Prepared for ABA Real estate

Arboriculture Impact Assessment Report

Site Address:

93-145 Hoxton Park Road and 20 and 48 Dale Ave and 49-51 Maryvale Ave and 260 Memorial Ave, Liverpool NSW 2170

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Contents

Executive summary

Cumberland Tree Services have been commissioned by ABA Estate Pty Ltd, to prepare an Arboricultural Impact Assessment Report relating to sixty (60) trees located on or close to the site that may be impacted by the proposed development, in line with AS4970 – 2009 *Protection of trees on development sites*.

An assessment of the subject trees was undertaken on the 17th of June and 1st of July 2023 to determine the health and structure of the subject trees, canopy spreads, tree protection zones, structural root zones, tree retention value and the impact of the proposed works on the subject trees. The proposed works include the following;

- Demolition of Existing Structures
- Construction of Six residential Flat Buildings.

The Consultant arborist has determined that the proposed works outlined in the proposed plans provided will facilitate the removal of the following 26 trees numbered: **11, 12, 16, 17, 18, 20, 24, 25, 29, 30, 31, 32, 33, 34, 35, 42, 43, 47, 50, 52, 53, 54, 55, 61, 62 and 63.** All tree removal works are to be undertaken by suitably qualified tree workers (minimum AQF Level 3 or equivalent), in accordance with the NSW Work Cover Code of Practice for the Amenity Tree Industry.

The following 29 trees numbered: **4, 5, 6, 7, 10, 13, 14, 15, 19, 21, 22 23, 26, 36, 38, 39, 40, 41, 45, 46, 48, 49, 51, 56, 57, 58, 59, 60, 64** should be retained with special protection measures.

11 trees recommended for retention numbered: **13, 14, 38, 41, 45, 46, 48, 56, 58, 59 and 60** are to be pruned for clearance, to facilitate erection of scaffolding prior to the commencement of works. The pruning of the subject trees is to be undertaken by an Arborist with a minimum Certificate III in Arboriculture, in accordance with AS4373-2007: *Pruning of Amenity Trees,* Clause 7.3.2 *Reduction pruning*.

All trees recommended for retention shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence in the positions as indicated in Figure 7 - Tree Management Plan.

The Project Arborist shall certify in writing to the Certifying Authority that the conditions of consent relating to tree removal, pruning and protection have been complied with, and provide recommendations for remedial actions where necessary.

1 Introduction

I. This Arboricultural Impact Assessment (AIA) was commissioned by ABA Estate Pty Ltd, with regards to providing an assessment of trees potentially impacted by a Development Application (DA) under the State Environmental Planning Policy (Exempt and Complying Development Codes 2008 [NSW] (SEPP 2008) and Liverpool City Council DCP Tree Management Policy 12 October 2016.

II. Liverpool City Council's DCP Defines a Tree as any perennial plant that has a:

a) Height greater than 3.5 metres; or

b) Canopy spread greater than 4.0 metres; or

c) Primary trunk diameter greater than 400 millimetres when measured 1.0 metre above existing ground level of the tree.

This clause does not apply to a tree or other vegetation that Council is satisfied is dead dying or dangerous and is not required as the habitat of native fauna.

III. The DA entails

I. Demolition of existing structures and construction of six residential 6 storey Flat Buildings.

II. The Arborist has identified a total of Sixty four (64) trees, located onsite and within the neighbouring properties that will be impacted by the proposed development, refer to figure 1 below. The trees were assessed with respect to the Australian *Standard- Protection of trees on development* sites (AS 4970:2009).

Figure 1 Site View (Nearmap)

2 Methodology

I. The Arborist conducted a Visual Tree Assessment (VTA), at ground level only, on the 17th of June and 1st of July 2023.

II. Advanced assessment by way of subterranean investigation or aerial canopy inspections were not undertaken nor warranted at the time of inspection.

III. Tree dimensions were determined using a metric tape.

IV. The Arborist has determined the locations of the trees based on site reference points.

V. The Arborist tables the following in 3.2 - Tree Observations and impact Summary (AS 4970-2009)

a. Genus & species, Common name, age, vigour and crown characteristics, general health and condition, defects and the presence of pest and disease.

b. Tree Retention Value (STARS Matrix) that assesses the trees significance and value for retention on the site where development occurs. (Refer to Appendix B for further clarification of all scales and values)

c. Calculation of Tree Protection Zones (TPZ) and Structural Root Zones (SRZ), proposed setbacks to works and degree of incursion characterised by minor, moderate, major or no impact to trees.

d. Provide recommendations for tree retention, protection and removal taking into consideration Australian Standard AS4970-2009 *Protection of trees on development sites*.

e. Findings in Table 1, 3.2 - Tree Observations and impact Summary (AS 4970-2009) are to be read in conjunction with Notes in Appendix E

VIII. Calculations of impacts are undertaken by using an interactive calculator. (Treetec, 2023)

IX. Tree Protection / Encroachment Plan in Appendix A, using survey provided by the client, and overlaid by the Arborist, to annotate TPZ's and SRZ's.

X. Photographs in this report were taken by the Arborist using an iPhone.

XII. The following documentation was used as part of this assessment;

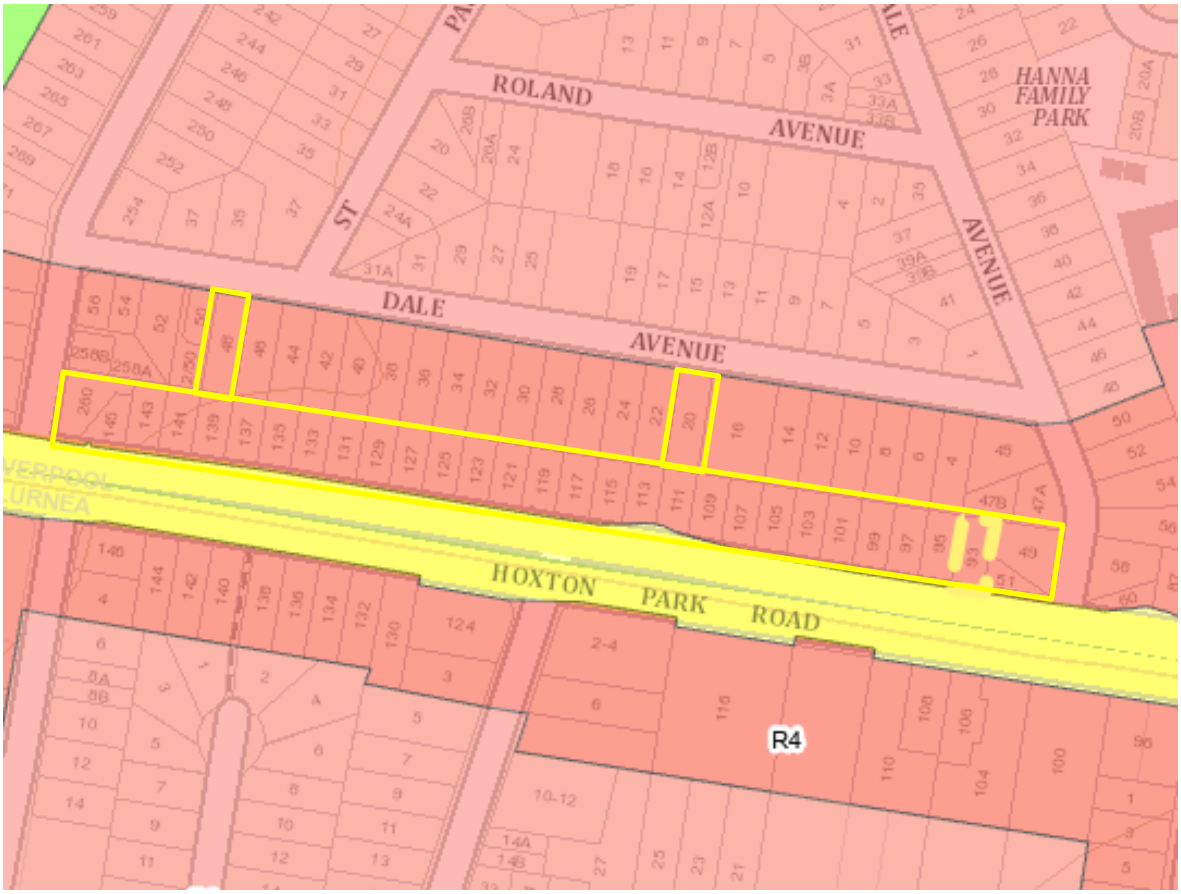
Plan Type/Document	Provided by	Issue:	Draw No.	Date
Basement Level	Toney Owen Ptnrs	B	A024	DEC/2024
Ground Level	Toney Owen Ptnrs	B	A027	DEC/2024
Level 4-5	Toney Owen Ptnrs	B	A029	DEC/2024
Survey Plan	Urbanex Surveyors	A	84-2022	02/08/2022

3 Observations

3.1 Site Observations

I. The site is zoned R4 - High Density Residential. (See NSW Planning Portal Map)

Figure 2 NSW Planning Portal



II. The site has an area of approximately 14,945m2. This consists of the amalgamation of some 32 sites being 93-145 on Hoxton Park Road, and 20 and 48 Dale Avenue and 49-51 Maryvale Ave and 260 Memorial Ave, Liverpool NSW 2170. 29 sites are located along almost a full block of Hoxton Park Road, with 2 sites located on the rear Dale Avenue. The site currently contains 4 detached houses. The site has a 450m frontage and is approximately 34m wide.

III. There are modest level changes across the site. As it is a large site, these vary in different places. Generally, the site is 1 level higher at the eastern end and there is generally a fall from north to south. The site is located along Hoxton Park Road which is a busy main road, this road contains the transitways bus network and there is a station directly

adjoining the site approximately mid-way along. The Majority of the trees are on the southern and northern boundaries.

IV. Site soil, although not formally assessed, ESpade Web mapping indicates South Creek **Alluvial soil landscape**, this soil landscape comprises the present active floodplain of many drainage networks of the Cumberland Plain. This includes the South Creek, Eastern Creek, Ricabys Creek and Prospect Creek systems. Typical profiles and landscape can be seen on South Creek between Bringelly Road and Elizabeth Drive.

V. **Soils**— often very deep layered sediments over bedrock or relict soils. Where pedogenesis has occurred Structured Plastic Clays or Structured Loams in and immediately adjacent to drainage lines; Red and Yellow Podzolic Soils are most common terraces with small areas of Structured Grey Clays, leached clays and Yellow Solodic Soils.

VI. **Limitations**— Flood hazard, seasonal waterlogging, permanently high water tables (localised), water erosion hazard (localised), surface movement potential (localised).

