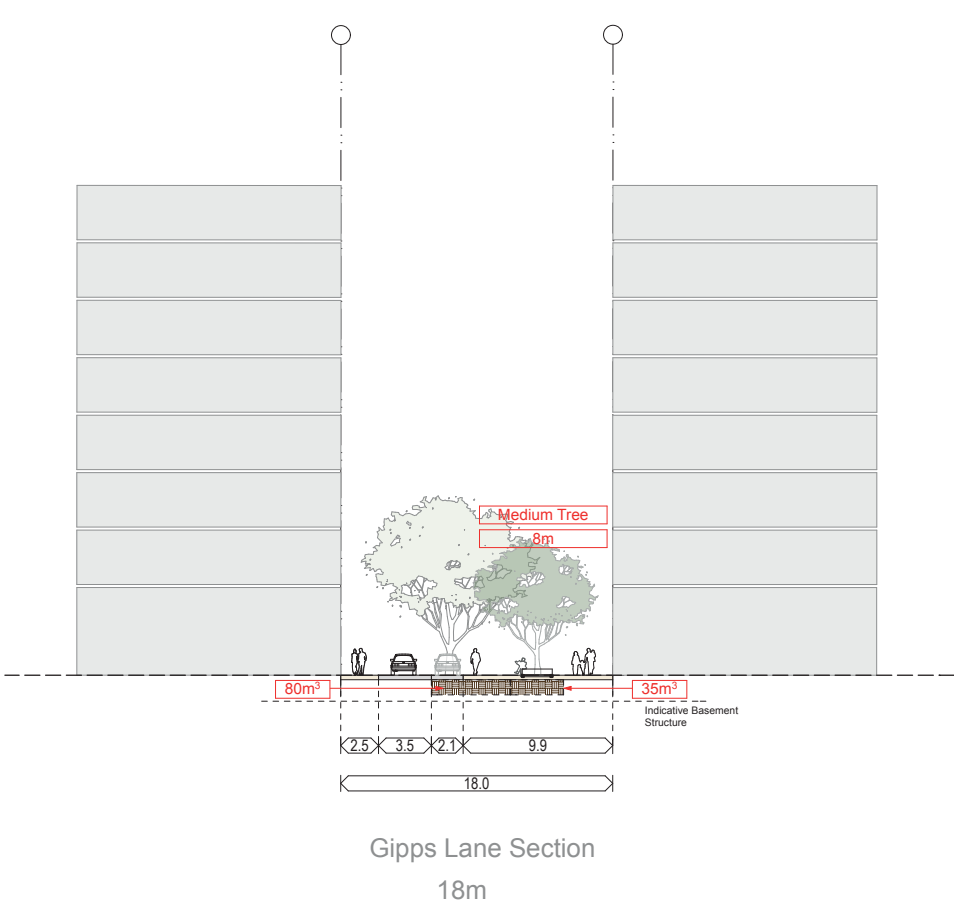
Figure 4: Street Section 2



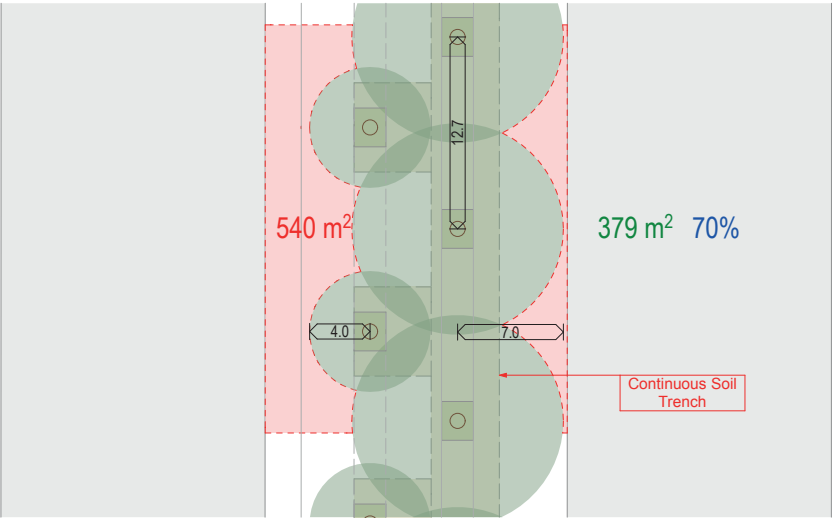
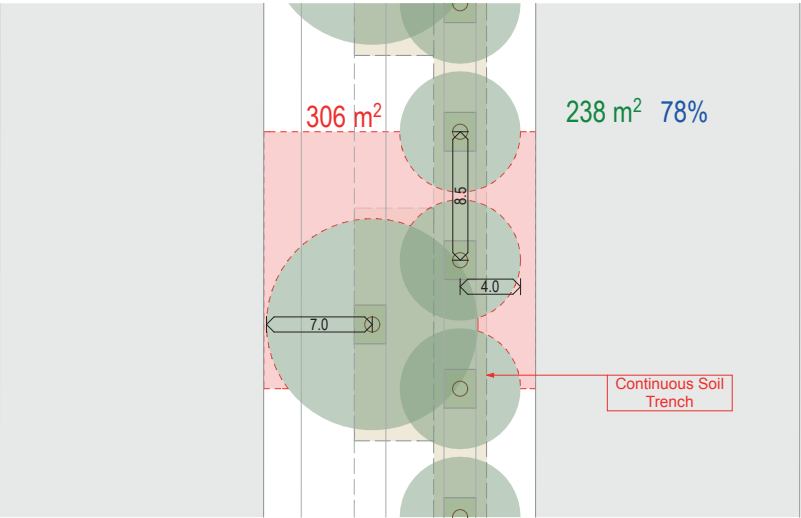
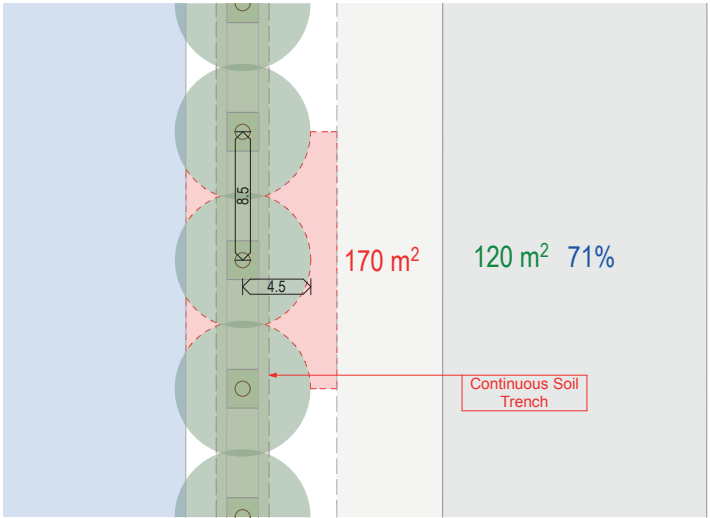
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2



3



- 4.5.2 It should be noted that the actual canopy cover percentages may be lower than what is projected in Table 6 as these figures include overlapping canopies and do not represent the entire street area (i.e gaps in canopy for intersections and the like). Nonetheless, the percentages meet the targets specified in the *Study Requirements (2017)* and will be subject to further design development based on this framework.

4.6 Species Selection & Diversity

- 4.6.1 There are a number of site constraints (i.e. wind, shade & salt spray) which need to be considered when progressing the design and selecting the species selection for the new tree plantings.

4.6.2 Wind

The Study Area is subject to a range of wind effects as indicated in the *Pedestrian Wind Environmental Study (2020)* which have the potential to impact the mechanical and biological processes of the new tree plantings. The selected tree species should be tolerant of wind impacts, and particularly along the foreshore, new tree plantings should include a variety of species with differing crown forms to help ameliorate wind conditions and provide protection for those species which are less wind tolerant.

4.6.3 Shade

