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Arboricultural Impact Assessment

Client:	NBRS Architecture
Job Address:	Sutherland Entertainment Centre-
	30 Eton St, Sutherland NSW2232
Date:	14th February 2020
Ref.:	7772
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	AQF 5 (Diploma of Arboriculture)

1. Table of Contents

2. Introduction

2.1. This Arboricultural Impact Assessment Report was commissioned by Mr Andrew Tripet from NBRS Architecture for the redevelopment of the Sutherland Entertainment Centre and Peace Park at 30 Eton St Sutherland.

2.2. This report will identify and collect relevant tree data of all site and nearby neighbouring trees and discuss the impact of the proposed development on them. The report will include ULE and STARS ratings[1], Tree Protection Zones and recommendations for removal, retention and/ or pruning.

3. Methodology

3.1. A site inspection was undertaken on Tuesday 9th July 2019, by principal consultant Stuart Rennie (AQF Level 5 Consulting Arborist), using the method of Visual Tree Assessment[2] (VTA); industry standard arboricultural assessment methodology.

3.2. The tree assessment was undertaken using International Society of Arboriculture (ISA) guidelines.

1. Species were identified using known attributes (e.g. capsules and buds)
2. Tree height was estimated
3. DBH was measured using diameter tape
4. Crown spread measurement was paced out.
5. A visual inspection of the condition and vigour of the tree was done from ground level. No aerial inspection was undertaken.

3.3. The client has provided the following documents and/or plans;

1. Landscape Plan- Peace Park Concept, Ref.: 18465 LSK01-1, Date 01/08/2019 by Chrofi & NBRS Architecture
2. Survey- Ref.: No.: B04540-1, Date June 2019 by Sutherland Shire Council

3.4. The system used to determine the priority for retention of each tree is the IACA Significance of a Tree Assessment Rating System (STARS), which combines the Useful Life Expectancy and Landscape Significance of all trees assessed. Details can be found in Appendix D and E.

3.5. The zones of protection (SRZ and TPZ) are calculated using the formulas found in the Australian Standard AS4970-2009 `*Protection of Trees on Development Sites'*.

3.6. The tree protection measures in this report are based on those found in the Australian Standard AS4970-2009 `*Protection of Trees on Development Sites'*. An exert from AS4970 has been provided in Appendix F for reference.

3.7. Photographs are provided in Appendix G for reference.

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[1] See Appendices

[2] Mattheck, C. Breloer, H. The Body Language of Trees – A handbook for failure analysis. The Stationary Office, London, 1994

4. Tree Impact Assessment

The proposed development for the refurbishment and addition of the Sutherland Entertainment Centre, including modifications to the adjoining Peace Park will require the removal of some site trees.

4.1. Of the Forty-two (42) trees were assessed, twenty-one (21) trees will need to be removed; Trees 5, 6, 7, 9, 10, 11, 13, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41 and 42.

1. Trees 11and 29 were considered to have a High Priority for retention. These trees are considered important for retention as they are of medium or high significance and have a medium to long useful life expectancy. The Author considers Tree 11 to eventually be removed due to safety reasons and Tree 29 is not located in a position to accommodate long-term growth. As these trees would need to be removed under the proposal, replacement tree planting of a suitable endemic species is recommended to offset the loss.
2. Trees 7, 9, 10, 13, 33, 37, 38, 41 and 42 were considered to have a Medium Priority for Retention. These trees are moderately important for retention as they are of low significance but have a medium to long useful life expectancy. These trees are considered less important to retain and would not normally require design modification to be implemented for their retention.
3. Trees 5, 6, 30, 31, 32, 34, 35, 36, 39 and 40 were considered to have Low Priority for Retention. These trees are not considered important for retention as they are of low significance and/or have a short useful life expectancy. The above-mentioned trees are still protected under Sutherland Shire Council Tree Preservation Policy and require consent to remove.

4.2. Of the Forty-two (42) trees were assessed, twenty-one (21) trees can be retained and protected; Trees 1, 2, 3, 4, 8, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27 and 28. An Arboricultural Method Statement is required to be implemented to aid landscape design and works to ensure successful tree retention. Recommendations for tree protection have been provided in Section 5. below to ensure that trees to be retained are adequately protected throughout all stages of the development.

5. Recommendations for tree protection

The following recommendations are made to ensure that all trees to be retained are adequately protected throughout all stages of the development;

5.1. An AQF 5 Project Arborist shall be enlisted and engaged prior to and throughout construction.

5.2. Tree protection is to form part of all site worker's induction.

5.3. The Project Arborist must oversee critical works such as excavation within the Tree Protection Zones (TPZ's).

5.4. Protective fencing is required prior to the commencement of works. See the exert from AS4970 in Appendix F. Fencing shall be 1.8m high chain mesh material temporary fencing. The purpose of the fencing is to protect the trees roots, trunk and branches, and minimize the impact on the trees during construction. Due to site restraints, fencing to enclose the TPZ is not always practical, however the contractors must be made aware of the TPZ's as a radius may go beyond the fenced off area but should enclose as much of the TPZ as practical.

1. Place a sign on the fencing stating; `Tree Protection Zone- Do not enter' so contractors are aware.
2. The building contractor shall ensure that the fencing remains secure throughout the development work period.

5.5. Some trees may require trunk protection. The trunk is to be first wrapped in hessian then timbers (2m lengths of 100mm x 50mm or similar) placed around the tree, spaced at 100mm, secured with galvanised wire, not fixed or nailed to the tree in any way.

5.6. Machinery such as an excavator will be required during demolition. Machines such as excavators cannot be used within the TPZ's of trees to be retained. This is to protect the trees roots from damage caused by compaction to the soil.

1. It is recommended that the operator keeps the tracks of the excavator outside of the TPZ and carefully works backwards with the bucket within the TPZ.
2. The removal of the structures within the TPZ's will utilise methods so that root systems are preserved intact and undamaged. Methods permitted are digging with hand tools, hydraulic, or pneumatic air excavation technology.
3. In some circumstances, machinery can be used within the TPZ, however ground protection is required and needs to be certified by the Project Arborist. Where

vehicular access is required, the TPZ is to be first laid with geotextile, then a 100mm mulch layer, plus further root protection such as steel plates or rumble boards to provide a temporary pathway over the mulch. The temporary vehicular access-way should be constructed as to be capable of supporting vehicles used during demolition. See the exert from AS4970 in Appendix F.
Note: Soil compaction is one of the major causes of root damage on development sites.

5.7. During earthworks and construction, it is important to irrigate the area within the TPZ's at least twice a week or when required. To further help improve the conditions for the trees being retained, apply Seasol to the soil within the dripline at the rate prescribed by the label. Seasol will promote root growth and help minimise any impact caused by the development.

5.8. Some TPZ's will require mulch to be added to a depth of 100mm and not covering the root flare. Mulch will reduce compaction and provide further protection for tree roots when work within the TPZ is required. Mulch can be removed towards the end of construction prior to landscaping.

5.9. All existing soil levels within the TPZ must remain as close to the existing levels as possible or unless otherwise approved. Added fill soil used for sub base must be an approved permeable material and will be 120mm above the existing grade. Note: Tree roots are generally a lot closer to the surface than what is commonly thought and on the other hand, soil build up around trees and/or stockpiling soil around trees can be damaging as it reduces the essential exchange of gases between the soil air and the atmosphere (aeration).

5.10. The building contractor shall ensure that during site works, the following activities shall not take place within the TPZ to prevent toxicity to the soil;

1. Preparation of chemicals, including cement products
2. Refuelling
3. Dumping of waste
4. Wash down and cleaning of equipment

5.11. Excavation within the TPZ's must be done under the supervision of the Project Arborist.

1. If roots are found the Arborist will need to determine whether these roots can be cut. Any roots cut should be done so cleanly using hand tools, then covered in hessian and kept moist to prevent them from drying out.

2. If underground services are required through the TPZ's of any tree to be retained such as storm water and other utilities (gas, water, optic fibre, electricity) will require Arborist Supervision will be necessary during excavation to determine whether roots will be affected and whether the loss of those roots, if any, are likely to affect tree vigour and/or stability. Hand digging and/or Under boring may be necessary.

5.12. If pruning is required on any tree to be retained then it must be in accordance with Australian Standards AS4373-2007-pruning of amenity trees.

5.13. The Project Arborist Practical should assess the trees on completion and certify that the completed works have been carried out to the tree protection specifications; practical completion assumes that all construction is finished. All remaining tree protection measures can be removed.

Please feel free to contact the Author if you have any questions.

