Arboricultural Impact Assessment

Prepared for Stephen Thompson
Site Address: 27 Bellevue Avenue Avalon

3rd September 2020, 30th September 2021 Revision G

Member of Arboriculture Australia No. 1286

Member of International Society of Arboriculture No. 157768

Bachelor of Horticultural Science, University Sydney.

AQF Level 2, 3 & 5 Diploma in Arboriculture

Graduate Certificate AQF Level 8 University Melbourne

Tree Risk Assessment Qualification (TRAQ)

Statement

Bradshaw Consulting Arborists is a company that exclusively provides tree consultancy within the tree industry. There is no conflict of interest concerning the recommendations outlined in this report.

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1 Introduction

This report has been prepared by Tristan Bradshaw for Stephen Thompson at the property of 27 Bellevue Avenue Avalon. The report request was to inspect 43 trees at the back of the property and any on surrounding properties. The trees' characteristics have been listed in Table 5 page 7. The aim is to determine the health and condition of the trees and their retention values to aid in determining a suitable house design. The inspection of the site was undertaken on the 12th February 2019 and again on the 4th September 2019. A tree root survey was undertaken on the 15th December 2020 and 2nd September 2021. See plan of dig locations in 7.2.

A predevelopment application report was completed on 15th February 2019 and an Arboricultural Impact Statement completed on the 6th September 2019. This final Arboricultural Impact statement was completed on 3rd September 2020 and revision G completed on the 30th September 2021.

Trees 16, 22, 31, 32, 36 and 38 listed in this report have been removed under Tree application TA2021/0378.

Survey plan supplied by Bee & Lethbridge dated 11/1/2019, stormwater drainage plan by M + G Consulting and Architectural plans by Shed Architects received September 2021 have been used in this assessment. See appendix B.

Tree numbers have been assigned to each tree on the survey plan. The trees have also been numbered onsite using metal tags.

The property is not within the RFS 10/50 vegetation clearing code.

The property is within the Northern Beaches council area and any tree taller than 5 metres is covered by their tree protection policy. The site's development is managed by Pittwater Local Environment Plan.

There is no heritage listing for this site. The site is not within a heritage conservation area.

The site is not within a 10/50 vegetation entitlement clearing area.

1.1 The Site

The site is composed of a house with trees surrounding it.

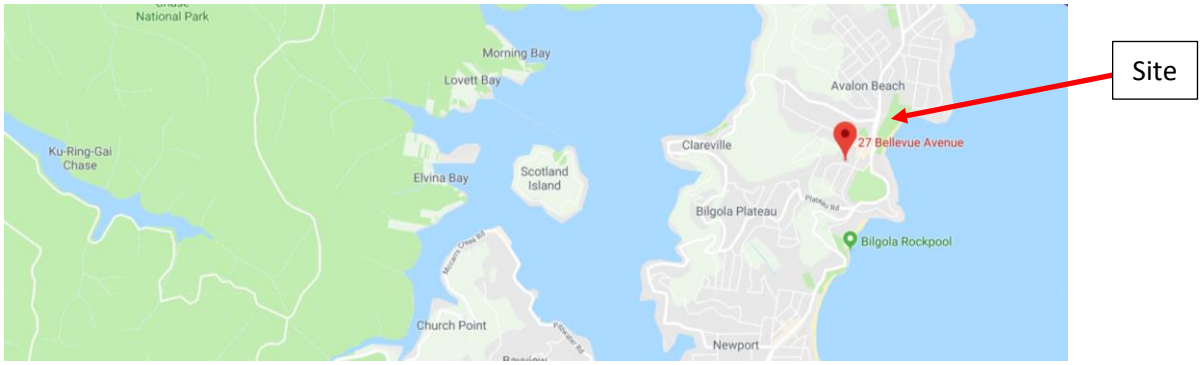

Figure 1 Assessed site location Google images 2021

1.2 Method

The inspection of the site was undertaken on the 12th February 2019 and 4th September 2019 and again on 12 December 2020.

The inspection method used was the Visual Tree Assessment (VTA) method (Mattheck & Breloer 2010. [1]). This method involves inspecting the trees from ground level, using binoculars to aid in identification of any external signs of decay, physical damage, growth related structural defects and the site conditions where the tree is growing. This method will ascertain whether there is need for a more detailed inspection of any part of the tree. No aerial or subterranean inspections were carried out. See appendix A for the complete flow chart.

The Diameter at Breast Height (DBH) was re measured using a diameter tape and not a tape measure as previously undertaken during the initial site visit. The height of the measurement was at 140 cm above the ground.

The height of the tree was estimated.

The canopy spread of the tree was estimated.

A tree root survey was conducted using hand tools and a small 1 tonne excavator. All works supervised by AQF level 8 arborist.

Health: Based on vigour, callus development, % of deadwood, dieback, fruiting levels, internode lengths

(E) Excellent

(G) Good

(F) Fair

(P) Poor

(D) Dead

Age Class: (Y) Young=Recently Planted

(S) Semi mature <20% of life expectancy

(M) Mature 20-80% of life expectancy

(O) Over Mature >80% of life expectancy

Condition: Based on the structural integrity of the tree, cavities, fungal decay, branch failure, branch taper, sap or Kino exudate, fruiting bodies, root condition.

(E) Excellent

(G) Good

(F) Fair

(P) Poor

(D) Dead

Landscape Significance and Retention Value see sections 6.7 and 6.9.

Safe Useful Life Expectancy (SULE) see section 6.8

In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. SULE is a system designed to classify trees into a number of defined categories so that information regarding tree retention can be concisely communicated in a non-technical manner. SULE categories are easily verifiable by experienced personnel without great disparity.

A tree's SULE category is the life expectancy of the tree modified by its age, health, condition, safety and location (to give safe life expectancy), then by economics (i.e. cost of maintenance; retaining trees at an excessive management cost is not normally acceptable), effects on better trees, and sustained amenity (i.e. establishing range of age classes in a local population).

SULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with short SULE may at present be making a contribution to the landscape but their value to the local community will decrease rapidly towards the end of this period, prior to their being removed for safety or aesthetic reasons. For details of SULE categories see Appendix A, adapted from Barrell (1993 and 1996).

Visual Habitat

This assessment is based on a visual observation of the tree, included in the VTA method.

Habitat trees are trees that provide microhabitats, these can include hollows, deeply fissured bark, cracks, epiphytes or forms of decay (Bütler, R., Lachat, T., Larrieu, L., & Paillet, Y., 2013).

Tree Protection Zone (TPZ) – A specified area above and below ground and at a given distance from the trunk, set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree that is to be retained where it is potentially subject to damage by development.

Structural Root Zone (SRZ) - The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.

2 Body Observations Results

Table 1 Individual tree characteristics

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
1	*Angophora costata* (Sydney Red Gum)	260	280	2	5	0	4	14	E	M	E	>40	V High	High	No	1.9	3.1	3.3%	Proposed retention
2	*Eucalyptus umbra* (Broad-leafed White Mahogany)	550	600	8	7	6	6	15	F	M	F	15-40	High	High	No	2.7	6.6	0%	Proposed retention
3	E. Sp.	250	300	2	2	2	2	8	DEAD	NA	P	0	V Low	V Low	No	2.0	3.0	0%	DEAD. Proposed retention
4	*Angophora costata* (Sydney Red Gum)	350	360	4	0	3	2	10	F	M	G	15-40	V High	High	No	2.2	4.2	0%	Proposed retention
5	*Angophora costata* (Sydney Red Gum)	370	380	3	5	4	3	9	F	M	G	15-40	V High	High	No	2.2	4.4	0%	Proposed retention
6	*Eucalyptus umbra* (Broad-leafed White Mahogany)	470	480	7	6	6	5	13	F	M	G	15-40	V High	High	No	2.4	5.6	0%	Epicormics and dieback, Proposed retention

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
7	*Corymbia gummifera* (Red Bloodwood)	350	350	4	4	4	4	13	P	OM	P	<5	High	Low	No	2.1	4.2	9% Carpark	50% of the upper canopy dead. Proposed retention
8	*Cinnamomum camphora* (Camphor Laurel)	250	270	3	3	3	3	8	P	SM	P	5-15	Low	V Low	No	1.9	3.0	1.7%	Weed species. Proposed retention
9	*Eucalyptus umbra* (Broad-leafed White Mahogany)	240	270	2	0	1	1	4	F	M	P	5-15	High	Mod	No	1.9	2.9	0%	Significantly unbalanced. Proposed retention
10	*Eucalyptus umbra* (Broad-leafed White Mahogany)	370	380	5	2	2	4	11	F	OM	F	5-15	High	Mod	No	2.2	4.4	0%	Dying. Proposed retention
~~11~~	~~*Eucalyptus umbra* (Broad-leafed White Mahogany)~~	~~220~~	~~220~~	~~3~~	~~0~~	~~0~~	~~3~~	~~10~~	~~P~~	~~M~~	~~F~~	~~5-15~~	~~High~~	~~Mod~~	~~No~~	~~1.8~~	~~2.6~~	~~0%~~	Removed by council
12	*Phoenix canariensis* (Canary Island Date Palm)	550	600	4	4	4	4	8	G	M	G	>40	Low	Mod	No	2.7	6.6	4%	Proposed retention
13	*Eucalyptus umbra* (Broad-leafed White Mahogany)	310	310	4	2	5	2	9	P	M	F	<5	High	Low	No	1.9	3.7	8% Carpark	80% of the upper canopy dead. Proposed retention

