116-120 Frenchs Forest Road West

& 11 Gladys Avenue Frenchs Forest NSW 2086

Arboricultural Impact Assessment

Prepared for Mr. Kevin Huang C/O Truslan PDM

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Document Tracking

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ACKNOWLEDGEMENTS

This document has been prepared by Arbor Express Pty Ltd with support from Mr. Kevin Huang C/O Truslan PDM

Disclaimer
I do not assume responsibility for liability associated with the tree on/or adjacent to this project site, the future demise and/or any damage which may result therefrom. They take care to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others. I cannot be held responsible for any consequences as result of work carried out outside specifications, not in compliance with Australian Standards or by inappropriately qualified staff. If further investigations such as, aerial, drill and root tests are recommended, the report shall not be considered final until all investigations have been completed as further defects may be found. I have made every effort to accurately identify the current tree health and hazards. Results may or may not correlate to actual tree structural integrity. There are many factors that may contribute to limb or total tree failure, not all these symptoms are visible. There can be hidden defects that may result in a failure even though it would seem that other, more obvious defects would be the likely cause of failure. All standing trees have an element of unpredictable risk. The inspection was limited to a visual ground examination of the tree, without aerial inspections and below ground excavations. The assessments are limited and do not include specialized analysis. No internal diagnostics, aerial inspection and pathology test were conducted. Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale.

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Abbreviations

Abbreviation	Description
AE	Arbor Express
AIA	Arboricultural Impact Assessment
AQF	Australian Qualifications Framework
AS	Australian Standards
C	Canopy
DAB	Diameter Above Buttress
DBH	Diameter at Breast Height
H	Height
m	Metre
mm	Millimetre
NDE	Non-Destructive Excavation
NO	Number
NSW	New South Wales
SRZ	Structural Root Zone
TPP	Tree Protection Plan
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment

1. Introduction

This AIA has been prepared for Mr. Kevin Huang C/O Truslan PDM in relation to a proposed development at 116-120 Frenchs Forest Road West & 11 Gladys Avenue Frenchs Forest NSW 2086. The address of the subject site is in Table 1 and mapped in Figure 1. The purpose of this report is to:

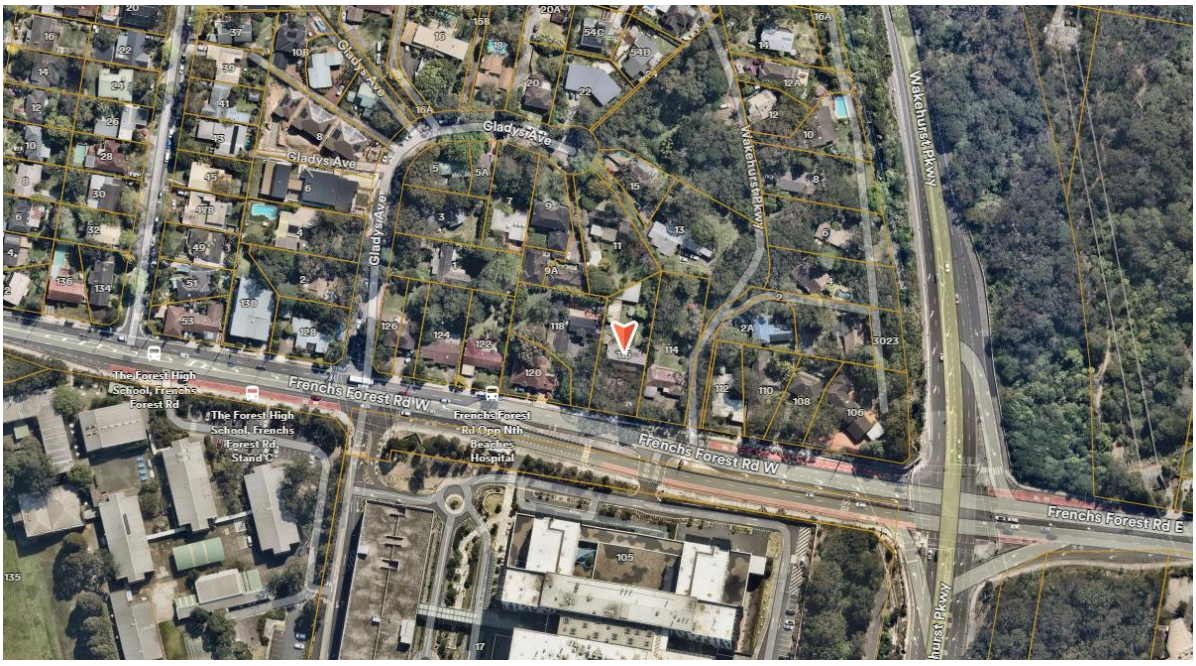
- Identify the trees within the site and adjacent surrounding area that are likely to be affected by the proposed development.
- Undertake a visual tree assessment of the subject trees.
- Assess the current overall health and condition of the subject trees.
- Evaluate the retention value of the subject trees.
- Identify trees to be removed, retained or transplanted.
- Determine the likely impacts of trees to be retained.
- Recommend tree protection measures to minimise the impacts to retained trees.
- Preparation of a tree protection plan for trees to be retained (if applicable).

Features of the subject site are tabulated below.

Table 1: Development site

Criteria	Description
Street address	116-120 Frenchs Forest Road West & 11 Gladys Avenue Frenchs Forest NSW 2086
Local government area	Northern Beaches Council
Land zoning	R3: Medium Density Residential
Biodiversity values map	The site is not in a high biodiversity area
10/50 entitlement	The site does not have a 10/50 entitlement

Figure 1: Location



2. Method

Visual Tree Assessment

The subject trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck and Breloer (1994)[1], and practices consistent with modern arboriculture.

A total of 112 subject trees were inspected on 21 October 2024.

The following limitations apply to this methodology:

- Trees were inspected from ground level.
- These assessments did not include aerial (climbing) inspections, soil sampling, or root excavations.
- The canopy spread was measured either by estimation or pacing, and the longest span was recorded.
- The height of each tree was estimated.
- Trees were inspected within limits of site access.
- No aerial inspections or root mapping was undertaken.
- Trees located on adjacent properties or in restricted areas were not fully visually inspected, so any defects or abnormalities may not have been documented.
- Tree identification relied on broad taxonomical features visible from ground level at the time of inspection.

Retention Values

The retention value is the value of retaining a tree or group of trees and is assessed based on a blend of environmental, cultural, physical, and social factors.

- **High:** These trees are deemed worthy of preservation, and their retention should be prioritized. Proposed site designs and the positioning of buildings and infrastructure should take into account the Tree Protection Zones (TPZs) to mitigate any negative effects. Additionally, the extent of the canopy, especially concerning high-rise development, should be taken into consideration. Significantly pruning the trees to accommodate building envelopes or temporary scaffolding is typically not acceptable.
- **Medium:** Retaining these trees is desirable. They should be preserved as part of any proposed development, if feasible. However, these trees are considered less crucial for retention. If their removal becomes necessary, replacement planting should be contemplated in alignment with the Council's Tree Replacement Policy to offset any loss of amenity.
- **Low:** These trees lack significant ecological, heritage, or amenity value, or such values are greatly diminished due to their Safe Useful Life Expectancy (SULE). Therefore, these trees should not be viewed as hindrances to the future development of the site.
- **Very Low:** These trees are regarded as potentially hazardous, very poor specimens, or may even qualify as environmental or noxious weeds. Consequently, their removal is recommended irrespective of any proposed development considerations.

