

Arboricultural Impact Assessment

Location:

92-96 Railway Crescent and 27-37 Kraft Court, Broadmeadows

Report Commissioned by:

Blur Architecture

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1 Introduction

Arbkey has been engaged by Blur Architecture to provide an Arboricultural Impact Assessment for trees likely to be affected by a proposed development at 92-96 Railway Crescent and 27-37 Kraft Court, Broadmeadows. Arboricultural Impact Assessments are a procedure for determining the viability of trees at the design and review stage of a project. For the report arbkey has:

- Identified and assessed the trees, providing their location, species, dimensions, useful life expectancy and health and structural condition.
- Allocated each tree an arboricultural value, indicating its merit for retention throughout nearby disturbance.
- Calculated the size of the Tree Protection Zone (TPZ) in accordance with Australian Standard 4970, Protection of Trees on Development Sites.
- Calculated and provided comment regarding the impact of the proposed development to the trees TPZs and assessed the suitability for retention of all trees against the current development plans.
- Provided recommendations to protect any trees through the proposed developments.

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2 Site Details

The subject site is a series of contiguously owned properties separated by a council-managed drainage reserve (Figure 1). The properties are currently utilised as education/childcare facilities, carparking and storage. Canopy trees are not generally a feature of the subject site, but occasionally are present within the surrounding road reserves and private property.



Figure 1: Subject site – Kraft Court frontage

2.1 Development Proposal

Demolition of the existing buildings and construction of an expanded school facility is proposed.

2.2 Planning and Policy Context

The subject site is located within Commercial 2 Zone of the Hume Planning Scheme (DEWLP 2023). The vegetation protection related planning or policy controls for the site and how they affect the assessed trees has been provided in Table 1.

Table 1: Vegetation controls at site

Planning/Policy Control	Applied to site?	Overview of control	Trees affected
52.17 Native Vegetation	Yes	A permit, and provision of an offset, is required to remove or destroy non-planted, locally indigenous vegetation	None (As confirmed by aerial imagery, the indigenous vegetation at the site is clearly planted for amenity purposes. Due to this factor these trees are exempt to the permit requirements of 52.17)

Due to their ownership, any trees within adjacent third-party owned property must remain viable throughout works at the subject site unless under agreement with the tree's respective owner. Modification of trees in adjacent property may also be subject to permit approval.

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2.3 Site Map

A site map detailing existing conditions and tree locations has been provided in Appendix 1: Site Map

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3 Methodology

On the 21 August 2023, Lachlan Scott undertook inspection of trees greater than 3m in height located at, or with tree protection zones (AS4970 2009) likely to intersect the property at, 92-96 Railway Crescent and 27-37 Kraft Court, Broadmeadows. The following information was collected for the trees:

- Tree Species
- Tree Location
- Height (m)
- Crown Spread (m)
- Diameter at Breast Height (DBH) at 1.4m (cm)
- Diameter at Base (DAB) at just above the root flare (cm)
- Health
- Structure
- Significance
- Photographs of tree

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Only a ground based visual inspection was undertaken of all trees according to the principles of Visual Tree Assessment and tree hazard assessment described in Harris, Clark and Matheny (1999) and Mattheck and Breloer (1994).

Tree location has been derived using a feature survey provided by the client or if not present aligned using an RTK corrected GNSS receiver.

Height was measured on site using an impulse laser accurate to +/- 30cm. Crown spread values or drawings are indicative of crown size only, not shape or form.

A diameter tape was used to measure DBH. To prevent trespass, DBH has been estimated on adjacent sites.

Health, Structure and Significance are qualitative values derived from visual indicators and the authors experience and qualifications.

Encroachment of TPZs by the development has been calculated using GIS software.

Full data collection definitions are available in Appendix 6: Data Definitions.

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3.1 Documents Reviewed

Table 2: Documents reviewed to assist in the compilation of this report

Document Name	DWG/Document #	Author	Document Description	Date compiled/drawn
SM 0322 PB	SM 0322	Blur Architecture	Site Plans	Edited sheets received 10 November 2023

4 Observations

4.1 Tree Details

34 trees were assessed, nine (9) on the site itself and 25 within adjacent third-party managed property (Table 3). Full details of the assessed trees have been provided in Appendix 2: Tree Details.

Table 3: Count of assessed species and their respective species origin

Genus Species	Common Name	Species Origin	Count of Trees	Tree IDs
<i>Acacia melanoxylon</i>	Blackwood	Indigenous	11	1, 3, 6, 9, 12, 13, 14, 15, 16, 18, 19
<i>Syzygium australe</i>	Brush Cherry	Australian Native	6	4, 5, 7, 8, 10, 11
<i>Eucalyptus sideroxylon</i>	Red Ironbark	Australian Native	4	25, 26, 27, 33
<i>Eucalyptus cladocalyx</i>	Sugar Gum	Australian Native	3	30, 31, 32
<i>Melaleuca styphelioides</i>	Prickly Paperbark	Australian Native	3	22, 23, 24
<i>Allocasuarina torulosa</i>	Forest Oak	Australian Native	2	17, 20
<i>Olea europaea</i>	European Olive	Exotic	2	28, 34
<i>Eucalyptus leucoxylon</i>	Yellow Gum	Australian Native	1	21
<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic	1	29
<i>Platanus xacerifolia</i>	London Plane	Exotic	1	2

5 Discussion

5.1 Arboricultural Value

All the assessed trees have been attributed an arboricultural value (Table 4). Arboricultural value is a calculated rating indicating the arboricultural merit of the tree for retention through any nearby disturbance. It is a qualitative combination of the trees ULE and significance values. Trees of higher arboricultural value should be prioritised for retention through works that may impact trees. Conversely, trees of low or no arboricultural value can often be removed to facilitate a development with little or no effect on wider landscape value.

Trees attributed an arboricultural value of 'Third Party Ownership' are located on adjacent land to the assessment. It is assumed that the owner of the tree attributes it a 'High' arboricultural value and requires its retention in the landscape.

Table 4: Overview of arboricultural value

Arboricultural Value	Count	Tree IDs
Low	9	4, 5, 7, 8, 10, 11, 21, 29, 34
Third Party Ownership	25	1, 2, 3, 6, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33

5.2 Tree Protection Zone (TPZ) and Structural Root Zone (SRZ)

AS4970 (2009) specifies areas drawn radially from each tree's stem which indicate the area required for its stability (SRZ) and viability (TPZ) throughout nearby disturbance such as development. Further information on TPZs and SRZs has provided in Appendix 7: Tree Protection Zones and Encroachment

5.2.1 TPZ and SRZ details

TPZ and SRZ details for all trees has been supplied in Appendix 3: TPZ and SRZ details.