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
14	*Callistemon viminallis* (Bottle Brush)	200	210	1	1	1	1	7	G	SM	G	15-40	Mod	Mod	No	1.7	2.4	0%	Proposed retention
~~15~~	~~*Phoenix canariensis* (Canary Island Date Palm)~~	~~500~~	~~500~~	~~3~~	~~3~~	~~3~~	~~3~~	~~3~~	~~G~~	~~M~~	~~G~~	~~>40~~	~~Low~~	~~Mod~~	~~No~~	~~2.5~~	~~6.0~~	~~6.8%~~	Removed by council
~~16~~	~~*Angophora costata* (Sydney Red Gum)~~	~~950~~	~~970~~	~~7~~	~~4~~	~~6~~	~~6~~	~~14~~	~~F~~	~~M~~	~~P~~	~~<5~~	~~V High~~	~~Low~~	~~No~~	~~3.3~~	~~11.4~~	~~37%~~	~~Cavity, canopy dieback.~~ Tree has been removed
~~17~~	~~*Syagrus romanzoffiana* (Cocos Palm)~~	~~270~~	~~270~~	~~3~~	~~3~~	~~3~~	~~3~~	~~7~~	~~E~~	~~M~~	~~G~~	~~15-40~~	~~Low~~	~~Low~~	~~No~~	~~1.9~~	~~3.2~~	~~100%~~	~~Exempt tree species, no approval required.~~ Tree has been removed
18	*Livingstonia australis* (Cabbage Tree Palm)	350	360	3	3	3	3	10	E	M	G	>40	V High	High	No	2.2	4.2	100%	Within 2 metres of existing house. Exempt tree species, no approval required. Proposed transplant
19	*Washingtonia filifera* (Cotton Palm)	350	370	2	2	2	2	5	G	M	G	>40	Mod	Mod	No	2.2	4.2	100%	Exempt tree species, no approval required. Proposed transplant
~~20~~	~~*Syagrus romanzoffiana* (Cocos Palm)~~	~~260~~	~~280~~	~~3~~	~~3~~	~~3~~	~~3~~	~~9~~	~~E~~	~~M~~	~~E~~	~~>40~~	~~Low~~	~~Low~~	~~No~~	~~1.9~~	~~3.1~~	~~100%~~	~~Exempt tree species, no approval required. Tree has been removed~~

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
21	*Angophora costata* (Sydney Red Gum)	550	560	6	6	6	6	14	E	M	G	>40	V High	High	No	2.6	6.6	<10%	Tree root survey conducted. Proposed retention. Permeable driveway.
~~22~~	~~*Angophora costata* (Sydney Red Gum)~~	~~620~~	~~630~~	~~9~~	~~0~~	~~5~~	~~5~~	~~14~~	~~E~~	~~M~~	~~P~~	~~Haz~~	~~V High~~	~~Very Low~~	~~No~~	~~2.7~~	~~7.4~~	~~20%~~	~~Bracket fungus, dieback. Risk of failure.~~ Tree has been removed
23	*Angophora costata* (Sydney Red Gum)	490	420	7	5	6	5	14	G	M	G	>40	V High	High	No	2.3	5.9	11.3% 3.4% permeable driveway	Proposed retention. Minor Level changes where permeable driveway located.
24	*Angophora costata* (Sydney Red Gum)	590	620	5	5	5	5	14	G	M	G	>40	V High	High	No	2.7	7.1	9.6% connecting pathway	Proposed retention
25	*Glochidion ferdinandi* (Cheese Tree)	390	400	6	0	4	4	9	F	M	F	5-15	V High	Mod	No	2.3	4.7	8.6%	Proposed retention
26	*Angophora costata* (Sydney Red Gum)	840	890	5	8	8	8	14	F	M	G	>40	V High	High	No	3.2	10.1	Actual impact 9.2%	Tree root survey conducted. Proposed retention

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
27	*Eucalyptus umbra* (Broad-leafed White Mahogany)	230	230	2	3	0	3	8	F	SM	G	15-40	V High	High	No	1.8	2.8	0%	Proposed retention
28	*Angophora costata* (Sydney Red Gum)	180	240	3	2	0	3	7	F	SM	F	15-40	V High	High	No	1.8	2.2	0%	Proposed retention
29	*Angophora costata* (Sydney Red Gum)	450	460	5	7	5	5	13	G	M	G	>40	V High	High	No	2.4	5.4	Actual impact7 %	Tree root survey conducted. Proposed retention
30	*Corymbia gummifera* (Red Bloodwood)	400	410	3	6	4	4	12	F	OM	F	15-40	V High	High	No	2.3	4.8	100%	Removal.
~~31~~	~~*Angophora costata* (Sydney Red Gum)~~	~~480~~	~~500~~	~~6~~	~~4~~	~~5~~	~~5~~	~~13~~	~~F~~	~~M~~	~~P~~	~~<5~~	~~V High~~	~~Low~~	~~No~~	~~2.5~~	~~5.8~~	~~100%~~	~~Decaying root system. Whole tree failure~~ Tree has been removed
~~32~~	~~*Angophora costata* (Sydney Red Gum)~~	~~290~~	~~300~~	~~4~~	~~3~~	~~3~~	~~3~~	~~10~~	~~P~~	~~OM~~	~~P~~	~~<5~~	~~V High~~	~~Low~~	~~No~~	~~2.0~~	~~3.5~~	~~20%~~	~~Significant dieback~~ Tree has been removed
33	*Angophora costata* (Sydney Red Gum)	460	480	4	4	5	5	12	F	M	P	5-15	V High	Mod	No	2.4	5.5	9.7%	Proposed retention. Tree root survey found no significant tree roots.

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
34	*Corymbia gummifera* (Red Bloodwood)	450	460	4	4	4	4	12	G	M	G	15-40	V High	High	No	2.4	5.4	100%	Proposed removal
35	*Eucalyptus umbra* (Broad-leafed White Mahogany)	300	310	5	0	3	3	12	F	M	F	5-15	High	Mod	No	2.0	3.6	100%	Proposed removal
~~36~~	~~*Eucalyptus umbra* (Broad-leafed White Mahogany)~~	~~220~~	~~230~~	~~1~~	~~1~~	~~1~~	~~1~~	~~10~~	~~P~~	~~SM~~	~~P~~	~~<5~~	~~High~~	~~Low~~	~~No~~	~~1.8~~	~~2.6~~	~~100%~~	Tree has been removed
37	*Lophostemon confertus* (Brush Box)	700	740	6	6	6	6	15	E	M	E	>40	High	High	No	2.9	8.4	Actual impact< 10%	Tree root survey conducted. Proposed retention
~~38~~	~~*Syzygium smithii* (Common Lilly Pilly)~~	~~320~~	~~360~~	~~4~~	~~4~~	~~4~~	~~4~~	~~10~~	~~P~~	~~OM~~	~~P~~	~~<5~~	~~High~~	~~Low~~	~~No~~	~~2.2~~	~~3.8~~	~~100%~~	~~Dying~~ Tree has been removed
39	*Glochidion ferdinandi* (Cheese Tree)	410	420	7	0	5	5	11	F	M	F	5-15	V High	Mod	No	2.3	4.9	Actual impact< 10%	Tree root survey conducted. Proposed retention
~~40~~	~~*Largerstroemia indica* (Crepe Myrtle)~~	~~210~~	~~210~~	~~3~~	~~3~~	~~3~~	~~3~~	~~7~~	~~F~~	~~M~~	~~G~~	~~15-40~~	~~Mod~~	~~Mod~~	~~No~~	~~1.7~~	~~2.5~~	~~100%~~	~~Exempt tree species, no approval required.~~ Tree has been removed

Tree Number	Botanical Name	DBH(mm)	DAB(mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition	SULE	Landscape significance	Retention Value	Habitat	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage encroachment	Notes
~~41~~	~~*Jacaranda mimosifolia* (Jacaranda)~~	~~250~~	~~270~~	~~3~~	~~3~~	~~3~~	~~3~~	~~9~~	~~G~~	~~M~~	~~G~~	~~15-40~~	~~Mod~~	~~Mod~~	~~No~~	~~1.9~~	~~3.0~~	~~25%~~	~~Exempt tree species, no approval required.~~ Tree has been removed
42	*Corymbia maculata* (Spotted Gum)	250	270	2	3	0	3	9	G	M	P	15-40	V High	High	No	1.9	3.0	0%	Proposed retention
43	*Corymbia maculata* (Spotted Gum)	430	450	5	5	5	5	14	G	M	G	>40	V High	High	No	2.4	5.2	0%	Proposed retention

3 Discussion

Of the 43 trees originally assessed a large number of trees are located on council property and neighbouring properties. A preliminary development arborist report was submitted to ensure a large number of trees of high retention were retained and protected. Retention value is a better indication of the likelihood of long-term growth as it considers the health, ecological, amenity and landscape significance. All factors must be considered when assessing trees for development. This includes surrounding trees in neighbouring properties and council owned trees.

Trees around the periphery of the block have been retained to maintain a treed landscape, maintaining privacy and inclusion of the building into the surrounding landscape.

Of the 43 trees assessed, trees 17, 18, 19, 20, 40 and 41 are either exempt tree species or within 2 metres of the existing house. Council approval is not required to remove these trees. Trees 17, 20, 40 and 41 are exempt tree species and have been removed from the property.

Palm trees 18 and 19 have been transplanted to the northern corner of the property in August 2021.

Of the remaining 37 trees, trees 37, 42 and 43 are in the neighbouring property of 29 Bellevue Avenue Avalon. There is no impact projected for trees 42 and 43. The encroachment as calculated from AS 4970-2007 for tree 37 is 23%. To provide an indication of the potential tree roots severed for this development a trench 700mm deep was excavated beside tree 37. Three tree roots 40mm, 90mm and 110mm were located. See section 6.2 for a plan of excavation. Due to the size of these tree roots, the impact if these were to be removed is closer to 10% compared to the calculated 23% incursion. The hardy nature of this tree species is well known and was shown to be one of the top performing trees planted in Hong Kong during forest rehabilitation programs (Corlett, 1999). Proposed works within the TPZ of tree 37 comply with AS 4970-2009. See figures 2 and 3 below.