VII. See picture (below) for tree locations, courtesy of Nearmap.

Figure 3 Tree Location (Nearmap)

3.2 Table 1: Tree Observations and impact Summary (AS 4970-2009)

Tree No.	Genus Species	Common Name	Height (m)	Spread (m)	Age	Condition	Vitality	TREEAZ	Retention Value	DBH (m)	DAB (m)	TPZ (m)	SRZ (m)	Impacts/ Incursions % Nil / Low / Moderate / Significant / Total Loss	Comments / Impact Summary
1	*Corymbia maculata*	Spotted Gum	22	12	M	G	G	A1	H	0.55	0.7	6.60	2.85	0	Tree is in good condition no impact accepted if protection measures are maintained. **Retain and protect.**
2	*Corymbia maculata*	Spotted Gum	18	12	M	G	G	A1	H	0.5	0.6	6.00	2.67	0	Tree is in good condition no impact accepted if protection measures are maintained. **Retain and protect.**
3	*Corymbia maculata*	Spotted Gum	20	12	M	G	G	A1	H	0.55	0.7	6.60	2.85	0	Tree is in good condition no impact accepted if protection measures are maintained. **Retain and protect.**
4	*Eucalyptus tereticornis*	forest red gum	8	4	EM	F	G	A2	M	0.25	0.32	3.00	2.05	19.2	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
5	*Eucalyptus tereticornis*	forest red gum	11	6	EM	G	P	A2	M	0.31	0.35	3.72	2.13	20.1	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be

														compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
6	*Eucalyptus tereticornis*	forest red gum	14	7	M	G	G	A1	M	0.39	0.45	4.68	2.37	22.6	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
7	*Eucalyptus tereticornis*	forest red gum	11	6	EM	G	G	A1	M	0.25	0.3	3.00	2.00	18.6	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
8	*Brachychiton acerifolius*	Illawarra Flame Tree	8	4	M	G	F	A2	M	0.33	0.4	3.96	2.25	0	Tree is in fair condition with dieback in crown no impact accepted if protection measures are maintained. **Retain and protect.**
9	*Jacaranda mimosifolia*	Blue Jacaranda	9	9	M	F	F	A2	M	0.51	0.6	6.12	2.67	0	Tree is in fair condition no impact accepted if protection measures are maintained.
10	*Eucalyptus tereticornis*	forest red gum	12	6	EM	G	G	A1	M	0.39	0.45	4.68	2.37	19.4	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
11	*Eucalyptus tereticornis*	forest red gum	20	11	M	P	F	Z9	L	0.9	1.2	10.8	3.57	100	Tree has had a major failure in the past and is hazardous. It will be lost to proposed Basement. **Remove and replace.**

12	*Eucalyptus moluccana*	grey box	25	16	M	F	G	A2	M	1.0	1.25	12.0	3.63	100	Tree is in good condition. However considering its location would be difficult to retain. Tree will be lost to proposed basement. **Remove and replace.**
13	*Eucalyptus moluccana*	grey box	23	16	M	F	F	A2	M	1.15	1.25	13.8	3.63	16.7	Tree is in fair condition with dead wood. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
14	*Eucalyptus tereticornis*	forest red gum	20	16	M	F	F	A2	M	0.92	1.15	11.0	3.51	22.3	Tree is in fair condition with dead wood. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
15	*Eucalyptus tereticornis*	forest red gum	8	4	EM	G	G	A1	M	0.2	0.3	2.40	2.00	5.6	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
16	*Eucalyptus moluccana*	grey box	22	15	M	G	G	A1	M	0.8	0.95	9.60	3.24	100	Tree is in good condition. However considering its location it would be difficult to retain. Tree will be lost to proposed basement. **Remove and replace.**
17	*Grevillea robusta*	silky oak	12	7	M	F	F	A2	L	0.3	0.38	3.60	2.20	100	Tree is in poor condition. It has been lopped and has canopy die-back. Tree will be lost to proposed basement. **Remove and replace.**
18	*Eucalyptus tereticornis*	forest red gum	10	7	EM	F	F	A2	M	0.4	0.46	4.80	2.39	100	Tree is in fair condition. Tree will be lost to proposed basement**. Remove and replace.**

19	*Eucalyptus moluccana*	grey box	30	18	M	G	G	A1	H	0.8	1.0	9.60	3.31	Moderate	Tree is in good condition a moderate impact is accepted for proposed driveway and landscaping. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
20	*Corymbia maculata*	Spotted Gum	11	6	EM	G	G	A1	M	0.3	0.33	3.60	2.08	100	Tree is in good condition. Tree will be lost to proposed driveway. **Remove and replace**
21	*Eucalyptus moluccana*	grey box	22	9	M	F	G	A2	M	0.4	0.5	4.80	2.47	Low	Tree is in fair condition and somewhat suppressed. Minimal impact is accepted for proposed driveway and landscaping. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
22	*Eucalyptus tereticornis*	forest red gum	20	8	M	F	F	A2	M	0.35	0.45	4.20	2.37	Low	Tree is in fair condition with deadwood. Minimal impact is accepted for proposed driveway and landscaping. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
23	*Eucalyptus tereticornis*	forest red gum	18	9	M	G	F	A2	M	0.65	0.75	7.80	2.93	Low	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained
24	*Eucalyptus tereticornis*	forest red gum	12	7	EM	G	F	A2	M	0.41	0.5	4.92	2.47	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace**
25	*Eucalyptus tereticornis*	forest red gum	12	8	EM	G	G	A1	M	0.32	0.36	3.84	2.15	30.3	Tree is in good condition. However will succumb to a major incursion into the SRZ by proposed basement. **Remove and replace**

26	*Eucalyptus tereticornis*	forest red gum	14	7	M	F	G	A2	M	0.41	0.48	4.92	2.43	3.3	Tree is in fair condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
27	*Eucalyptus tereticornis*	forest red gum	15	6	M	G	F	A2	M	0.31	0.4	3.72	2.25	0	Tree is in good condition. No impact accepted if protection measures are maintained. **Retain and protect.**
28	*Grevillea robusta*	silky oak	16	9	M	F	F	A2	M	0.5	0.62	6.00	2.71	0	Tree is in fair condition with deadwood. No impact accepted if protection measures are maintained. **Retain and protect.**
29	*Washingtonia robusta*	Mexican fan palm	18	3	M	G	F	A2	M	0.5	0.7	6.00	2.85	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
30	*Eucalyptus tereticornis*	forest red gum	12	7	EM	G	G	A2	M	0.3	0.38	3.60	2.20	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
31	*Eucalyptus tereticornis*	forest red gum	23	14	M	P	F	Z9	L	0.64	0.73	7.68	2.90	100	Tree is in poor condition with codominant included leader stems with an active crack. The tree will be lost to proposed basement. **Remove and replace.**
32	*Eucalyptus tereticornis*	forest red gum	9	6	EM	F	F	A2	M	0.24	0.31	2.88	2.02	100	Tree is in fair condition. With many included branches and sparse canopy. It will be lost to proposed basement**. Remove and replace.**
33	*Eucalyptus tereticornis*	forest red gum	10	6	EM	G	F	A2	M	0.29	0.34	3.48	2.10	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
34	*Eucalyptus tereticornis*	forest red gum	11	6	EM	G	F	A2	M	0.29	0.35	3.48	2.13	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
35	*Eucalyptus tereticornis*	forest red gum	11	11	EM	G	F	A2	M	0.52	0.58	6.24	2.63	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**

36	*Eucalyptus tereticornis*	forest red gum	16	6	M	F	F	A2	M	0.4	0.5	4.80	2.47	2.7	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
37	*Corymbia maculata*	Spotted Gum	11	6	EM	G	G	A1	M	0.25	0.35	3.00	2.13	0	Tree is in good condition. No impact accepted if protection measures are maintained. **Retain and protect.**
38	*Corymbia maculata*	Spotted Gum	16	11	M	G	G	A1	M	0.34	0.45	4.08	2.37	3.0	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
39	*Eucalyptus tereticornis*	forest red gum	16	7	M	G	G	A1	M	0.36	0.44	4.32	2.34	2.3	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
40	*Corymbia maculata*	Spotted Gum	16	5	M	P	P	Z5	L	0.39	0.44	4.68	2.34	5.9	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
41	*Eucalyptus tereticornis*	forest red gum	10	7	EM	P	F	Z9	L	0.34	0.43	4.08	2.32	2.3	Tree is in fair condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
42	*Eucalyptus tereticornis*	forest red gum	13	7	M	F	F	A2	M	0.31	0.42	3.72	2.30	100	Tree is in fair condition. With a mechanical basal wound. The tree will be lost to proposed basement. **Remove and replace**.

43	*Eucalyptus tereticornis*	forest red gum	9	6	EM	G	F	A2	M	0.22	0.3	2.64	2.00	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
44	*Eucalyptus tereticornis*	forest red gum	12	7	EM	F	F	A2	M	0.32	0.43	3.84	2.32	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
45	*Corymbia maculata*	Spotted Gum	19	8	M	G	G	A1	M	0.4	0.49	4.80	2.45	7.1	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
46	*Eucalyptus tereticornis*	forest red gum	17	9	M	P,F	F	Z4	L	0.4	0.49	4.80	2.45	7.0	Tree is in poor-fair condition. With cankers present at base and borer activity. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
47	*Eucalyptus tereticornis*	forest red gum	12	7	EM	F	F	A2	M	0.34	0.41	4.08	2.28	100	Tree is in fair condition with a sparse canopy and deadwood. Tree will be lost to proposed basement. **Remove and replace.**
48	*Corymbia maculata*	Spotted Gum	15	6	M	G	F	A1	M	0.36	0.42	4.32	2.30	2.6	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
49	*Corymbia maculata*	Spotted Gum	15	8	M	G	F	A1	M	0.32	0.4	3.84	2.25	1.8	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain**

														and protect.
50	*Eucalyptus tereticornis*	forest red gum	20	8	M	P,F	G	Z5	L	0.46	0.6	5.52	2.67	100	Tree is in poor-fair condition with included codominant leader stems and an active crack with poor reaction wood. Tree will be lost to proposed basement. **Remove and replace**.
51	*Eucalyptus tereticornis*	forest red gum	15	7	M	G	F	A2	M	0.33	0.45	3.96	2.37	24.5	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
52	*Eucalyptus tereticornis*	forest red gum	14	7	M	G	F	A2	M	0.3	0.4	3.60	2.25	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
53	*Corymbia maculata*	Spotted Gum	16	8	M	G	F	A2	M	0.33	0.42	3.96	2.30	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace**.
54	*Eucalyptus tereticornis*	forest red gum	14	6	M	G	F	A1	M	0.3	0.4	3.60	2.25	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
55	*Corymbia maculata*	Spotted Gum	19	8	M	G	G	A1	M	0.44	0.58	5.28	2.63	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
56	*Eucalyptus tereticornis*	forest red gum	14	10	M	G	F	A2	M	0.46	0.55	5.52	2.57	24.7	Tree is in good condition. The proposed development will have a significant impact on the tree. However the area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
57	*Eucalyptus tereticornis*	forest red gum	13	6	M	F	F	A2	M	0.32	0.44	3.84	2.34	13.5	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain**

															and protect.
58	*Eucalyptus tereticornis*	forest red gum	16	7	M	G	F	A2	M	0.31	0.39	3.72	2.23	10.4	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
59	*Corymbia maculata*	Spotted Gum	18	8	M	G	G	A1	H	0.43	0.48	5.16	2.43	11.4	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
60	*Corymbia maculata*	Spotted Gum	18	8	M	G	G	A1	H	0.46	0.56	5.52	2.59	13.4	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**
61	*Eucalyptus tereticornis*	forest red gum	20	6	M	F	F	A2	M	0.32	0.38	3.84	2.20	100	Tree is in fair condition with sparse canopy. Tree will be lost to proposed basement. **Remove and replace.**
62	*Corymbia maculata*	Spotted Gum	21	6	M	G	G	A1	M	0.46	0.58	5.52	2.63	100	Tree is in good condition. Tree will be lost to proposed basement. **Remove and replace.**
63	*Eucalyptus tereticornis*	forest red gum	19	7	M	F	G	A2	M	0.45	0.56	5.40	2.59	100	Tree is in fair condition with include codominant leader stems. Tree will be lost to proposed basement. **Remove and replace.**
64	*Corymbia maculata*	Spotted Gum	20	8	M	F	G	A2	M	0.47	0.61	5.64	2.69	7.2	Tree is in good condition. Minimal impact accepted for proposed basement. Area lost will be compensated. Tree is viable for retention if protection measures are maintained. **Retain and protect.**

