



ARBORICULTURAL IMPACT ASSESSMENT | 14 BROUGHTON RD. STRATHFIELD

Prepared For Mr. Cameron Lam

13.01.22

Prepared By Liam Strachan

**STRATHFIELD COUNCIL
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ABNOBA ARBOR

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1 EXECUTIVE SUMMARY

On the 17th December 2021 525 Mr. Cameron Lam commissioned Abnoba Arbor to provide an Arboricultural Impact Assessment pertaining to the trees at 14 Broughton Rd. Strathfield. The property lies within the Strathfield Council LGA.

The proposed development includes the demolition of an existing stand-alone brick dwelling to be followed by the installation of a new double storey dwelling with an additional basement level and a new swimming pool.

Site inspection was conducted by Liam Strachan AQF Level 5 Arborist on 11th January 2022.

The purpose of this report is to provide information on any trees that may be affected by the proposed demolition and development at 14 Broughton Rd. Strathfield.

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, structural condition including potential mitigation options, priority rating for all recommended works.
- Ascertain Tree Protection Zones and Structural Root Zones.
- Determine the impact of the development on all of the trees.
- The amenity of adjoining neighbours and members community is to be considered.
- That report contains all relevant information as outlined in Strathfield Council DCP 2005.

Conclusions and recommendations include:

The following trees will require to be removed and replaced with the current design:

- T3 *Cupressus sempervirens* (Medium Retention Value)
 - T4
 - T5 *Jacaranda mimosifolia* (Low Retention Value)
 - T6 *Liquidambar styraciflua* (Medium Retention Value)
 - T7 *Persea americana* (Low Retention Value)
 - T8 *Viburnum sp.* (Low Retention Value)
 - T9 *Jacaranda mimosifolia* (Low Retention Value)
 - T10 *Macadamia tetraphylla* (Medium Retention Value)
 - T11 *Callistemon viminalis* (Medium Retention Value)
 - T12 *Koelreuteria bipinnata* (High Retention Value)
 - T13 *Jacaranda mimosifolia* (High Retention Value)
 - T15 *Stenocarpus sinuatus* (Medium Retention Value)
- i. Due to the loss of 2 large trees on site, an offset planting schedule should be prepared utilising a planting ration of 3 replacement trees for each tree. Due to the limited space on the site, some of the offset plantings should be undertaken off site but within the local area
 - ii. The selected trees should be endemic and in keeping to the area and should be capable of reaching dimensions similar to the tree to be removed. Trees endemic to the soil type capable of reaching such dimensions are; Sydney blue gum *Eucalyptus saligna* and blackbutt *E. pilularis*. Other species include

turpentine *Syncarpia glomulifera*, grey ironbark *E. paniculata*, white stringybark *E. globoidea* and rough-barked apple *Angophora floribunda*.

The following trees may be retained and subject to the following tree protection measures;

- T14 *Brachychiton acerifolius* (trunk protection, ground protection, TPZ Fencing)

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3 INTRODUCTION

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The proposed development includes the demolition of an existing stand-alone brick dwelling to be followed by the installation of a new double storey dwelling with an additional basement level and a new swimming pool.

Site inspection was conducted by Liam Strachan AQF Level 5 Arborist on 11th January 2022.

3.1 SCOPE

The purpose of this report is to provide information on any trees that may be affected by the proposed demolition and development at 14 Broughton Rd. Strathfield.

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, structural condition including potential mitigation options, priority rating for all recommended works.
- Ascertain Tree Protection Zones and Structural Root Zones.
- Determine the impact of the development on all of the trees.
- The amenity of adjoining neighbours and members community is to be considered.
- That report contains all relevant information as outlined in Strathfield Council DCP 2005.

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 <ul style="list-style-type: none"> • Height • DBH(Diameter at breast height) • SRZ (Structural root zone) • TPZ (Tree protection zone) 	<ul style="list-style-type: none"> • Clinometer, Tape measure • Diameter tape • $SRZ = (DAB \times 50)^{0.42} \times 0.64$ • $DBH \times 12$ (AS4970-2009)
Documents Reviewed	<ul style="list-style-type: none"> • Strathfield Council DCP 2005 • Strathfield Council DCP 2005 • Strathfield Council DCP Part O Tree Management 2015
Drawings Reviewed	<ul style="list-style-type: none"> • Azimuth Surveors Pty Ltd Ref. 1492-21 Sheet 1 of 1 • North Western Surveys Pty Ltd. Service Protection Report • CLD Studio Dwg No. 21223 Sheet 3/10 • CLD Studio Dwg No. 21223 Sheet 4/10 • CLD Studio Dwg No. 21223 Sheet 5/10 • CLD Studio Dwg No. 21223 Sheet 8/10 • CLD Studio Dwg No. 21223 Sheet 9/10 • CLD Studio Dwg No. 21223 Sheet 10/10 • CLD Studio Dwg No. 21223 Sheet AC • CLD Studio Dwg No. 21223 Sheet SP • CLD Studio Dwg No. 21223 Sheet LP
Tree retention assessment	<p>ULE (Useful life expectancy)</p> <p>STARS METHOD (IACA, 2010)</p>
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:

- Australian Standard AS4970-2009 Protection of Trees on Development Sites
- Strathfield Council DCP 2005
- Strathfield Council DCP 2005
- Strathfield Council DCP Part O Tree Management 2015
- Azimuth Surveys Pty Ltd Ref. 1492-21 Sheet 1 of 1
- North Western Surveys Pty Ltd. Service Protection Report
- CLD Studio Dwg No. 21223 Sheet 3/10
- CLD Studio Dwg No. 21223 Sheet 4/10
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- CLD Studio Dwg No. 21223 Sheet 10/10
- CLD Studio Dwg No. 21223 Sheet AC
- CLD Studio Dwg No. 21223 Sheet SP
- CLD Studio Dwg No. 21223 Sheet LP

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 PLANNING GUIDELINES AND SPECIFIC LEGISLATION

Tree management measures are in place for Strathfield Council under the provisions of the trees and vegetation preservation for properties covered under Strathfield Council DCP 2005.

- According to the NSW Planning Portal, the site is listed as R2 Low Density Residential.
- The site does not contain, nor does it form part of a heritage item.
- The site is not listed on the terrestrial biodiversity map, nor is it listed as an area of Critically Endangered Ecological Communities.

4.8 SIGNIFICANCE IN THE ENVIRONMENT.

Trees are subject to the following legislation:

- Biodiversity Conservation Act NSW (BIO Act 2016): Provides provisions for conserving biodiversity.
- Threatened Species Conservation Act NSW (1995 TCS Act): Provides provisions for conserving threatened species, populations and ecological communities of animals and plants as well as managing key threatening processes.
- Environmental Protection and Biodiversity Conservation Act NSW (EPBC Act 1999): Provides provision to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
- Biosecurity Act NSW (BIO Act 2015): Refers to the protection of native plant communities, reducing the risk to human's health and the risk to agricultural production from invasive weeds.
- NSW Bushfire Brigade 10/50 Legislation is not enforced for this site.

4.9 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.

4.10 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.

- 3.4.6 Where construction is proposed within Structural Root Zone (SRZ) offsets, those trees have been similarly recommended for removal. 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. 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 retainable with specific tree protection or tree protection monitoring required.

