Moore Trees
Arboricultural Services

ABN 90887347745

Arboricultural Impact Assessment Report
&
Tree Protection Plan and Specification

APT Woolloomooloo
Facility installation

March 2022
FINAL

Prepared for: City of Sydney
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VERSION CONTROL

Date of Issue	Details
23 March 2022	Draft 1
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1 INTRODUCTION

1.1 This Arboricultural Impact Assessment (AIA) and Tree Protection Plan and Specification has been written for trees that are located at Dowling Street, Woolloomooloo, a site that has been designated for an Automated Public Toilet ("APT"). This report assesses the potential impacts to three (3) trees at the location shown in Table 1. This report has been prepared for QMS Media, Level 4, 5 Blue Street, North Sydney NSW 2060 based on the City of Sydney (hereinafter referred to as "CoS") requirements for Arboricultural reports.

1.2 The purpose of this report is to collect the appropriate tree related data on the subject trees and to provide advice on the categorization of the trees in order to assist in potential design layouts and impacts.

1.3 This AIA follows the requirements for Consulting Arborists reporting to CoS as detailed in 8.2.1 *Arboricultural Impact Assessment Report* of Schedule 8 of the Sydney Development Control Plan 2012.

1.4 This report also contains the following information as part of the Impact Assessment:-

a) Reviewing the Architectural Drawings and assessing the potential impact of the proposed development works on existing trees to be retained, including assessment of any proposed incursions to the canopy and/or root zone;
b) Advising if further investigations, such as root investigations are required;
c) Recommending modifications to the design or construction methods where appropriate to minimise adverse impact on trees considered worthy of retention including recommended setbacks or other measures to avoid adverse impacts; and
d) Providing recommendations for tree protection measures to ensure the retention of healthy trees as appropriate.

1.5 Documents and information provided: For this AIA Report I was provided a site survey and plans of the proposed design (Appendix 1). This AIA Report has been assessed against these plans.

1.6 Location: The site is located on the corner of Dowling Street and Stephen Street, Woolloomooloo New South Wales 2011.

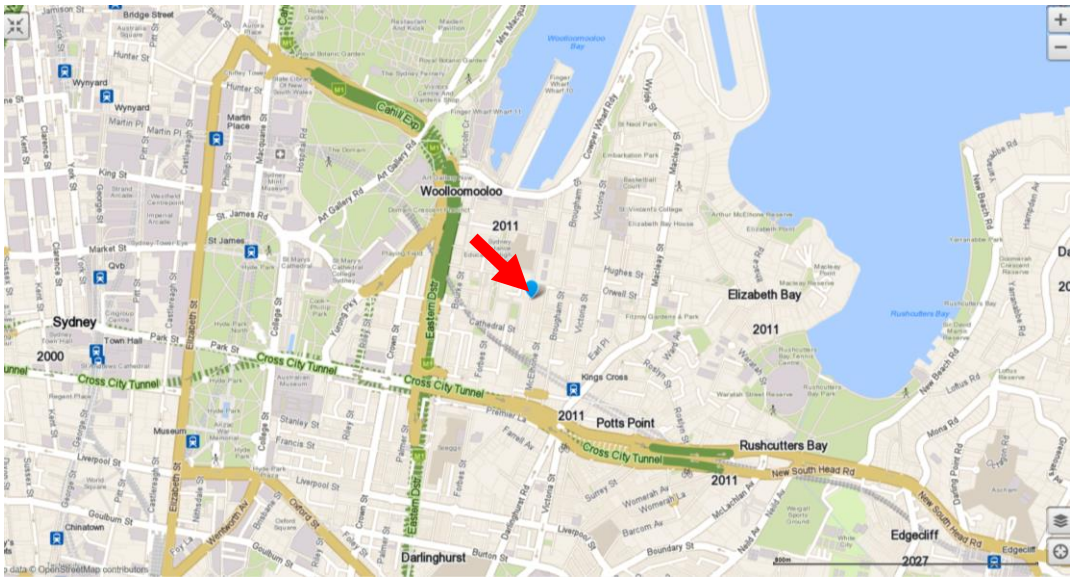


Diagram 1: Dowling Street, Woolloomooloo (Red arrow) (whereis.com.au, 2022)

2 METHODOLOGY

2.1 To record the health and condition of the trees, a Visual Tree Assessment (VTA) was undertaken on the subject trees on 15th March 2022. This method of tree evaluation is adapted from Matheny and Clark, 1994 and is recognised by The International Society of Arboriculture. Individual tree assessments are listed in Appendix 2 in tabulated format. All inspections were undertaken from the ground. No diagnostic devices were used on these trees.

2.2 **Tree Protection Zones (TPZ):** The Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is 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. TPZ's have been calculated for the site trees. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites*, AS 4970, 2009.

2.3 **Structural Root Zone (SRZ)**: The SRZ is a specified distance measured from the trunk that is set aside for the protection of tree roots, both structural and fibrous. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. SRZ areas are also shown in (Appendix 1). The TPZ and SRZ are measured as a radial measurement from the trunk. No roots should be severed within this area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 5.

2.4 **Tree Significance & Retention Value:** The Tree Significance & Retention Value used in this report is known as the Significance of a Tree, Assessment Rating System or STARS© system created by the Australian Institute of Consulting Arboriculturists (IACA). As noted by IACA, this system is a free to use system by Arboriculturists as at the date of this report. This system allows a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments (Draper and Richards 2009). The system uses a scale of *High, Medium and Low significance* in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. The Retention

Value is selected between *High, Medium, Low and Priority for removal.* The Matrix can be seen in Appendix 3.