4 Discussion / Conclusion

4.1 Tree Protection Zone

The Tree Protection Zone (TPZ) is an area where ground disturbance must be carefully controlled. It is intended to ensure the protection of the above and below ground parts of the tree from potential damage that may occur from construction works and to ensure the long-term health, stability and viability of trees to be retained. The TPZ was established according to the recommendations set out in AS4970-2009 and is the radial offset distance of twelve (x12) times the trunk diameter. In principle, a maximum of 10% encroachment is acceptable with in the TPZ and a high level of care is needed during any activities that are authorised with in it if significant trees are to be successfully retained.

4.2 Structural Root Zone

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, so the entire profile (depth) of the root zone is included in the structural root zone. 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. Determine SRZ radius from the trunk diameter (measured immediately above the root buttress) using the following formula or Figure 1 of the standard.

Radius of SRZ = $(D \times 50)^{0.42} \times 0.64$

Where: D = trunk diameter (metres), measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15 metres will be 1.5 metres

4.3 Minor Encroachment into TPZ

The Australian Standard AS4970:2009 – *Protection of Trees on Development Sites* (Standards Australia, 2009) Section 3.3.2 defines a minor encroachment as "less than 10% of the area of the TPZ and is outside the SRZ… the area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ".

4.4 Major Encroachment into TPZ

The Australian Standard AS4970:2009 – *Protection of Trees on Development Sites* (Standards Australia, 2009) Section 3.3.3 defines a major encroachment as "greater than 10% of the TPZ or inside the SRZ". Where unavoidable, exploratory excavation using non-destructive methods such as pneumatic, hydraulic or using hand tools may be required to evaluate the extent of the potential damage to the root system and determine whether the tree(s) will remain viable. Any area lost to encroachment should be compensated for elsewhere and contiguous with the TPZ.

4.5 Impact Assessment

The following factors were taken into consideration to determine the impact to trees on site that may occur due to the proposed development:

- Site and soil conditions
- Existing trees TPZ & SRZ
- Footprint of the proposed development and scaffolding
- Excavation required to undertake proposed works.

4.6 Table 2: Summary of Impact

Impact	Reason	Tree Identification
Trees to be removed	Building construction, new surfacing and/or proximity, trees in poor condition	11, 12, 16, 17, 18, 20, 24, 25, 29, 30, 31, 32, 33, 34, 35, 42, 43, 47, 50, 52, 53, 54, 55, 61, 62, 63 (26 Trees)
Retained trees that will be subject to TPZ encroachment	Removal of existing surfacing/structures and/or installation of new surfacing/structures	4, 5, 6, 7, 10, 13, 14, 15, 19, 21, 22 23, 26, 36, 38, 39, 40, **41**, 45, 46, 48, 49, 51, 56, 57, 58, 59, 60, 64 (29 Trees)
Trees to be retained that will not be subject to TPZ encroachment	Space for development	1, 2, 3, 8, 9, 28 (6 Trees)
Trees requiring further investigation (Root Mapping)	Soil characteristics, topography and level changes within the TPZ	None
Retained trees requiring canopy management	Scaffold and building clearance	13, 14, 38, 41, 45, 46, 48, 56, 58, 59, 60 (11 Trees)

5 Recommendations

5.1 Trees recommended for removal

The Consultant arborist has determined that the proposed works outlined in the proposed plans provided will facilitate the removal of the following 26 trees numbered: **11, 12, 16, 17, 18, 20, 24, 25, 29, 30, 31, 32, 33, 34, 35, 42, 43, 47, 50, 52, 53, 54, 55, 61, 62 and 63.** All tree removal works are to be undertaken by suitably qualified tree workers (minimum AQF Level 3 or equivalent), in accordance with the NSW Work Cover Code of Practice for the Amenity Tree Industry.

5.2 Impacted trees to be retained

The following 29 trees numbered: **4, 5, 6, 7, 10, 13, 14, 15, 19, 21, 22 23, 26, 36, 38, 39, 40, 41, 45, 46, 48, 49, 51, 56, 57, 58, 59, 60, 64** should be retained with special protection measures as follows:

5.3 Excavation within the TPZ

All excavation works within the TPZ of these trees shall be carried out under the supervision of the Project Arborist. Sensitive areas in close proximity to trees, or where works will encroach upon the SRZ will require non-destructive methods such as hydro-vacuum excavation or manual excavation. The Project Arborist will specify any sensitive areas during construction.

If the Project Arborist identifies conflicting roots that require pruning, they must be pruned with a sharp implement such as; secateurs, pruners, handsaws or chainsaw back to undamaged tissue as per Section 9 of AS 4373© Pruning of amenity trees. All exploratory excavation and root pruning within the TPZ must be performed by, or under the supervision of the Project Arborist.

5.4 Back filling/Stockpiling

Applying Back fill or stockpiling with in the TPZ is to be avoided throughout the duration of the project.

5.5 Canopy Management

The following 11 trees recommended for retention numbered: **13, 14, 38, 41, 45, 46, 48, 56, 58, 59 and 60** are to be pruned for clearance, to facilitate erection of scaffolding prior to the commencement of works. The pruning of the subject trees is to be undertaken by an Arborist with a minimum Certificate III in Arboriculture, in accordance with AS4373-2007: *Pruning of Amenity Trees,* Clause 7.3.2 *Reduction pruning*, to minimise the overextended / overhanging scaffold branches and achieve a clearance of 1.0 metre. The pruning must not exceed 10% of total live canopy in order to achieve the desired results, while retaining the main structural branches and shape of the tree. Pruning wounds for live branches must not exceed 50mm diameter.

5.6 Tree Protection Fencing

All trees recommended for retention shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence in the positions as indicated in Figure 7 - Tree Management Plan. As a minimum, the fence shall consist of temporary chain wire panels of 1.8 metres in height, supported by steel stakes or concrete feet as required and fastened together and

supported to prevent sideways movement using corner braces where required. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge, a single fence encompassing the area is deemed to be adequate. Existing site boundary fences and buildings may form part of the enclosure.

5.7 Signage

Signs shall be installed on the Tree Protection Fence to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone. The signs shall be securely attached to the fence using cable ties or equivalent. Signs shall be placed at minimum 10 metre intervals. The wording and layout of the sign shall comply with AS 4970-2009.

5.8 Ground protection / Mulching

A 75-100mm layer of organic mulch shall be installed within fenced areas of the TPZs of trees recommended for retention as it is proven to have major benefits to tree health. It reduces soil summer temperature, compaction and evaporation from the soil surface, whilst increasing organic matter content, water infiltration and moisture availability. This will greatly improve the chances of the trees to remain healthy into the future.

If temporary access for machinery is required within the TPZ, ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch (75mm-100mm thick) or crushed rock below rumble boards. Rumble boards should be of suitable thickness to prevent soil compaction and root damage. These measures may be applied to root zones beyond the TPZ.

5.9 Activities prohibited within the TPZ

The following activities are prohibited within the TPZ of Protected trees during the period of demolition, excavation and construction:

a. Entry onto or across unprotected surfaces.

b. Excavation for any purpose including service installation, except as allowed elsewhere in this Tree Management Plan;

c. Erection of site sheds or structures.

d. Changes in ground surface level: no scalping or fill except as detailed above.

e. Movement or parking of vehicles or machinery;

f. Storage of building materials or soil fill;

g. Cleaning or washing of equipment.

h. Spillage or disposal of materials or waste.

5.10 Project Monitoring

5.10.1 Project arborist

An official Project Arborist must be commissioned to oversee the tree protection, any works within the TPZ and complete regular monitoring of compliance. The Project Arborist must hold an AQF Level 5 in Arboriculture.

5.10.2 Project Milestones

Inspections are to be conducted by the Project Arborist at several key points during the construction to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be monitored and identified.

5.10.3 Project Milestones and Reporting

The following inspections and milestones are required for the Project Arborist:

Item	Purpose of inspection	Timing	Prerequisites	Reporting/Compliance
1	Pre-construction project induction: site walk-through; confirmation of TPZs; fencing; signage and specified protection measures.	Lead contractor to provide a minimum of five days advanced notice for the visit	Prior to commencement of works. All parties involved in the project to attend.	***Inception Report*.** Project Arborist to certify specified tree protection measures have been met.
2	Supervision of works in TPZ's including regrading, scaffolding and excavations	When work is planned to be performed within the TPZ's. Lead contractor to provide a minimum of five days advance notice visits.	Prior to commencement of works. All parties involved in the project to attend.	***Progress report.*** Project Arborist to confirm work is in accordance with AS 4970.
3	Regular site inspections	Bi-Monthly for duration of the project.	Authorised lead contractor representative to accompany Project Arborist.	***Corrective/Preventative*** *Action template* and checklist completed by the Project Arborist; co- signed by lead contractor.
4	Final sign off.	Following completion of works.	Practical completion of works and prior to tree protection removal.	***Final Report*** on health and condition of retained trees

6 Appendix A

Tree Location / Encroachment Plan

(Please refer to all attached PDF files for clarity of figures 4-7).