Figure 3 Trench looking west 2 tree roots

Figure 2 40mm tree root located within trench

Of the remaining 34 trees, trees 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 21, 24, 27, 28 and 29 are located on council property. It is proposed that all these trees are retained and protected. Projected impact to the TPZ has been included in table 5 page 7 and figures 5 and 6 below. No incursion is greater than 10%. The TPZ incursion for the construction of the tandem carpark for trees 7 and 13 is less than 9% and 8% respectively. This is in accordance with AS 4970-2009. Trees 11 and 15 have been removed by council. See figure 4 below.

Northern Beaches council have chosen to remove rhizomatous bamboo and additional trees have been scheduled for removal along the western boundary.

Figure 4 Tree 11 has been removed, stump remains

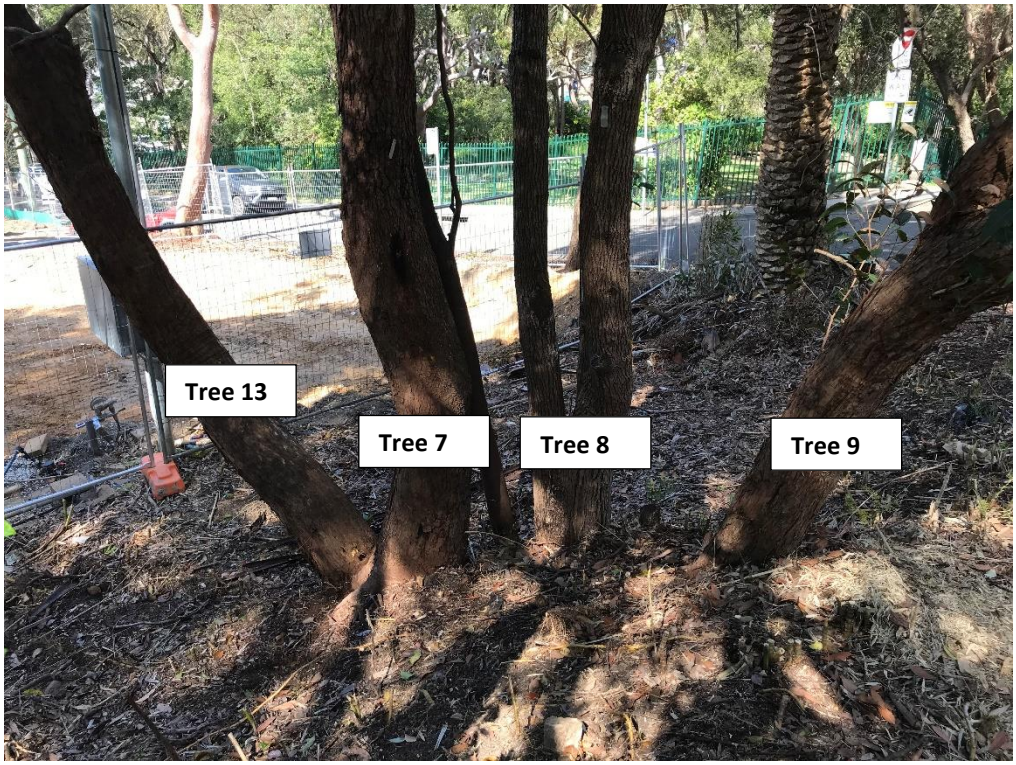

Figure 5 Trees 7, 8, 9 and 13

Figure 6 Distance of tree 13 from boundary, 2700mm.

The impacts to tree 21 include new curb, new driveway, driveway turning area and stormwater. The proposed incursion is not greater than 10% because of chosen construction methods and the results of a tree root survey. The proposed permeable driveway is an improvement in conditions within part of the TPZ compared to the existing sealed driveway.

The proposed curb is located within the SRZ of tree 21. Council's specifications for curbs involve excavation of 150mm for the installation of the curb. A tree root survey was conducted to locate any tree roots that may be severed for this construction. The tree root survey was within approximately 1 metre of the tree and excavated to a depth of 200mm, 50mm more than what is required. See figures 7, 8 and 9 below.

One 40mm tree root at a depth of 200mm below existing grade was located. This tree root is deeper than the proposed excavation and will be retained. See figure 7 below.

Figure 8 Up hill western trench 200mm deep, no tree roots from tree 21

Figure 7 Middle trench, excavation between the road and tree 21. One 40mm tree root located 200mm below ground level

Figure 9 Lower trench 200mm deep no tree roots from tree 21

The existing crossover will be replaced, using concrete. It will have no impact on tree 21 as it replaces and existing structure.

The proposed driveway (Permeable) on the property to the north of the tree occupies approximately 13% of the TPZ. A tree root survey was conducted to determine the impact of the proposed driveway as it is to curve around within the TPZ. One tree root 110mm root was identified. See

figure 12 below. To install the driveway in this location it would involve severing this tree root. Proposed excavation works are outside the SRZ and the actual impact is less than 10%.

An existing combination of concrete, bitumen and sandstone paving makes up the existing driveway. Most of this is a sealed surface that water runs off into the stormwater and not into the ground. It is proposed this driveway is replaced with no fines permeable concrete as the subbase and topped with Terrabond (commercial product name "*stone set*") comprising of a rock and resin bound material with a high porosity of 60 litres/m^2/second. The depth of excavation is equivalent to the existing driveway therefore retaining all of the tree's root structure under this driveway.

This product has been used and approved by Northern Beaches council at alternate sites, one such example is the recent construction of a carpark at the back of shops in Frenchs Forest. 3 Patanga Road Frenchs Forest was a residential block with a house (see figure 10 and 11 below). This property has recently been converted to a car park built entirely around an existing mature *Quercus robur* (English Oak). Approximately 55% of the TPZ is covered by a hard-wearing surface (concrete or bitumen) and 25% is covered by the stone set product (See figure 6 below). The coverage of the TPZ is far in excess of the Australian standard 4970-2009 and the tree remains in good health.

Figure 10 Patanga Road Frenchs Forest prior to its conversion to a carpark

Figure 11 Stone Set and no fines concrete used to create a carpark within the TPZ of a mature English Oak at 3 Patanga Road Frenchs Forest.

Figure 12 Tree root 110mm found 4 metres from tree 21

The proposed stormwater has been reduced in length, part of it remains with the TPZ. The pit is required to drain any overland flows and the drainage grate is required for any excess water from the driveway. The position of the pit within the TPZ can be repositioned if required so as not impact any tree roots. Excavation to install the pit and pipes must be hand excavated under the supervision of the project arborist. Any tree roots greater than 30mm must be retained.

Of the remaining 14 trees, trees 16, 22, 31, 32, 36 and 38 are of low retention value and it is recommended they are removed. Tree 38 was incorrectly identified as *Syzygium paniculatum* in the initial Arboricultural assessment. The tree has since been identified as *Syzygium smithii*. All of these trees have since been removed under tree application TA2021/0378 from letter dated 4/6/2021 approved by tree assessment officer Michael Nolan of Northern Beaches Council. These trees are no longer relevant to this proposal.

An existing masonry wall is located on the boundary beside trees 27, 28 and 29. A tree root survey was conducted to determine extent of root growth, particularly from tree 29. The trench was excavated beyond the wall to the west. No tree roots of significance were located. The masonry wall is acting as a tree root barrier and preventing tree roots from trees 27, 28 and 29 entering the property of 27 Bellevue Pde Avalon. Any proposed works inside of the existing masonry wall will not affect trees 27, 28 and 29. The incursion for all 3 trees is within the guidelines of AS4970-2009. See figures 13, 14 and 15 below. It is proposed this masonry wall is removed for this development this will increase the available soil volume for these 3 trees.

Figure 13 Masonry wall beside tree 29

Figure 14 Masonry wall behind trees 27, 28 and 29

Figure 15 Trench beside tree 29

Of the remaining 8 trees. Tree 23 has marginally greater than 10% impact to the TPZ. 11.3% of the TPZ is occupied by the proposed permeable walkway and 3.4% will be occupied by the permeable driveway. The majority of the tree's root system will be retained as the proposed levels of the driveway are similar to existing RL measurements. The permeable driveway will allow retention and extension of the tree's root system. The permeable pathway will allow additional soil volume that

the tree can access. The stormwater passing through the TPZ of this tree must be hand excavated, any tree roots greater than 30mm must be retained.

Tree 25 is proposed to be retained; the proposed raised walkway has been deleted and replaced with an access permeable pathway that encroaches 8.6% into the TPZ. The pool has been reduced in size and its position altered. This encroachment is in accordance with AS 4970-2009.

Trees 26 has a calculated 36% incursion to the TPZ when using the Australian Standard formulae. The potential impact to this tree is the building and walkway. A tree root survey was conducted to determine the size and number of tree roots that may be potentially severed for this proposed construction. The trench location found the lower building would not impact this tree as there were no tree roots greater than 10mm located during the survey. The depth of the trench was 700mm. See figures 16, 17 and 18 below.

A new permeable walkway has been proposed to provide access between the two buildings, this walkway occupies a large portion of the TPZ. Part of the walkway (10.3% of the TPZ) to the east is above ground level with the proposed finished level at 14.40 and the natural ground level is 14.02. This part of the walkway can be pier and beam raised above ground to retain any tree roots in this vicinity. The root survey did not assess the impact of the walkway to the west of the tree. The TPZ area not assessed is approximately 9.2% of the TPZ. Excavation is required for the walkway to the west of the tree. The use of a permeable pavement and a suspended concrete slab for the unit balcony will allow additional soil volume for the surrounding trees for future growth.

While part of the potential soil volume is lost due to this development, there are no tree roots within the TPZ occupied by the lower building. This tree will continue to develop its root structure to the east and west. The demolishing of the existing masonry wall (acting as a tree root barrier) close to the tree will allow further establishment of the root system.

