Arboricultural Impact Assessment
and
Tree Protection Plan

Lizzie the Arborist

Site Address:	Dapto Leagues Club Cnr Station St & Bong Bong Rd Dapto NSW 2530
Client:	Integrated Projects Pty Ltd PO Box 122 Tanilba Bay NSW 2319
LGA:	Wollongong City Council
Report Date:	06.06.2024 V2
Inspection Date:	15.02.2024
Report REF#	202402-07
Assessor:	Elizabeth Cowan Consulting Arborist (Dip. Arb) T/A *Lizzie the Arborist* 0401 301 233 info@lizziethearborist.com.au ABN: 85 603 187 540

Integrated Projects Pty Ltd
Dapto Leagues Club
Cnr Station St & Bong Bong Rd
Dapto NSW 2530

06.06.2024

Our Reference #: 202402-07

RE: Arboricultural Impact Assessment for one hundred and nine (109) trees in proximity to proposed development works at Dapto Leagues Club.

Dear Integrated Projects Pty Ltd,

Enclosed is the Arboricultural Impact Assessment for 109 (one hundred and nine) trees in proximity to proposed development works at Dapto Leagues Club (Cnr Station St & Bong Bong Rd, Dapto NSW 2530). It has been recommended that Wollongong City Council condition a Project Arborist to supervise and guide tree protection and development works within the TPZ of trees to be retained. A breakdown of trees to be removed and retained are below:

Retention Value (STARS)	Remove for development works (Declared Trees)	Remove for development works (Exempt Trees)	Retain, Protect, and Integrate into the new landscaping plan
High	N/A	N/A	Seventeen (17) trees: #1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17
Medium	Sixteen (16) trees: # 25, 35, 38, 43, 44, 68, 72, 73, 74, 75, 80, 81, 82, 87, 93, and 109	Thirty-seven (37) trees: # 21, 22, 23, 24, 26, 27, 29, 30, 31, 32, 36, 37, 39, 40, 41, 69, 76, 78, 79, 83, 88, 89, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, and 108	Twenty-three (23) trees: # 33, 34, 45, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, and 71
Low	Three (3) trees: #18, 70, and 86	Thirteen (13) trees: # 19, 20, 28, 42, 46, 47, 48, 77, 84, 85, 90, 91, and 92	-
TOTALS	**Nineteen (19) trees**	**Fifty (50) trees**	**Forty (40) trees**

I appreciate the opportunity to be involved with your project and understand the importance of such assessments in the context of responsible and sustainable development within New South Wales. I am committed to providing you with the highest arboricultural expertise that works towards integration between trees and construction.

The use of this report is explicitly authorised under the conditions outlined in the accompanying Disclaimer and acknowledgment of Section 4: Limitations.

Please contact me with any questions on 0401 301 233 or info@lizziethearborist.com.au.

Yours sincerely

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Disclaimer

This report has been prepared per the scope of works agreed upon by Lizzie the Arborist and the client. This report is valid only from the date of publication documented on the cover page and in the footer of each page. This report supersedes any prior revisions pertaining to the subject site. This report becomes void should unauthorised amendments, new information, project revisions, events, or the like occur or become available after the date of this report's publication. It is assumed that any property/project does not violate any application codes, ordinances, statutes, or any other government regulations.

Lizzie the Arborist is suitably experienced and competent in arboriculture to perform the tasks required by *AS4970-2009 Protection of trees on development sites*. All care has been taken to ensure that the information collated and reported in this report has been obtained from reliable sources. Discussions and recommendations in this report are based on the observations of the trees examined during the inspection and within the specified conditions. Any sketches, diagrams, maps, or the like are intended as visual aids, are not necessarily in scale, and should not be constructed as engineering surveys.

Any statement, declaration, opinion or advice that is stated or indicated in this report is made in good faith but on the condition that Lizzie the Arborist is not liable (whether by negligence, lack of care or otherwise) to any person for any damage, injury, or loss which has occurred or may occur in relation to the interpretation of the information in this report. Lizzie the Arborist shall not be required to give testimony or attend court by reason of this report unless subsequential contractual arrangements are made, including payment of an additional fee for such services.

A living tree's response to its environment constantly changes throughout its life cycle. It is influenced by many external factors, such as extreme climatic events and conditions, that are impossible to predict. While a visual tree assessment (VTA) can identify the external symptoms and defects of tree parts, it cannot guarantee that a tree is immune to failure due to unforeseen circumstances, and Lizzie the Arborist shall not be held liable for any damage, injury, or loss caused by unforeseen circumstances. This report cannot definitively recommend anything about parts of a tree's root system not exposed to visual inspection. Furthermore, it is not possible to assume that a tree will always be safe under all conditions in the future. No warranty is given to recommendations, expressed or implied, that the issues may not arise again.

The clients are responsible for obtaining the required permits for tree works, managing ongoing inspections, and managing the ongoing maintenance of the trees included in this report.

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Contents

1. Introduction

1.1 Lizzie the Arborist was commissioned by Integrated Projects Pty Ltd (the client) to produce this Arboricultural Impact Assessment for one hundred and nine (109) trees at Dapto Leagues Club. A Visual Tree Assessment (VTA) was conducted on Thursday, 15th February 2024, by Elizabeth Cowan, AQF Level 5 Consulting Arborist.

1.2 The client intends to submit a Development Application with Wollongong City Council to alter and add to the existing building, including a multilevel car park. The works proposed include removing trees planted within garden beds. Wollongong City Council requested this Arboricultural Impact Assessment as a result of a pre-DA meeting.

1.3 The purpose of this report is to document trees on the site and within 15 metres of any adjacent properties that may be impacted by the proposed development works. Where possible, recommendations have been provided to integrate suitable trees and development using the guidelines and practices published within *AS4970-2009 Protection of trees on development sites.*

1.4 A *Tree Schedule* is provided in Section 8 that documents all tree data collected during the site inspection used to create this report. This table includes botanical and common names, location, protection status, dimensions inclusive of height, crown spread, trunk diameter at breast height (DBH), trunk diameter at base (DAB), the calculated Tree Protection Zone (TPZ), the calculated Structural Root Zone (SRZ), age class, tree health, tree structure, and tree defects observed.

2. Legislation and Documents Referenced

2.1 The following documents have been supplied to Lizzie the Arborist, to produce this report. These are all Issue 1, dated 04.06.2024, and by Altis Architecture.

- DA0000 COVER PAGE
- DA0001 SITE PLAN
- DA0002 SITE ANALYSIS
- DA0003 SHADOW DIAGRAM - SUMMER SOLSTICE
- DA0004 SHADOW DIAGRAM - WINTER SOLSTICE
- DA1000 EXISTING DEMOLITION BASEMENT PLAN - ZONE A
- DA1001 EXISTING DEMOLITION GROUND FLOOR PLAN - ZONE A
- DA1002 EXISTING DEMOLITION GROUND FLOOR PLAN - ZONE B
- DA1003 EXISTING DEMOLITION LEVEL 1 PLAN - ZONE A
- DA1004 EXISTING DEMOLITION LEVEL 2 PLAN (PLANT ROOM) - ZONE A
- DA1005 EXISTING DEMOLITION ROOF PLAN - ZONE A
- DA1100 BASEMENT PLAN - ZONE A
- DA1101 GROUND FLOOR PLAN - ZONE A
- DA1102 GROUND FLOOR PLAN - ZONE B
- DA1103 LEVEL 1 PLAN - ZONE A
- DA1104 LEVEL 1 PLAN - ZONE B
- DA1105 LEVEL 2 PLAN (PLANT ROOM) - ZONE A
- DA1106 ROOF PLAN - ZONE A
- DA2100 PROPOSED OVERALL ELEVATIONS
- DA2101 PROPOSED ELEVATIONS - ZONE A
- DA2102 PROPOSED ELEVATIONS - ZONE A
- DA2103 PROPOSED ELEVATIONS - ZONE B
- DA3000 PROPOSED SECTIONS - ZONE A
- DA3001 PROPOSED SECTIONS - ZONE A
- DA3002 PROPOSED SECTIONS - ZONE B
- DA9001 3D VIEWS
- DA9002 SITE PLAN - WAYFINDING PLAN

2.2 The following legislative documents pertain to the protection of trees on the subject site:

- AS4373-2007 Pruning of amenity trees
- AS4970-2009 Protection of trees on development sites
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- Wollongong Development Control Plan (DCP) - *Chapter E17: Preservation and Management of Trees and Vegetation*
- Wollongong Local Environmental Plan 2009 (2010 EPI 76)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021
- State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017
- Threatened Species Conservation Act 1995

3. Scope

3.1 This report aims to document trees on the subject site and surrounding sites that the proposed development works may impact. This report is intended to assist Wollongong City Council in determining arboricultural-related decisions, including any recommendations for the protection of trees suitable to be retained and the removal and replacement of suitable trees per the legislation listed in Section 2.

4. Limitations

4.1 This report is not intended to be a comprehensive Tree Hazard Report, and the site assessment did not include penetrative/internal tree part testing, diagnostic testing, tree aerial assessment, soil testing, root mapping, or underground tree part assessment.

4.2 Only what was accessible at the time of the site inspection was assessed. Therefore, assessment of tree health and structure was limited to the observations from ground level on the external parts of each tree. Where trees on adjoining sites have been assessed, all dimensions have been estimated unless otherwise specified.

4.3 Plans detailing elevations, detailed cut/fill, stormwater, or any other above/below ground service locations were not provided to Lizzie the Arborist to prepare this report.

5. Method

5.1 Tree Data Collection

5.1.1 Elizabeth Cowan (AQF Level 5 Arborist) conducted a Level 1 **V**isual **T**ree **A**ssessment (VTA) from ground level on Thursday, 15th February 2024. Tree locations were geo-located using a Garmin eTrex 22X handheld data collector, and tree data was collected with written notes. Each tree was allocated an individual identification number that was tagged each trunk with a plant tag. Council and neighbouring trees were not tagged. The data collected included:

- Tree species
- Tree location
- Approximate height (m)
- Approximate crown spread (m)
- Diameter at Breast Height (mm) (DBH)
- Diameter at Base (mm) (DAB)
- Tree age class
- Tree health and vigour
- Tree structure
- Tree defects
- Estimated Life Expectancy (ELE)
- Tree Significance & Retention value (STARS)

5.1.2 The VTA method is based on observing trees' biological and mechanical characteristics and is designed to detect and diagnose defects and weaknesses in tree structure. The VTA method is a step-by-step process for observing and interpreting the signs and symptoms of tree defects. It includes various diagnostic tools and techniques, such as using sonic and

resistance measurements to detect decay. More information on VTA is available in Appendix 2.

5.1.3 Diameter at Breast Height (DBH) was measured at 1.4m from ground level, and Diameter at Base (DAB) was measured over bark at ground level, using diameter tape where access permitted. Heights and crown spreads referenced are approximations unless otherwise stated. Where access was limited to tree trunks, DBH and DAB have been estimated.

5.1.4 Any photographs within this report were taken by Elizabeth Cowan using an iPhone 15 Pro on the Timestamp Capture app. Photographs may have been altered to adjust brightness and clarity only. Other images within this report have been sourced online and referenced.

5.2 Calculating Tree Protection Zones (TPZ) and Structural Root Zones (SRZ)

5.2.1 AS4970-2009 defines the TPZ as 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. It is calculated by multiplying the DBH by 12.

5.2.2 AS4970-2009 defines the SRZ as the area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area. It is calculated with the following formula: (DABx50) 0.42 x 0.64.

5.2.3 Each subject tree's calculated TPZ and SRZ have been drawn onto the provided site plan in the specified scale using QGIS. The TPZ of palms, other monocots, cycads and tree ferns were calculated at 1m outside their crown projection per the guidance of AS4970-2009.

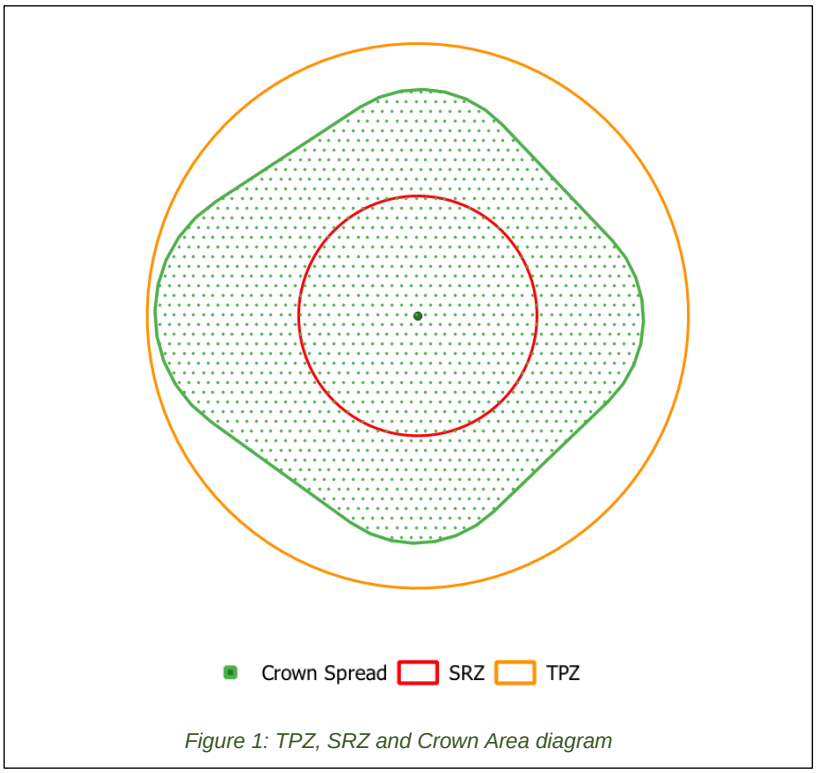


Figure 1: TPZ, SRZ and Crown Area diagram

5.3 Tree Retention Values

5.3.1 A high, medium, or low retention value rating has been allocated to each subject tree using the Institute of Australian Consulting Arborists' (IACA) Significance of a Tree Assessment Rating System (STARS). 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 and Andrew Morton in June 2001. The full method is listed in Appendix 2.

Priority for Retention (High)	These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree-sensitive construction measures must be implemented, e.g. pier and beam, etc, if works are to proceed within the Tree Protection Zone.
Consider for Retention (Medium)	These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
Consider for Removal (Low)	These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
Priority for Removal	These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

5.4 Tree Vigour and Structure

5.4.1 The vigour and structure of each subject tree have been classified as Very Good, Good, Fair, or Poor per the below classifications. Observations have been listed within the Notes column of the Tree Data Table.

CLASSIFICATION	VIGOUR	STRUCTURE
Very Good	Form typical of species, normal foliage size, colour and density, no pests or disease, no deadwood or epicormic shoots.	Good structural integrity, no evidence of instability, no defects or damage
Good	Form typical of species, normal foliage size, colour and density, no pests or disease, little deadwood and epicormic shoots.	Good structural integrity, minor structural defects that can be remedied
Fair	Form typical of species, fair health and vigour, may be slightly thinning/sparse, moderate levels of deadwood and epicormic shoots, low to moderate pest and disease.	Fair structural integrity, minor-moderate defects that can be remedied or managed
Poor	Abnormal foliage size, colour and density, major levels of deadwood and epicormic shoots, moderate to severe pest infestation	Poor structural integrity, major structural defects that cannot be remedied

6. The Subject Site

6.1 Site Description

6.1.1 The subject site is located within the Wollongong City Council LGA and is zoned E1: Local Centre (NSW Planning Portal Spatial Viewer 2024). The controls within the Wollongong Development Control Plan (DCP) - Chapter E17: *Preservation and Management of Trees and Vegetation* applies to any future tree work on the site. The site is actively occupied by patrons of the Dapto Leagues Club. The site has no adjoining properties. The aerial image below represents the site in its local environment and indicates the site's boundaries:

Image 1: Dapto Leagues Club (Cnr Station St &, Bong Bong Road, Dapto NSW 2530) local context (Sixmaps 2024)

6.2 Soil landscape

6.2.1 The site is located on the Fairy Meadow soil landscape, which occurs along a discontinuous distribution on the Wollongong Plain extending from Austimer to Lake Illawarra.

6.2.2 The natural soils are moderately deep (<100 cm) well-drained earthy sands. The soils found on site where predominantely within constructed garden beds. Garden beds within the site were found to have top-soil properties and an irrigation system connected—garden beds along the boundary of the site were adequately mulched and irrigated. Soils on the council strip appeared characteristic of the expected natural soils and were dry and slightly dehydrated.

