Tree Management Plan

for

URBN DG

Management of trees at Bowes St, Phillip (Block 4, Section 7)

Prepared by

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Friday, 1 August 2025

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Table 1: Table of Revisions

Rev No.	Report Date	Description	Author	Internal Review Date	Reviewed by
0	*16.07.2025*	*Report for Submission to client*	*AMS*	*15.07.2025*	*ELB*
1	*01.08.2025*	*Amended Report to include reference to Canopy Contribution Table*	*AMS*	*01.08.2025*	*AMS*

1. Introduction

Homewood Consulting Pty Ltd has been engaged to provide a Tree Management Plan for trees located at Bowes St, Phillip (Block 4, Section 7). Preparation of a Tree Management Plan is required as part of the Development Application.

The proposed plans have been supplied by Oculus including:

- *Tree Removal Plan Off-Site Works* (Drawing no. L100 dated 30.06.2025)
- *Tree Management Plan* (including Canopy Contribution Table, Drawing no. L100, dated 01.08.2025)
- *Landscape Plan – Off-Site Works* (Drawing no. L200, dated 01.08.2025)
- *Landscape Plan Ground Floor* (Drawing no. L201 dated 01.08.2025)

These plans have been used to assess encroachment into the Tree Protection Zone from the design and to determine tree protection requirements, if any.

This report provides Tree Protection Zone (TPZ) dimensions in accordance with the *Urban Forest Act 2023*, and Structural Root Zone Dimensions (SRZ) in accordance with Australian Standard (AS 4970-2025) *Protection of Trees on Development Sites* for the subject trees.

2. Method

On Friday, 11 July 2025 Evan Richardson conducted a site inspection.

Data collected for the trees included:

- Photograph
- Botanical Name
- Canopy Dimensions
- Diameter at Standard Height (DSH)
- Diameter above basal root flare
- Health
- Structure
- Useful Life Expectancy (ULE)
- Retention Value.

A ‘Visual Tree Assessment’ (VTA) was conducted for each tree. A VTA consists of a detailed visual inspection of a tree and its surrounding site, including a complete walk around the tree, looking at the buttress roots, trunk, branches and leaves. The tree is observed from a distance and close up to consider crown shape, landscape context and surroundings.

The assessment was conducted from ground level with no instruments used other than a diameter tape to measure trunk diameter. Any assessments of decay are qualitative only.

Tree locations have been aligned to the *Tree Removal Plan Off-Site Works.*

Under the *Urban Forest Act 2023*, all trees on public unleased land are considered ‘Protected’ and require ACT government approval for pruning or removal.

Table 3 shows the data collected for the trees. For definitions and descriptors of the data collected on site see Appendix 1.

3. Protection of Trees on Development Sites

The Tree Protection Zone (TPZ) is the principal means of protecting trees on development sites. It is a combination of the root area and crown area which is isolated from construction disturbance, so that the tree remains viable. The TPZ incorporates the Structural Root Zone (SRZ); the area around the base of a tree required for the tree's stability in the ground, with the woody root growth and soil cohesion in this area necessary to hold the tree upright.

All TPZs dimensions have been calculated in accordance with the *Urban Forest Act 2023*, and SRZs in accordance with the Australian Standard (AS 4970-2025) *Protection of Trees on Development Sites* and for the subject trees.

Further description of the TPZ and SRZ, and methods used for their calculation can be seen in Appendix 2.

3.1 Arboricultural Impact

Arboricultural impact is determined based on the level of encroachment into the TPZ of a tree as specified in AS 4970:2025 *Protection of Trees on Development Sites*.

Table 2: Arboricultural Impact categories and descriptors

Category	Description
Major: Not viable	The proposed design has a TPZ area encroachment greater than 20%, and/or is inside the SRZ. Proposed works either require removal of the tree or are expected to have a significant detrimental impact on tree health, structure or longevity. The Project Arborist shall be engaged to explore alternative designs and/or construction methods with the design team, and/or conduct a root investigation for those trees that require retention.
Major: Viable	The proposed design has a TPZ area encroachment greater than 20%, and/or is inside the SRZ. The Project Arborist can demonstrate that the tree will remain viable through one, or a combination of the following: • A non-destructive root exploration has demonstrated limited root distribution within the proposed area of works • Root/tree sensitive construction methods are specified which adequately reduce the impact on the tree • Investigation of relevant factors adequately demonstrates limited root distribution within the proposed area of works
Moderate: Not viable	The proposed design has a TPZ area encroachment of greater than 10% and less than or equal to 20% and is outside the SRZ. There is no recent TPZ encroachment. Proposed works are expected to have a significant detrimental impact on tree health, structure or longevity. The Project Arborist shall be engaged to recommend suitable design measures and construction controls to adequately reduce impact to those trees that require retention.
Moderate: Viable	The proposed design has a TPZ area encroachment of greater than 10%, and less than or equal to 20%, and is outside the SRZ. There is no recent TPZ encroachment. The Project Arborist shall review the proposed impact, and demonstrate how the tree will remain viable, by addressing relevant tree, site or encroachment factors, and/or

Category	Description
	through the implementation of suitable design measures and construction controls to mitigate impacts.
Minor	The proposed design has a TPZ area encroachment of less than 10% and is outside the SRZ. There are no recent TPZ encroachments. It is unlikely that there will be a significant impact to tree health, structure or longevity, providing tree protection measures are implemented on site.
No impact	The proposed design does not enter the TPZ. There should be no impact to tree health, structure or longevity, providing tree protection measures are implemented on site.
Remove tree (poor condition)	The tree is in such poor condition that it is recommended for removal, regardless of the proposed design. The tree does not warrant retention and protection throughout the proposed works.

For all levels of encroachment, retained trees will require a Tree Protection Zone to be established and tree protection measures implemented. To avoid a net loss of soil area and volume, an area equivalent to the TPZ encroachment shall be incorporated into the TPZ, unless the Project Arborist otherwise demonstrates that the tree will remain viable.

4. Overview of Proposed Works

4.1 Existing Conditions

The subject site is situated within the high-density residential and commercial precinct of Phillip. It comprises the Woden temporary bus interchange and an adjoining asphalt carpark. The site is bounded by Callam Street to the east, Matilda Street to the north, and Bowen Street to the west and south. All assessed trees are located on the periphery of the asphalt carpark, positioned within either small gravel garden beds bordered by kerbing and asphalt, bare earth garden beds enclosed by concrete footpaths, or compact garden plots surrounded by paving.

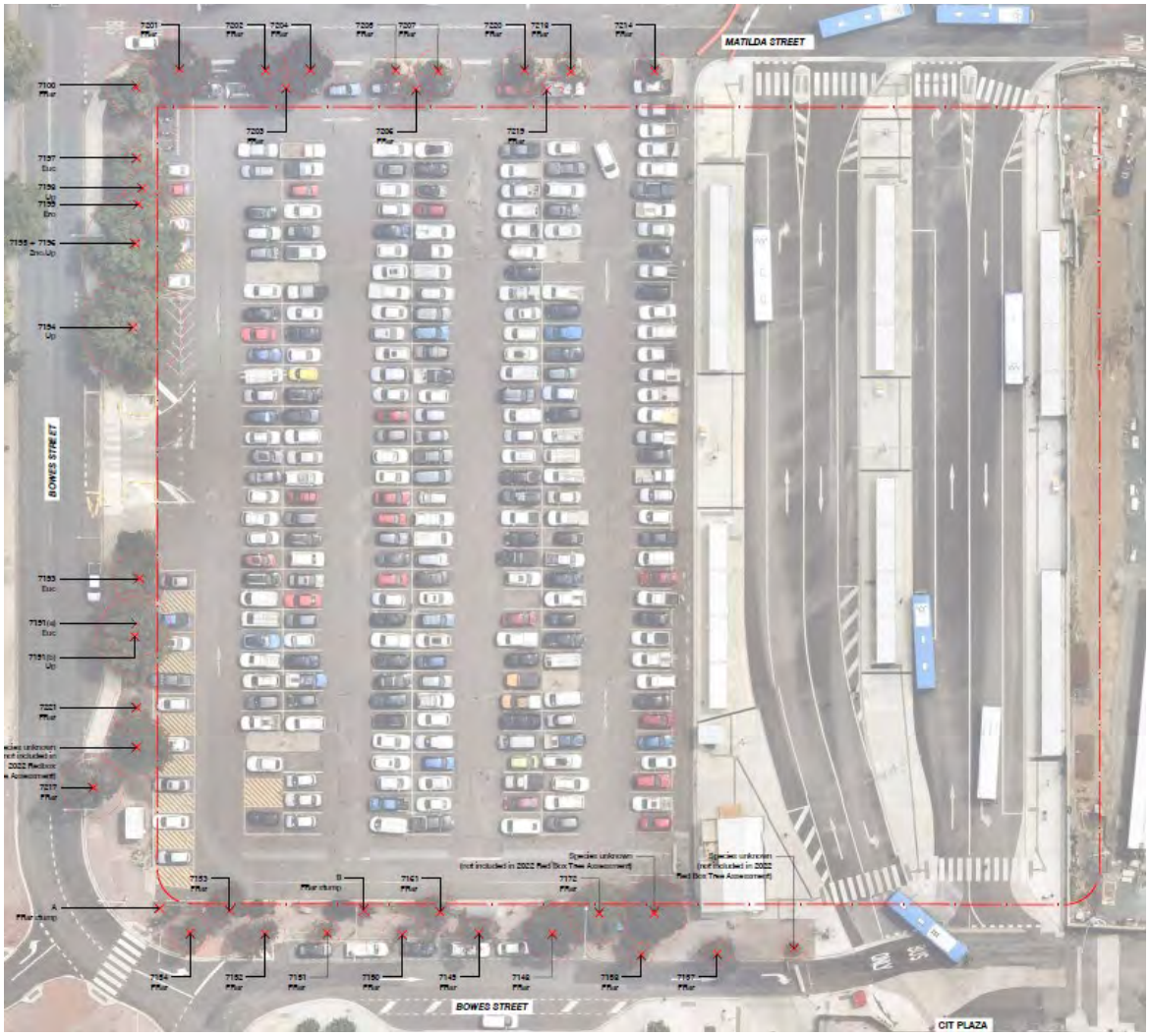

Figure 1: *Tree Removal Plan Off-Site Works* (Oculus, Drawing no. L100 dated 30.06.2025)

4.2 Proposed Works

The design proposal includes the complete demolition of all existing site features including kerbs, asphalt, footpaths and pavers and construction of multi-story residential and commercial buildings with significant landscaping of the surrounding street verge including concrete paths/driveway installation and tree planting.

A landscape plan showing the proposed works have been prepared by Oculus (Drawing no. L201 dated 01.08.2025, Figure 2). These plans have been used to determine the impact of proposed works on the assessed trees.

Additionally, a Canopy Contribution Table has been included in the *Tree Management Plan* prepared by Oculus (Drawing no. L100 dated 01.08.2025), outlining proposed replacement tree ratio's for removed trees.

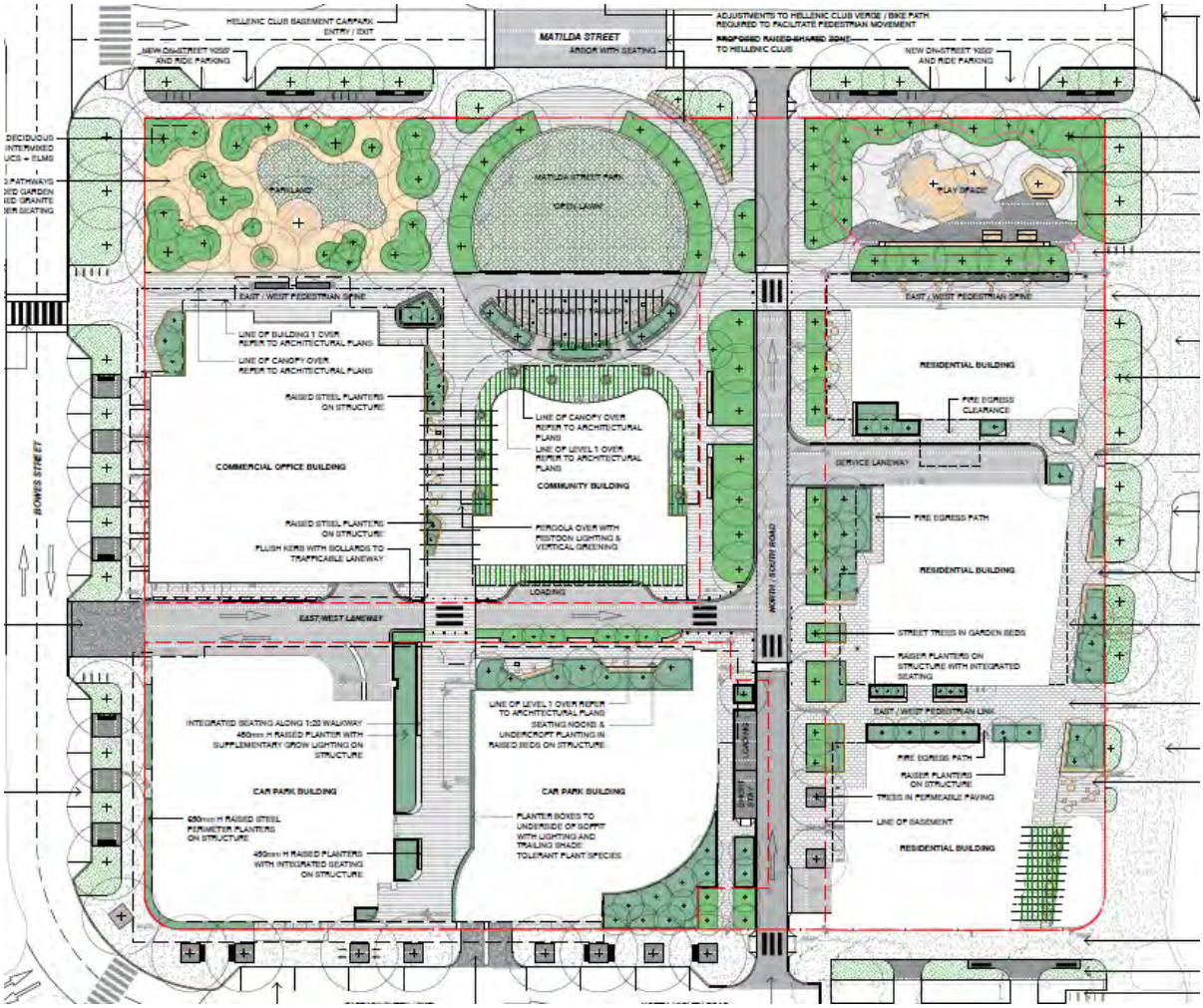

Figure 2: *Landscape Plan Ground Floor* (Drawing no. L201 dated 01.08.2025)

Table 3 displays the assessment data for all trees, as well as the dimensions of the TPZs, SRZs and the arboricultural impact from the proposed design.