2.5 Impact Assessment: The site survey plan provided by QMS Media was assessed for the following:

- Reduced Level (R.L.) at base of any site tree.
- Incursions into the Tree Protection Zone (TPZ).
- Assessment of the likely impact of the works.
- Possible remediation opportunities.
- Potential service trenching
- Impacts to overhanging canopies

2.6 Terms: The following terms have been used in this report and due to the extent of various disciplines involved on a project of this size, basic terminologies have been used as described below;

***Foot print*:** The term footprint will relate to any proposed structure located above Ground Level (GL) that may potentially affect the root zone of any tree or tree itself. The structure may be as small as a rubbish bin or as large as an area of paving.

***Excavation*:** This includes trenching, trenching and batters, footings for walls, trenching for services, pipes, lighting telecommunications.

***Hand dig*:** Excavation to occur by hand so as not to damage or sever any roots associated with nearby trees. In general, the Project Arborist inspects or supervises this work.

***TPZ encroachments*:** The Australian Standard *Protection of trees on development sites,* (AS 4970) recommends no more than 10% encroachment unless the TPZ can be compensated elsewhere and contiguous with the TPZ. Any encroachment greater than 10% is considered a major encroachment. In this instance the Project Arborist is required to demonstrate that the tree would remain viable due to the >10% encroachment.

3 SITE OBSERVATIONS

3.1 Based on the plan provided, the APT is proposed to be located under the canopies of large mature trees and within their TPZ areas.

3.2 The tree species were identified as being Tree 1 a mature Broad leaved paperbark *(Melaleuca quinquenervia),* Tree 2 a large mature Kaffir plum *(Harpephyllum caffrum)* and Tree 3 a mature Hackberry *(Celtis australis).*

3.3 These trees were found to be in good health and condition. The main trunks, first and second order branches are free of any, splits or fruiting bodies. Old pruning wounds are showing good occlusion, a sign that the trees are photosynthesizing effectively. New extension growth was noted with leaf colour showing good vitality. The basal area and woody root zones were free of any ground heaving, or lifting.

3.4 Trees 1 and 2 are likely to have been planted either before, or at the same time as, the adjacent sandstone garden edge was constructed (Plate 1). This may have had an impact on the direction of the root system of these trees and as such the trees may have a slightly reduced woody rootzone due to deflecting off these large stone blocks. Both trees have had extensive crown reduction pruning with the removal of lower first order limbs back to the main trunks.

Plate 1: Tree 1 (red arrow), Tree 2 (Blue arrow). P.Vezgoff

Plate 2: Tree 1 on slight lean to the south. P.Vezgoff

3.5 Tree 3 is in good health and condition (Plate 3) however recent trenching has certainly breached the TPZ and SRZ on this tree (Plate 4). This tree has developed a fine network of branches creating a rounded canopy. Canopy overhang with Tree 3 in conflict with the installation of the APT will need to be considered.

Plate 3: Image showing Tree 3 (Red arrow). P.Vezgoff

Plate 4: Image showing new trenching below Tree 3. P.Vezgoff

3.6 **Drainage works:** As this APT is a new installation there are currently no services available and new services will be required. This will require trenching that will be close or even breach the TPZ distances of these trees.

3.7 The trees were assessed as below for the Significance of a Tree, Assessment Rating System or STARS©. The STARS© Matrix can be seen in Appendix 3.

Significance Scale	**1 (High)**	**2 (Medium)**	**3 (Low)**
Tree No.	1, 2, 3		

Table 1: Significance Scale of STARS©

4 TREE IMPACTS

4.1 Calculations based on the plans provided show the percentage of incursions to each tree in Table 2 as a graphic. The incursion to Tree 1 is 5.7%, the incursion to Tree 2 is 2.4% incursion with a slight incursion to the SRZ area and Tree 3 has a 2.6% incursion. Although the SRZ on Tree 2 is breached it is possible roots have been deflected downward by the stone retaining wall. These incursions are minimal however the locations of trenching for services have not been provided and these have the potential to be quite significant.

4.2 Below grade works involve a 450 x 450 millimetre beams below grade, with a slab on top of these. Maximum excavations are four hundred and fifty (450) millimetres in depth.

4.3 Root loss based on the slightly larger building footprint is expected to be minimal (not including trenching for services that will require further assessment), however a management process should still be implemented should roots greater than forty (40) millimetres in diameter be exposed during the building process.