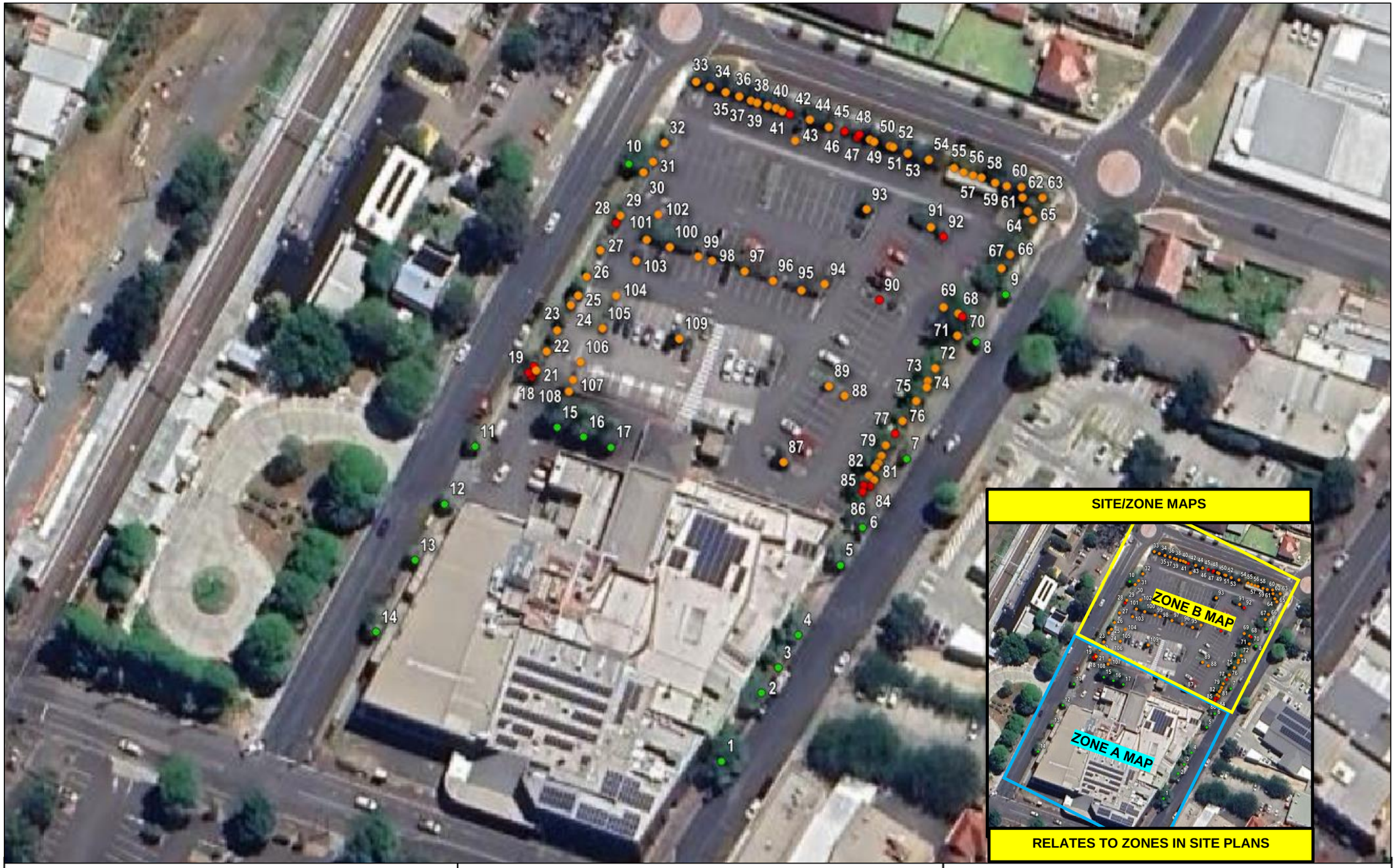
6.3 Site vegetation

6.3.1 The Fairy Meadow soil profile almost completely cleared of native vegetation except for some isolated stands of low open-forest (dry sclerophyll forest) and woodland. No remnant trees or vegetation were found during the site inspection.

6.4 Legislative Requirements for Tree Works

6.4.1 The approval of Development Applications including tree pruning, tree removal, and root pruning, is determined by Wollongong City Council against the requirements of the Wollongong Development Control Plan (DCP) and the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017. At the time of this report, future tree works are not controlled by any additional local or state planning instruments.

7. Tree Location Maps



Legend
- High Retention Value Tree
- Medium Retention Value Tree
- Low Retention Value Tree

TREE LOCATION MAP

WHOLE SITE - Dapto Leagues Club
LGA: Wollongong City Council
Surveyed: 15.02.2024
Drawn: 16.02.2024

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Legend

- High Retention Value Tree
- Medium Retention Value Tree
- Low Retention Value Tree

TREE LOCATION MAP

ZONE A - Dapto Leagues Club
LGA: Wollongong City Council
Surveyed: 15.02.2024
Drawn: 16.02.2024

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Legend

- High Retention Value Tree
- Medium Retention Value Tree
- Low Retention Value Tree

TREE LOCATION MAP

ZONE B - Dapto Leagues Club
LGA: Wollongong City Council
Surveyed: 15.02.2024
Drawn: 16.02.2024

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8. Tree Schedule

Tree #	*Botanical Name*	*Location Notes*	Protection Status	Species Origin	Height (m)	Ave. Spread (m)	DBH (mm)	DAB (mm)	TPZ Radius (m)	SRZ Radius (m)	Age Class	Vigour	Structure	Estimated Life Expectancy (ELE)	Significance Value (STARS)	Retention Value (STARS)	Arborist Notes
1	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	8	9	710	1000	8.52	3.31	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, buttress base, crown overhanging building, crown height starts at 2m above ground level. Multi-stemmed 380+600 (mm).
2	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	6	510	500	6.12	2.47	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, exposed roots, crown encroaching on building, crown height starts at 2m above ground level. Multi-stemmed 320+320+230 (mm).
3	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	5	490	540	5.88	2.55	M	G	F-G	Medium	High	**High**	Codominant stems from 1 m, Pruned for powerline clearance, crown encroaching on building, exposed roots, crown starts at 2m above ground level, Multistemmed 320+230+200 (mm).
4	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	5	480	800	5.76	3.01	M	G	F-G	Medium	High	**High**	Multistemmed from 800mm, Pruned for powerline clearance, crown encroaching on building, exposed roots, crown starts at 1m above ground level.
5	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	6	480	400	5.76	2.25	M	G	F-G	Medium	High	**High**	Multistemmed from 800mm, Pruned for powerline clearance, crown encroaching on building, crown starts at 1.5m above ground level. Multi-stemmed 230+230+350 (mm).
6	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	6	500	640	6.00	2.74	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, crown starts at 1.5m above ground level.
7	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	3	520	520	6.24	2.51	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, crown starts at 1.5m above ground level.
8	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	4	2	430	370	5.16	2.18	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, crown starts at 1.5m above ground level.
9	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	4	2	430	370	5.16	2.18	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, crown starts at 1.5m above ground level.
10	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	4	6	510	550	6.12	2.57	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, crown starts at 2m, exposed roots
11	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	4	390	750	4.68	2.93	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, epicormic shoots growing into powerlines, crown starts at 2m above ground level., exposed roots
12	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	5	350	440	4.20	2.34	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, epicormic shoots growing into powerlines, crown starts at 2m above ground level., exposed roots
13	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	5	6	750	720	9.00	2.88	M	G	F-G	Medium	High	**High**	Pruned for powerline clearance, crown starts at 2m above ground level., exposed roots
14	*Lophostemon confertus* (Brushbox)	Street Tree	Declared Tree	Native	6	6	330	580	3.96	2.63	M	G	F-G	Medium	High	**High**	Pruned v powerline clearance, crown starts at 2m above ground level., exposed roots
15	*Phoenix canariensis* (Canary Island Date Palm)	Ramp Garden Bed	Exempt Species	Exotic	10	4	580	730	6.96	2.90	M	G	G	Medium	High	**High**	No visual defects sited

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16	*Phoenix canariensis* (Canary Island Date Palm)	Ramp Garden Bed	Exempt Species	Exotic	10	4	620	830	7.44	3.06	M	G	G	Medium	High	High	No visual defects sited
17	*Phoenix canariensis* (Canary Island Date Palm)	Ramp Garden Bed	Exempt Species	Exotic	10	4	580	700	6.96	2.85	M	G	G	Medium	High	High	No visual defects sited
18	*Callistemon viminalis* (Weeping Bottlebrush)	West Boundary	Declared Tree	Native	6	4	140	300	2.00	2.00	OM	F	F	Short	Medium	Low	In a state of decline, root competition. Multistemmed 70+60+80+60 (mm).
19	*Ligustrum lucidum* (Broad-Leaf Privet)	West Boundary	Exempt Species	Exotic	6	4	200	250	2.40	1.85	M	G	F	Long	Low	REMOVE	Noxious weed
20	*Ulmus parvifolia* (Chinese Elm)	West Boundary	Exempt - Small Dimensions	Exotic	2	2	100	120	2.00	1.50	SM	G	F	Long	Low	Low	Poor development, supressed by privet
21	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	2	2	100	120	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
22	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	2.5	2	200	220	2.40	1.75	SM	G	G	Medium	Medium	Medium	No visual defects sited
23	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	3	3	140	140	2.00	1.50	SM	G	G	Medium	Medium	Medium	Ground cover vegetation encroaching on trunk, multi-stemmed 70x4
24	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	2	1	100	140	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
25	*Tristaniopsis laurina* (Water Gum)	West Boundary	Declared Tree	Illawarra Native	6	4	320	250	3.84	1.85	SM	G	G	Long	Medium	Medium	Multi-stemmed 130x6 (mm), epicormic shoots
26	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	2	2	100	140	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
27	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	2	2	100	140	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
28	*Acer negundo* (Box Elder)	West Boundary	Exempt Species	Exotic	2	1	100	140	2.00	1.50	IM	G	G	Long	Low	REMOVE	No visual defects sited, sapling
29	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	1	1	100	80	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
30	*Cinnamomum camphora* (Camphor Laurel)	West Boundary	Exempt - Species	Exotic	2	3	80	100	2.00	1.50	SM	G	G	Medium	Medium	REMOVE	Exposed roots
31	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	100	150	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
32	*Tristaniopsis laurina* (Water Gum)	West Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	100	150	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
33	*Grevillea banksii* (Banks' grevillea)	North Boundary	Exempt - Small Dimensions *	Native	4	4	180	200	2.16	1.68	M	G	F	Medium	Medium	Medium	No visual defects sited
34	*Callistemon viminalis* (Weeping Bottlebrush) x 3	North Boundary	Declared Tree	Native	5	2	220	200	2.64	1.68	M	G	G	Medium	Medium	Medium	No visual defects sited
35	*Elaeocarpus reticulatus* (Blue Berry Ash)	North Boundary	Declared Tree	Illawarra Native	6	2	150	180	2.00	1.61	M	G	G	Medium	Medium	Medium	Exposed roots
36	Callistemon viminalis (Weeping Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	4	4	250	280	3.00	1.94	SM	G	G	Medium	Medium	Medium	Failed branches (mechanical damage)
37	*Syzygium smithii* (Common Lilly Pilly)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	4	3	80	180	2.00	1.61	SM	G	G	Medium	Medium	Medium	No visual defects sited
38	*Elaeocarpus reticulatus* (Blue Berry Ash)	North Boundary	Declared Tree	Illawarra Native	6	2	150	180	2.00	1.61	M	G	G	Medium	Medium	Medium	No visual defects sited
39	*Melaleuca linariifolia* (Snow-in-Summer)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	120	150	2.00	1.50	SM	G	F	Medium	Medium	Medium	Suppressed
40	Callistemon viminalis (Weeping Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	4	4	250	280	3.00	1.94	SM	G	F	Medium	Medium	Medium	Thinning crown, necrotic foliage
41	Callistemon viminalis (Weeping Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	3	1	100	120	2.00	1.50	SM	G	F	Medium	Medium	Medium	Suppressed form
42	*Acer negundo* (Box Elder)	North Boundary	Exempt Species	Exotic	7	3	150	200	2.00	1.68	SM	G	F	Medium	Low	REMOVE	No visual defects sited
43	*Elaeocarpus reticulatus* (Blue Berry Ash)	North Boundary	Declared Tree	Illawarra Native	5	2	80	100	2.00	1.50	SM	F	F	Medium	Medium	Medium	Mechanical damage to trunk at 800mm
44	Callistemon viminalis (Weeping Bottlebrush)	North Boundary	Declared Tree	Native	5	4	200	320	2.40	2.05	M	G	G	Medium	Medium	Medium	No visual defects sited

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45	*Elaeocarpus reticulatus* (Blue Berry Ash)	North Boundary	Declared Tree	Illawarra Native	6	4	120	140	2.00	1.50	M	G	G	Medium	Medium	Medium	No visual defects sited
46	*Melaleuca rugulosa* (Scarlet Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	2	2	80	100	2.00	1.50	OM	P	P-F	Short	Low	REMOVE	Dead/dying
47	*Melaleuca rugulosa* (Scarlet Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	2	2	80	100	2.00	1.50	M	F	F	Short	Low	REMOVE	Necrotic foliage
48	*Melaleuca rugulosa* (Scarlet Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	2	2	80	100	2.00	1.50	M	F	F	Short	Low	REMOVE	Necrotic foliage
49	*Elaeocarpus reticulatus* (Blue Berry Ash)	North Boundary	Declared Tree	Illawarra Native	7	2	120	180	2.00	1.61	M	G	G	Medium	Medium	Medium	No visual defects sited
50	*Melaleuca linariifolia* (Snow-in-Summer)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	120	150	2.00	1.50	SM	G	F	Medium	Medium	Medium	Suppressed form
51	Callistemon viminalis (Weeping Bottlebrush) x 2	North Boundary	Declared Tree	Native	5	3	200	320	2.40	2.05	M	G	G	Medium	Medium	Medium	No visual defects sited
52	*Melaleuca linariifolia* (Snow-in-Summer)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	150	200	2.00	1.68	SM	G	F	Medium	Medium	Medium	Suppressed form
53	*Elaeocarpus reticulatus* (Blue Berry Ash)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	4	2	90	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
54	Callistemon viminalis (Weeping Bottlebrush) x 4	North Boundary	Exempt - Small Dimensions *	Native	4	3	200	250	2.40	1.85	SM	G	G	Medium	Medium	Medium	No visual defects sited
55	Callistemon viminalis (Weeping Bottlebrush)	North Boundary	Exempt - Small Dimensions *	Native	3	3	200	250	2.40	1.85	SM	G	G	Medium	Medium	Medium	No visual defects sited
56	*Tristaniopsis laurina* (Water Gum)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	4	3	180	200	2.16	1.68	SM	G	G	Medium	Medium	Medium	No visual defects sited
57	*Melaleuca linariifolia* (Snow-in-Summer) *x 3*	North Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	120	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
58	*Grevillea banksii* (Banks' grevillea) x 2	North Boundary	Exempt - Small Dimensions *	Native	3	3	120	150	2.00	1.50	M	G	G	Medium	Medium	Medium	No visual defects sited
59	*Tristaniopsis laurina* (Water Gum)	North Boundary	Declared Tree	Illawarra Native	7	6	260	300	3.12	2.00	M	G	G	Medium	Medium	Medium	No visual defects sited
60	*Grevillea banksii* (Banks' grevillea) x 2	North Boundary	Exempt - Small Dimensions *	Native	3	3	80	120	2.00	1.50	M	G	G	Medium	Medium	Medium	No visual defects sited
61	*Melaleuca linariifolia* (Snow-in-Summer) *x 3*	North Boundary	Exempt - Small Dimensions *	Illawarra Native	3	2	80	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
62	*Tristaniopsis laurina* (Water Gum)	North Boundary	Declared Tree	Illawarra Native	7	5	190	230	2.28	1.79	M	G	G	Medium	Medium	Medium	No visual defects sited
63	*Tristaniopsis laurina* (Water Gum)	North Boundary	Exempt - Small Dimensions *	Illawarra Native	2	1	80	110	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
64	*Melaleuca linariifolia* (Snow-in-Summer)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	2	1	80	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
65	*Melaleuca linariifolia* (Snow-in-Summer)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	2	2	80	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	No visual defects sited
66	*Grevillea banksii* (Banks' grevillea) x 7	East Boundary	Exempt - Small Dimensions *	Native	3	2	100	200	2.00	1.68	M	G	G	Medium	Medium	Medium	No visual defects sited
67	*Tristaniopsis laurina* (Water Gum)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	3.5	2	100	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	Suppressed form
68	*Platanus × acerifolia* (London Plane)	East Boundary	Declared Tree	Exotic	8	6	350	400	4.20	2.25	M	G	G	Medium	Medium	Medium	No visual defects sited
69	*Tristaniopsis laurina* (Water Gum)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	2	1	50	80	2.00	1.50	SM	G	G	Medium	Medium	Medium	Suppressed form
70	*Eucalyptus sp.*	East Boundary	Declared Tree	Native	12	6	400	500	4.80	2.47	OM	P	F	Short	Low	REMOVE	deadwood >10cm diameter, dieback, cankers on branches, failed branches, unevenly weighted crown
71	*Lophostemon confertus* (Brushbox)	East Boundary	Exempt - Small Dimensions *	Native	4	1	80	100	2.00	1.50	SM	G	G	Medium	Medium	Medium	Suppressed form
72	*Syzygium smithii* (Common Lilly Pilly)	East Boundary	Declared Tree	Illawarra Native	5	4	270	290	3.24	1.97	M	F	G	Medium	Medium	Medium	Leaf galls, multi-stemmed 170+150+140 (mm)
73	*Syzygium smithii* (Common Lilly Pilly)	East Boundary	Declared Tree	Illawarra Native	5	4	270	290	3.24	1.97	M	F	G	Medium	Medium	Medium	Leaf galls, multi-stemmed 170+150+140 (mm)