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5.3 Arboricultural Impact, TPZ Encroachment and Viability

5.3.1 Tree removal

17 trees are proposed for removal under the current development plans (Table 5). Planning permit approval is not required for the removal of these trees. 10 of the trees proposed for removal, Trees 1, 6, 13-19, 26 and 27, are council managed street trees. Permission from these trees' manager, Hume City Council, will be required prior to their removal.

Table 5: Trees proposed for removal, arboricultural value, and permit requirements.

Tree ID	Genus Species	Common Name	Arboricultural Value	Height (m)	Total DBH (cm)	DAB (cm)
1	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	4	8	10
4	<i>Syzygium australe</i>	Brush Cherry	Low	3	7	9
5	<i>Syzygium australe</i>	Brush Cherry	Low	3	7	9
6	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	3	7	9
7	<i>Syzygium australe</i>	Brush Cherry	Low	3	7	9
8	<i>Syzygium australe</i>	Brush Cherry	Low	3	7	9
10	<i>Syzygium australe</i>	Brush Cherry	Low	3	7	9
11	<i>Syzygium australe</i>	Brush Cherry	Low	3	7	9
13	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	2	8	7
14	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	4	9	14
15	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	5	9	13
16	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	5	12	14
18	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	3	8	11
19	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	3	9	13
21	<i>Eucalyptus leucoxylon</i>	Yellow Gum	Low	3	7	9
26	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Third Party Ownership	7	21	26
27	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Third Party Ownership	8	27	35

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Figure 2: Tree 14 is a council managed street tree. Permission from its manager, Hume City Council, will be required prior to its removal.

5.3.2 Impact of design on trees to be retained

To assess the viability of the trees to be retained throughout the design's implementation, their TPZ and SRZ has been calculated and mapped as per AS4970 (2009). Where a development's footprint overlaps a TPZ it is termed 'encroachment' within AS4970 (2009).

12 trees have TPZ encroached by the proposed development's footprint (Table 6).

One (1) tree, Tree 32, has a TPZ encroached by less than 10% of its respective area by the proposed development footprint. Where encroachment of a respective TPZ is limited to less than 10% of its area it is termed 'Minor Encroachment'. Minor encroachment and corresponding variations to a TPZ are considered acceptable while the lost area is compensated elsewhere while still being contiguous with the TPZ. Tree 32 is expected to remain viable throughout the implementation of the design.

11 trees, Trees 2, 3, 9, 17, 20, 22, 23, 24, 28, 30, and 31, have TPZ encroached by more than 10% of their respective area by the proposal. Where encroachment of the standard TPZ exceeds 10% of a TPZ it is termed 'Major Encroachment'. Major encroachment and corresponding variations to a TPZ can be considered acceptable providing the following conditions are met:

- The project arborist demonstrates the tree will remain viable through the encroachment.
- The lost area is compensated elsewhere while still being contiguous with the TPZ.

Table 6: Trees to be retained with TPZ encroached by development footprint (AS4970 2009)

Tree ID	Genus Species	Common Name	Arboricultural Value	TPZ Encroachment (%)	SRZ Encroachment?	Encroachment Classification
2	<i>Platanus xacerifolia</i>	London Plane	Third Party Ownership	25.9	Yes	Major
3	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	10.4	Yes	Major
9	<i>Acacia melanoxylon</i>	Blackwood	Third Party Ownership	17.3	Yes	Major
17	<i>Allocasuarina torulosa</i>	Forest Oak	Third Party Ownership	41.9	Yes	Major
20	<i>Allocasuarina torulosa</i>	Forest Oak	Third Party Ownership	39.1	Yes	Major
22	<i>Melaleuca styphelioides</i>	Prickly Paperbark	Third Party Ownership	100	Yes	Major
23	<i>Melaleuca styphelioides</i>	Prickly Paperbark	Third Party Ownership	41.2	Yes	Major
24	<i>Melaleuca styphelioides</i>	Prickly Paperbark	Third Party Ownership	46.7	Yes	Major
28	<i>Olea europaea</i>	European Olive	Third Party Ownership	13.5	Yes	Major
30	<i>Eucalyptus cladocalyx</i>	Sugar Gum	Third Party Ownership	14.5	Yes	Major
31	<i>Eucalyptus cladocalyx</i>	Sugar Gum	Third Party Ownership	17.6	No	Major
32	<i>Eucalyptus cladocalyx</i>	Sugar Gum	Third Party Ownership	1.3	No	Minor

The remaining trees to be retained are not encroached by the design footprint and will remain viable throughout its implementation.

5.3.3 TPZ, SRZ and Encroachment Map

Maps detailing the TPZ, SRZ and Encroachment have been provided in Appendix 4: TPZ, SRZ and Encroachment Map.

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5.3.4 Mitigation measures

Where a tree's TPZ is majorly encroached by a development or disturbance, the project arborist must, if possible, demonstrate that the trees will remain viable throughout the implementation of the design or disturbance.

5.3.4.1 Trees 3 and 9

Trees 3 and 9 are recently planted council managed street trees with TPZ majorly encroached by proposed car parking areas. Considering their reasonably low-level major encroachment (<20%) and their semi-mature state, if the excavation within their TPZ is undertaken sensitively, it is expected they would remain viable throughout the works. To maintain the viability of Trees 3 and 9 throughout the proposal's implementation, any excavation within their TPZ must be directed and supervised by an arborist qualified to a minimum of AQF level V in arboriculture.

5.3.4.2 Trees 2, 17, 20, 22, 23 and 24

Trees 2, 17, 20, 22, 23 and 24 are third party managed trees with TPZ majorly encroached by a proposed driveway. Considering this driveway is to be installed at the existing soil grade and out of materials permeable to water and air, if properly protected, Trees 2, 17, 20, 22, 23 and 24 will remain viable throughout. It is critical that the materials and method of the works surrounding these trees in undertaken in accordance with a Tree Protection Management Plan (TPMP) prepared prior to the works in accordance with AS4970 (2009).