Section 6 shows the Arboricultural Impact Assessment Plan. TPZs and SRZs for the assessed trees are depicted to scale and the construction footprint of the proposed works is indicated.

5. Tree Assessments

Table 3: Summary of tree assessments and arboricultural impact from the proposed design.

ID	*Botanical Name*	Origin	Height & Width (m)	DSH (cm)	Age Class	Health	Structure	ULE (years)	Retention Value	TPZ Radius (m)	SRZ Radius (m)	TPZ Intrusion (%)	*Urban Forest Act 2023* – Protection Status	Arboricultural Impact	Hollows Present
1	*Fraxinus* Raywood	Exotic	6 x 3	14	Semi mature	Fair	Fair	10-20	Low	3.5	1.5	100	Protected	Major – within construction footprint	None
2	*Fraxinus* Raywood	Exotic	7 x 8	23	Semi mature	Fair	Good	10-20	Medium	6	2.3	100	Protected	Major – within construction footprint	None
3	*Fraxinus* Raywood	Exotic	5 x 3	15	Semi mature	Fair	Good	10-20	Low	3.5	1.7	100	Protected	Major – within construction footprint	None
4	*Fraxinus angustifolia* subsp. *angustifolia*	Exotic	7 x 6	27	Semi mature	Good	Good	20-40	Medium	5	2.1	100	Protected	Major – within construction footprint	None
5	*Fraxinus* Raywood	Exotic	7 x 6	20	Semi mature	Good	Good	10-20	Medium	5	1.7	100	Protected	Major – within construction footprint	None
6	*Fraxinus* Raywood	Exotic	6 x 4	19	Semi mature	Poor	Fair	5-10	Low	4	1.7	100	Protected	Major – within construction footprint	None
7	*Fraxinus* Raywood	Exotic	6 x 6	22	Semi mature	Poor	Poor	5-10	Low	5	1.7	100	Protected	Major – within construction footprint	None
8	*Fraxinus* Raywood	Exotic	6 x 3	21	Semi mature	Very poor	Poor	1-5	Low	3.5	1.9	100	Protected	Major – within construction footprint	None
9	*Fraxinus angustifolia* subsp. *angustifolia*	Exotic	4 x 1	6	Semi mature	Fair	Poor	5-10	Low	2.5	1.5	100	Protected	Major – within construction footprint	None
10	*Fraxinus* Raywood	Exotic	5 x 2	14	Semi mature	Poor	Poor	1-5	Low	3	1.6	100	Protected	Major – within construction footprint	None

ID	*Botanical Name*	Origin	Height & Width (m)	DSH (cm)	Age Class	Health	Structure	ULE (years)	Retention Value	TPZ Radius (m)	SRZ Radius (m)	TPZ Intrusion (%)	*Urban Forest Act 2023* – Protection Status	Arboricultural Impact	Hollows Present
11	*Fraxinus* Raywood	Exotic	7 x 5	33	Semi mature	Poor	Poor	1-5	Low	4.5	2.2	100	Protected	Major – within construction footprint	None
12	*Fraxinus* Raywood	Exotic	6 x 3	23	Semi mature	Poor	Fair	5-10	Low	3.5	1.9	100	Protected	Major – within construction footprint	None
13	*Fraxinus* Raywood	Exotic	6 x 5	28	Semi mature	Poor	Fair	5-10	Low	4.5	2.1	100	Protected	Major – within construction footprint	None
14	*Fraxinus angustifolia* subsp. *angustifolia*	Exotic	5 x 3	16	Semi mature	Fair	Fair	10-20	Low	3.5	2	100	Protected	Major – within construction footprint	None
15	*Fraxinus* Raywood	Exotic	10 x 8	38	Mature	Poor	Fair	5-10	Low	6	3.4	100	Protected	Major – within construction footprint	None
16	*Fraxinus angustifolia* subsp. *angustifolia*	Exotic	8 x 7	26	Semi mature	Good	Good	20-40	Medium	5.5	2.2	100	Protected	Major – within construction footprint	None
17	*Ulmus parvifolia*	Exotic	6 x 7	29	Semi mature	Fair	Poor	10-20	Low	5.5	2.9	100	Protected	Major – within construction footprint	None
18	*Eucalyptus leucoxylon*	Australian Native	7 x 5	22	Mature	Poor	Poor	5-10	Low	4.5	1.8	100	Protected	Major – within construction footprint	None
19	*Eucalyptus melliodora*	Indigenous	6 x 5	25	Semi mature	Poor	Poor	5-10	Low	4.5	1.9	100	Protected	Major – within construction footprint	None
20	*Ulmus parvifolia*	Exotic	10 x 11	45	Mature	Good	Fair	20-40	Medium	7.5	2.9	100	Protected	Major – within construction footprint	None
21	*Ulmus parvifolia*	Exotic	11 x 7	35	Mature	Good	Fair	20-40	Medium	5.5	2.8	100	Protected	Major – within construction footprint	None
22	*Ulmus parvifolia*	Exotic	11 x 8	30	Mature	Good	Fair	20-40	Medium	6	2.5	100	Protected	Major – within construction footprint	None

ID	*Botanical Name*	Origin	Height & Width (m)	DSH (cm)	Age Class	Health	Structure	ULE (years)	Retention Value	TPZ Radius (m)	SRZ Radius (m)	TPZ Intrusion (%)	*Urban Forest Act 2023* – Protection Status	Arboricultural Impact	Hollows Present
23	*Eucalyptus leucoxylon*	Australian Native	6 x 4	22	Semi mature	Poor	Poor	5-10	Low	4	2.2	100	Protected	Major – within construction footprint	None
24	*Ulmus parvifolia*	Exotic	8 x 6	24	Semi mature	Good	Good	20-40	Medium	5	2.1	100	Protected	Major – within construction footprint	None
25	*Fraxinus angustifolia* subsp. *angustifolia*	Exotic	7 x 4	16	Semi mature	Good	Good	20-40	Medium	4	1.9	100	Protected	Major – within construction footprint	None
26	*Fraxinus angustifolia* subsp. *angustifolia*	Exotic	8 x 7	31	Mature	Good	Good	20-40	Medium	5.5	2.4	100	Protected	Major – within construction footprint	None
27	*Fraxinus* Raywood	Exotic	9 x 7	31	Mature	Good	Good	10-20	Medium	5.5	2.3	83	Protected	Major - not viable	None
28	*Fraxinus* Raywood	Exotic	7 x 4	18	Semi mature	Fair	Good	10-20	Low	4	2.1	100	Protected	Major – within construction footprint	None
29	*Fraxinus* Raywood	Exotic	7 x 4	25	Semi mature	Good	Fair	10-20	Low	4	2	100	Protected	Major – within construction footprint	None
30	*Fraxinus* Raywood	Exotic	8 x 6	25	Semi mature	Good	Good	10-20	Medium	5	2.1	67	Protected	Major - not viable	None
31	*Fraxinus* Raywood	Exotic	4 x 2	24	Semi mature	Very poor	Poor	1-5	Low	3	2.4	43	Protected	Major - not viable	None
32	*Fraxinus* Raywood	Exotic	5 x 4	25	Semi mature	Poor	Poor	1-5	Low	4	2.2	100	Protected	Major – within construction footprint	None
33	*Fraxinus* Raywood	Exotic	6 x 4	31	Semi mature	Poor	Fair	1-5	Low	4	2.4	77	Protected	Major - not viable	None
34	*Fraxinus* Raywood	Exotic	8 x 6	35	Semi mature	Poor	Fair	1-5	Low	5	2.4	100	Protected	Major – within construction footprint	None

ID	*Botanical Name*	Origin	Height & Width (m)	DSH (cm)	Age Class	Health	Structure	ULE (years)	Retention Value	TPZ Radius (m)	SRZ Radius (m)	TPZ Intrusion (%)	*Urban Forest Act 2023* – Protection Status	Arboricultural Impact	Hollows Present
35	*Fraxinus* Raywood	Exotic	6 x 2	18	Young	Poor	Fair	1-5	Low	3	1.9	100	Protected	Major – within construction footprint	None
36	*Fraxinus* Raywood	Exotic	6 x 4	29	Semi mature	Poor	Fair	5-10	Low	4	2.2	100	Protected	Major – within construction footprint	None

6. Arboricultural Impact Assessment Plan

Base Plan: Landscape Plan Ground Floor (Oculus, Drawing no. L201 dated 30.06.2025)
Projection: GDA2020 / MGA zone 55
Date: 16/07/2025
Plotted: AMS
Reference: 5536

Legend

- Trees
- Structural Root Zone (SRZ)
- Tree Protection Zone (TPZ)
- Medium Retention Value
- Low Retention Value
- Major TPZ Encroachment

N

0 25 50 m

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7. Arboricultural Impact Assessment Summary

Table 4: Summary of impact from the proposed design

Arboricultural Impact	Tree Retention Value			Total No. of Trees
	High	Medium	Low	
Impact Major – within construction footprint	0	10	22	**32**
Impact Major - not viable	0	2	2	**4**
Total	**0**	**12**	**24**	**36**

Of the 36 trees assessed:

- 32 trees are directly within the construction footprint of proposed footpaths, driveways or roads and **require removal** to facilitate the proposed design.
    - ◊ Trees 2, 4, 5, 16, 20 - 22, 24 - 26 and 30 have Medium retention value.
    - ◊ Trees 1, 3, 6 - 15, 17 - 19, 23, 28, 29, 32, 34 - 36 are of Low retention value and do not warrant a design modification in order to allow their retention.
- Eight trees have a **major TPZ encroachment** under the proposed design and are not expected to remain viable.
    - Three trees (ID 27 and 30) have a Medium retention value.
    - Five trees (ID 31 and 33) are of Low retention value and do not warrant a design modification in order to allow their retention.

Removal and replacement of all 36 trees is considered an acceptable landscape outcome.

8. References

ACT Government, n.d, *Registered Trees*, viewed 11 July 2025 at <https://www.cityservices.act.gov.au/trees-and-nature/trees/act_tree_register/registered_trees>

ACT Government, n.d., *Provisionally Registered Trees*, viewed 11 July 2025 at <https://www.cityservices.act.gov.au/trees-and-nature/trees/act_tree_register/provisionally_registered_trees>

ACT Government, *Urban Forest Act 2023*, viewed 11 July 2025 at <https://www.legislation.act.gov.au/View/a/2023-14/current/html/2023-14.html>

AS 4970 - 2025, *Australian Standard, Protection of Trees on Development Sites*, Standards Australia.

Biddle, P.G., 1998, *Tree root damage to buildings, Causes, Diagnosis and Remedy,* Willowmead Publishing Ltd., Wantage,UK.

Mattheck, C. and Breloer, H. 1994, *The body language of trees: a handbook for failure analysis*, London: HMSO.

Appendix 1. Data Collection Definitions & Descriptors

Tree assessments are based on the assessor's experience and opinion of the tree.

1.1 Botanical name

The scientific name identifying the genus and species of the tree. Each species has only one scientific name.

1.2 Common name

The colloquial name for a tree species, usually in plain English. Common names for a species are often local or regional and each species can have multiple common names.

1.3 Tree dimensions

Tree height and canopy width in metres (estimated unless stated otherwise).

1.4 DSH

Diameter of the trunk at standard height (1.4m above ground level) measured using a diameter tape.

1.5 Basal diameter

Diameter of the trunk above the root buttress, measured using a diameter tape. Used to calculate the Structural Root Zone radius.

1.6 Tree Origin

Category	Description
Exotic	The species originates in a country other than Australia.
Australian Native	The species originates within Australia.
Indigenous	The species originates within the local environs.

1.7 Age Class

Category	Description
Mature	Tree has reached the expected size for the species at the site.
Semi-mature	Established tree that has not yet reach the expected size for the species at the site.
Young	Recently planted tree or juvenile self-sown tree (generally less than 5 years old).

1.8 Health

Category	Description
Very Good	The tree is demonstrating excellent or exceptional growth. The tree exhibits a full canopy of foliage and is free of pest and disease problems.
Good	The tree is demonstrating good or exceptional growth. The tree exhibits a full canopy of foliage and has only minor pest or diseases problems.
Fair	The tree is in reasonable condition and growing well. The tree exhibits an adequate canopy of foliage. There may be some deadwood present in the crown. Some grazing by insects or possums may be evident.
Poor	The tree is not growing to its full capacity; extension growth of the laterals is minimal. The canopy may be thinning or sparse. Large amounts of deadwood may be evident throughout the crown. Significant pest and disease problems may be evident or there may be symptoms of stress indicating tree decline.
Very Poor	The tree appears to be in a state of decline. The tree is not growing to its full capacity. The canopy may be very thin and sparse. A significant volume of deadwood may be present in the canopy or pest and disease problems may be causing a severe decline in tree health.
Dead	The tree is dead.

1.9 Structure

Category	Description
Good	The tree has a well-defined and balanced crown. Branch unions appear to be sound, with no significant defects evident in the trunk or the branches. Major limbs are well defined. The tree is considered a good example of the species.
Fair	The tree has some minor problems in the structure of the crown. The crown may be slightly out of balance, and some branch unions may be exhibiting minor structural faults. If the tree has a single trunk, it may be on a slight lean or exhibiting minor defects.
Poor	The tree may have a poorly structured crown. The crown may be unbalanced or exhibit large gaps. Major limbs may not be well defined. Branches may be rubbing or crossing over. Branch unions may be poor or faulty at the point of attachment. The tree may have suffered root damage.
Very Poor	The tree has a poorly structured crown. The crown is unbalanced or exhibits large gaps with possibly large sections of deadwood. Major limbs may not be well defined. Branches may be rubbing or crossing over. Branch unions may be poor or faulty at the point of attachment. Branches may exhibit large cracks that are likely to fail in the future. The tree may have suffered major root damage.
Has Failed	A section of the tree has failed or is in imminent danger of failure and the tree is no longer a viable specimen.

