

EXPLORATORY ROOT INVESTIGATION REPORT|12 PHILIP RD. MONAVALLE

Prepared for Mr. Anthony Osment

6.7.21

1 EXECUTIVE SUMMARY

On the 1st July 2021 Mr. Anthony Osment of 12 Philip Rd. Mona Vale commissioned Abnoba Arbor to provide exploratory root investigation and report pertaining to a development at the aforementioned address.

Mr. Osment has already lodged a Development Application (DA2021/0447) and received a Landscape referral response from Northern Beaches Council requesting more information.

An Arborist report completed by Kane Hollstein of Canopy Consulting was submitted with the DA lodgement. This report has been written in conjunction that report.

The development includes the demolition of an existing retaining wall to be moved inward and replaced. This is being done in order to make way for a new 'granny flat' being placed at the bottom of the garden. This report focuses only on the retaining wall and the impact moving said wall will have on one *Syncarpia glomulifera* (Turpentine). No other trees on site have been assessed by Abnoba Arbor.

Site inspection and root mapping was conducted by Liam Strachan, AQF Level 5 arborist on 3rd July 2021.

The purpose of this report is to provide information on one *Angophora costata* (Sydney red gum) and the impact that the proposed swimming pool will have on the tree. Assessment of other trees on site did not form part of the scope of this report.

The purpose of this report is to provide information on one *Syncarpia glomulifera* (Turpentine) and the impact that moving the retaining wall will have on the tree. Assessment of other trees on site did not form part of the scope of this report.

The recommendations and comments in this report are based on the following:

- Conduct a basic ground based visual tree assessment
- Provide information regarding tree species, dimensions, Landscape amenity value, health and vigour assessment.
- Ascertain Tree Protection Zones and Structural Root Zones.
- Conduct exploratory root investigation using non-destructive measures.
- That report contains all relevant information as outlined in Northern Beaches Council DCP (Pittwater 21 DCP).
- That this report satisfies the details requested in Northern Beaches Landscape Referral Response DA2021/0447; 05/05/2021)

Exploratory root investigation was undertaken using hand tools only, the soil was excavated 600mm to the depth of the current retaining wall. Compacted clay was located between 450 and 550mm. The trench was dug at the line of the new wall.

No roots were located. The heavily compacted clay was removed and no root activity, including small fibrous roots from smaller shrubs located in close proximity to the trench were present within this soil horizon.

Based on the findings, it is apparent to the author of this report that the tree will remain viable post development, in terms of both health and structural integrity.

2 TABLE OF CONTENTS

1	EXECUTIVE SUMMARY	1
3	INTRODUCTION	3
3.1	SCOPE	3
4	METHOD.....	4
4.1	METHODOLOGY SUMMARY	4
4.2	LIMITATIONS	4
4.3	SITE INSPECTION	5
4.4	MEASUREMENTS	5
4.5	REFERENCE DOCUMENTS.....	5
4.6	DETERMINING A TREES SIGNIFICANCE	6
4.7	VTA.....	6
4.8	EXPLORATORY ROOT INVESTIGATION	6
4.9	AUSTRALIAN STANDARD AS4970-2009	6
5	FINDINGS.....	8
5.1	THE SITE	8
5.2	SUMMARY OF SITE INSPECTION DATA	8
5.3	SUMMARY OF PROPOSED DEVELOPMENT	8
5.4	CURRENT TREE POPULATION	9
5.5	TREE SIGNIFICANCE	9
5.6	PROPOSED DEVELOPMENT IMPACT.....	10
5.6.1	<i>Retaining wall</i>	10
6	DISCUSSION	10
6.1	EXPLORATORY ROOT INVESTIGATION	10
7	CONCLUSIONS AND RECOMMENDATIONS	11
8	WORKS CITED	11
9	GLOSSARY OF TERMS.....	12
10	APPENDIX 1: TREE SCHEDULE	13
11	APPENDIX 2: STARS	14
12	SITE PHOTOGRAPHS.....	16
13	SITE DRAWINGS	19

3 INTRODUCTION

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The development includes the demolition of an existing retaining wall to be moved inward and replaced. This is being done in order to make way for a new 'granny flat' being placed at the bottom of the garden. This report focuses only on the retaining wall and the impact moving said wall will have on one *Syncarpia glomulifera* (Turpentine). No other trees on site have been assessed by Abnoba Arbor.