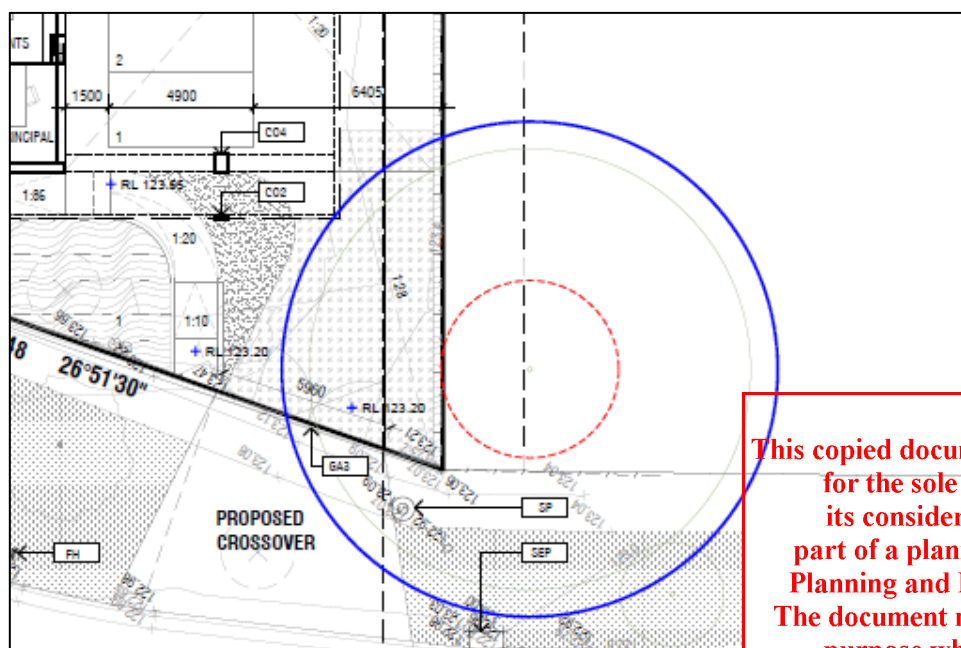


Figure 3: Hatching on site plans shows permeable surface to be installed within TPZ of Tree 2.

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5.3.4.3 Trees 28, 30 and 31

Trees 28, 30, and 31 are third party managed trees with TPZ majorly encroached by the proposed basement carparking footprint. Considering these trees reasonably low-level major encroachment (<20%) and their species' resilience to below ground disturbance, it is considered likely they would remain viable throughout the works without the implementation of encroachment mitigation measures. To ensure that any roots that have incurred into the subject site are correctly severed, any excavation within their TPZ must be directed and supervised by an arborist qualified to a minimum of AQF level V in arboriculture.

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6 Conclusions and Recommendations

Demolition of the existing buildings and construction of an expanded school facility is currently proposed at 92-96 Railway Crescent and 27-37 Kraft Court, Broadmeadows. Arbkey has been engaged to assess the impact of the development on the trees at or adjacent to the site. 34 trees were assessed, nine (9) on the site and 25 within adjacent property. 17 of these trees are proposed for removal under the current development plans. Planning permit approval is not required for the removal of these trees. 10 of the trees proposed for removal, Trees 1, 6, 13-19, 26 and 27, are council managed street trees. Permission from these trees' manager, Hume City Council, will be required prior to their removal.

To assess the viability of the trees to be retained throughout the design's implementation, their tree protection zone (TPZ) and structural root zone (SRZ) has been calculated and mapped as per AS4970 (2009). Where a development's footprint overlaps a TPZ it is termed 'encroachment' within AS4970 (2009). 12 of the trees to be retained have TPZ encroached by the proposed design footprint.

One (1) tree, Tree 32, has a TPZ encroached by less than 10% of its respective TPZ area, a level considered generally permissible under AS4970 (2009). Tree 32 will remain viable throughout the implementation of the proposal.

11 trees, Trees 2, 3, 9, 17, 20, 22, 23, 24, 28, 30, and 31, have TPZ encroached by greater than 10% of their respective TPZ area, a level considered major and generally intolerable under AS4970 (2009).

Trees 2, 17, 20, 22, 23 and 24 are third party managed trees with TPZ majorly encroached by a proposed driveway. Considering this driveway is to be installed at the existing soil grade and out of materials permeable to water and air, if properly protected, Trees 2, 17, 20, 22, 23 and 24 will remain viable throughout. It is critical that the materials and method of the works surrounding these trees in undertaken in accordance with a Tree Protection Management Plan (TPMP) prepared prior to the works in accordance with AS4970 (2009).

Trees 3, 9, 28, 30 and 31 are third party managed trees with TPZ majorly encroached by proposed parking areas. Considering these trees reasonably low-level major encroachment (<20%) and their species resilience to below ground disturbance, if the excavation within their TPZ is undertaken sensitively, it is expected they would remain viable throughout the works. To maintain these tree's viability throughout the works, any excavation within their TPZ must be directed and supervised by an arborist qualified to a minimum of AQF level V in arboriculture.

The remaining trees to be retained are not encroached by the design footprint and will remain viable throughout its implementation. It is recommended that:

- Trees that are unable to be retained through the development are removed prior to the commencement of construction but after the approval of final plans by the relevant authority.
- Prior to the commencement of any construction or demolition activities:
 - A Tree Protection Management Plan (TPMP) in accordance with AS4970 (2009) is prepared outlining the procedure for protecting any impacted trees throughout the implementation of the endorsed design.

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8 Appendix 1: Site Map



- LEGEND**
- Assessed Trees**
- High arboricultural value
 - Medium arboricultural value
 - Low or no arboricultural value
 - Third party ownership
- DEWLP**
- Property Boundaries
 - Roads

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Figure 4: Site Map – Existing Condition