Regards

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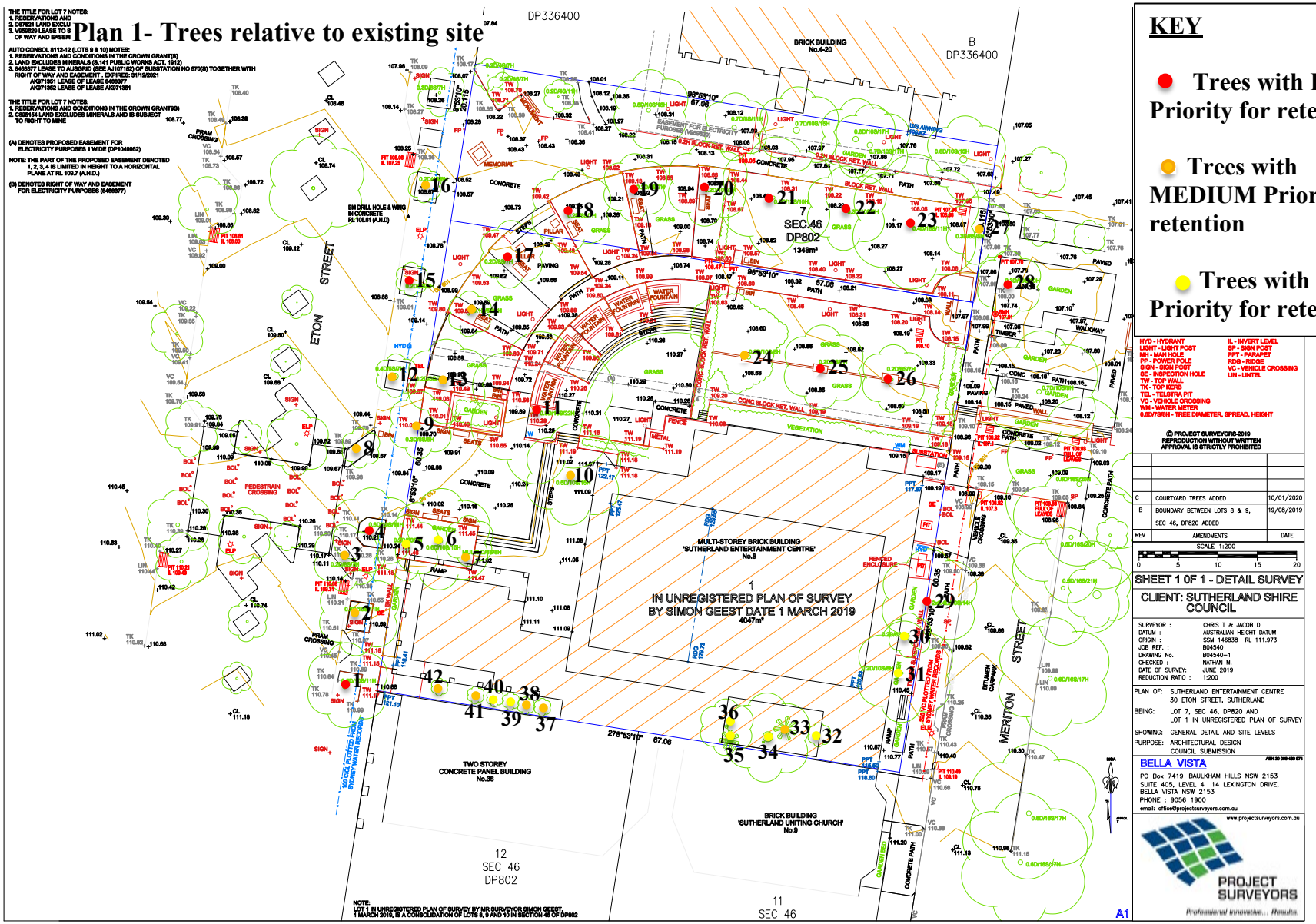
AQF 5 (Diploma of Arboriculture)
Arboriculture Australia Member No.2535
ISA Tree Risk Assessment Qualified

Disclaimer

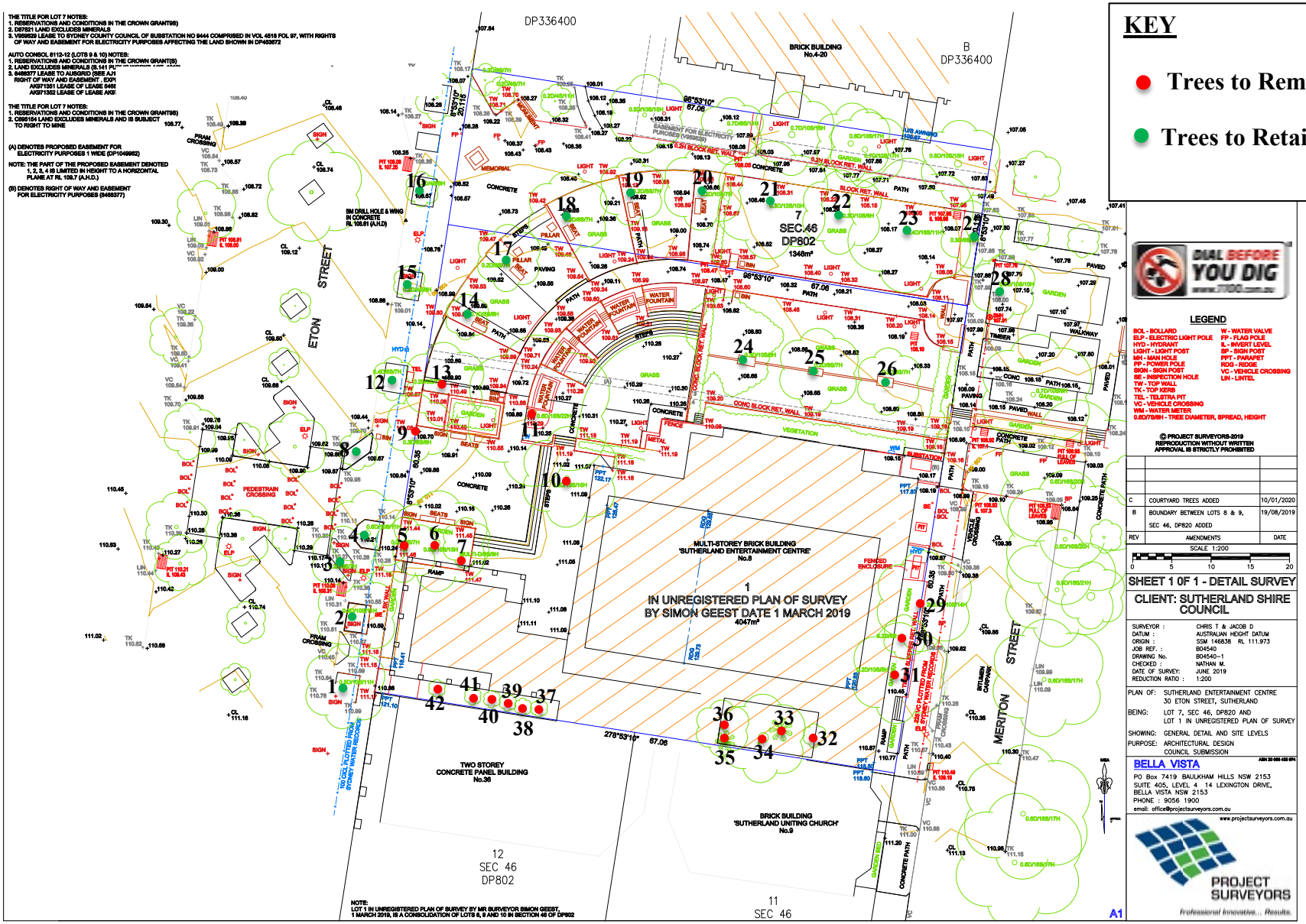
The inspection undertaken by our qualified staff relies on visual attributes of tree vigour and structure, which can be assessed from a ground-based inspection. Hidden defects, which are not readily visible, may not be detected. We therefore cannot wholly guarantee the condition and safety of the trees inspected beyond what can be reasonably assessed from the procedure used.
Any protection or preservation methods recommended are not a guarantee of tree survival or safety but are designed to improve vigour and reduce risk. Timely inspections and reports are necessary to monitor the trees' condition. No responsibility is accepted for damage or injury caused by the trees and no responsibility is accepted if the recommendations in this report are not followed.
This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.
Any tree work recommended in this report is to be conducted in accordance with: Australian Standards – AS4373; `Pruning of Amenity Trees', Work Health and Safety Act 2011 (WHS Act) and Work Health and Safety Regulation 2011 (WHS Regulation). All tree works recommended in this report must be carried out under the supervision of a minimum AQF 3 Arborist. All tree work recommended in this report are to be in accordance with the appropriate authorities.