Figure 4 Tree Location and Encroachment Plan 1 of 2

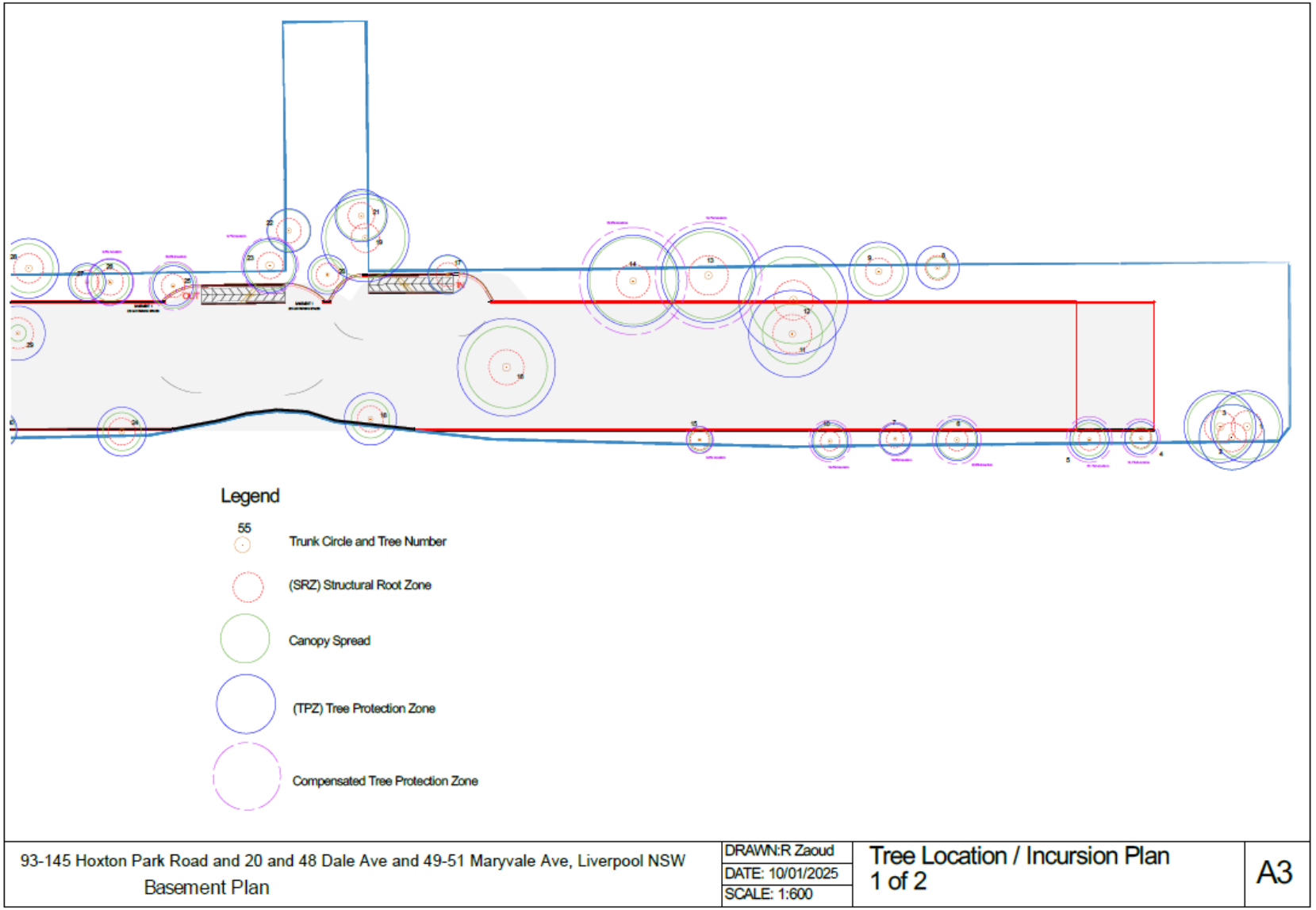


Figure 5 Tree Location and Encroachment Plan 2 of 2

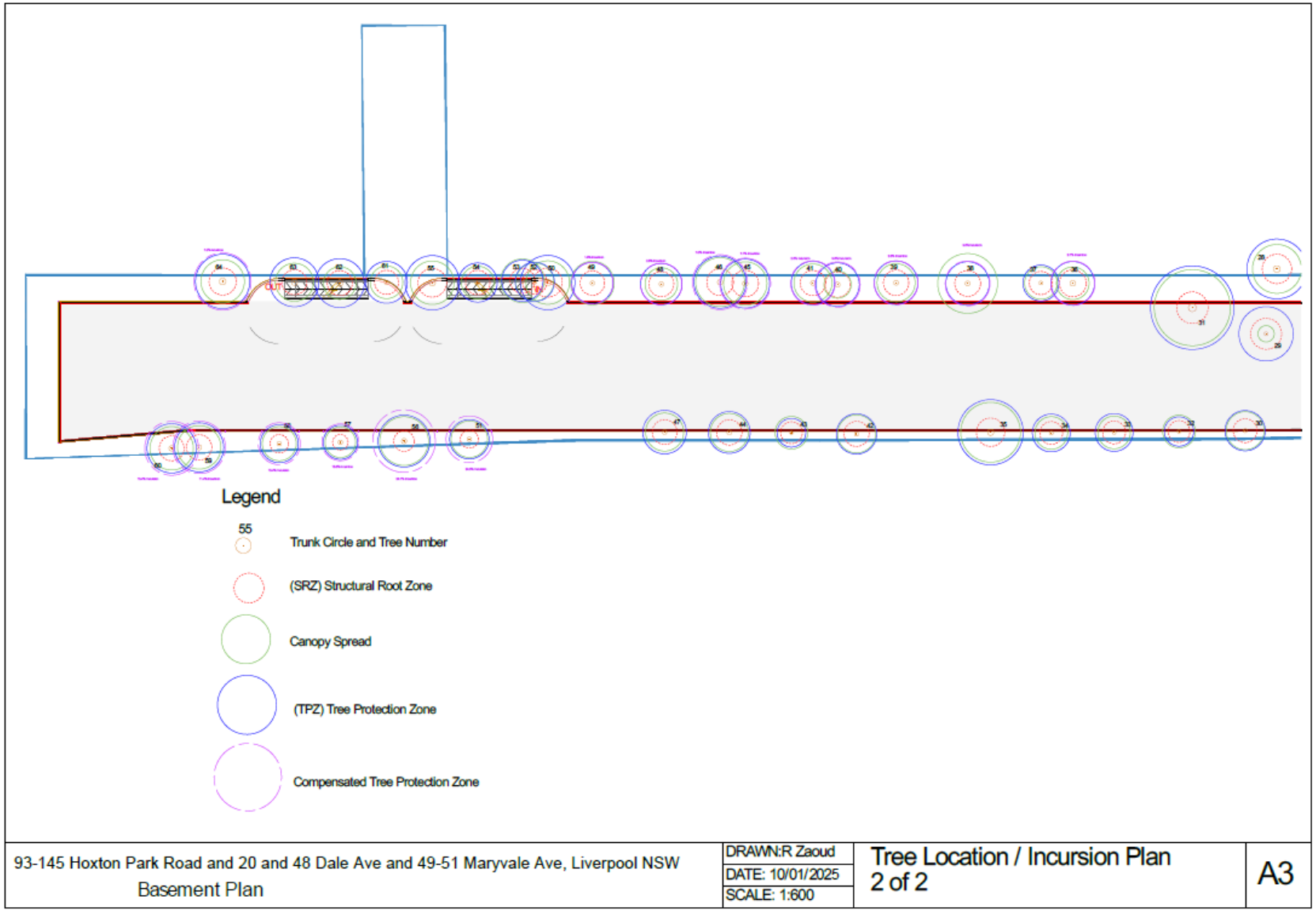


Figure 6 Tree Location and Crown Management Plan