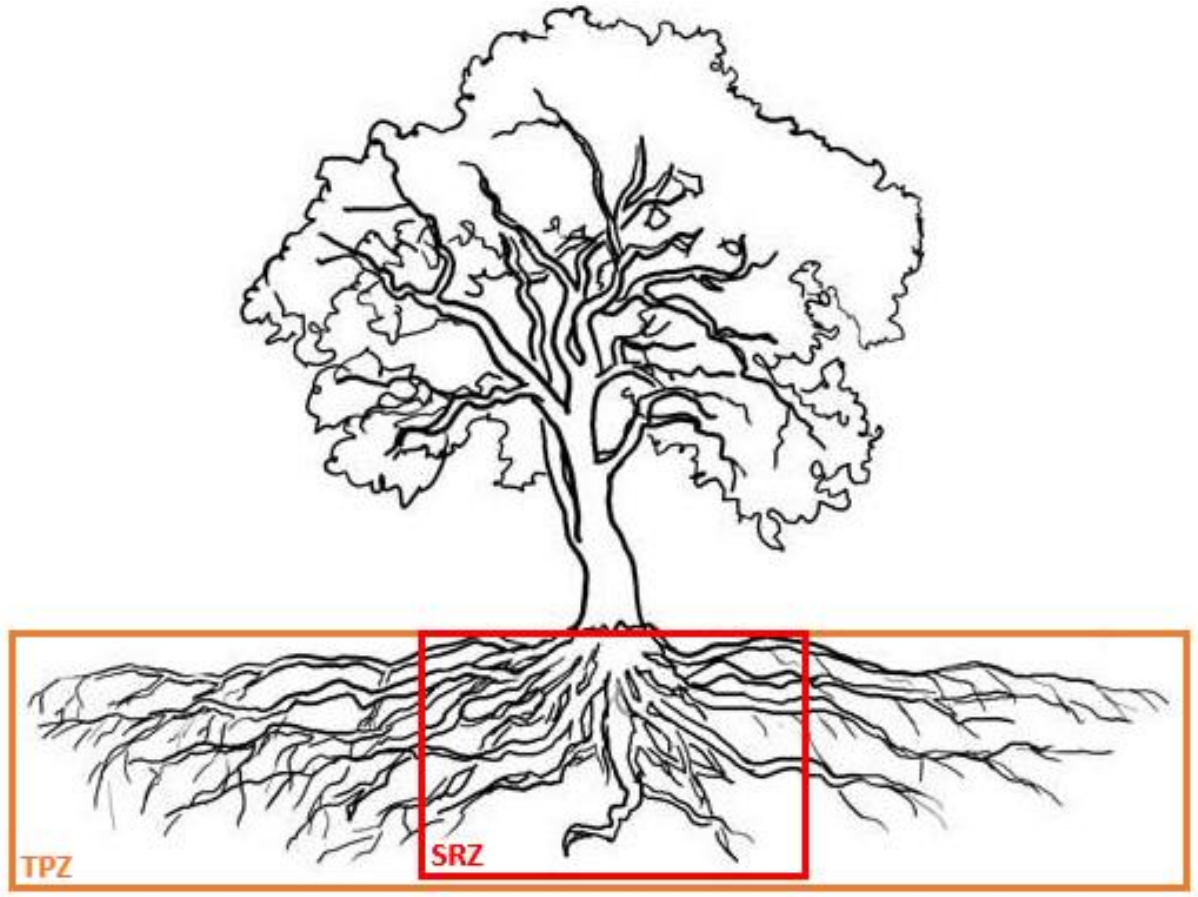
[1] Field Guide for Visual Tree Assessment (VTA) by Mattheck, C., and Breloer, H. Arboricultural Journa1, Vol 18 pp 1-23 (1994).

Protection Zones

Tree Protection Zone (TPZ): The Tree Protection Zone (TPZ) is fundamental for safeguarding trees on development sites. It encompasses both the root and crown spread, creating a protected space free from construction disturbances to preserve the tree's health and viability.

Structural Root Zone (SRZ): The Structural Root Zone (SRZ) defines the space essential for maintaining tree stability, often requiring a larger area to sustain the tree's health. Calculating the SRZ becomes necessary when substantial encroachment into a Tree Protection Zone (TPZ) is proposed. Further analysis through root investigations can provide valuable insights into the extent of these roots.