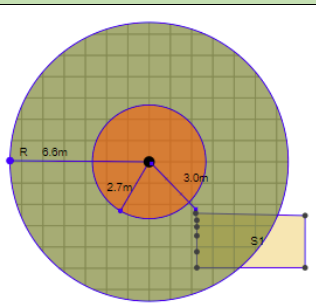
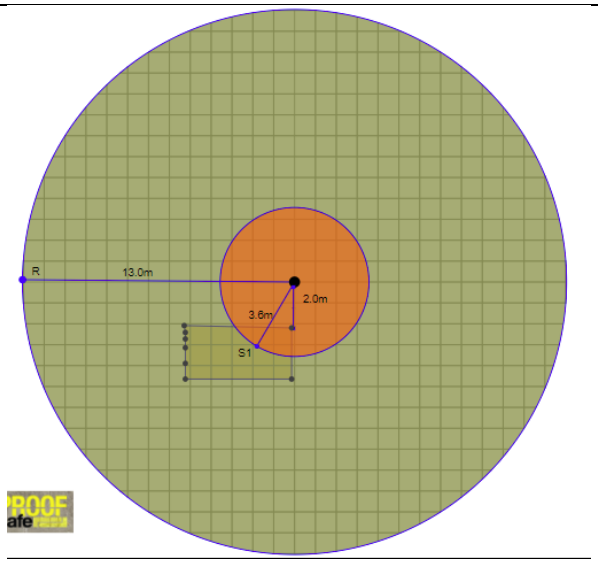
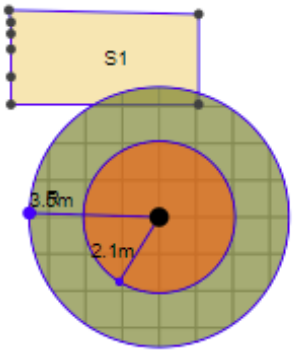
4.4 Based on the Australian Standard *Protection of trees on development sites*, (AS 4970) recommends no more than 10% encroachment unless the TPZ can be compensated elsewhere and contiguous with the TPZ. Any encroachment greater than 10% is considered a major encroachment. An encroachment of <10% is considered minimal. As such, all of the encroachments to Trees 1, 2 and 3, would be considered minimal.

4.5 Another potential impact to Tree 3 is to the canopy and its proximity to craning vehicles but also the final position of the APT. The choice of vehicle shall be confirmed prior to works commencing and shall ensure that the boom and slings will remain clear of all tree canopies. If this does not occur it is possible branches could tear from the subject trees, thus causing extensive detrimental damage that Council may request any bond on any tree be surrendered. The final location of the APT may also require reduction pruning of approximately 10-15% of the canopy of Tree 3.

4.6 Council has specified (letter dated 22nd November 2021, Author Michael Soo) that non-destructive exploratory excavations are to occur to expose roots greater than forty (40) millimetres in diameter. This is an option for this site due to it being clear of any structures.

4.7 In conclusion, another site may be a better option for this APT however further assessment of the service trenching locations in relation to TPZ areas of the three (3) trees and also the impacts to the canopy of Tree 3 may not be accepted by Council. If no other options are available a *Tree Pruning Specification Report (TPSR)* will be required so that excessive pruning is not undertaken on this tree. This TPSR will be required by Council.

Table 2: TPZ incursions

Tree Number	TPZ (Area)	TPZ incursion %	Incursion graphic
1	135m²	7.7m² 5.7% incursion	
2	534m²	13m² 2.4% incursion	
3	39m²	1m² 2.6% incursion	

TREE PROTECTION SPECIFICATION

APT PROJECT, Woolloomooloo

TREE PROTECTION SPECIFICATION

1 INTRODUCTION

1.1 This Tree Protection Specification (TPS) has been detailed for the project known as APT Woolloomooloo, an automated public toilet installation at this site. This section of the report addresses the protection of the trees specified within this report.

1.2 The tree protection specified within this report is to be in place PRIOR to the commencement of any site works. "Site works" includes the demolition of existing structures or the entrance onto the site of any machinery for excavation, soil remediation or large-scale facility removal.

2 METHODOLOGY

2.1 **Tree Protection Zones (TPZ):** The Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. The TPZ is 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. TPZ's have been calculated for the site trees. The TPZ calculation is based on the Australian Standard *Protection of trees on development sites,* AS 4970, 2009. The Tree Protection Zones are listed in Appendix 2 (Tree Schedule) and can also be seen in the Site Location Plan (Appendix 1).

2.2 **Structural Root Zone (SRZ)**: The SRZ is a specified distance measured from the trunk that is set aside for the protection of tree roots, both structural and fibrous. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The TPZ and SRZ are measured as a radial measurement from the trunk. No roots should be severed within this area. A detailed methodology on the TPZ and SRZ calculations can be found in Appendix 5.

2.3 This document is also references the Australian Standard *Protection of trees on development sites,* AS 4970, 2009. The tree protection specifications and measures in this report are based on this Standard, but not limited to AS 4970.

3 TREE PROTECTION SPECIFICATIONS

3.1 The Client shall appoint a Project Arborist to help manage any tree related issues relating to the site trees during construction. The Project Arborist shall carry AQF Level 5 Diploma of Arboriculture qualifications and be a member of either professional associations, Arboriculture Australia (AA) or The Institute Australian of Consulting Arborists (IACA).

3.2 The key areas of tree protection for this project are protecting the canopies and the canopy overhang through site access and excavations relating to footing and service connections.

3.3 Council has specified that non-destructive exploratory excavations are to occur to expose roots greater than forty(40) millimetres in diameter for the footing excavations.

3.4 **Tree Protection Zone (TPZ) breach:** The TPZ distances are breached on Trees 1, 2 and 3. The TPZ encroachments for these trees is <10%. The following methodologies shall be applied near these breaches for the APT footing area;

3.5 **Mechanised excavation:** A flat bucket attachment on the excavator can be used within the TPZ areas for Trees 1, 2 and 3 to locate roots provided levels are reduced by small increments so as not to damage any roots found. Should any roots 40mm or >40mm be located hand excavation will follow. This is to ensure that no roots within the TPZ are to be cut or damaged that are >40mm in diameter. The Project Arborist shall supervise hand excavation works within any TPZ area.

or

3.6 **Hydrovac:** An alternative option and preferred method, is excavation with water pressure and vacuum methods (Hydrovac). When undertaking hydro-vacuum excavation the water pressure shall be calibrated so as to not damage, remove bark, or sever roots over 40mm in diameter. Canopy clearance will require assessment based on the size of the truck that will be supplied. Depending on the location of storage bays and site sheds it may be possible to park the truck off the street, provided canopy clearance is available. The truck should also be kept out of the TPZ areas and not parked within any TPZ area for the duration of the works except where there is hard surface for the truck to park on.