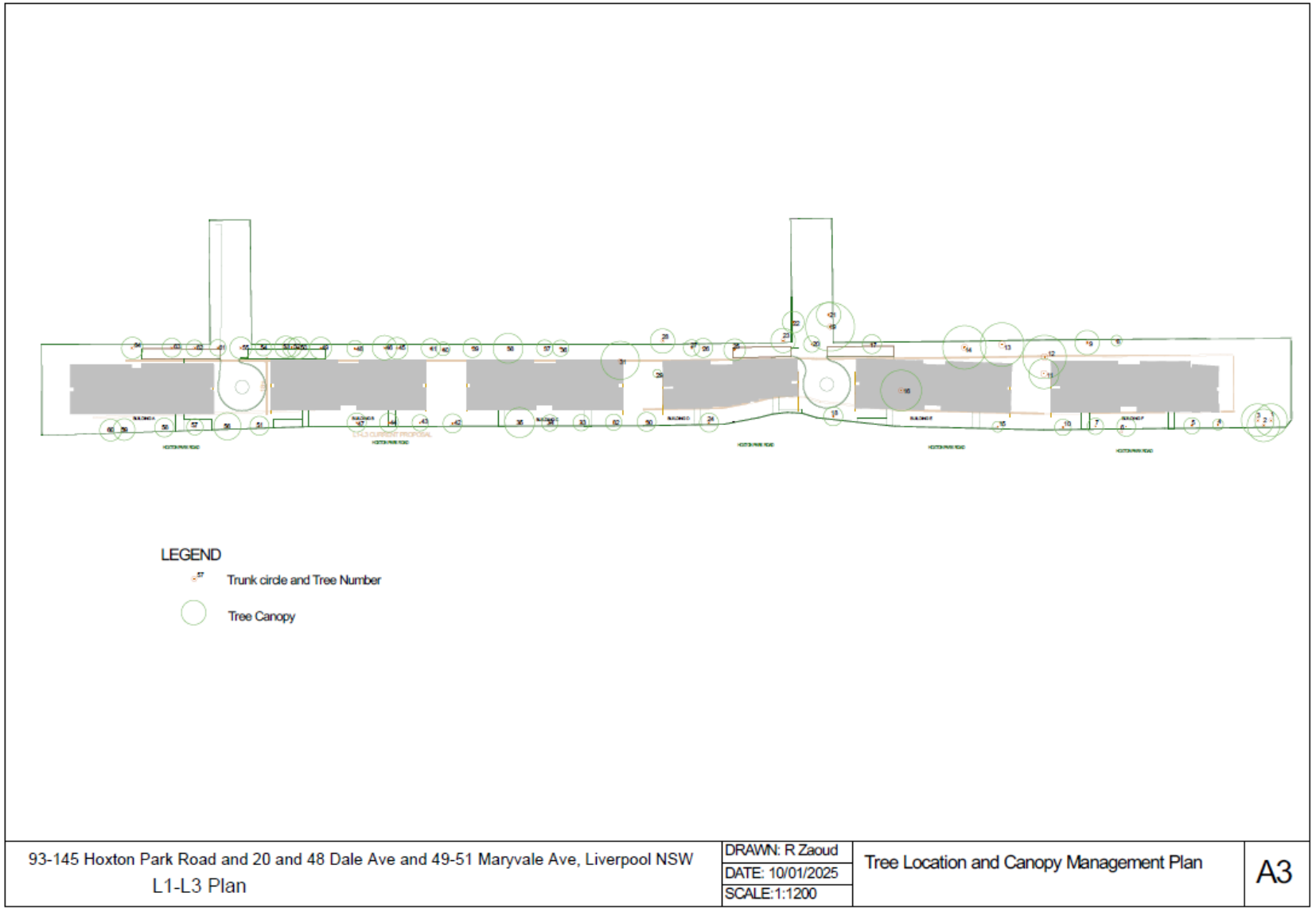
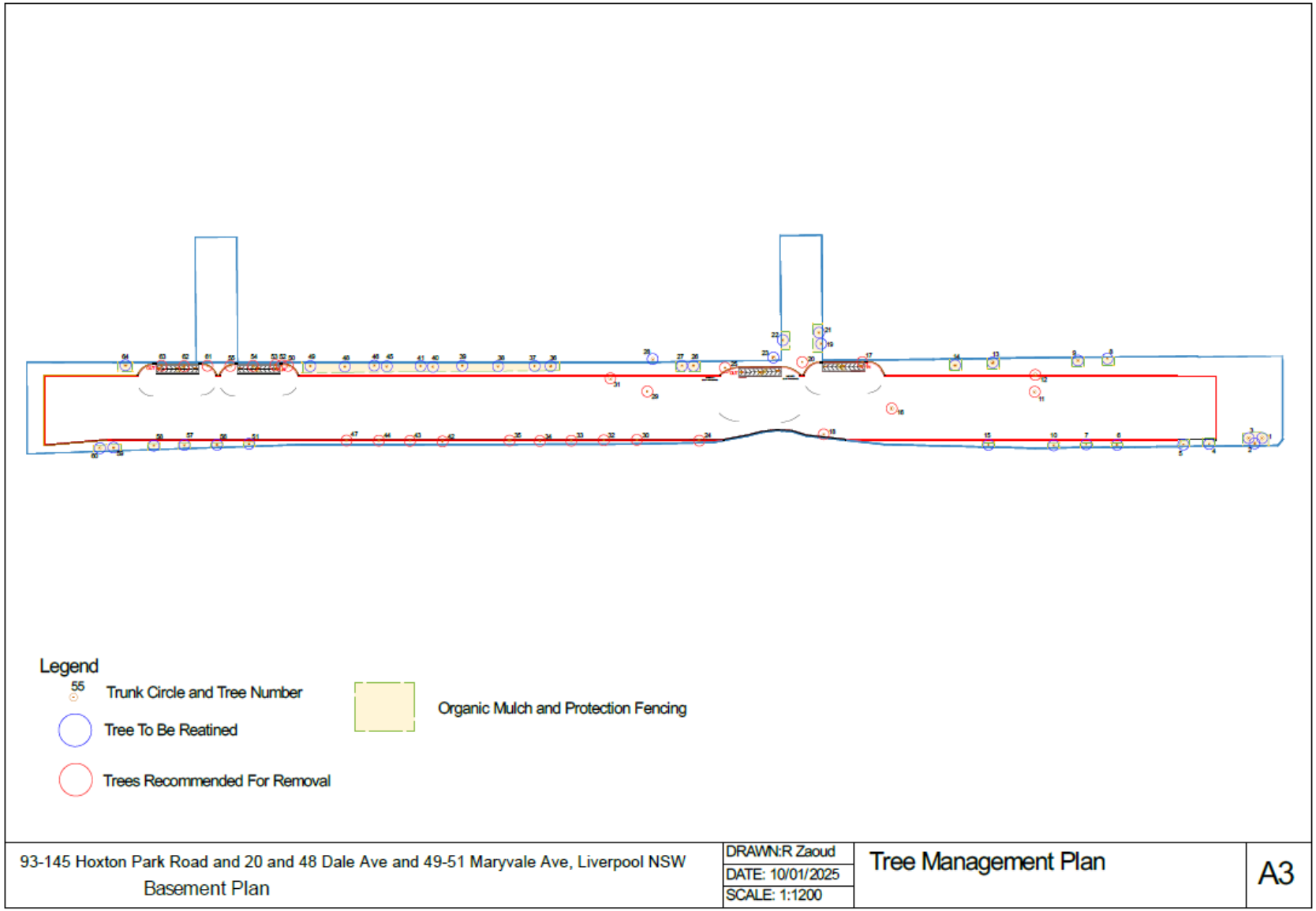
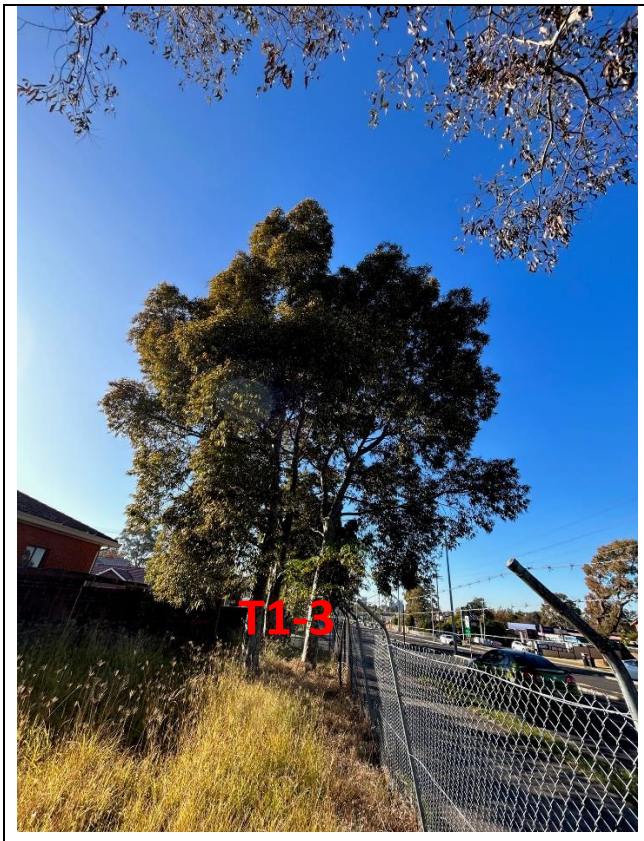


Figure 7 Tree Management Plan



Appendix B

Photographs

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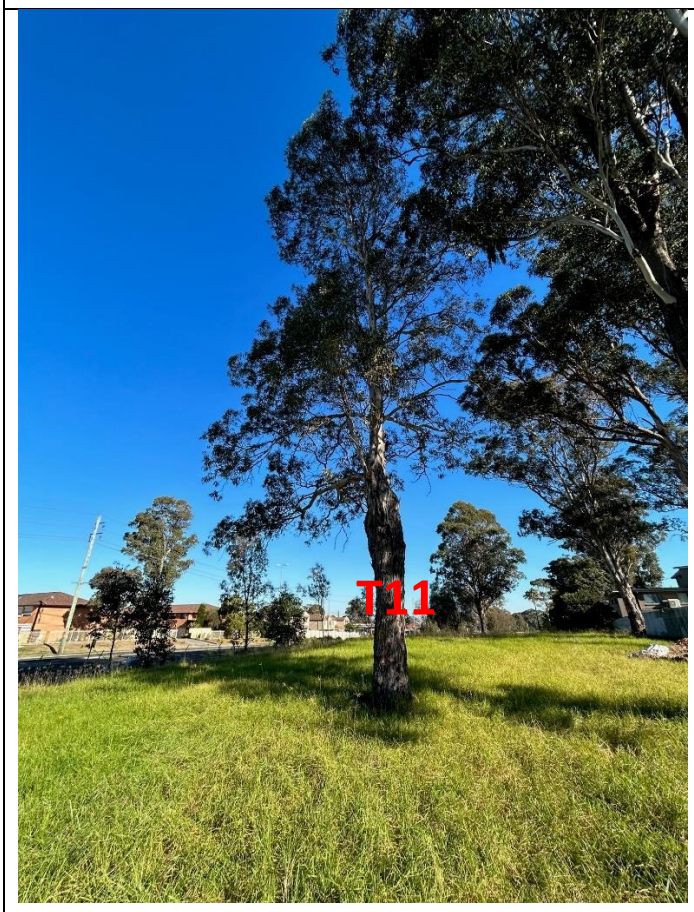
T8