Site inspection and root mapping was conducted by Liam Strachan, AQF Level 5 arborist on 3rd July 2021.

3.1 SCOPE

The purpose of this report is to provide information on one *Syncarpia glomulifera* (Turpentine) and the impact that moving the retaining wall will have on the tree. Assessment of other trees on site did not form part of the scope of this report.

The recommendations and comments in this report are based on the following:

- Conduct a basic ground based visual tree assessment
- Provide information regarding tree species, dimensions, Landscape amenity value, health and vigour assessment.
- Ascertain Tree Protection Zones and Structural Root Zones.
- Conduct exploratory root investigation using non-destructive measures.
- That report contains all relevant information as outlined in Northern Beaches Council DCP (Pittwater 21 DCP).
- That this report satisfies the details requested in Northern Beaches Landscape Referral Response DA2021/0447; 05/05/2021)

Australian Standard AS4970-2009 Protection of Trees on Development Sites has been used as a benchmark in the preparation of this report.

The report will also assess the on-going viability of the tree and if deemed appropriate, provide recommendations for pruning or the removal of the subject trees. The following report will focus on the trees sustainability within the landscape and will provide recommendations on the most appropriate course of action. The determination will be reached through the assessment of the tree's health, vigour, and structural condition at the time of inspection. The assessment did not include any internal diagnostics such as picus, resistograph, woody tissue examination, nor has any soil testing been conducted.

4 METHOD

4.1 METHODOLOGY SUMMARY

Table 1

Characteristic	Method
Photos	Digital camera
Tree measurements • Height • DBH(Diameter at breast height) • SRZ (Structural root zone) • TPZ (Tree protection zone)	• Clinometer, Tape measure • Diameter tape • $SRZ = (DAB \times 50)^{0.42} \times 0.64$ • $DBH \times 12$ (AS4970-2009)
Documents Reviewed	• Northern Beaches DCP (Pittwater 21 DCP) • Pittwater LEP 2014 • Canopy Consulting Arborist Report Ref. Q1242
Drawings Reviewed	• RK Designs Site and Roof Plan Dwg. 20-92 (1) • RK Designs Ground Floor Plan Dwg. 20-92 (2) • RK Designs Elevations and Sections Dwg. 20-92 (3)
Tree retention assessment	ULE (Useful life expectancy) STARS METHOD (IACA, 2010)
Tree health assessment	Visual Tree Assessment, (VTA) as per (Mattheck, et al., 2015) Inspection limited to ground based visual examination of the tree.

4.2 LIMITATIONS

Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible. However, Liam Strachan - Consulting Arborist can neither guarantee nor be responsible for the accuracy of information provided by others. Unless stated otherwise:

- Information contained in this report covers only the trees examined and reflects the health and structure of the tree at the time of inspection. The documented, observations, results, recommendations and conclusions given may vary after the site visit due to environmental conditions. Liability will not be accepted for damage to person or property as a result of natural processes, unforeseeable actions or occurrences.
- Observations recorded for trees located within adjacent properties have been made without entering that property. Deciduous trees inspected during winter and all trees obscured by other vegetation are

not able to be properly assessed. As a result, measurements for these trees are estimated. Similarly, these trees were not subject to a complete visual inspection and defects or abnormalities may be present but not recorded.

- The inspection was limited to visual examination from the base of the subject tree without dissection, excavation, probing or coring (unless specifically noted otherwise).
- There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

4.3 SITE INSPECTION

A visual inspection of the tree/s was performed from ground level, data collected includes:

- Genus, Species, Common Name;
- Height, Width, DBH (Diameter at Breast Height), DRB (Diameter above Root Buttress);
- Age, Health & Vigour;
- Significance, Amenity and Ecological Value;
- Form and Structural Condition;
- Visible Defects or Evidence of Wounding.

4.4 MEASUREMENTS

- Tree locations are supplied by client on the survey plan or triangulated using a measuring tape.
- Diameter at breast height (DBH) and Diameter above Root Buttress (DRB) are measured using a diameter tape.
- Height is measured using a clinometer.
- Canopy width is measured using a laser measure or tape measure.
- Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) radii are calculated (in accordance with AS 4970-2009).
- TPZ or SRZ incursions are measured from the nearest face of the trunk to the face of the structure.

Tree schedule data is recorded in Appendix1.