5 FINDINGS

5.1 SITE CONTROL MAPS

According to the NSW Planning Portal, the site is listed as R2 Low Density Residential. Please see Figure 1



Figure 1

The following relevant Government environmental and heritage mapping overlays have been reviewed (SEED – NSW Government 2020). The site was not listed as a site of Terrestrial Biodiversity, Environmentally Sensitive Land or part of a Critically Endangered Ecological Community. Please see Figure 2.

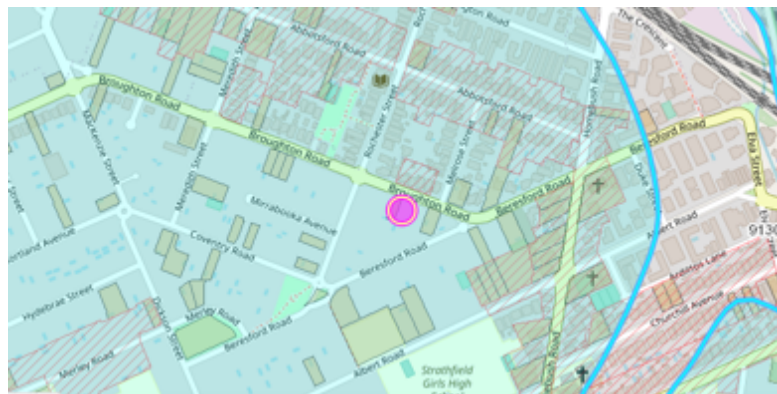


Figure 2

5.2 THE SITE



Figure 3

The sites currently contain one single storey stand-alone brick dwelling.

Site topography is relatively level with a high point R.L of 15.86 at the southern boundary and a low point R.L of 14.92 in the North western corner.

Site soils are likely to deviate from their natural state due to past urban development, however, site soils are classified as 9130bt (Blacktown) Residual soil characterised as:

Landscape – gently undulating rises on Wianamatta Group shales and Hawkesbury shale. Local relief to 30 m, slopes are usually <5%. Broad rounded crests and ridges with gently inclined slopes. Cleared eucalypt woodland and tall open-forest (wet sclerophyll forests).

Soils – shallow to moderately deep (<100 cm) Red and Brown Podzolic Soils (Dr3.21, Dr3.11, Db2.11) on crests, upper slopes and well-drained areas; deep (150–300 cm) Yellow Podzolic Soils and Soloths (Dy2.11, Dy3.11) on lower slopes and in areas of poor drainage.

Limitations – moderately reactive highly plastic subsoil, low soil fertility, poor soil drainage.

Vegetation for the site is classified as Almost completely cleared tall open-forest (wet sclerophyll forest) and open-woodland (dry sclerophyll forest). Remaining traces of the original wet sclerophyll forest containing Sydney blue gum *Eucalyptus saligna* and blackbutt *E. pilularis* are located at Ashfield Park. The original woodland and open-forest in drier areas to the west were dominated by forest red gum *E. tereticornis*, narrow-leaved ironbark *E. crebra* and grey box *E. moluccana*. This has been almost completely cleared. At Duffys Forest there is an open-forest dominated by ash *E. sieberi* with a dry sclerophyll shrub understorey.

5.3 SUMMARY OF SITE INSPECTION DATA

Generally, the sites vegetation was observed to have a mixture of exotic and endemic tree canopy. The existing surveyed trees are shown in Appendix 1.

Other vegetation on site does not meet the dimensions for Strathfield Council to consider them as trees, trees as defined in Part O Tree Management; where the tree has a height greater than 4 metres or a girth greater than half a metre measured at 1 metre above ground level.

5.4 SUMMARY OF PROPOSED DEVELOPMENT

The proposed development includes the demolition of an existing stand-alone brick dwelling to be followed by the installation of a new double storey dwelling with an additional basement level and a new swimming pool.

5.5 CURRENT TREE POPULATION

A total of sixteen trees were assessed in total.

The tree population comprised of:

Table 2

Species	Origin	No. Of Trees
<i>Lophostemon confertus</i> (Brushbox)	Australian native	T1
<i>Callistemon viminalis</i> (weeping bottlebrush)	Australian native	T2, T11
<i>Cupressus sempervirens</i> (Mediterranean Cypress)	Exotic	T3
<i>Camelia japonica</i> (Camelia)	Exotic	T4
<i>Jacaranda mimosifolia</i> (Jacaranda)	Exotic	T5, T9, T13
<i>Liquidambar styraciflua</i> (Sweet gum)	Exotic	T6
<i>Persea americana</i> (Avacado)	Exotic	T7
<i>Viburnum sp.</i>	Exotic	T8
<i>Macadamia tetraphylla</i> (Avacado)	Australian native	T10
<i>Koelreuteria bipinnata</i> (Golden Rain Tree)	Exotic	T12
<i>Brachychiton acerifolius</i> (Illawarra Flame tree)	Australian native	T14
<i>Stenocarpus sinuatus</i> (Firewheel tree)	Australian native	T15

It should be noted that T1 and T2 are located on the council owned nature strip.

5.6 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.	T5, T7, T9	T2, T3, T4, T6, T8, T10, T11, T14, T15	T1, T12, T13

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

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. At this time no exploratory root investigation has been undertaken, it may be recommended based on the findings within this report.

6.1 TREES WITHIN DEVELOPMENT FOOTPRINT

Table 4

Tree No	Genus Species (Common Name)	Height (m)	Canopy Spread (m)				Diameter (m)		SRZ	TPZ	Age Class	Health	Structure	E.L.E	Landscape Significance	Arborist Notes
			N	E	S	W	@1.4m	Base								
3	Cupressus sempervirens (Mediterranean Cypress/Pensil Pine)	6	1	1	1	1	0.2	0.28	1.9	2.4	MATURE	GOOD	GOOD	15>40	MEDIUM	In footprint of new driveway
4	Camelia japonica	5	1	1	1	1	0.2	0.23	1.8	2.4	SEMI MATURE	FAIR	FAIR	15>40	MEDIUM	In footprint of new boundary wall
5	Jacaranda mimosifolia (Jacaranda)	7	4	3	2	3	0.18	0.22	1.8	2.2	SEMI MATURE	FAIR	FAIR	<1-15	LOW	Within 1m of existing building In proposed building footprint
6	Liquidamber styraciflua (Liquidamber/Sweet Gum)	10	2	3	3	2	0.22	0.28	1.9	2.6	SEMI MATURE	GOOD	GOOD	15>40	MEDIUM	Within 200ml of existing shed In proposed building footprint
7	Percea americana (Avocado)	5	2	2	2	2	0.17	0.2	1.7	2.0	SEMI MATURE	FAIR	POOR	<1-15	LOW	Lopped In proposed building footprint
8	Viburnum sp.	5	3	2	3	1	0.15	0.19	1.6	1.8	SEMI MATURE	GOOD	FAIR	15>40	MEDIUM	In proposed building footprint
9	Jacaranda mimosifolia (Jacaranda)	7	2	1	1	2	0.19	0.22	1.8	2.3	YOUNG	GOOD	FAIR	<1-15	LOW	In proposed building footprint

10	Macadamia tetraphyll (Macadamia)	6	2	2	2	2	0.22	0.28	1.9	2.6	MATURE	FAIR	FAIR	15>40	MEDIUM	In footprint of proposed pool
11	Callistemon viminalis (Weeping Bottlebrush)	8	3	3	2	1	0.38	0.49	2.5	4.6	MATURE	FAIR	FAIR	15>40	MEDIUM	In footprint of proposed pool