Appendix A- Plans

Plan 1- Trees relative to existing site



Plan 2- Trees to retain and remove based on the proposal



Appendix B- Tree data and Assessment Table

Definitions can be found in Appendix C

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
1	*Lophostemon confertus* Brush Box Native	0.58	12	M	G	G	C SYM 10 x 9	A1	Medium	High	-	6.9	Council tree- Retain and Protect
Assessment • Tree 1 is a council tree located along the street frontage and forms a row of Brushbox trees lining the street. **See Photo 1 in Appendix G.** • This tree displays good vigour and condition and the typical habit for the species.													
2	*Lophostemon confertus* Brush Box Native	0.28	12	SM	F	F	C SYM 8 x 9	C2	Medium	Medium	-	3.4	Council tree- Retain and Protect
Assessment • Tree 2 is a council tree located along the street frontage and forms a row of Brushbox trees lining the street. **See Photo 2 in Appendix G.** • This is a semi-mature specimen; its growth is moderately restricted by the adjacent trees and as such has more upright branches and not the typical rounded crown. Crown density appears partial in comparison to Tree 1, hence the fair vigour rating.													
3	*Ulmus parvifolia* Chinese Elm Exotic	0.23	10	SM	Dec	F	C SW 6 x 6	B5	Medium	Medium	-	2.7	Council tree- Retain and Protect
Assessment • Tree 3 is a semi-mature specimen located in a small garden adjacent to the pedestrian crossing. **See Photo 3 in Appendix G.** • Tree 3 has a crown aspect to the southwest over the road due to the adjacent Brush Box trees and the crown has been pruned for ground clearance. The upper crown also interferes with the street light. Typically, Chinese Elms are a fast growing, semi deciduous tree, forming a broad vase-shape habit and pendulous branches. This specimen forms more of an upright habit due to the above ground restrictions in growth.													
4	*Lophostemon confertus* Brush Box Native	0.54	12	M	G	G	C SYM 9 x 9	A1	Medium	High	-	6.5	Council tree- Retain and Protect
Assessment • Tree 4 is a council tree located along the street frontage and forms a row of Brushbox trees lining the street. **See Photo 4 in Appendix G.** • This tree displays good vigour and condition and the typical habit for the species.													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
5	*Callistemon viminalis* Weeping Bottlebrush Endemic	0.13 0.13 0.15	7	M	F	F	I SYM 6 x 4	C3	Medium	Low	-	2.8	Remove- Conflicts with proposal
Assessment • Tree 5 is a site tree, located in a retained garden. **See Photo 5 in Appendix G.** • This tree consists of multiple upright leaders to form a vase-shaped crown. Crown density is partial with small dead twiggy branches. The crown is moderately restricted by the surrounding trees and the tree is planted close to the brick retaining wall.													
6	*Eucalyptus scoparia* Wallangarra White Gum Native	0.68	14	M	F	P/ F	D SYM 11 x 8	B3	Medium	Low	-	8.1	Remove- Conflicts with proposal
Assessment • Tree 6 is a site tree, located in a retained garden. **See Photo 6 in Appendix G.** • There is a wound to the vascular cambium around the base. The extent of the decay is unknown and will be the determinant as far as how likely tree failure is. **See Photo 7.** This tree has a single trunk to 4m then divides into two leaders with a small but dense crown. Pruning has occurred to remove lower limbs and there is some dieback to the upper crown. • Further assessment is required to determine the extent of decay and whether the structural integrity of the tree is compromised. Regardless, the Author considers this specimen to only be suitable to retain for the short term due to issues that may arise from the damage to the base and its restrictions in growth below ground.													
7	*Callistemon viminalis* Weeping Bottlebrush Endemic	Multi	7	M	G	G	C N 6 x 5	A2	Medium	Medium	-	3.4	Remove- Conflicts with proposal
Assessment • Tree 7 is a site tree, located in a retained garden. **See Photo 8 in Appendix G.** • This tree consists of multiple upright leaders to form a rounded and weeping crown with good vigour. The crown has a slight northern aspect due to the proximity to building.													
8	*Ulmus parvifolia* Chinese Elm Exotic	0.15	7	SM	Dec	G	C SYM 6 x 3	B5	Medium	Medium	-	2	Council tree- Retain and Protect
Assessment • Tree 8 is a semi-mature specimen located in a small garden adjacent to the pedestrian crossing. **See Photo 9 in Appendix G.** • This specimen has been previously pruned for ground clearance but otherwise displays the typical habit and good condition and vigour.													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
9	*Ulmus parvifolia* Chinese Elm Exotic	0.21	8	M	Dec	G	C SYM 10 x 8	A2	Medium	Medium	-	2.5	Remove- Conflicts with proposal
Assessment • Tree 9 is a site tree. **See Photo 10 in Appendix G.** • Concrete, asphalt and a small raised garden surround the tree but otherwise Tree 9 displays good condition and vigour.													
10	*Liriodendron tulipifera* Tulip Tree Exotic	0.57	14	M	Dec	G	C SYM 11 x 11	A2	Medium	Medium	-	6.8	Remove- Conflicts with proposal
Assessment • Tree 10 is a site tree located close to the existing building in a small garden, surrounded by concrete stairs and paths. **See Photo 11 in Appendix G.** • Tulip trees are deciduous and originate from North America. This specimen is in good condition.													
11	*Corymbia maculata* Spotted Gum Endemic	0.65	20	M	G	G	D SYM 18 x 18	B2	High	High	-	7.8	Remove- Conflicts with proposal
Assessment • Tree 11 is a site tree located in an area used frequently by park users. **See Photo 12.** It is located in a small garden, surrounded predominantly by concrete and water feature (Peter Day Kirk's mural). **See Photo 13.** • This specimen displays good vigour and the typical habit for the species. There appears to be a cavity forming on the trunk above the 2nd order primary limb. **See Photo 14.** Some branch stubs within crown indicate past branch failures. • The Author considers this specimen to have a Medium ULE as it may eventually be removed due to safety reasons.												
12	*Lophostemon confertus* Brush Box Native	0.35	7	M	G	F	C NW 7 x7	B2	Medium	Medium	-	4.2	Council tree- Retain and Protect
Assessment • Tree 12 is a council tree located along the street frontage and forms a row of Brushbox trees lining the street. **See Photo 15 in Appendix G.** • The crown has been previously lopped and has a north-western crown aspect due to its co-dominant growth response to an adjacent tree, but otherwise has good vigour. • This specimen may not be suitable to retain for the long term due to issues that may arise from the potentially weakened attachment of the regrowth from lopping.													
13	*Ulmus parvifolia* Chinese Elm Exotic	0.25	7	M	Dec	G	C SYM 8 x 8	A2	Medium	Medium	-	3	Remove- Conflicts with proposal
Assessment • Tree 13 forms one of the Chinese Elm trees throughout Peace Park. It displays the typical habit for the species. **See Photo 16.**													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
14	*Ulmus parvifolia* Chinese Elm Exotic	0.18	6	SM	DEC	F	D SYM 7 x 5	B2	Medium	Medium	-	2.1	Retain and Protect
Assessment • Tree 14 forms one of the Chinese Elm trees throughout Peace Park. It has been lopped and epicormic growth has formed along the branches. **See Photo 17.** • The Author considers this specimen to have a Medium ULE due to safety issues that may arise from the lopped branches.													
15	*Lophostemon confertus* Brush Box Native	0.22	7	SM	G	G	D SYM 4 x 4	A1	Medium	High	-	2.6	Council tree- Retain and Protect
Assessment • Tree 15 is a council tree located along the street frontage and forms a row of Brushbox trees lining the street. **See Photo 18.** • This tree displays good vigour and condition and the typical habit for the species.													
16	*Lophostemon confertus* Brush Box Native	0.19	8	SM	F	F	D SYM 5 x 4	A2	Medium	Medium	-	2.2	Council tree- Retain and Protect
Assessment • Tree 16 is a council tree located along the street frontage and forms a row of Brushbox trees lining the street. **See Photo 19.** • This tree displays fair vigour and condition based on the partial crown density and dead twiggy branches to the western side of the crown.													
17	*Ulmus parvifolia* Chinese Elm Exotic	0.25	7	M	DEC	G	C SYM 10 x 10	A1	Medium	High	-	3	Retain and Protect
Assessment • Tree 17 is one of the Chinese Elms in Peace Park, planted to side of the stairs leading to the war memorial and the Entertainment Centre. The park honours the sister city relationship between the Sutherland Shire and Chuo in Tokyo. **See Photo 20.** • This tree displays good vigour and condition and the typical habit for the species.													
18	*Ulmus parvifolia* Chinese Elm Exotic	0.27	7	M	Dec	G	C SYM 8 x8	A1	Medium	High	-	3.2	Retain and Protect
Assessment • Tree 18 is one of the Chinese Elms in Peace Park, planted to side of the stairs leading to the war memorial and the Entertainment Centre. The park honours the sister city relationship between the Sutherland Shire and Chuo in Tokyo. **See Photo 20.** • This tree displays good vigour and condition and the typical habit for the species.													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
19	*Ulmus parvifolia* Chinese Elm Exotic	0.22	7	M	Dec	G	C SYM 7 x 7	A1	Medium	High	-	2.6	Retain and Protect
Assessment • Tree 19 forms a row of Chinese Elm trees along the path way leading to the war memorial and Chuo City Garden. **See Photo 21.** • This tree displays good vigour and condition and the typical habit for the species.													
20	*Ulmus parvifolia* Chinese Elm Exotic	0.28	8	M	Dec	G	C SYM 10 x 8	A1	Medium	High	-	3.3	Retain and Protect
Assessment • Tree 20 forms a row of Chinese Elm trees along the path way leading to the war memorial and Chuo City Garden. **See Photo 21.** • This tree displays good vigour and condition and the typical habit for the species.													
21	*Ulmus parvifolia* Chinese Elm Exotic	0.29	10	M	Dec	G	C SYM 11 x 12	A1	Medium	High	-	3.4	Retain and Protect
Assessment • Tree 21 forms a row of Chinese Elm trees along the path way leading to the war memorial and Chuo City Garden. **See Photo 22.** • This tree displays good vigour and condition and the typical habit for the species.													
22	*Ulmus parvifolia* Chinese Elm Exotic	0.21	8	M	Dec	G	C SYM 8 x 8	A1	Medium	High	-	2.5	Retain and Protect
Assessment • Tree 22 forms a row of Chinese Elm trees along the path way leading to the war memorial and Chuo City Garden. **See Photo 22.** • This tree displays good vigour and condition and the typical habit for the species.													
23	*Ulmus parvifolia* Chinese Elm Exotic	0.32	12	M	Dec	G	C SYM 12 x 11	A1	Medium	High	-	3.8	Retain and Protect
Assessment • Tree 23 forms a row of Chinese Elm trees along the path way leading to the war memorial and Chuo City Garden. **See Photo 22.** • This tree displays good vigour and condition and the typical habit for the species.													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
24	*Ulmus parvifolia* Chinese Elm Exotic	0.31	9	SM	Dec	F	C N 11 x 12	B2	Medium	Medium	-	3.7	Retain and Protect
Assessment • Trees 24, 25 and 26 are planted in a row, in a separate grassed area within Peace Park. They will eventually form an avenue with Trees 21-23 planted on the opposite side of the path. • Tree 24 has a stem bias to the north but otherwise has good condition and vigour. **See Photo 23.**													
25	*Ulmus parvifolia* Chinese Elm Exotic	0.25	8	SM	Dec	G	C SYM 7 x 7	A1	Medium	High	-	3	Retain and Protect
Assessment • Trees 24, 25 and 26 are planted in a row, in a separate grassed area within Peace Park. They will eventually form an avenue with Trees 21-23 planted on the opposite side of the path. • Tree 25 has a slight stem bias but otherwise has good condition and vigour. **See Photo 23.**													
26	*Ulmus parvifolia* Chinese Elm Exotic	0.2	7	SM	Dec	G	C SYM 7 x 8	A1	Medium	High	-	2.4	Retain and Protect
Assessment • Trees 24, 25 and 26 are planted in a row, in a separate grassed area within Peace Park. They will eventually form an avenue with Trees 21-23 planted on the opposite side of the path. • Tree 26 displays good vigour and the typical habit. **See Photo 23.**													
27	*Prunus persica* Flowering Peach tree Exotic	0.22	5	M	Dec	F	C SYM 8 x 6	A5	Medium	Medium	-	2.6	Retain and Protect
Assessment • Tree 27 appears to form part of the Chuo City Garden. These trees are a small deciduous tree, grown for their heavy flowering display in late winter. **See Photo 24.** The upper crown has been previously tip pruned but otherwise displays the typical habit for the species.													
28	*Salix matsudana `Tortuosa'* Tortured Willow Exotic	0.41	10	M	Dec	F	D SYM 8 x 8	B1	High	High	-	4.92	Retain and Protect
Assessment • Tree 28 forms part of the Chuo City Garden. The species is named in honour of Sadahisa Matsuda, a Japanese botanist. **See Photo 25.** The crown has been previously tip pruned but otherwise displays the typical habit for the species.													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
29	*Syncarpia glomulifera* Turpentine Endemic	0.27 0.34 0.51	16	M	G	F	C SYM 12 x 12	C2	High	High	-	8.0	Remove- Conflicts with proposal
Assessment • Tree 29 is a site tree located at the rear boundary, in a garden between building and footpath. **See Photo 26.** • Tree 29 has codominant leaders. The main leader has good condition and vigour. The smaller secondary leader requires pruning to remove an included branch and dead wood. The base of the tree is moderately restricted by the concrete and garden edging. **See Photo 27.** • This tree is considered to have a High Significance in Landscape rating as the species forms part of a critically endangered ecological community (EEC) Sydney Turpentine Ironbark Forest (STIF) protected by NSW state legislation. The Author considers this specimen to have a Medium ULE due to the restrictions in growth. • This tree conflicts with the proposal and would need to be removed. Replacement tree planting of a suitable endemic species is recommended to offset the loss.													
30	*Pittosporum undulatum* Native Daphne Endemic	0.16 0.22	8	M	F	F	I SYM 6 x 6	A3	Medium	Low	-	3.2	Remove- Conflicts with proposal
Assessment • Tree 30 is a site tree located at the rear boundary, in a garden between building and footpath. **See Photo 28.** • Tree 30 has fair vigour and the typical habit. This species is typically found in shady gullies and is known to be a very opportunistic species, often known as a `pest' in urban bushland. Very common in the Sutherland Shire. • The remaining ULE is considered to be Short as they are often prone to borer damage and the specimen is moderately restricted in growth.													
31	*Pittosporum undulatum* Native Daphne Endemic	0.23 0.25	8	M	F	G	C E 7 x 8	A3	Medium	Low	-	4.0	Remove- Conflicts with proposal
Assessment • Tree 31 is a site tree located at the rear boundary, in a garden between building and footpath. **See Photo 28.** • Tree 31 has fair vigour and the typical habit. This species is typically found in shady gullies and is known to be a very opportunistic species, often known as a `pest' in urban bushland. Very common in the Sutherland Shire.													
32	*Acmena smithii* Lilly Pilly Endemic	0.15	9	SM	G	P	I SYM 4 x 3	C3	Medium	Low	-	2	Remove- Conflicts with proposal
Assessment • Trees 32 -36 are located within a courtyard, surrounded by two-three storey high walls, accessible only from inside the Entertainment Centre. • Tree 32 has been planted against a brick wall, causing restrictions in growth above and below ground. **See Photo 29.** • This specimen would only be suitable to retain for the short term however, this tree conflicts with the proposal and would need to be removed													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
33	*Howea forsteriana* Kentia Palm Native	0.2	7	M	G	G	S SYM 3 x 3	C2	Medium	Medium	-	2.5	Remove- Conflicts with proposal
Assessment • Trees 32 -36 are located within a courtyard, surrounded by two-three storey high walls, accessible only from inside the Entertainment Centre. • Tree 33 displays good vigour and the typical habit for the species but its growth is somewhat restricted by Tree 34 overhead. Kentia palms are a native palm, popular for their elegant and tropical look. **See Photo 30.**													
34	*Eucalyptus nicholii* Small-leaved Peppermint Native	1.27	20	OM	G	P	D SYM 11 x 14	B3	Medium	Low	-	15	Remove- Conflicts with proposal
Assessment • Trees 32 -36 are located within a courtyard, surrounded by two-three storey high walls, accessible only from inside the Entertainment Centre. • Tree 34 has a broad trunk with co-dominant leaders at 2m. One leader has been removed or lopped. The lopped leader has decaying wood that extends down in to the main trunk. **See Photos 31 and 32.** The remaining leader has good vigour and extends above the high surrounding walls. **See Photo 33.** • These trees are endemic to the New England portion of the northern tablelands of NSW. In Sydney however, they typically exhibit dieback and a short to medium useful life expectancy. They have low durability and tolerance to pathogenic decay, particularly vulnerable to root decay and pose a high proportion of failures relative to other species in windstorms. • The Author considers this specimen to have a Short ULE due to safety reasons. The overall STARS rating is Low. This tree is considered less important to retain. • This tree conflicts with the proposal and would need to be removed												
35	*Melaleuca linariifolia* Snow in Summer Endemic	0.41	12	M	G	F	C S and W 7 x 7	C3	Medium	Low	-	4.9	Remove- Conflicts with proposal
Assessment • Trees 32 -36 are located within a courtyard, surrounded by two-three storey high walls, accessible only from inside the Entertainment Centre. • Tree 35 has been planted against a brick wall, causing restrictions in growth below ground. **See Photo 33.** The crown extends above the 2-3 storey high wall. **See Photo 34.** • The Author considers this specimen to have a Short ULE due to location.													
36	*Archontophoenix cunninghamiana* Bangalow Palm Endemic	0.17	7	M	F	P	S SYM 2.5 x 2.5	C3	Medium	Low	-	2.25	Remove- Conflicts with proposal
Assessment • Trees 32 -36 are located within a courtyard, surrounded by two-three storey high walls, accessible only from inside the Entertainment Centre. • Tree 36 has been planted against a brick wall and Tree 35, causing restrictions in growth above and below ground. **See Photos 33 and 35.**													

Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
• This specimen would only be suitable to retain for the short term however, this tree conflicts with the proposal and would need to be removed.													
37	*Melaleuca styphelioides* Prickly-leaved Paperbark Endemic	0.26	14	M	G	F	I SYM 3 x 3	B2	Medium	Medium	-	3.1	Remove- inappropriate for location
Assessment • Trees 37-42 form a row of trees planted in a narrow garden bed between two 3-storey buildings. • These trees display an intermediate/ forest class growth habit, with tall slender trunks and small crowns above the buildings. **See Photos 36 and 37.**													
38	*Melaleuca styphelioides* Prickly-leaved Paperbark Endemic	0.24	14	M	G	F	I SYM 3 x 3	B2	Medium	Medium	-	2.8	Remove- inappropriate for location
Assessment • Trees 37-42 form a row of trees planted in a narrow garden bed between two 3-storey buildings. • These trees display an intermediate/ forest class growth habit, with tall slender trunks and small crowns above the buildings. **See Photos 36 and 37.**													
39	*Melaleuca styphelioides* Prickly-leaved Paperbark Endemic	0.19	14	M	G	P	I SYM 1 x 1	B3	Medium	Low	-	2.2	Remove- inappropriate for location
Assessment • Trees 37-42 form a row of trees planted in a narrow garden bed between two 3-storey buildings. These trees display an intermediate/ forest class growth habit, with tall slender trunks and small crowns above the buildings. **See Photos 36 and 37.** • Tree 39 was co-dominant at 1/2m but the western leader has been removed. • The proposal does not conflict with these trees and can therefore be retained and protected.													
40	*Melaleuca styphelioides* Prickly-leaved Paperbark Endemic	0.16	8	M	F	P	S SYM 2 x 1	C3	Low	Low	-	2	Remove- inappropriate for location
Assessment • Trees 37-42 form a row of trees planted in a narrow garden bed between two 3-storey buildings. **See Photos 36 and 37.** • Tree 40 is a smaller suppressed specimen. • The proposal does not conflict with these trees and can therefore be retained and protected.													