No roots >40mm within the SRZ are to be cut or damaged. The Project Arborist shall supervise these works.

3.7 Canopy protection: Protection of the tree canopies is imperative. The main issue will be the area between the canopies and the delivery space. The choice of vehicle shall be confirmed prior to works commencing and shall ensure that the boom and slings will remain clear of all tree canopies. City of Sydney will generally not accept pruning of tree canopies under any circumstance. A spotter shall be used to ensure that clearance is maintained through the installation of the new APT.

3.8 Building material storage: Areas on the sites shall have to be set aside for the exclusive use of:

- Construction access points / roads
- Position of site sheds and latrines and temporary services
- Storage of materials

These points are to be outside of any TPZ area. Any area set aside for the stockpiling of soil and waste shall have the appropriate erosion control measures around this area as specified by an engineer. These erosion control measures shall be monitored and maintained regularly throughout the construction period of the site. These measures are to restrict any waste material entering the TPZ areas of the trees to be retained.

3.9 Damaged trees: If any tree is damaged (bark tear, branch damage, root damage) during construction the Project Arborist shall be notified as soon as possible so that remedial action can be taken. Under no circumstances are construction personnel to repair any damaged trees.

3.10 **Root Pruning:** Any roots found during any excavation shall not be pruned unless under forty (40) millimetres in diameter. If roots are found and are over forty (40) millimetres in diameter, the Project Arborist shall be contacted immediately. Any tree roots over forty (40) millimetres in diameter that are damaged due to excavation or any other construction work shall be pruned cleanly with a saw following approval by the Project Arborist.

3.11 **Spoil:** Spoil from trenches or other excavations shall not be placed within TPZ areas that are soil. Hard surfaces is acceptable.

3.12 Table 3 lists Arboricultural hold points for the project. Along with these hold points the client will ensure each contractor supervisor shall be made aware at the initial site inductions the site specific tree related issues relating to the protection of the site trees.

Hold point	**Action required**
1	Site induction meeting with contractors.
2	Site inspection of trees prior to works commencing to ensure client does not "inherit" tree damage from previous root pruning on Tree 3
3	Trunk protection to be installed on Trees 1, 2 and 3
4	Project Arborist to supervise footing excavations.
5	Project Arborist to inspect site once all works are completed and to supply any remediation report.

Table 3: Tree Protection Hold points.

4 TREE PROTECTION MEASURES

4.1 Individual trunk protection: Trees 1, 2 and 3 will require trunk protection. This is achieved by attaching lengths of timber (75mm x 50mm x 2000mm) fastened around the trunk. Geotextile fabric or carpet underlay shall be wrapped around the trunk prior to the timbers being attached. These timbers are to be fastened with hoop iron strapping and not attached directly into the bark of the tree. These timbers are only to be removed when all construction is complete. See Plate A for an example of trunk protection.

Plate A: Example of trunk protection. P. Vezgoff.

4.2 The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ): The TPZ is implemented to ensure the protection of the trunk and branches of the subject tree. The TPZ is based on the Diameter at Breast Height (DBH) of the tree. The SRZ is also a radial measurement from the trunk used to protect and restrict damage to the roots of the tree.

The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) shall be measured from the centre of the trunk. The following activities shall be avoided within the TPZ and SRZ of the subject trees;

- Erecting site sheds or portable toilets.
- Trenching, ripping or cultivation of soil (with the exception of approved footings).
- Soil level changes or fill material.
- Storage of building materials. On the hard surfaces within the TPZ areas is acceptable.
- Disposal of waste materials, solid or liquid.

5 SITE INSPECTIONS

5.1 Site Induction: A site induction shall be undertaken between the Construction Contractor and the appointed Project Arborist. This is to ensure that Construction Contractor is made aware of the Inspection times and specific areas of the project that will require Arboricultural supervision.

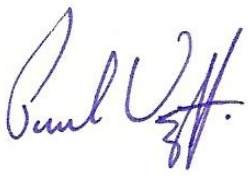
5.2 Site Inspections: In order to verify that retained trees have been correctly retained and protected as per the Arborist recommendations the Site Inspection Form (Appendix 7) shall be completed for each visit.

5.3 Table 3 (Tree Protection Specifications Section 3.12) lists the project hold points.

5.4 Additional Inspections. Additional inspections may be required as works proceed. These may include, but not be limited to, the following;

- Additional tree treatments
- Design changes
- Unapproved activity near trees

If you have any questions in relation to this report, please contact me.