Angophora costata (Sydney Red Gum) can grow from between 15 and 25 metres in height (ANBG, 2021). On this property the Angophora trees are less than 15 metres in height, and they are considered mature specimens. Throughout the surrounding streets this species averages less than 15 metres for all mature Angophora trees, this is evident across the road at the school. Tree 26 is at maturity and is not expected to grow significantly larger. While soil volume has been lost the root system of this tree is not likely to significantly grow.

The gardens will be managed, they will be fertilised and watered more frequently. Highly managed landscapes can support a greater density of vegetation.

Figure 17 Trench beside tree 26 looking west

Figure 16 Trench beside tree 26 looking east

Figure 18 Face of trench beside tree 26, no roots encountered.

The encroachment into the TPZ for tree 33 has been calculated at 9.7%, the building has been relocated outside the SRZ and this has reduced the basement's impact. To determine the actual impact to this tree a root survey was conducted. A trench was hand excavated 700mm deep to heavily compacted sand, 3 metres from the northern boundary and 2.7 metres from the eastern boundary. The trench was 3 metres long. One tree root 20mm was located and no structural or significant tree roots identified. The proposed impact to this tree is less than 10% and this complies

with the Australian Standard 4970-2009. This tree will be retained and protected. See figures 19-22 below.

Section 3.3.2 and 3.3.4 of Australian Standard 4970-2009 requires the lost soil volume from an incursion and consideration for future soil volume required for the tree's growth be available. An existing masonry boundary wall will be demolished allowing extensive available soil volume to the north. See section 7.3.

Battering of the soil is not to occur during basement excavation, sheet piling or similar to prevent over excavation.

Stormwater installation through the TPZ must be undertaken by hand excavation. The removed masonry wall is likely to leave a trench. The stormwater should be located where the masonry fence was located, to reduce its impact.

Figure 19 Trench beside tree 33

Figure 21 Northern section, 20mm tree root located.

Figure 20 Middle section

Figure 22 Southern section

The projected TPZ impact to tree 30 is 100% from the proposed walkway that connects the top of the site with Wickham Lane. A tree root survey and design changes were proposed, however due to specialised design requirements this tree must be removed.

It is proposed tree 39 is retained. Part of the upper building (proposed pool) covers the TPZ, this is a cantilevered construction that will avoid any significant tree roots bridging the SRZ and TPZ. A tree root survey was conducted to identify any major tree roots from the lower building (See figure 23 for the tree survey location). No tree roots greater than 30mm were located from tree 39 during the excavation. The solid brick base for a shed beside this tree has likely prevented any large tree roots from passing under it. From AS 4970-2009 the calculated TPZ incursion is 16% however the actual incursion is less than 10%. The proposed pool will be a suspended structure retaining the root system under it. And the tree root survey found no structural tree roots in the vicinity of the proposed lower building. This tree will require trunk and ground protection during construction.

The stormwater located within the TPZ must be hand excavated, no tree roots greater than 30mm are to be severed.

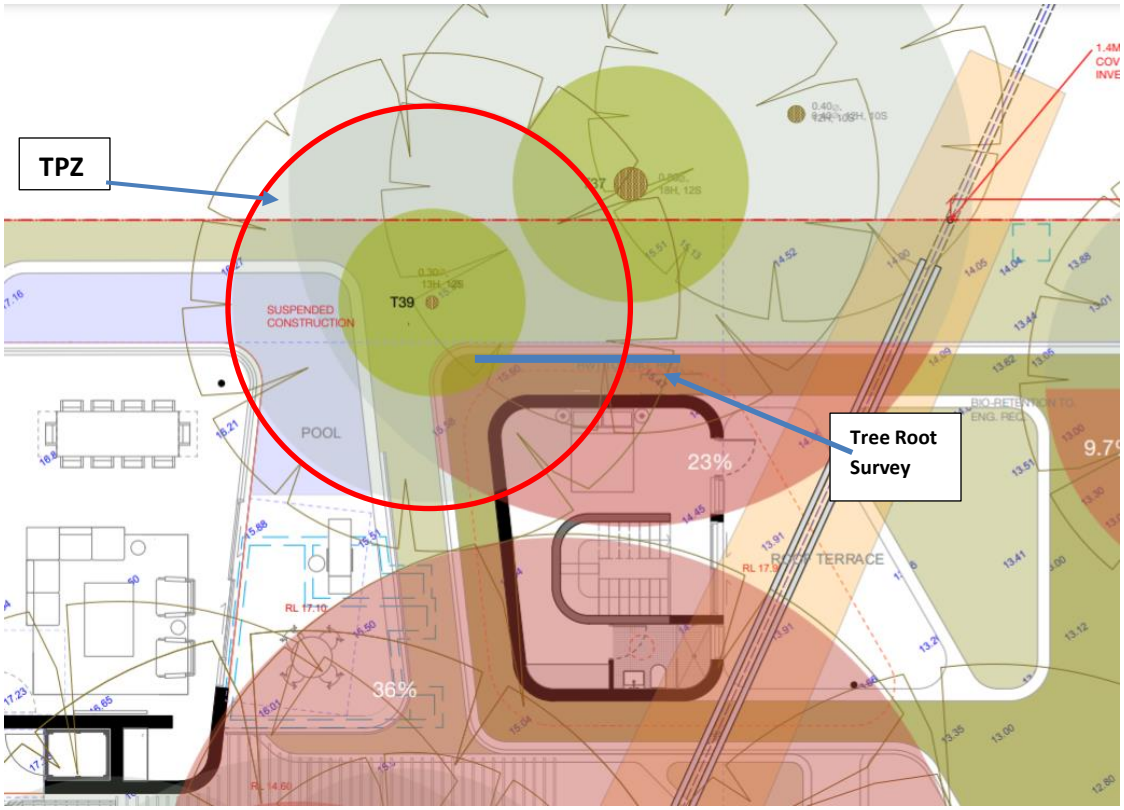

Figure 23 Position and impact to tree 39

Trees 34 and 35 are impacted negatively by this proposal and require removal.

4 Recommendations

1. Removal of trees 30, 34 and 35.
2. Retain and protect trees 1-15, 18, 19, 21, 23, 24, 25, 26, 27, 28, 29, 33, 37, 39, 42 and 43.
3. Tree removal should be conducted by an Arborist with a minimum (Australian Qualification Framework) AQF level 3.
4. Work must be undertaken as per the Code of Practice Amenity Tree Industry 1998.
5. The tree removal process and staff should be skilled and undertake the removal of the tree as per the minimum industry standards.
6. Appoint project arborist. Minimum AQF Level 5 with 5 years' experience.
7. Retain and protect trees as per tree Management plan section 6.5. This is a combination of physical fencing, trunk protection and ground protection. See Section 7 Appendix G for specifications. All TPZ must have 100mm of organic mulch over the soil surface.
8. Irrigation is recommended for all trees retained if works are undertaken during summer. Scheduling of irrigation times to be coordinated by the project arborist. See section 8 regarding irrigation installation specifications.
9. Areas denoted as suspended slabs must have ground protection installed prior to any works conducted at the site. This can be left in situ if unable to be removed after construction.
10. Project arborist must supervise works within the TPZ of retained trees. This includes but not limited to excavation stage and piering works for basement concrete slabs, removal of existing driveway beside tree 21 and 29. Removal of the paving and retaining walls within

TPZ of tree 33 and 37. Excavation to install curb and gutter. Piering for raise walkway within the TPZ. All excavation within TPZ should be by hand to a depth of 700mm, beyond this hydraulic equipment can be used. No heavy equipment is to enter TPZ.

11. Tree protection zones that have been fenced: if access is required to undertake construction ground protection and trunk protection must be installed for the duration of works. This must be approved and supervised by the project arborist.
12. The project arborist must inspect the site once every 2 months and provide a letter of recommendations and/or photographic evidence that tree protection has not been compromised.

5 Project Arborist Monitoring Stages

The list of monitoring stages are imperative to the long term health of those trees to be retained. The principal contractor (Site Builder) should be informed of these requirements as they often form the basis of the conditions of consent for the project. The stages set out below are a minimum requirement to aid in ensuring the long-term health of any tree recommended for retention on the site.

Stage	Type of Monitoring	What is required
1	Ensure tree protection has been installed as per tree protection plan section 7.5	Tree Protection Certification
2	On site supervision during Excavation. Sheet Piling to be used beside tree 33, no battering of soil. Existing upper driveway to remain until new driveway installation.	Excavation certificate with photos
3	Inspections every 2 months	Certificate confirming health or trees and tree protection is in place.
4	During any work within TPZ	Certificate of attendance.
5	Installation of scaffolding	Certificate and photos
6	Stormwater installation within the TPZ of tree 21, 23, 33 and 39.	Certificate of attendance.
7	Supervision during curb, gutter, driveway and connecting pathway beside trees 21, 23, 24, 25, 26, 27, 28 and 29.	Certificate of attendance.
8	Final certification summarises the attendance to the site and reason for attendance. Comment on the likely long-term health of the retained trees. Provide any ongoing recommendations.	Final certificate supplied for occupation certificate