The Study Area has a south-westly aspect and structures such as Western Distributor Motorway/Anzac Bridge Viaduct and existing buildings outside of the Study Area to the north and east cast a degree of shade. The development of the Study Area will also create additional shading which needs to be considered. The impacts of shading vary widely between tree species. Some shaded trees can have a slower growth rate, reduced vigour, and can develop phototropic trunk leans and asymmetric crown forms. Tree selection in areas subject to shading should focus on recognized shade-tolerant species, particularly littoral rainforest species which can tolerate the harbour foreshore location of the Study Area.

4.6.4 Salt Spray

The foreshore areas of the Study Area may be exposed to salt laden winds on occasion and salt-tolerant species should be selected in these areas. The accumulation of salt on the foliage of non-salt tolerant species causes desiccation and damage to leaf tissue, and defoliation in extreme cases. Over extended periods of exposure, non-salt tolerant tree species are likely to decline and dieback.

- 4.6.6 Species selection will be undertaken during future design development with a list of potential species provided in Table 7 below. A list of potential species specifically for the promenade is provided in Table 8. The *Study Requirements (2017)* for species which complement the existing park planting themes in Wentworth Park and Glebe foreshore parks is recognized and it is assumed that large Fig tree species will be included in Banks Street Park and Park Street/Waterside Park. Species which maximise solar access during winter will be incorporated depending on street orientation, width and building heights.