Paul Vezgoff
Consulting Arborist
Dip Arb (Dist), Arb III, Hort cert, AA, ISA

22 March 2022

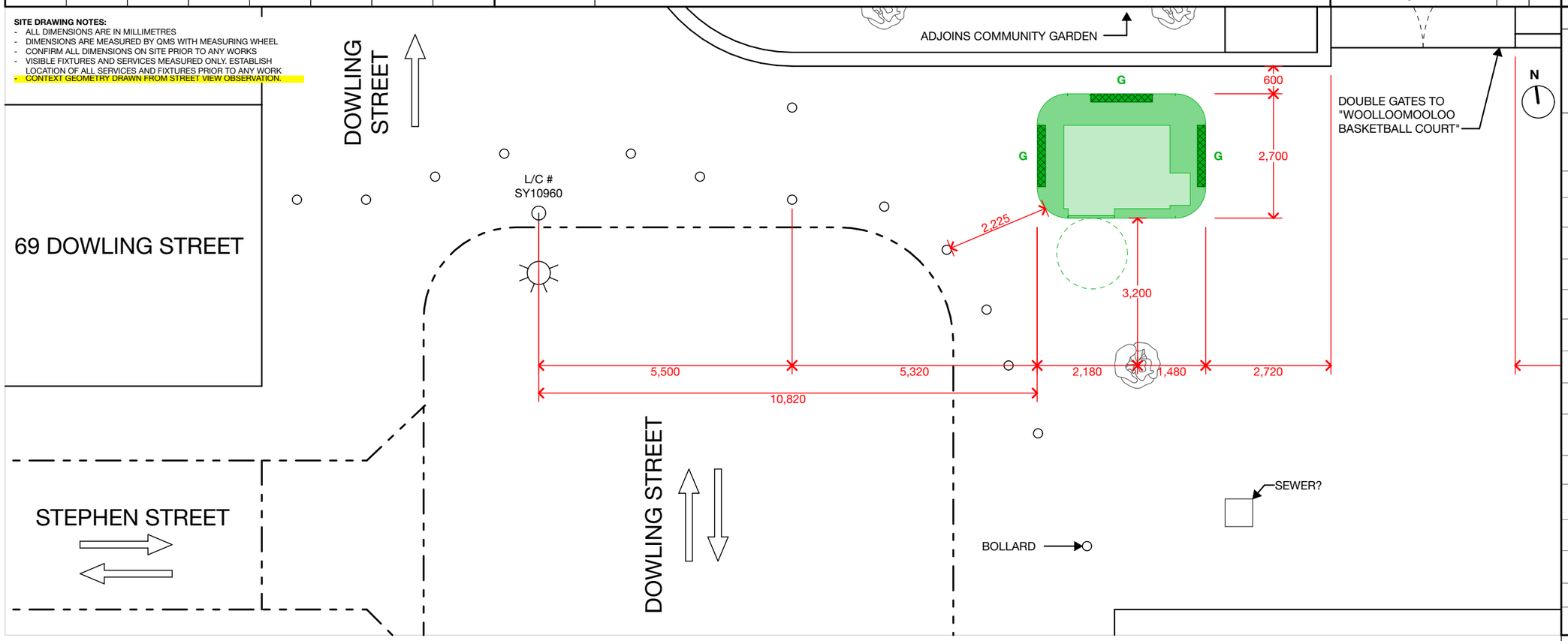
Appendix 1

Site Location Plan

Dowling Street, Woolloomooloo

EXISTING SITE ID: APTXX	**NEW APT ID:** APT16	**ROAD TYPE:**	☐ Local	☐ Secondary	☐ Main	**ASSET TYPE:**	**REINSTATEMENT:**	**SIGNIFICANT GRADIENT:**			**OHS CONSIDERATIONS:**
MAIN STREET:	SYDNEY PLACE AT DOWLING STREET	**AREA:**	☐ Residential	☐ Commercial	☐ Industrial	☐ Communication Pylon	☐ Asphalt ☐ Other	Lengthwise	Y	N	☐ Overhead Cables ☐ Other
						☐ Bus Shelter	☐ Brick	Width Wise	Y	N	☐ Underground Cables
CROSS STREET:	DOWLING STREET	**SITE ZONE:**	☐ CBD Zone	☐ Village Area	☐ Other	☐ Bus Shelter Narrow	☐ Concrete	**FOOTPATH WIDTH:**			☐ Gas Main
OUTSIDE/OPP.:		**JCD NO.:**	APT16	**APT TYPE:**	SINGLE	☐ Kiosk	☐ Concrete Paving	Actual Footpath Width			☐ Water Main
ROAD DIRECTION:		**AD TYPE:**	☐ AD	**CONFIG:**	LH	☒ APT	☐ Specialist Paving	Narrow Kiosk Required	Y	N	☐ Telephone
ADDITIONAL AD POTENTIAL:	☐ Yes ☐ No		☒ Non-AD	**GREEN ROOF:**	NO		☐ Unmade/Grass	Narrow Footpath	Y	N	☐ Traffic Management
POTENTIAL ADVERTISEMENTS:	D = Digital S = Static G = Green Wall	**COMMENTS:**						<1.2m clear path or <1.8m clear path in City Centre/Village Main Street			☐ Access Issues
Face A N/A	Face B N/A	Face C N/A									☐ Parking Issues

SITE DRAWING NOTES:
- ALL DIMENSIONS ARE IN MILLIMETRES
- DIMENSIONS ARE MEASURED BY QMS WITH MEASURING WHEEL
- CONFIRM ALL DIMENSIONS ON SITE PRIOR TO ANY WORKS
- VISIBLE FIXTURES AND SERVICES MEASURED ONLY. ESTABLISH LOCATION OF ALL SERVICES AND FIXTURES PRIOR TO ANY WORK
- CONTEXT GEOMETRY DRAWN FROM STREET VIEW OBSERVATION.