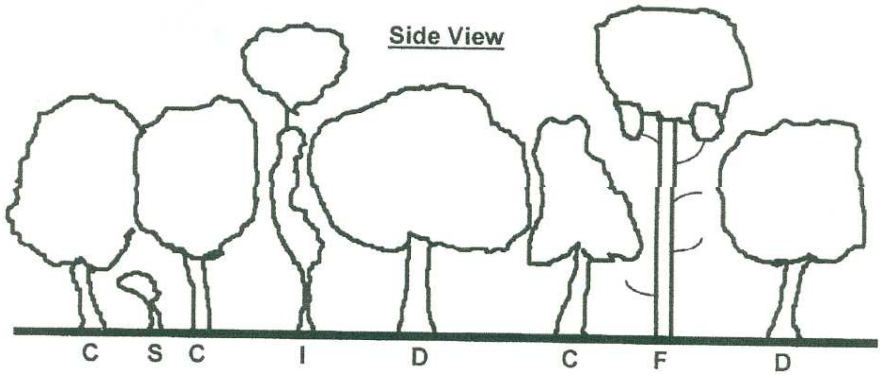
Tree No.	Species 1. *Botanical name* 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown 1. Class 2. Aspect 3. Spread (m)	ULE Rating	Landscape Rating	STARS Rating	SRZ (m)	TPZ (m)	Recommendation
41	*Melaleuca styphelioides* Prickly-leaved Paperbark Endemic	0.41	15	M	G	F	C SYM 8 x 6	A2	Medium	Medium	-	4.9	Remove- inappropriate for location
Assessment • Trees 37-42 form a row of trees planted in a narrow garden bed between two 3-storey buildings. **See Photos 36 and 37.**													
42	*Melaleuca styphelioides* Prickly-leaved Paperbark Endemic	0.43	15	M	G	F	C SYM 6 x 8	A2	Medium	Medium	-	5.1	Remove- inappropriate for location
Assessment • Trees 37-42 form a row of trees planted in a narrow garden bed between two 3-storey buildings. **See Photos 36 and 37.**													

Appendix C- Glossary

Age
Is the estimate of the tree age based upon the expected life span of the species. Divided into three stages.
Young- Trees less than 20% of life expectancy.
Mature - Trees aged between 20% to 80% life expectancy.
Over-mature- Trees aged over 80% of life expectancy (potential symptoms of senescence)

AQF Australian Qualification Framework

Crown Class
Dominant- Crown is receiving uninterrupted light from above and sides, also known as emergent.
Codominant- Crown is receiving light from above and one side of the crown.
Intermediate- Crown is receiving light from above but not the sides of the crown.
Suppressed- Crown has been shadowed by the surrounding elements and receives no light from above or sides.
Forest - Characterised by an erect, straight stem (usually excurrent) with little stem taper and virtually no branching over the majority of the stem except for the top of the tree which has a small concentrated branch structure composing the crown.



Illustrated Crown classes
Source: Hazard Tree Assessment Program, Recreation and Park Department, City of San Francisco, California, cited in Matheny, N. & Clark, J. R., 1998.

Crown Aspect In relation to the root crown, this refers to the aspect the majority of the crown is located. Symmetrical where the centre of the crown resides over the root crown or the cardinal direction the centre of the crown resides, being North, South, East or West.

Crown Spread A two-dimension linear measurement (metres) of the crown plan. The first figure being the north-south span, the second being the east-west measurement.

Condition is the trees crown form and growth habit. It can be categorised as:
G- Good
F- Fair
P- Poor
D- Dead

DBH Diameter at Breast Height (approx. 1.4 metres above ground level)

Origin
Refers to the natural occurrence of the tree species as referenced in Forest Trees of Australia.
This may be summarised by one of the three terms:
Endemic- natural occurrence to the area the species is located (and possibly other areas).
Exotic- naturally occurs in another country but not in Australia.
Native- does not naturally occur within the area the species is located but is found elsewhere in Australia.
Remnant- natural occurrence within area, and part of the natural planting

SRZ Structural Root Zone; disturbance within this area may affect stability of the tree $((D \times 50)^{0.42} \times 0.64$ expressed as a radius measured from the centre of trunk – source AS4970-2009 Section 3, pp. 11-14)

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

TPZ Tree Protection Zone; tree may cope with minimal disturbance in this area, depends on underlying soil, existing structures, etc. (DBH x 12 expressed as a radius measured from the centre of trunk – source AS4970-2009 Section 3, pp. 11-14)

ULE Useful Life Expectancy (after Jeremy Barrel, 2009)

Vigour is the ability of a tree to sustain its life processes. It can be categorised as:
G- Good
F- Fair
P- Poor
Dec- Deciduous or dormant tree vigour

(VTA) Visual tree assessment
A procedure of defect analysis developed by Mattheck and Breloer (1994), that uses the growth response and form of trees to detect defects.

Appendix D: Useful Life Expectancy (ULE)

After Jeremy Barrell, 2009
Barrelltreecare.co.uk

	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).	

Appendix E: IACA Significance of a Tree Assessment Rating System (STARS)

Criteria for Assessment of Landscape Significance

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

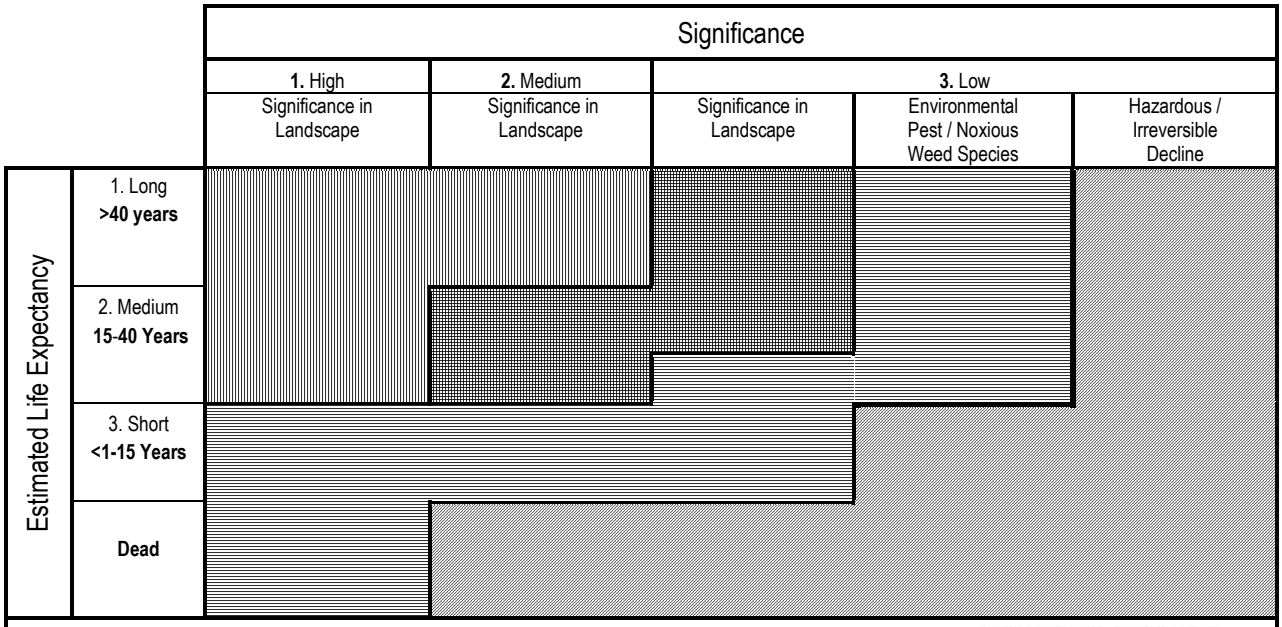
- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the 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.

Tree Retention Values- Assessment Methodology



Legend for Matrix Assessment

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Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc 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.

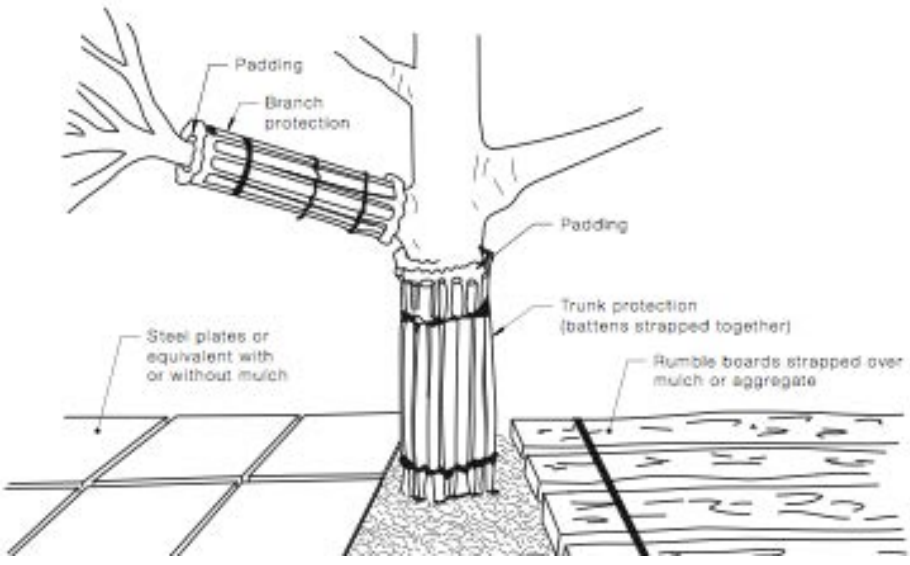
Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