1.10 Useful Life Expectancy (ULE)

Category	Description
40+ years	The tree is in excellent condition and under normal conditions and with appropriate management is expected to continue as a viable landscape component in excess of 40 years.
20 - 40 years	The tree is in good condition and under normal conditions and with appropriate management is expected to continue as a viable landscape component for 20-40 years.
10 - 20 years	The tree is in fair condition and under normal conditions and with appropriate management is expected to continue as a viable landscape component for 10-20 years.
5 - 10 years	The tree is in fair to poor condition or it is not a long lived species. Removal and replacement may be required within the next 10 years.
1 - 5 years	The tree is in poor condition due to advanced decline or structural defect. Removal and replacement may be required within the next 5 years.
0 years	The tree is dead or is considered hazardous in the location. Removal may be required.

1.11 Tree Retention Value

Term	Description
Very High	Tree of exceptional quality in good condition. A prominent landscape feature and/or of historic, cultural, ecological or other significance. Has the potential to be a long-term landscape component where managed appropriately. All efforts should be made to retain the tree and protect from arboricultural impact.
High	Tree of high quality in good to fair condition. Generally, a prominent landscape feature. Has the potential to be a medium to long-term landscape component where managed appropriately. All efforts should be made to retain the tree and protect from arboricultural impact.
Medium	Tree of moderate quality in fair condition. Generally, a modest landscape feature. May have a health or structural issue that can be resolved with arboricultural input or may refer to a medium to small tree in good condition. Has the potential to be a medium to long-term landscape component where managed appropriately. Where practical, design modifications should be considered in order to retain and protect from arboricultural impact.
Low	Either: Tree of low quality in poor condition. Generally, provides little amenity value. Unlikely to be a long or medium term landscape component. The tree may be considered a weed species, structurally unsound, dead/dying/diseased, nearing the end of its ULE or may not be suitable for the site. Or: small tree of good or fair condition which is easily replaced in the landscape through planting of advanced stock.
Third party ownership	The tree is located outside of the subject site and is owned by a third party. It may be owned by a private entity (residential) or public body (council). Third party owned trees must be retained and protected from arboricultural impact, unless a mutually acceptable outcome is negotiated with the tree owner and relevant authorities.

Appendix 2. Tree Protection Zones & Structural Root Zones

All parts of the tree may be damaged by development and damage to any one part of the tree may affect its functioning as a whole.

Root damage is the most common cause of damage to trees on development sites. Roots may be directly damaged when removed, wounded, crushed or torn during grading, excavation or trenching. Soil compaction from foot traffic and vehicle traffic indirectly damages tree roots, resulting in loss of pore space within the soil which is essential for the exchange of gases between the soil and atmosphere and for soil drainage.

Trunks of trees may be wounded mechanically during demolition and construction work. This not only predisposes a tree to potential decay, but it also interferes with the transport of water, nutrients and sugars throughout the tree. Serious impacts may structurally weaken the tree.

The canopy of trees can be damaged through incorrect pruning techniques or mechanical injury by trucks, cranes, excavators etc. The removal of leaves reduces the level of photosynthesis and reduces the tree's capacity to function normally and to withstand stresses. Incorrect pruning and mechanical damage can produce wounds that are susceptible to infection by wood decay organisms.

For trees to be retained and their requirements met, procedures must be in place to protect trees at every stage of the development process. This needs to be taken into account at the earliest planning stage of any outdoor event or design of a development project where trees are involved.

2.1 Tree Protection Zones

The most common method of protecting trees during construction is by establishing a Tree Protection Zone (TPZ). The TPZ is an area isolated from construction disturbance area, so that the tree remains viable. The TPZ radius has been calculated according with the *Urban Forest Act 2023*. This method calculates the TPZ as:

- The area under the canopy of the; and
- The 2m wide area surrounding the vertical projection of the canopy; and
- The 4m wide area surrounding the trunk as measured at 1m above natural ground level.

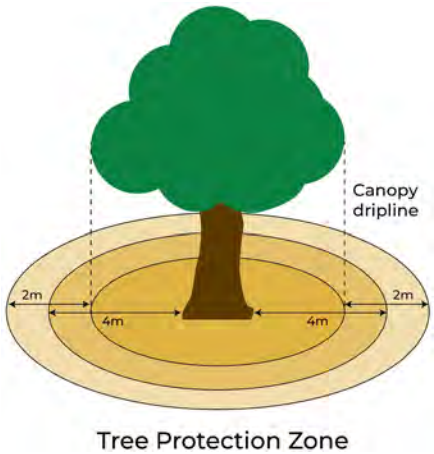


Figure 3: The *Urban Forest Act 2023* Tree Protection Zone.

2.2 Structural Root Zones

The Structural Root Zone (SRZ) is the minimum volume of roots required by the tree to remain stable in the ground. If the SRZ is breached the chances of windthrow are significantly increased. Windthrow is an event where the entire tree fails/falls over.

It is important to note that the SRZ is not related to tree health. It refers to the physical volume of roots required for the tree to remain stable in the ground (Figure 4). It is in no way related to the physiological requirements of the tree but is the minimum volume of roots required for the tree to remain standing (Mattheck and Breloer 1994).

According to AS 4970-2025 the SRZ radius of the trees has been calculated using the equation:

$$R_{srz} = (D \times 50)^{0.42} \times 0.64$$

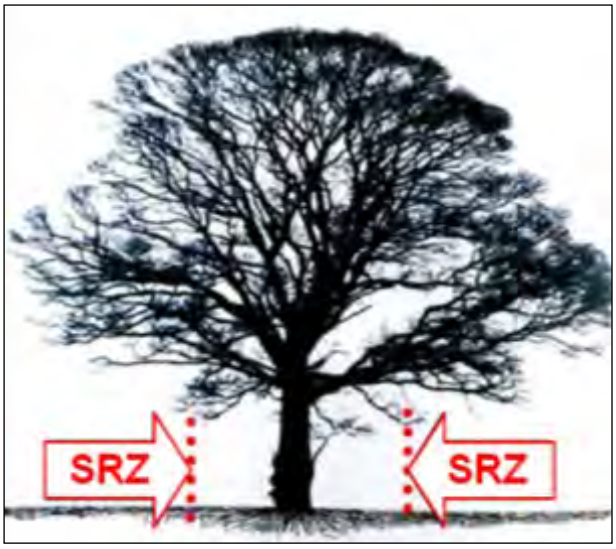


Figure 4: The SRZ = minimum volume of roots required to maintain tree stability (Biddle 1998).

2.3 TPZ and SRZ encroachment

It may be possible to encroach into the TPZ. Encroachment is defined as works or change of use (temporary or permanent) proposed to occur within an TPZ, either above or below ground, regardless of work method or construction type.

Encroachment can occur throughout all stages of development, including demolition, site preparation, civil works, installation of utilities and services, construction and landscaping.

Table 5: Levels of TPZ encroachment as defined by AS 4970:2025

Level of Encroachment	Description/ Definition	Requirements
Minor	• Encroachment of less than or equal to 10% of the area of the TPZ • Has not had recent TPZ encroachments	Generally unlikely that there will be a significant impact to tree health, structure or longevity.

	• Is outside the SRZ	
Moderate	• Encroachment of greater than 10% and less than or equal to 20% of the area of the TPZ • Has not had recent TPZ encroachments • Is outside the SRZ	The Project Arborist shall review the proposed impact and determine if the tree will remain viable. This may be through consideration of relevant tree, site or encroachment factors, and/or through the implementation of suitable design measures and construction controls to mitigate impact. If trees designated for retention are not viable, The Project Arborist shall be engaged to recommend suitable design measures and construction controls to adequately reduce impact.
Major	• Greater than 20% of the area of the of the TPZ; and/or • Is inside the SRZ	The Project Arborist shall review the proposed impact and determine if the tree will remain viable. This may require root investigation by non-destructive methods and/or a detailed investigation of relevant factors of tree health, vigour, stability, species sensitivity and soil characteristics. If trees designated for retention are not viable, The Project Arborist shall be engaged to explore alternative designs and/or construction controls with the design team.

For all levels of encroachment:

- Tree protection measures should be implemented during site works.
- To avoid a net loss of soil area and volume, an area equivalent to the encroachment shall be incorporated into the TPZ, unless the Project Arborist otherwise demonstrates that the tree will remain viable (Figure 5).

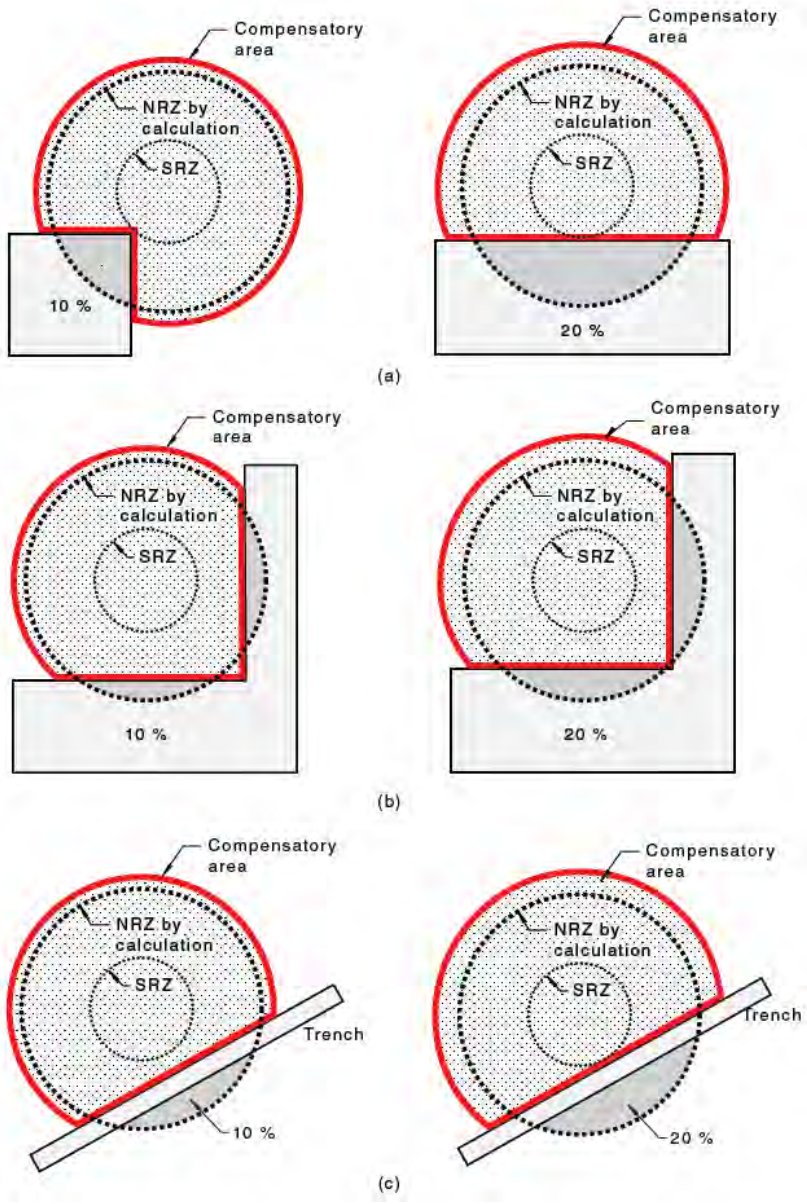


Figure 5: Example of minor and moderate encroachments and compensatory offsets (image from AS 4970:2025).

2.4 Root Investigation

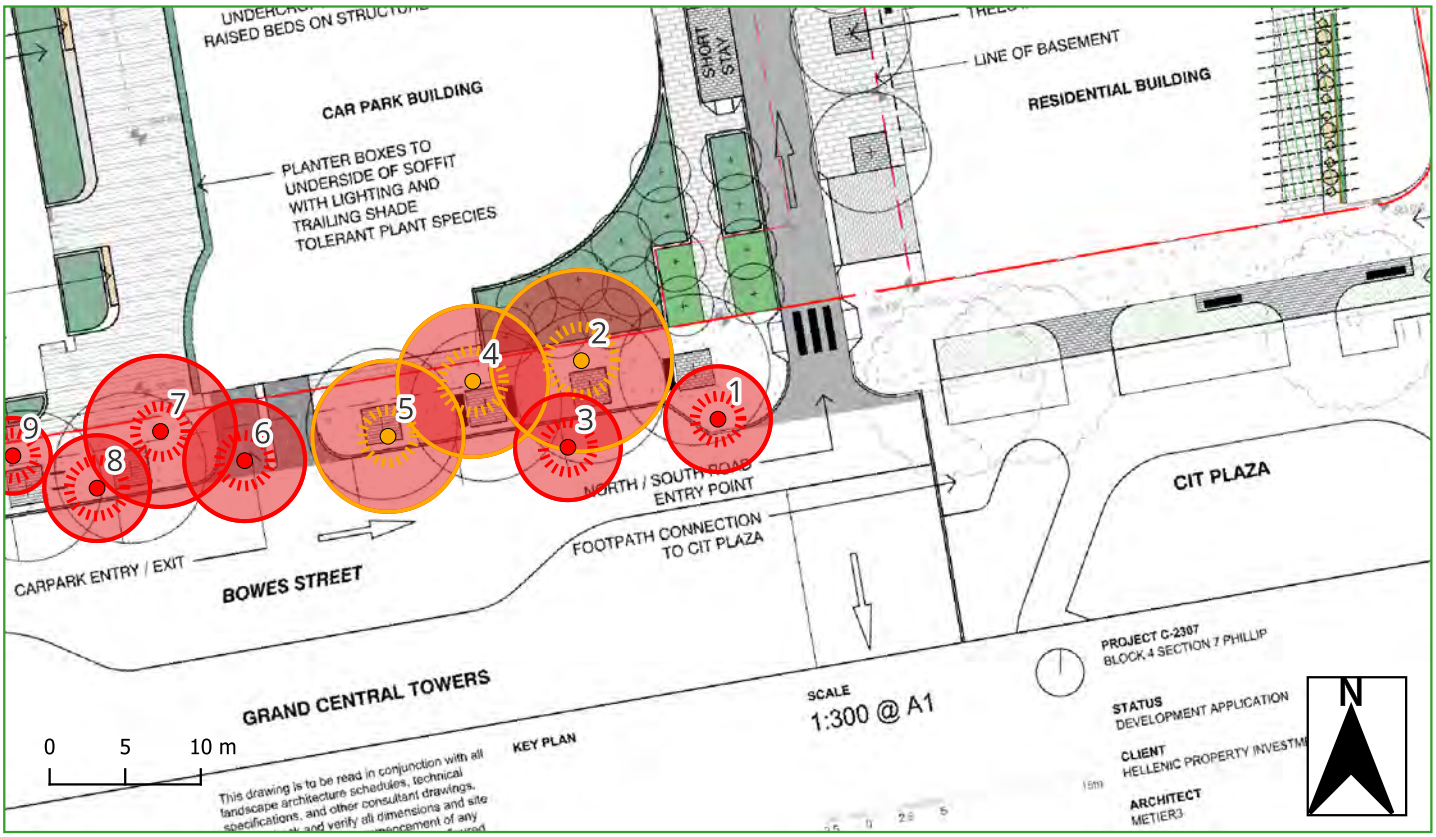
A root investigation may be required to assess the impact of proposed works on trees to be retained when there is a major encroachment. The location and distribution of the roots should be determined through minimally destructive investigation methods (pneumatic, hydraulic, hand digging or ground penetrating radar). The Project Arborist should prepare a report, including photographs. Root damage must be minimised during this process and roots should only be exposed for as long as required to meet the purposes of the investigation.