LEGEND

- NEW AUTOMATIC PUBLIC TOILET (APT)
- WHEELCHAIR MANOUVERING AREA
- EXISTING APT OUTLINE
- SEAT — EXISTING BENCH SEAT
- BIN
- TREE (NTS)
- POWER POLE
- SMART POLE/LIGHT POLE
- PIT — SERVICE PIT
- ? — UNKOWN SERVICE PIT
- TRAFFIC LIGHT
- SIGN POST/LOADING ZONE/PARKING
- BIKE RACK
- GRASS
- PLANTER BED
- TACTILE INDICATOR-EXIST
- STREET KERB
- FENCE

DATE:	21/4/22
SCALE:	1:100@A3
DRAWN:	BAT
SURVEY NO.:	APT16

ISSUE	DESCRIPTION	DATE	DRAWN
03	APTs - UPDATES	21/4/22	BAT

PLANNING APPLICATION NOTES:
1. The proposal relates to the APT and advertising signage panel.
2. Refer to the DA Master Matrix for the APT Type. Drawings for each APT Type can be found in the Schedules of the SEE.
3. Tactile Ground Surface Indicators are indicative only. All TGSI to comply with AS1428.4.1

0 1 2 3 4 5m

LOCATION PLAN - PROPOSED

EXISTING SITE ID:	**APTXX**
NEW APT ID:	**APT16**

Appendix 2

Tree health & condition assessment schedule

TREE FIELD DATA SCHEDULE – APT, Dowling Street, Woolloomooloo

Tree	Species	Height (m)	Spread (m)	DBH (m)	SRZ basal	Live canopy %	SULE	Condition	Age	Comments	TPZ (m)	SRZ (m)
1	Broad leaved paperbark (Melaleuca quinquenervia)	16	7	0.55	0.65	90	2a May only live for 15-40 years	Good	Mature	Codominant tree growing within a garden bed restricted roots behind Sandstone wall. Asymmetrical lane to the south west	6.6	2.7
2	Kaffir plum (Harpephyllum caffrum)	15	9	1.1	1.2	95	2a May only live for 15-40 years	Good	Mature	Codominant tree growing within a garden bed restricted roots behind Sandstone wall	13.2	3.5
3	Hackberry (Celtis australis)	9	5	0.29	0.39	100	2a May only live for 15-40 years	Good	Mature	Tree in good health and condition damage to Asphalt surface. Raised woody roots within SRZ area.	3.5	2.2

KEY

Tree No: Relates to the number allocated to each tree for the Tree Plans.

Height: Height of the tree to the nearest metre.

Spread: The average spread of the canopy measured from the trunk.

DBH: Diameter at breast height. An industry standard for measuring trees at 1.4 metres above ground level, this measurement is used to help calculate Tree Protection Zones.

Live Crown Ratio: Percentage of foliage cover for a particular species.

Age Class:	Young:	Recently planted tree	Semi-mature:< 20% of life expectancy
	Mature:	20-90% of life expectancy	Over-mature:>90% of life expectancy

SULE: See SULE methodology in the Appendix 4

Tree Protection Zone (TPZ): The minimum area set aside for the protection of the trees trunk, canopy and root system throughout the construction process. Breaches of the TPZ will be specified in the recommendations section of the report.

Structural Root Zone (SRZ): The SRZ is a specified distance measured from the trunk that is set aside for the protection of the trees roots both structural and fibrous.

Appendix 3

Tree Significance - Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ - tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

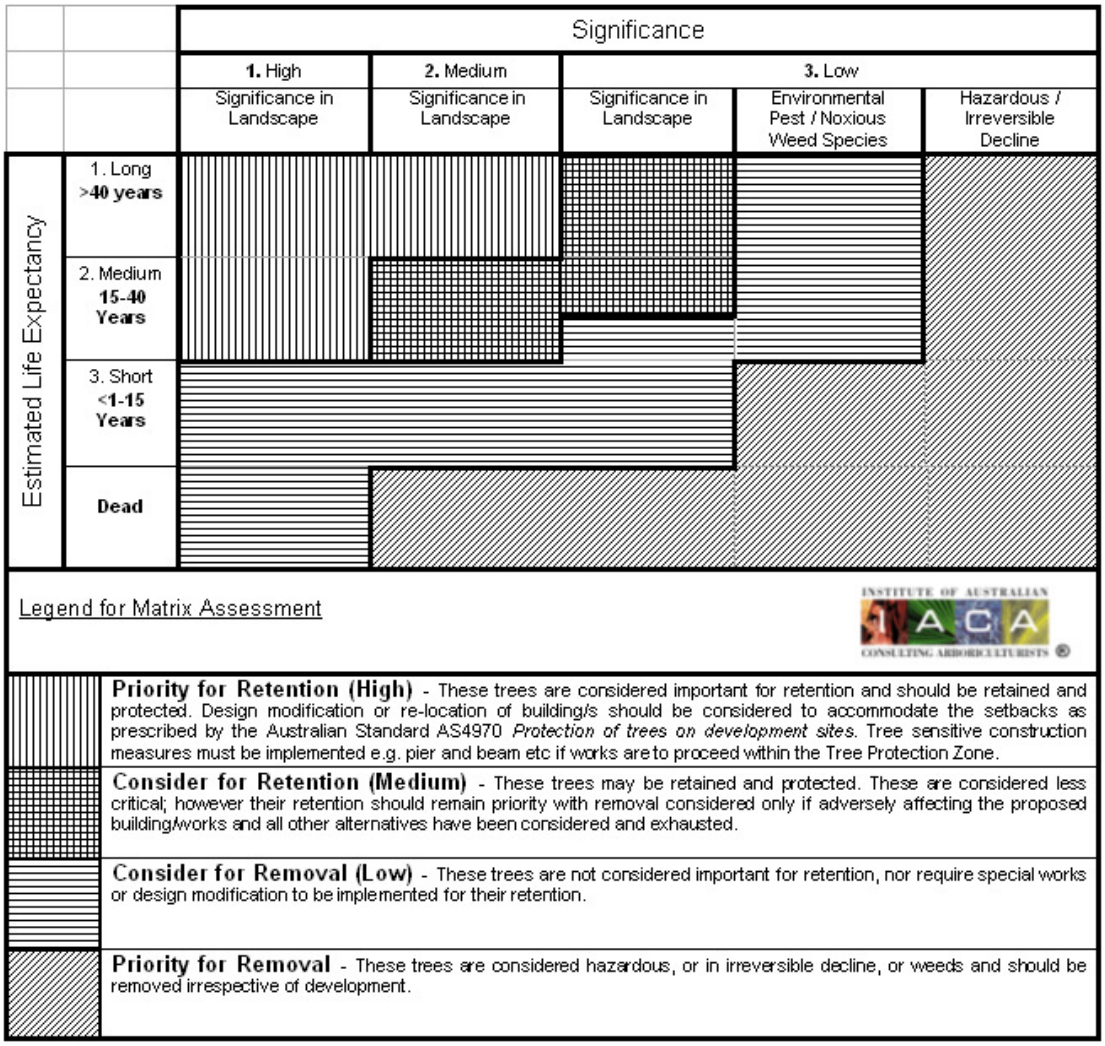
Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous, - The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.