6 References

1. Bütler, R., Lachat, T., Larrieu, L. and Paillet, Y., 2013. 2.1 Habitat trees: key elements for forest biodiversity. *Integrative approaches as an opportunity for the conservation of forest biodiversity*, p.84.
2. Australian Standard, A.S., 4970, 2009. *Protection of trees on development sites,* Sydney.
3. Australian Standard A.S., 4373-2007. *Pruning of Amenity Trees, 2007,* Sydney
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9. Corlett, R.T., 1999. Environmental forestry in Hong Kong: 1871–1997. Forest Ecology and Management, 116(1-3), pp.93-105.
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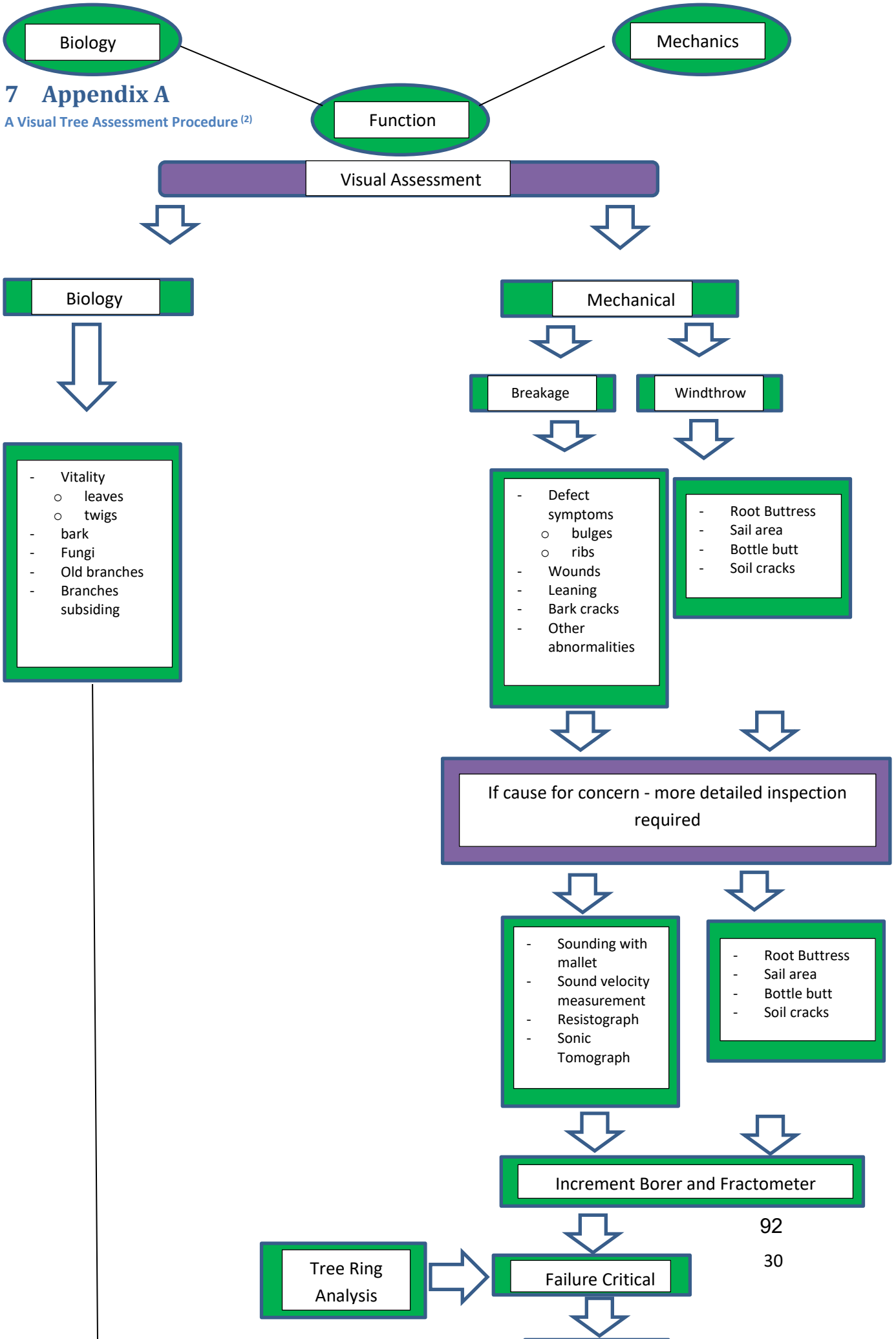
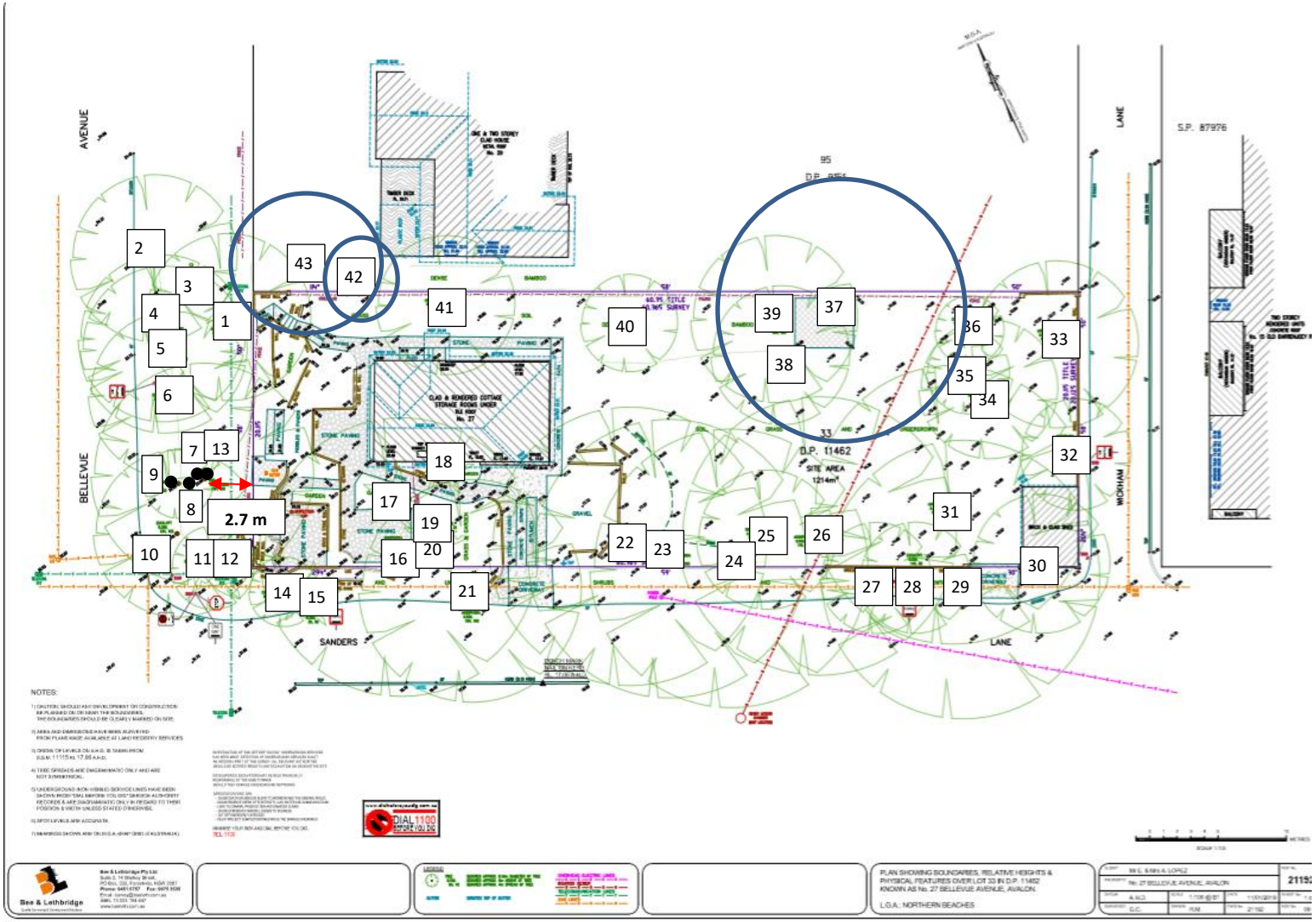
11. Australian National Botanic Gardens. https://www.anbg.gov.au/gnp/gnp8/ango-cos.html#:~:text=Angophora%20costata%2C%20or%20Smooth%2Dbarked,The%20timber%20is%20rather%20brittle. https://www.anbg.gov.au/gnp/gnp8/ango-cos.html#:~:text=Angophora%20costata%2C%20or%20Smooth%2Dbarked,The%20timber%20is%20rather%20brittle. Viewed 16th August 2021.