- 4.6.7 Species diversity of 40% for family, 30% for genus and 10% as specified in the *Study Requirements (2017)* is proposed where possible however the range of species appropriate for new tree plantings may be limited by the growing conditions as outlined above.

Table 7: Potential Species for Study Area

Small (<7m)	Medium (7-10m)	Large (10-20m)	Extra Large (20m+)
<i>Alloxylon flammeum</i> (Tree Waratah)	<i>Arbutus canariensis</i> (Canary Madrone)	<i>Casuarina equisetifolia</i> (Beach Casuarina)	<i>Agathis robusta</i> (Queensland Kauri)
<i>Angophora hispida</i> (Dwarf Apple)	<i>Arbutus unedo</i> (Irish Strawberry Tree)	<i>Corymbia eximia</i> (Yellow Bloodwood)	<i>Angophora costata</i> (Sydney Red Gum)
<i>Banksia serrata</i> (Old Man Banksia)	<i>Backhousia citriodora</i> (Lemon Myrtle)	<i>Elaeocarpus eumunidii</i> (Quandong)	<i>Araucaria heterophylla</i> (Norfolk Island Pine)
<i>Dais cotinifolia</i> (Pompom Tree)	<i>Brachyciton acerifolia</i> (Illawarra Flame Tree)	<i>Flindersia australis</i> (Crow's Ash)	<i>Argyrodendron actinophyllum</i> (Black Booyong)
<i>Dracaena draco</i> (Dragons Blood Tree)	<i>Caesalpinia ferrea</i> (Leopard Tree)	<i>Ginkgo biloba</i> (Ginkgo)	<i>Araucaria cunninghamiana</i> (Hoop Pine)
<i>Lagerstroemia indica</i> (Crepe Myrtle)	<i>Harpullia pundula</i> (Tulipwood)	<i>Lophostemon confertus</i> (Brush Box)	<i>Ficus henneana</i> (Deciduous Fig)
<i>Pandanus</i> sp. (Pandanus Tree)	<i>Hibiscus tiliaceus</i> (Cotton Tree)	<i>Melaleuca leucadendra</i> (Weeping Paperbark)	<i>Ficus rubiginosa</i> (Port Jackson Fig)
<i>Pittosporum rhombifolium</i> (QLD Pittosporum)	<i>Magnolia grandiflora</i> cvs (Bulls Bay Magnolia)	<i>Podocarpus elatus</i> (Brown Pine)	<i>Jubaea chilensis</i> (Chilean Wine Palm)
<i>Rhaphiolepis indica</i> cvs (Indian Hawthorn cvs)	<i>Nyssa sylvatica</i> (Black Tupelo)	<i>Zelkova serrata</i> cvs (Japanese Zelcova cvs)	<i>Liriodendron tulipifera</i> (Tulip Tree)
<i>Tristaniaopsis laurina</i> (Water Gum)	<i>Stenocarpus sinuatus</i> (Firewheel Tree)	<i>Sophora japonica</i> (Japanese Pagoda Tree)	<i>Livistona australis</i> (Cabbage Palm)

Table 8: Potential Species for Promenade

Species	Comments
<i>Buckinghamia celsissima</i> (Ivory Curl Flower)	<ul style="list-style-type: none"> Formative pruning required during the production stage due to the tendency for the species to develop bark inclusions
<i>Cupaniopsis anacardioides</i> (Tuckeroo)	<ul style="list-style-type: none"> Fruit drop
<i>Elaeocarpus eumunidii</i> (Quandong)	<ul style="list-style-type: none"> Fruit drop
<i>Flindersia australis</i> (Crows Ash)	<ul style="list-style-type: none"> More suited to garden bed than pavement areas due to drop of woody fruit capsules. Variable crown form
<i>Livistona australis</i> (Cabbage Palm)	<ul style="list-style-type: none"> Plant in mixed height groups for maximum amenity
<i>Lophostemon confertus</i> (Brush Box)	<ul style="list-style-type: none"> Reduction Pruning in maturity likely required to maintain building clearances
<i>Podocarpus elatus</i> (Brown Pine)	<ul style="list-style-type: none"> Reduction Pruning in maturity likely required to maintain building clearances

4.7 Stock Selection & Procurement

- 4.7.1 Selecting a healthy and structurally sound tree with traits appropriate to site constraints can help to prevent future problems. Poorly grown stock will greatly reduce a tree's potential and is likely to have greater maintenance costs over its lifetime. *Australian Standard 2303 (2015) Tree Stock for Landscape Use* provides recommendations and specifications for the production of quality nursery stock. Newly planted trees should meet these standards as a minimum.
- 4.7.2 Forward-ordering and contract growing from specialised tree nurseries should be undertaken to ensure availability of species and numbers. Additional trees should be ordered to allow for the rejection of individual trees which are of insufficient quality or as replacements for any trees which fail to establish.
- 4.7.3 Lead times for growing trees will vary greatly between species (i.e growth rates) and starter stock available (i.e. what is either currently in production or able to be outsourced to grow-on). However, Table 9 provides generic estimations based on expected growth rates of fast, medium and slow growing species.⁷ Once species have been selected, more accurate projections can be determined based on growth rates for the individual species and starter stock available.