Legend for Matrix Assessment.

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, **www.iaca.org.au**

Appendix 4

SULE categories (after Barrell, 2001)[1]

SULE Category	Description
Long	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.
1a	Structurally sound trees located in positions that can accommodate for future growth
1b	Trees that could be made suitable for retention in the long term by remedial tree care.
1c	Trees of special significance that would warrant extraordinary efforts to secure their long-term retention.
Medium	Trees that appeared to be retainable at the time of assessment for 15-40 years with an acceptable level of risk.
2a	Trees that may only live for 15-40 years
2b	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons
2c	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.
2d	Trees that could be made suitable for retention in the medium term by remedial tree care.
Short	Trees that appeared to be retainable at the time of assessment for 5-15 years with an acceptable level of risk.
3a	Trees that may only live for another 5-15 years
3b	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
3c	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
3d	Trees that require substantial remedial tree care and are only suitable for retention in the short term.
Remove	Trees that should be removed within the next five years.
4a	Dead, dying, suppressed or declining trees.
4b	Dangerous trees because of instability or loss of adjacent trees
4c	Dangerous trees because of structural defects
4d	Damaged trees not safe to retain.
4e	Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
4f	Trees that are damaging or may cause damage to existing structures within 5 years.
Small	Small or young trees that can be reliably moved or replaced.
5a	Small trees less than 5m in height.
5b	Young trees less than 15 years old but over 5m in height.

1 (Barrell, J. (2001) "SULE: Its use and status into the new millennium" in *Management of mature trees*, Proceedings of the 4th NAAA Tree Management Seminar, NAAA, Sydney.

Appendix 5

TPZ and SRZ methodology

Determining the Tree Protection Zone (TPZ)

The radium of the TPZ is calculated for each tree by multiplying its DBH x 12.

TPZ = DBH x 12

Where

DBH = trunk diameter measured at 1.4 metres above ground

Radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 metres no greater than 15 metres (except where crown protection is required.). Some instances may require variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 metre outside the crown projection.

Determining the Structural Root Zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1. Root investigation may provide more information on the extent of these roots.

SRZ radius = $(D \times 50)^{0.42} \times 0.64$

Where

D = trunk diameter, in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15m will be 1.5m (see Figure 1).

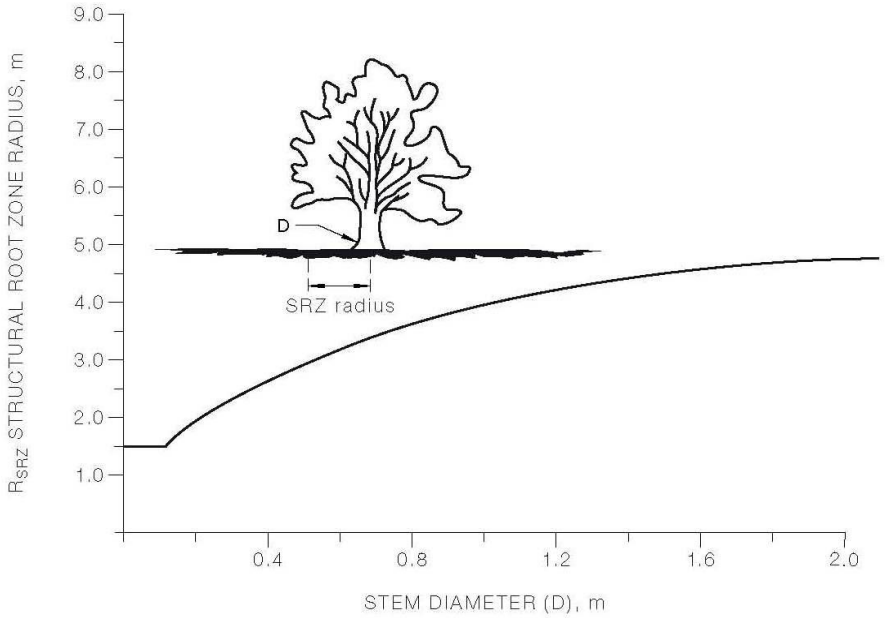


FIGURE 1 - STRUCTURAL ROOT ZONE

Notes:

1 R_{SRZ} is the structural root zone radius.
2 *D* is the stem diameter measured immediately above root buttress.
3 The SRZ for trees less than o.15 metres diameter is 1.5 metres.
4 The SRZ formula and graph do not apply to palms, other monocots, cycads and tree ferns.
5 This does not apply to trees with an asymmetrical root plate.