Appendix F: Tree Protection

Protective Fencing

LEGEND:
1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

Root, branch and trunk protection



Appendix G: Photos

PHOTO 1- Tree 1 (facing east)

PHOTO 2- Tree 2 (facing NE)

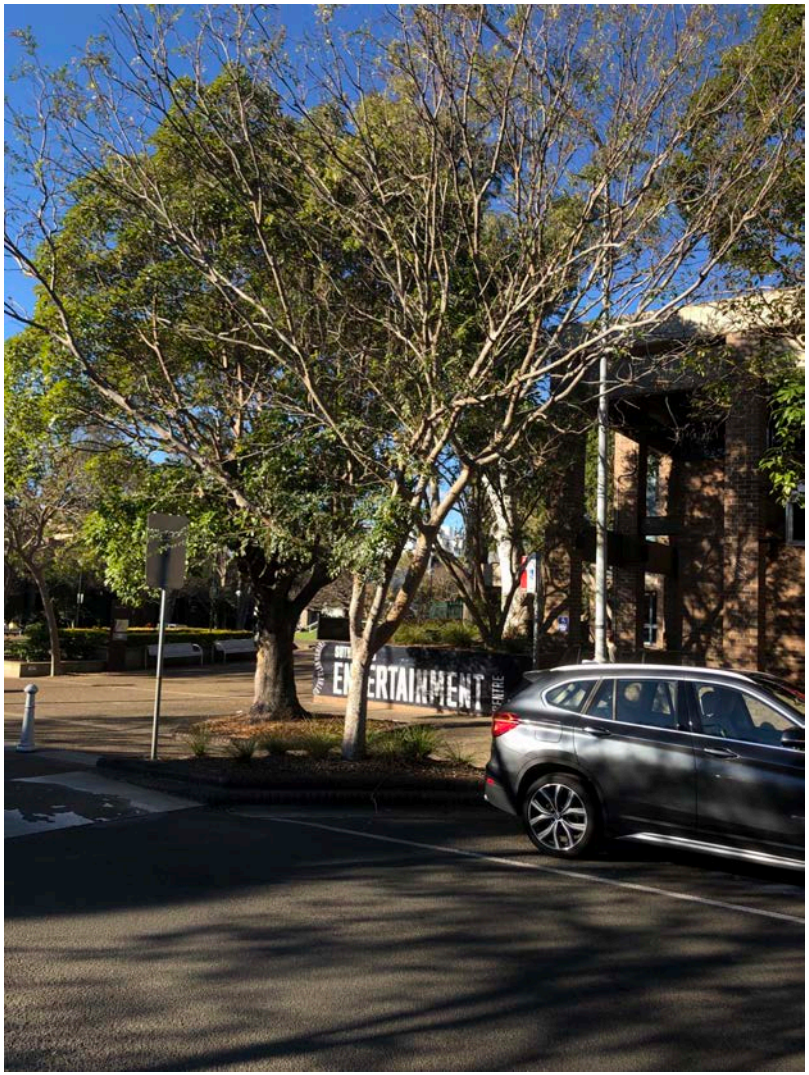


PHOTO 3- Tree 3 (facing NE)

PHOTO 4- Tree 4 (facing east)

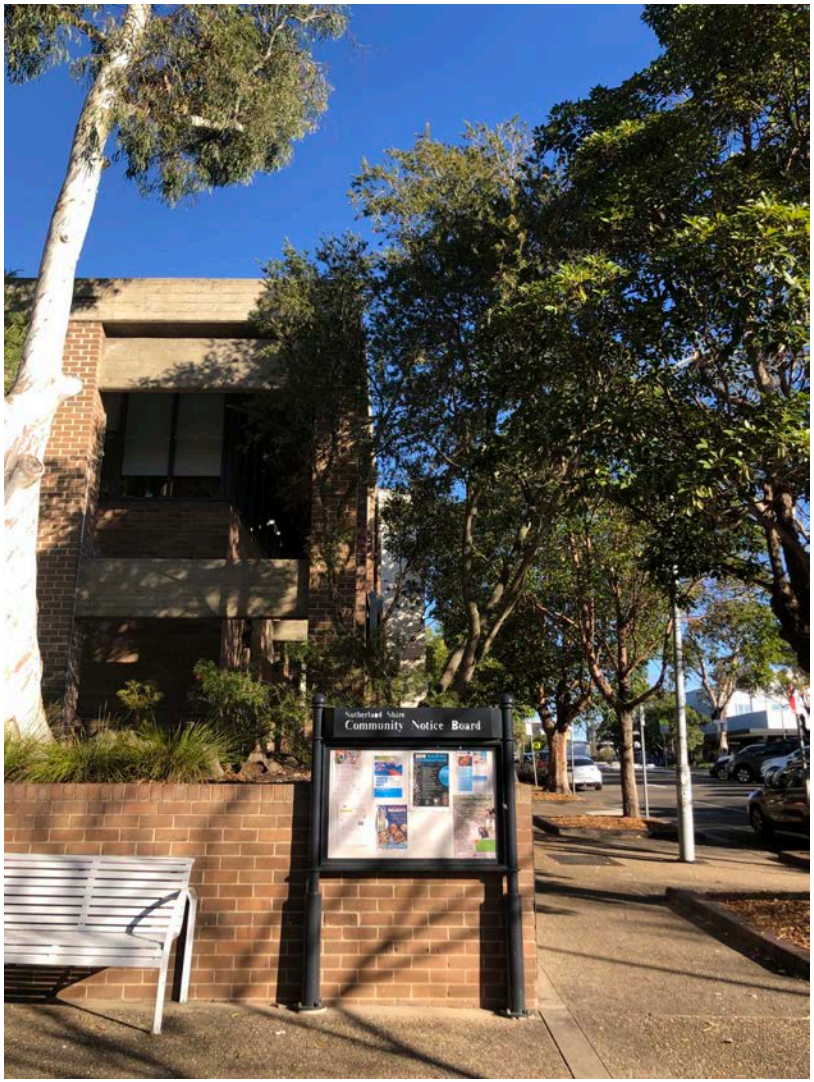


PHOTO 5- Tree 5 (facing south)

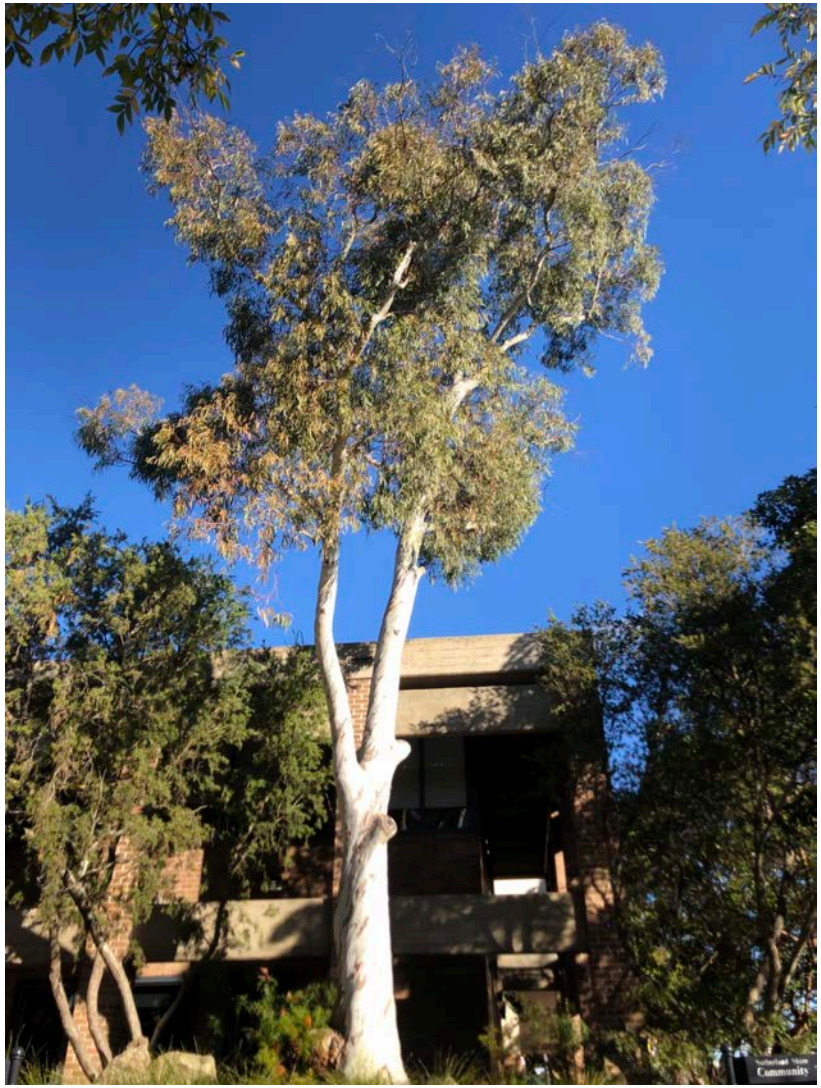


PHOTO 6- Tree 6 (facing south)

PHOTO 7- Shows the damage to the base of Tree 6

PHOTO 8- Tree 7 (facing south)

PHOTO 9- Tree 8 (facing NNW)

PHOTO 10- Tree 9 (facing NNE)

PHOTO 11- Tree 10 (facing east)

PHOTO 12- Tree 11 (facing NE)