6.2 TREES UNNAFFECTED BY PROPOSED DEVELOPMENT

Table 5

Tree No	Genus Species (Common Name)	Height (m)	Canopy Spread (m)				Diameter (m)		SRZ	TPZ	Age Class	Health	Structure	E.L.E	Landscape Significance	Arborist Notes
			N	E	S	W	@1.4m	Base								
1	Lophostemon confertus (Brushbox)	7	3	3	3	3	0.4	0.58	2.6	4.8	MATURE	GOOD	FAIR	>40	HIGH	
2	Callistemon viminalis (Weeping Bottlebrush)	5	2	2	1	3	0.2	0.3	2.0	2.4	SEMI MATURE	FAIR	FAIR	15>40	MEDIUM	
14	Brachychiton acerfolius (Illawarra Flame Tree)	12	3	2	3	4	0.38	0.46	2.4	4.6	MATURE	FAIR	FAIR	15>40	MEDIUM	Large canker at 7m an 2m

6.2.1 DISCUSSION

- i. **T1 LOPHOSTEMON CONFERTUS** - T1 is a council owned *Lophostemon confertus*. The tree is located at the front of the neighbouring property, 16 Broughton Rd. The tree suffers no incursion from the driveway widening. Given that the tree is located at the opposite side of the neighbour's driveway, no conflict is foreseen, and no arboricultural intervention will be required.
- ii. **T2 CALLISTEMON VIMINALIS** is a council owned tree located at the front of 14 Broughton Rd. The tree suffers no incursion from the widening of the driveway.

- iii. The tree will be protected with TPZ Fencing as per section 7.1.1 of this report to protect the tree from sustaining any mechanical damage throughout the construction period.
- iv. **T14 BRACHYCHITON ACERIFOLIUS** is a mature medium retention value tree. The tree shows symptoms of either crown gall or canker at an old pruning cut located at head height and at approximately 7 metres. The canker/gall encompasses approximately 25% of the trunk circumference. Further testing, such as internal diagnostics or pathogen testing, would be required to determine the longevity of the tree.
- v. The tree suffers no direct impact from the proposed development, although the tree has been designated to be removed on the plans.

6.3 TREES WITH MAJOR INCURSIONS

Table 6

Tree No	Genus Species (Common Name)	Height (m)	Canopy Spread (m)				Diameter (m)		SRZ	TPZ	Age Class	Health	Structure	E.L.E	Landscape Significance	Arborist Notes	Inc. %	Retainable
			N	E	S	W	@1.4m	Base										
12	Koelreuteria bipinnata (Golden rain tree)	7	3	5	5	4	0.3	0.36	2.2	3.6	MATURE	GOOD	GOOD	>40	HIGH		18%	NO
13	Jacaranda mimosifolia (Jacaranda)	12	5	7	5	3	0.61	0.66	2.8	7.3	MATURE	GOOD	GOOD	>40	HIGH		20%	NO
15	Stenocarpus sinuatus (Firewheel tree)	12	3	2	1	1	0.41	0.48	2.4	4.9	MATURE	FAIR	FAIR	15>40	MEDIUM		26%	NO

6.3.1 DISCUSSION

- i. **T12 KOELREUTERIA BIPINNATA** suffers a major incursion, including an incursion to the SRZ due to the proposed pool, the tree would not remain viable.
- ii. **T13 JACARANDA MIMOSIFOLIA** suffers a major incursion, including an incursion to the SRZ due to the proposed pool, the tree would not remain viable.

- iii. **T15 STENOCARPUS SINUATUS** suffers a major incursion, including an incursion to the SRZ due to the proposed pool, the tree would not remain viable.

7 CONCLUSIONS AND RECOMMENDATIONS

The following trees will require to be removed and replaced with the current design:

- T3 *Cupressus sempervirens* (Medium Retention Value)
 - T4
 - T5 *Jacaranda mimosifolia* (Low Retention Value)
 - T6 *Liquidambar styraciflua* (Medium Retention Value)
 - T7 *Persea americana* (Low Retention Value)
 - T8 *Viburnum sp.* (Low Retention Value)
 - T9 *Jacaranda mimosifolia* (Low Retention Value)
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 - T13 *Jacaranda mimosifolia* (High Retention Value)
 - T15 *Stenocarpus sinuatus* (Medium Retention Value)
- iii. Due to the loss of 2 large trees on site, an offset planting schedule should be prepared utilising a planting ration of 3 replacement trees for each tree. Due to the limited space on the site, some of the offset plantings should be undertaken off site but within the local area
- iv. .The selected trees should be endemic and in keeping to the area and should be capable of reaching dimensions similar to the tree to be removed. Trees endemic to the soil type capable of reaching such dimensions are; Sydney blue gum *Eucalyptus saligna* and blackbutt *E. pilularis*. Other species include turpentine *Syncarpia glomulifera*, grey ironbark *E. paniculata*, white stringybark *E. globoidea* and rough-barked apple *Angophora floribunda*.

The following trees may be retained and subject to the following tree protection measures;

- T14 *Brachychiton acerifolius* (trunk protection, ground protection, TPZ Fencing)

7.1 TREE PROTECTION MEASURES

7.1.1 FENCING

It will not be practical or possible to erect a TPZ fence encompassing the entire TPZ as access will be required to perform the works, however, an exclusion zone should be erected around the tree to limit activities that take place within the TPZ. *AS4970-2009 Protection of Trees on Development sites* states that the following activities are prohibited within the TPZs;

- Storage.
- Preparation of chemicals, including preparation of cement products.
- Refueling.
- Dumping of waste.
- Washing down and cleaning of equipment.

AS 4687 specifies applicable fencing requirements, 1.8M Mesh fence. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area.

Fencing must

- be 1.8m high fully supported chainmesh protective fencing. The fencing shall be secure and fastened to prevent movement. The fencing shall have a lockable opening for access. Roots greater than 40mm in diameter shall not be pruned, damaged or destroyed during the installation or maintenance of the fencing. The fencing shall not be moved, altered or removed without the approval of the Project Arborist;
- have a minimum of two signs that include the words “Tree Protection Zone – Keep Out”. Each sign shall be a minimum size of 600mm x 500mm and the name and contact details of the Project Arborist. Signs shall be attached facing outwards in prominent positions at 10 metre intervals or closer where the fence changes direction. The signs shall be visible within the site;
- be kept free of weeds and, except where the existing surface is grass, grass. Weeds shall be removed by hand; and
- unless the existing surface is grass, have mulch installed and maintained to a depth of 75mm.

Fencing should be installed before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. Fencing must be clearly signed and adhere to the standard as outlined in *AS4970-2009 Protection of Trees on Development Sites*.

7.1.2 TRUNK PROTECTION

Trunk protection as outlined in *Australian Standard AS4970-2009 Protection of Trees on Development Sites* should be installed. This should be installed by or signed off by an AQF Level 5 arborist.

Trunk protection is achieved when the vertical trunk of exposed trees is protected by the placement of 1.8m lengths of 50 x 100mm hardwood timbers, spaced vertically, at 150mm centres and secured by 2mm wire at 300mm wide spacing over suitable protective padding material e.g. Jute Matting. The trunk protection shall be maintained intact until the completion of all work on site. Additionally, smaller fences can be erected around the trunks to avoid damage.

Trunk protection should be installed before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, trunk protection should be certified by the project arborist and adhere to the standard as outlined in *AS4970-2009 Protection of Trees on Development Sites*.