7 Appendix A

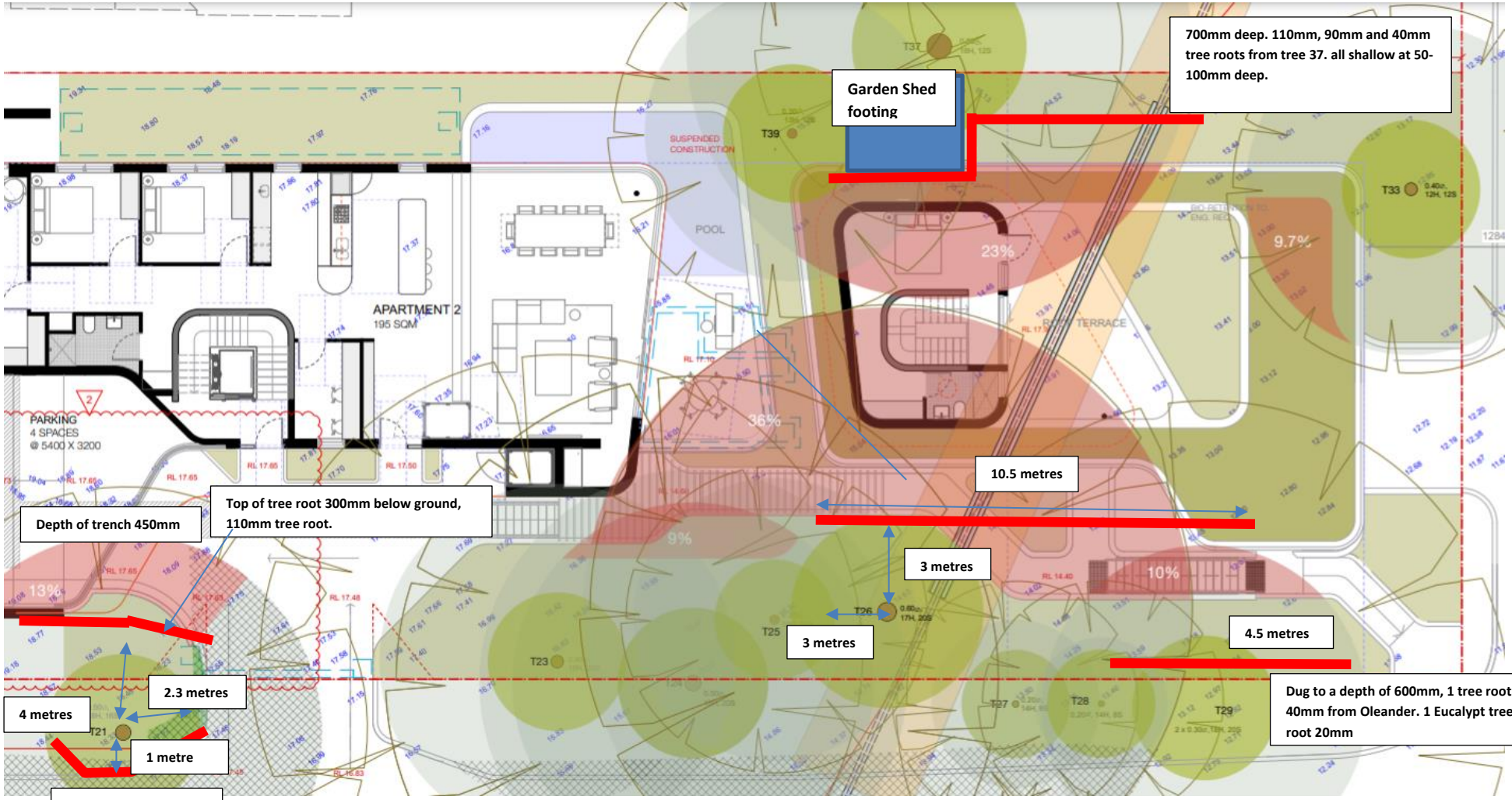
A Visual Tree Assessment Procedure [2]



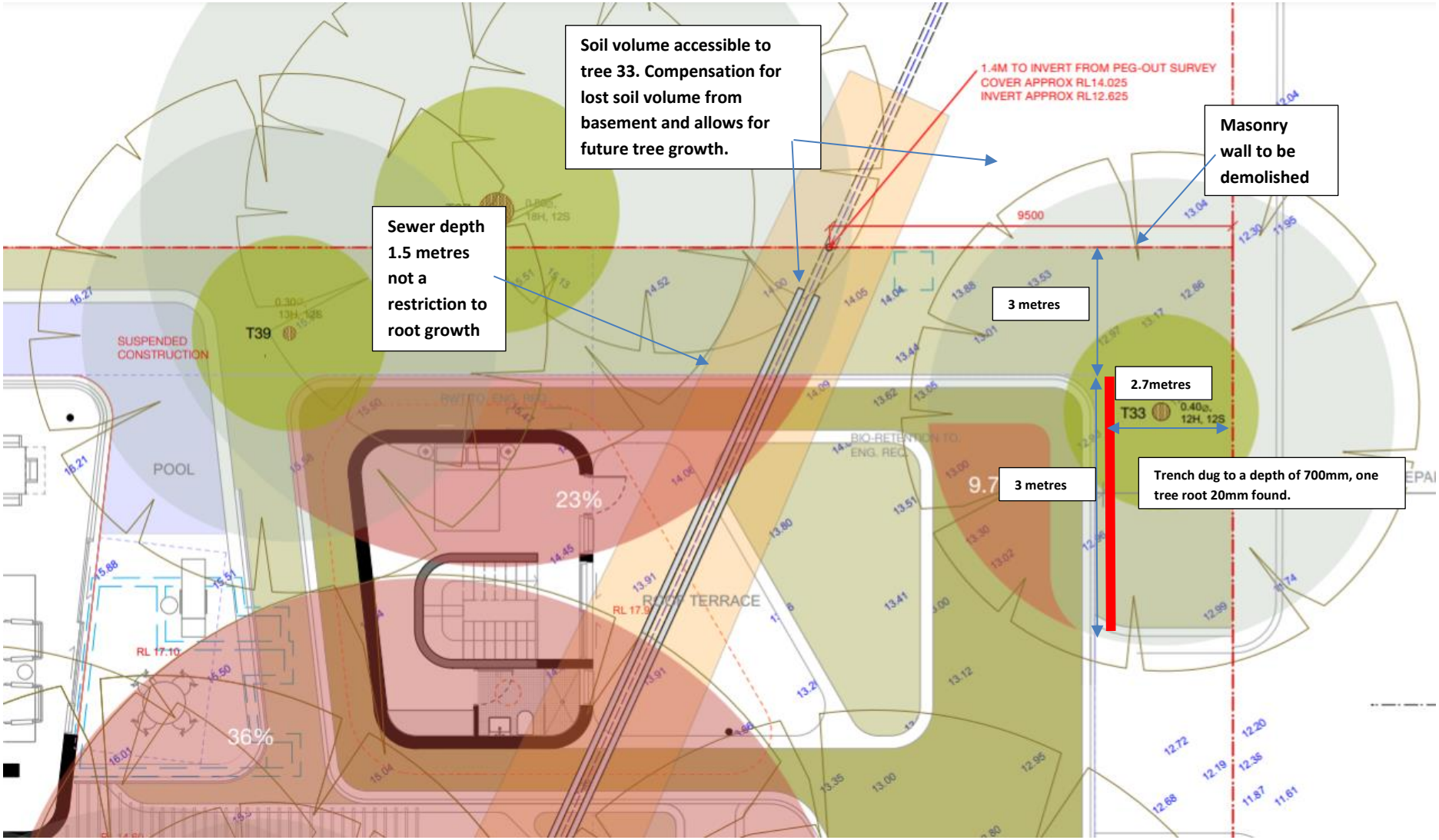
7.1 Appendix B Tree locations



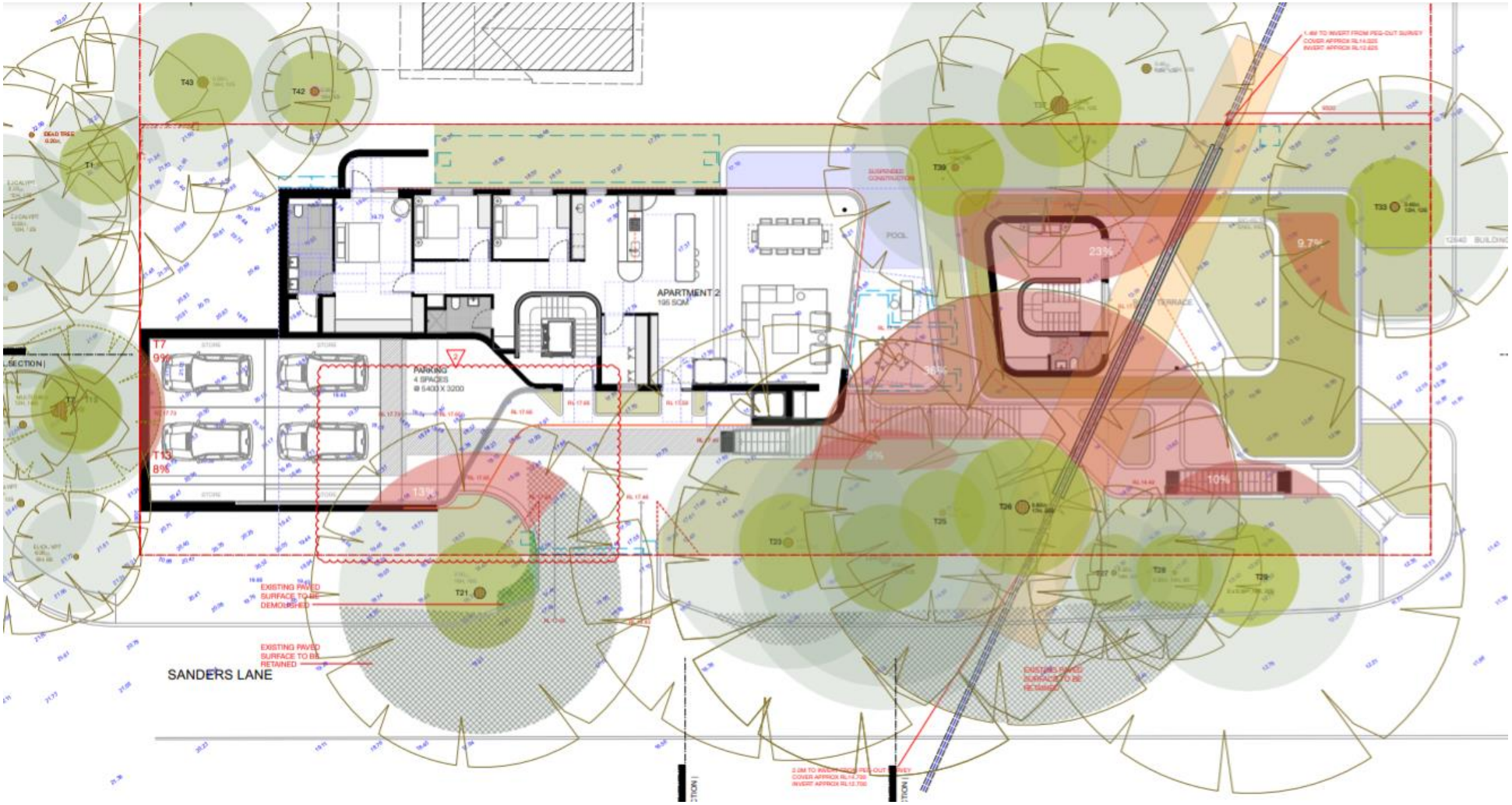
7.2 Tree Root Survey trees 21, 26 and 37