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74	*Lophostemon confertus* (Brushbox)	East Boundary	Declared Tree	Native	9	5	240	290	2.88	1.97	SM	G	G	Medium	Medium	**Medium**	Suppressed form
75	*Syzygium smithii* (Common Lilly Pilly)	East Boundary	Declared Tree	Illawarra Native	6	4	270	300	3.24	2.00	M	F	F	Medium	Medium	**Medium**	Leaf galls, included bark union, multi-stemmed 180+180+100
76	*Glochidion ferdinandi* (Cheese Tree)	East Boundary	Exempt - Small Dimensions	Illawarra Native	4	3	110	130	2.00	1.50	M	F	F	Medium	Medium	**Medium**	included bark union at base, multi-stemmed 80+80 (mm)
77	*Elaeocarpus reticulatus* (Blue Berry Ash)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	3	1	50	80	2.00	1.50	SM	F	P-F	Short	Low	**Low**	Poor development
78	*Elaeocarpus reticulatus* (Blue Berry Ash)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	4	1	70	100	2.00	1.50	SM	F	F	Medium	Medium	**Medium**	Poor development
79	*Camellia sasanqua* (Camellia)	East Boundary	Exempt - Small Dimensions	Exotic	2	1	70	100	2.00	1.50	M	G	G	Medium	Medium	**Medium**	No visual defects sited
80	*Syzygium smithii* (Common Lilly Pilly)	East Boundary	Declared Tree	Illawarra Native	5	3	120	140	2.00	1.50	M	F	F	Medium	Medium	**Medium**	leaf galls, included bark union
81	*Syzygium smithii* (Common Lilly Pilly)	East Boundary	Declared Tree	Illawarra Native	5	3	140	160	2.00	1.53	M	F	F	Medium	Medium	**Medium**	leaf galls, included bark union, Glochindion ferdinadi growing from root crown
82	*Syzygium smithii* (Common Lilly Pilly)	East Boundary	Declared Tree	Illawarra Native	8	4	150	180	2.00	1.61	M	F	F	Medium	Medium	**Medium**	Dieback
83	*Murraya paniculata* (Orange jessamine) x 3	East Boundary	Exempt - Small Dimensions	Exotic	3.5	2	80	100	2.00	1.50	M	G	G	Medium	Medium	**Medium**	No visual defects sited
84	*Camellia sp.*	East Boundary	Exempt - Small Dimensions	Exotic	1.4	1	40	60	2.00	1.50	M	F	P	Short	Low	**Low**	Mechanical damage to base
85	*Elaeocarpus reticulatus* (Blue Berry Ash)	East Boundary	Exempt - Small Dimensions *	Illawarra Native	2	1	60	90	2.00	1.50	SM	F	P	Short	Low	**Low**	Topped at 2m
86	Jacaranda mimosifolia *(Jacaranda)*	East Boundary	Declared Tree	Exotic	5	7	280	290	3.36	1.97	M	F-G	F	Short	Low	**Low**	Multi-stemmed 150x 3, 80, 50 (mm)
87	*Lophostemon confertus* (Brushbox)	Car Park Gardens	Declared Tree	Native	8	3	170	240	2.04	1.82	SM	G	F	Medium	Medium	**Medium**	Located in garden bed with limited soil volume, exposed roots
88	Callistemon viminalis (Weeping Bottlebrush)	Car Park Gardens	Exempt - Small Dimensions *	Native	2	1	60	70	2.00	1.50	SM	F-G	F	Medium	Medium	**Medium**	Located in garden bed with limited soil volume. .
89	*Lophostemon confertus* (Brushbox)	Car Park Gardens	Exempt - Small Dimensions *	Native	3.5	1.5	140	100	2.00	1.50	SM	G	F	Medium	Medium	**Medium**	Located in garden bed with limited soil volume. Multi-stemmed 70+70+10 (mm)
90	*Elaeocarpus reticulatus* (Blue Berry Ash)	Car Park Gardens	Exempt - Small Dimensions *	Illawarra Native	2	1	40	50	2.00	1.50	SM	G	F	Short	Low	**Low**	Located in a small a garden bed within the existing carpark with limited soil volume
91	*Grevillea banksii* (Banks' grevillea) x 3	Car Park Gardens	Exempt - Small Dimensions *	Native	2	2	100	100	2.00	1.50	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
92	*Lophostemon confertus* (Brushbox)	Car Park Gardens	Exempt - Small Dimensions *	Native	2	2	80	90	2.00	1.50	SM	G	P	Medium	Low	**Low**	Significant stem lean, Located in a small garden bed within the existing carpark with limited soil volume
93	*Tristaniopsis laurina* (Water Gum)	Car Park Gardens	Declared Tree	Illawarra Native	5	4	260	490	3.12	2.45	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, exposed roots, multi-stemmed 140+130+180 (mm)
94	*Corymbia ficifolia* (Red Flowering Gum)	Car Park Gardens	Exempt - Small Dimensions *	Native	1.5	1	100	110	2.00	1.50	SM	F	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
95	Callistemon viminalis (Weeping Bottlebrush) x 5	Car Park Gardens	Exempt - Small Dimensions *	Native	2	1	220	200	2.64	1.68	SM	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects. .
96	*Elaeocarpus reticulatus* (Blue Berry Ash)	Car Park Gardens	Exempt - Small Dimensions *	Illawarra Native	2.5	1	80	85	2.00	1.50	SM	F	F	Medium	Medium	**Medium**	No visual defects sited
97	Callistemon viminalis (Weeping Bottlebrush) x 4	Car Park Gardens	Exempt - Small Dimensions *	Native	2	1	220	200	2.64	1.68	SM	F	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, necrotic foliage, *Pittosporum sp.* growing at base

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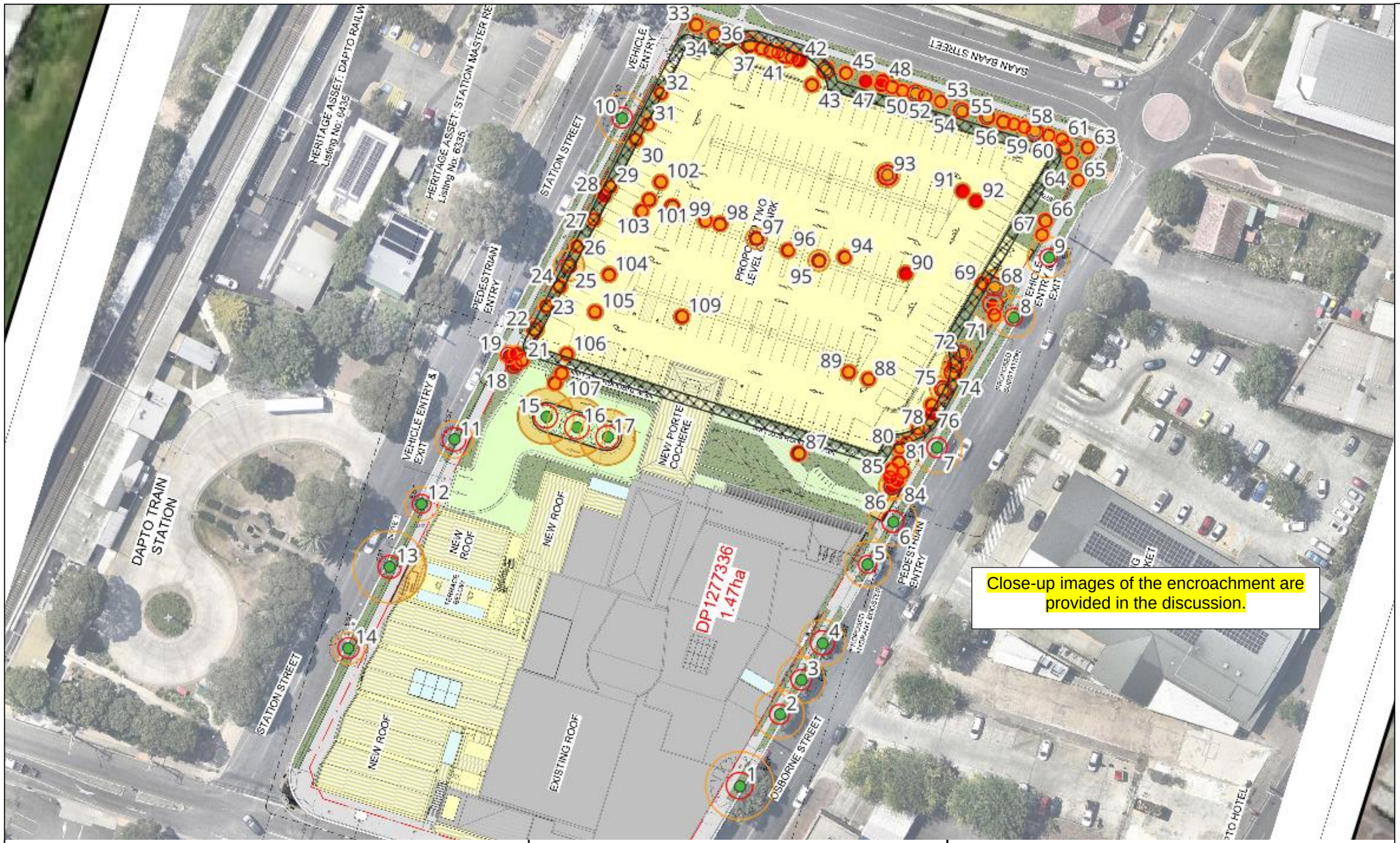
98	*Melaleuca linariifolia* (Snow-in-Summer) *x 4*	Car Park Gardens	Exempt - Small Dimensions *	Native	1.5	1	150	180	2.00	1.61	SM	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
99	*Elaeocarpus reticulatus* (Blue Berry Ash)	Car Park Gardens	Exempt - Small Dimensions *	Illawarra Native	2	1	70	90	2.00	1.50	SM	F	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
100	*Grevillea banksii* (Banks' grevillea) x 5	Car Park Gardens	Exempt - Small Dimensions *	Native	2.5	2	150	240	2.00	1.82	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
101	Callistemon viminalis (Weeping Bottlebrush)	Car Park Gardens	Exempt - Small Dimensions *	Native	4	3	130	180	2.00	1.61	SM	F	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects, multi-stemmed 100 + 80 (mm)
102	*Corymbia ficifolia* (Red Flowering Gum)	Car Park Gardens	Exempt - Small Dimensions *	Native	2	2	70	80	2.00	1.50	SM	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
103	*Corymbia ficifolia* (Red Flowering Gum)	Car Park Gardens	Exempt - Small Dimensions *	Native	2	2	90	100	2.00	1.50	SM	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
104	*Corymbia ficifolia* (Red Flowering Gum)	Car Park Gardens	Exempt - Small Dimensions *	Native	2	2	50	90	2.00	1.50	SM	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
105	*Grevillea banksii* (Banks' grevillea)	Car Park Gardens	Exempt - Small Dimensions *	Native	2.5	2	100	150	2.00	1.50	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
106	*Grevillea banksii* (Banks' grevillea)	Car Park Gardens	Exempt - Small Dimensions *	Native	2.5	2	100	150	2.00	1.50	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
107	*Grevillea banksii* (Banks' grevillea)	Car Park Gardens	Exempt - Small Dimensions *	Native	2.5	2	100	150	2.00	1.50	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
108	*Yucca sp.*	Car Park Gardens	Exempt - Small Dimensions	Exotic	4	2	100	180	2.00	1.61	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects
109	*Tristaniopsis laurina* (Water Gum)	Car Park Gardens	Declared Tree	Illawarra Native	6	3	160	180	2.00	1.61	M	G	G	Medium	Medium	**Medium**	Located in a small garden bed within the existing carpark with limited soil volume, no visual defects

DBH: Diameter at Breast Height
DAB: Diameter at Base
TPZ: Tree Protection Zone. See Section 5.2.1.
SRZ: Structural Root Zone. See Section 5.2.2.
Age Class: Immature = <20% of life expectancy for species | Semi-mature = 20-50% of life expectancy for species | Mature = 50-80% of life expectancy for species | Over-mature = >80% of life expectancy for species
Vigour/Structure: See Section 5.4
Estimated Life Expectancy: Long = > 40 years | Medium = 15 - 40 years | Short = 5 - 15 years
Retention Value (STARS ©): See Section 5.3. High = priority for retention | Medium = may be retained and protected, considered less critical | Low = not considered important for retention

**** Exempt - Small Dimensions:*** *Although these trees do not meet the height or DBH requirements to be considered a Declared Tree per the Wollongong Development Control Plan (DCP) - Chapter E17: Preservation and Management of Trees and Vegetation, they are known nectar producing trees and may be considered to have Habitat potential.*

9. Arboricultural Impact Assessment

9.1 Site Plan (Whole)



Legend

- High Retention Value Tree
- Medium Retention Value Tree
- Low Retention Value Tree
- SRZ
- TPZ
- SRZ Encroachment
- TPZ Encroachment
- 2100mm Scaffolding

ENCROACHMENT MAP
Dapto Leagues Club
LGA: Wollongong City Council
Surveyed: 15.02.2024
Drawn: 06.06.2024

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Lizzie the Arborist

AS4970-2009
Variations to the TPZ resulting from development:

The intersection between established tree roots (TPZ and SRZ - Section 5.2) and proposed encroachment has been highlighted. Where existing branches require pruning for clearance this is noted in Section 10.

Major Encroachment (Clause 3.3.3) = more than 10% of the TPZ area (orange) and/or within the SRZ area (red). Refer to tree retention value and see section 10.2.3 of this report for options. Tree must be either be removed (low – medium retention value trees), encroachment reduced (medium – high retention value trees or neighbouring trees), or proven viable via non-destructive root mapping.

Minor Encroachment (Clause 3.3.2) = less than 10 of the TPZ and outside the SRZ. Tree is likely viable to be retained and protected.

The Arboricultural Impact Assessment Map has been created in QGIS at a scale of 1:200).

The provided plans were overlayed to scale to create one plan showing all proposed encroachment.

9.2 Arboricultural Impact Assessment Table

9.2.1 The following table documents the encroachment proposed on affected trees per *AS4970-2009 Protection of trees on development sites.*

STREET TREES					
TREE #	POTENTIAL ENCROACHMENT	TPZ IMPACTED	SRZ IMPACTED	SUITABILITY TO BE INTEGRATED INTO DEVELOPMENT WORKS	REMOVE/RETAIN
1, 2, 3, 4, 5, 8, 10, 11, 12, 14	These trees are not directly impacted by the proposed development.	-	-	All surrounding street trees are suitable for retention. Demolition to remove hard and soft landscaping and construction to renew these areas will occur within the TPZ of Trees 6 and 13. It will be recommended that these works be completed using non-destructive methods to protect tree roots methods and be supervised by a Project Arborist. It will be recommended that an Arborist conduct routine inspections to monitor the health and condition of the trees throughout the project. Refer to the specifics within the Tree Protection Plan. Tree Trunk Protection with TPZ signage attached will be recommended to provide physical protection. Tree-sensitive construction/demolition methods and activities to be excluded from their calculated Tree Protection Zones will be recommended. Refer to the specifics within the Tree Protection Plan.	Retain and Protect
6	Demolition of existing hard landscaping structures and construction of a new concrete pedestrian entry from Osbourne Street. Construction works to occur within the same footprint as existing hard and soft landscaping surfaces.	17.90%	-		
7	Demolition of existing hard landscaping structures and construction of a new concrete pedestrian entry from Osbourne Street.	2.24%	-		
9	Construction of the entry and exit driveway from Osbourne Street.	2.70%	-		
13	Demolition of existing hard structures (staircase) (within 22.60% of TPZ) and construction of the proposed alfresco food & beverage area (within 6% of TPZ).	22.60%	--		
TREES PLANTED IN THE GARDEN BEDS <u>AROUND</u> THE EXISTING CARPARK					
TREE #	POTENTIAL ENCROACHMENT	TPZ IMPACTED	SRZ IMPACTED	SUITABILITY TO BE INTEGRATED INTO DEVELOPMENT WORKS	REMOVE/RETAIN
18, 19, 20, 21	Within the footprint of the proposed *"New Through Site Link",.*	100%	100%	N/A – these trees will require removal for the proposed works to proceed.	Remove and replace
22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 35, 44, 69, 72, 73, 74, 77, 78, 79, 80	Scaffolding to be erected 2100mm out from the proposed multi-level car park during construction	100%	100%	N/A – these trees will require removal for the proposed works to proceed.	Remove and replace
36, 37, 38, 39, 40, 41, 42, 75, 76	These trees are inside the footprint of the proposed up / down ramps to service the multi-level car park.	100%	100%	N/A – these trees will require removal for the proposed works to proceed.	Remove and replace
33 and 34	These trees are located in the northwest corner of the site inside a garden bed. No direct encroachment is estimated.	-	-	These trees are suitable to be integrated into the new landscaping Plan. It will be recommended that an Arborist conduct routine inspections to monitor the health and condition of the trees throughout the project. Refer to the specifics within the Tree Protection Plan.	Retain and Protect
45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63	These trees are located along the northern boundary inside the existing garden beds. No direction encroachment is estimated.	-	-	Trees 46, 47, and 48 are suitable to be removed regardless of development as they are dead/dying. Trees 45, and 49 – 63 are suitable to be integrated into the new landscaping Plan. It will be recommended that an Arborist conduct routine inspections to monitor the health and condition of the trees throughout the project. Refer to the specifics within the Tree Protection Plan.	Retain and Protect
64, 65, 66, 67, 70, 71	These trees are located along the eastern boundary inside the existing garden beds. No direction encroachment is estimated.	-	-	Tree 70 is suitable to be removed regardless of development as it is dead/dying. Trees 64, 65, 66, 67, and 71 are suitable to be integrated into the new landscaping Plan. It will be recommended that an Arborist conduct routine inspections to monitor the health and condition of the trees throughout the project. Refer to the specifics within the Tree Protection Plan.	Retain and Protect
81, 82, 83, 84, 85, 86, 87	Demolition of existing hard landscaping structures and construction of a new concrete pedestrian entry from Osbourne Street.	100%	100.%	N/A – these trees will require removal for the proposed works to proceed.	Remove and replace
68	Scaffolding to be erected 2100mm out from the proposed multi-level car park during construction will cause crown encroachment and the renewal of the entry and exit driveway off Osbourne Street.	18..84%	20.21%	N/A – this tree will require removal for the proposed works to proceed.	Remove and replace
TREES PLANTED IN THE GARDEN BEDS <u>INSIDE</u> THE EXISTING CAR PARK					
TREE #	POTENTIAL ENCROACHMENT	TPZ IMPACTED	SRZ IMPACTED	SUITABILITY TO BE INTEGRATED INTO DEVELOPMENT WORKS	REMOVE/RETAIN
15, 16, 17	These trees are located within a garden bed in the middle of the existing drop-off area. This area will be modified during construction. No direct encroachment is estimated.	-	-	It will be recommended that any concrete removal and construction of new hard surfaces within the TPZ area of these trees be completed using non-destructive methods and be supervised by a Project Arborist. It will be recommended that an Arborist conduct routine inspections to monitor the health and condition of the trees throughout the project. Refer to the specifics within the Tree Protection Plan. Tree Trunk Protection with TPZ signage attached will be recommended to provide physical protection. Tree-sensitive construction/demolition methods and activities to be excluded from their calculated Tree Protection Zones will be recommended. Refer to the specifics within the Tree Protection Plan.	Retain
87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109	These trees are located within the footprint of the proposed new multi-level car park.	100.00%	100.00%	N/A – these trees will require removal for the proposed works to proceed.	Remove and Replace

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10. Discussion

10.1 Development Works and Trees

10.1.1 Urban tree canopy and green cover play an important role in creating healthy, cooler and liveable neighbourhoods (NSW Government Planning 2024). A living tree is a dynamic organism that needs specific environmental conditions to continue healthy, stable growth.