7.1.3 GROUND PROTECTION

It is also recommended that the trees are mulched within the TPZ's. Section 4.6 of Australian Standard AS4970-2009 Protection of Trees on Development Sites states that the area within the TPZ should be mulched. The mulch must be maintained to a depth of 50–100 mm using material that complies with AS 4454. Mulch should be applied at no greater depth than 50-75 mm. Mulch should be spread beyond the dripline (Shigo, 1991). The mulch should be no closer than 200mm away from the base of the trunk as this can cause collar rot and increase the incidence of disease.

This will also allow for a favourable root environment for the trees possibly improving tree health throughout the development period. Benefits of mulching include:

- Conservation of soil moisture.
- Soil erosion and runoff are reduced, slowing water movement and keeping water in contact with soil.
- Soil fertility is increased by nutrients from mulch.
- Soil microorganism activity is enhanced.
- Protects surface soil from compactive forces, such as vehicles, people and rain impact.

The mulch should be suitably coarse and broken down to ensure a Carbon: Nitrogen ratio of no more than 25:1 or less and should be no less than 75mm and no more than 100mm in depth. It is important to choose the correct mulch for improving soil fertility. The mulches must have high C:N ratios. Mulches with low C:N ratios may develop nitrogen deficiency (Carlson, 2001) Mulching should be arranged by a project arborist.

Soil moisture levels should be regularly monitored by the project arborist. "Benefits of mulch to the soil environment and ultimately plant health and growth are accrued both immediately after application as the mulch protects the soil surface, and over time as the organic mulch decomposes. Immediate benefits include conserving soil moisture, reducing salt build up in the surface soil, reducing soil erosion and water runoff, protection from compactive forces, insulating the soil from temperature extremes, reducing reflection and reradiation of heat, and suppressing weed growth. Benefits that accrue over time from the use of organic mulches involve improvements to soil structure, permeability, aeration, fertility, and biological activity. Improved aeration, temperature, and moisture conditions near the surface encourage rooting and other biological activities that enhance soil structure. Just the absence of cultivation and the low amount of compaction will allow soil structure to improve through wetting and drying cycles and biological activity. Improved soil structure increases the infiltration rate and allows more uniform water distribution and less soil erosion, all of which favour plant growth." (Harris, Clark & Matheny, 2004)

If access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ.

Although heavy machinery is not permitted within the TPZ, access is permitted when additional ground protection measures are employed in accordance with *AS4970-2009 Protection of Trees on Development sites* specifically section 4.5.3 Ground Protection . A permeable geotextile membrane should be laid over the required area beneath a layer of coarse mulch and then covered with rumble boards. The boards should be placed on their flat edge, side by side with a 30-50mm gap to form a rumble strip. The boards are to be held together with a metal bracing straps.

7.1.4 PRUNING RETAINED TREES

Trees that require pruning in order to facilitate the new build should be directed by an AQF Level 5 project arborist and undertaken by a minimum AQF Level 3 arborist adhering to *AS4373-2007* and NSW Workcover Code of Practice *Amenity Tree Industry 1998* and *Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016*.

7.1.5 EXCAVATION WITHIN THE TPZ

When the extent of TPZ incursion is deemed minor as per *AS4970 Protection of Trees on Development Sites* i.e., less than 10%, excavation may be undertaken using traditional methods. Excavation for Benching and Shoring must be considered.

When the encroachment is deemed to be major i.e., greater than 10% of the TPZ of trees to be retained; exploratory root investigation using non-destructive root sensitive techniques should be undertaken at the

perimeter of the required penetration point nearest the tree, bearing in mind compensation for benching and battering.

Techniques include:

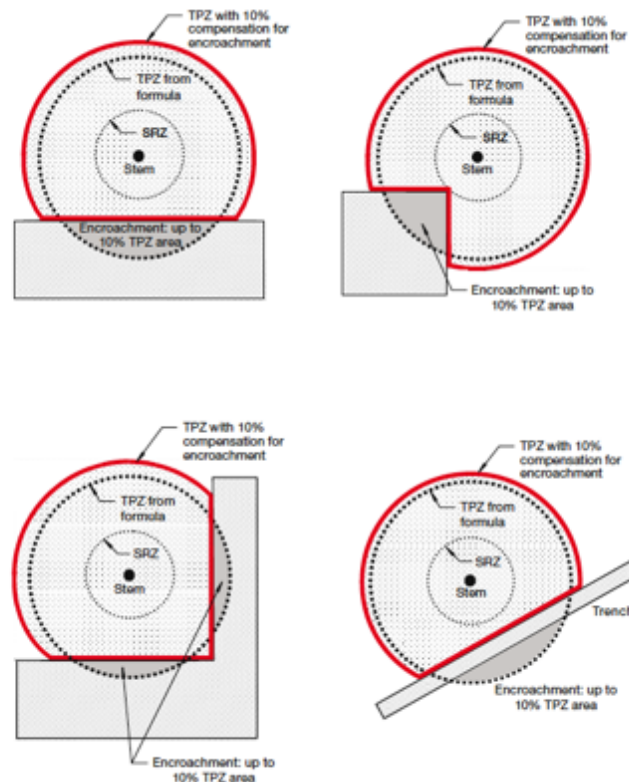
- Hand excavation
- Vacuum excavation
- High pressure water jet excavation
- Air Spade

The exploratory root investigation should be undertaken at the outer limits of the of the penetration point to a maximum of 700mm or when compacted sub-soil or rock bed is encountered. Roots greater than 50mm in diameter should be retained and advice from a project arborist sought.

Any roots less than 50mm in diameter that will require pruning should be undertaken by a suitably qualified arborist using sharp tools to ensure clean cuts. “When intentionally cutting roots, it is important to make clean cuts, perpendicular to the line of the root. Clean cuts offer a smaller surface for drying and compartmentalize better. Roots that are torn by large grading equipment can develop cracks that run laterally along the root, increasing the extent of damage. When grading near trees, always prune the roots in advance.” (Urban 2008)

7.1.6 TPZ COMPENSATION

TPZ area lost to incursions should be compensated for elsewhere on the site and contiguous to the TPZ.



7.1.7 INSTALLATION OF SERVICES WITHIN TPZ

All underground services should be placed outside the TPZs of the retained trees. When routing services outside the TPZ becomes unavoidable, trenching must be undertaken using tree sensitive excavation.

Techniques include:

- Hand excavation
- Vacuum excavation
- High pressure water jet excavation
- Air Spade
- Horizontal Directional Drilling (Entry and exit pits must be located outside of the TPZ)

All excavation should be undertaken or supervised by an AQF Level 5 Arborist.

7.1.8 PIER PLACEMENT WITHIN TPZ

When placing piers in the TPZ, the first 800mm should be undertaken by hand digging only. Care should be taken not to damage roots 50mm and over. Pier holes should be flexible in design and be placed in such a manner that significant roots are bridged rather than severed.

7.1.9 DEMOLITION OF HARDSTAND AREAS WITHIN TPZ

Demolition of hardstand areas within the TPZ's of trees may be undertaken using machinery but must be done so with care. Demolition should commence at the outer most point of the hard stand area nearest the tree working backwards away from the tree, with the machinery remaining on hard stand surfaces.

Where hard stand surfaces aren't available for machinery ground protection will be required.

This should be done under the supervision of a project arborist.

Once the hardstand surface has been demolished, ground protection as per AS4970 should be installed to limit the incidence of compaction and soil contamination.