Table 9: Indicative Growth Rates

Growth Rate	Start	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Fast	25L	100L	250L	500L	800L	1200L	1500L	2000L
Medium	25L	45L	100L	200L	400L	700L	900L	1200L
Slow	25L	45L	100L	150L	250L	350L	450L	600L

5.0 CONCLUSIONS

- 5.1.1 The existing trees within the Study Area include a mix of locally indigenous, Australian native and exotic species. None of the trees are listed in the *City of Sydney Register of Significant Trees 2013* based their historical, cultural, social, ecological or outstanding visual and aesthetic appeal.⁸ However, two (2) trees have been allocated a Retention Value of *Priority for Retention*, and ideally, these trees should be retained and protected. Future designs should maintain existing ground levels within TPZ areas and tree sensitive design and construction methods should be used to minimise adverse impacts.
- 5.1.2 The Urban Forestry Strategy outlines that the specific targets set in The State Significant Precinct Study Requirements 2017 (Section 15 Urban Forest) can be achieved. Future designs should be based on this framework and demonstrate capacity to meet the urban forestry targets.

⁷ Trees Impact (2017)

⁸ City of Sydney (2013)

5.1.3 Ongoing design development and future Development Applications should incorporate the following:

- Preparation of a detailed Arboricultural Impact Assessment where works are proposed within the TPZ areas of trees to be retained
- Street and park areas designed to provide the capacity to meet the urban forestry targets as outlined within the *Study Requirements (2017)*
- Investigations in relation to soil and engineering requirements for the tree planting pits
- Selection of tree species focusing on the site constraints
- Forward-ordering and contract growing to ensure availability of species and numbers

6.0 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.

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7.0 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

City of Sydney (2012), *Sydney Local Environmental Plan*

<https://www.legislation.nsw.gov.au>

City of Sydney (2013), *Register of Significant Trees*

http://www.cityofsydney.nsw.gov.au/__data/assets/pdf_file/0007/143395/130617_EC_ITEM05_ATTACHMENTC4.PDF

City of Sydney (2012), *Development Control Plan 2012 (Section 3.5 Urban Ecology)*

Ecological (2017), *Constraints & Opportunities for Bays Market Design*

Maunsell, Aecom & Scott Carver (2006), *Bank Street Pyrmont Masterplan*

Mattheck & Breloer (2003), *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*

Safe Work Australia (2016), *Guide for Managing Risks of Tree Trimming and Removal Work*.

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

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

Standards Australia (2015), *Tree Stock for Landscape Use AS-2303*

Trees Impact (2017), *Generic Growth Rates – personal communication between treeiQ and Trees Impact*

TreeiQ (2016), *University of Sydney Tree Management Plan*

Appendix 1: Methodology

- 1.1 Site Inspection:** This report was determined as a result of several comprehensive site inspection during 2017. The comments and recommendations in this report are based on findings from these site inspections.
- 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*.⁹ The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic 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 rated as *Good*, *Fair* or *Poor* based on an assessment of the following factors:
- 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 rated as *Good*, *Fair* or *Poor* based on an assessment of the following factors:
- 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

⁹ Mattheck & Breloer (2003)

- 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 or low 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 <i>Local Environmental Plan</i> with a local or state level of significance.
	The subject tree is listed on Council's Significant Tree Register or meets 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.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of cultural or historical importance or is widely known.
	The subject tree is a prominent specimen which forms part of the curtilage of a heritage item with a known or documented association with that item.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species for the site defined under the provisions of the NSW <i>Biodiversity Conservation Act (2016)</i> or the Commonwealth <i>Environmental Protection and Biodiversity Conservation Act (1999)</i> .
	The subject tree is known to contain nesting hollows to a species scheduled as a Threatened or Vulnerable Species for the site as defined under the provisions of the NSW <i>Biodiversity Conservation Act (2016)</i> or the Commonwealth <i>Environmental Protection and Biodiversity Conservation Act (1999)</i> .
	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.
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 is a good representative of the species in terms of aesthetic value.
Low	The subject tree is a known environmental weed 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.