T10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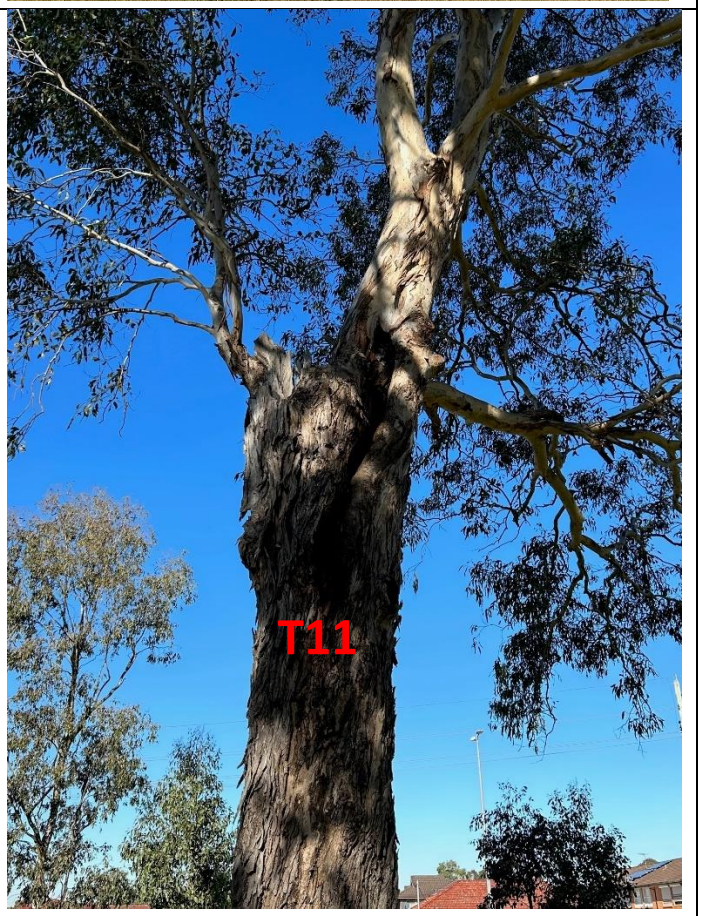
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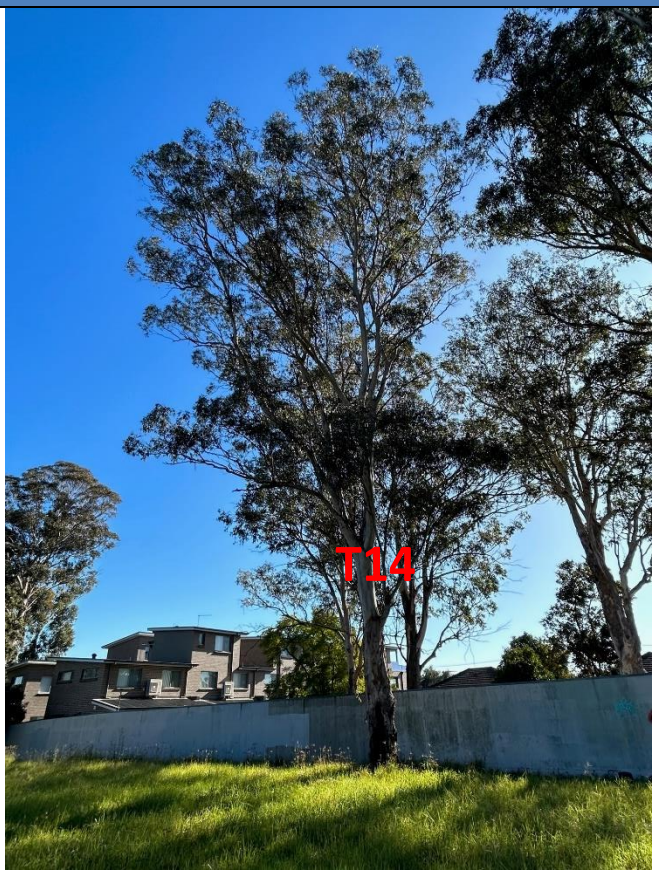
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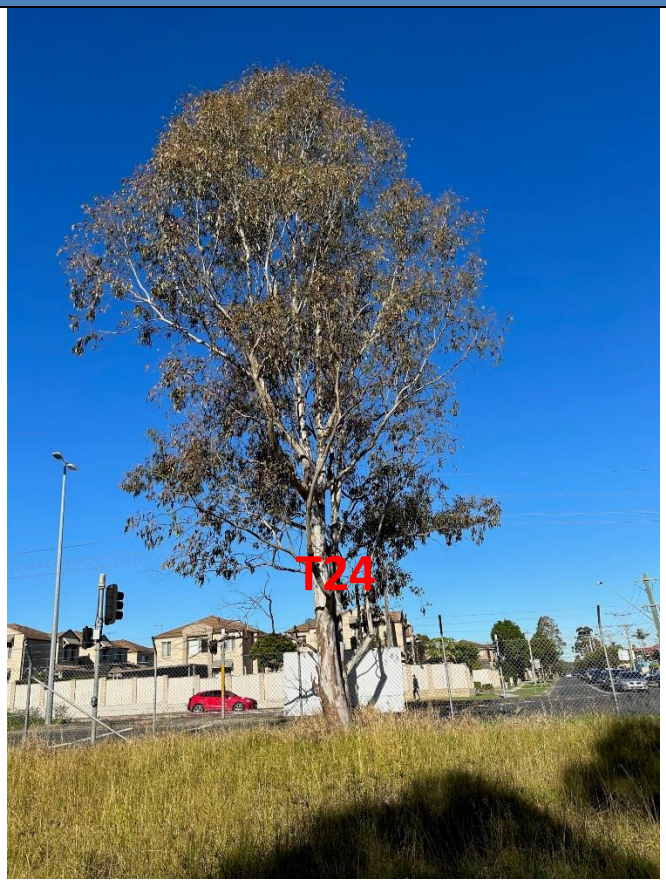
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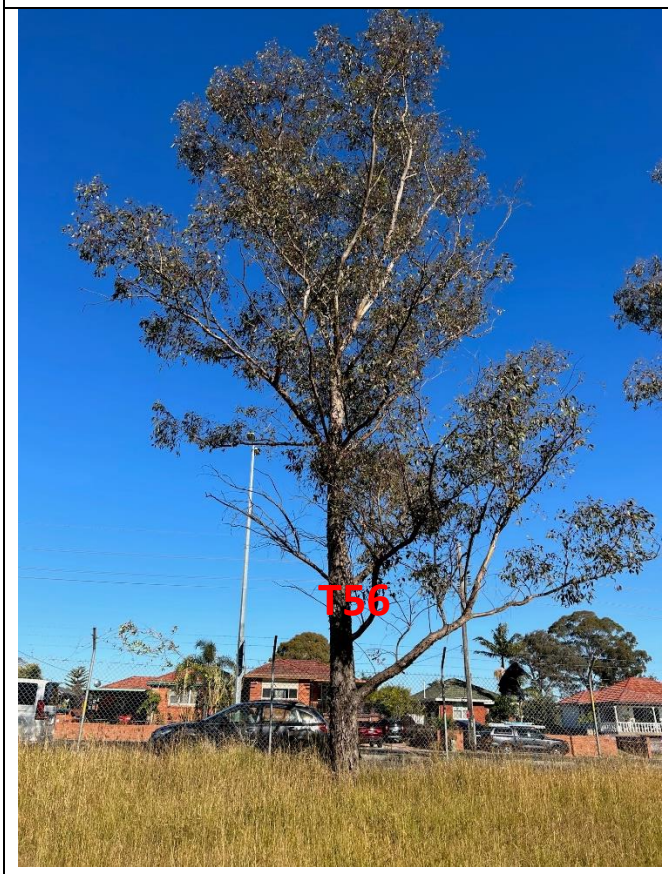

T56

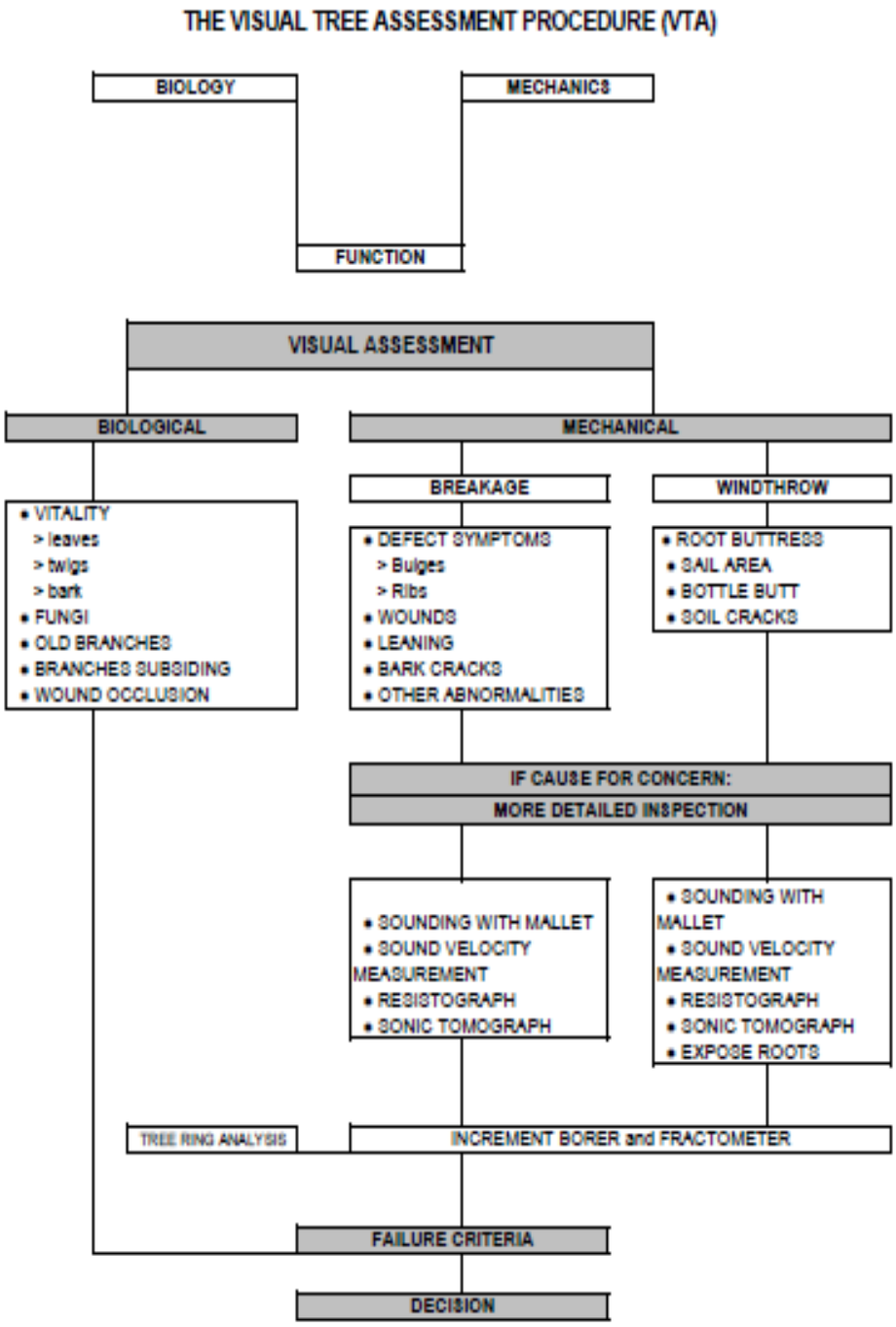

T56
T57
T58


T60
T59
RED SHIELD APPEAL
Google

Appendix C

Visual Tree Assessment (VTA)

Figure 5 Visual Tree Assessment (VTA) by Mattheck, Claus & Breloer, Helge (1994).



Ref: Mattheck, Claus & Breloer, Helge (1994)
The Body Language of Trees - A handbook for failure analysis - Sixth impression (2001)
The Stationery Office, London, U.K.
Fig 120 page 196

IACA Significance of a Tree

Figure 6 - IACA Significance of a Tree, Assessment Rating System (STARS)

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

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

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. An example of its use in an Arboricultural report is shown as Appendix A.