4.5 REFERENCE DOCUMENTS

This report was written in coordination with:

- Northern Beaches DCP (Pittwater 21 DCP)
- Pittwater LEP 2014
- Canopy Consulting Arborist Report Ref. Q1242
- Australian Standard AS4970-2009 Protection of Trees on Development Sites
- RK Designs Site and Roof Plan Dwg. 20-92 (1)
- RK Designs Ground Floor Plan Dwg. 20-92 (2)
- RK Designs Elevations and Sections Dwg. 20-92 (3)

4.6 DETERMINING A TREES SIGNIFICANCE

Tree health assessments were carried out using VTA as per Mattheck and significance and retention determinations were carried out using the STAR's method which combines ULE (useful life expectancy of subject tree) and significance rating based on characteristics such as health, form, vigour, cultural, heritage and amenity value. The 2 results are placed within a matrix which determines the retention value.

1. Is the tree a locally native remnant; an endangered species; a part of an endangered ecological community; or does the tree provide critical habitat for an endangered species?
2. Is the tree of botanical interest; Is it included in a significant tree register or listed as a heritage item under the Federal State or Local Regulations?
3. Is the tree visually prominent in the locality?
4. Is the tree well structured?
5. Is the tree in good health and/or does it display signs of good vigour?
6. Is the tree typically formed for the species?
7. Is the tree currently located in a position that will accommodate future growth?

Please see Appendix 2: Stars.

4.7 VTA

The VTA system is based on the theory of tree biology, physiology and tree architecture and structure. This method is used by Arborists to identify visible signs on trees that indicate good health or potential problems. Symptoms of decay, growth patterns and defects are identified and assessed as to their potential to cause whole tree, part tree or branch failure, this system is based around methods discussed by Claus Mattheck in 'The Body Language of Trees' (1994). For the purpose of this report, parts of the VTA system will be used along with other industry standard literature and other relevant studies that provide an insight into potential hazards in trees. This assessment is a snapshot of what could be reasonably seen or determined from a basic visual inspection. The VTA system is generally used as a means to identify hazardous trees, it is important to realize that for a tree to be hazardous there must be a target.

4.8 EXPLORATORY ROOT INVESTIGATION

Exploratory root investigation was undertaken using hand tools in order to preserve any large roots that were encountered. Uncovered roots were to be sprayed with pink spray paint, measured and plotted on the Ground Floor Plan.

4.9 AUSTRALIAN STANDARD AS4970-2009

- The Australian Standard AS4970–2009 Protection of trees on development sites has been used as a benchmark in the preparation of this report and the terminology and impact assessment methodology have been adopted from this document. This AIA complies with 2.3.5 Arboricultural Impact Assessment of AS4970-2009.
- Recommendations have been based on tree Retention Value, Vigour, Condition and ULE. Trees with a high Retention Value should be given greater priority for retention than trees with Medium Retention Value. Trees with Long (40 years +) ULE should be given greater priority for retention than trees with Short (5-15 years) ULE

- Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) are as per Section 3 of AS4970-2009 and are defined in the rear of this report. It should be noted that the TPZs and SRZs indicated on the site drawings are notional areas only and do not reflect actual root locations.
- “Construction” for the purpose of this AIA means excavation (greater than 100mm), compacted fill or machine trenching. “Excavation” includes cut batters, boxing-out for the various pavement types, trenching for utilities and footings for retaining walls.
- Trees within proposed construction footprints are recommended for removal (Rm).
- 3.4.6 Where construction is proposed within Structural Root Zone (SRZ) offsets, those trees have been similarly recommended for removal (Rm). Fully elevated, pier and beam type construction or hand dug services trenches (or horizontal boring) is recommended and an accepted form of construction methodology for this type of structure.
- Trees with greater than 25% of the Tree Protection Zone (TPZ) impacted by construction are generally recommended for removal (Rm). There are however different types of construction incursions proposed (e.g. fill, cut, services, pavement type, retaining walls) with varying tree impacts likely. Existing constraints to root development also vary the notional TPZ. Compacted fill can be equally as damaging to tree longevity: root development is restricted within heavily compacted soils.
- Trees to be retained with construction impacting less than 25% of the TPZ area were rated as. Specific construction monitoring will be required for these trees (refer to Recommendations).
- TPZ encroachments of >10% are defined (3.3.3 of AS4970) as ‘major’. This does not mean that the tree will be fatally injured, but that ‘the project arborist must demonstrate that the tree(s) would remain viable’.
- Where construction is proposed beyond the TPZ, those trees are rated as Retain (R) with no specific tree protection design or tree protection monitoring required.