10.1.2 Tree protection must be taken into account at the earliest planning stage. Most trees will take many years and possibly decades to establish but can be injured or killed quickly as their vulnerability is commonly misunderstood. This is especially true concerning tree root systems that cannot usually be seen.

10.1.3 Successful long-term retention of trees on development sites depends on accepting and acknowledging the constraints and benefits that existing trees generate (AS4970-2009). Protecting trees per AS4970-2009 may influence design and construction costs, which should be considered in project budgets and contracts.

10.1.4 Procedures must be in place to protect trees at every stage of the development process. A comprehensive Tree Protection Plan, which includes specifications for tree protection measures and tree-sensitive construction methods, has been provided at the end of this report. All specifications should be adhered to at the stipulated construction milestone.

10.2 Arboricultural Impact Assessment Schedule

10.2.1 Variations to the TPZ, SRZ and Crown areas resulting from proposed development are visually mapped in Section 9 and detailed in the schedule in Section 10. This has been completed by finding the intersection between established tree roots (TPZ and SRZ—Section 5.2) and proposed encroachment has been highlighted. The following works are considered within this assessment:

- Existing Levels
- Proposed Levels
- Tree Protection Zones (TPZ)
- Structural Root Zones (SRZ)
- Crown Zones
- Footprint of the proposed development
- Temporary structures (scaffolding, hoardings etc.);
- Encroachment (crown, machine trenching, compacted fill, and excavation)
- Species tolerance to disturbance; and
- Assessment of the likely impact of the works on existing trees.

10.3 Major Development Encroachment (AS 4970-2009: Clause 3.3.3)

10.3.1 A major development encroachment is greater than 10% of the TPZ and/or inside the SRZ. Depending on the tree retention value (low, medium, or high – refer to Section 5.3), the tree will be recommended for removal or retention. When tree preservation is considered a priority, a Project Arborist must demonstrate that the tree would remain viable during and after construction by considering;

- **Physical Root Investigation**: Non-destructive excavation, i.e. hand digging or pneumatic excavation, to locate tree roots within the area proposed to be developed
- **Estimated Root Loss:** The potential loss of root mass resulting from the encroachment (the number and size of roots)
- **Tree Specific Tolerance:** Tree species and tolerance to root disturbance, age, vigour, and size of the tree, lean and stability of the tree, soil characteristics and volume, topography, and drainage. The presence of existing or past structures or obstacles affecting root growth.
- **Design factors:** Review of the proposed development footprint and/or construction methods.

10.4 Minor Development Encroachment (AS 4970-2009: Clause 3.3.3)

10.4.1 If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, the tree could be viable, provided this encroachment can be compensated for elsewhere and contiguous with the TPZ.

10.4.2 A comprehensive Tree Protection Plan, which includes specifications for tree protection measures and tree-sensitive construction methods, has been provided at the end of this report. All specifications should be adhered to at the stipulated construction milestone.

10.5 Development Impacts and Tree Discussion

10.5.1 Sixty-six (66) trees (#20, 21, 22, 23, 24, 26, 27, 29, 31, 32, 33, 36, 37, 39, 40, 41, 46, 47, 48, 50, 52, 53, 54, 55, 56, 57, 58, 60, 61, 63, 64, 65, 66, 67, 69, 76, 77, 78, 79, 83, 84, 85, 88, 89, 90, 91, 92, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, and 108) do not meet the dimension requirements to be considered a Declared Tree per the DCP Chapter E17 (*five (5) metres or more in height, or a diameter of 30 cm (300 mm) measured at ground level*). The majority of these trees are known nectar-feeding trees, such as *Melaleuca sp, Elaeocarpus sp, Grevillea sp,* and *Callistemon sp*. Where the proposed works do not impact these trees, their retention and protection should be prioritised. Where these trees are within the footprint of the proposed works (such as those located within the garden beds of the existing car park), their replacement with another nectar-feeding tree should be prioritised.

10.5.2 Site trees 19, 28, 30, and 42 are **exempt tree species** per the Wollongong Development Control Plan (DCP) - Chapter E17: Preservation and Management of Trees and Vegetation Section 10. These trees are declared weeds in NSW and should be removed to prevent their spread. Site trees 15, 16, and 17 are *Phoenix canariensis* (Canary Island Date Palm) and are also exempt species but have a high retention value given their location on the site.

Image 2: Red = Exempt Trees and Green = Protected Trees

10.5.2 The fourteen street trees assessed are all **high retention value** *Lophostemon confertus* (Brushbox). Street Trees # 1, 2, 3, 4, 5, 8, 10, 11, 12, and 14 are not directly impacted by the proposed development works. Street Trees # 6, 7, 9, and 13 have works proposed within their calculated TPZ:

- **Tree 6** - Demolition of existing hard landscaping structures and construction of a new concrete pedestrian entry from Osbourne Street. Construction works to occur within the same footprint as existing hard and soft landscaping surfaces. This will occur within **17.90%** of the TPZ area. No works are proposed within the Structural Root Zone. The tree is suitable to be retained and protected.

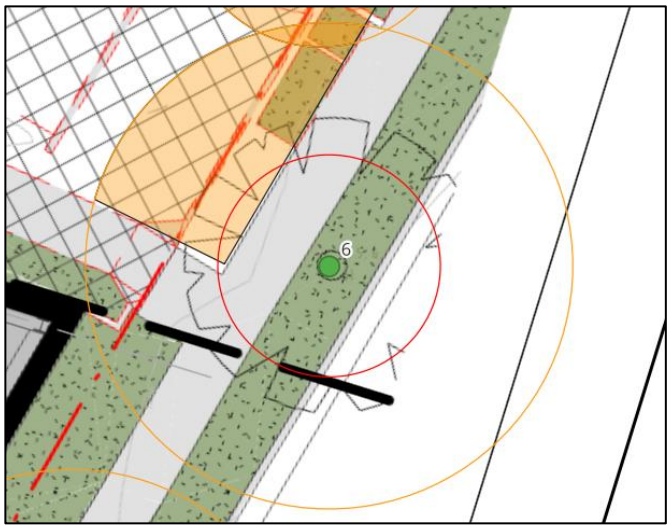

Image 3: Demolition of hard surfaces inside the TPZ of Tree 6

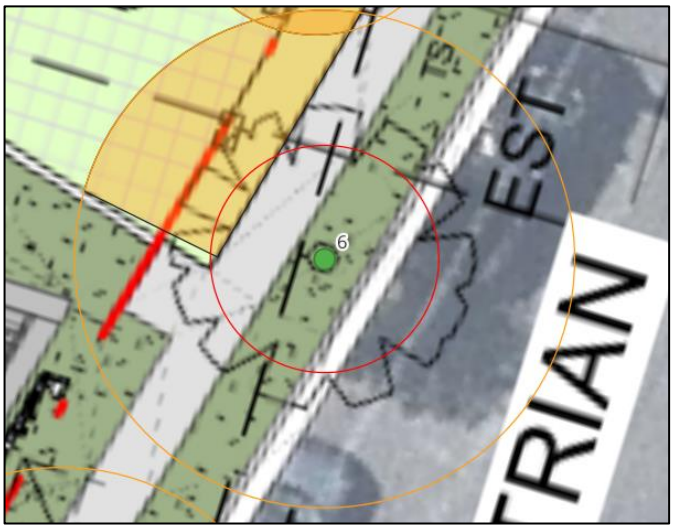

Image 4: Proposed new concrete entry pathway inside the TPZ of Tree 6

- **Tree 7 -** Demolition of existing hard landscaping structures and construction of a new concrete pedestrian entry from Osbourne Street within **2.24%** of the TPZ area. No works are proposed within the Structural Root Zone. The tree is suitable to be retained and protected.

- **Tree 9 -** Construction of the entry and exit driveway from Osbourne Street within **2.70%** of the TPZ area. No works are proposed within the Structural Root Zone. The tree is suitable to be retained and protected
- **Tree 13 -** Demolition of existing hard structures (staircase) (within **22.60%** of TPZ) and construction of the proposed alfresco food & beverage area (within **6%** of TPZ). No works are proposed within the Structural Root Zone. The tree is suitable to be retained and protected.

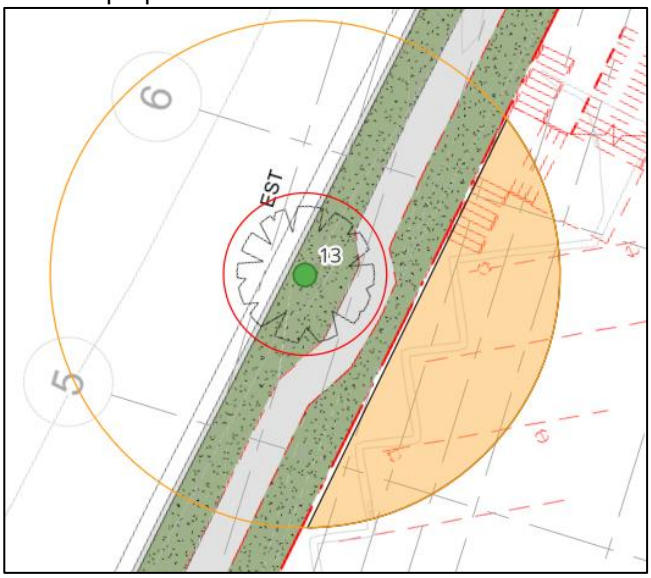

Image 5: Demolition of hard surfaces inside the TPZ of Tree 13

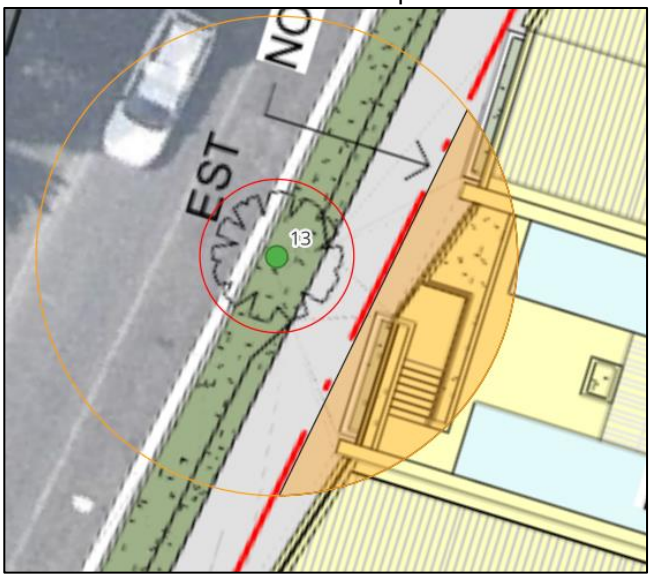

Image 5: Proposed development inside the TPZ of Tree 13

10.5.3 Site Trees 46, 47, 48, and 70 will be recommended for removal and replacement based on their poor health and condition:

- **Trees 46, 46, and 48 are** *Melaleuca rugulosa* (Scarlet Bottlebrush) that are dead/dying.
- **Tree 70** is an overmature *Eucalyptus* sp. with a short estimated life expectancy. It has deadwood >10cm in diameter, a sparse crown, dieback, cankers on branches, and evidence of previously failed branches.

10.5.5 Site trees 15, 16, 17, 33, 34, 45, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 70, and 71 are **not directly impacted** by the proposed development and are all suitable to be retained and protected. Specifications for physical tree protection have been provided in the Tree Protection Plan in accordance with AS4970-2009.

10.5.6 Site trees 36, 37, 38, 39, 40, 41, 42, 75, 76, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, and 109 are located inside garden beds within the existing car park. These trees will require removal for the construction of the proposed multi-level car park.

Image 6: Trees 36, 37, 38, 3, 40, 41, 42, and 43 are shown inside the footprint of the proposed development.

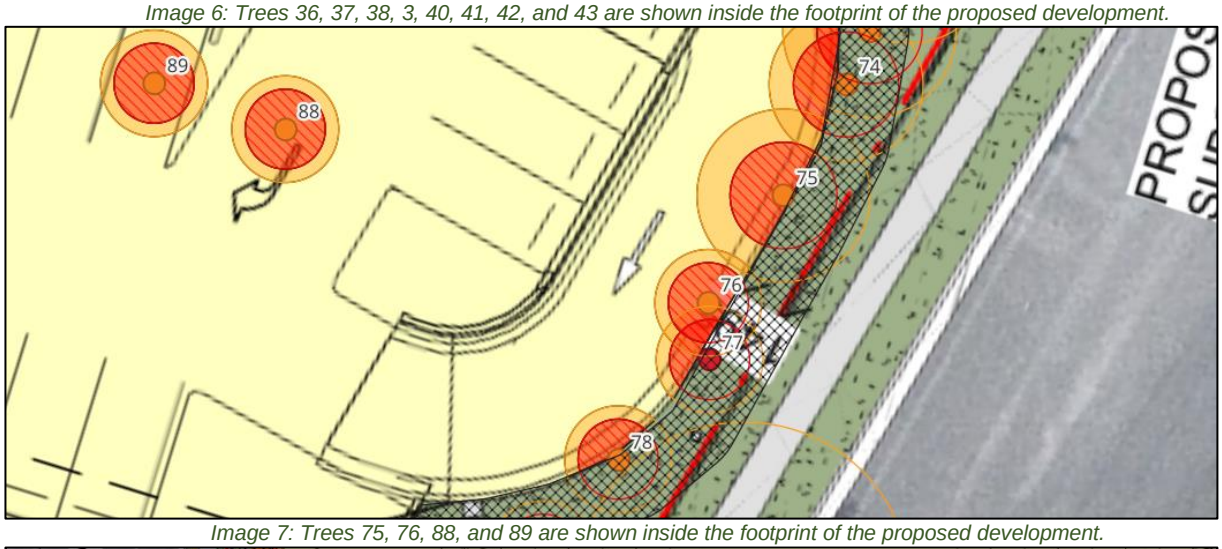

Image 7: Trees 75, 76, 88, and 89 are shown inside the footprint of the proposed development.

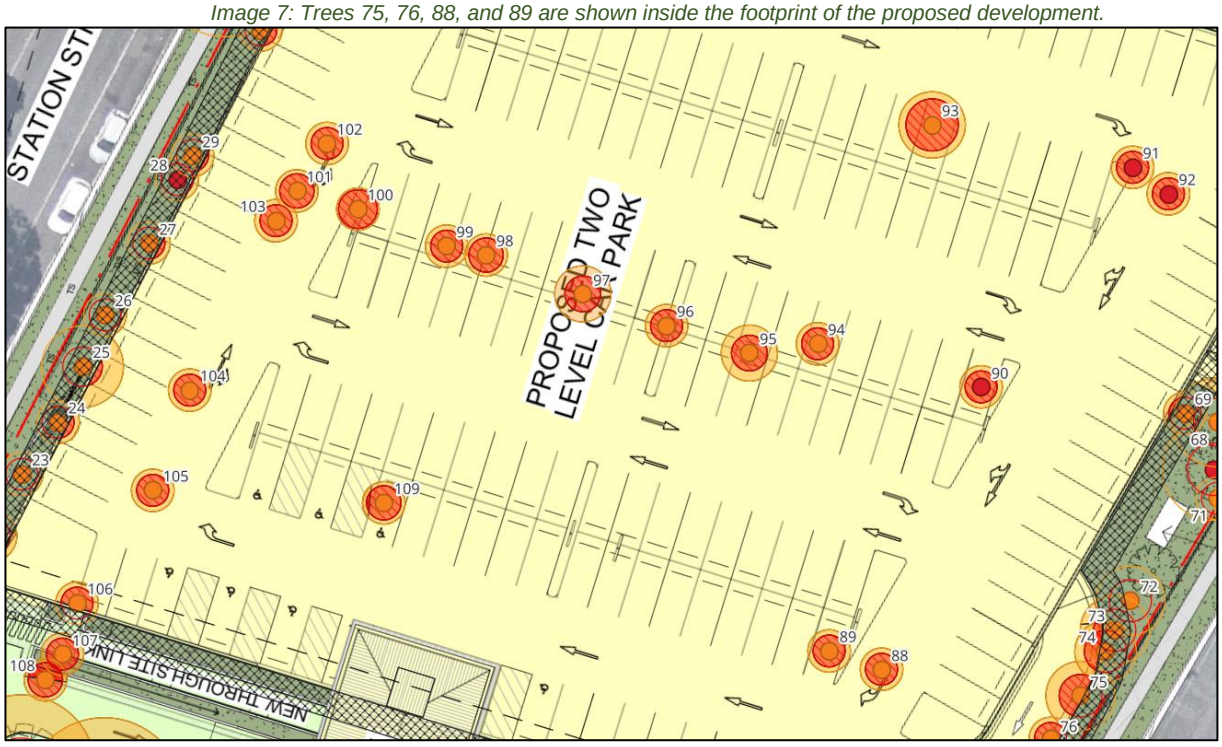

Image 8: Trees 88, 8, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, and 109 shown inside the footprint of the proposed development.