9 Appendix 2: Tree Details

Table 7: Details of assessed trees

Tree ID	Genus Species	Common Name	Species Origin	Height (m)	Crown Spread (m)	Total DBH (cm)	DAB (cm)	Health	Structure	Maturity	ULE (years)	Significance	Arboricultural Value	Notes
1	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	4	2	8	10	Good	Good	Immature	15 to 40	Third Party Ownership	Third Party Ownership	
2	<i>Platanus xacerifolia</i>	London Plane	Exotic	15	13	70	80	Good	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	
3	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	4	2	9	12	Good	Good	Immature	15 to 40	Third Party Ownership	Third Party Ownership	
4	<i>Syzygium australe</i>	Brush Cherry	Australian Native	3	2	7	9	Good	Fair	Immature	15 to 40	Low	Low	Group of 6 planted in childcare yard
5	<i>Syzygium australe</i>	Brush Cherry	Australian Native	3	2	7	9	Good	Fair	Immature	15 to 40	Low	Low	Group of 6 planted in childcare yard
6	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	3	1	7	9	Good	Good	Immature	15 to 40	Third Party Ownership	Third Party Ownership	
7	<i>Syzygium australe</i>	Brush Cherry	Australian Native	3	2	7	9	Good	Fair	Immature	15 to 40	Low	Low	Group of 6 planted in childcare yard
8	<i>Syzygium australe</i>	Brush Cherry	Australian Native	3	2	7	9	Good	Fair	Immature	15 to 40	Low	Low	Group of 6 planted in childcare yard
9	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	5	2	11	15	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
10	<i>Syzygium australe</i>	Brush Cherry	Australian Native	3	2	7	9	Good	Fair	Immature	15 to 40	Low	Low	Group of 6 planted in childcare yard
11	<i>Syzygium australe</i>	Brush Cherry	Australian Native	3	2	7	9	Good	Fair	Immature	15 to 40	Low	Low	Group of 6 planted in childcare yard
12	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	4	3	11	14	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
13	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	2	1	8	7	Fair	Poor	Immature	<5	Third Party Ownership	Third Party Ownership	Not stable
14	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	4	2	9	14	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
15	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	5	2	9	13	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	

Tree ID	Genus Species	Common Name	Species Origin	Height (m)	Crown Spread (m)	Total DBH (cm)	DAB (cm)	Health	Structure	Maturity	ULE (years)	Significance	Arboricultural Value	Notes
16	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	5	2	12	14	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
17	<i>Allocasuarina torulosa</i>	Forest Oak	Australian Native	8	5	32	36	Good	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	Poor visibility
18	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	3	2	8	11	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
19	<i>Acacia melanoxylon</i>	Blackwood	Indigenous	3	3	9	13	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
20	<i>Allocasuarina torulosa</i>	Forest Oak	Australian Native	7	4	22	26	Fair	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	
21	<i>Eucalyptus leucoxylon</i>	Yellow Gum	Australian Native	3	3	7	9	Fair	Fair	Immature	15 to 40	Low	Low	
22	<i>Melaleuca styphelioides</i>	Prickly Paperbark	Australian Native	7	6	57.88	65	Fair	Fair	Mature	5 to 15	Third Party Ownership	Third Party Ownership	
23	<i>Melaleuca styphelioides</i>	Prickly Paperbark	Australian Native	9	6	53.39	65	Fair	Fair	Mature	5 to 15	Third Party Ownership	Third Party Ownership	
24	<i>Melaleuca styphelioides</i>	Prickly Paperbark	Australian Native	7	6	57.01	65	Good	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	
25	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Australian Native	7	3	16	19	Good	Good	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	
26	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Australian Native	7	3	21	26	Good	Good	Semi-mature	>40	Third Party Ownership	Third Party Ownership	
27	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Australian Native	8	4	27	35	Good	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	Precious stem failure at 5m
28	<i>Olea europaea</i>	European Olive	Exotic	3	3	12	15	Good	Fair	Semi-mature	15 to 40	Third Party Ownership	Third Party Ownership	Only olive on boundary to reach 3m
29	<i>Phoenix canariensis</i>	Canary Island Date Palm	Exotic	5	6	70	80	Good	Good	Semi-mature	15 to 40	Low	Low	Dbh estimate
30	<i>Eucalyptus cladocalyx</i>	Sugar Gum	Australian Native	7	3	13	16	Good	Good	Semi-mature	>40	Third Party Ownership	Third Party Ownership	
31	<i>Eucalyptus cladocalyx</i>	Sugar Gum	Australian Native	18	15	70	80	Good	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	
32	<i>Eucalyptus cladocalyx</i>	Sugar Gum	Australian Native	20	11	70	80	Fair	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	Location triangulated with hypso
33	<i>Eucalyptus sideroxylon</i>	Red Ironbark	Australian Native	13	7	39	43	Good	Fair	Mature	15 to 40	Third Party Ownership	Third Party Ownership	
34	<i>Olea europaea</i>	European Olive	Exotic	3	3	12.12	14	Good	Fair	Semi-mature	>40	Low	Low	

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10 Appendix 3: TPZ and SRZ details

Table 8: TPZ and SRZ details of assessed trees (AS4970 2009)

Tree ID	Genus Species	Common Name	SRZ radius (m) AS4970	TPZ radius (m) AS4970	TPZ Area AS 4970 (m ²)
1	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
2	<i>Platanus xacerifolia</i>	London Plane	3.01	8.4	221.671
3	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
4	<i>Syzygium australe</i>	Brush Cherry	1.5	2	12.566
5	<i>Syzygium australe</i>	Brush Cherry	1.5	2	12.566
6	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
7	<i>Syzygium australe</i>	Brush Cherry	1.5	2	12.566
8	<i>Syzygium australe</i>	Brush Cherry	1.5	2	12.566
9	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
10	<i>Syzygium australe</i>	Brush Cherry	1.5	2	12.566
11	<i>Syzygium australe</i>	Brush Cherry	1.5	2	12.566
12	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
13	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
14	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
15	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
16	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
17	<i>Allocasuarina torulosa</i>	Forest Oak	2.15	3.84	46.325
18	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
19	<i>Acacia melanoxylon</i>	Blackwood	1.5	2	12.566
20	<i>Allocasuarina torulosa</i>	Forest Oak	1.88	2.64	21.896
21	<i>Eucalyptus leucoxylon</i>	Yellow Gum	1.5	2	12.566
22	<i>Melaleuca styphelioides</i>	Prickly Paperbark	2.76	6.95	151.747
23	<i>Melaleuca styphelioides</i>	Prickly Paperbark	2.76	6.41	129.082
24	<i>Melaleuca styphelioides</i>	Prickly Paperbark	2.76	6.84	146.981
25	<i>Eucalyptus sideroxylon</i>	Red Ironbark	1.65	2	12.566
26	<i>Eucalyptus sideroxylon</i>	Red Ironbark	1.88	2.52	19.95
27	<i>Eucalyptus sideroxylon</i>	Red Ironbark	2.13	3.24	32.979
28	<i>Olea europaea</i>	European Olive	1.5	2	12.566
29	<i>Phoenix canariensis</i>	Canary Island Date Palm	0	4	50.265
30	<i>Eucalyptus cladocalyx</i>	Sugar Gum	1.53	2	12.566
31	<i>Eucalyptus cladocalyx</i>	Sugar Gum	3.01	8.4	221.671
32	<i>Eucalyptus cladocalyx</i>	Sugar Gum	3.01	8.4	221.671
33	<i>Eucalyptus sideroxylon</i>	Red Ironbark	2.32	4.68	68.808
34	<i>Olea europaea</i>	European Olive	1.5	2	12.566