Figure 2: Tree Protection Zone and Structural Root Zone

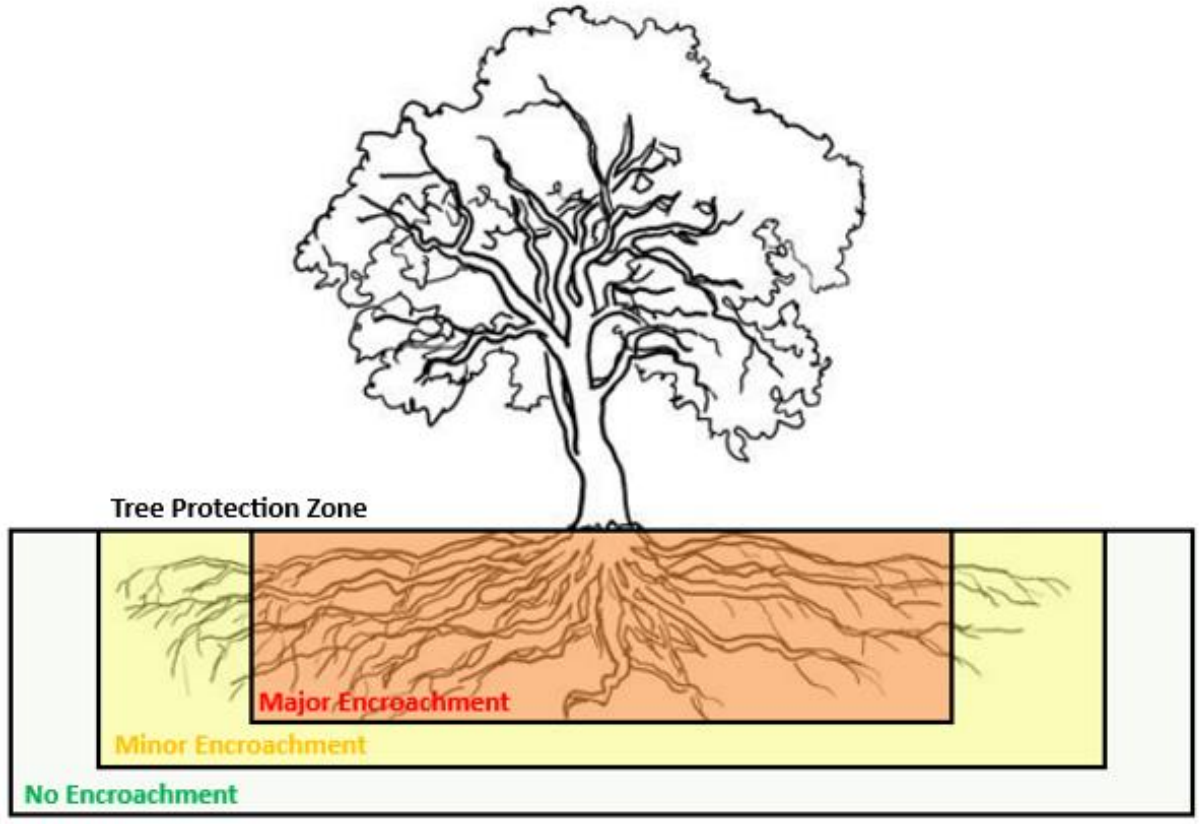


Impact Assessment

Development activities should be undertaken outside of Tree Protection Zones as much as possible. However, it's recognized that complete avoidance is not always feasible, and some encroachment within these zones may occur due to various reasons. Australian Standard AS 4970-2009, "*Protection of trees on development sites*," offers guidelines for managing such encroachments without necessitating extensive tree management and protection measures. Encroachment parameters are categorized as follows:

- **Minor encroachment**: Detailed root investigations should not be necessary if the proposed encroachment is less than 10% of the TPZ and outside of the SRZ. However, the area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ.
- **Major encroachment**: If the proposed encroachment exceeds 10% of the TPZ, it is imperative to show that the tree(s) can still thrive. The lost area due to this encroachment should be offset elsewhere, maintaining continuity with the TPZ. Non-destructive root investigations may be necessary for any planned works within this area.

Figure 3: Tree Protection Zone Encroachments



3. Tree Schedule

Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
1	*Eucalyptus sp.* (Peppermint)	7	6	223	3.5	1.8	8.9%	3A	Low	Retain
1a	*Syzygium luehmannii* (Small-leaf Lillypilly)	5	5	80 + 120	2.7	1.6	7.5%	2A	Moderate	Retain
2	*Corymbia gummifera* (Red Bloodwood)	18	6	404	4.9	2.4	0.0%	2A	Moderate	Retain
2a	*Angophora costata* (Sydney Red Gum)	20	10	450	5.4	2.5	0.0%	1A	High	Retain
3	*Eucalyptus sp.* (Stringybark)	12	8	150 + 300	5.0	2.0	0.0%	1A	High	Retain
4	*Corymbia gummifera* (Red Bloodwood)	20	10	564	6.8	2.7	11.5%	1A	High	Remove
5	*Corymbia gummifera* (Red Bloodwood)	13	4	264	3.2	2.0	100.0%	4A	Low	Remove
6	*Angophora costata* (Sydney Red Gum)	18	14	557	8.0	2.7	100.0%	1A	High	Remove
7	*Corymbia gummifera* (Red Bloodwood)	12	5	280	3.4	2.2	0.0%	2A	Low	Remove
8	*Corymbia gummifera* (Red Bloodwood)	22	7	481	5.8	2.5	9.1%	1A	High	Retain
9	*Angophora costata* (Sydney Red Gum)	23	11	637	7.6	2.7	5.4%	3A	Moderate	Retain
10	*Corymbia gummifera* (Red Bloodwood)	12	6	328	3.9	2.1	100.0%	4A	Low	Remove
11	*Angophora costata* (Sydney Red Gum)	25	15	675	9.0	2.9	100.0%	1A	High	Remove
12	*Eucalyptus sp.* (Stringybark)	13	10	357	5.5	2.3	100.0%	1A	High	Remove
13	*Angophora costata* (Sydney Red Gum)	20	4	360	4.3	2.3	100.0%	3A	Moderate	Remove
14	*Corymbia gummifera* (Red Bloodwood)	20	6	439	5.3	2.4	21.2%	3A	Moderate	Remove
15	*Angophora costata* (Sydney Red Gum)	16	8	334	5.5	2.1	22.5%	1A	High	Remove
15a	*Ficus benjamina* (Weeping Fig)	6	6	100	3.0	1.4	15.6%	1A	Low	Remove

Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
16	*Angophora costata* (Sydney Red Gum)	18	14	600	8.0	2.8	9.1%	1A	High	Retain
17	*Archontophoenix cunninghamii* (Bangalow Palm)	6	4	175	2.5	1.7	0.0%	2A	Low	Remove
18	*Syagrus romanzoffianum* (Cocos Palm)	8	6	258	3.5	2.0	11.8%	2A	Low	Remove
19	*Ficus benjamina* (Weeping Fig)	6	7	130 + 180	4.0	1.8	29.5%	2A	Low	Remove
20	*Archontophoenix cunninghamii* (Bangalow Palm)	8	5	180	3.0	1.8	100.0%	2A	Low	Remove
21	*Ulmus parvifolia* (Chinese Elm)	8	10	200x2	5.0	2.0	100.0%	2A	Low	Remove
21a	*Gleditsia triacanthos* (Honey Locust)	6	5	134	3.0	1.5	100.0%	3A	Low	Remove
22	*Casuarina glauca* (Swamp Oak)	12	4	180	2.5	1.8	100.0%	4A	Very Low	Remove
23	*Angophora costata* (Sydney Red Gum)	20	10	455	5.5	2.4	100.0%	2A	Moderate	Remove
24	*Eucalyptus sp.* [resinifera] (Red Mahogany)	18	16	500	7.5	2.6	100.0%	1A	High	Remove
25	*Schefflera actinophylla* (Umbrella Tree)	9	5	200	3.0	1.8	100.0%	2B	Very Low	Remove
26	*Eucalyptus sp.* [resinifera] (Red Mahogany)	17	11	475	6.5	2.5	100.0%	2A	Moderate	Remove
27	*Gleditsia triacanthos* (Honey Locust)	6	7	159	4.0	1.6	100.0%	3B	Very Low	Remove
28	*Archontophoenix cunninghamii* (Bangalow Palm)	10	4	204	3.0	1.9	100.0%	2A	Low	Remove
29	*Syagrus romanzoffianum* (Cocos Palm)	11	5	200	3.0	1.8	100.0%	2B	Low	Remove
30	*Syagrus romanzoffianum* (Cocos Palm)	10	4	230	3.0	1.9	100.0%	2B	Low	Remove

Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
31	*Citharexylum spinosum* (Fiddlewood)	9	7	200	4.0	1.8	100.0%	2A	Low	Remove
32	*Angophora costata* (Sydney Red Gum)	14	12	650	7.8	2.9	100.0%	4A	Low	Remove
33	*Malus sp.* (Apple tree)	5	5	100x3	3.0	1.7	0.0%	4A	Very Low	Remove
33a	*Eucalyptus sp.* [resinifera] (Red Mahogany)	18	10	420	5.5	2.5	0.0%	1A	High	Retain
33b	*Schefflera actinophylla* (Umbrella Tree)	6	1	80	2.0	1.3	100.0%	4A	Very Low	Remove
34	*Prunus sp.* (Peach tree)	6	8	170x2	4.0	1.8	0.0%	2A	Very Low	Remove
35	*Ficus carica* (Common Fig)	6	6	120 + 150x2	3.2	1.9	0.0%	2A	Low	Remove
36	*Eucalyptus sp.* [resinifera] (Red Mahogany)	17	8	417	5.0	2.3	19.5%	2A	Moderate	Remove
37	*Callistemon viminalis* (Weeping Bottlebrush)	6	5	200	2.6	1.8	100.0%	3A	Low	Remove
38	*Syagrus romanzoffianum* (Cocos Palm)	8	4	200	2.4	1.8	100.0%	2B	Low	Remove
39	*Washingtonia robusta* (Washington Palm)	6	3	250	3.0	2.0	100.0%	2A	Low	Remove
40	*Schefflera actinophylla* (Umbrella Tree)	10	6	200 + 250	3.6	2.1	100.0%	3B	Low	Remove
41	*Syagrus romanzoffianum* (Cocos Palm)	7	3.5	140	2.5	1.5	100.0%	2B	Low	Remove
42	*Syagrus romanzoffianum* (Cocos Palm)	6	3.5	160	2.5	1.6	100.0%	2B	Low	Remove
43	*Eucalyptus tereticornis* (Forest Red Gum)	22	18	600 + 750	12.0	3.6	100.0%	3A	Moderate	Remove
43a	*Syzygium luehmannii* (Small-leaf Lillypilly)	6	4	100	2.2	1.4	100.0%	1A	Moderate	Remove

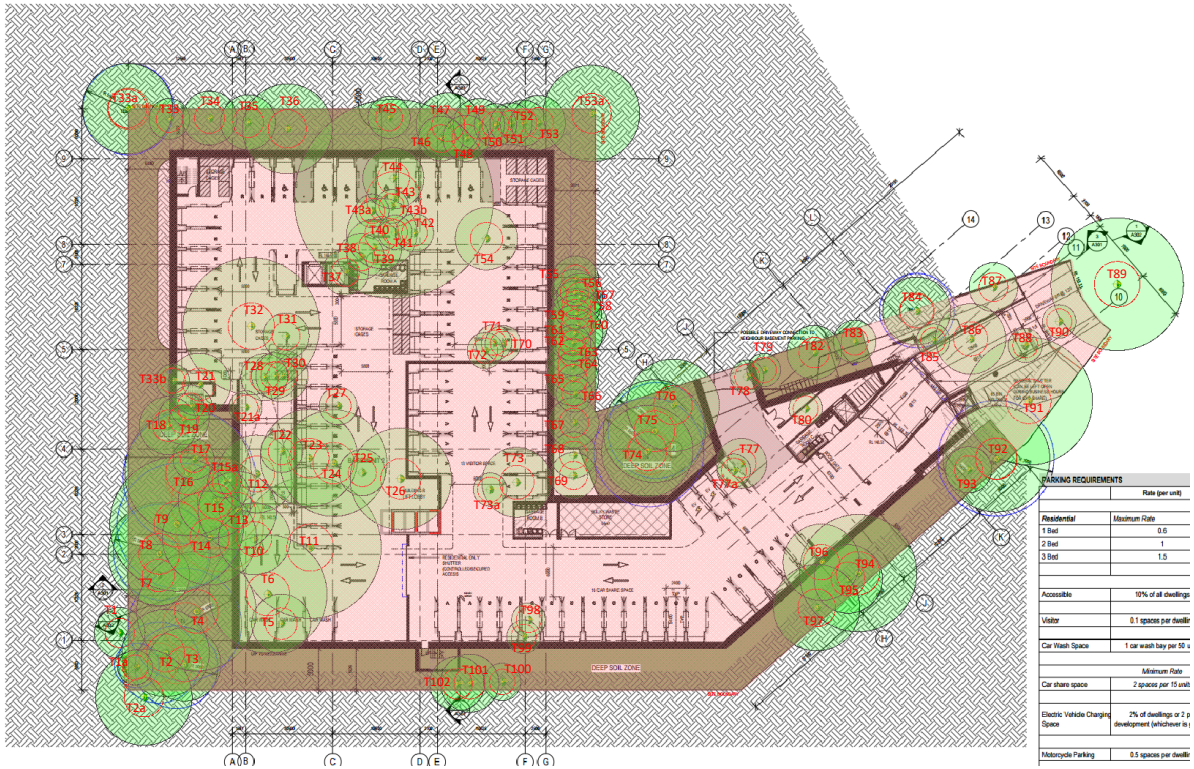
Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
43b	*Syzygium luehmannii* (Small-leaf Lillypilly)	6	4	100	2.2	1.4	100.0%	1A	Moderate	Remove
44	*Eucalyptus tereticornis* (Forest Red Gum)	13	8	274	4.5	2.0	100.0%	1A	Moderate	Remove
45	*Callistemon salignus* (Willow Bottlebrush)	9	5	100 + 150	3.0	1.7	0.0%	4A	Very Low	Remove
46	*Banksia serrata* (Old Man Banksia)	9	3.5	194	2.5	1.8	9.5%	1A	Moderate	Retain
47	*Syzygium australe* (Lilly Pilly)	9	9	290	5.0	2.0	7.9%	1A	Moderate	Retain
48	*Tibouchina granulosa* (Lasiandra)	6	7	200	4.0	1.9	9.8%	2A	Low	Retain
49	*Syzygium australe* (Lilly Pilly)	9	6	226	4.0	1.6	0.0%	2A	Moderate	Retain
50	*Syzygium australe* (Lilly Pilly)	9	6	180	4.0	1.8	0.0%	2A	Moderate	Retain
51	*Syzygium australe* (Lilly Pilly)	9	7	180	4.0	1.8	0.0%	2A	Moderate	Retain
52	*Syzygium australe* (Lilly Pilly)	9	7	200	4.0	1.8	0.0%	2A	Moderate	Retain
53	*Syzygium australe* (Lilly Pilly)	9	7	170x2	4.0	1.8	0.0%	3A	Moderate	Retain
53a	*Musa sp.* (Banana Palm)	7	7	100x15	5.4	2.5	0.0%	3A	Low	Retain
54	*Schinus areira* (Peppercorn Tree)	11	12	280	6.3	2.1	100.0%	1A	Moderate	Remove
55	*Syagrus romanzoffianum* (Cocos Palm)	13	5	200	3.0	1.8	0.0%	2A	Low	Retain
56	*Archontophoenix cunninghamii* (Bangalow Palm)	11	4	200	3.0	1.8	0.0%	2A	Low	Retain
57	*Archontophoenix cunninghamii* (Bangalow Palm)	10	4	200	3.0	1.8	0.0%	2A	Low	Retain
58	*Xylosma senticosa* (Shiny Xylosma)	7	7	150x2	4.0	1.7	0.0%	3A	Low	Retain
59	*Xylosma senticosa* (Shiny Xylosma)	6	6	200 + 100	3.5	1.8	0.0%	3A	Low	Retain

Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
60	*Syagrus romanzoffianum* (Cocos Palm)	11	5	270	3.2	2.0	0.0%	1A	Low	Retain
61	*Syagrus romanzoffianum* (Cocos Palm)	9	4	250	3.0	1.9	0.0%	1A	Low	Retain
62	*Xylosma senticosa* (Shiny Xylosma)	6	5	150	3.0	1.6	0.0%	3A	Low	Retain
63	*Syagrus romanzoffianum* (Cocos Palm)	9	4.5	200	3.0	1.8	0.0%	3A	Very Low	Retain
64	*Syagrus romanzoffianum* (Cocos Palm)	11	4.5	230	3.0	1.8	0.0%	3A	Very Low	Retain
65	*Syagrus romanzoffianum* (Cocos Palm)	10	4.5	230	3.0	1.8	5.4%	3A	Very Low	Retain
66	*Syagrus romanzoffianum* (Cocos Palm)	9	4.5	150	3.0	1.7	0.0%	3A	Very Low	Remove
67	*Syagrus romanzoffianum* (Cocos Palm)	10	4.5	220	3.0	1.8	7.6%	3A	Very Low	Remove
68	*Syagrus romanzoffianum* (Cocos Palm)	11	4.5	200	3.0	1.8	100.0%	2A	Low	Remove
69	*Syagrus romanzoffianum* (Cocos Palm)	12	4.5	200	3.0	1.8	100.0%	2A	Low	Remove
70	*Howea forsteriana* (Kentia Palm)	9	5	150	3.0	1.6	100.0%	2A	Low	Remove
71	*Howea forsteriana* (Kentia Palm)	7	4	150	2.5	1.6	100.0%	2A	Low	Remove
72	*Howea forsteriana* (Kentia Palm)	8	4	150	2.5	1.6	100.0%	2A	Low	Remove
73	*Syagrus romanzoffianum* (Cocos Palm)	14	6	318	3.8	2.1	100.0%	2B	Low	Remove
73a	*Plumeria rubra* (Red Frangipani)	3.5	4	120	2.2	1.4	100.0%	2A	Low	Remove

Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
74	*Lophostemon confertus* (Brushbox)	13	9	270 + 330	6.6	2.7	8.5%	1A	High	Retain
75	*Lophostemon confertus* (Brushbox)	14	9	480	5.8	2.6	0.0%	1A	High	Retain
76	*Lophostemon confertus* (Brushbox)	10	8	430	5.2	2.5	19.5%	3A	Low	Remove
77	*Dicksonia antarctica* (Soft Tree Fern)	2	2	220	2.6	1.8	100.0%	3A	Very Low	Remove
77a	*Duranta erecta 'Variegata'* (Variegated Pigeonberry)	4.5	5	60x3	2.5	1.3	100.0%	3A	Low	Remove
78	*Camellia sasanqua* (Sasanqua Camellia)	4.5	5	60x5	2.5	1.5	100.0%	3A	Low	Remove
79	*Tibouchina granulosa* (Lasiandra)	5	4	70x2	2.2	1.5	100.0%	3A	Low	Remove
80	*Murraya paniculata* (Murraya)	3	3	50x5	2.0	1.5	100.0%	3A	Very Low	Remove
82	*Callistemon sp.* [viminalis] (Weeping Bottlebrush)	6	4	170x2	3.6	2.1	100.0%	3A	Low	Remove
83	*Prunus sp.* (Peach tree)	5	4	130x2	2.6	1.8	100.0%	3A	Very Low	Remove
84	*Malus floribunda* (Japanese Crabapple)	8	9	180 + 250	4.5	2.1	7.9%	3A	Moderate	Retain
85	*Juniperus sp.* (Juniper)	3.5	3	40x7	2.0	1.7	100.0%	3A	Very Low	Remove
86	*Fraxinus griffithii* (Evergreen Ash)	6	8	100x10	4.8	2.4	100.0%	3A	Very Low	Remove
87	*Tibouchina granulosa* (Lasiandra)	5	5	90x6	3.0	1.6	100.0%	3A	Low	Remove
88	*Tibouchina granulosa* (Lasiandra)	6	6	70x4	3.2	1.6	100.0%	3A	Low	Remove
89	*Liquidambar styraciflua* (Liquidambar)	19	17	630	7.6	2.8	100.0%	2A	High	Remove
90	*Syzygium australe* (Lilly Pilly)	6	5	120	2.6	1.5	100.0%	2A	Low	Remove
91	*Citharexylum spinosum* (Fiddlewood)	13	10	370 + 480	6.6	2.7	100.0%	1A	Low	Remove
92	*Eucalyptus botryoides* (Bangalay)	20	11	500	7.0	2.5	9.5%	1A	High	Retain

Tree #	*Botanical Name* (Common Name)	Height (m)	Canopy (m)	DBH (mm)	TPZ (m)	SRZ (m)	TPZ Encroachment	SULE	Retention Value	Action
93	*Tibouchina granulosa* (Lasiandra)	4.5	5	200	2.6	2.0	0.0%	3A	Low	Remove
94	*Eucalyptus elata* (River Peppermint)	12	7	270 + 180 + 450	6.0	2.7	18.5%	3A	Low	Remove
95	*Eucalyptus elata* (River Peppermint)	13	8	220x2	5.6	2.7	10.8%	3A	Moderate	Remove
96	*Eucalyptus elata* (River Peppermint)	15	10	350	5.0	2.4	100.0%	3A	Very Low	Remove
97	*Eucalyptus elata* (River Peppermint)	15	10	400	6.0	2.4	13.3%	3A	Low	Remove
98	*Cyathea cooperi* (Rough Tree Fern)	4	4	100x2	2.2	1.5	100.0%	3A	Very Low	Remove
99	*Cyathea cooperi* (Rough Tree Fern)	4	4	120	2.2	1.5	100.0%	3A	Very Low	Remove
100	*Howea forsteriana* (Kentia Palm)	7	3.5	156	2.5	1.6	0.0%	2A	Low	Remove
101	*Strelitzia nicolai* (Giant White Bird of Paradise)	7	5	100x7	3.4	2.0	18.6%	2B	Moderate	Remove
102	*Strelitzia nicolai* (Giant White Bird of Paradise)	6	5	100x6	3.4	2.0	20.1%	2B	Moderate	Remove