10.5.7 Site trees 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 35, 44, 68, 69, 72, 73, 74, 77, 78, 7, and 80 are located inside garden beds around the existing car park. These trees will require removal and replacement to allow the required scaffolding to be erected to construct the multi-level car park.

10.5.8 Site trees 18, 20, and 21 are located along the western boundary in a garden bed. These trees will require removal and replacement to construct the proposed concrete pedestrian entry from Station Street.

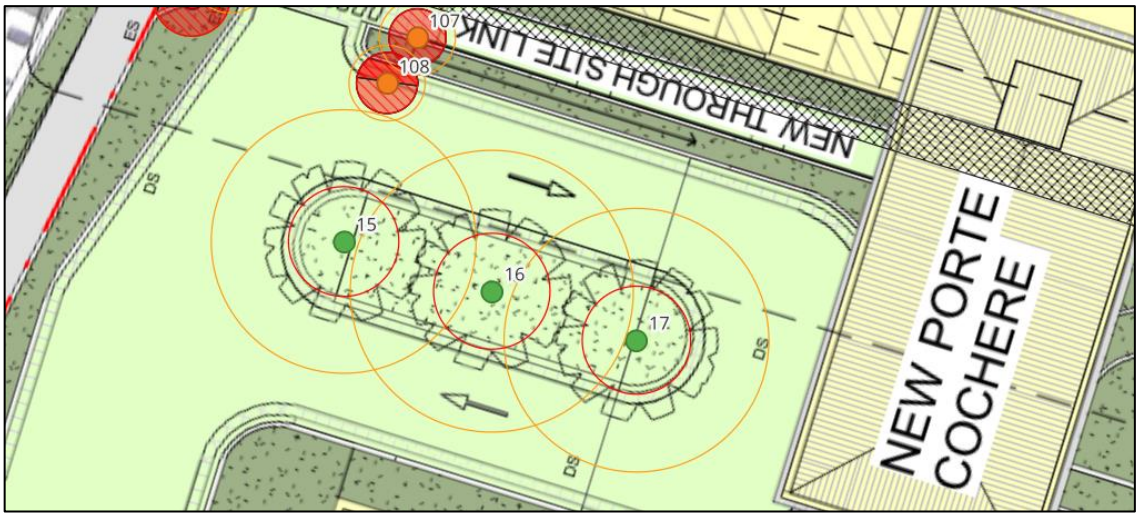

Image 9: Trees 15, 16, and 17 are shown inside their existing garden bed.

10.5.9 Site trees 81, 82, 83, 84, 85, 86, and 87 are located along the eastern boundary in a garden bed. These trees require removal to construct the proposed concrete pedestrian entry from Osbourne Street.

Image 10: Trees 81, 82, 83, 84, 85, 86, and 87 will be recommended for removal to allow space for the proposed concrete pedestrian entry from Osborne Street.

10.5.10 Site trees 18, 19, 20, and 21 are located along the western boundary in a garden bed. These trees require removal to construct the proposed concrete pedestrian entry from Station Street.

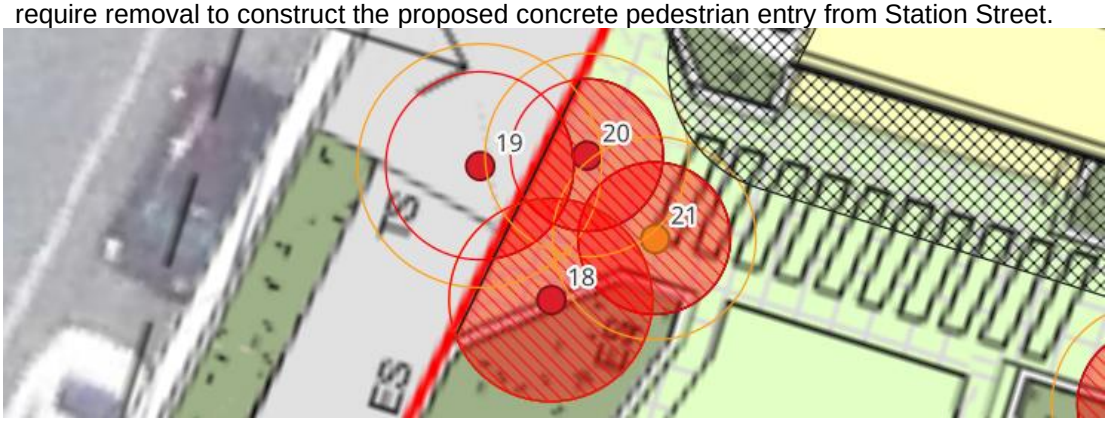

Image 11: Trees 18, 19, 20, and 21 will be recommended for removal to allow space for the proposed concrete pedestrian entry from Station Street.

11. Tree Removal and Retention Maps

Legend

- Tree proposed for retention and protection
- Tree proposed for removal

TREE REMOVAL / RETENTION MAP
Dapto Leagues Club
LGA: Wollongong City Council
Surveyed: 15.02.2024
Drawn: 06.06.2024

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12. Conclusion

12.1 Integrated Projects Pty Ltd commissioned this Arboricultural Impact Assessment for one hundred and nine (109) trees near proposed alterations and additions at Dapto Leagues Club. The information detailed within this report is intended to assist Wollongong City Council in making Arboricultural decisions when assessing the Development Application.

12.2 Seventeen (17) trees (# 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17) have a high retention value per the Significance of a Tree Assessment Rating System (STARS). These trees are considered important for preservation and are suitable to be retained and protected.

12.3 Seventy-six (76) trees (# 21, 22, 23, 24, 25, 26, 27, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 43, 44, 45, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, 72, 73, 74, 75, 76, 78, 79, 80, 81, 82, 83, 87, 88, 89, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, and 109) have a medium retention value per STARS. These trees are considered less critical; however, their retention should remain a priority, with removal considered only if it adversely affects the proposed building/works and all other alternatives have been considered and exhausted. If retained, the setbacks as prescribed by the Australian Standard *AS4970-2009 Protection of trees on development sites* should be maintained.

12.4 Nine (9) trees (#18, 20, 77, 84, 85, 86, 90, 91, and 92) have a low retention value per STARS. These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention. If retained, the setbacks as prescribed by the Australian Standard *AS4970-2009 Protection of trees on development sites* should be maintained.

12.5 Eight (8) trees (# 19, 28, 30, 42, 46, 47, 48, and 70) are a priority for removal per STARS. These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

12.6 A breakdown of trees proposed to be retained and removed has been included below:

Retention Value (STARS)	Remove for development works (Declared Trees)	Remove for development works (Exempt Trees)	Retain and Protect
High	N/A	N/A	Seventeen (17) trees: #1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17
Medium	Sixteen (16) trees: # 25, 35, 38, 43, 44, 68, 72, 73, 74, 75, 80, 81, 82, 87, 93, and 109	Thirty-seven (37) trees: # 21, 22, 23, 24, 26, 27, 29, 30, 31, 32, 36, 37, 39, 40, 41, 69, 76, 78, 79, 83, 88, 89, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, and 108	Twenty-three (23) trees: # 33, 34, 45, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, and 71
Low	Three (3) trees: #18, 70, and 86	Thirteen (13) trees: # 19, 20, 28, 42, 46, 47, 48, 77, 84, 85, 90, 91, and 92	-
TOTALS	**Nineteen (19) trees**	**Fifty (50) trees**	**Forty (40) trees**
	Sixty-nine (69) trees		

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13. Recommendations

13.1 Project Arborist

13.1.1 It is recommended that Wollongong City Council condition the Development Consent to appoint a Project Arborist to provide guidance and documentation for approved tree protection and the supervision of approved works within TPZ areas. Specifications are provided within the attached Tree Protection Plan. The responsibilities of the Project Arborist are documented in Section A, and the documentation requirements are listed in Section G.

13.2 Tree Removal

13.2.1 Nineteen (19) Declared Trees #18, 25, 35, 38, 43, 44, 68, 70, 72, 73, 74, 75, 80, 81, 82, 86, 87, 93, and 109 are recommended to be considered for removal by Wollongong City Council as a condition of the Development Consent.

13.2.2 Additionally, trees #19, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 36, 37, 39, 40, 41, 42, 46, 47, 48, 69, 76, 77, 78, 79, 83, 84, 85, 88, 89, 90, 91, 92, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, and 108 that are under 5m tall and 300mm diameter at base are required to be removed for the proposed works to proceed. Specifications for approved tree removal are documented in the Tree Protection Plan Section B.3.

13.3 Replacement Trees

13.3.1 It is recommended that forty (40) native specimens be incorporated into a new landscaping plan to offset the Arboricultural loss to the site. Ideally, these should be nectar-producing trees. Specifications for replacement tree planting are documented in the Tree Protection Plan Section B.5. Alternatively, Green plan credit or payment into an urban greening fund for trees to be planted on public land could be conditioned.

13.4 Tree Pruning

13.4.1 The following trees are recommended to be considered for pruning works by Wollongong City Council as a condition of the Development Consent. Specifications for tree pruning (per AS4373-2007) are documented in the Tree Protection Plan Section B.2.

Tree #	Pruning Works	AS4373-2007 Specification
1 – 14 (Street trees)	Wollongong City Council is recommended to prune street trees 1 – 4m to achieve a crown clearance of 2.4m over the pedestrian footpaths.	7.3.3

13.5 Physical Tree Protection (AS4970-2009)

13.5.1 The following tree protection measures are recommended to be considered by Wollongong City Council as a condition of the Development Consent. Specifications for tree protection (per AS4970-2009) are documented in the Tree Protection Plan Section C and Section D. Maintenance of the TPZ area is documented in Section F.

Tree #	Protection
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17	Tree trunk protection (TPP Section C.3) TPZ signage (TPP Section C.2) Ground protection (TPP Section C.4)
33, 34, 45, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, and 71	Tree protection fencing (TPP Section C.1) TPZ signage (TPP Section C.2) Ground protection (TPP Section C.4)

13.5.2 A Tree Protection Map has been drawn to scale in the Tree Protection Plan Section A.

13.6 Construction Specifications for Works Inside TPZ Areas (AS4970-2009)

13.5.1 It is recommended that Wollongong City Council consider approving the following TPZ encroachment per the specifications within the provided Tree Protection Plan Section D and Section E. An *Ongoing Tree Management Plan* has been provided in Section H to guide management of trees post-construction

Tree #	Description of Proposed Works inside the TPZ area
Street Trees 6 and 13	Non-destructive demolition works to remove the existing hard and soft surfaces (TPP Section E.1) Construction under the supervision or guidance of a Project Arborist within the TPZ area. (TPP Section E)

END.

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Tree Protection Plan

Lizzie the Arborist

Site Address:	Dapto Leagues Club Cnr Station St & Bong Bong Rd Dapto NSW 2530
Client:	Integrated Projects Pty Ltd PO Box 122 Tanilba Bay NSW 2319
LGA:	Wollongong City Council
Report Date:	06.06.2024
Inspection Date:	15.02.2024
Report REF#	202402-07
Assessor:	Elizabeth Cowan Consulting Arborist (Dip. Arb) T/A *Lizzie the Arborist* 0401 301 233 info@lizziethearborist.com.au ABN: 85 603 187 540

Contents

A. General Information

A.1 Australian Standards and the Project Arborist

A.1.1 The applicable Australian Standards referenced within this Tree Protection Plan are AS4373-2007 Pruning of amenity trees and AS4970-2009 Protection of trees on development sites.

A.1.2 A Project Arborist should be commissioned to oversee all stages of the development project to ensure compliance with the Conditions of Consent and the relevant Australian Standards. The Project Arborist must be suitably experienced and competent in arboriculture, have a minimum Australian Qualification Framework (AQF) Level 5, Diploma of Horticulture (Arboriculture), and have the knowledge and skills enabling that person to perform the tasks required.

A.1.3 The client must allow for the following Project Arborist site inspections, supervision and compliance certificates at a minimum. Should there be any deviation from the approved plans requiring access or adjustment to tree protection areas, this will trigger a new inspection and compliance certificate per occasion. It is the client's responsibility to advise the Project Arborist of such an event. Additionally, further inspections and compliance certificates may be required if remedial tree works are required after practical completion.

1. Inspection and Compliance Certificate during **Initial Site Preparation**
2. Supervision, Inspection and Compliance Certificate during **Construction**
3. Supervision, Inspection and Compliance Certificate during **Implementation of hard and soft landscape works**
4. Inspection and Compliance Certificate during **Practical Completion**
5. Inspection and Compliance Certificate during **Defects liability/maintenance period** (if required)

A.1.4 It is the responsibility of the Project Arborist and the Principal Site/Project Manager to enforce the required tree protection and tree-sensitive construction measures. A minimum of 5 working days' notice is required for Project Arborist supervision. No works are to proceed within the TPZ of any retained tree without the supervision of the Project Arborist.

A.2 Approval and the Determining Authority

A.2.1 The Project Arborist must only allow works approved by the Determining Authority within the TPZ. Should there be any deviation from the approved plans requiring access or adjustment to tree protection areas, this will trigger a new inspection and compliance certificate per occasion. Any recommendations or specifications within this Tree Protection Plan and/or the related Arboricultural Impact Assessment are not to be taken as any form of approval. Only the approved works within the Condition of Consent will be considered/acknowledged by the Project Arborist.

A.3 General Notes on Tree Sensitive Construction

A.3.1 Tree-sensitive construction measures should be considered at all stages for works within the TPZ, such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling to minimise the impact of encroachment.

A.3.2 When the root zone is reactive clay, techniques such as localised pier and beam (bridged), screw pile footings or root and soil moisture control barriers may be appropriate to minimise effects on structures

A.4 Construction Management Plan

A.4.1 The Project Arborist should be consulted in the preparation of a Construction Management Plan (CMP) to provide relevant information relating to the access of TPZ areas for construction vehicle/machinery access and the storage and handling of construction materials on s

A.5 Tree Protection Map

Legend		
High Retention Value Tree	Tree Trunk Protection	**TREE PROTECTION MAP**
Medium Retention Value Tree	Tree Fencing Protection	Dapto Leagues Club
Low Retention Value Tree	Non-Destruction Demolition & Construction inside TPZ	LGA: Wollongong City Council Surveyed: 15.02.2024 Drawn: 06.06.2024

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A.6 Construction Milestones

A.6.1 Specifications for the responsibility of the client and the Project Arborist have been adopted from the DCP and AS4970-2009 Protection of trees on development sites. The below table stages the responsibility of the client and the Project Arborist into the expected construction milestones:

Stage in Development	Tree Management Process	
	Client Action	**Project Arborist Action and Certification**
Initial Site Preparation	Approved tree removal and pruning works. Installation of approved tree protection measures. A copy of the Tree Protection Plan is to be printed and kept on-site and used in site inductions. Advise completion of the above to the Project Arborist prior to Site Establishment so an inspection and certification of tree pruning, removal and protection measures can be provided.	**Milestone 1:** Project Arborist to inspect and provide certification of approved tree pruning and removal works and approved protection measures prior to site establishment.
Site establishment	Maintain tree protection measures and ensure temporary infrastructure is located outside protection zones. Ensure all excluded activities per the specification in section 13.11 are restricted. Advise the Project Arborist should any encroachment into tree protection areas occur.	**Milestone 1a:** Guide maintenance or amendments to tree protection measures **(if required).**
Construction	Demolition and construction work within TPZ areas are to be conducted per the specifications of this Tree Protection Plan and under the supervision and guidance of the Project Arborist. The Project Arborist must amend the Tree Protection Measures prior and instruct the client to install Ground Protection where fencing has been removed. Book in advance with the Project Arborist to schedule time to supervise works (if required).	**Milestone 2:** Guide maintenance or amendments to tree protection measures **(if required).** Supervise the tree-sensitive renewal of the driveway, amend tree protection measures **(if required),** document tree health and condition, and provide certification of the above.
Implementation of hard and soft landscape works	Soft and Hard Landscaping works within TPZ areas are to be conducted per the specifications of this Tree Protection Plan and under the supervision and guidance of the Project Arborist. The Project Arborist must amend the Tree Protection Measures prior and instruct the client to install Ground Protection where fencing has been removed. Book in advance with the Project Arborist to schedule time to supervise works (if required).	**Milestone 3:** Supervise the tree-sensitive renewal of the driveway, amend tree protection measures (if required), document tree health and condition, and provide certification of the above.
Practical Completion	Remove tree protection measures and conduct any remedial tree works as required by the Project Arborist. Excluded activities within the TPZ still apply (per section 9.8). Advise the Project Arborist at the time of practical completion to conduct final certification of tree protection.	**Milestone 4:** Certification of tree protection throughout the construction process and final tree health and condition after any remedial tree works are completed. Recommend further remedial works if required.
Defects liability/maintenance period *(if required).*	**If required:** Conduct any recommended tree maintenance or remedial works recommended at the time of practical completion. Advise the Project Arborist upon completion of all remedial works to conduct final certification of tree protection.	**Milestone 5:** Final certification of tree condition (if required due to remedial or maintenance works).