7.1.10 LANDSCAPING WITHIN THE TPZ

Any landscaping works that require excavation within the TPZ should be done so using the methods outlined in 7.1.4.

Any pier holes for retaining walls should be done so by hand prior to piling.

Any excavation within the SRZ of trees should be done so under the direct supervision of a project arborist.

7.1.11 REPLANTING

Replanting is an important process. Failure of the plants due to the supply of inferior nursery stock, poor planting area preparation and installation practices and the failure to look after the trees during their initial years can result in substantial resources and time and effort being wasted. The trees should be maintained and watered regular for at least the first 24 months to ensure their survival, watering maybe undertaken with the installation of an irrigation system.

Species choice should be carefully considered, and decisions shouldn't be made until soil tests/profiles have been conducted and sun/shade determined.

The size of the replacement plants greatly affects the pricing. It would be recommended that the minimum size used for any replacement trees be 45L. This would be a tree that is approximately 1.5-2.0m tall at installation. This size is easy to supply, transport and unload. The preparation of the planting pit is reasonably straight forward and planting is a relatively easy manual process. These are relatively small trees and it will take some years for their impact to be visually felt.

A more appropriate size may be 100-150L sized trees. These would be in the order of 3-4m, in height with a greater proportion of foliage and larger stem calliper. Although relatively small compared to the existing tree their presence would be more immediately recognizable. At this size, transport and supply is more specialised and manual handling needs to be replaced with small forklifts or excavators to unload and manoeuvre the trees.

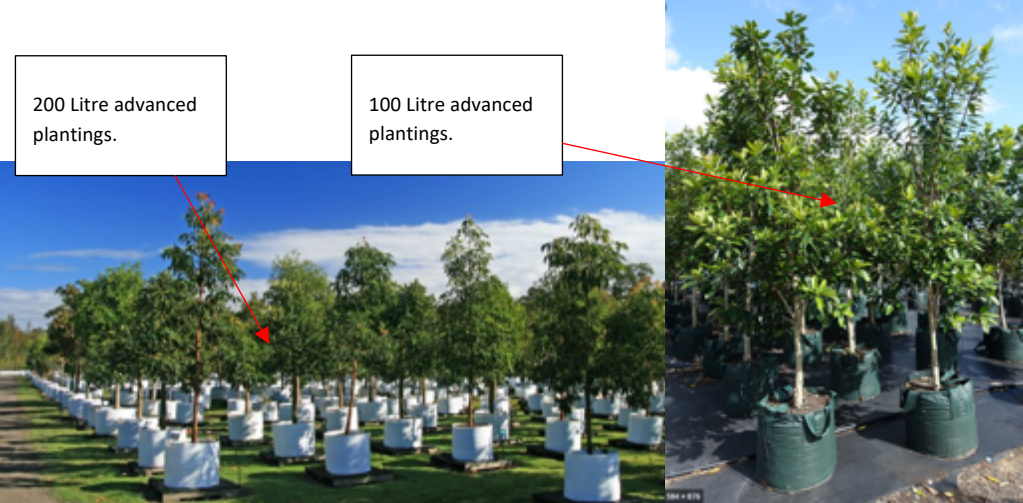
Finally, if very immediate effect was desired and affordable, the replacement plants could be provided at quite mature sizes. With pre-planning and ordering the trees could be supplied at 200-600L pot sizes. These could be trees that had substantial presence at planting time and be 4-7m tall with 100-150mm stem callipers. These would start to feel like small trees from the day of their planting and their presence would be immediately recognizable. At this size, transport and supply is quite specialized and handling needs to be replaced with 'hiab' lifts on the trucks and small forklifts or excavators to unload and manoeuvre the trees into position. A small excavator will be needed to prepare and dig the planting holes and reinstall the backfill soil.

The table below shows the general size of trees in relation to the pots they are purchased in.

Table 5

Litre	Calliper	Height	Spread
45	15 - 25mm	1.5-2m	0.6-1m
75	25 - 35mm	2-2.5m	1m
100	40 - 50mm	2.5-3.5m	1-2 m
200	60 - 70mm	3.5-4.5m	1.5-3m
300	70 - 80mm	4.5m	3-4m
400	80 - 90mm	4.5-6m	3-4m

Figure 3 depicts the advanced nature of 100 and 200 litre potted trees available from nurseries. With any replanting the proper procurement and quality control will be critical. Poor trees at a young age usually turn into average trees in old age.



7.2 HOLD POINTS, INSPECTION AND CERTIFICATION

To ensure all plans are implemented hold points have been specified in a schedule of works (below). Once each stage is reached the work will be inspected and certified by the project arborist and the next stage may commence.

7.2.1 SCHEDULE OF WORKS AND RESPONSIBILITIES

Table 5

Hold Point	Task	Responsibility	Certification	Timing of Inspection
1	Review construction plan and update TPP	Principle Contractor	Project Arborist	Prior to CC being granted
2	Install TPZ Fencing, trunk and branch protection.	Principle Contractor	Project Arborist	Prior to site establishment.
3	Install ground protection.	Principle Contractor	Project Arborist	Prior to site establishment.
4	Fortnightly inspection of site	Principle Contractor	Project Arborist	Fortnightly as required
5	Final inspection of Trees by Project Arborist	Principle Contractor	Project Arborist	Prior to issue of occupancy certificate.

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9 GLOSSARY OF TERMS

Borers: larvae beetles, moths or wasps that cause damage within the phloem/cambium, sapwood and heartwood of the tree. Borers generally attack weakened trees or stressed trees.

Cambium: The layer of cells between the exterior bark and the inner wood which control cell division, hence stem, branch and shoot expansion.

Cavity: A void, initiated by a wound within the trunk, branches or roots. These voids are referred to as hollows.

Co-dominant: Stems or branches equal in size and relative importance.

Crown: The width of the foliage in the upper canopy of the assessed tree to the four cardinal points.

Crown lifting: The removal of the lower branches of the tree.

Crown thinning: The portion of the tree consisting of branches and leaves and any part of the stem from which branches arise.

Drip line: Where the canopy releases water shed from the foliage during precipitation.

DBH/Diameter: Diameter of trunk at 14meters in height of assessed tree.

Dead wooding: The removal dead branches from a tree.

Dieback: Tree deterioration where the branches and leaves die.

Flush cut: A cut that damages or removes the branch collar or removes the branch and stem tissue and is inconsistent with the branch attachment as indicated by the bark branch ridge.

Genus/ Species: Identified using its scientific name. Where the species name is not known, species is used. The common name for trees may vary considerably in each area of geographical differences and so will not be used in the field survey.

Height: Height has been estimated to + / - 2 meters.

Maturity: Tree age, Assessed as over mature (last 1/3 of life expectancy), mature (1/3 to 2/3 life expectancy) and semi mature (less than 1/3 life expectancy).

Remedial (restorative) pruning: includes: Removing damaged, deadwood; trimming diseased or infested branches. Trimming branches back to undamaged tissue in order to induce the production of shoots from latent or adventitious buds, from which a new crown will be established.

SRZ- Structural Root Zone: An area within the trees root zone in which roots stabilize the tree. Roots cut in this zone can cause instability and lead to anchorage loss.

Structural Integrity: Describes the internal supporting timber. (Substantial to frail)

Target: risk targets are people, property or activities that could injure, damage or disrupted.

Tree Numbering: All trees listed in the tree survey have been numbered and plotted.

TULE- Tree Useful Life

Expectancy: An estimation of the trees useful life expectancy using appropriate industry methods with an inspection regime.