Appendix 3. Individual Tree Data

Tree Number: 1

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 3
DBH (cm):	14
Health:	Fair
Structure:	Fair
ULE:	10-20 years
Retention Value:	Low
TPZ Radius (m):	11
SRZ Radius (m)	1.5
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:

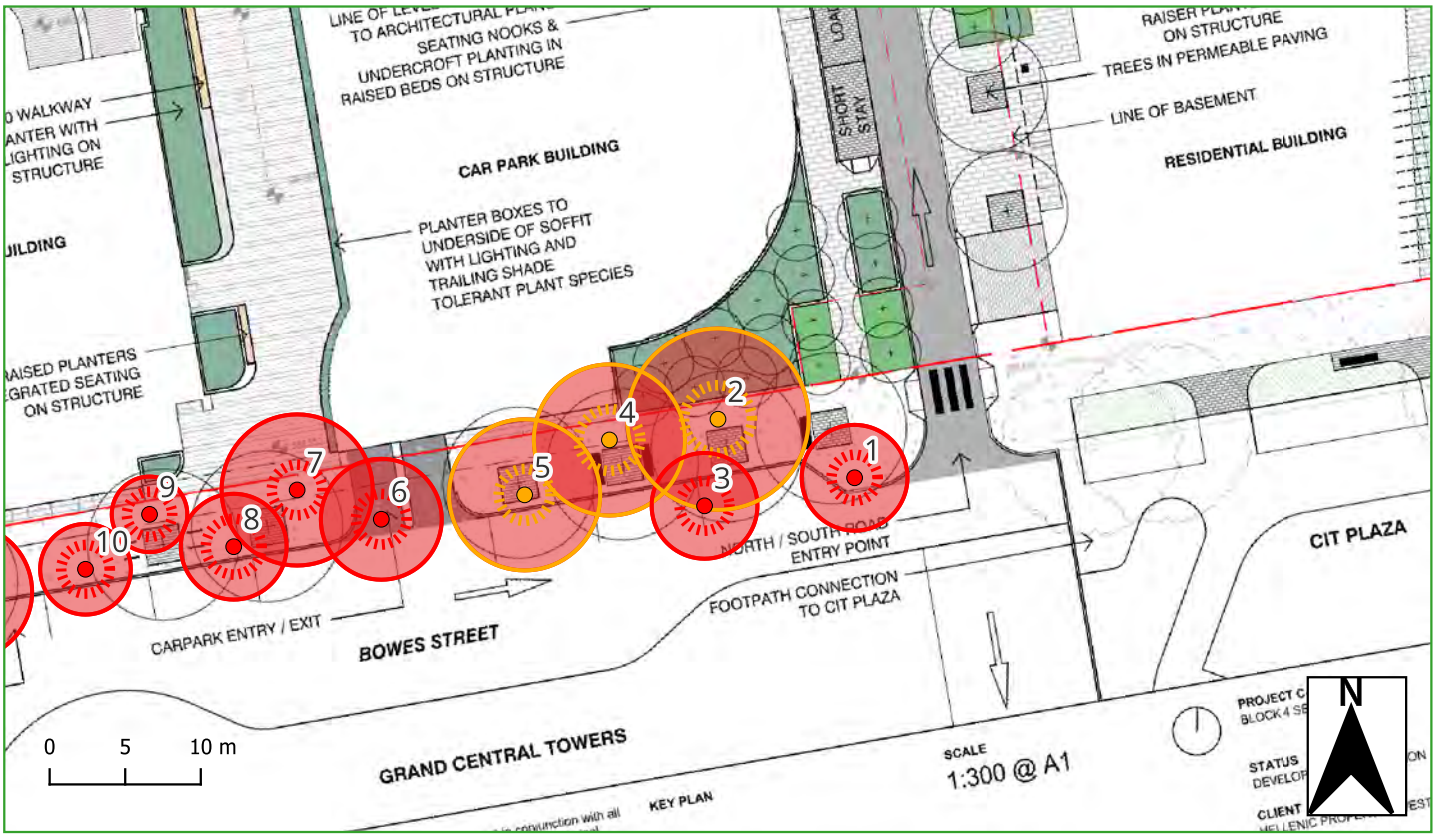


Appendix 3. Individual Tree Data

Tree Number: 2

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	7 x 8
DBH (cm):	23
Health:	Fair
Structure:	Good
ULE:	10-20 years
Retention Value:	Medium
TPZ Radius (m):	6
SRZ Radius (m)	2.3
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

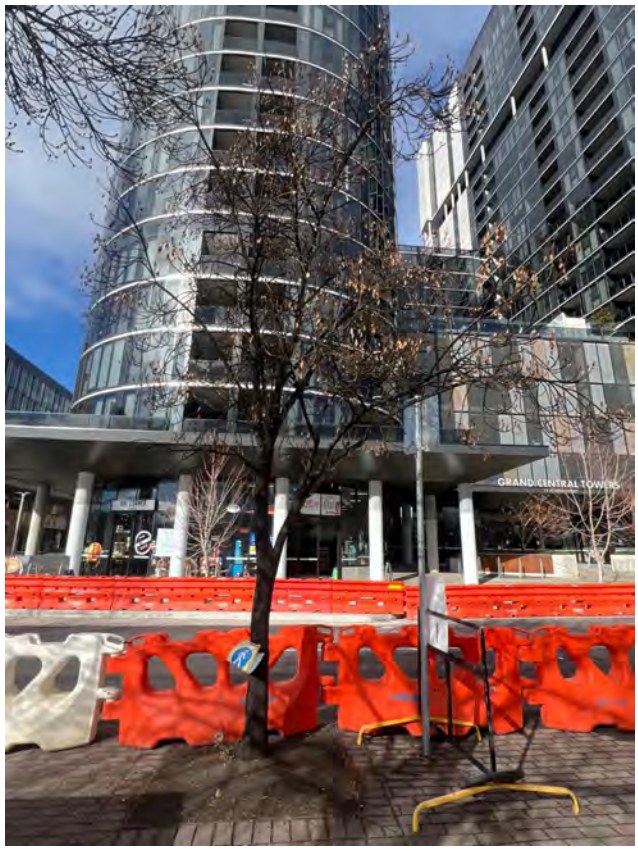
Comment:

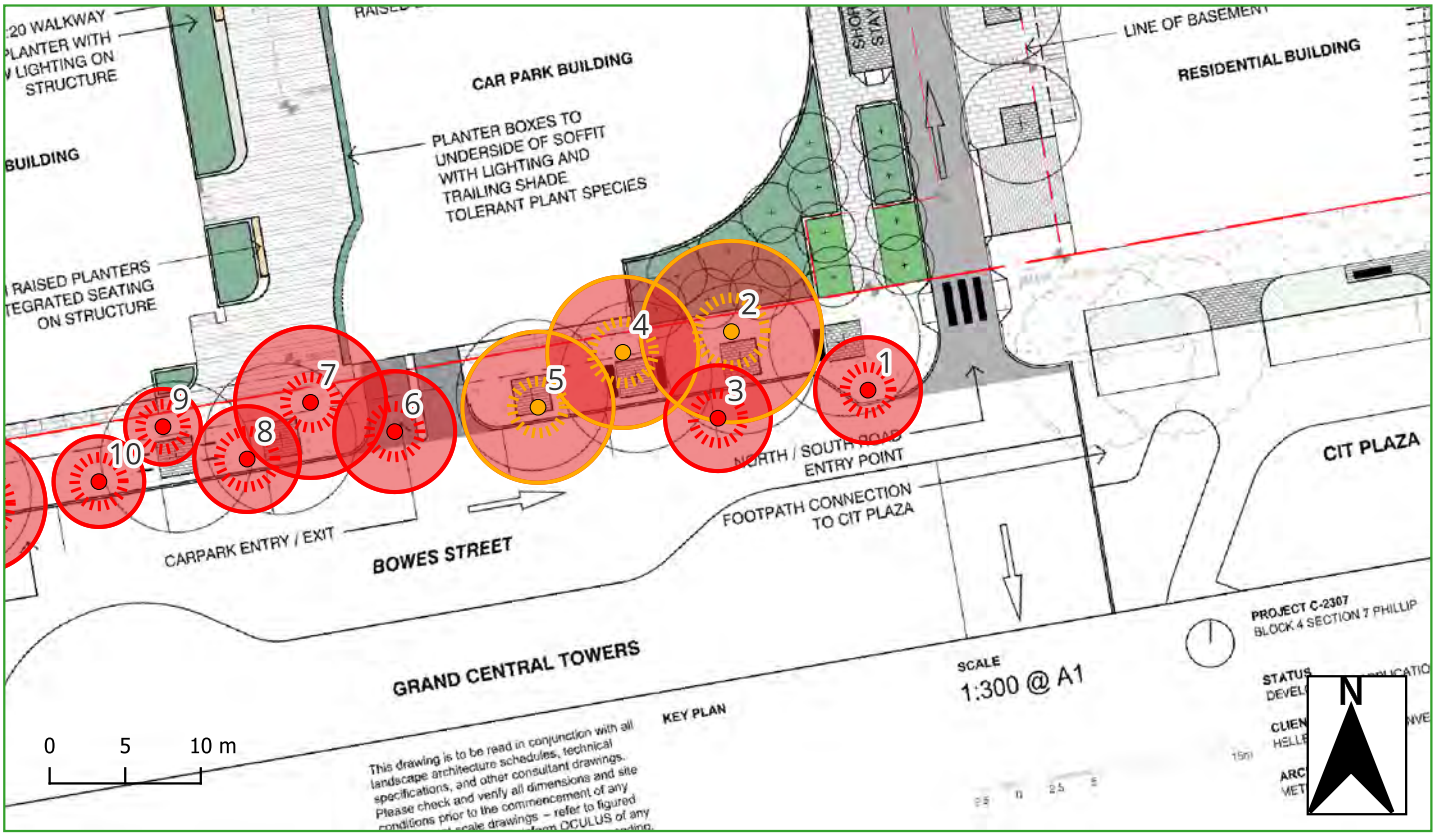


Appendix 3. Individual Tree Data

Tree Number: 3

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	5 x 3
DBH (cm):	15
Health:	Fair
Structure:	Good
ULE:	10-20 years
Retention Value:	Low
TPZ Radius (m):	12
SRZ Radius (m)	1.7
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

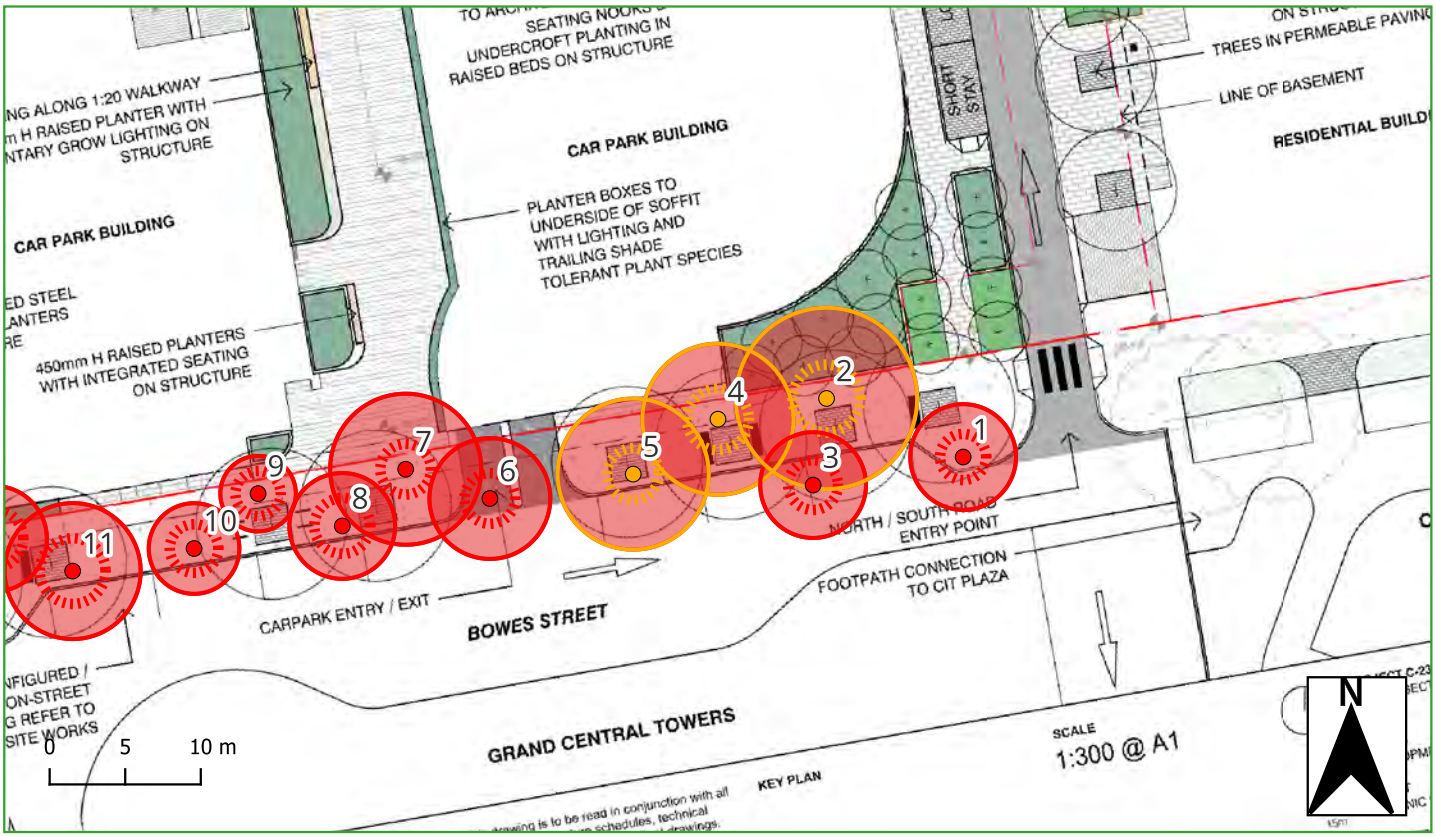




Appendix 3. Individual Tree Data

Tree Number: 4

Botanical Name:	*Fraxinus angustifolia subsp. angustifolia*
Common Name:	Desert Ash
Origin:	Exotic
Height and Width (m):	7 x 6
DBH (cm):	27
Health:	Good
Structure:	Good
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	5
SRZ Radius (m)	2.1
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