- 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

ULE		Landscape Significance		
	Very High	High	Moderate	Low
40 years +	Priority for Retention	Priority for Retention		Consider for Removal
15-40 years		Priority for Retention	Consider for Retention	
5-15 years		Consider for Retention		
Less than 5 years	Consider for Removal	Priority for Removal		

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

Blackwattle Bay Precinct Plan

/existing trees

Potential Trees to Retain	Tree Proposed for Removal
1, 2, 27, 28, 34, 35, 36, 37, 75, 77, 79	3-26, 29-33, 38-74, 76, 78, 80-84



1 Potential trees to retain



1 Trees proposed for removal



Appendix 3: Tree Assessment Schedule

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
1	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	17	12	1600	Good	Fair	Small (<25mmØ) & medium (25-75mmØ) deadwood in low volumes. Partially suppressed. Co-dominant inclusions, major. Bark inclusion(s), major. Wound(s), various stages of decay. Limited crown clearance from building.	Mature	15-40	High	Priority for Retention	15	4
2	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	17	15	2000	Good	Fair	Small (<25mmØ) & medium (25-75mmØ) deadwood in low volumes. Partially suppressed. Co-dominant inclusions, major. Bark inclusion(s), major. Wound(s), various stages of decay. Limited crown clearance from building.	Mature	15-40	High	Priority for Retention	15	4.4
3	<i>Lophostemon confertus</i>	6	4	150	Fair	Good	Crown density 25-50%. Small (<25mmØ) & medium (25-75mmØ) deadwood in high volumes. Partially suppressed. Wound(s), no visible sign of decay.	Semi-mature	5-15	Low	Consider for Removal	2	1.5
4	<i>Cupressus sempervirens</i> (Italian Cypress)	8	2	300	Fair	Fair	Structures within SRZ. Crown conflict with adjacent building.	Mature	<5	Low	Priority for Removal	3.6	2
5	<i>Eucalyptus saligna</i>	9	7	350	Fair	Fair	Crown density 75-95%. Small (<25mmØ), medium (25-75mmØ) & large (>75mmØ) deadwood in low volumes. Structures within SRZ. Sap sucking leaf damage.	Mature	5-15	Mod	Consider for Retention	4.2	2.1

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
6	<i>Grevillea robusta</i>	10	6	200	Fair	Fair	Crown density 75-95%. Small (<25mmØ) deadwood in low volumes. Structures within SRZ. Limited trunk clearance.	Mature	<5	Mod	Priority for Removal	2.4	1.7
7	<i>Syagrus romanzoffianum</i> (Cocos Palm)	7	3	200	Good	Good	Limited soil volume.	Mature	5-15	Low	Consider for Removal	4	n/a
8	<i>Livistonia australis</i>	8	3	500	Good	Good	Limited soil volume.	Mature	5-15	Low	Consider for Removal	4	n/a
9	<i>Casuarina glauca</i> (Swamp She Oak)	7	5	300	Good	No access to base. No rating.	Tree occluding tree grate. Wound(s), early signs of decay. Previous branch failure(s).	Mature	5-15	Low	Consider for Removal	3.6	2
10	<i>Celtis sinensis</i>	8	5	250	Dormant. No rating.	Fair	Not in full leaf at time of assessment. Large trunk wound with early stages of decay. Structures within SRZ. Limited crown clearance.	Semi-mature	<5	Low	Priority for Removal	3	1.8

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
11	<i>Casuarina glauca</i> (Swamp She Oak)	8	4	300	Good	Good	Group of 4 trees.	Mature	5-15	Mod	Consider for Retention	3.6	2
12	<i>Ficus rubiginosa</i>	5	10	1000	Good	Fair	Growing on wall. Crossing branches.	Mature	15-40	Moderate	Consider for Retention	12	3.3
13	<i>Celtis sinensis</i>	4	3	140	Dormant. No rating.	Fair	Not in full leaf at time of assessment. Lopped. Flush cuts.	Semi-mature	<5	Low	Priority for Removal	2	1.5
14	<i>Celtis sinensis</i>	4	3	300	Dormant. No rating.	No access to base. No rating.	Not in full leaf at time of assessment. Partially suppressed.	Mature	<5	Low	Priority for Removal	3.6	2
15	<i>Pittosporum undulatum</i> (Native Daphne)	7	6	300	Good	Good	Small (<25mmØ) deadwood in low volumes. Co-dominant inclusions, minor.	Mature	15-40	Mod	Consider for Retention	3.6	2