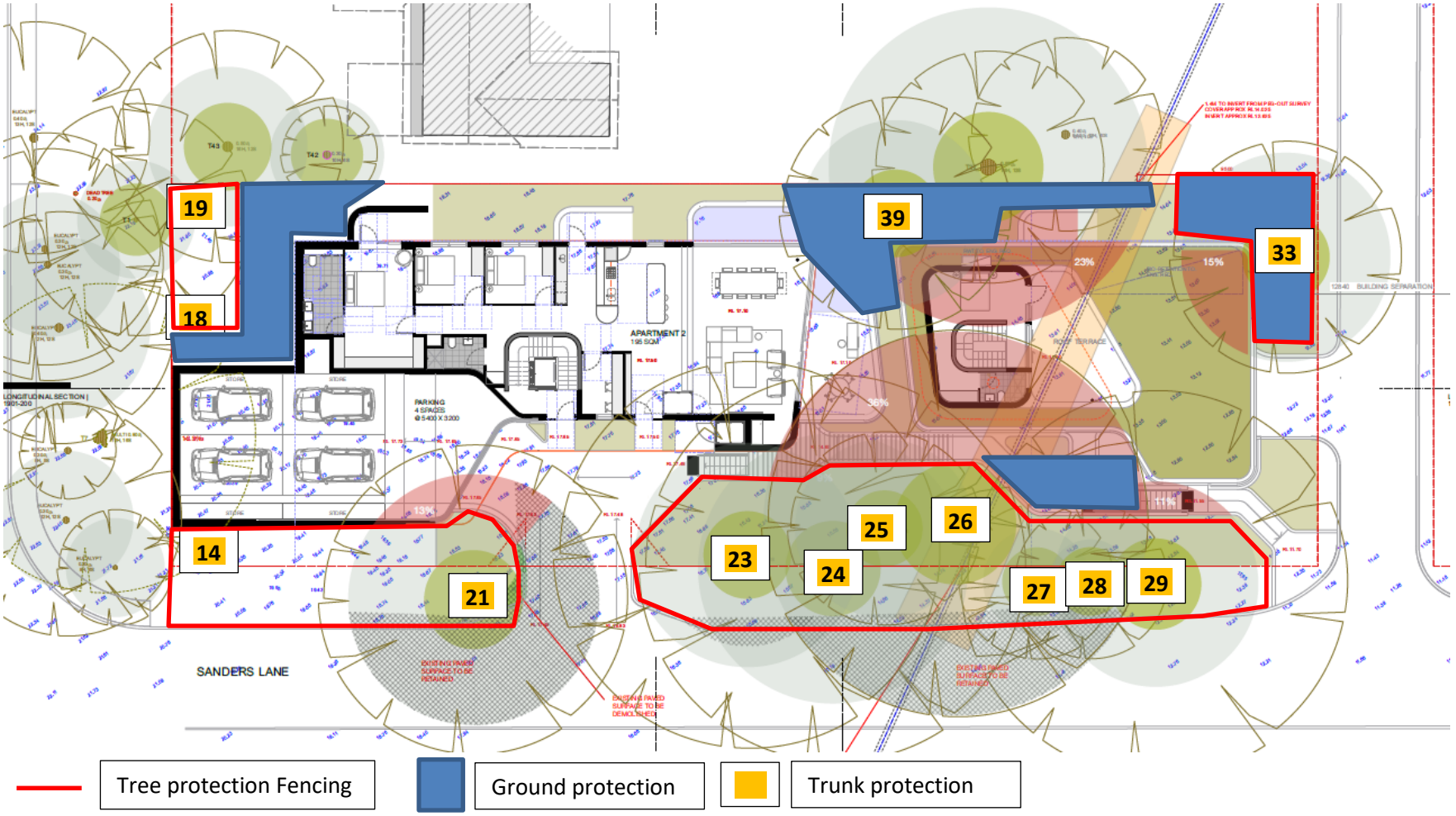
7.3 Tree Root Survey tree 33



7.4 TPZ incursion of retained trees as calculated from AS 4970-2009. Tree root survey has altered these figures.



7.5 Tree Management Plan (TMP) showing TPZ, SRZ, Tree Protection Fencing, Trunk Protection and Ground Protection



7.6 Appendix C Methodology for Determining Tree Retention Value

The aim of this process is to determine the relative value of each tree for retention (i.e. its Retention Value) in the context of development. This methodology assists in the decision-making process by using a systematic approach. The key objective of process is to ensure the retention of good quality trees that make a positive contribution to these values and ensure that adequate space is provided for their long term preservation. The Retention Value of a tree is a balance between its sustainability in the setting in which it is located (the 'landscape') and its significance within that setting (landscape significance).

Step 1: Determining the Landscape Significance Rating

The 'landscape significance' of a tree is a measure of its contribution to amenity, heritage, and ecological values. While these values are fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the Retention Value of each tree. To ensure in a consistent approach, the assessment criterion shown in Table 2 should be used. A Tree may be considered 'significant' for one or more reasons. A tree may meet one or more of the criteria in any value category (heritage, ecology or amenity) shown in Table 2 to achieve the specified rating. For example, a tree may be considered 'significant' and given a rating of 1, even if it is only significant based on the amenity criteria.

Based in the criterion in this table, each tree should be assigned a landscape significance rating as follows:

1. Significant
2. Very High
3. High
4. Moderate
5. Low
6. Very Low
7. Insignificant

Step 2: Determining Safe Useful Life Expectancy (SULE)

The sustainability of a tree in the landscape is a measure of its remaining lifespan in consideration of its current health, condition and suitability to the locality and site conditions. The assessment of the remaining lifespan of a tree is a fairly objective assessment when carried out by a qualified Consulting Arborist. Once a visual assessment of each tree is completed (using the Visual Tree Assessment criteria), the arborist can make an informed judgement about the quality and remaining lifespan of each tree. The Safe Useful Life Expectancy (SULE) methodology (refer to Table 3) can be used to categorise trees as follows:

- Long (Greater than 40 years)
- Medium (Between 15 and 40 years)
- Short (Between 5 and 15 years)
- Transient (less than 5 years)
- **Dead or Hazardous (no remaining SULE)**

The SULE of a tree is calculated based on an estimate of the average lifespan of the species in an urban area, less its estimated current age and then further modified where necessary in consideration of its current health, condition (structural integrity) and suitability to the site.

7.7 Appendix D Table 2 Step 1 Landscape Significance Rating

RATINGS	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage item under the Local Environment Plan (LEP) with a local, state, or national level of significance or is listed on Council's Significant Tree Register.	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conversation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999.	The subject tree has a very large live crown size exceeding 100m2 with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species.
	The subject tree forms part of the curtilage of a Heritage Item (building/structure/artefact as defined under the LEP) and has a known or documented association with that item.	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species.	The Subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity.
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event.	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area.	The tree is visually prominent in view form surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally indigenous species representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 60m2, a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence.	The tree is a locally indigenous and representative of the original vegetation of the area and the tree is located within a defined vegetation link/wildlife corridor or has known wildlife habitat value.	The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible form the street and/or surrounding properties and makes a positive contribution to the visual character and the amenity of the area.
4. MODERATE	The tree has no known or suspected historical association but does not detract or diminish the value the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of the DCP.	The subject tree has a medium live crown size exceeding 25m^2; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal).
			The tree is visible from surrounding properties but is not visually prominent- view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values and diminishes the value of the heritage item.	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown of less than 25m^2 and can be replaced within the short term (5-10 years) with new tree planting.
6. VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the Local Government Area, being invasive, or is a nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50%.

7.8 Appendix E Table 3 Estimating Safe Useful Life Expectancy (SULE) Step 2

1	Estimate the age of the tree
2	Establish the average life span of the species
3	Determine whether the average life span needs to be modified due to local environmental situation
4	Estimate remaining life expectancy

Life Expectancy	=	average modified life span of species - age of tree

5	Consider how health may affect safety (& longevity)
6	Consider how tree structure may affect safety
7	Consider how location will affect safety
8	Determine safe life expectancy

Safe Life Expectancy	=	life expectancy modified by health, structure and location

9	Consider economics of management (cost vs benefit of retention)
10	Consider adverse impacts on better trees
11	Consider sustaining amenity - making space for new trees
12	Determine SULE

Safe Useful Life Expectancy	=	safe life expectancy modified by economics, effects on better trees and sustaining amenity

Ref: Barrell, Jeremy (1996)
Pre-development Tree Assessment
Proceedings of the International Conference on Trees and Building Sites (Chicago)
International Society of arboriculture, Illinois, USA

7.9 Appendix F Table 4 Determining Tree Retention Values

The Retention Value of a tree is increased or diminished based on its sustainability in the landscape, which is expressed as its SULE. A tree that has a high Landscape Significance Rating, but low remaining SULE, has a diminished value for retention and therefore has an appropriate Retention Value assigned. Conversely a tree with a low Landscape Significance Rating even with a long remaining SULE, is also considered of low Retention Value. This logic is reflected in the matrix shown in Table 1.

Once the landscape Significance Rating and SULE category have been determined, the following matrix can be used to determine a relative value (or priority) for retention:

TABLE 1 – DETERMINING TREE RETENTION VALUES

	Landscape Significance Rating						
SULE	1	2	3	4	5	6	7
Long - greater than 40 years	High Retention Value						
Medium - 15 to 40 years			Moderate Retention Value				
Short - 5 to 15 years				Low Retention Value			
Transient - less than 5 years				Very Low Retention Value			
Dead or Hazardous							

8 Appendix G Tree Protection specifications

Tree Protection Fencing (See Figure 24 **below)**

Tree protection is to be carried out on all trees to be retained on site.

All fencing should be at the perimeter of the Tree Protection Zone (TPZ).