B. Approved Tree Works Specifications

B.1 Approved Tree Works

B1.1 All tree works must be approved by the determining authority in writing (i.e. within the Conditions of Consent or a separate Tree Permit Application). Should tree works be required when no specific approval has been granted (e.g. crown lifting for access), the client must inform the Project Arborist to guide the works and provide advice on any permit required.

B.2 Approved Tree Pruning

B.2.1 All approved pruning works are to be conducted by a minimum AQF Level 3 Arborist who is familiar with the relevant acts, guidelines, and standards, such as the Work Health and Safety Act, the SafeWork NSW guidelines for tree work, and AS4373-2007 Pruning of amenity trees.

B.2.2 The tree pruning works are to be completed in a way that does not jeopardise the retention value of any trees recommended for retention and protection.

B.2.3 General maintenance pruning (deadwooding, crown thinning, selective pruning, and formative pruning) can be undertaken in addition to any approved pruning works in accordance with AS4373-2007 and within the scope of the council's Development Control Plan guidelines for vegetation/tree management. The Project Arborist should be consulted prior to any additional pruning works being completed.

B.3 Approved Tree Removal

B.3.1 The removal of approved trees must be completed by a minimum AQF Level 3 Arborist who is familiar with the relevant acts, guidelines, and standards that apply to tree removal works, such as the Work Health and Safety Act, the SafeWork NSW guidelines for tree work, and AS4373-2007.

B.3.2 The tree removal works are to be completed in a way that does not jeopardise the retention value of any trees recommended for retention and protection. All green waste should be removed from the site.

B.4 Approved Root Pruning

B.4.1 All approved root pruning works are to be conducted by a minimum AQF Level 3 Arborist under the supervision and/or guidance of an AQF Level 5 Arborist who is familiar with the relevant acts, guidelines, and standards, such as the Work Health and Safety Act, the SafeWork NSW guidelines for tree work, and AS4373-2007 Pruning of amenity trees.

B.4.2 Excavation of the required trench is to comply with section E.2. Roots must be pruned with a final cut to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaws or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for roots within the TPZ to be ' pruned' with machinery such as backhoes or excavators.

B.4.3 Where roots within the TPZ are left exposed by pruning works, temporary root protection should be installed to prevent them from drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged and kept moist when the root zone is exposed.

B.5 Approved Replacement Tree Planting

B.5.1 The replacement trees must meet the quantity and pot size requirements of the Conditions of Consent. Where no conditions are included in the Conditions of Consent, the minimum pot size and tree quantity default to that recommended within the Arboricultural Impact Assessment.

B.5.2 The replacement trees are to be planted to ensure their viability and longevity. Trees must not be planted during unsuitable weather conditions such as extremes of heat, cold, wind or rain or saturated soils. Replacement trees must comply with relevant legislation, including AS 2303-2015 Tree Stock for Landscape Use. The person must carry out the tree planting works must act in accordance with the following:

- AS 4419-2003 - Soils for landscaping and garden use
- AS 4454-2012 - Compost, soil conditioners and mulches
- AS 2303-2018 - Tree stock for landscape use

B.5.3 The person carrying out the work must handle all trees carefully during the planting process. Trees must be lifted and carried by the container or root ball and not the stem. Where this is not practicable, the tree stem must be wrapped in soft padding and only handled at this point. Planting pit openings must be large enough to provide space for the mature size of the stem. A layer of coarse mulch applied over a tree planting pit will enhance root growth and prevent weed or turf growth. The mulch applied should be 75 – 100mm thick and comply with AS 4454.

B.5.4 Good quality plants should be self-supporting and should not require staking. If a tree is staked at the time of planting, remove the stakes as the tree grows, and the following materials should be used:

- Stakes: 50 X 50 X 1800mm hardwood stakes (3 per tree) driven securely into the subgrade and clear of the root ball.
- Ties: 50mm Hessian webbing stapled to the outside of stakes at approximately two-thirds the height of stake above ground level

B.5.5 The replacement tree establishment period is three years from the date of planting. During the tree establishment period, the trees must be watered once a week in the first four weeks after planting, once every two weeks for the next eight weeks, and after the first 12 weeks, once every month until the trees are three years old. Watering should be avoided during the hottest time of the day (ideally should be completed early morning) and must thoroughly wet the root system.

B.5.6 Should any replacement tree die within its establishment period (3 years), the Project Arborist must be notified, and a replacement tree must be planted. The Project Arborist must identify why the tree failed and guide the planting of a replacement tree.

C. Physical Tree Protection Specifications

C.1 Tree Protection Fencing

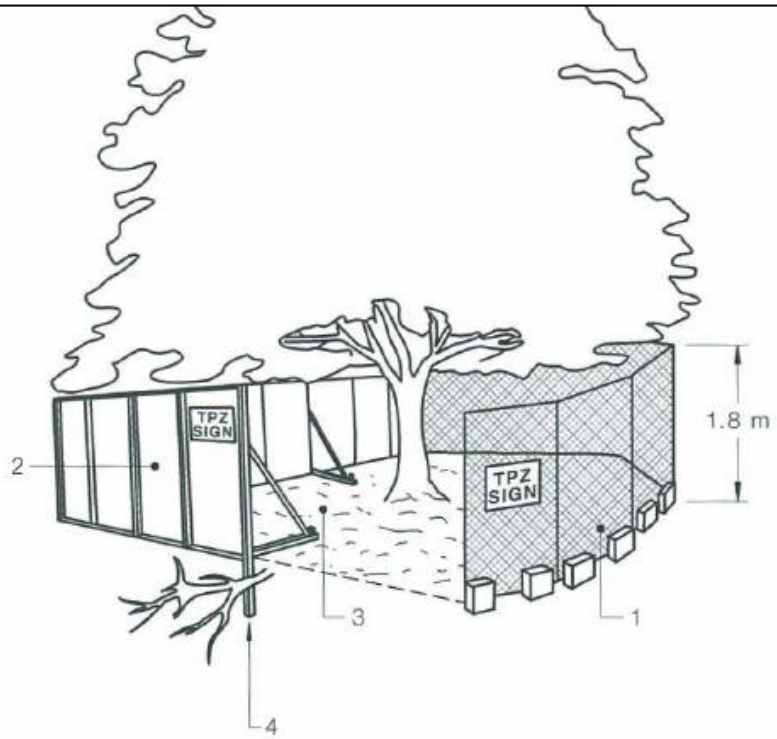
C.1.1 Fencing must be erected before any machinery or materials are brought onto the site and before the commencement of works, including demolition, and be certified by the Project Arborist during **Initial Site Preparation.**

C.1.2 The fencing shall be installed utilising chain wire mesh panels, minimum 1.8m tall, held in place with concrete feet. Where the TPZ is located within or below the tree's crown, the fencing should be extended outside the dripline by a minimum of 1m to allow crown protection. Where this is not possible, the Project Arborist reserves the right to request that ground protection (per 13.5) is installed.

C.1.3 The fencing must be secured to restrict access. AS 4687 specifies applicable fencing requirements. Fence posts and supports should have a diameter greater than 20 mm and be located clear of any roots.

C.1.4 Shade cloth must be attached to reduce the transport of dust, other particulate matter and liquids into the protected area at the request of the Project Arborist.

C.1.5 The Project Arborist must certify tree protection fencing before works commence during the **Initial Site Preparation.** Once erected, protective fencing must not be accessed, removed, or altered without approval by the Project Arborist. The Project Arborist must assess the protective fencing throughout the project and make adjustments where required.



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 3 PROTECTIVE FENCING

Tree Protection Fencing and Signage Diagram (AS4970-2009 Section 4.3)

C.2 Tree Protection Signage Specifications

C.2.1 Signs identifying the TPZ should be placed around the edge of the fencing. The sign must be weatherproof (e.g., laminated) and a minimum of A4 in size. The lettering on the sign should comply with AS 1319.

Example of appropriate Tree Protection Signage

C.3 Trunk and Branch Protection Specifications

C.3.1 Where fencing cannot be installed due to space limitations, protection is to be installed on the trunk and branches AS4970-2009. Padding must be installed directly to each tree's trunks and/or branches to a minimum height of 2m, and battens must be strapped together to protect from potential mechanical damage. Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

C.4 Ground Protection Specifications

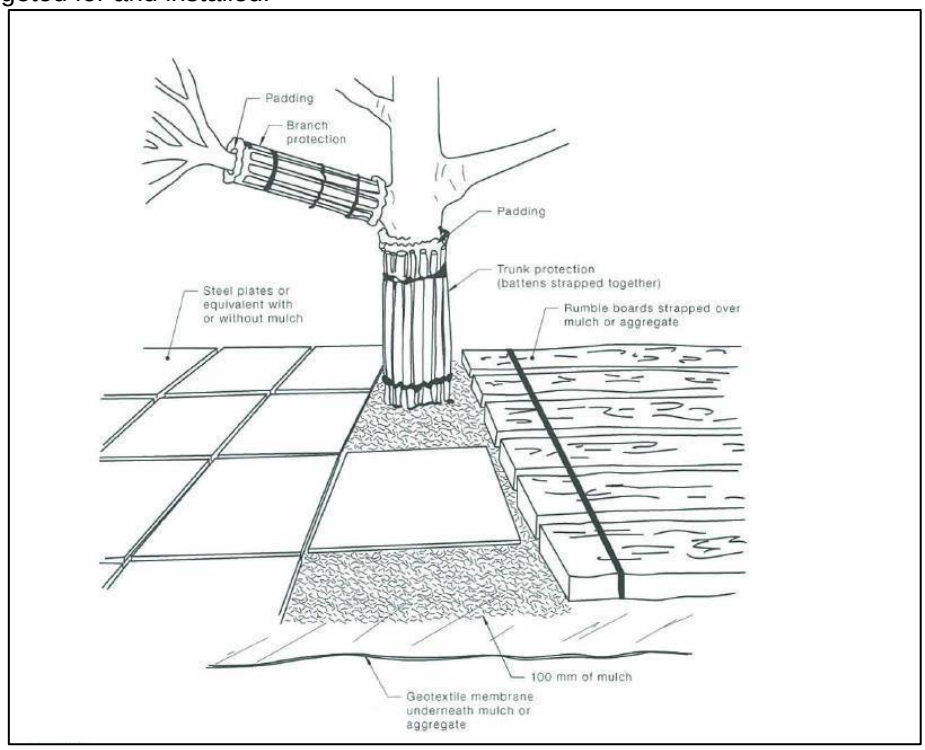
C.4.1 Ground protection is to be installed to mitigate the risk of root damage and soil compaction at the request of the Project Arborist. Damage is commonly caused by construction equipment and vehicles that have no other option than to travel through the Tree Protection Zone of retained trees. Note: Even repeated foot traffic over tree roots that have never experienced similar compression forces in the past is enough to cause compaction issues.

C.4.2 It is preferred that smaller or lighter machinery that exerts less pressure on the soil is used around. Consider using equipment with wide tracks or tyres or air-filled tyres. Where heavy machinery will be used, it is best practice to plan construction activities to avoid working near trees during sensitive periods such as the growing season (September to November). Performing work during dry conditions and dormant growing periods can also reduce the risk of soil compaction and tree damage (June to August).

C.4.3 The ground protection chosen should be able to bear the weight of the required construction equipment whilst allowing for water filtration and avoiding compaction of the existing soil grade. Acceptable ground protection options include:

< 3t	A geotextile membrane overlaid with 100mm of coarse mulch or aggregate overlaid with rumble boards (i.e. timber battens or plywood strapped together with metal chain links) (AS4970-2009 Section 4.5.3). Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.
> 3t	A geotextile membrane overlaid with 200mm of coarse mulch or aggregate overlaid with steel plates (i.e. metal road plates) (AS4970-2009 Section 4.5.3).

C.4.5 Existing load-bearing surfaces (such as a concrete pathway or driveway) may act as adequate ground protection. Should these surfaces be removed within the TPZ, their removal is subject to the conditions of consent and an appropriate ground protection option should be budgeted for and installed.



Tree Trunk, Branch, and Ground Protection Diagram (AS4970-2009 Section 4.5)

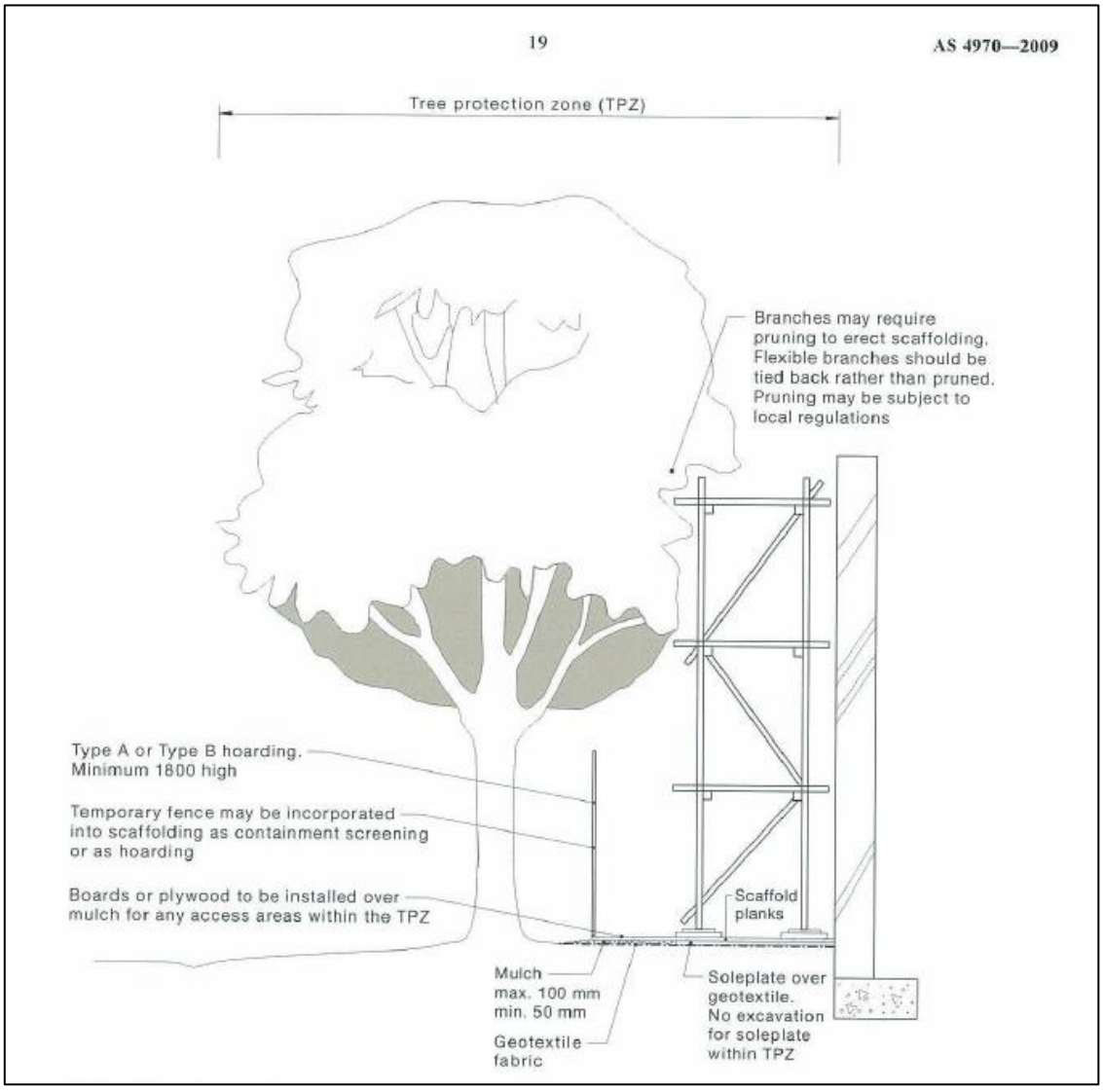
C.5 Crown Protection Specifications

C.5.1 Tree crowns may be injured by machineries such as excavators, drilling rigs, cranes, trucks, hoarding installation and scaffolding. The TPZ may need to include additional protection of the above-ground parts of the tree. Where crown protection is required, it is usually located at least one metre outside the crown's perimeter.

C.5.2 The erection of scaffolding may require an additional setback from the edge of the crown. Crown protection may include tying-back of branches or other measures. If pruning is required, requirements are specified in AS 4373 and should be undertaken before the establishment of the TPZ.

C.5.3 Where scaffolding is required, it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimised. This can be achieved by designing scaffolding to avoid branches or tying back branches. Where pruning is unavoidable, the project arborist must specify it per AS 4373. NOTE: Pruning works may require approval by determining authority.

C.5.4 The ground below the scaffolding should be protected by boarding (e.g., scaffold board or plywood sheeting), as shown in Figure 5. A boardwalk or other surface material should be installed where access is required to minimise soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed. Soleplate to be placed over geotextile material. No excavation for the soleplate within the TPZ.



Tree Crown Protection Diagram (AS4970-2009 Section 4.5)

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D. TPZ Access Specifications

D.1 Excluded Activities Specifications

D.1.1 The following activities are not to be located within proximity to the tree protection zones:

(a) machine excavation, including trenching.
(b) excavation for silt fencing.
(c) cultivation.
(d) storage.
(e) preparation of chemicals, including preparation of cement products.
(f) parking of vehicles and plants.
(g) refuelling.
(h) dumping of waste.
(i) washing down and cleaning of equipment.
(j) placement of fill.
(k) lighting of fires.
(l) soil level changes.
(m) temporary or permanent installation of utilities and signs, and
(n) physical damage to the tree

D.2 Temporary Access to TPZ

D.2.1 Temporary access into the TPZ area is permissible under the supervision of the Project Arborist. This may occur for many reasons, including the transport of construction materials or equipment around the subject site. Construction works within the TPZ are not permissible unless approved by the determining authority. Appropriate ground protection per C.4 will be required and signed off by the Project Arborist.