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
16	<i>Ficus rubiginosa</i>	7	8	1000	Good	Fair	Lopped.	Mature	15-40	Mod	Consider for Retention	12	3.3
17	<i>Celtis sinensis</i>	8	8	424.2 64	Dormant. No rating.	Fair	Not in full leaf at time of assessment. Partially suppressed. Co-dominant inclusions, minor. Wound(s), various stages of decay.	Mature	<5	Low	Priority for Removal	5.1	2.3
18	<i>Cinnamomum camphora</i> (Camphor Laurel)	6	2	75	Good	Fair	Co-dominant stem removed.	Juvenile	<5	Low	Priority for Removal	2	1.5
19	<i>Eucalyptus saligna</i>	11	10	400	Good	No access to base. No rating.	Sap sucking leaf damage.	Mature	15-40	Mod	Consider for Retention	4.8	2.3
20	<i>Metrosideros kermadecensis</i>	8	5	700	Good	Fair	Mechanical damage from adjacent structures. Crown density 75-95%. Partially suppressed. Co-dominant inclusions, major.	Mature	5-15	Mod	Consider for Retention	8.4	2.8

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
21	<i>Eucalyptus saligna</i>	16	10	850	Good	Good	Storm damage. Crown density 75-95%. Partially suppressed.	Mature	15-40	Mod	Consider for Retention	10.2	3.1
22	<i>Eucalyptus saligna</i>	17	10	550	Good	Good	Crown density 75-95%. Partially suppressed.	Mature	15-40	Mod	Consider for Retention	6.6	2.6
23	<i>Phoenix canariensis</i>	7	4	1400	Good	Good	Group of 6 trees. Close to wall. Soil compaction.	Mature	5-15	Mod	Consider for Retention	15	3.8
24	<i>Syzygium luehmannii</i>	5	2	75	Good	Good	Group of 2 trees. Shaded by over-pass.	Mature	5-15	Low	Consider for Removal	3	n/a
25	<i>Celtis sinensis</i>	8	8	400	Dormant. No rating.	Good	Not in full leaf at time of assessment. Structures within SRZ.	Mature	<5	Low	Priority for Removal	4.8	2.3

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
26	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	12	10	550	Good	Good	Limited clearance due to over-pass. Large number of surface roots. Wound(s), various stages of decay. Branch inclusions, major.	Mature	15-40	High	Consider for Retention	6.6	2.6
27	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	11	8	425	Good	Good	Limited clearance due to over-pass. Large number of surface roots. Asymmetric root plate. Crossing branches. Significant damage to pavement. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes. Mechanical damage to exposed surface roots. Bark inclusion(s), minor. Structures within SRZ. Wound(s), various stages of decay.	Mature	15-40	High	Consider for Retention	5.1	2.3
28	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	17	15	1500	Good	Poor	Limited clearance due to over-pass. Large number of surface roots. Asymmetric root plate. Crossing branches. Significant damage to pavement. Small (<25mmø), medium (25-75mmø) & large (>75mmø) deadwood in low volumes. Mechanical damage to exposed surface roots. Bark inclusion(s), minor. Structures within SRZ. Wound(s), various stages of decay.	Mature	5-15	High	Consider for Retention	15	3.9
29	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	17	15	1200	Good	Poor	Limited clearance due to over-pass. Large number of surface roots. Asymmetric root plate. Crossing branches. Significant damage to pavement. Crown extends over building. Wound(s), various stages of decay.	Mature	5-15	High	Consider for Retention	14.4	3.6
30	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	17	10	900	Fair	Poor	Adjacent tree removed exposing crown with resultant sunburn and epicormic growth. Asymmetric root plate. Asymmetric crown. Significant damage to pavement. Small (<25mmø) & medium (25-75mmø) deadwood in moderate volumes. Partially suppressed.	Mature	<5	High	Priority for Removal	10.8	3.2
31	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	15	10	850	Good	Fair	Surface roots. Mechanical damage to branches. Small (<25mmø) & medium (25-75mmø) deadwood in low volumes. Partially suppressed. Co-dominant inclusions, major. Structures within SRZ.	Mature	15-40	High	Consider for Retention	10.2	3.1