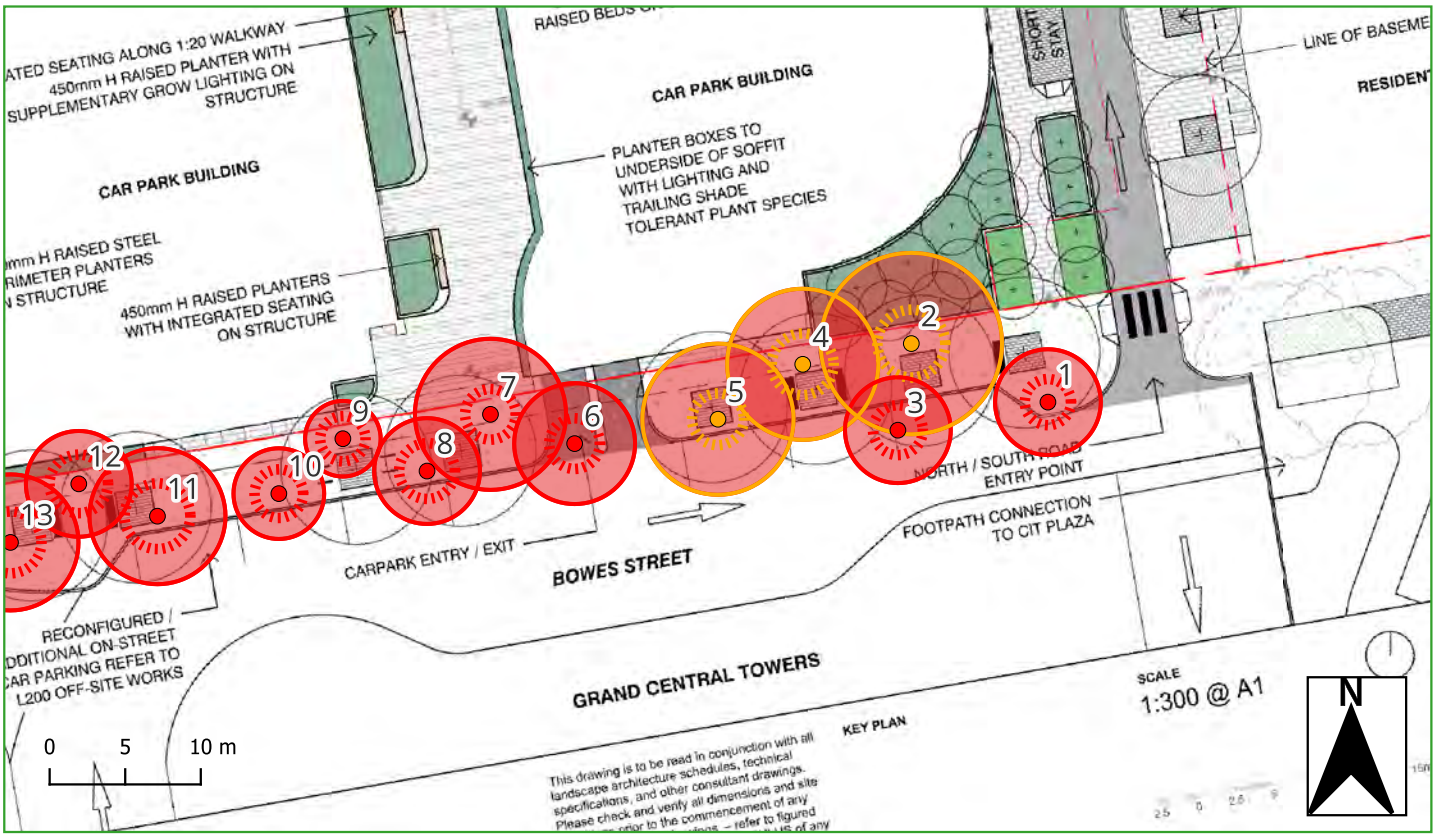


Appendix 3. Individual Tree Data

Tree Number: 5

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	7 x 6
DBH (cm):	20
Health:	Good
Structure:	Good
ULE:	10-20 years
Retention Value:	Medium
TPZ Radius (m):	5
SRZ Radius (m)	1.7
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:

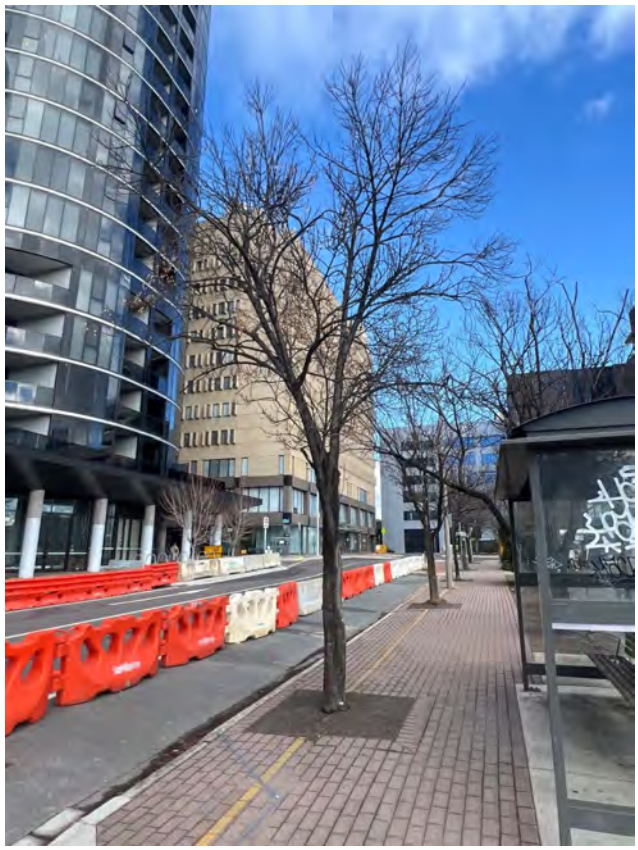


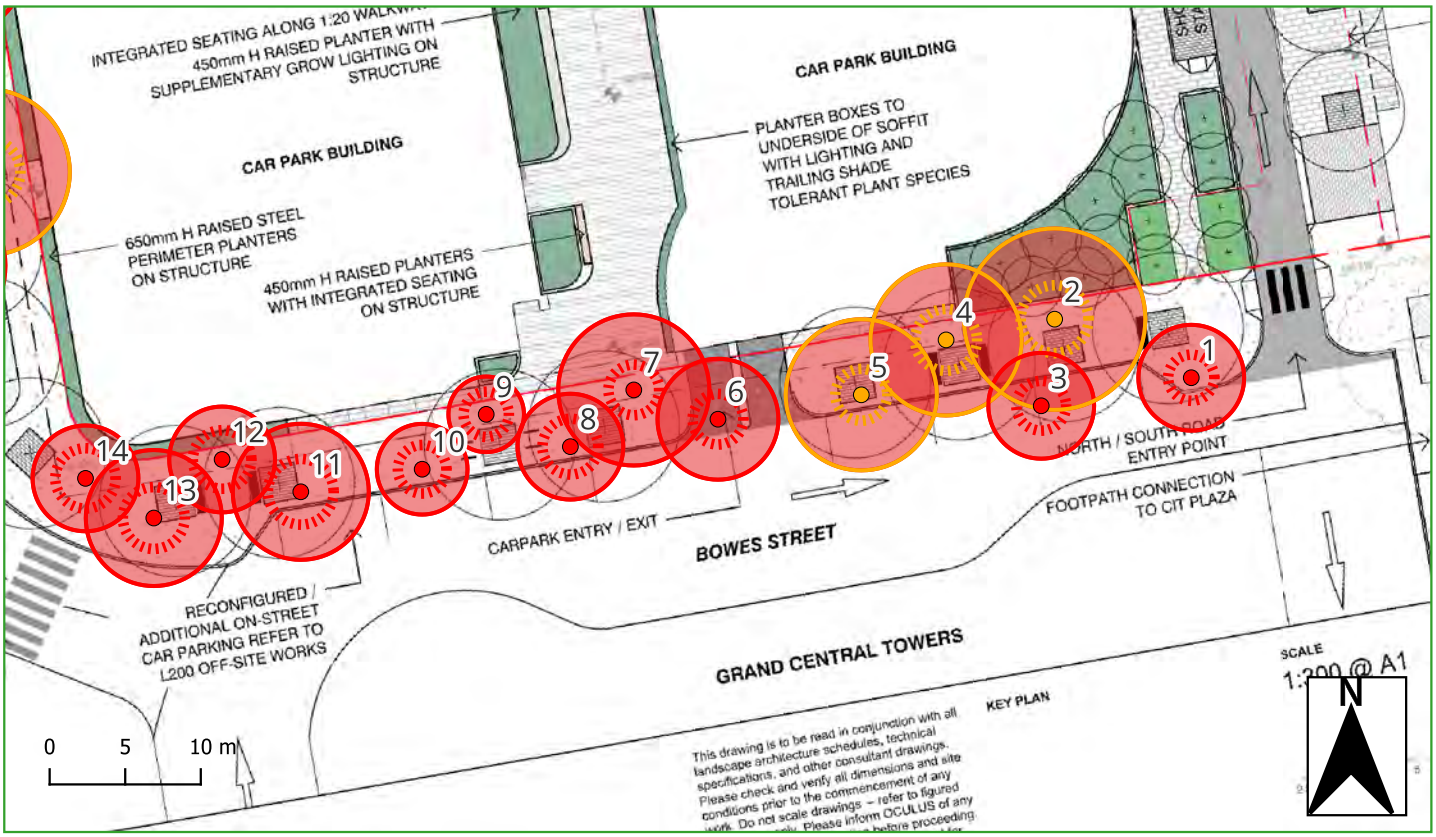
Appendix 3. Individual Tree Data

Tree Number: 6

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 4
DBH (cm):	19
Health:	Poor
Structure:	Fair
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	14
SRZ Radius (m)	1.7
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:



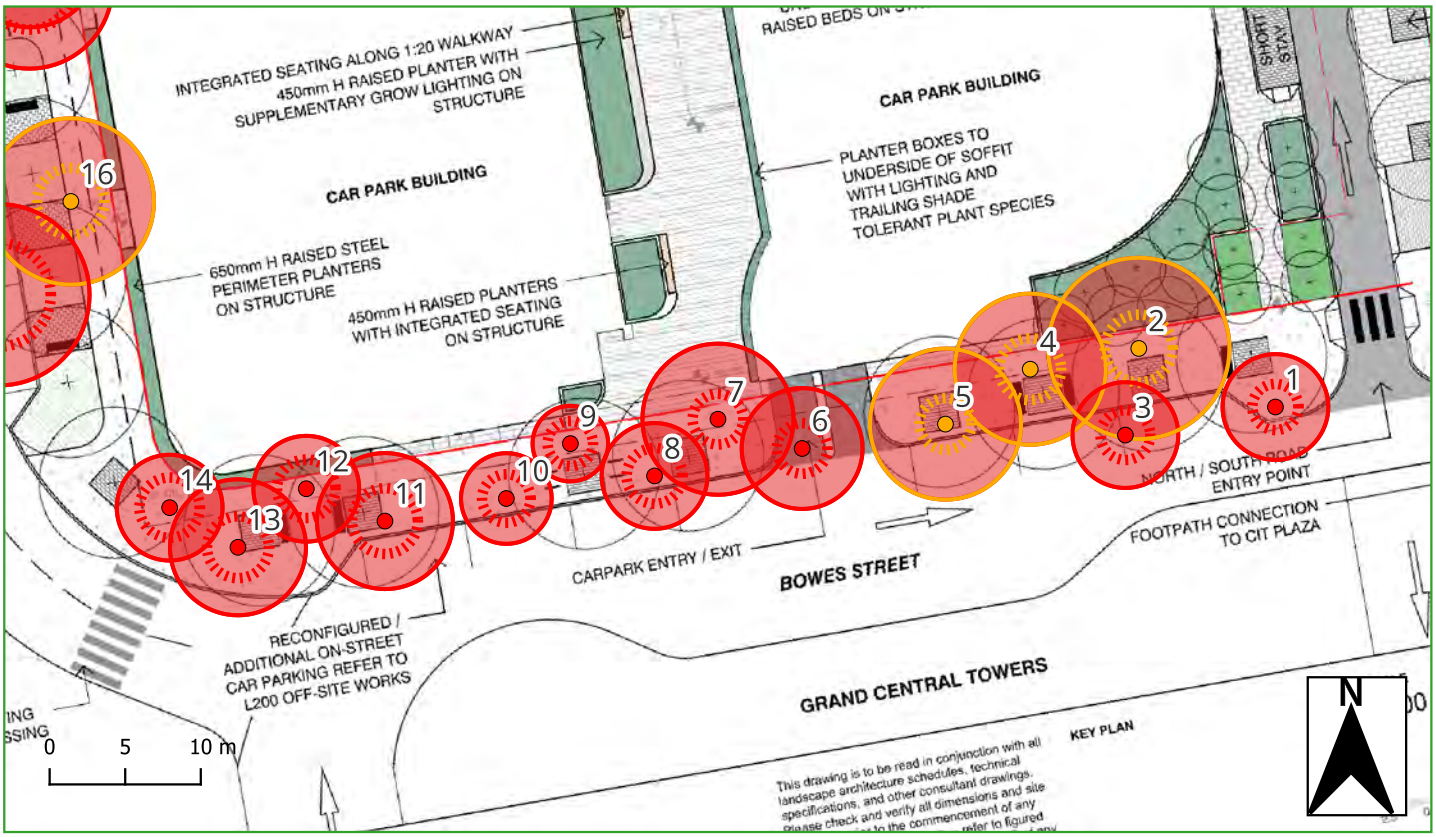


Appendix 3. Individual Tree Data

Tree Number: 7

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 6
DBH (cm):	22
Health:	Poor
Structure:	Poor
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	5
SRZ Radius (m)	1.7
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:

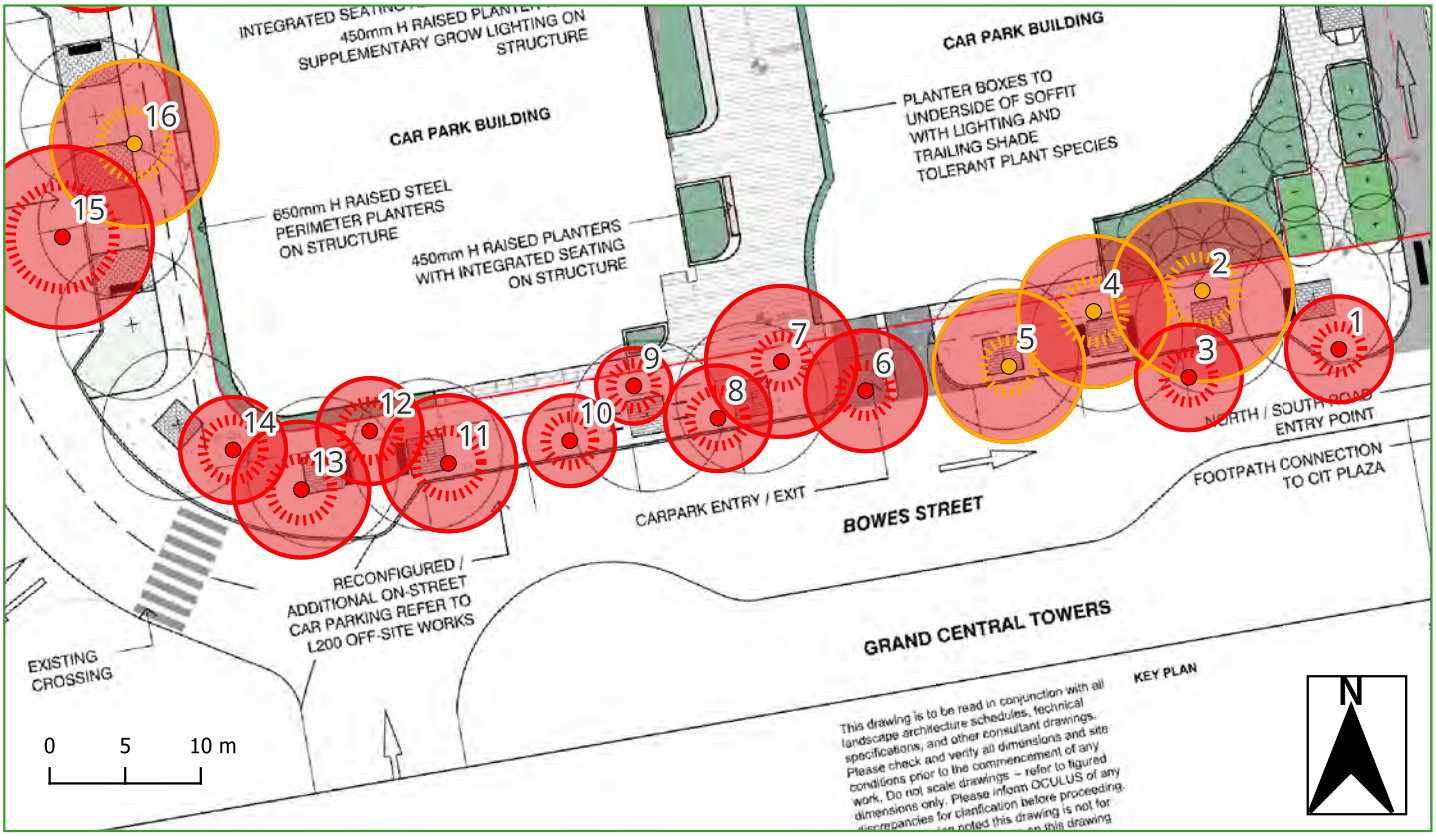


Appendix 3. Individual Tree Data

Tree Number: 8

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 3
DBH (cm):	21
Health:	Very poor
Structure:	Poor
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	15
SRZ Radius (m)	1.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

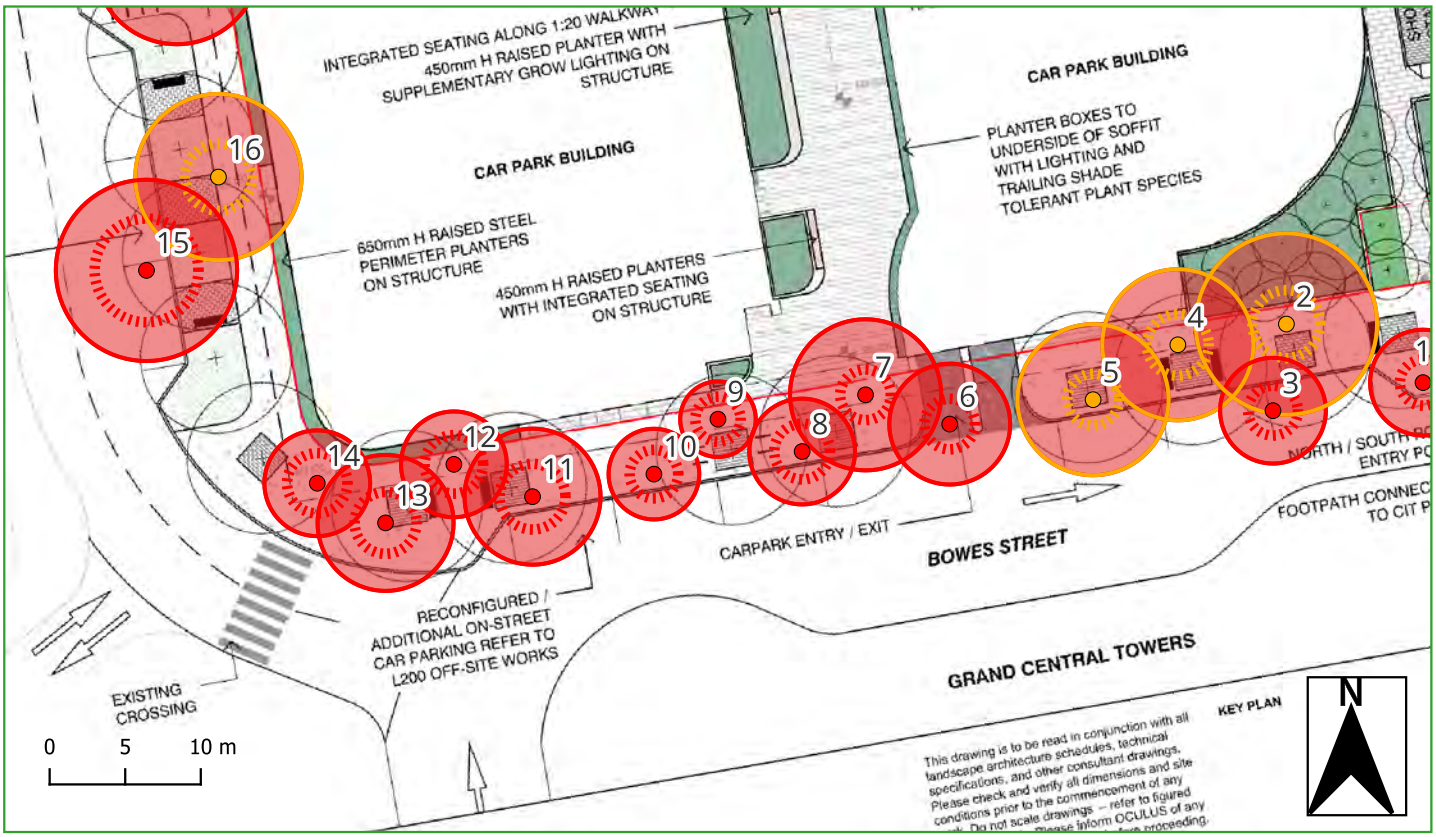
Comment:



Appendix 3. Individual Tree Data

Tree Number: 9

Botanical Name:	*Fraxinus angustifolia subsp. angustifolia*
Common Name:	Desert Ash
Origin:	Exotic
Height and Width (m):	4 x 1
DBH (cm):	6
Health:	Fair
Structure:	Poor
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	7
SRZ Radius (m)	1.5
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 10

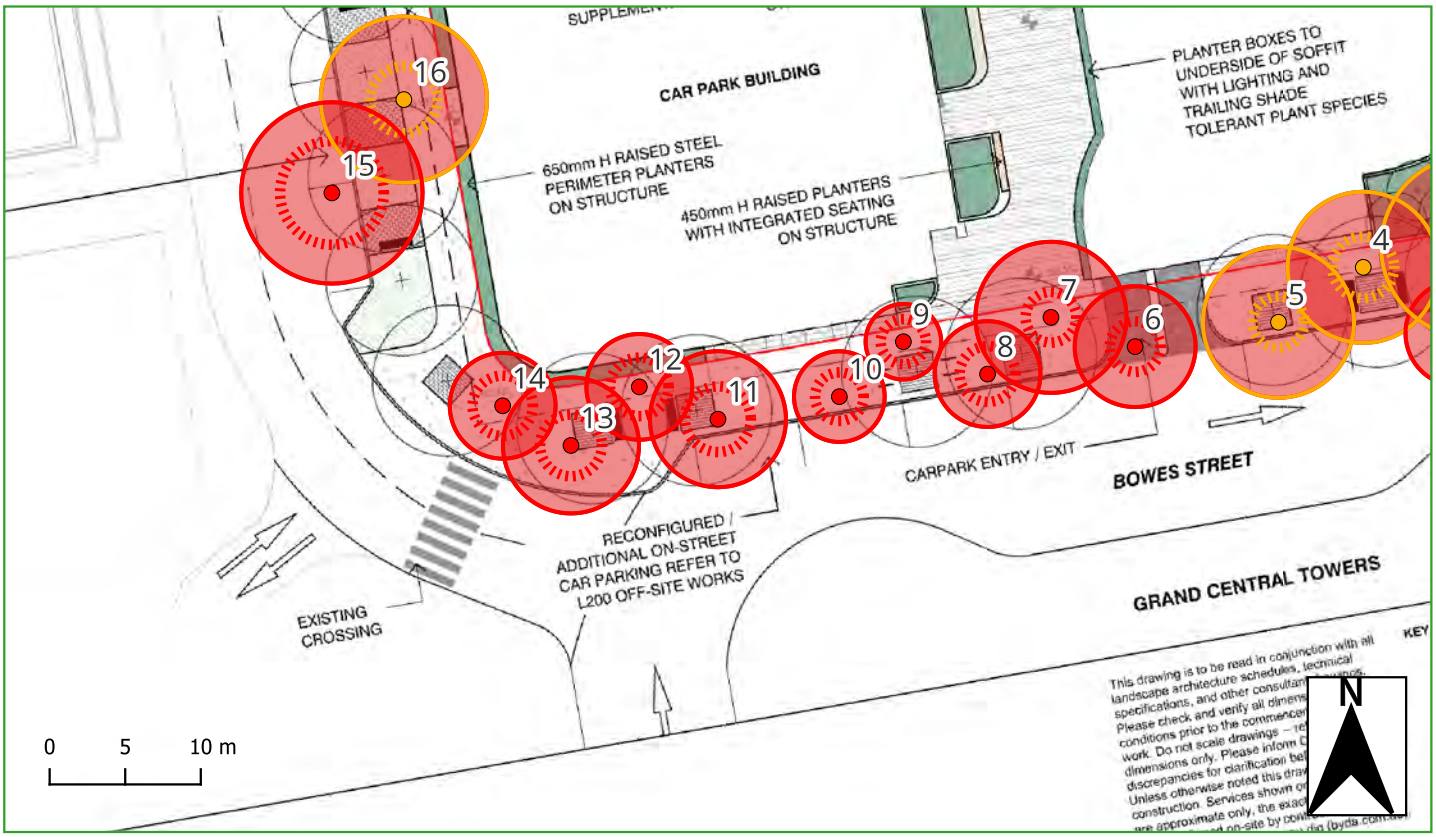
Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	5 x 2
DBH (cm):	14
Health:	Poor
Structure:	Poor
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	11
SRZ Radius (m)	1.6
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

Appendix 3. Individual Tree Data

Tree Number: 11

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	7 x 5
DBH (cm):	33
Health:	Poor
Structure:	Poor
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	5
SRZ Radius (m)	2.2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:

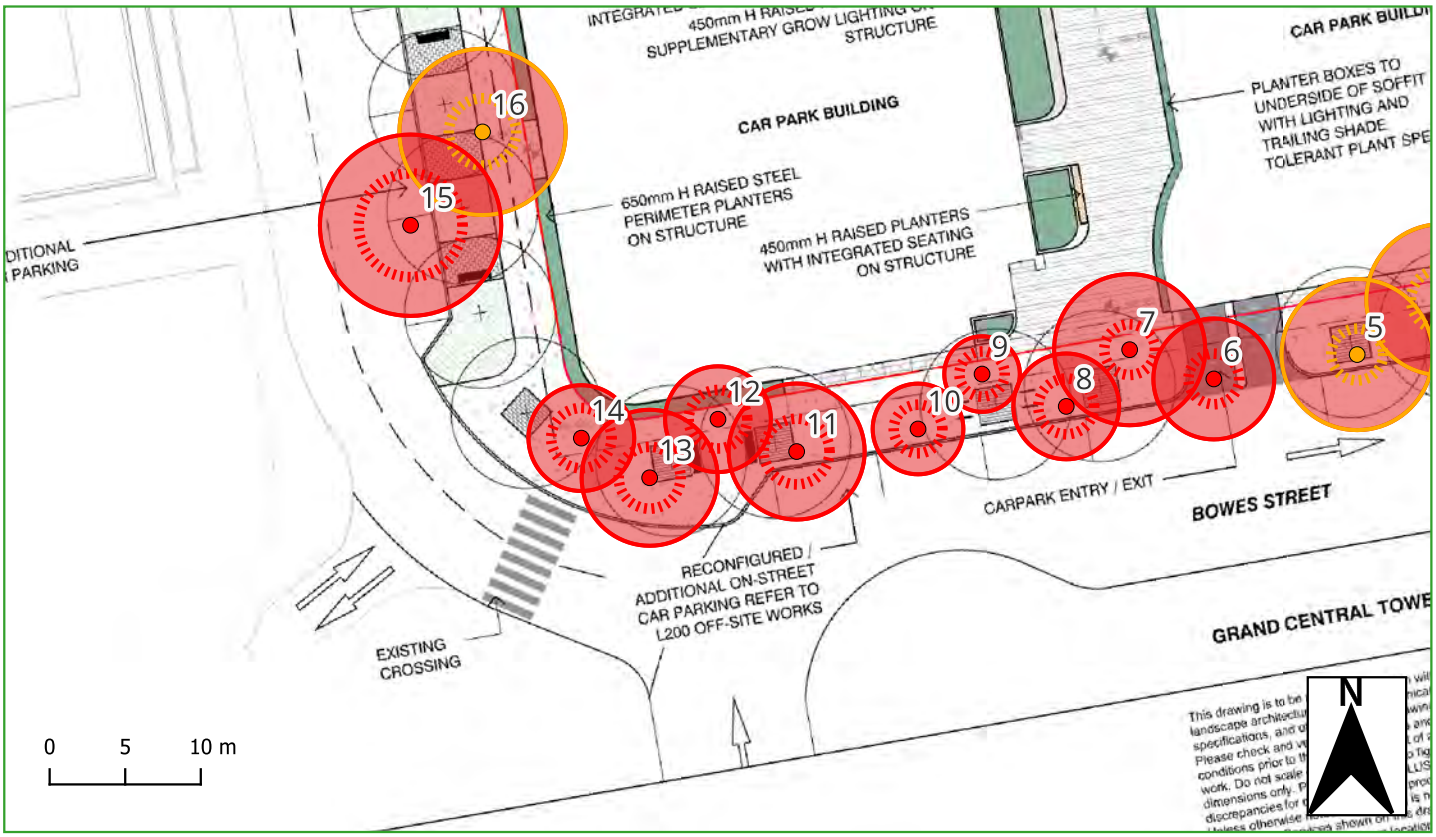


Appendix 3. Individual Tree Data

Tree Number: 12

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 3
DBH (cm):	23
Health:	Poor
Structure:	Fair
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	16
SRZ Radius (m)	1.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

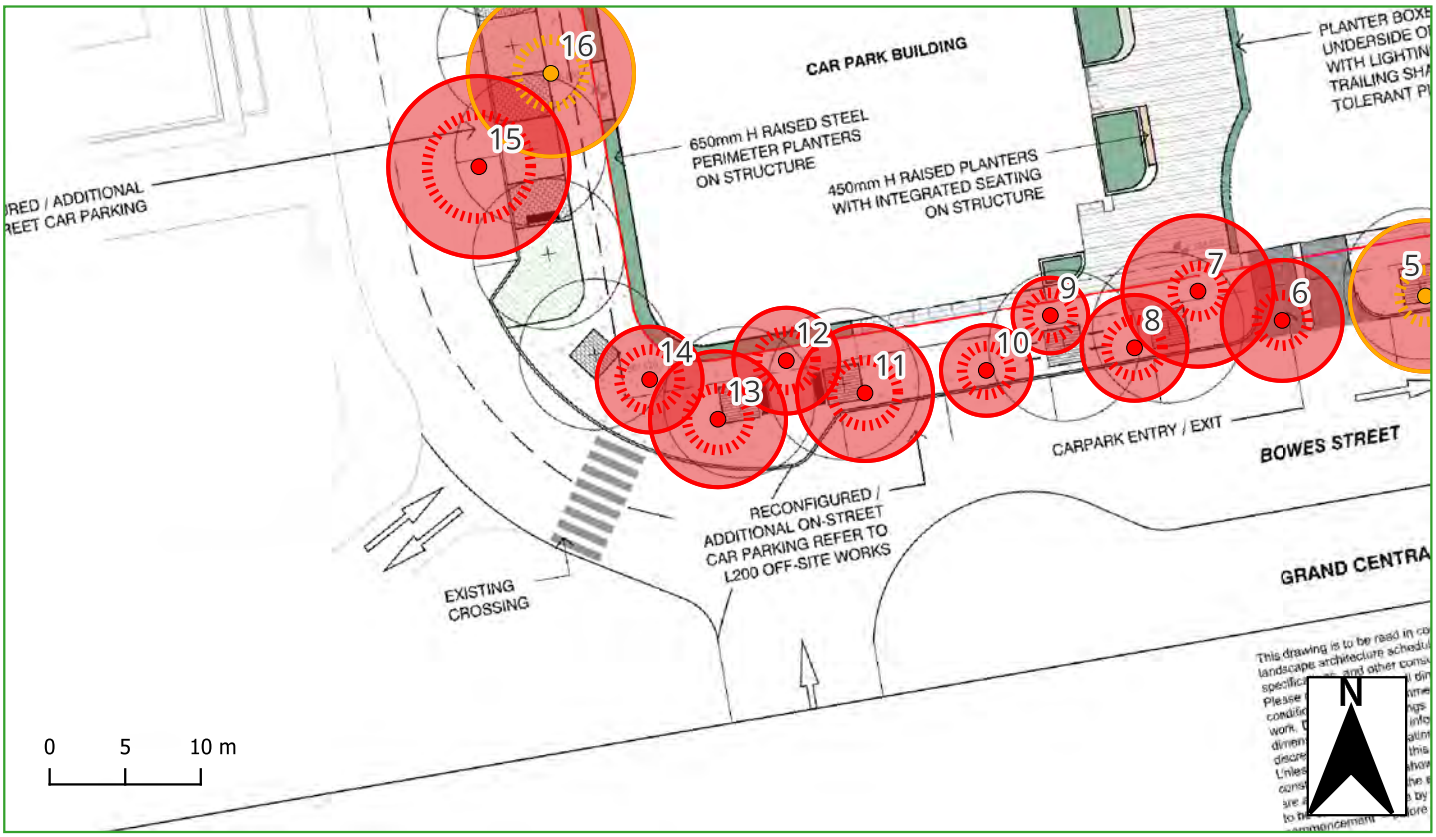
Comment:



Appendix 3. Individual Tree Data

Tree Number: 13

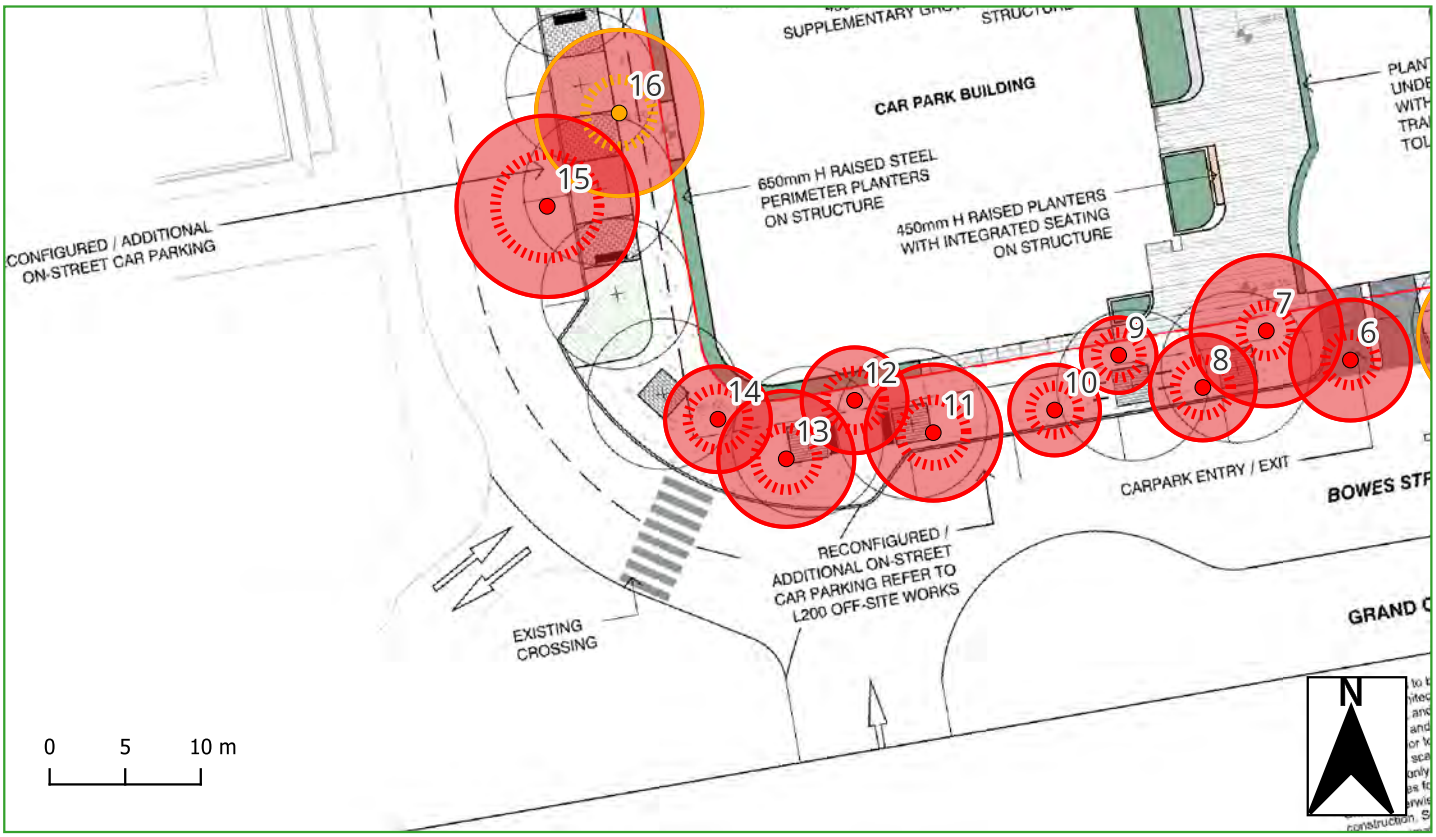
Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 5
DBH (cm):	28
Health:	Poor
Structure:	Fair
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	5
SRZ Radius (m)	2.1
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 14

Botanical Name:	*Fraxinus angustifolia subsp. angustifolia*
Common Name:	Desert Ash
Origin:	Exotic
Height and Width (m):	5 x 3
DBH (cm):	16
Health:	Fair
Structure:	Fair
ULE:	10-20 years
Retention Value:	Low
TPZ Radius (m):	12
SRZ Radius (m)	2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

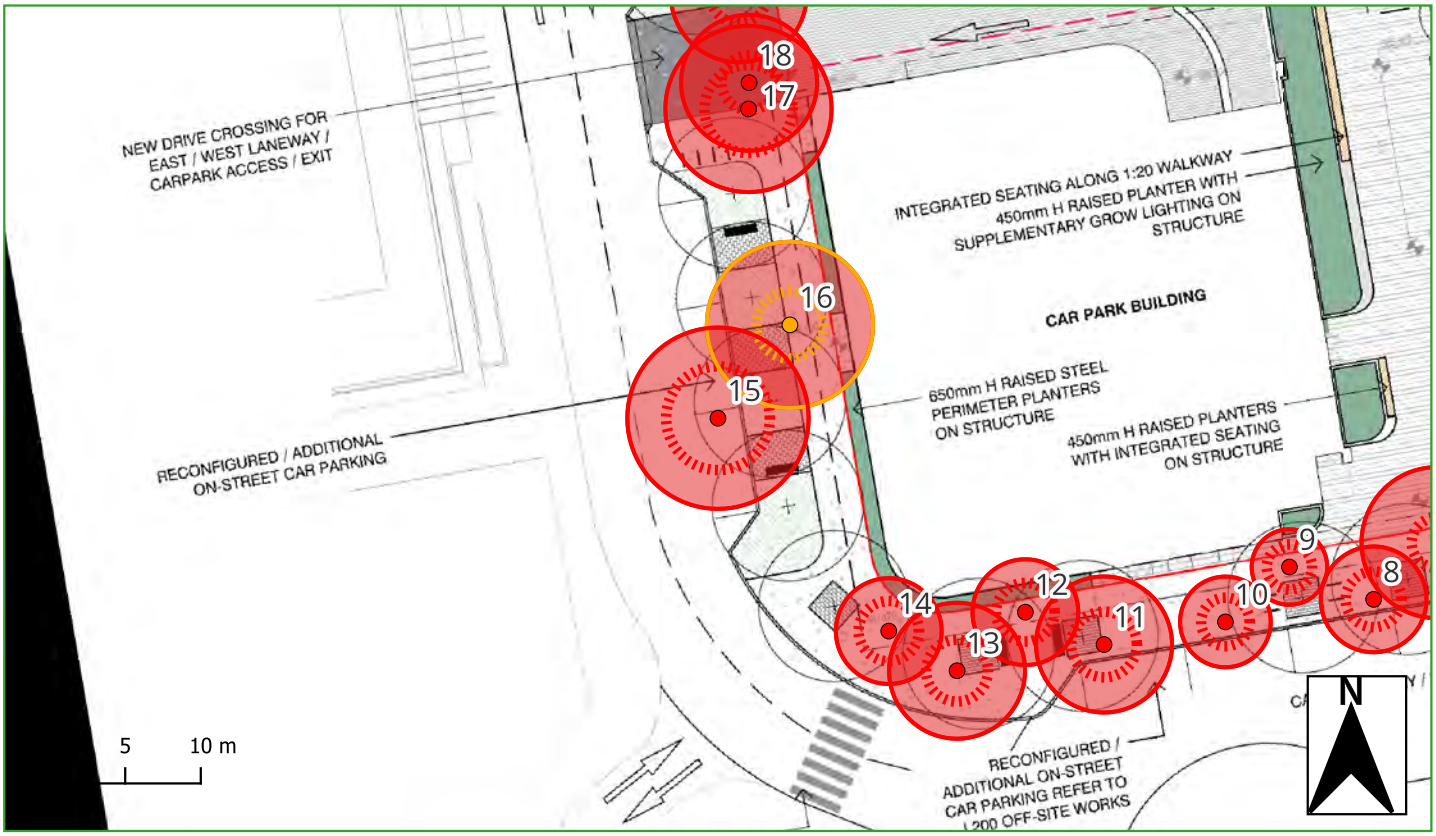


Appendix 3. Individual Tree Data

Tree Number: 15

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	10 x 8
DBH (cm):	38
Health:	Poor
Structure:	Fair
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	6
SRZ Radius (m)	3.4
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