D.3 Alteration of TPZ Protection

D.3.1 Removal or alteration of the installed tree protection must not occur without the supervision and approval of the Project Arborist. The Project Arborist must assess the protective measures installed throughout the project and make adjustments where required.

D.4 Waste and Materials Storage

D.4.1 The storage or construction waste and materials must be located outside the calculated TPZ area of all retained trees per (d) of section D.1.1.

E. TPZ Construction Specifications

E.1 Demolition

E.1.1 The approved demolition of existing structures within or on the outer edge of the TPZ shall be conducted under the guidance and supervision of the Project Arborist.

E.1.2 Non-destructive methods are preferred, such as using a rock hammer to break up the structure into manageable pieces to avoid damage to roots underneath. The Project Arborist must approve the use of machinery within the TPZ. Where appropriate, such as for concrete slab removal, the machinery must be parked outside the TPZ area and reach within the TPZ area. Machinery must never make contact with any tree parts, and minimal scraping must occur to avoid root damage and compaction. If the machinery must be parked within the TPZ of retained trees due to space limitation, appropriate ground protection per section C.4 will be required by the Project Arborist. Wherever possible, footings or structures below grade should be retained to minimise soil disturbance.

E.2 Excavation Specifications

E.2.1 Excavation within the TPZ should be avoided and requires approval from the determining authority and supervision from the Project Arborist. Where excavation is required, it is generally approved to be conducted using non-destructive measures such as hand digging or pneumatic excavation (e.g. Hydrovac or Air Excavation).

E.2.2 Over-excavation is not permissible beyond the footprint of any structure within the TPZ of any retained tree. Should roots be identified as >25mm in diameter, works are to stop within the TPZ, and the Project Arborist is to inspect the roots and implement viable options to protect the tree.

E.3 Footings Specifications

E.3.1 Footings should be avoided within the TPZ. Approved footings must be of pier and beam style construction (unless otherwise approved by the determining authority) and installed under the supervision of a Project Arborist. Excavation must be non-destructive per specification E.2.1 to a minimum depth of 500mm or until rock. Mechanical means can be utilised beyond 500mm depth or rock, if required, on the condition that the diameter of the excavation does not exceed that completed non-destructively. All other parts must be fitted above existing ground levels.

E.3.2 Should the Project Arborist identify roots >25mm in diameter, the footing position must be changed to retain the root. This will require flexibility for final footing locations. 100mm distance must be allowed for the retention of significant roots.

E.4 Hard Landscaping Specifications

E.4.1 Hard landscaping features such as retaining walls, edgings, and footpaths are regarded as construction works and require approval from the determining authority for construction within the TPZ.

E.4.2 Any retaining walls to be constructed or renewed must be engineered to sustain retained trees and constructed with tree-sensitive footings (i.e. pier and beam) using tree-sensitive materials like timber sleepers and per the specifications of E.3.

E.4.3 The new surface and subsurface for footpaths, driveways and the like should be established at/above grade within the TPZ. Where grade changes are necessary, the soil must not be lowered by more than 50mm or increased by more than 100mm. The sub-base material should comply with section E.6.3.

E.5 Soft Landscaping Specifications

E.5.1 Soft landscaping works such as planting trees and vegetation or the installation of turf and other ground covers like mulch must be conducted under the guidance of the Project Arborist within the TPZ.

E.5.2 Any excavation within the TPZ must be conducted per E.2. Any fill required within the TPZ must be installed per E.6.

E.6 Grade Change Specifications

E.6.1 New surfaces and subsurface should be established at grade. Where grade changes are necessary, the soil must not be lowered by more than 50mm or increased by more than 100mm within the TPZ.

E.6.2 Fill materials within the TPZ should be avoided and require approval from the determining authority and guidance from the Project Arborist. The soil must not be increased by more than 100mm. A porous fill material such as crushed stones (e.g. Blue Metal 20-50mm should be used, and materials like road bases or crushed sandstone should be avoided. The fill material should be consolidated using a non-vibrating roller to prevent compaction. To prevent the stone from travelling into the subgrade, a permeable geotextile can be laid down first.

E.6.2 Lowering the existing grade within a TPZ should be avoided and requires approval from the determining authority and guidance from the Project Arborist. The soil must not be scraped/lowered by more than 50mm, ensuring that roots are not damaged or compacted in this process.

E.7 Root Protection Specifications

E.7.1 The Project Arborist must supervise approved works that may potentially expose or damage tree roots. The Project Arborist is to identify roots critical to tree stability. Should roots be identified as>25mm in diameter, works are to stop within the TPZ, and the Project Arborist is to inspect the roots and implement viable options to protect the tree.

E.7.2 Where the Project Arborist identifies roots to be pruned inside or at the outer edge of the TPZ, they should be pruned with a final cut to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaws or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for roots within the TPZ to be ' pruned' with machinery such as backhoes or excavators.

E.7.3 Where roots within the TPZ are exposed by manual/non-destructive excavation, temporary root protection should be installed to prevent them from drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged and kept moist when the root zone is exposed.

E.8 Underground Services Specifications

E.8.1 The installation of underground services (particularly pipes carrying water/moisture) should be routed outside the tree protection zone and is not permissible inside the SRZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or manually excavated trenches (refer to specification E.2) under the supervision of the Project Arborist. The directional drilling bore should be at least 600 mm deep, and entry and exit pits must be located outside the TPZ of all retained trees.

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F. TPZ Maintenance Specifications

F.1 Irrigation/Watering

F.1.1 Soil moisture levels within the TPZ should be regularly monitored. Temporary irrigation or watering is required to avoid tree stress from nearby construction works. Trees that will sustain root loss as a result of approved development works must be watered more frequently. When watering trees:

- Water deeply and less frequently rather than shallow and frequent watering.
- Water in the early morning or late afternoon to minimise water loss due to evaporation and ensure the tree has sufficient moisture during the day.
- Apply water directly to the root zone, where the tree can easily absorb it. Avoid wetting the tree's foliage unnecessarily.
- Use a soaker hose or drip irrigation to deliver water slowly and directly to the root zone, reducing runoff and wastage.
- Adjust the frequency and duration of watering based on weather conditions, soil type, and the tree's water requirements.

F.2 Weed Management

F.2.1 All weeds should be removed by hand without soil disturbance or controlled with the appropriate herbicide use.

F.3 Mulch

F.3.1 The area within the TPZ should be mulched unless otherwise advised by the Project Arborist. The mulch must be maintained to a depth of 100mm using material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g., garden beds or turf), mulch may not be required.

F.4 Damage to trees

F.4.1 All efforts must be made to avoid damage to the roots, trunk, branches, and foliage of trees conditioned to be retained; this includes damage from any of the activities listed in D.1.

F.4.2 Should any trees be damaged during construction, they must be promptly reported to the Project Arborist for immediate attention.

G. Documentation Requirements

G.1 TTP & Site Documentation

G.1.1 This Tree Protection Plan (TPP) is to be printed and kept on-site throughout the entire development project and referred to when conducting works within or on the outer edge of any TPZ.

G.2 Project Arborist Documentation

G.2.1 The Project Arborist must provide documentation pertaining to all milestones per section A.5. The documentation must include the date, time, details of works supervised, who supervised the works, details of protection measures assessed, details of tree health and condition, and certification that observations made within the inspection are compliant and undertaken in accordance with the relevant Australian Standards.

H. Ongoing Tree Management

H.1 Post-construction tree management

H.1.1 Management of trees post-construction ensures safety, environmental preservation, regulatory compliance, and the long-term sustainability of the development site and surrounding ecosystem. Best practices for general tree management have been included below:

H.2 Avoid Soil Compaction

H.2.1 Soil compaction harms trees, negatively affecting their root health and overall growth. Soil compaction refers to the compression and reduction of pore spaces between soil particles, leading to a decrease in air and water movement within the soil. Reasons to avoid compaction include:

- **Root Growth:** Compacted soil restricts root growth as it becomes difficult for tree roots to penetrate the soil. Roots need oxygen to function properly, and compacted soil reduces oxygen availability in the root zone, leading to stunted or limited root development.
- **Water Infiltration:** Compacted soil has reduced pore space, which hinders water infiltration and drainage. This can result in waterlogged soil, leading to root rot and other water-related problems, or drought stress, as water cannot reach the deeper layers of the soil during dry periods.
- **Nutrient Uptake:** Roots require access to nutrients in the soil to support tree growth and health. Soil compaction can limit the movement of nutrients to the root zone, leading to nutrient deficiencies and affecting the overall vitality of the tree.
- **Soil Aeration:** Soil compaction reduces soil aeration, which is crucial for soil organisms that aid decomposition and nutrient cycling. Poor soil aeration can lead to the buildup of toxic substances and the depletion of essential nutrients.
- **Stability**: Compacted soil can also compromise the stability of trees, especially during severe weather events like storms or heavy winds. Shallow, weak root systems due to compaction make trees more susceptible to uprooting.
- **Long-term Impact**: Soil compaction can have long-lasting effects, persisting for years or even decades if left untreated. This chronic stress weakens trees and makes them more susceptible to pests, diseases, and environmental stresses.
- **Tree Decline and Mortality**: The cumulative impact of soil compaction on root health, nutrient uptake, and overall tree vitality can eventually lead to tree decline and even death, especially if other stressors are present.

H.2.2 To prevent or mitigate soil compaction around trees, it is essential to implement proper management practices, such as continuously avoiding heavy machinery and foot traffic in the root zone, using mulch to protect the soil, and aerating the soil when necessary. Promoting healthy soil conditions will support the growth and longevity of trees in urban and natural environments.

H.3 Mulching

H.3.1 Mulch benefits trees for several reasons and proper mulching practices can significantly contribute to their health and well-being. Why mulch is good for trees:

- **Moisture retention**: Mulch helps retain soil moisture by reducing evaporation, especially during hot and dry periods. This benefits tree roots, which need a consistent water supply to remain healthy.
- **Weed suppression**: Mulch acts as a natural weed barrier, preventing weed growth around the tree. Weeds compete with trees for water and nutrients, so reducing their presence helps the tree thrive.
- **Temperature moderation**: Mulch insulates the soil, protecting tree roots from extreme temperature fluctuations, which can damage the root system.
- **Erosion control**: Mulch helps prevent soil erosion caused by wind and water, keeping the soil in place and protecting trees' shallow roots.

- **Nutrient cycling**: Organic mulch breaks down over time, adding nutrients to the soil and improving its fertility. These nutrients are then available to the tree roots.
- **Soil structure improvement:** Mulch enhances soil structure by promoting the activity of beneficial soil organisms, which aid in nutrient cycling and aeration.

H.3.2 The root collar is the area where the trunk meets the root system. It is essential to avoid piling mulch against the root collar for the following reasons:

- **Root rot**: Excessive moisture trapped against the root collar can create a favourable environment for fungal growth, leading to root rot. When mulch is piled against the trunk, it holds moisture against the bark, increasing the risk of decay and disease.
- **Bark damage:** Contact with damp mulch can lead to the softening of the bark, making the tree more susceptible to injury from lawnmowers, string trimmers, or other mechanical damage.

H.3.3 To correctly mulch around trees, follow these guidelines:

- Apply a layer of coarse eucalyptus mulch around the tree to a thickness of 100mm.
- Keep the mulch away from direct contact with the trunk, leaving a mulch-free area around the root collar.
- The mulch should resemble a doughnut shape, with the tree's trunk in the centre hole.
- Avoid using excessive amounts of mulch, as a thick layer can still create problems with excess moisture and root health.

H.4 Weed Removal

H.4.1 Removing weeds around a tree benefits the tree's health and growth. Weeds compete with trees for essential resources, and their presence can negatively impact the tree in several ways:

- **Competition for Water:** Weeds compete with trees for water, especially in dry conditions. They have shallow root systems that quickly absorb water from the soil, leaving less available for the tree's deeper and more extensive root system. Inadequate water availability can lead to drought stress and hinder the tree's growth and vitality.
- **Nutrient Competition**: Weeds also compete with trees for nutrients in the soil. They can absorb and utilise nutrients before the tree's roots can access them, leading to nutrient deficiencies, such as discoloured leaves, reduced growth, and overall decline.
- **Space and Light**: Weeds can grow rapidly and spread out, occupying valuable space around the tree. They can shade the tree's lower branches and foliage, reducing its access to sunlight. As trees depend on sunlight for photosynthesis, reduced light exposure can affect their ability to produce energy and food.
- **Soil Compaction**: In some cases, weeds with dense growth or invasive root systems can contribute to soil compaction, harming tree roots. Compacted soil restricts root growth and decreases air and water movement in the soil.
- **Pest and Disease Habitat**: Weeds can serve as hosts for pests and diseases that may affect the tree. They can harbour insects, fungi, and bacteria that could spread to the tree and cause health issues.

H.5 WATERING

H.5.1 Watering trees is essential during specific periods and circumstances:

- **Drought Conditions**: During periods of drought or extended dry spells, supplemental watering becomes crucial when rainfall is insufficient to meet the tree's water needs. Lack of water can stress the tree, leading to wilted leaves, reduced growth, and, in severe cases, tree decline or death.
- **Newly Planted Trees**: Newly planted trees have not yet established an extensive root system, making them more vulnerable to water stress. Watering is vital during the first couple of years after planting to help the tree develop a strong root system and establish itself in the new environment.
- **Hot and Dry Weather**: In hot and dry weather, trees lose water through transpiration (similar to sweat). If the rate of water loss exceeds the tree's

ability to take up water from the soil, it can lead to water stress. Providing supplemental water during such conditions helps the tree maintain its health.

- **Sandy or Rocky Soil**: Soils with high sand or rock content do not retain water well and can lead to rapid drainage, leaving trees susceptible to water stress. In such cases, regular watering may be necessary to compensate for the poor water-holding capacity of the soil.
- **Declining Trees:** If you notice signs of stress or decline in a tree, such as wilting leaves, discoloured foliage, or reduced growth, it may indicate insufficient water supply. In such cases, additional watering can help alleviate stress and promote recovery.
- **Specific Tree Species**: Some species have higher water requirements than others. Understanding the trees' water needs in your landscape will help you determine when and how much to water.

H.5.2 When watering trees, it is essential to follow these guidelines:

- Water deeply and less frequently rather than shallow and frequent watering.
- Water in the early morning or late afternoon to minimise water loss due to evaporation and ensure the tree has sufficient moisture during the day.
- Apply water directly to the root zone, where the tree can easily absorb it. Avoid wetting the tree's foliage unnecessarily.
- Use a soaker hose or drip irrigation to deliver water slowly and directly to the root zone, reducing runoff and wastage.
- Adjust the frequency and duration of watering based on weather conditions, soil type, and the tree's water requirements.

END

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Appendix 1: Glossary

Age Class	I = Immature (under 20% of life expectancy for species) SM =Semi-mature (20-50% of life expectancy for species) M =Mature (50-80% of life expectancy for species) OM = Overmature (over 80% of life expectancy for species)
Bark	All tissues outside the vascular cambium.
Botanical Name	A botanical name is the scientific name given to a particular plant species. It must conform to the system of botanical nomenclature as prescribed by the International Code of Nomenclature for algae, fungi, and plants (ICN).
Co-dominate stems/union	Stems or trunks of about the same size originating from the same position from the main stem.
Common Name	The local name given to a particular plant species, as opposed to the scientific Latin or Greek name, is used universally. (taxonomy) The colloquial name of a taxon or species that is in any language.
Crown	A tree's crown, also known as the canopy, refers to the uppermost part of the tree, comprising its branches, leaves, and twigs. The portion of the tree extends outward and upward from the trunk and represents the tree's overall shape and appearance.
Crown Lifting	The removal of the lower branches.
DBH	Diameter at breast height - The nominal trunk diameter at 1.4 m above ground level is determined from the trunk's circumference divided by pi.
DAB	Diameter at base - determined from the trunk's circumference divided by pi.
Decay	The process of degradation of woody tissues by micro-organisms.
Dripline	A tree's dripline refers to the outermost edge of its canopy or crown. It is the imaginary line on the ground directly below the outermost reach of the tree's branches. When it rains, waterfalls on the branches and leaves drip off and fall to the ground, typically along this drip line.
Deadwooding	Removal of dead branches from the crown of a tree
Declining tree	A declining tree is a tree experiencing a gradual and sustained deterioration in health and Vigor. It shows signs of stress and exhibits various symptoms of decline over time. Declining trees may eventually reach a point where they cannot recover, leading to their eventual death if not addressed appropriately.
ELE	Estimated Life Expectancy (ELE) Long = > 40 years (Long) Medium = 15 - 40 years (Medium) Short = 5 - 15 years (Short) Remove = < 5 years (Remove)
Epicormic shoots	Shoots produced from epicormic buds at the cambium of trunks or branches.
Final cut	This is the final cut in the process of the reduction or removal of branches and stems. This final cut aims to reduce the risk of microorganism infection according to branch attachment and compartmentalisation principles to encourage even wound closure.
Flush cut	A flush cut to a tree refers to cutting a branch or limb completely flush with the main trunk or a larger branch. This means the cut is made very close to the point where the branch attaches to the tree, leaving no branch collar or branch bark ridge remaining.
Hanging branches	Unattached, cut or broken branches that are caught in the crown.
Height (m)	An estimate of a tree's overall height
Minor encroachment	If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.
Major encroachment	If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. This may require root investigation by non-destructive methods.
Pathogen	A disease-causing organism.