Tree Significance - Assessment Criteria

INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS

1. High Significance in landscape

- The tree is in good condition and good vigour;
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

2. Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

3. Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline

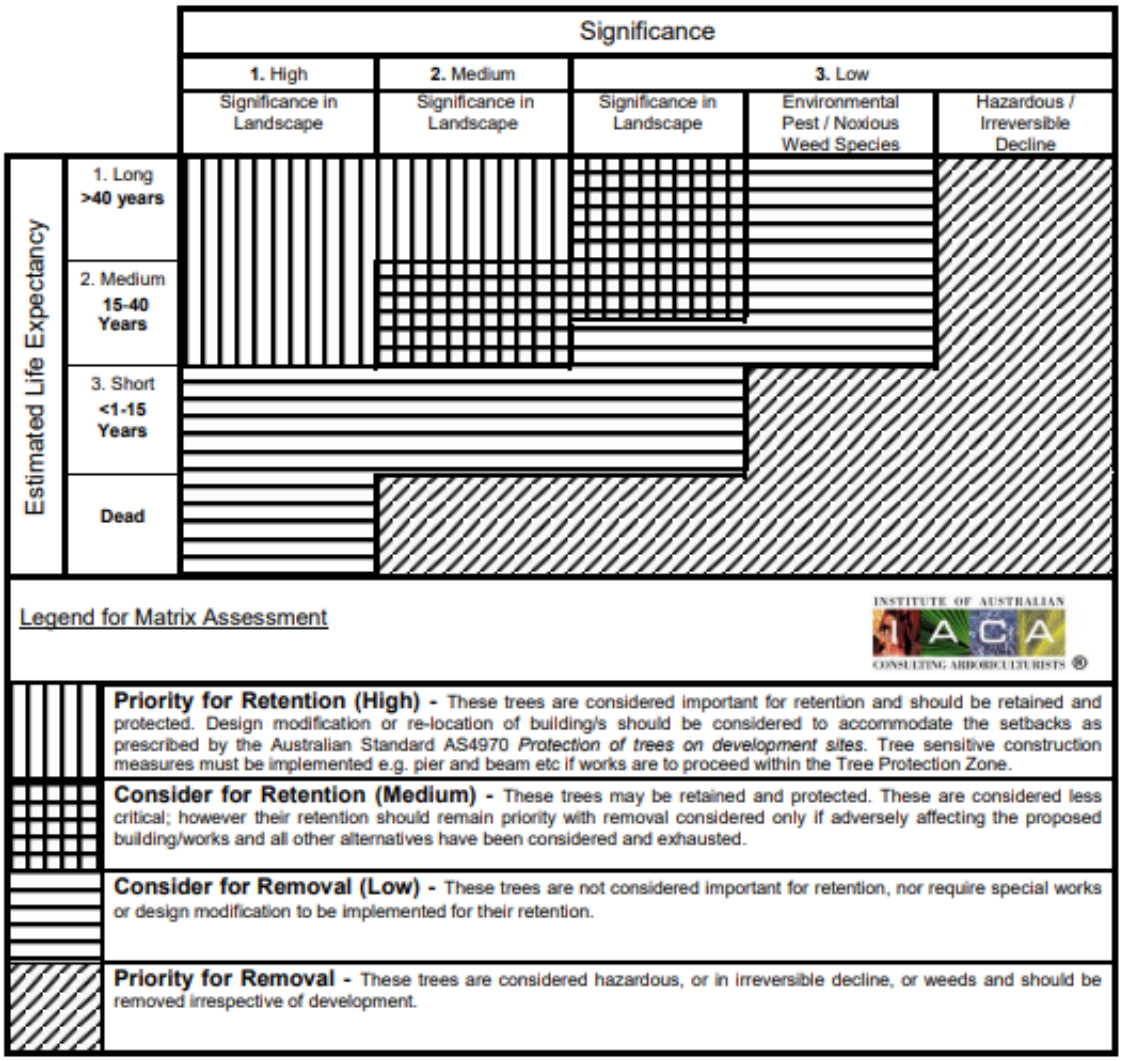
- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

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

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

Table 1.0 Tree Retention Value - Priority Matrix.



USE OF THIS DOCUMENT AND REFERENCING

The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows:

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

REFERENCES

Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia

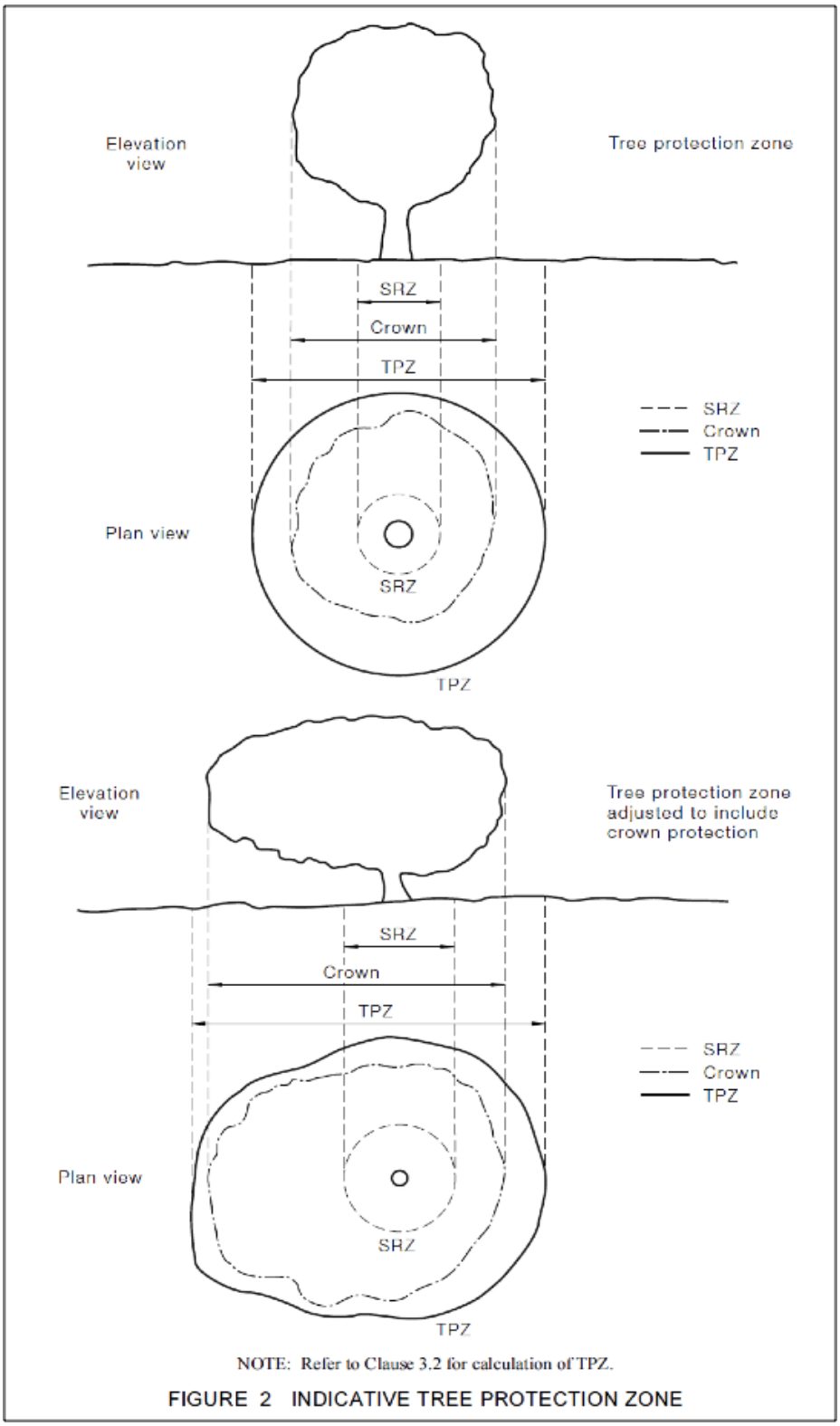
Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

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

AS4970 – 2009 Protection of trees on development sites.

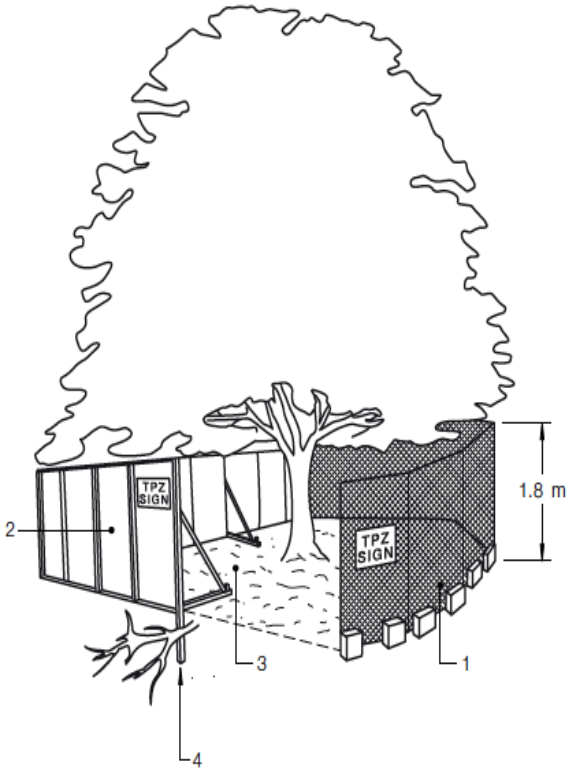
Figure 7 – TPZ & SRZ (Standards Australia, 2009



NOTE: Refer to Clause 3.2 for calculation of TPZ.

FIGURE 2 INDICATIVE TREE PROTECTION ZONE

Figure 8 Tree Protection Fencing (Standards Australia, 2009)

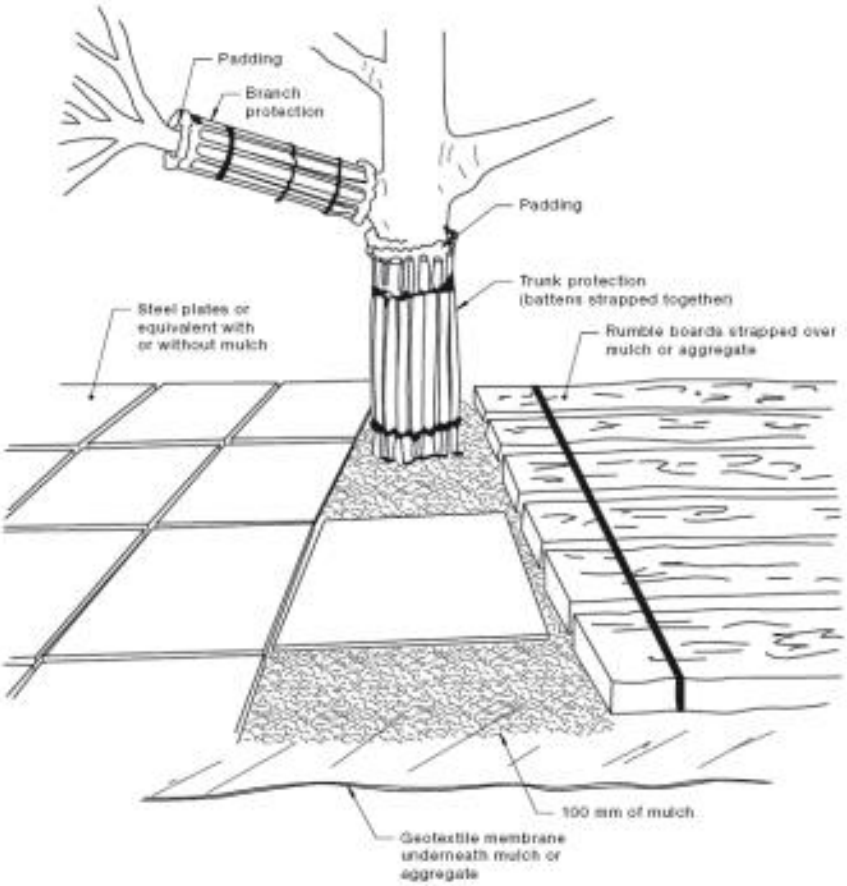


LEGEND:

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

Figure 9 - Example of Tree Protection Signage (Standards Australia, 2009)

Figure 10 - Trunk and Branch Protection (Standards Australia, 2009)