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11 Appendix 4: TPZ, SRZ and Encroachment Map

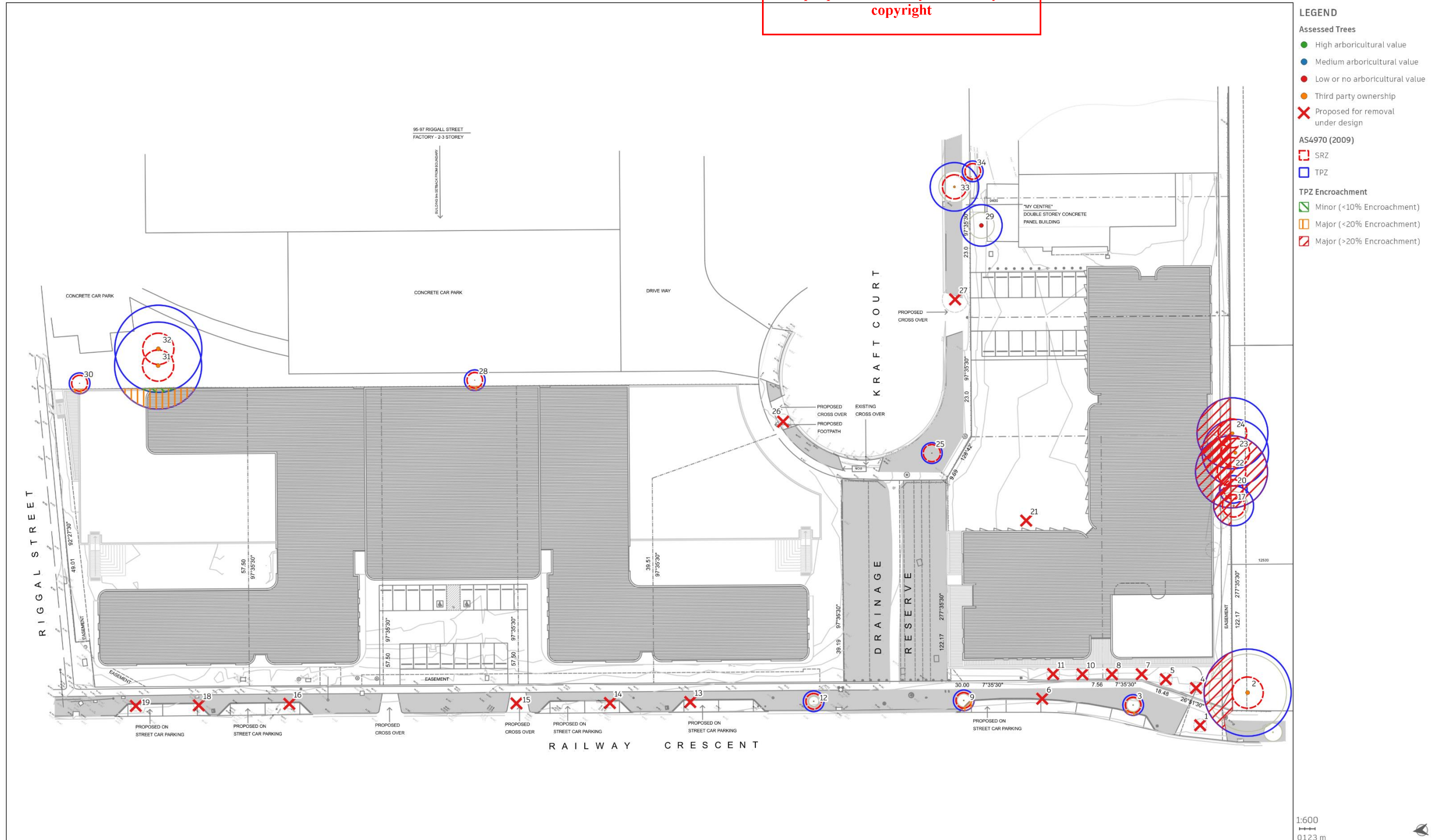


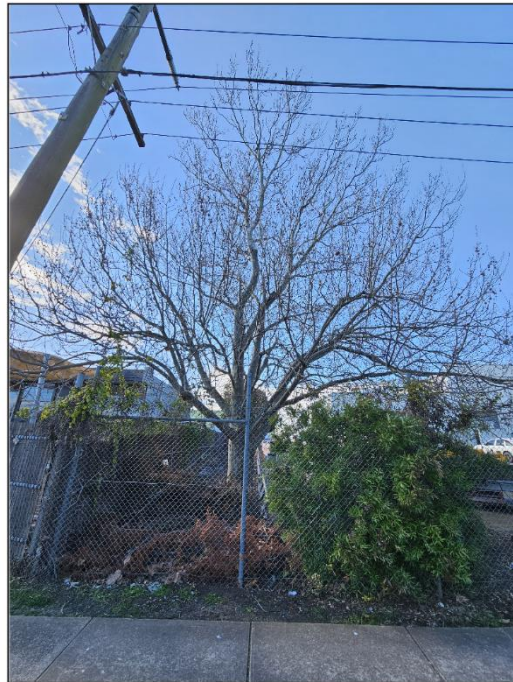
Figure 5: TPZ, SRZ and Encroachment Map

12 Appendix 5: Tree Photos

Tree ID: 1



Tree ID: 2



Tree ID: 3



Tree ID: 4



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Tree ID: 5



Tree ID: 6



Tree ID: 9



Tree ID: 12



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Tree ID: 13



Tree ID: 14



Tree ID: 15



Tree ID: 16



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Tree ID: 17



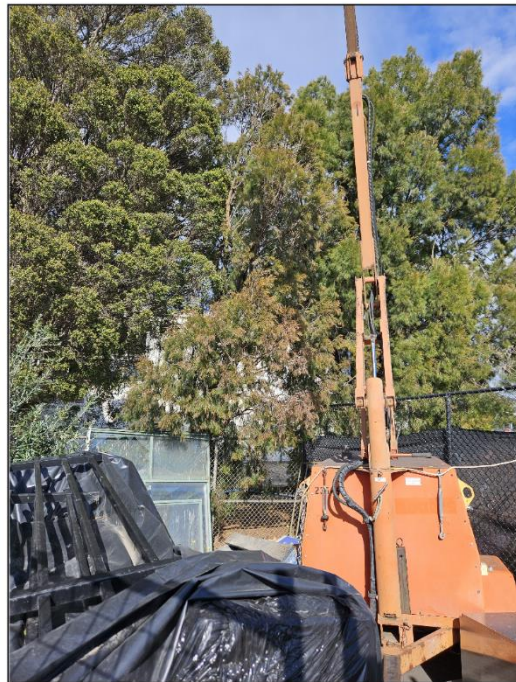
Tree ID: 18



Tree ID: 19



Tree ID: 20



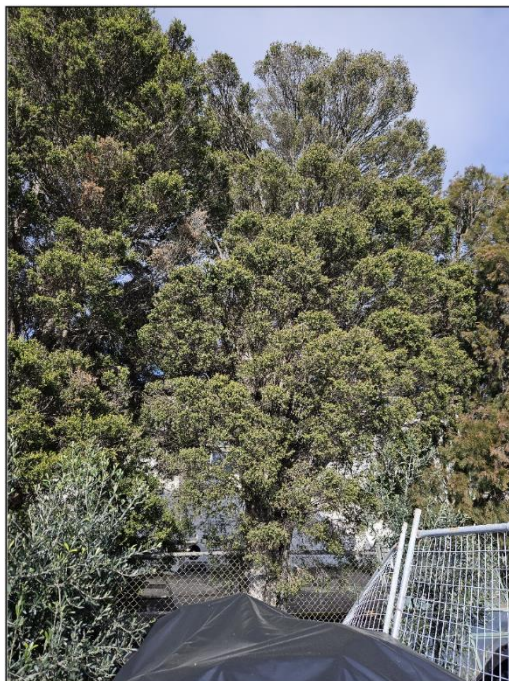
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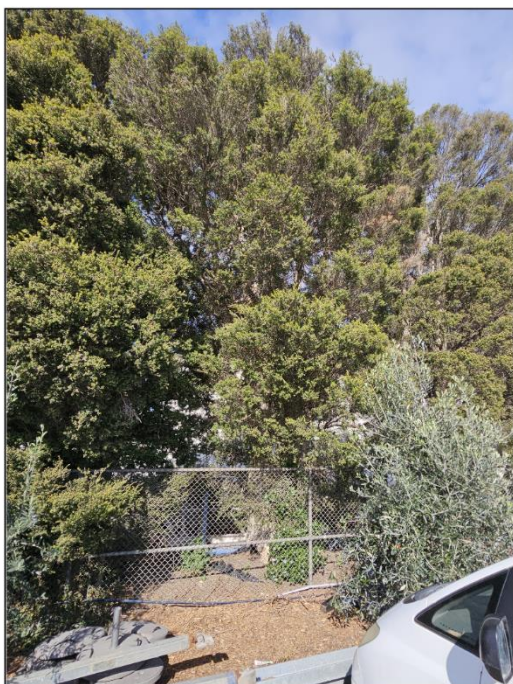
Tree ID: 21



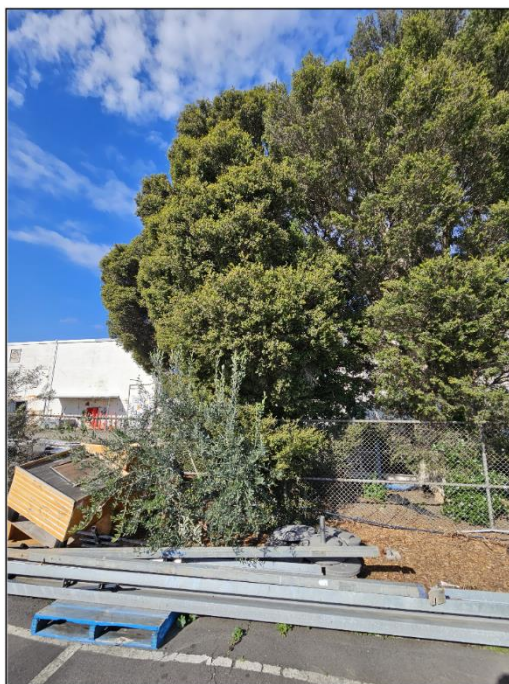
Tree ID: 22



Tree ID: 23



Tree ID: 24