5 FINDINGS

5.1 THE SITE



Figure 1

The site is a multi-level residential block located at 12 Philip Rd. Mona Vale containing one multi-storey dwelling. The site has a steep north-western gradient and is separated by a series of terraces. The proposed granny flat is to be located on the lowest of the terraces at the northern end of the site.

The subject tree is located in a raised garden bed and is separated from the lower terrace by a 600mm wooden retaining wall that is built using pier and beam construction.

The subject tree is circled in red.

5.2 SUMMARY OF SITE INSPECTION DATA

One large *Syncarpia glomulifera* (Turpentine) was assessed, the purpose of this report is to provide information regarding the new placement of the retaining wall.

5.3 SUMMARY OF PROPOSED DEVELOPMENT

The development includes the installation of one new 'granny flat' which will require the existing retaining wall to be moved 500m to the south of the site (closer to the tree).

5.4 CURRENT TREE POPULATION

A total of one tree was assessed in total.

The tree population comprised of:

Table 2

Species	Origin	No. Of Trees
<i>Syncarpia glomulifera</i> (Turpentine)	Endemic	T11

5.5 TREE SIGNIFICANCE

Retention values were recorded using IACA Significance of a Tree, Assessment Rating System (STARS). Results are published in the table below.

Table 3

Retention Value	Low	Med	High
Tree No.			T11

IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au Appendix 2.

5.6 PROPOSED DEVELOPMENT IMPACT

Tree Protection Zones (TPZ's) and Structural Root Zones (SRZ's) are defined as per Section 3 of Australian Standard AS4970-2009 Protection of Trees on Development Sites. It should be noted that TPZ's and SRZ's are notional areas only and do not reflect actual root locations. All TPZ's and SRZ's are marked on plans located at the rear of this document.

5.6.1 RETAINING WALL

Table 4

<i>Tree No.</i>	<i>Ret. Value</i>	<i>TPZ Inc.</i>	<i>SRZ Inc.</i>	<i>Major/ Minor</i>	<i>Building Part</i>	<i>Retainable</i>	<i>Comments</i>
T11	H	16%	No	Major	Retaining Wall	Yes	Excavation revealed no root conflict.

6 DISCUSSION

6.1 EXPLORATORY ROOT INVESTIGATION

Exploratory root investigation was undertaken using hand tools only, the soil was excavated 600mm to the depth of the current retaining wall. Compacted clay was located between 450 and 550mm. The trench was dug at the line of the new wall.

No roots were located. The heavily compacted clay was removed and no root activity, including small fibrous roots from smaller shrubs located in close proximity to the trench were present within this soil horizon.

Although the overhead plans show that the new wall is being placed within the TPZ of the tree, this is not the case. The tree is located upon a steep slope and the excavation is in fact taking place just outside of the 2.9m Structural Root Zone at 3.4 metres.

The tree trunk was observed to have a significant lean to the North due to the surrounding vegetation and the building being located on a higher terrace. The tree has grown towards the light and then self-corrected. However, the tree is still more heavily weighted to the North. This means that the tension roots are located at the southern side of the tree and the compression roots at the northern end.

On the southern side of the tree, there is a brick paved yard and an old wall separating the terrace area from the garden. The wall most likely predates the tree and is clearly disturbed by the tree roots suggesting the presence of larger roots on the tension side of the tree.

It is not uncommon for trees growing on slopes to lay the vast majority of their roots uphill. The tension side of a root plate is usually always significantly larger and contains thicker, larger roots than the compression side. It is not uncommon for trees on slopes to lay down nearly vertical support roots on the compression side of the tree.

7 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings, it is apparent to the author of this report that the tree will remain viable post development, in terms of both health and structural integrity.

8 WORKS CITED

IACA. (2010). *www.iaca.org.au*. Retrieved August 13, 2018

Mattheck, C., Bethge, K., & K. Weber. (2015). *The Body Language of Trees, Encyclopedia of Visual Tree Assessment*. Karlsruhe: Karlsruhe Institute of Technology.