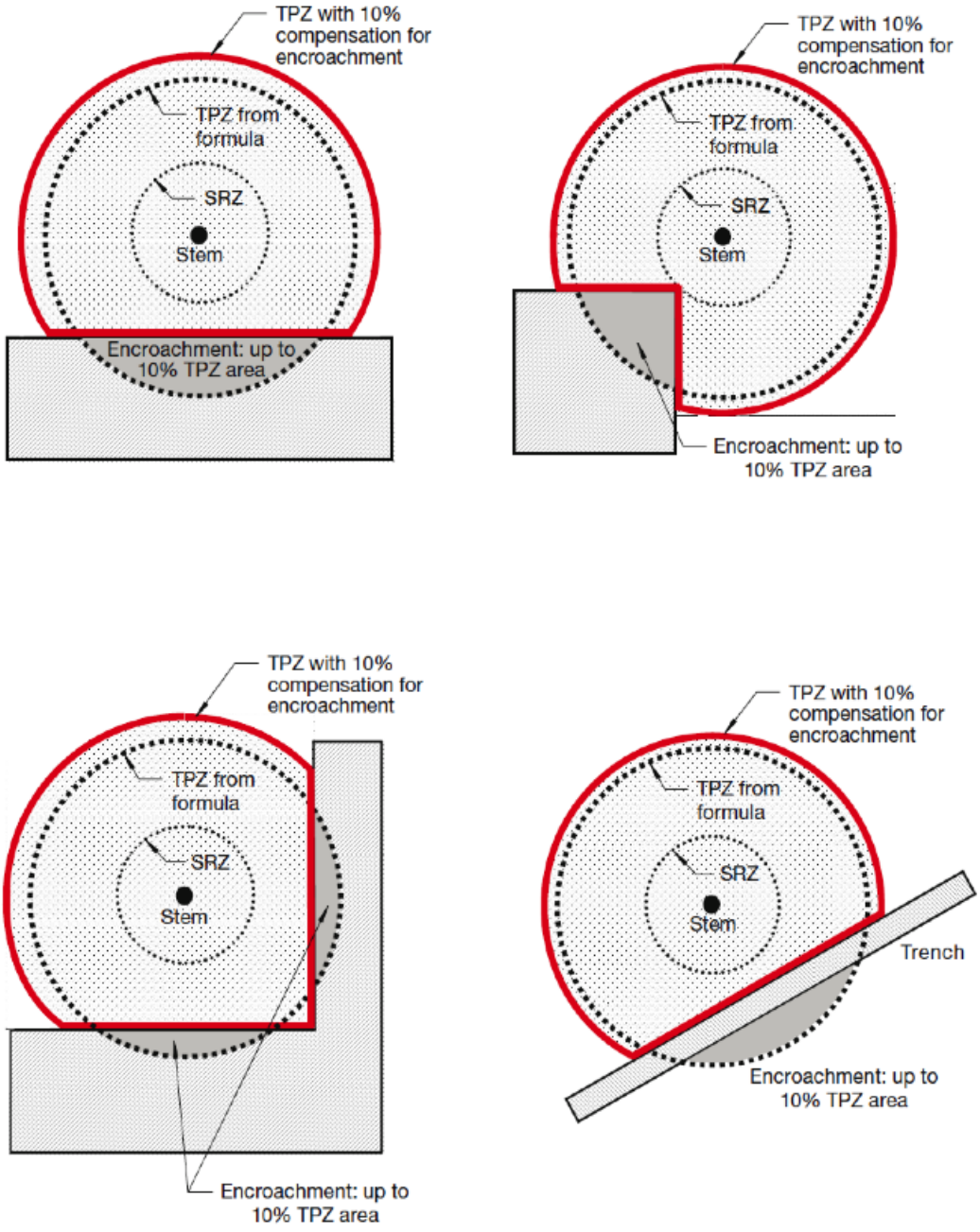
NOTES:

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 8 – TPZ & SRZ Encroachment (Standards Australia, 2009)

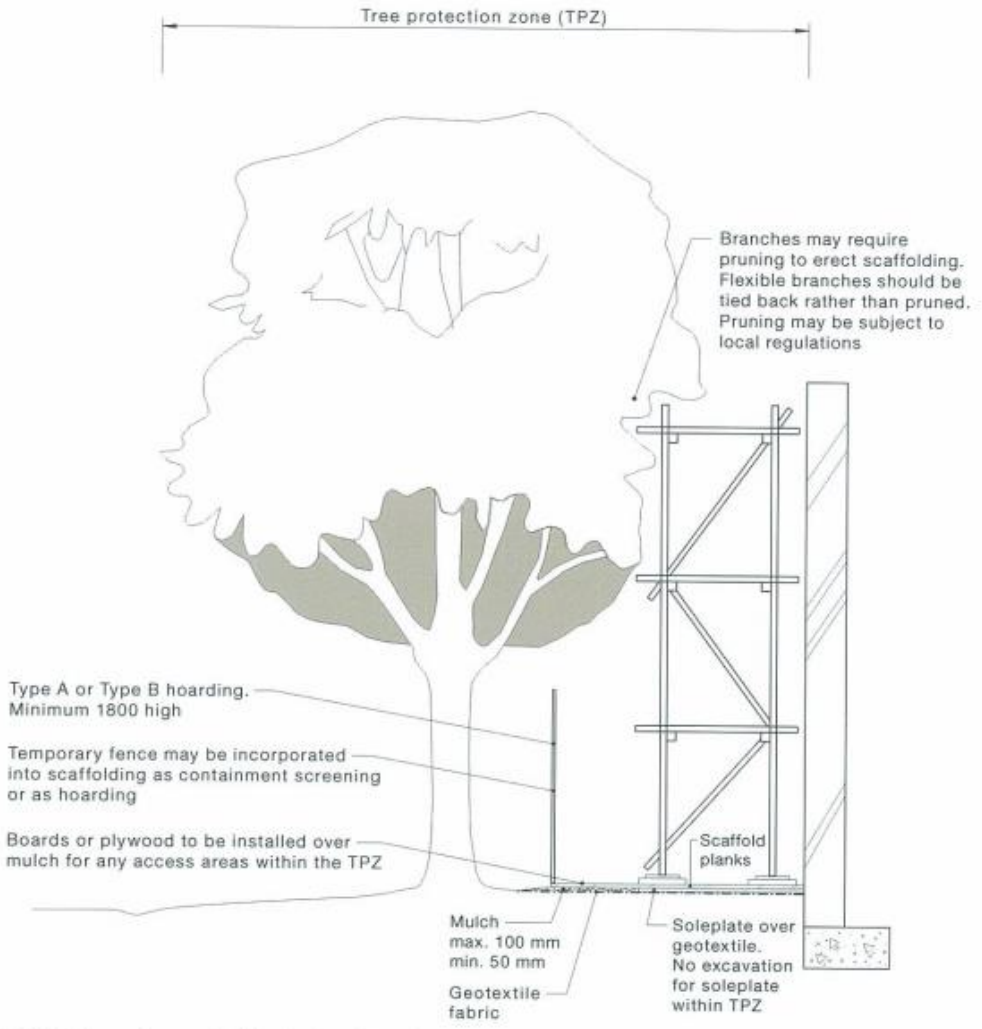
Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D1 provides examples of TPZ encroachment by area, to assist in reducing the impact of such incursions.



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

FIGURE D1 EXAMPLES OF MINOR ENCROACHMENT INTO TPZ

Figure 9 – Indicative scaffolding within a TPZ (Standards Australia, 2009)



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

Appendix D

Tree AZ Categories (Version 10.10 ANZ)

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

Z1	Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
Z2	Too close to a building, i.e. exempt from legal protection because of proximity, etc
Z3	Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe

Z4	Dead, dying, diseased or declining
Z5	Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
Z6	Instability, i.e. poor anchorage, increased exposure, etc

Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people

Z7	Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
Z8	Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

Z9	Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
Z10	Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
Z11	Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
Z12	Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

A1	No significant defects and could be retained with minimal remedial care
A2	Minor defects that could be addressed by remedial care and/or work to adjacent trees
A3	Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

TreeAZ is designed by Barrell Tree Consultancy (www.barrelltreecare.co.uk) and is reproduced with their permission

Appendix E

Tree Assessment & Impacts Evaluation Table Notes

Tree Assessment & Impacts Evaluation Table Notes					
H	Height of tree (estimated)				
S	Spread of tree (estimated)				
Age	Y = Young J = Juvenile M = Mature O = Over mature S = Senescent EM = Early Mature				
Condition	G = Good F = Fair P = Poor D = Dead				
TRESS AZ	Categorisation of trees with regards to development: Refer to Appendix – Tree AZ				
Retention Value	H = High M = Medium L = Low R = Removal Refer to Appendix – Significance of a Tree, Assessment Rating System (STARS)©				
DBH	Diameter at Breast Height (estimated circumference of a tree at approximately 1400mm)				
DAB	Diameter at Basal				
TPZ	Calculated area above and below the ground at a radial distance from centre of trunk. Exclusion zone for the protection of tree roots and crown to ensure tree viability.				
SRZ	Calculated area below ground at a radial distance from centre trunk of tree, required exclusively for tree stability.				
Impacts/Incursions	Calculated degree of incursion				
	Nil No impact	Low 0% - 15%	Moderate 15% - 25%	Significant 25%+	Total Loss Lost to proposal
Tree data/Impacts Summary	Arborist commentary on tree location, health, structure and relationship to development				

Disclaimer

This report has been compiled using knowledge & expertise relating to trees, and makes recommendations based on this. It should be noted that trees are affected by many elements, environmental and situational, some of which cannot be predicted or foreseen even by Qualified Arborists.

The client when reading this report should take the following factors into consideration;

❖ It is not feasible to assume that Arborists identify all hazards or risks associated with trees at the time of consultation or indeed in this report.

❖ This Assessment is valid for 3 months from the date stipulated on the report, and may need to be updated after this.

❖ Regular maintenance and monitoring by a Qualified Arborist will minimize the risks associated with tree and contribute to its longevity in its growing environment, however there is no guarantee that all risks are to be eliminated and that the tree is not privy to external factors that will impact on the tree after it has been assessed by our service.

❖ The report is compiled in good faith, where any information given to our service is correct and true, and where interested parties and /or stakeholders are notified. This includes title and ownership of property, orders as directed by relevant authorities, development application determinations and other matters that affect the tree/s in question.

❖ The Arborist shall not be required to give testimony or to attend court by reason of this report unless other arrangements are made prior.

❖ This Arborist Report does not issue permission for any recommendations made in this report, particularly where trees are to be removed. Permission must be sought and obtained from Council and owner/s of trees.

❖ Any treatments recommended by the Arborist cannot be guaranteed, due to the volatile environment in which trees are growing.

❖ Clients may choose to accept or disregard the recommendations of the Arborist, or to seek additional advice.

❖ This report is intended for the Recipient; no part of this report is to be copied or altered without the authors permission

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