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
32	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	15	10	927.3 62	Good	Poor	Mechanical damage to branches from adjacent structures. Crown over hanging building. Small (<25mmØ) & medium (25-75mmØ) deadwood in low volumes. Co-dominant inclusions, major. Wound(s), various stages of decay. Trunk cavity(s), minor. Structures within SRZ. Internal diagnostic testing recommended.	Mature	15-40	High	Consider for Retention	11.1	3.2
33	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	898.9 58	Good	Fair	Crossing branches. Exposed surface roots. Partially suppressed. Co-dominant inclusions, major. Structures within SRZ.	Mature	15-40	High	Consider for Retention	10.8	3.2
34	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	1200	Good	Fair	Congested branch structure. Co-dominant inclusions, major. Bark inclusion(s), major. Crown conflict with adjacent structures.	Mature	15-40	High	Consider for Retention	14.4	3.6
35	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	1000	Good	Fair	Asymmetric crown spread. Mechanical damage to exposed surface roots. Co-dominant inclusions, major. Bark inclusion(s), major. Crown conflict with adjacent structures.	Mature	15-40	High	Consider for Retention	12	3.3
36	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	1000	Good	Fair	Asymmetric crown spread. Mechanical damage to exposed surface roots. Co-dominant inclusions, major. Bark inclusion(s), major. Crown conflict with adjacent structures.	Mature	15-40	High	Consider for Retention	12	3.3
37	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	700	Good	Fair	Asymmetric crown spread. Mechanical damage to exposed surface roots. Co-dominant inclusions, major. Bark inclusion(s), major. Crown conflict with adjacent structures. Crown density 75-95%.	Mature	15-40	High	Consider for Retention	8.4	2.8
38	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	650	Good	Fair	Small (<25mmØ) deadwood in low volumes. Small (<25mmØ) epicormic growth in moderate volumes. Pruned/lopped for powerline clearance. Selective reduction pruning for ABC clearance. Structures within SRZ.	Mature	15-40	High	Consider for Retention	7.8	2.8

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
39	<i>Ficus microcarpa</i> var. 'hilli' (Hills Weeping Fig)	14	12	600	Good	Fair	Girdled roots. Wound(s), advanced stages of decay. Previous branch failure(s).	Mature	15-40	High	Consider for Retention	7.2	2.7
55	<i>Phoenix canariensis</i>	10	5	750	Good	Good	Limited soil volume. Structures in root zone.	Mature	15-40	Mod	Consider for Retention	9	2.9
56	<i>Phoenix canariensis</i>	9	5	650	Good	Good	Limited soil volume. Structures in root zone.	Mature	15-40	Mod	Consider for Retention	7.8	2.8
57	<i>Phoenix canariensis</i>	9	5	650	Good	Good	Limited soil volume. Structures in root zone.	Mature	15-40	Mod	Consider for Retention	7.8	2.8
58	<i>Phoenix canariensis</i>	12	5	525	Good	Good	Limited soil volume. Structures in root zone.	Mature	15-40	Mod	Consider for Retention	6.3	2.5

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
59	<i>Phoenix canariensis</i>	12	5	600	Good	Good	Limited soil volume. Structures in root zone.	Mature	15-40	Mod	Consider for Retention	7.2	2.7
60	<i>Phoenix canariensis</i>	12	5	650	Good	Good	Limited soil volume. Structures in root zone. Wires in crown.	Mature	15-40	Mod	Consider for Retention	7.8	2.8
69	DEAD										DEAD		
70	<i>Eucalyptus robusta</i>	15	15	400	Fair	Fair	Limited site access. Crown density 50%-75%. Restricted root zone. Impact damage. Wound/s, various stages of decay. Small (<25mmØ) & medium (25-75mmØ) epicormic growth in moderate volumes.	Mature	<5	Mod	Priority for Removal	4.8	2.3
71	<i>Eucalyptus robusta</i>	15	15	650	Fair	Fair	Limited site access. Crown density 50%-75%. Restricted root zone. Impact damage. Wound/s, various stages of decay. Small (<25mmØ) & medium (25-75mmØ) epicormic growth in moderate volumes.	Mature	<5	Mod	Priority for Removal		

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
72	<i>Eucalyptus saligna</i>	17	10	800	Fair	Poor	Limited site access. Crown density 50%-75%. Restricted root zone. Limited site access.	Mature	<5	Mod	Priority for Removal	9.6	3
73	<i>Eucalyptus</i> sp.	12	8	400	Fair	Fair	Limited site access. Crown density 50%-75%. Restricted root zone. Wound/s, various stages of decay. Trunk conflict with wall.	Mature	<5	Mod	Priority for Removal	4.8	2.3
74	<i>Eucalyptus botryoides</i> (Bangalay)	15	8	650	Fair	Fair	Limited site access. Crown density 50%-75%. Restricted root zone. Wound/s, various stages of decay.	Mature	<5	Mod	Priority for Removal	7.8	2.8
75	<i>Eucalyptus saligna</i>	15	10	300	Good	Good	Limited site access. Wound/s, various stages of decay. Small (<25mmØ) & medium (25-75mmØ) deadwood in low volumes.	Mature	15-40	Mod	Consider for Retention	3.6	2
76	<i>Eucalyptus saligna</i>	12	6	250	Poor	Poor	Limited site access. Dead terminal leader. Small (<25mmØ) & medium (25-75mmØ) deadwood in moderate volumes. Wound/s, various stages of decay.	Mature	<5	Mod	Priority for Removal	3	1.8