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Tree ID: 25



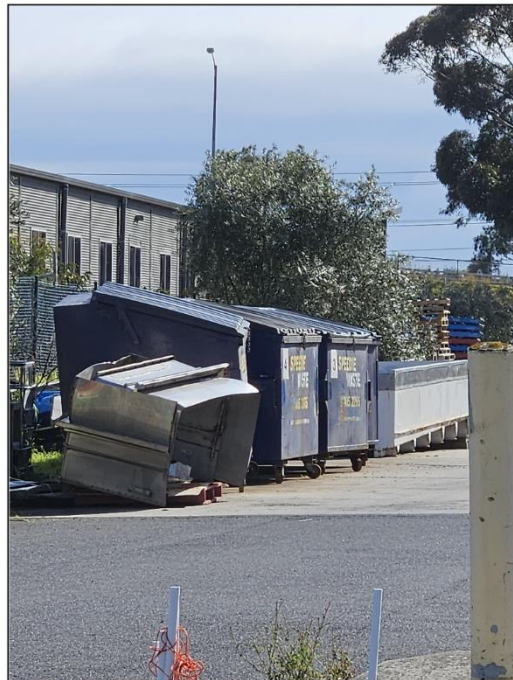
Tree ID: 26



Tree ID: 27



Tree ID: 28



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Tree ID: 29



Tree ID: 30



Tree ID: 31



Tree ID: 32



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Tree ID: 33



Tree ID: 34



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13 Appendix 6: Data Definitions

DBH (Diameter at Breast Height) is measured at 1.4 m above ground level or calculated from the total stem area if the tree was multi-stemmed at 1.4m above ground level in accordance with AS 4970 (2009).

DAB (Diameter at Base) is measured just above the root collar of a tree in accordance with AS 4970 (2009)

Health summarises qualitative observations of tree health and vigour made in the field:

Structure summarises qualitative observations of tree structure and stability made in the field:

Maturity summarises the life stage of the tree.