Vigour: This is an indication of the tree health. Trees have either been assessed as Good Vigour, Normal Vigour or Low Vigour.

10 APPENDIX 1: TREE SCHEDULE

Tree No	Genus Species (Common Name)	Height (m)	Canopy Spread (m)				Diameter (m)		SRZ	TPZ	Age Class	Health	Condition	E.L.E	Landscape Significance	Arborist Notes
			N	E	S	W	@1.4m	Base								
1	Lophostemon confertus (Brushbox)	7	3	3	3	3	0.4	0.58	2.6	4.8	MATURE	GOOD	FAIR	>40	HIGH	
2	Callistemon viminalis (Weeping Bottlebrush)	5	2	2	1	3	0.2	0.3	2.0	2.4	SEMI MATURE	FAIR	FAIR	15>40	MEDIUM	
3	Cupressus sempervirens (Mediterranean Cypress/Pensil Pine)	6	1	1	1	1	0.2	0.28	1.9	2.4	MATURE	GOOD	GOOD	15>40	MEDIUM	
4	Camelia japonica	5	1	1	1	1	0.2	0.23	1.8	2.4	SEMI MATURE	FAIR	FAIR	15>40	MEDIUM	
5	Jacaranda mimosifolia (Jacaranda)	7	4	3	2	3	0.18	0.22	1.8	2.2	SEMI MATURE	FAIR	FAIR	<1-15	LOW	Within 1m of existing buiding
6	Liquidamber styraciflua (Liquidamber/Sweet Gum)	10	2	3	3	2	0.22	0.28	1.9	2.6	SEMI MATURE	GOOD	GOOD	15>40	MEDIUM	Within 200ml of existing shed
7	Percea americana (Avocado)	5	2	2	2	2	0.17	0.2	1.7	2.0	SEMI MATURE	FAIR	POOR	<1-15	LOW	Lopped
8	Viburnum sp.	5	3	2	3	1	0.15	0.19	1.6	1.8	SEMI MATURE	GOOD	FAIR	15>40	MEDIUM	
9	Jacaranda mimosifolia (Jacaranda)	7	2	1	1	2	0.19	0.22	1.8	2.3	YOUNG	GOOD	FAIR	<1-15	LOW	Self seeded on boundary within 2m of neighbouring property
10	Macadamia tetraphylla (Macadamia)	6	2	2	2	2	0.22	0.28	1.9	2.6	MATURE	FAIR	FAIR	15>40	MEDIUM	Macadamia
11	Callistemon viminalis (Weeping Bottlebrush)	8	3	3	2	1	0.38	0.49	2.5	4.6	MATURE	FAIR	FAIR	15>40	MEDIUM	Suppressed, phototropic
12	Koelreuteria bipinnata (Golden rain tree)	7	3	5	5	4	0.3	0.36	2.2	3.6	MATURE	GOOD	GOOD	>40	HIGH	Ashy thingy
13	Jacaranda mimosifolia (Jacaranda)	12	5	7	5	3	0.61	0.66	2.8	7.3	MATURE	GOOD	GOOD	>40	HIGH	

14	Brachychiton acerfolius (Illawarra Flame Tree)	12	3	2	3	4	0.38	0.46	2.4	4.6	MATURE	FAIR	FAIR	15>40	MEDIUM	Large canker at 7m an 2m
15	Stenocarpus sinuatus (Firewheel tree)	12	3	2	1	1	0.41	0.48	2.4	4.9	MATURE	FAIR	FAIR	15>40	MEDIUM	

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				

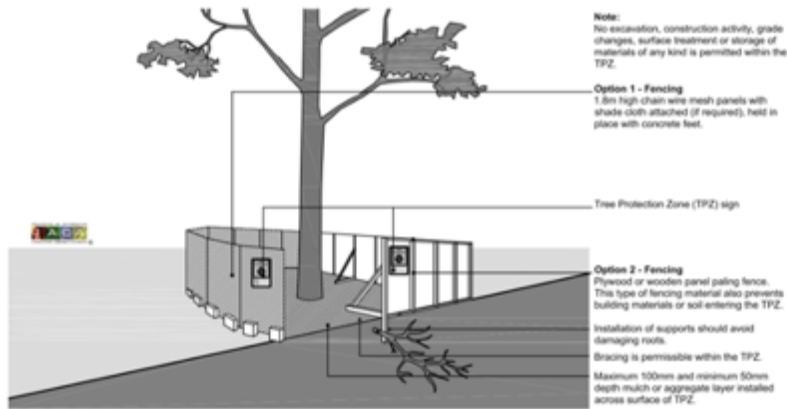
Legend for Matrix Assessment	
	Priority for Retention (High) – These trees are considered important for retention and should be retained and protected. Design modification and re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard 4970 <i>Protection 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>

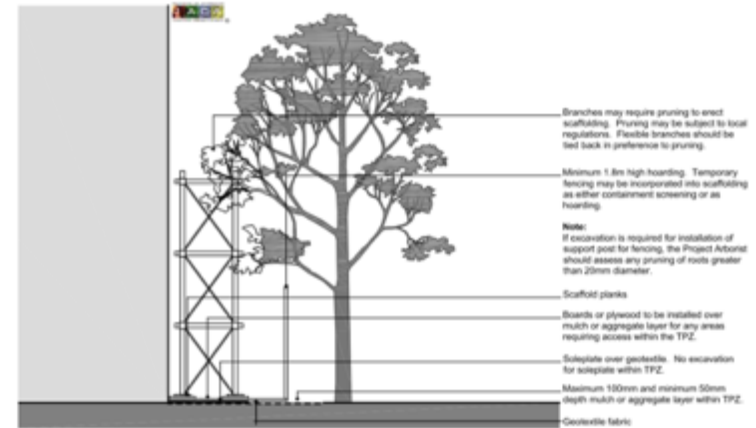
12 APPENDIX 3: SULE

	1. Long	2. Medium	3. Short	4. Removal	5. Moved or Replaced
	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 15 – 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 5 – 15 years with an acceptable level of risk.	Trees that should be removed within the next 5 years.	Trees which can be reliably moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 years.	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small trees less than 5m in height.
B	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through instability on recent loss of adjacent trees.	Young trees less than 15 years old but over 5m in heights
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.	Trees that may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Damaged trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings.	
F				Trees that are damaging or may cause damage to existing structures within 5 years.	
G				Trees that will become dangerous after removal of other trees for reasons given in (A) to (F).	