The TPZ must be enclosed with a fully supporting 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 30mm diameter are not to be damaged/severed during the construction of the fence. See Figure 24 Drawing taken from AS 4970-2009below.

The enclosed area must be free of weeds and grass, the application of a 75mm layer of leaf mulch to the tree protection zone (TPZ) must be maintained for the duration of works.

Two signs on either side of the fencing are to be erected showing the name and contact details of the site Arborist and the words NO ENTRY clearly written.

No work is to be undertaken within this Tree Protection Zone; this includes:

-No removal or pruning of trees

-No construction, stockpiling or storage of chemicals, soil, and cement. Or the movement of machinery, parking and personnel is to occur within the TPZ.

-No refuelling, dumping of waste, placement of fill or Soil level changes.

-No lighting of fires or physical damage to protected trees.

-No temporary or permanent installation of utilities or signs.

-No service trenches should pass through the TPZ, unless approved and supervised by the project arborist.

Example of tree protection fencing

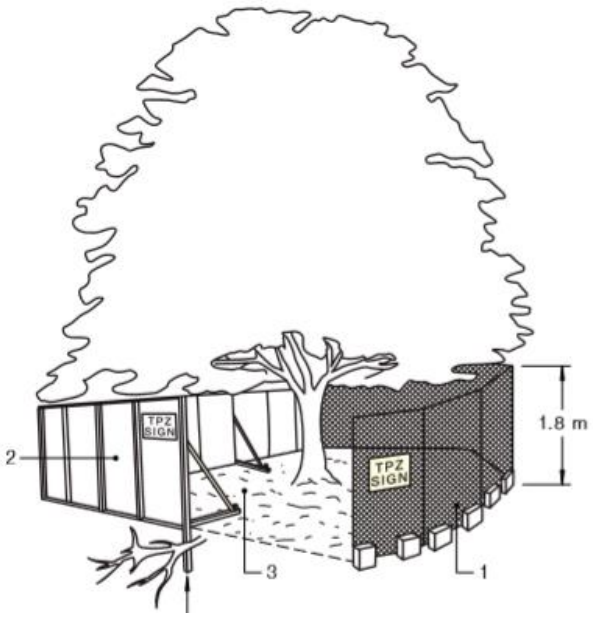
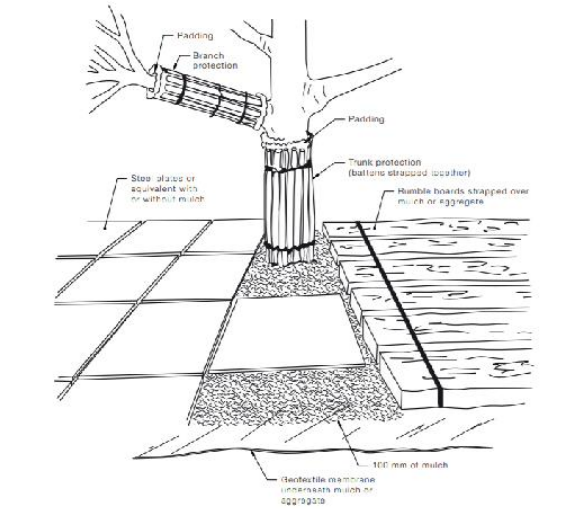


Figure 24 Drawing taken from AS 4970-2009



NOTES:
1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

Figure 26 Trunk and branch Protection (AS 4970-2009)

Figure 25 Trunk Protection

Trunk/Branch Protection

Hessian or similar material is used as a wrap around the trunk/branch to a height of 2.6 metres from the base of the tree. Covering the hessian are timbers 100x50x2500mm These are to be spaced around the trunk with gaps of approximately 100mm. The timbers are to be secured with metal strapping. These materials are not to be directly fastened to the tree. See Figure 25 and Figure 26 above.

Ground protection

This is used to protect the Tree Protection Zone (TPZ) from soil compaction. Soil compaction reduces the available pore spaces within the soil, this reduces water holding capacity, oxygen and carbon dioxide diffusion. It can cause water to runoff the soil surface reducing infiltration. Over time the root system in a soil that is compacted (High Bulk Density) reduces in size. As the root system of a tree declines so does its canopy. When soil compaction is severe the entire tree can die.

Where scaffolding, foot traffic or wheel barrow access is required. The soil surface should be covered by Geotextile fabric followed by plywood sheets 1.2 x 2.4 metres x 18mm thick and then covered by 100mm of mulch to provide a trafficable surface. Driveways or areas that will have heavy vehicles over the soil surface should have geotextile fabric, 100mm of mulch or gravel followed by sleepers 100x 200 x 3000mm. The sleepers are spaced 150mm apart and the gaps filled with gravel or mulch. The sleepers are then strapped together with hoop pine to prevent movement.

8.1 Installation of underground services

All underground services must be routed outside the TPZ of any protected tree. The project arborist must be consulted (or council if required in DA conditions) if works pass through the TPZ of any tree. Methods such as thrust boring/directional drilling or hand excavation, during supervision by the project arborist are methods that reduce impact to surrounding trees. These are acceptable methods under AS 4970-2009.

9 Installation of Drip line irrigation

Subsurface irrigation systems shall comprise of Netafim (or equivalent) pressure compensating inline dripper pipe with anti-siphon ability and copper oxide impregnated diaphragm. The subsurface lines are to be installed at a maximum of 300mm spacing's and at a rate nominated to provide the required precipitation rate to the planted garden beds whilst not exceeding the manufacturer's maximum length of drip line and to maintain an application uniformity of 90% and/or maximum frictional pressure loss representing the difference between the operating pressure and minimum operating pressure of the emitters as recommended by the manufacturers.

Drip irrigation shall be installed on the soil surface or below mulch if this has been specified. The subsurface laterals are to be pegged with steel pegs 300mm in length at a maximum of 2m centres along each drip line run. All solenoid valves providing irrigation water to areas of drip irrigation shall be fitted with a valve sized plastic bodied filter unit incorporating a disc filtration element equivalent to 120-mesh filtration. The system shall incorporate a line sized nylon ball valve located prior to the inlet of the filter and installed below ground level within a plastic valve enclosure. The filter enclosure to be sized so that filter may be easily maintained (JUMBO Valve box).

Where drip tubing is to be installed under mulch or buried directly in the soil, the contractor shall include a PVC or PE pipe to form a manifold for all of the drip tubes for both ends of the tubing, as follows:

- A water supply manifold connected to the drip irrigation filter and solenoid valve assembly.
- A water collection (drain) manifold connected to the downstream ends of all drip poly tubing runs.
- All ends of the water supply manifold shall be fitted with manually operated flushing valves.
- At least one end of the collection manifold shall be fitted with a manually operated flushing valve.
- At least one end of the collection manifold shall be fitted with an automatic drain valve.
- Air release valve shall be fitted at the highest point in the water supply manifold.
- Generally, all drain valves shall be installed at the lowest point of a drain manifold.
- Vacuum & drain valves may be interchanged, to suit the relative ground levels at the installation, the intention being that upon closure of the solenoid valve, air is allowed to enter the tubing at the high point and water is allowed to drain from the low point. All vacuum breaker valves, flushing and drain valves shall be housed within a 1910 valve box.

A manual timer or computerised timer with watering times scheduled by the project arborist should be used. See figure below.

Figure 27 Drip irrigation spacing

10 Qualifications and Experience

TRISTAN BRADSHAW

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Industry Licence AL1286-1

Professional Memberships

Member of the International Society of Arboriculture. No: 157768

Member of Arboriculture Australia No. 1286

Qualifications

2016-2018 Graduate Certificate in Arboriculture AQF8 at Melbourne University.

2015 Tree Risk Assessment Qualification (TRAQ)

2013-2014 Diploma of Arboriculture AQF5 at Ryde TAFE. Distinction

2012 Certificate III in Arboriculture at Ryde TAFE

2011 Certificate IV in Occupational Health and Safety

2010 Aboriginal Sites Awareness Course by Aboriginal Heritage Office

1996-1999 Bachelor of Horticultural Science at University of Sydney. Honours+

Tristan Bradshaw has been involved in the Horticultural and Arboricultural Industry since 1995. The business Bradshaw Horticultural Services was formed and incorporated Horticultural consulting work and landscaping. In 2000 Tristan undertook the Level 2 Arboriculture course at Ryde TAFE. The business progressively specialised in consulting, tree removal, pruning and stump grinding works. Extensive hands-on knowledge was developed during the climbing of trees undertaking pruning or removal and during storm events understanding the tolerances of trees.

In 2009 the new business name Bradshaw Tree Services was registered to reflect works only being undertaken in the tree industry. The business operated throughout Sydney employing up to 25 people. Tristan Bradshaw's main role was as a consultant advising clients and writing reports. In 2019 Bradshaw Tree Services ceased operations and Tristan Bradshaw began Bradshaw Consulting Arborists exclusively undertaking tree consultancy.

Tristan Bradshaw with continued education has attained a Level 8 qualification, attends the annual Arboriculture conferences taking part in the seminars to broaden his knowledge.

This assessment was carried out from the ground and covers what was reasonably able to be assessed and available to this assessor at the time of inspection. No subterranean inspections were carried out. The preservation methods recommended where applicable are not a guarantee of the tree survival but are designed to reduce impacts and give the trees the best possible chance of adapting to new surroundings.

Limitations on the use of this report:

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 or the original report is referenced in, and directly attached to that submission, report or presentation.

Assumptions:

Care has been taken to obtain information from reliable resources. All data has been verified insofar as possible: however, Bradshaw Consulting Arborists 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 tree/s that was/were examined and reflects the condition of the tree at the time of the assessment: and
-The inspection was limited to visual examination of the subject tree without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.
-The assessment does not identify hazards and associated risk; this report is not a risk assessment.

Yours sincerely,

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