PHOTO 13- Shows the area surrounding Tree 11

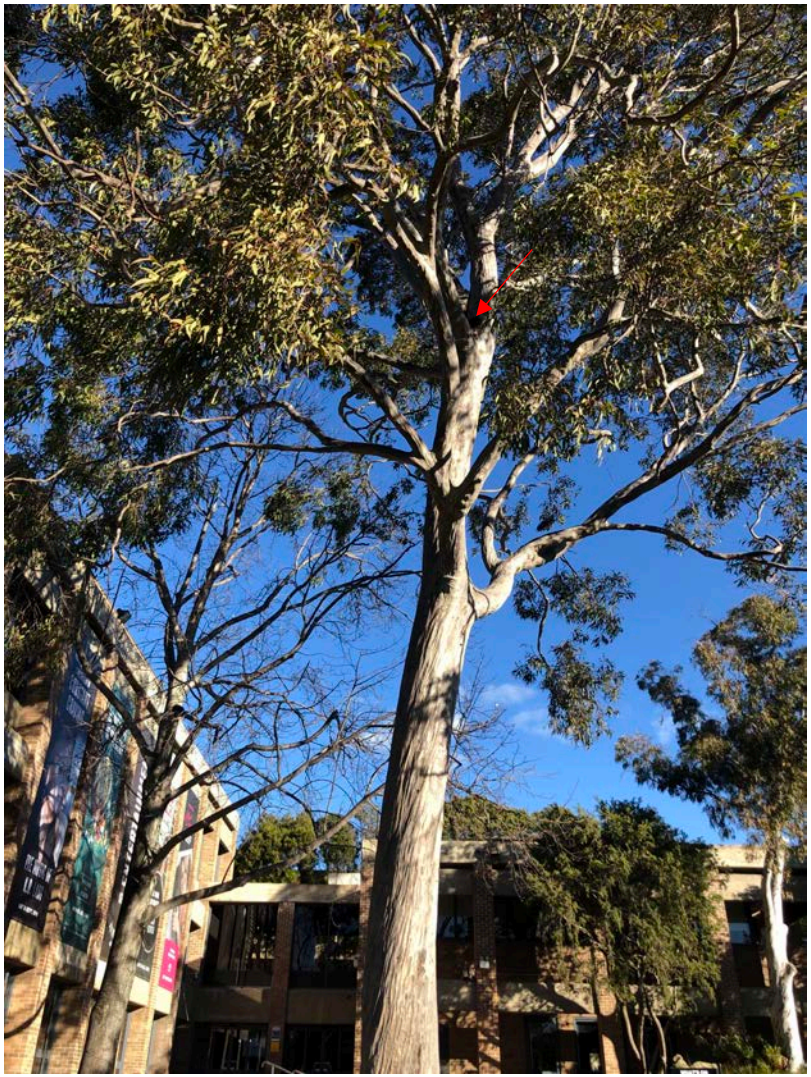


PHOTO 14- Arrow indicates the cavity forming in Tree 11.

PHOTO 15- Tree 12 (facing North)

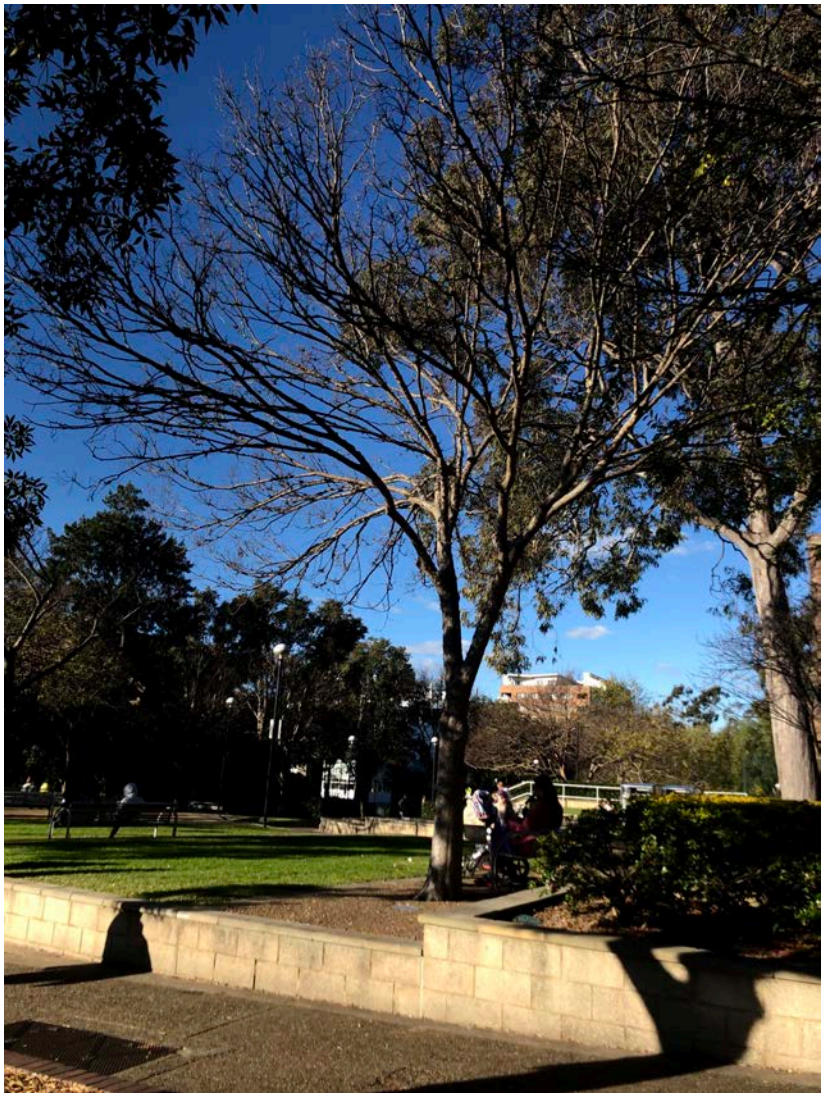


PHOTO 16- Tree 13 (facing NE)

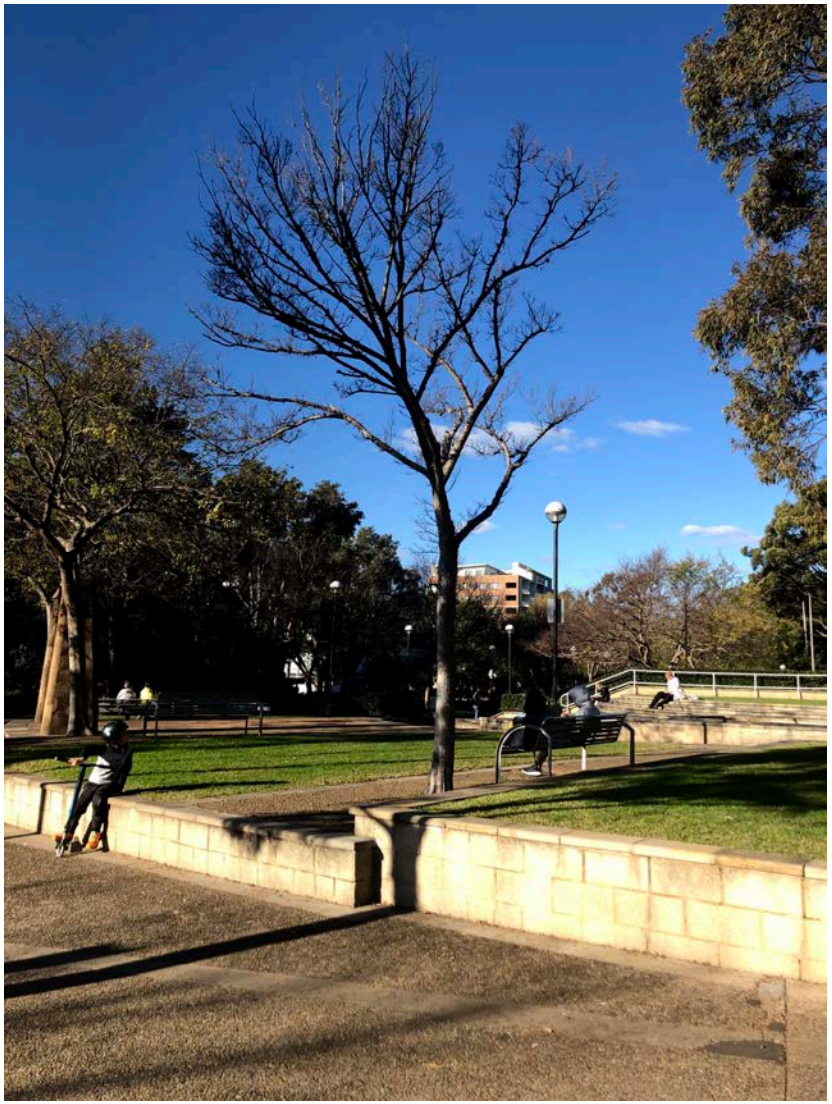


PHOTO 17- Tree 14 (facing NE)