4. Arboricultural Impact Assessment



Legend

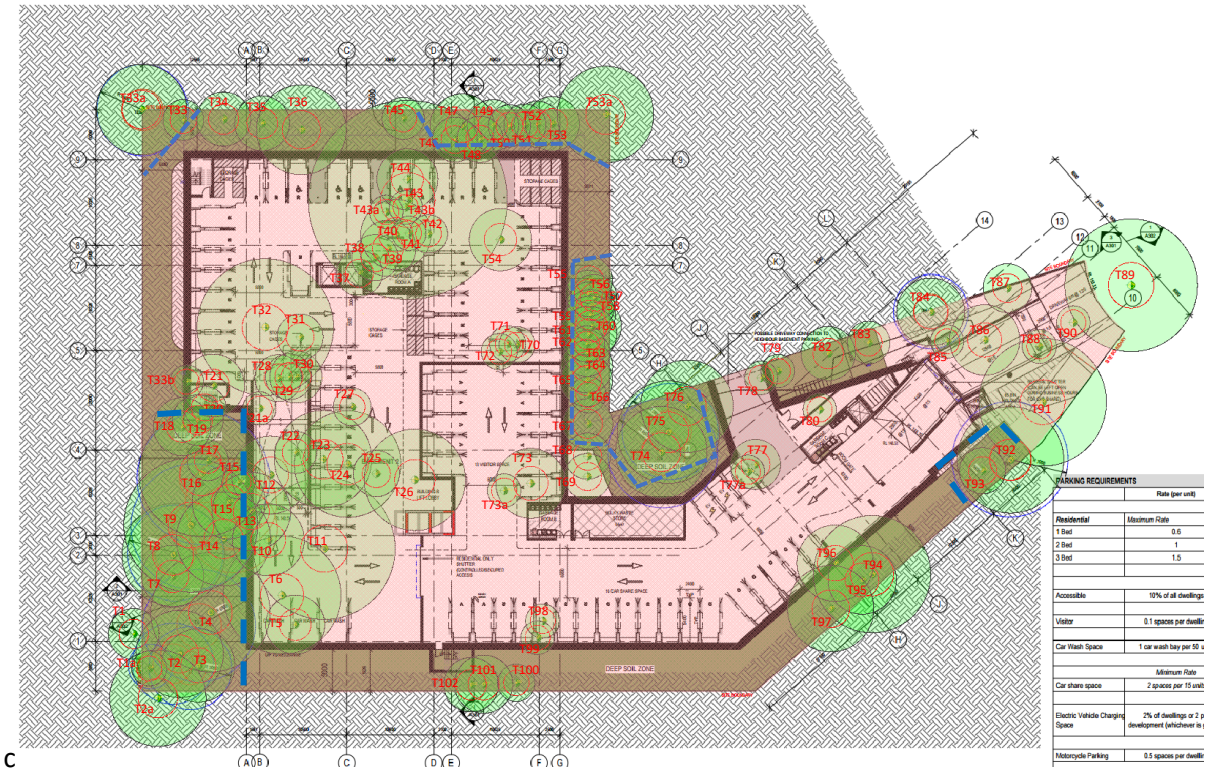
Tree Protection Zone

Tree Protection Zone Encroachment

Structural Root Zone

Arbor Express

5. Tree Protection Plan



Legend

Tree Protection Fencing - - - - - - -

Trunk Protection

Proposed Root Mapping - - - - - - -

Arbor Express

6. Recommendations

Tree Protection

A total of 34 individual trees are proposed for retention. The following mitigation measures will be required:

- The tree protection plan (Section 5) must be implemented.
- Mulch ground cover protection is required over the TPZ (where viable) of Trees 1, 1a, 2, 2a, 3, 8, 9, 16, 33a, 46-53a, 55-65, 74, 75, 84 and 92. This is to consist of 100mm depth layers of clean and ceritified Eucalyptus spp mulch.
- Tree protection fencing is required around the TPZs (where viable) of Trees 1, 1a, 2, 2a, 3, 8, 9, 16, 33a, 46-53a, 55-65, 74, 75, 84 and 92.
- All trees to be retained must be protected in accordance with AS 4970-2009, details of which are included in Appendix D.
- No over-excavation, shall be undertaken beyond the footprint of any structure unless approved by the Project Arborist.

Tree Removal

Trees 5, 6, 10-13, 20-32, 33b, 38-44, 54, 67-73a, 77-80, 82, 83, 85-61, 96, 98 and 99 are located within the footprint of the development and must be removed for the development to proceed.

Trees 4, 14, 15, 15a, 18, 19, 36, 66, 76, 94, 95, 97, 101 and 102 have a major encroachment from the proposed development of over 10%. These trees have been recommended for removal to accommodate the proposed development due to the major TPZ encroachment and root loss.

Trees 7, 17, 33, 34, 35, 45, 93 and 100 have no encroachment from the proposed development but have been proposed to be removed as part of the development application.

7. Construction Hold Points for Tree Protection

Project Arborist

Below is a sequence of hold points requiring project arborist certification throughout the development process. It provides a list of hold points that must be checked and certified. All certifications must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principle contractor should be responsible for implementation of all tree protection requirements.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS 4970-2009 prior to works commencing at site.	Prior to development work commencing	
In accordance with AS 4970-2009 the Project Arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. Site inspections are recommended on a monthly frequency.	On-going through the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the Project Arborist.	Demolition	
Project Arborist to supervise all manual excavations and root pruning inside the TPZ of any tree to be retained. Project Arborist to approve all pruning of roots greater than 30mm inside TPZ. All root pruning of roots greater than 30mm in diameter must be carried out by an AQF level 5 Arborist.	Construction	
Project Arborist to certify that all underground services including storm water inside TPZ of any tree to be retained have been installed in accordance with AS 4970-2009.	Construction	
Project Arborist to approve relocation of tree protection for landscaping. All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the Project Arborist to minimise the impact to trees.	Construction / Landscape	
After all demolition, construction and landscaping works are complete the Project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of the development	

8. References

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Standards Australia 2009. *Australian Standard: Protection of trees on development sites, AS 4970 (2009)*. Standards Australia, Sydney.

Appendix A: Glossary of Terms

Abiotic - Pertaining to non-living agents, e.g. environmental factors.

Anchorage - The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree.

Branch:
- Primary. A first order branch arising from a stem.
- Lateral. A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches.
- Sub-lateral. A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs.

Branch collar - A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base.

Cambium - Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally.

Canker - A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria.

Compartmentalisation - The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region.

Condition - An indication of the physiological condition of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree.

Crown/Canopy - The main foliage bearing section of the tree.

Crown lifting - The removal of limbs and small branches to a specified height above ground level.

Crown reduction/shaping - A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape.

DAB (Diameter Above Buttress) - Trunk diameter measured above the root buttress.

Defect - In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment.

Dieback - The death of parts of a woody plant, starting at shoot-tips or root-tips.

Disease - A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms.

DBH (Diameter at Breast Height) - Stem diameter measured at a height of 1.4 metres or the nearest measurable point. Where measurement at a height of 1.4 metres is not possible, another height may be specified.

Deadwood - Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard.

Epicormic shoot - A shoot having developed from a dormant or adventitious bud and not having developed from a first year shoot.

Heartwood/false-heartwood - The dead central wood that has become dysfunctional as part of the aging processes and being distinct from the sapwood.

Included bark (ingrown bark) - Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact.

Lions tailing - A term applied to a branch of a tree that has few if any side-branches except at its end and is thus liable to snap due to end- loading.

Occlusion - The process whereby a wound is progressively closed by the formation of new wood and bark around it.

Pruning - The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs.

Reactive Growth/Reaction Wood - Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth).

Ring-barking - The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates below the area of damage. Almost inevitably results in the eventual death of the affected stem or branch above the damage.

Stress - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature.

SRZ (Structural Root Zone) - The area around the base of the tree required for the tree's stability in the ground.

Topping - In arboriculture, the removal of the crown of a tree, or of a major proportion of it.

TPZ (Tree Protection Zone) - 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 to be retained where it is potentially subject to damage by development.