9 GLOSSARY OF TERMS

- **COMMON NAME/GENUS SPECIES CULTIVAR** – Common names can vary with selected texts. Where species is unknown, “sp.” indicated after genus. Where cultivar is unknown “cv” indicated after species.
- **DBH – Diameter at Breast Height.** Tree trunk diameter measured at breast height (1.4 metres above ground level). Fabric diameter tape is used which assumes a circular cross section. Multiple measurements indicate multiple trunks. Where DBH measurement cannot be taken at 1.4m the height at which it has been taken is indicated.
- **CANOPY SPREAD RADIUS** – Average canopy radius, Circular canopy depictions on Tree Plan/Survey are indicative only. Where canopy spread was significantly skewed, all four cardinal point measurements were recorded.
- **AGE CLASS** – Immature (IM), Semi-mature (SM), Mature (M). Assessment of the tree’s current Age. A Mature (M) tree has reached a near stable size above and below ground. Trees can have a Mature age class for >90% of life span.
- **VIGOUR** – Good (G), Average (A), Below Average (BA) or Poor (P). The general appearance of the canopy/foilage of the tree at the time of inspection. Vigour can vary with the season and rainfall frequency. A tree can have Good vigour but be hazardous due to Poor condition. A tree in Good vigour has the ability to sustain its life processes. Vigour is synonymous with health.
- **CONDITION** – Good (G), Average (A), Below Average (BA) or Poor (P). The general form and structure of the trunk/s and branching. Trunk lean, trunk/branch structural defects, canopy skewness or other hazard features are considered.
- **SRZ RADIUS** – Structural Root Zone. The area around a tree required for tree stability. Earthworks should be prohibited within the SRZ. The area is calculated from the formula outlined in AS4970-2009.
- **TPZ RADIUS** – Tree Protection Zone. Radial offset (m) of twelve times (12x) trunk DBH measured from centre of trunk (for trees less than 0.3 metre DBH minimum TPZ is 2.0 metres). To satisfactorily retain the tree, construction activity (both soil cut and fill) must be restricted within this offset. TPZ offsets are rounded to the nearest 0.1 metre. Existing constraints to root spread can vary. Generally an area equivalent to the TPZ should be available to the tree post development. Encroachment occupying up to 10% of the TPZ area is acceptable without detailed rootzone assessment. Encroachments greater than 10% require specific arboricultural assessment.
- **ULE** – Useful Life Expectancy. The length of time from the date of inspection that the Arborist estimates the tree will live and provide a useful positive contribution to the landscape amenity of the site. ULE ratings are Long (retainable for 40 years or more), Medium (retainable for 16-39 years), Short (retainable for 5-15 years) and Removal (tree requiring immediate removal due to imminent risk or absolute unsuitability).
- **RECOMMENDATIONS** – Retain (R) No TPZ encroachments; Remove (R)

10 APPENDIX 1: TREE SCHEDULE

Tag No.	Species	Height (m)	DBH (mm) DAC (mm)	Canopy Spread (m)	TPZ (M) SRZ (M)	Health #	Structure #	ULE Rating ****	Landscape Rating +	Stars Rating +	Observations and comments
T11	<i>Syncarpia glomulifera</i> Turpentine	11	620 730	8	7.4 2.9	G	G	L	H	H	

Explanatory Notes for Table

- *Dbh = Diameter of trunk at breast height.
- ** DAC = Diameter above the root collar used to measure the Structural Root Zone (SRZ).
- ***TPZ is the recommended TPZ 12x the DBH at 1.4m, SRZ is the trees structural root zone. Refer to AS4970 for details.
- **** ULE Explanation can be found in Appendix 2.
- + IACA Landscape value and S.T.A.R.S Rating system. Refer to Appendix 2
- # Health and Structure values represented above are P = poor, BA = Below Average, A = Average, G = Good

11 APPENDIX 2: STARS

IACA Significance of a Tree, Assessment Rating System (STARS)© (IACA 2010)©

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2001.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have 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 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. 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. An example of its use in an Arboricultural report is shown as Appendix A.

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.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

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

		Tree Significance			
		High	Medium	Low	
Tree Life Expectancy	Long >40 years				
	Medium 15-40 years				
	Short <1-15 years				
	Remove / Dead				

Legend for Matrix Assessment	
	Priority for Retention (High) – These trees are considered important for retention and should be retained and protected. Design modification and re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard 4970 <i>Protection of tree on development sites</i> . Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) – These trees may be retained and protected. These are considered less critical; however, their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) – These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal – These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

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

12 SITE PHOTOGRAPHS

I



Images of trench.



Images of trench.



Images of trench depth



Image of trench East to West

13 SITE DRAWINGS