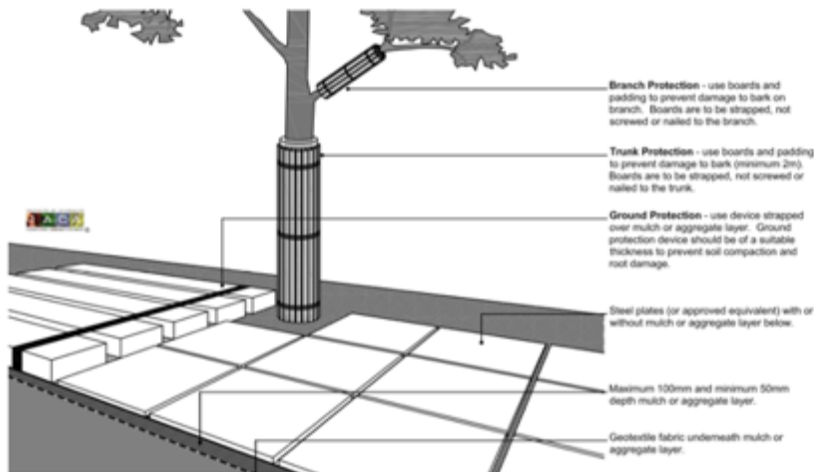
13 APPENDIX 4: TREE PROTECTION (GENERIC)