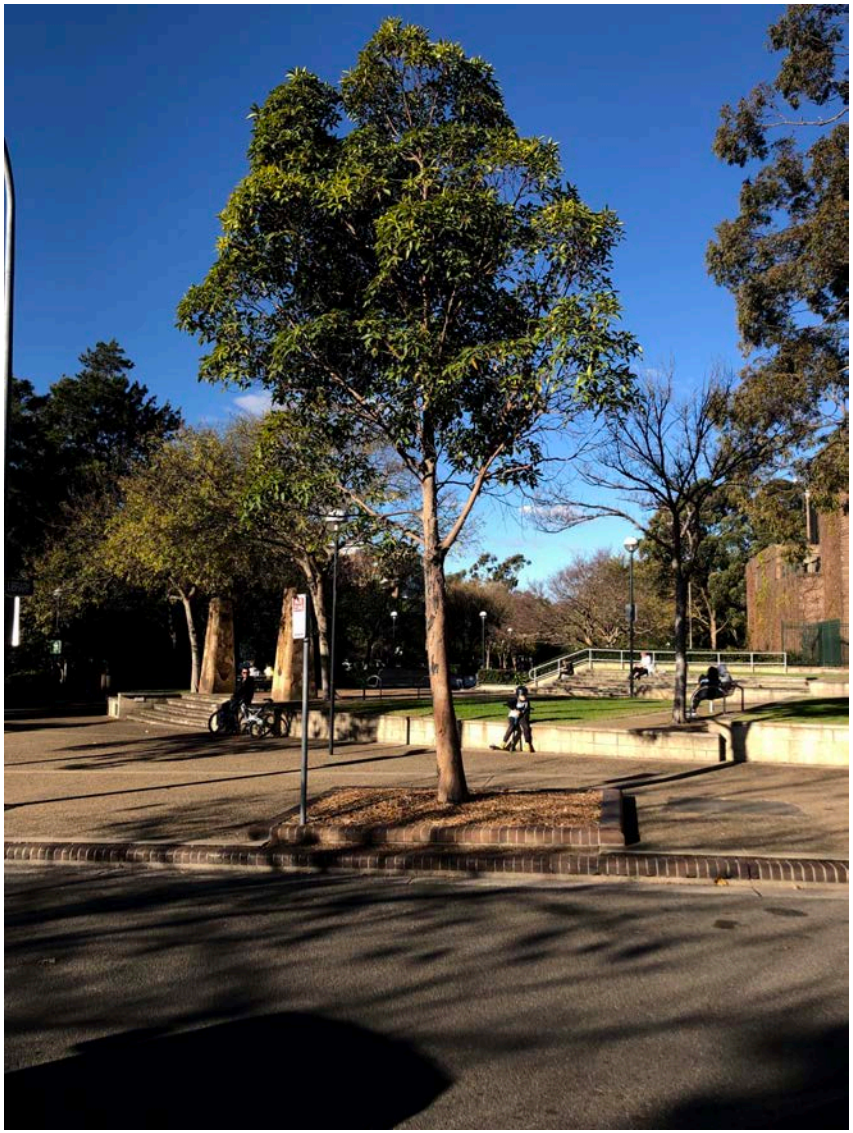


PHOTO 18- Tree 15 (facing east)

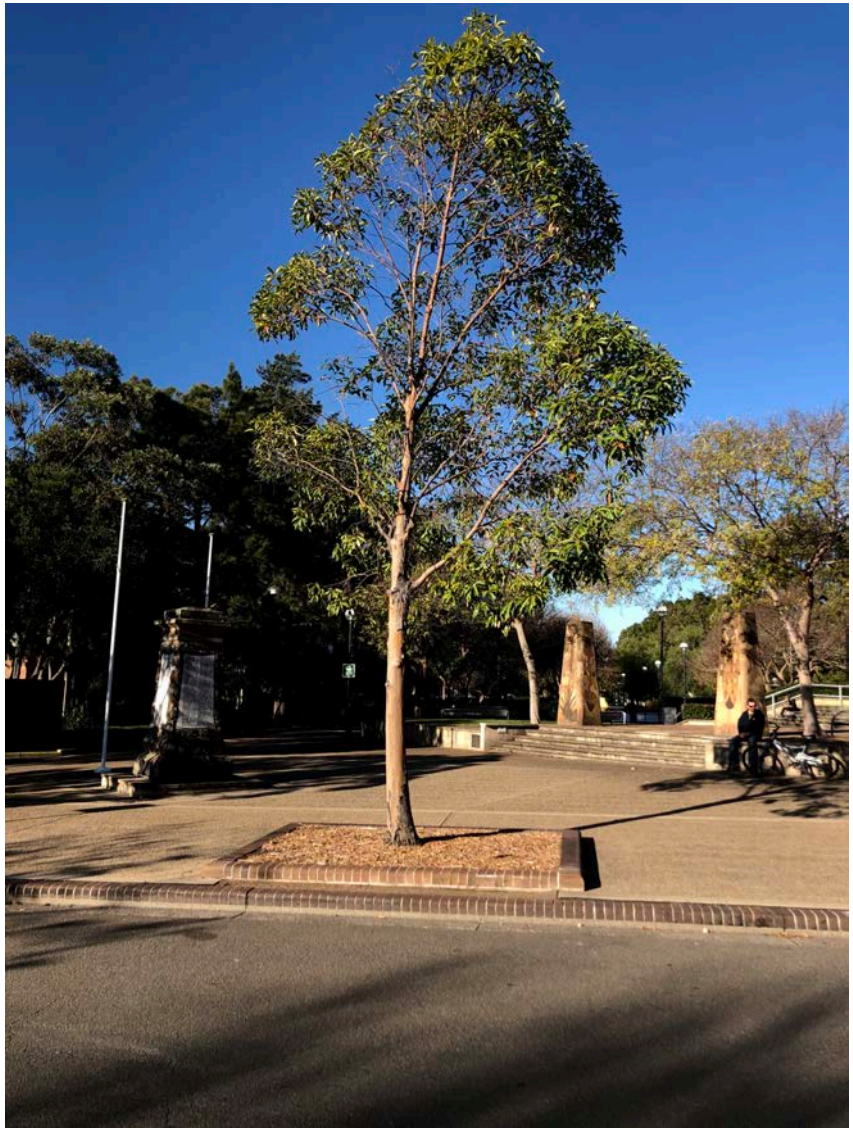


PHOTO 19- Tree 16 (facing east)

PHOTO 20- Trees 17 and 18 (facing SE)

PHOTO 21- Trees 19 and 20 (facing ESE)

PHOTO 22- Trees 21, 22 and 23 (facing ESE)

PHOTO 23- Trees 24, 25 and 26 (facing SW)

PHOTO 24- Tree 27 (facing north)

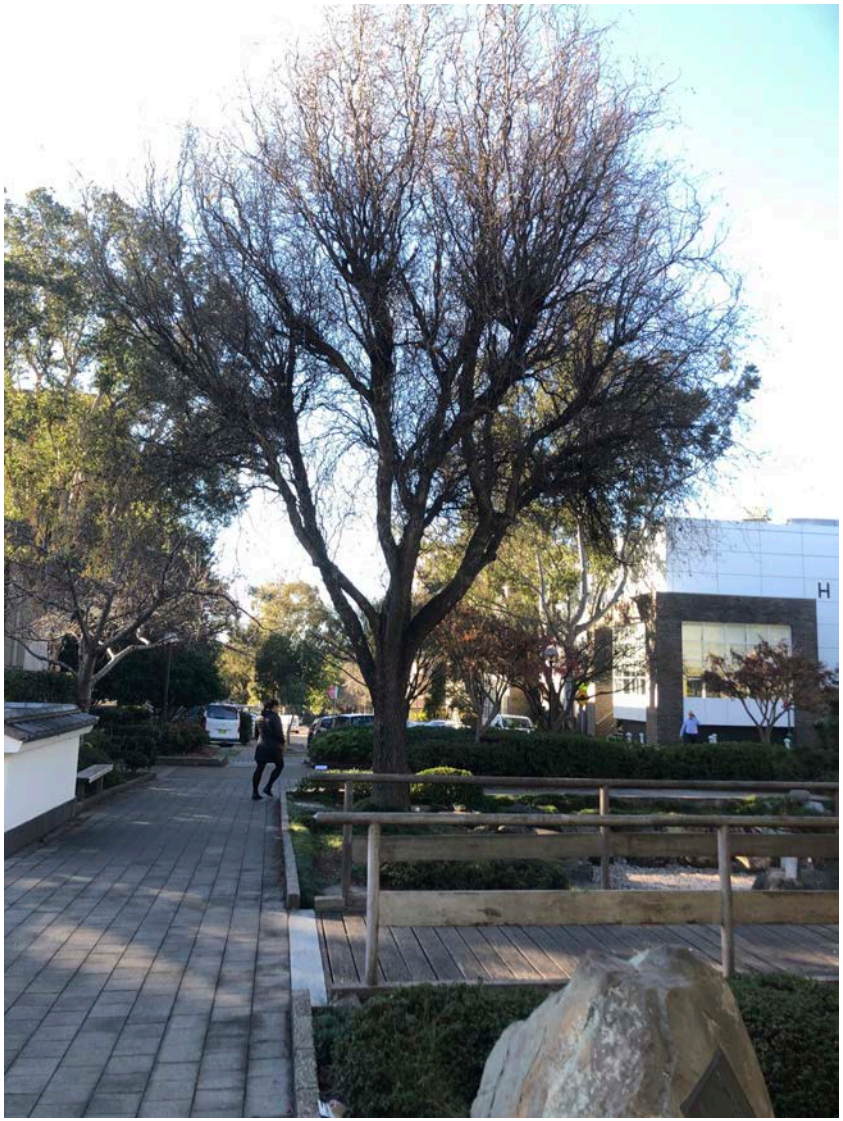


PHOTO 25- Tree 28 (facing NNE)

PHOTO 26- Tree 29 (facing SSW)

PHOTO 27- Shows the area surrounding Tree 29