Veteran tree - Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem.

Vigour - The expression of carbohydrate expenditure to growth (in trees).

Appendix B: Retention Value

Evaluating Sustainability and Landscape Significance to Determine Retention Value	
Retention Value	**Criteria and Categories**
High	These trees are considered to be worthy of preservation. As such, careful consideration should be given to their retention as a priority. Proposed site design and placement of buildings and infrastructure should consider the TPZ to minimize any adverse impact. In addition to TPZs, the extent of the canopy should also be considered, particularly in relation to a high-rise development. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
Moderate	The retention of these trees is desirable. These trees should be retained as part of any proposed development, if possible; however, these trees are considered to be less critical for retention. If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.
Low	These trees are not considered to be worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. These trees should not be considered as a constraint to future development of the site.
Very Low	These trees are considered to be potentially hazardous or very poor specimens or may be environmental or noxious weeds. The removal of these trees is therefore recommended regardless of the implications of any proposed development.

Appendix C: Safe Useful Life Expectancy (SULE)

	1 LONG SULE	2 MEDIUM SULE	3 SHORT SULE	4 REMOVALS	5 MOVED OR REPLACED
	Long: appeared to be retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Medium: appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Short: appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Removal: trees which should be removed within the next 5 years.	Moved or Replaced: Trees which can be readily moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 more 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 5 metres (m) in height.
B	Trees that could be made suitable for long-term retention 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 damage, structural defect, instability or recent toss of adjacent trees.	Young trees less than 1 5 years old but over 5m in height.
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 should 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.	Dangerous trees through structural detects including cavities, decay, included bark, wounds or poor form.	Trees that have been regularly 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	

	1 LONG SULE	2 MEDIUM SULE	3 SHORT SULE	4 REMOVALS	5 MOVED OR REPLACED
				provide space for new planting.	
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 the reasons given in A) to F).	

Appendix D: Tree Protection Guidelines

The following tree protection guidelines must be implemented during the construction period if no tree specific recommendations are detailed.

Tree Protection Zone Establishment

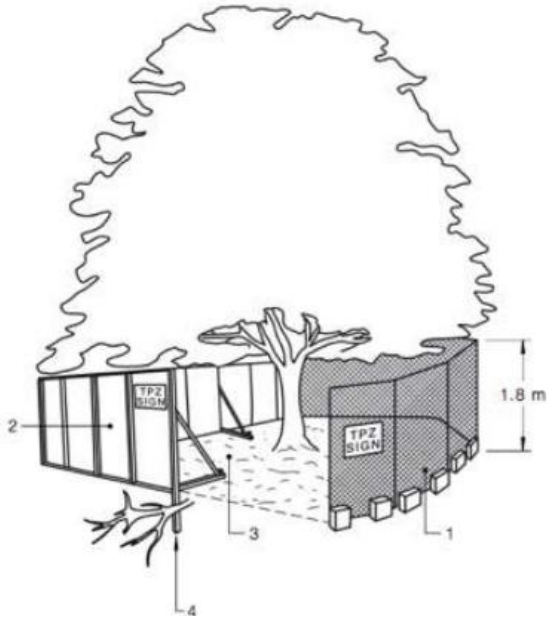
Prior to the introduction of any machinery or materials onto the site, and before initiating any works such as bulk earthworks, fencing should be installed. Once in place, any alterations or removal of protective fencing must receive approval from the project arborist. Access to the TPZ must be restricted by securing it appropriately. The establishment and management of the Tree Protection Zone should adhere to the following guidelines:

1) Specify the trees within and around the subject allotment that are slated for preservation and protection during the development process. This could involve trees on neighboring properties as well as street trees.

2) The Tree Protection Zone radius should align with the calculation specified in the Individual Tree Data and Imagery.

3) Please locate and mark the alignment of protective fencing. This alignment may differ from the actual TPZ radius, taking into account areas where acceptable encroachment is permitted (determined in consultation with the project arborist) and site access needs. Protective fencing is necessary only within the subject allotment, assuming appropriate boundary fencing is already installed.

4) Set up protective fencing as depicted in the accompanying image. Adhere to the relevant fencing requirements outlined in AS 4687 for temporary fencing and hoardings. Additionally, affix shade cloth or a similar material to mitigate the transfer of dust, particulate matter, and liquids into the protected area.



Legend:

1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden palling 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.

Protection when works within the tree protection zone is required

If the fencing has been reduced from the full TPZ radius to accommodate vehicle or machinery access, it's crucial to implement heavy-duty ground protection and trunk protection. This measure is essential to support the passage of vehicles like excavators, cranes, pier drilling machinery, hydro-excavation trucks, and other necessary equipment.

The heavy-duty ground protection includes:

1) A layer of geotextile fabric on top of the natural ground.

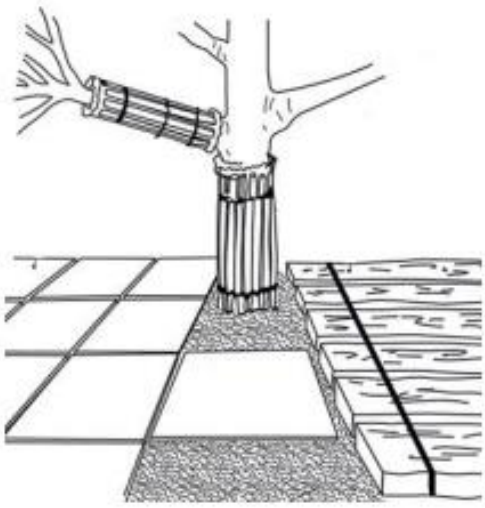
2) Cover the geotextile with a 100mm thick layer of organic mulch.

3) Install ground protection on top of the organic mulch (Bog mat or timber battens)

Trunk protection will include protection to the trunk and branches of trees as shown below. A minimum height of 2m is recommended.

1) Install breathable padding or hessian around the trunk of the tree.

2) Install closely spaced timber battens around the trunk, with the top edge protecting the trunk/bark by the padding/hessian. Secure with strapping