Project arborist	The person responsible for carrying out the tree assessment, report preparation, consultation with designers, specifying tree protection measures, monitoring and certification. The project arborist will be suitably experienced and competent in arboriculture, having acquired through training, qualification (minimum Australian Qualification Framework (AQF) Level 5, Diploma of Horticulture (Arboriculture)) and equivalent experience, the knowledge and skills enabling that person to perform the tasks required by this Standard.
Remedial pruning	Removing damaged, diseased or lopped branches back to undamaged tissue to induce the production of shoots from latent or adventitious buds, from which a new crown will be established.
Sparse crown	A sparse crown on a tree refers to a canopy or foliage that is thin, open, and has reduced density compared to a typical healthy tree of the same species and age. A tree with a sparse crown has fewer branches, leaves, and twigs, which can result in a less vibrant and full appearance.
Spread (m)	An estimate of the crown length from the longest driplines.
Structural root zone (SRZ) radius	The area around the base of a tree is required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.
Structure	Very good (VG) = good structural integrity, no evidence of instability, no defects or damage Good (G) = good structural integrity, minor structural defects that can be remedied Fair (F) = fair structural integrity, minor-moderate defects that can be remedied or managed Poor (P) = poor structural integrity, major structural defects that cannot be remedied
Tree	Long-lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).
Tree protection zone (TPZ) radius	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.
Tree-sensitive construction measures	Tree-sensitive construction measures such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling can minimise the impact of encroachment. When siting a structure near a tree, the future growth of the tree, both above and below ground, should be considered. Precautions should be taken at the planning and design stage to minimise potential conflict between trees and new structures.
Vigour	The ability of a tree to sustain its life processes. In this document, the term ' vigour' is synonymous with commonly used terms such as ' health ' and 'vitality '. Very good (VG) = form typical of species, normal foliage size, colour and density, no pests or disease, little deadwood and no epicormic shoots Good (G) = form typical of species, normal foliage size, colour and density, no pests or disease, little deadwood and epicormic shoots Fair (F) = form typical of species, fair health and vigour, maybe slightly thinning/sparse, moderate levels of deadwood and epicormic shoots, low to moderate pest and disease. Poor (P) = abnormal foliage size, colour and density, major levels of deadwood and epicormic shoots, moderate to severe pest infestation

Appendix 2: Method

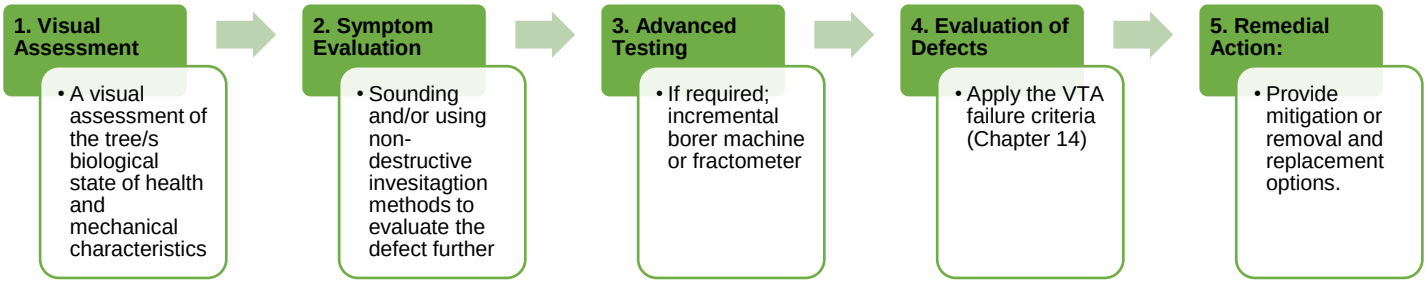
Visual Tree Assessment (Mattheck, D, & Breloer, H 1994)

Introduction

The Body Language of Trees: A Handbook for Failure Analysis is a publication by Claus Mattheck and Heinz Breloer (1994). The book is a comprehensive guide to tree failure analysis and includes a detailed Visual Tree Assessment (VTA) method description. The VTA method is based on observing trees' biological and mechanical characteristics and is designed to detect and diagnose defects and weaknesses in tree structure. The VTA method is a step-by-step process for observing and interpreting the signs and symptoms of tree defects. It includes various diagnostic tools and techniques, such as using sonic and resistance measurements to detect decay.

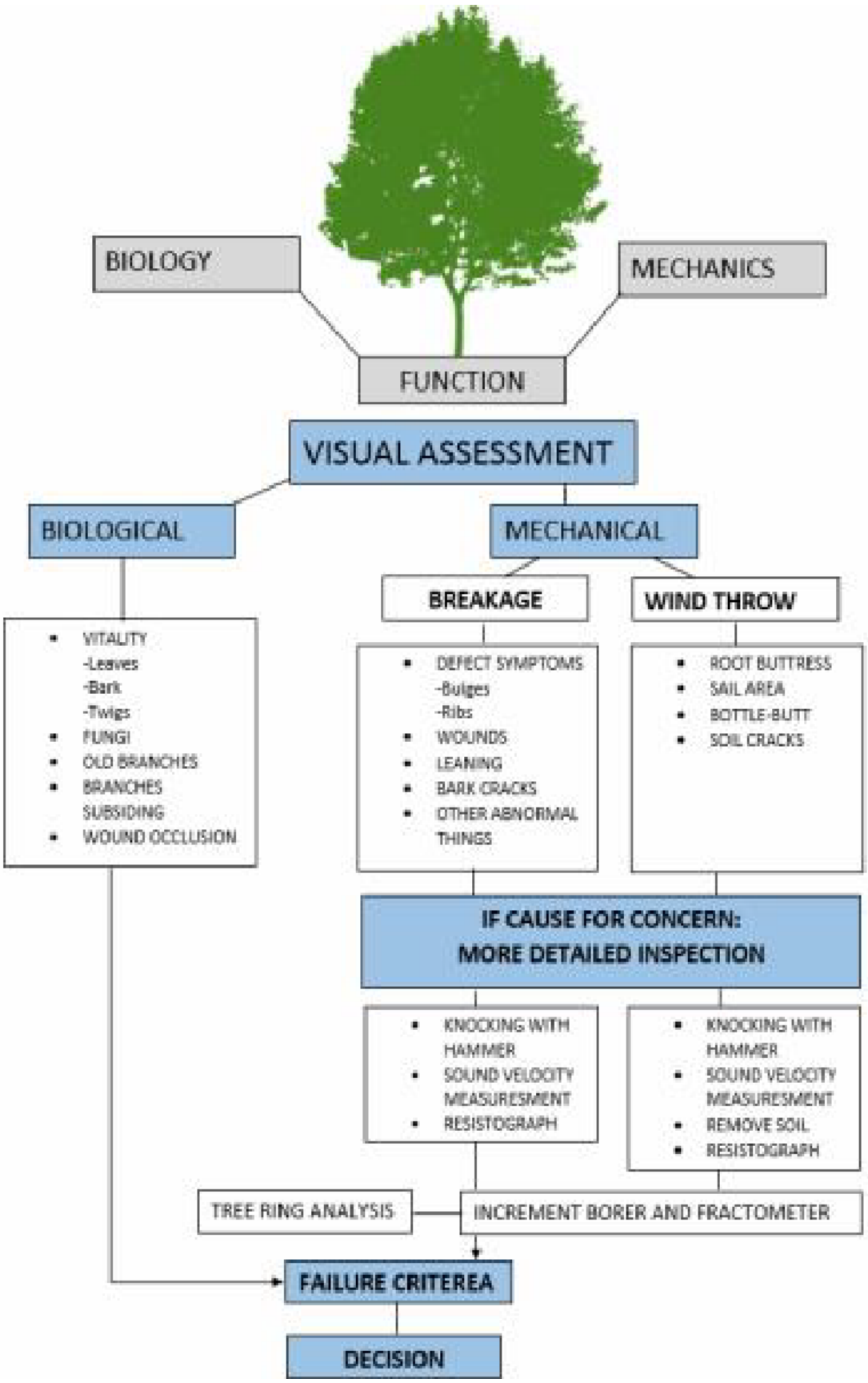
The VTA Process

Chapter 8.4 of “The body language of trees” (Mattheck, C., & Breloer, H. 1994) lists the VTA process as (page 118):



Biological and mechanical characteristics:

VTA Biological Characteristics Health & Vigour	VTA Mechanical Characteristics Structural / Condition
• Suppressed species • Phototropic • Foliage size and colour • Sparse crown – photosynthetic area • Live crown ratio (%) • Defoliation • Dieback • Epicormic growth • Deadwood • Crown thinning • Bark delaminating/degraded/wounded • Saprophytes – cambial zone / periderm • Stem splits (increment growth) • Branches crossing/rubbing • Fauna browsing/damage • Kino or resin exudation • Pest (insect) and disease (pathogen) • Basal suckers • Soil compaction	• Deadwood (%) • Fungal fruiting bodies • Stem cracks/fractures • Stem taper • Subsiding branches • Excessive end weight • Branch attachments • Weak unions • Hangers • Inclusions – branch/stem • Codominant – crown/base • Previous failures • Pruning history – resulting health wounds/lesions/cankers cavities/decay/hollows • Stem bulges/swelling/ribs • Mechanical damage – stems / roots • Excessive lean / instability • Root inclusions • Root zone - soil upheaval



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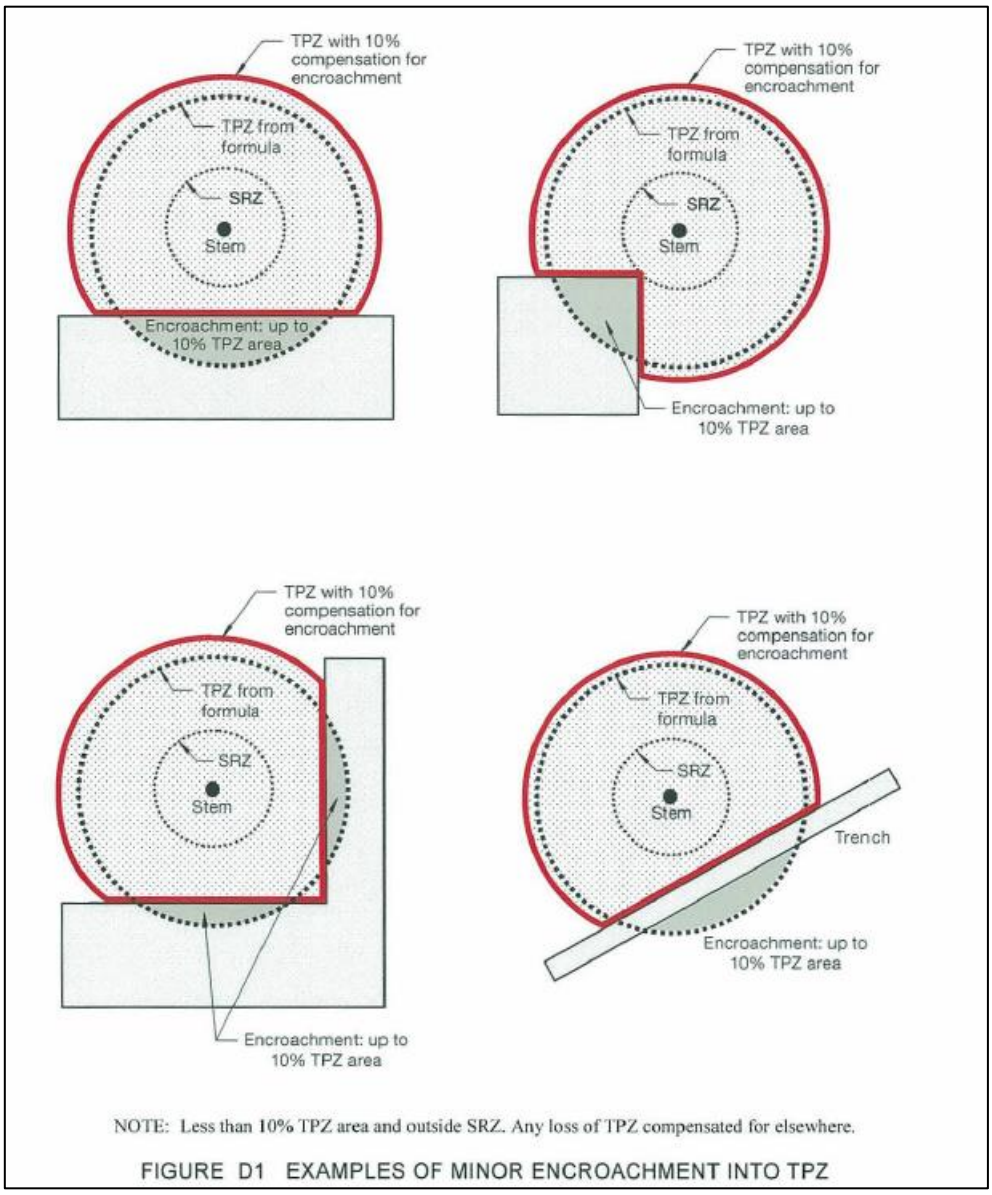
Tree Protection Zone (TPZ) & Structural Root Zone (SRZ) Calculations

Per AS 4970-2009 Protection of Trees on Development Sites, the radius of the TPZ is calculated for each tree by multiplying its DBH x 12 (AS4970-2009 Section 3.2). The radius is measured from the centre of the stem at ground level. For multi-stemmed trees the formula used is RTPZ = √[(DBH1)2 + (DBH2)2 + (DBH3)2].

A TPZ should not be less than 2 m nor greater than 15 m (except where crown protection is required). Clause 3 .3 covers variations to the TPZ. The TPZ of palms, other monocots, cycads and tree ferns should not exceed 1m outside the crown projection.

Per AS 4970-2009 Protection of Trees on Development Sites, the SRZ radius is calculated by measuring the diameter of the stem close to ground level, just above the basal flare (D). SRZ = (Dx50)0.42 x 0.64 measured radially from the centre of the stem.

Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D 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

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

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 a planted locally indigenous specimen and is rare or uncommon in the local area, of botanical interest, or of substantial age.
- The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community on the Council's 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 contributes 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 to the taxa in situ – a tree is appropriate to the site conditions.

Medium Significance in landscape

- The tree is in fair-good condition and good or low vigour.
- The tree has a typical or atypical form of the species.
- The tree is a locally indigenous or a common species with its taxa commonly planted in the local area.
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings when viewed from the street.
- The tree contributes fairly 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.

Low Significance in landscape

- The tree is in fair-poor condition and has good or low vigour.
- The tree has a form atypical of the species.
- The tree is not visible or is particularly visible from surrounding properties as obstructed by other vegetation or buildings.
- The tree provides a minor contribution or hurts the visual character and amenity of the local area.
- The tree is a young specimen that may or may not have reached the dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can be easily replaced by a suitable specimen.
- The tree's growth is severely restricted by above or below-ground influences, unlikely to reach a dimension typical of the taxa in situ – a tree is appropriate 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 a defect that has the potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

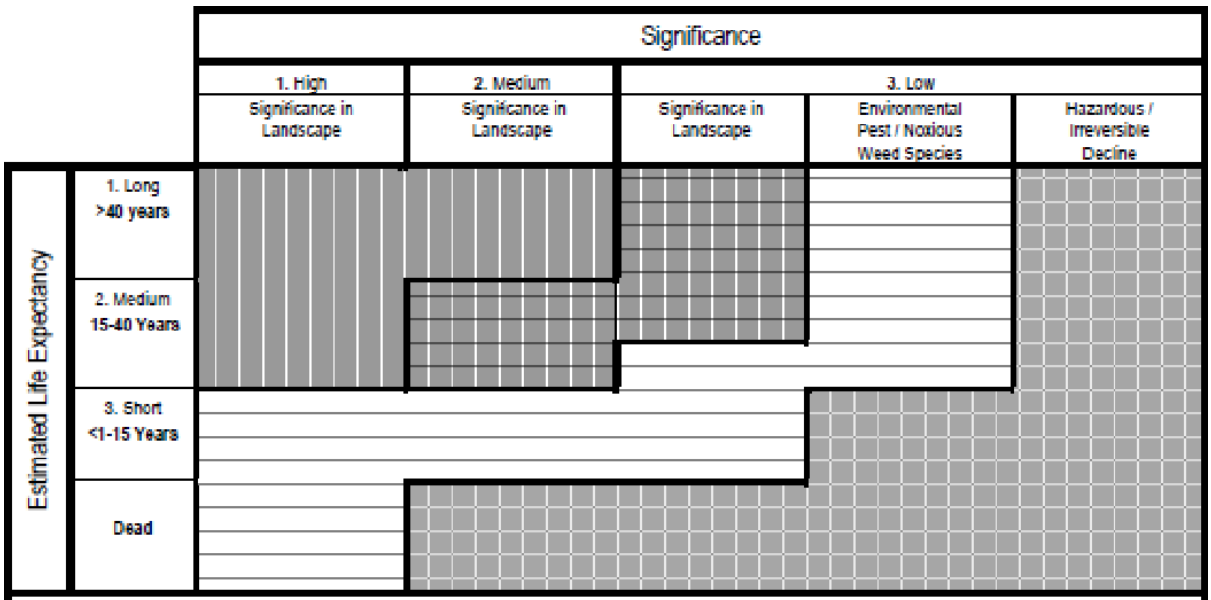
- The tree is an Environment Pest Species due to its invasiveness or poisonous/allergenic properties.
- The tree is declared an anxious weed by legislation.

Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and 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, they can be applied to a monocultural stand, e.g., hedge.

IACA Retention of a Tree, Assessment Rating System (STARS)



Legend for Matrix Assessment

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

Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.

Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.

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

Appendix 3: References

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