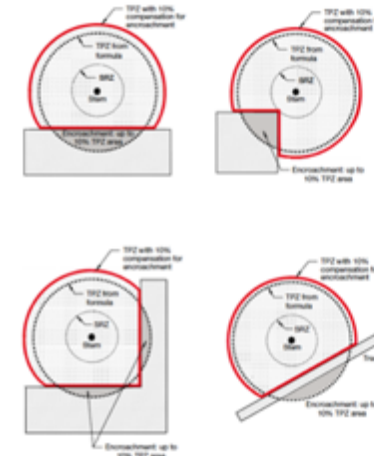
1. Tree Protection Fencing



2. Scaffolding Within TPZ

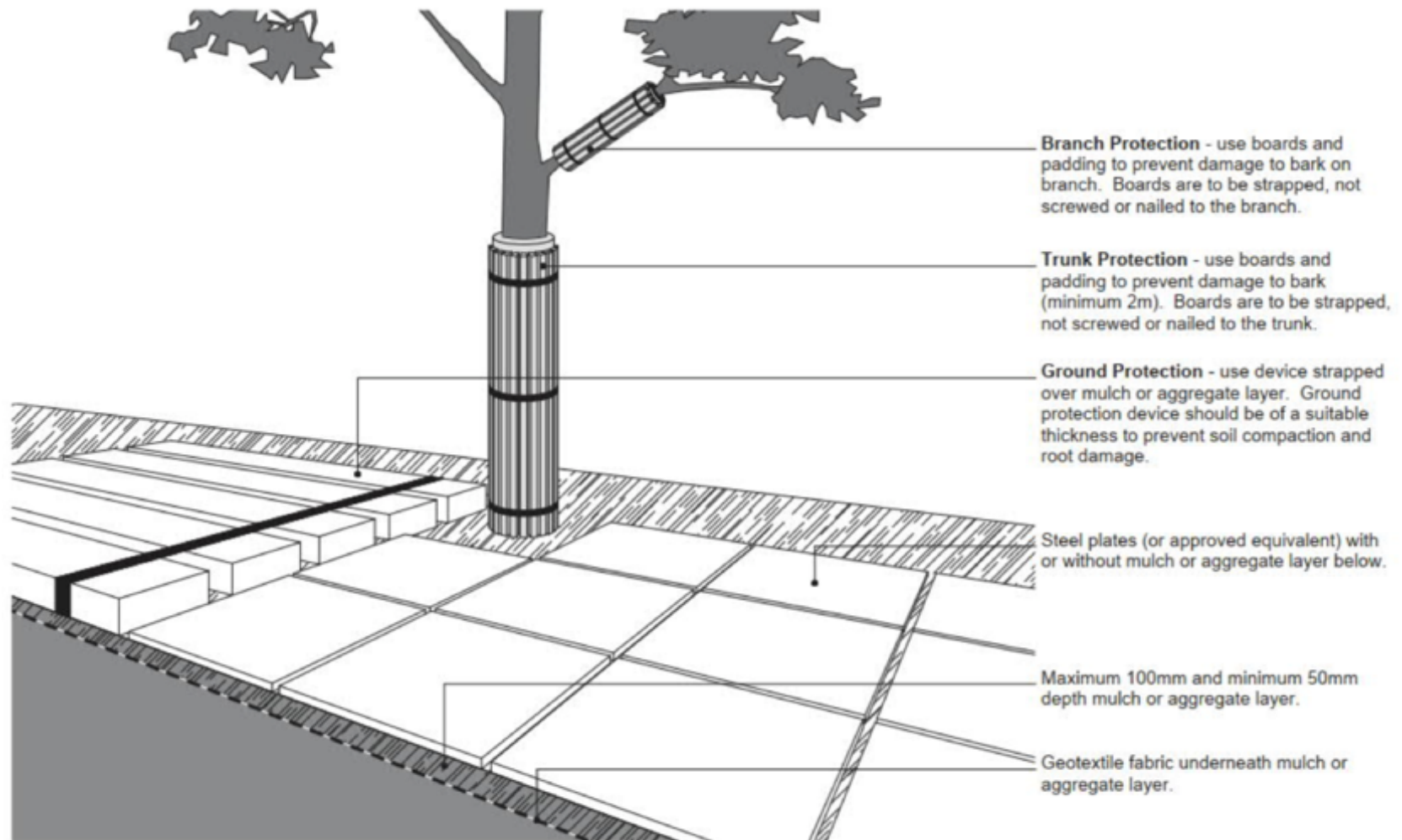


3. Examples Of Trunk, Branch and Ground Protection

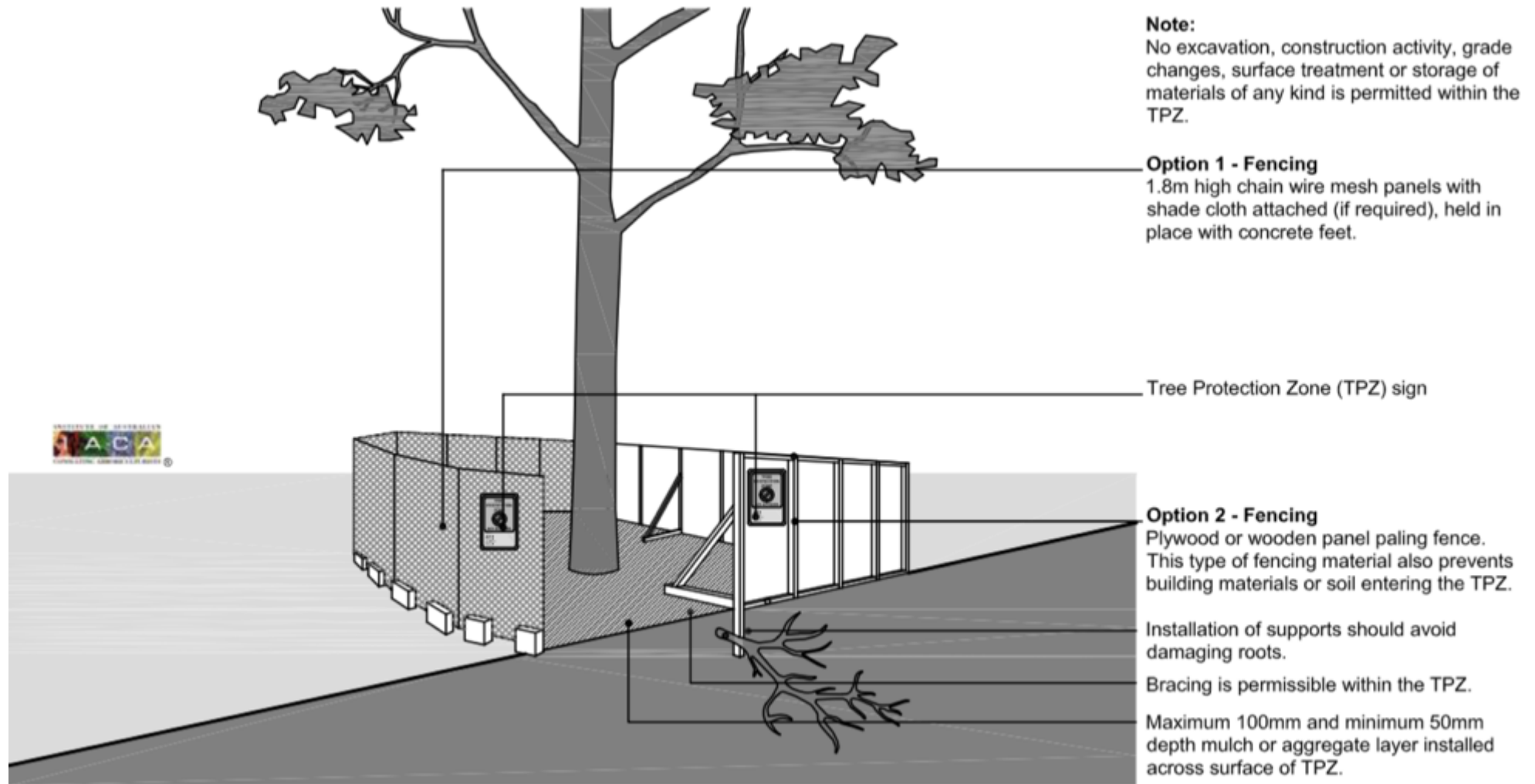


4. TPZ Encroachment Compensation

14 TRUNK AND GROUND PROTECTION



15 TPZ FENCING



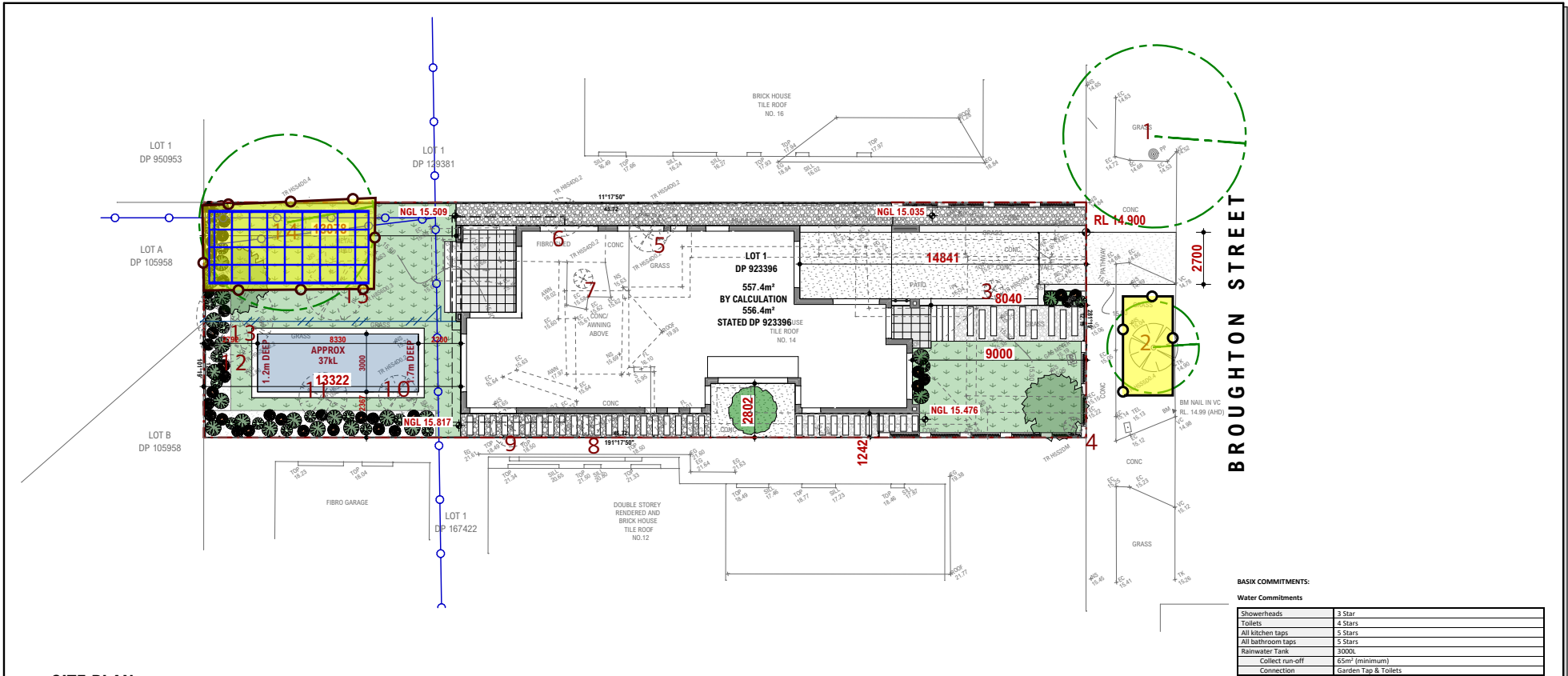
16 SITE DRAWINGS

16.1 TREE LOCATION PLAN

16.2 TREE PROTECTION PLAN

16.2.1 SITE DRAWING LEGEND





SITE PLAN

1:200

BASIC COMMITMENTS:

Water Commitments

Showerheads	3 Star
Toilets	4 Stars
All kitchen taps	5 Stars
All bathroom taps	5 Stars
Rainwater Tank	3000L
Collect run-off	65m ² (minimum)
Connection	Garden Tap & Toilets

Thermal Commitments

Wall construction	Brick Cavity (external) Single Brick (internal), 90mm stud as indicated
Wall insulation	To be confirmed
Roof	Metal roof with R1.3 Foil faced blanket
Ceiling insulation	To be confirmed
Window frame	Aluminium
Window Glazing	Double glazing (Glazing to be confirmed)

Energy Commitments

Hot water system	Gas instantaneous 6 Stars
Bathroom ventilation	Individual fan ducted to facade or roof; manual switch on/off
Kitchen ventilation	Individual fan ducted to facade or roof; manual switch on/off
Laundry ventilation	Individual fan ducted to facade or roof; manual switch on/off
Cooling (living & bedrooms)	3-phase (EER 2.5 – 3.0 zoned)
Heating (living & bedrooms)	3-phase (EER 3.0 – 3.5 zoned)
Artificial lighting	LED dedicated to: Bedrooms / study Living / dining rooms Each kitchen All bathroom / toilets All hallways
Natural lighting	To kitchen 5 bathrooms/toilets
PV panels	Minimum 3kW
Kitchen cooktop / oven	Gas cooktop & electric oven
Others	Private outdoor clothes drying line

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 ACCREDITED
 BUILDING DESIGNER

REV.	DATE	DRAWING	INT.
A	22.10.21	PRELIM DRAWINGS (CLIENT REVIEW)	CL
B	13.12.21	CONSULTANT ISSUE	CL
C	20.12.21	REDESIGN	CL

CLIENT:	Cameron & Margaret Lam	LOT NO.:	Lot 1
ADDRESS:	14 Broughton Road	DP NO.:	DP923396
SUBURB:	Strathfield	POSTCODE:	2135

SHEET NAME:	SITE PLAN	COUNCIL:	Strathfield
SCALE:	1:200, 1:2	DRAWN:	CL
HOUSE NAME:		DATE:	13.12.21

NORTH:

DRAWING NO.: 21223

SHEET NO.: 3/10

REVISION: C

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DA ISSUE