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
77	<i>Eucalyptus saligna</i>	12	6	250	Fair	Fair	Limited site access. Storm damage. Small (<25mmø) & medium (25-75mmø) deadwood in moderate volumes. Wound/s, various stages of decay.	Mature	5-15	Mod	Consider for Retention	3	1.8
78	<i>Cotoneaster</i> sp.	5	5	300@ base	Fair	Fair	Limited site access. Small (<25mmø) & medium (25-75mmø) deadwood in moderate volumes. Wound/s, various stages of decay.	Mature	<5	Low	Priority for Removal	3.6	2
79	<i>Eucalyptus saligna</i>	12	6	650	Good	Good	Limited site access. Storm damage. Small (<25mmø) & medium (25-75mmø) deadwood in moderate volumes. Wound/s, various stages of decay.	Mature	15-40	Mod	Consider for Retention	7.8	2.8
80	<i>Celtis sinensis</i>	8	4	200	Dormant. No rating.	Fair	Not in full leaf at time of assessment. Structures with SRZ.	Mature	<5	Low	Priority for Removal	2.4	1.7
81	<i>Cupressus arizonica</i>	12	6	450	Poor	Fair	Limited site access. Crown density 50%-75%. Small (<25mmø) & medium (25-75mmø) deadwood in moderate volumes. Wound/s, various stages of decay.	Late-mature	<5	Low	Priority for Removal	5.4	2.4

Tree No.	Species	Height (m)	Radial Crown Spread (m)	DBH (mm)	Health Rating	Structural Condition Rating	Comments	Age Class	ULE (years)	L/Sign	Retention Value	Radial TPZ (m)	Radial SRZ (m)
82	<i>Celtis sinensis</i>	8	4	200	Dormant. No rating.	Fair	Not in full leaf at time of assessment. Structures with SRZ.	Mature	<5	Low	Priority for Removal	2.4	1.7
83	<i>Pittosporum undulatum</i> (Native Daphne)	10	5	250 250	Good	Fair	Co-dominant inclusion. Small (<25mmø) & medium (25-75mmø) deadwood in moderate volumes. Wound/s, various stages of decay.	Mature	5-15	Low	Consider for Removal	2	1.5

Appendix 4: Brief CV – Anna Hopwood

Qualifications

- Grad Cert. (Arboriculture)
- Dip. Hort (Arboriculture)
- Dip. Hort (Landscape Design)
- ISA TRAQ

Memberships

- Member: Institute of Australian Consulting Arboriculturists (IACA)
- Member: Arboriculture Australia (AA)

Profile

Anna Hopwood is the Director of TreeiQ and oversees all projects. She has extensive experience undertaking arboriculture and landscape assessments and has been a key member of several strategic working groups. Prior to establishing TreeiQ in 2006, Anna was employed as a design manager for a Sydney-based landscape architecture firm.

Anna was the Vice President of Institute of Australian Consulting Arboriculturists (IACA) 2017-2019 and sat on the expert panel for Sydney 2050.

In 2006 Anna received the NSW State Medal (Arboriculture) and the Local Government Tree Resources Association Award. In 2015 Anna received the University of Melbourne Scott Sharpe Award.

Experience

- Sydney Football Stadium
- Sydney Modern
- Parramatta Aquatic Centre
- Stadium Australia
- National Herbarium of NSW
- Powerhouse Parramatta
- Parramatta Square Development
- Hyde Park & Anzac Memorial
- St John's Cathedral, Parramatta
- Bondi Park & Pavilion, Bondi Beach
- Observatory Hill
- Bondi to City Cycleway
- George Street Cycleway
- Wilson Street Cycleway
- Newmarket Green
- White City
- Liverpool Hospital Health & Education Precinct
- Royal North Shore Hospital
- Canterbury Bankstown Urban Tree Canopy Masterplan
- Callan Park (Greater Sydney Parklands) – Tree Management Plan
- City of Sydney – Tree Guidelines for Pruning, Reporting and using an Arborist
- University of Sydney - Tree Management Plan
- Hunters Hill Council Significant Tree Register
- Hunters Hill Council Tree Management Development Control Plan
- Waverly Council Significant Tree Register
- Waverly Council – Tree Management Control Review
- Strathfield Council Tree Management Development Control Plan
- Kogarah Council Street Tree Masterplan & Management Strategy