- Juvenile – The tree is in approximately the first 10% of its expected lifespan in its current environment
- Semi-mature – Tree is 10%-20% through its expected lifespan in its current environment and has not yet reached its mature dimensions.
- Mature – The tree is through 20%-90% of its expected lifespan in its current environment.
- Over-mature – The tree is through approximately 90% of its expected lifespan in its current environment

ULE (Useful Life Expectancy) indicates the anticipated remaining years of lifespan of the tree in its existing surroundings. The tree's lifespan is the time that it will continue to provide amenity value without undue risk or hazard and with a reasonable amount of maintenance.

Significance indicates the importance a tree may have on a respective site. The following descriptors are used to derive this value (adapted from IACA 2010):

High -

- Tree is good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant specimen or is rare or uncommon in the local area or of botanical interest or substantial age
- The tree is listed as a heritage item or threatened species or listed on a municipal significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions due to its size and scale. The tree makes a positive contribution to the local amenity.
- The tree supports social or cultural sentiments or spiritual associations or has commemorative values
- The tree is appropriate to the site conditions

Medium -

- The tree is in fair condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous taxa or a common species within the area.
- The tree is visible from surrounding properties, although not visually prominent
- as partially obstructed by other vegetation or buildings when viewed from a public space. The tree provides a moderate contribution to the amenity and character of the local area
- The tree is often partially restricted by above or below ground influences and/or resources.

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Low –

- The tree is in fair condition and good or low vigour
- The tree has form atypical of the species.
- The tree is not visible or is partly visible from surrounding properties due to obstructions.
- The tree provides a minor contribution or has a negative impact on landscape amenity or character of the local area.
- The tree is a juvenile specimen that can easily be replaced.
- The tree's growth is severely restricted by above or below ground influences and/or resources.
- The tree has a feature that has potential to become structurally unsound.
- The tree is listed as a noxious or environmental weed under state, federal or municipal policy

Dead/Irreversible Decline –

- The tree is structurally unsound or unstable
- The tree is dead or in irreversible decline

Third Party Ownership

- The tree is located on adjoining land to the assessment.

A tree is to meet several or all the criteria in a category to be classified in that group

Arboricultural Value is a calculated value indicating the merit of the tree for retention through any nearby developments. It is a qualitative combination of the trees ULE and Significance Values (Table 9).

Table 9: Matrix for the calculation of Arboricultural Value

ULE	Significance Value					
		High	Medium	Low	Dead/Irreversible Decline	Third Party Ownership
	>40 years	High	Medium	Low	Low	Third Party Ownership
	15-40 years	High	Medium	Low	Low	Third Party Ownership
	5-15 years	High	Medium	Low	None	Third Party Ownership
	<5 years	Medium	Low	None	None	Third Party Ownership
	0 years	Low	None	None	None	Third Party Ownership

- High – Trees attributed a 'High' arboricultural value are generally of strong visual amenity and significant in the landscape. The utmost level of consideration should be given for the retention of these trees throughout development activities and/or nearby disturbance
- Medium – Trees attributed a 'Medium' arboricultural value are of moderate amenity value and have been attributed some value in the landscape. Trees attributed a 'Medium' arboricultural value should be retained and designed around during developments or nearby disturbance. If retention is not possible for these trees, removal and replacement can be often considered as an acceptable compromise.
- Low – Trees attributed a Low arboricultural value are of poor arboricultural merit. Removal and replacement is an acceptable compromise if designing around these trees is not possible.
- None – Trees attributed an arboricultural value of none have no arboricultural merit. Removal is usually acceptable or required for these trees.
- Third Party Ownership – The tree is located on adjacent land to the assessment. It is assumed that the owner of the tree attributes it a High arboricultural value and requires its retention in the landscape.

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14 Appendix 7: Tree Protection Zones and Encroachment

14.1 Structural Root Zones (SRZ)

SRZs are an indication of the area surrounding the base of a tree that is required for its stability. AS 4970 (2009) provides a method to calculate the SRZ of trees: The SRZ is calculated as

$$(DAB \times 50)^{0.42} \times 0.64$$

For grass like trees such as palms or tree ferns; SRZs are not calculated.

14.2 Tree Protection Zone (TPZ)

A Tree Protection Zone (TPZ) is considered one of the most effective ways to ensure the retention of trees throughout development. The aim of a TPZ is to secure the space around the tree so that no above or below ground activities or developments can affect the integrity of the tree's root system or above ground parts.

AS 4970 (2009) provides a method for calculating the standard area of TPZ's. For all broadleaf trees, the radius of the TPZ is calculated as:

$$12 * DBH$$

For grass like trees such as palms or tree ferns; TPZs are calculated as:

$$\text{Radius of extent of canopy} + 1\text{m},$$

Dead trees are attributed a TPZ of the same size as their SRZ as only their stability can now be protected and not their vigour

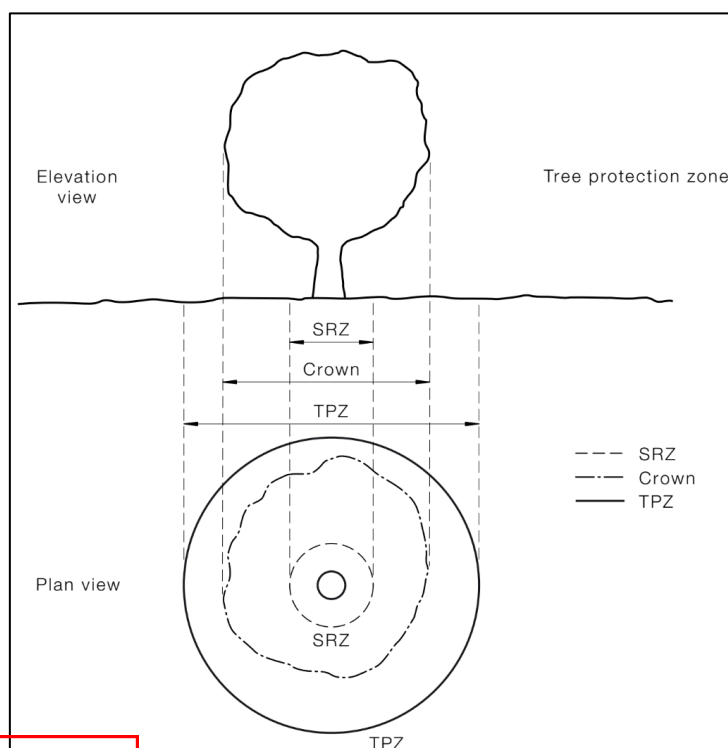


Figure 6: Diagram of TPZ and SRZ (AS 4970 2009)

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14.2.1 TPZ Encroachment:

AS 4970 (2009) allows the extents of 'calculated' TPZs to be varied, under certain conditions, to allow varying levels encroachment into TPZs. Encroachment is the term given to the level of impact of the footprint of a disturbance (such as a development or construction activity) on the calculated TPZ of a tree. Two levels of encroachment are classified within AS 4970:

14.2.1.1 Minor Encroachment

Where encroachment of a respective TPZ is limited to less than 10% of a TPZs area it is termed 'Minor Encroachment'. Minor encroachment and corresponding variations to a TPZ is considered acceptable while the lost area is compensated elsewhere while still being contiguous with the TPZ.