Appendix 6

Explanatory Notes

- **Mathematical abbreviations:** > = Greater than; < = Less than.

- **Measurements/estimates:** All dimensions are estimates unless otherwise indicated. Less reliable estimated dimensions are indicated with a '?'.

- **Species:** The species identification is based on visual observations and the common English name of what the tree appeared to be is listed first, with the botanical name after in brackets. In some instances, it may be difficult to quickly and accurately identify a particular tree without further detailed investigations. Where there is some doubt of the precise species of tree, it is indicated with a '?' after the name in order to avoid delay in the production of the report. The botanical name is followed by the abbreviation sp if only the genus is known. The species listed for groups and hedges represent the main component and there may be other minor species not listed.

- **Height:** Height is estimated to the nearest metre.

- **Spread:** The maximum crown spread is visually estimated to the nearest metre from the centre of the trunk to the tips of the live lateral branches.

- **Diameter:** These figures relate to 1.4m above ground level and are recorded in centimetres. If appropriate, diameter is measure with a diameter tape. 'M' indicates trees or shrubs with multiple stems.

- **Estimated Age:** Age is estimated from visual indicators and it should only be taken as a provisional guide. Age estimates often need to be modified based on further information such as historical records or local knowledge.

- **Distance to Structures:** This is estimated to the nearest metre and intended as an indication rather than a precise measurement.

Appendix 7

Arborist site inspection form

Site address…….
Date of inspection…….....
Site Arborist……
Also present…….

Development stage

- ☐ Preconstruction
- ☐ Tree Care
- ☐ Trenching
- ☐ Demolition / Stripping
- ☐ Soil profiling
- ☐ Street construction/ Drainage/ Utilities
- ☐ Building construction
- ☐ Fine grading/ landscaping
- ☐ Other

Site conditions

Tree No.concerns / conditions / treatment required

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Recommendations and follow-up

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Appendix 8

Bibliography

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Standards Australia Ltd

Sydney

Standards Australia, 2009. *Protection of trees on development sites*, AS 4970, 2009

Standards Australia Ltd

Sydney

Curriculum Vitae

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EDUCATION and QUALIFICATIONS

- 2007 – Diploma of Arboriculture (AQF Cert V) Ryde TAFE. (Distinction)
- 1997 – Completed Certificate in Crane and Plant Electrical Safety
- 1996 – Attained Tree Surgeon Certificate (AQF Cert II) at Ryde TAFE
- 1990 – Completed two-month intensive course on garden design at the Inchbald School of Design, London, United Kingdom
- 1990 – Completed patio, window box and balcony garden design course at Brighton College of Technology, United Kingdom
- 1989 – Awarded the Big Brother Movement Award for Horticulture (a grant by Lady Peggy Pagan to enable horticulture training in the United Kingdom)
- 1989 – Attained Certificate of Horticulture (AQF Cert IV) at Wollongong TAFE

INDUSTRY EXPERIENCE

Moore Trees Arboricultural Services **January 2006 to date**

Tree Consultancy and tree ultrasound. Tree hazard and risk assessment, Arborist development application reports
Tree management plans.

Woollahra Municipal Council **Oct 1995 to February 2008**

ARBORICULTURE TECHNICAL OFFICER
August 2005 – February 2008
Tree asset management, programmed inspection, inventory and condition surveys of council trees, hazard and risk appraisal, Tree root damage investigation and reporting, assessment of impacts of capital works projects on council trees.
ACTING COORDINATOR OF TREES MAINTENANCE
June – July 2005, 2006
Responsible for all duties concerning park and street trees. Prioritising work duties, delegation of work and staff supervision.
TEAM LEADER
January 2003 – June 2005
TEAM LEADER
September 2000 – January 2003
HORTICULTURALIST
October 1995 – September 2000

Northern Landscape Services **July to Oct 1995**

Tradesman for Landscape Construction business

Paul Vezgoff Garden Maintenance (London, UK) **Sept 1991 to April 1995**

CONFERENCES AND WORKSHOPS ATTENDED

- International Society of Arboriculture Conference (Canberra May 2017)
- QTRA Conference, Sydney Australia (November 2016)
- TRAQ Conference, Auckland NZ (October 2013)
- International Society of Arboriculture Conference (Brisbane 2008)
- Tree related hazards: recognition and assessment by Dr David Londsdale (Brisbane 2008)
- Tree risk management: requirements for a defensible system by Dr David Londsdale (Brisbane 2008)
- Tree dynamics and wind forces by Ken James (Brisbane 2008)
- Wood decay and fungal strategies by Dr F.W.M.R. Schwarze (Brisbane 2008)
- Tree Disputes in the Land & Environment Court – The Law Society (Sydney 2007)
- Barrell Tree Care Workshop- Trees on construction sites (Sydney 2005).
- Tree Logic Seminar- Urban tree risk management (Sydney 2005)
- Tree Pathology and Wood Decay Seminar presented by Dr F.W.M.R. Schwarze (Sydney 2004)
- Inaugural National Arborist Association of Australia (NAAA) tree management workshop- Assessing hazardous trees and their Safe Useful Life Expectancy (SULE) (Sydney 1997).