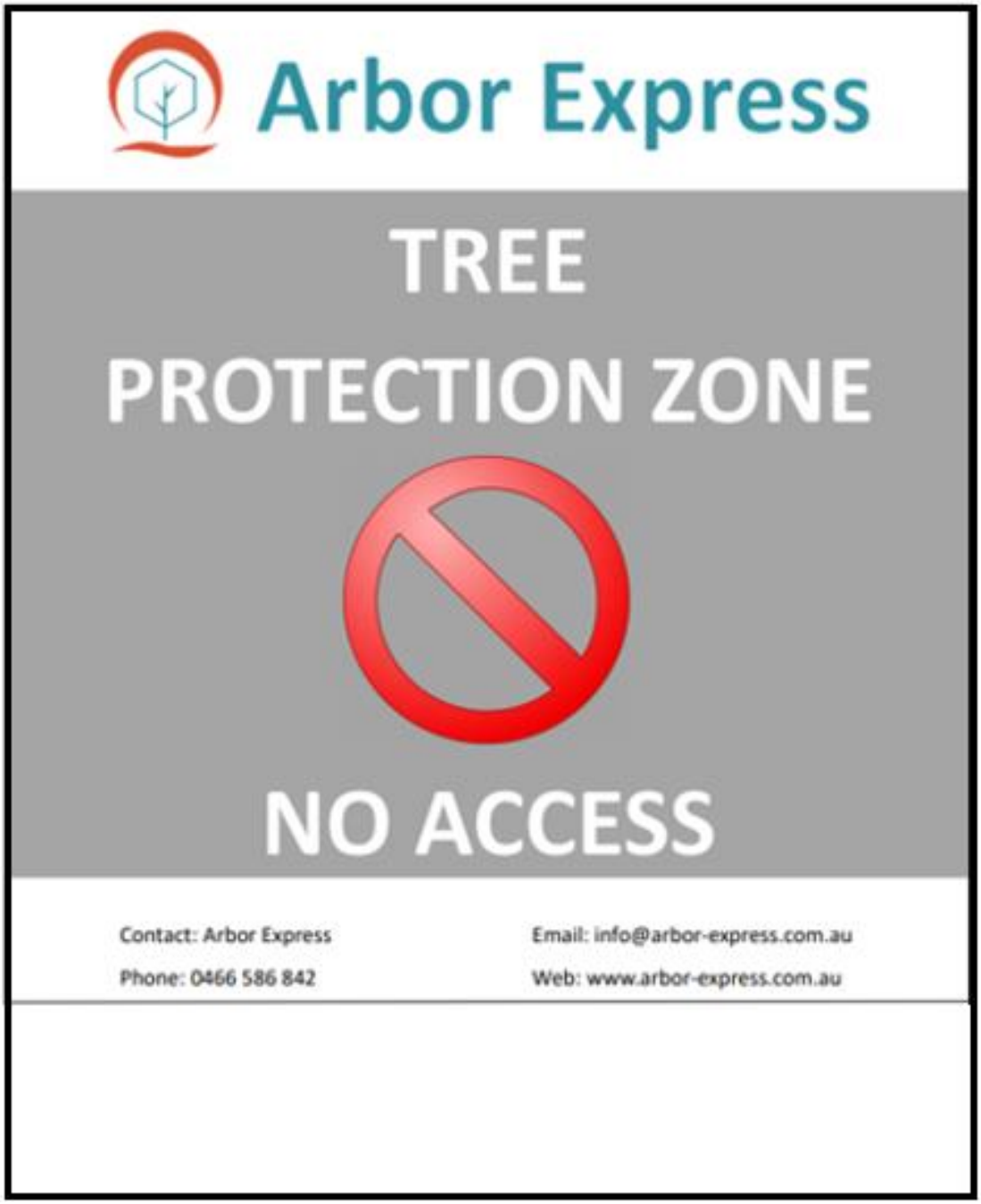
Notes:

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.

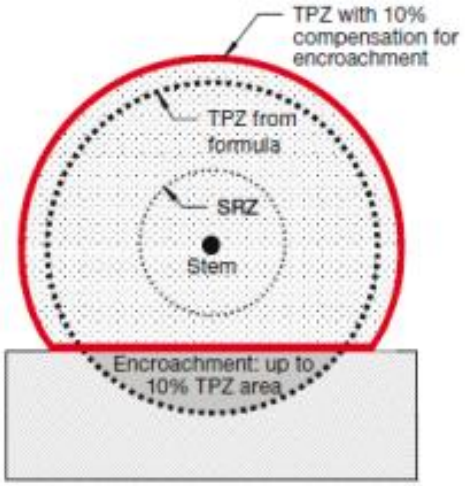
Underground Services

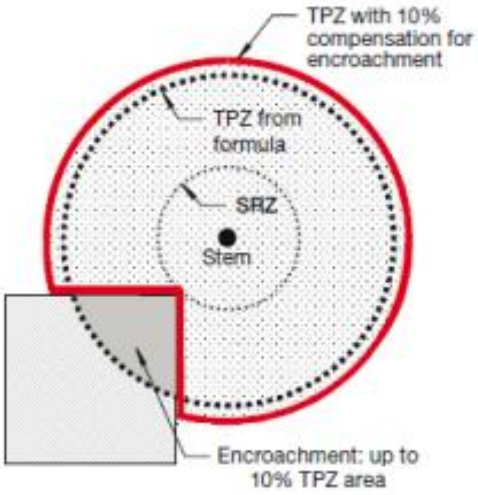
Whenever feasible, route all underground services away from the TPZ. If installing underground services within the TPZ becomes unavoidable, utilize non-intrusive methods such as horizontal directional drilling (HDD), non-destructive excavation (NDE) techniques like hydro-vacuum or Air Spade, or manually excavated trenches. Ensure that horizontal drilling or boring is carried out at a depth of at least 600 mm below grade. It's important to note that trenching for services is classified as "excavation." The project arborist should assess the potential impacts of drilling and bore pits on retained trees.

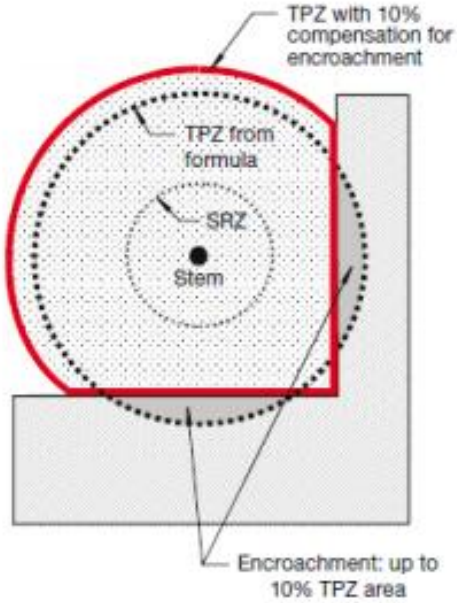
Example of a Tree Protection Sign

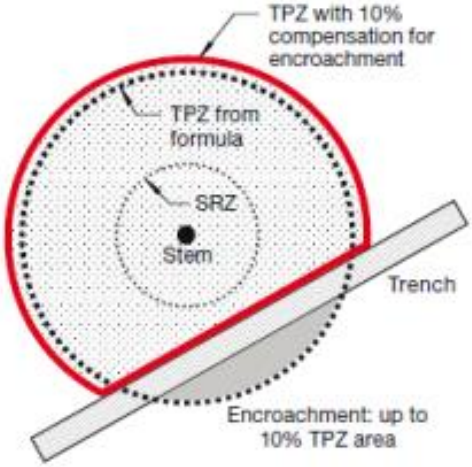


Appendix E: Encroachment into the Tree Protection Zones









Locations

- Sydney
- NSW South Coast (Wollongong to Bega)
- NSW Central Coast (Gosford to Newcastle)
- Southern Highlands
- Blue Mountains
- Canberra and Queanbeyan
- Regional NSW

Services

- Arborist Reports for Developments
- Tree Root Mapping
- Project Arborist
- Tree Health and Safety Assessments
- Tree Structural Testing (Resistograph)
- Flora & Fauna Assessments and Project Ecologist
- Vegetation Management Plans

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