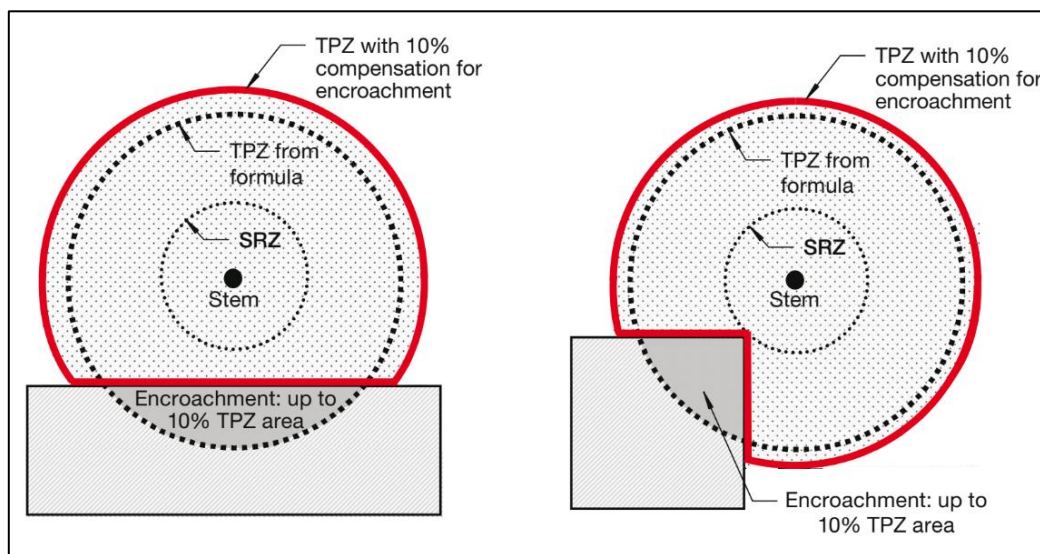


Figure 7: Examples of Minor TPZ encroachment and contiguous TPZ compensation (AS 4970 2009)

14.2.1.2 Major Encroachment

Where encroachment of the standard TPZ exceeds 10% of a TPZ it is termed 'Major Encroachment'. Major encroachment and corresponding variations to a TPZ can be considered acceptable providing the following conditions are met:

- The project arborist demonstrates the tree will remain viable through the encroachment.
- The lost area is compensated elsewhere while still being contiguous with the TPZ.

Regardless of encroachment, final TPZs and tree protection requirements should be clear to all parties during the entire construction process. Ideally all tree protection requirements should be outlined within a Tree Protection Management Plan (TPMP), prepared by a suitably qualified arborist, prior to the commencement of any construction activities

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14.2.2 Tree Protection Fencing

Tree protection fencing should be installed around the final area of the TPZs of trees to be retained. Fencing should always be installed before the commencement of any construction activities and secured for the life of the construction. TPZ fencing should consist of chain mesh fencing of a minimum of 1.8m in height connected by temporary concrete footings. Where applicable, a finer mesh such as shade cloth should be applied to prevent airborne contaminants entering the TPZ. Warning signs should be erected at regular intervals along the entire length of any TPZ fencing.

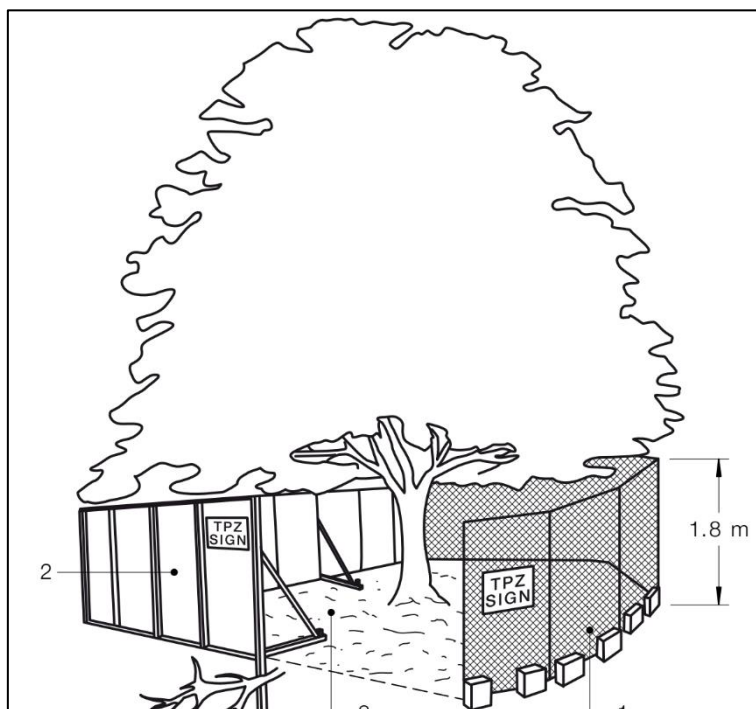


Figure 8: Examples of TPZ fencing (AS 4970 2009)

If the installation of tree protection fencing is not possible; alternative methods for protection of above and below grounds tree parts such a ground protection and physical barriers can be considered at the discretion of the project arborist.

14.2.2.1 General Tree Protection Guidelines

The following recommendations have been provided to as best practice guidelines to the establishment of a TPZ during the length of construction activities.

Exclude the following from taking place within any TPZ (adapted from AS 4970-2009):

- built structures or hard landscape features (i.e. paving, retaining walls)
- materials storage (i.e. equipment, fuel, building waste or rubble)
- soil disturbance (i.e. stripping or grade changes)
- excavation works including soil cultivation (specifically surface-dug trenches for underground utilities)
- placement of fill
- lighting of fires
- preparation of chemicals, including preparation of cement products
- pedestrian or vehicular access (i.e. pathways).

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