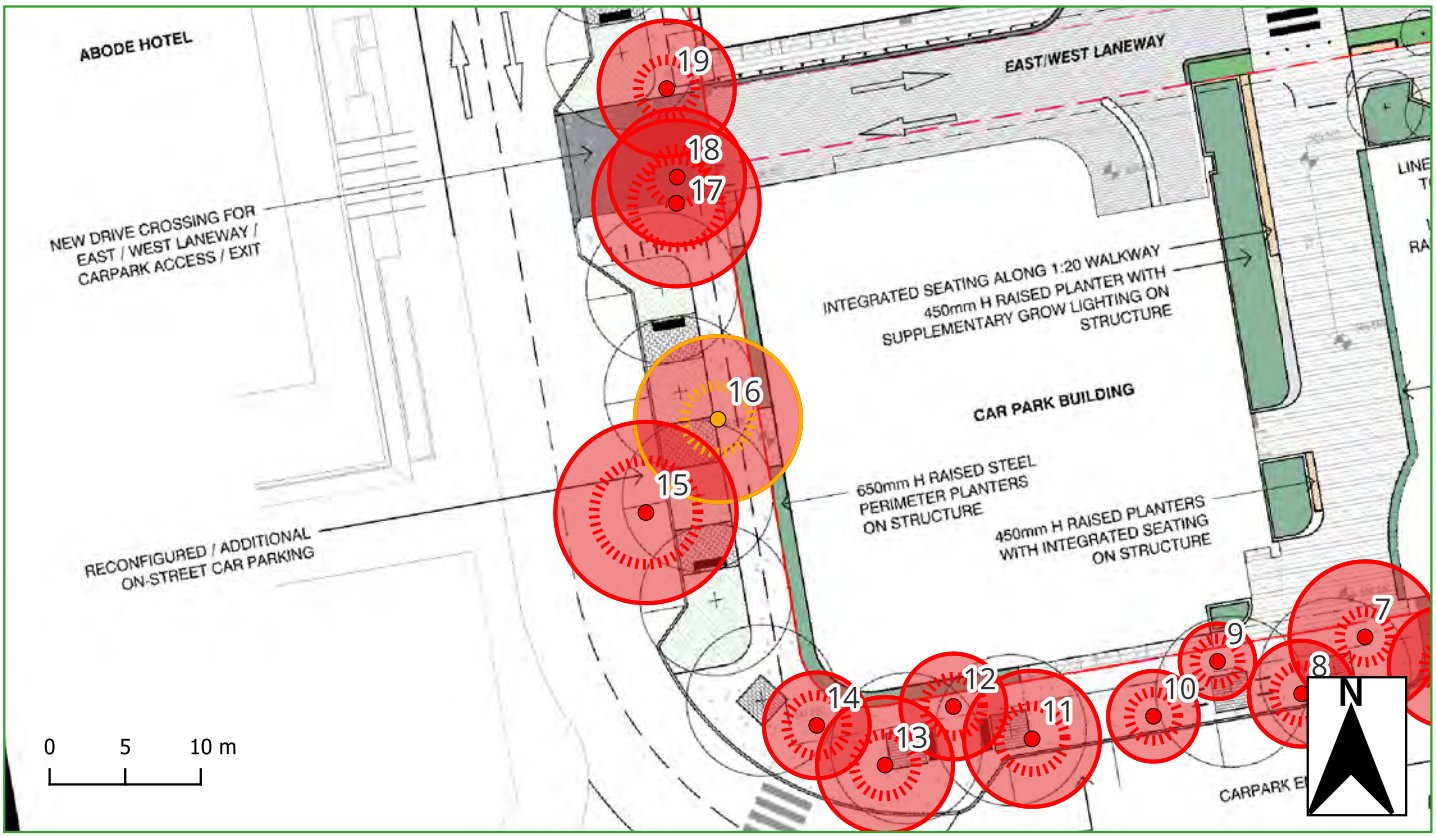
Comment:



Appendix 3. Individual Tree Data

Tree Number: 16

Botanical Name:	*Fraxinus angustifolia subsp. angustifolia*
Common Name:	Desert Ash
Origin:	Exotic
Height and Width (m):	8 x 7
DBH (cm):	26
Health:	Good
Structure:	Good
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	6
SRZ Radius (m)	2.2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

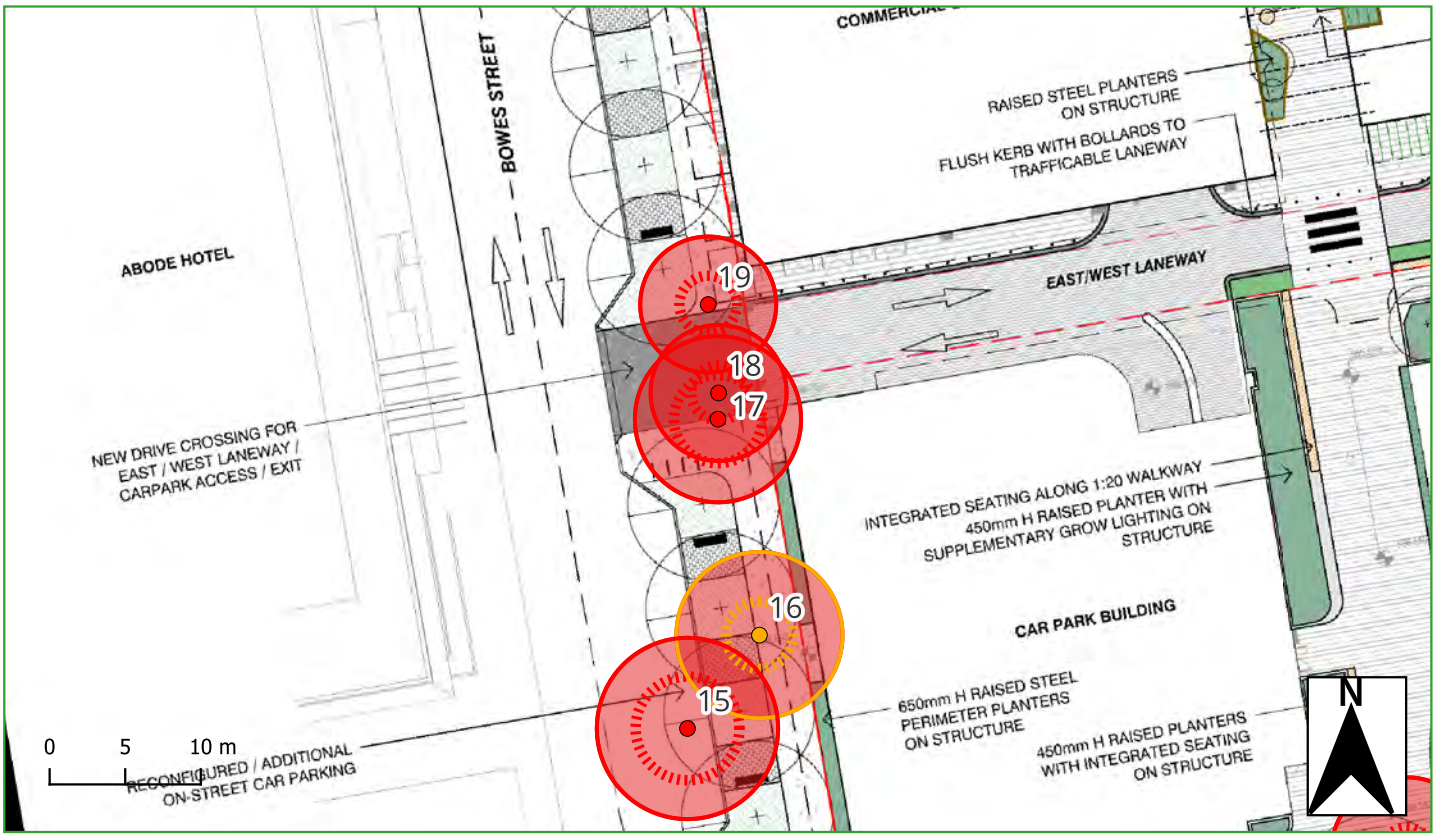


Appendix 3. Individual Tree Data

Tree Number: 17

Botanical Name:	*Ulmus parvifolia*
Common Name:	Chinese Elm
Origin:	Exotic
Height and Width (m):	6 x 7
DBH (cm):	29
Health:	Fair
Structure:	Poor
ULE:	10-20 years
Retention Value:	Low
TPZ Radius (m):	6
SRZ Radius (m)	2.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

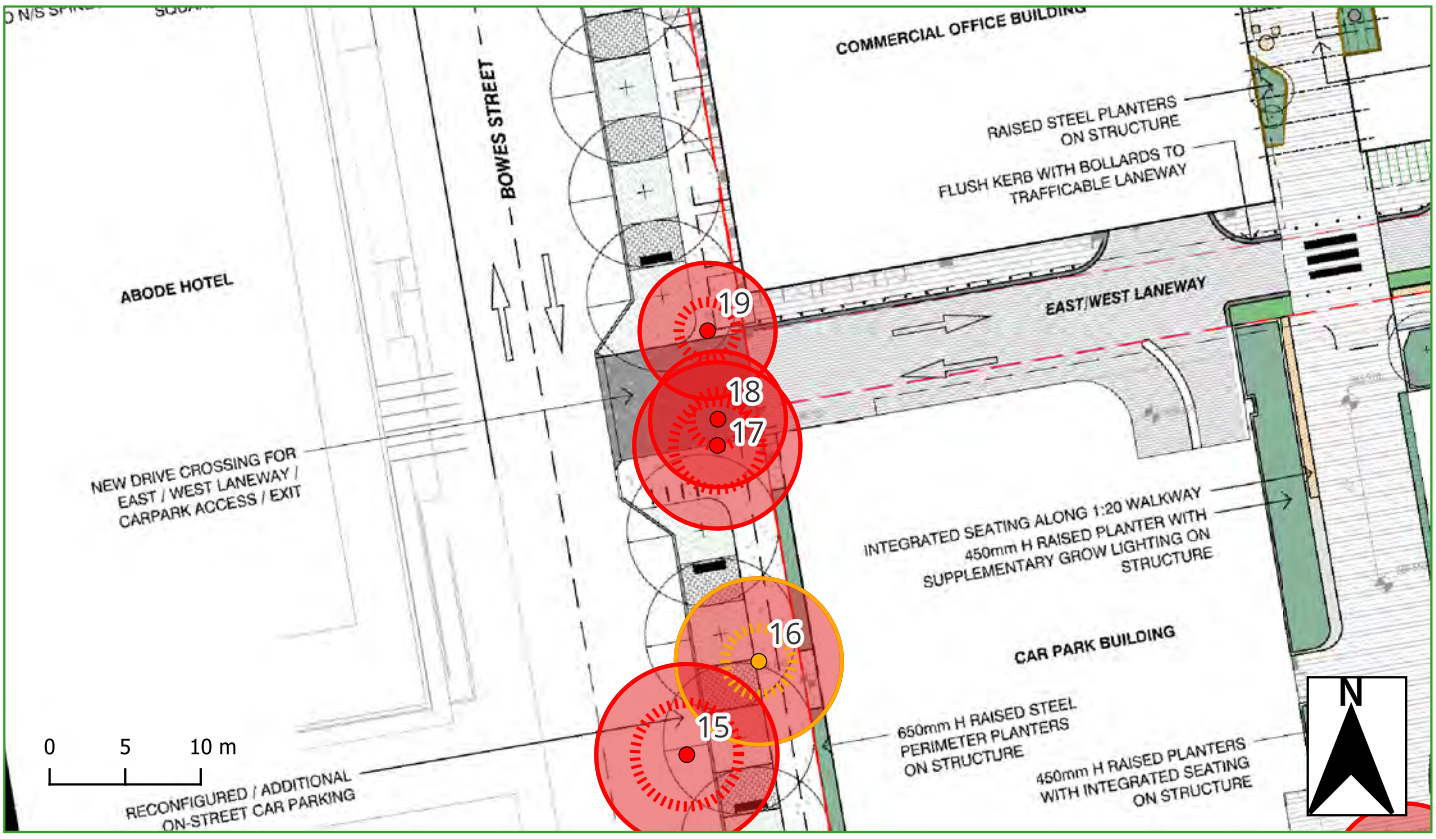
Comment:



Appendix 3. Individual Tree Data

Tree Number: 18

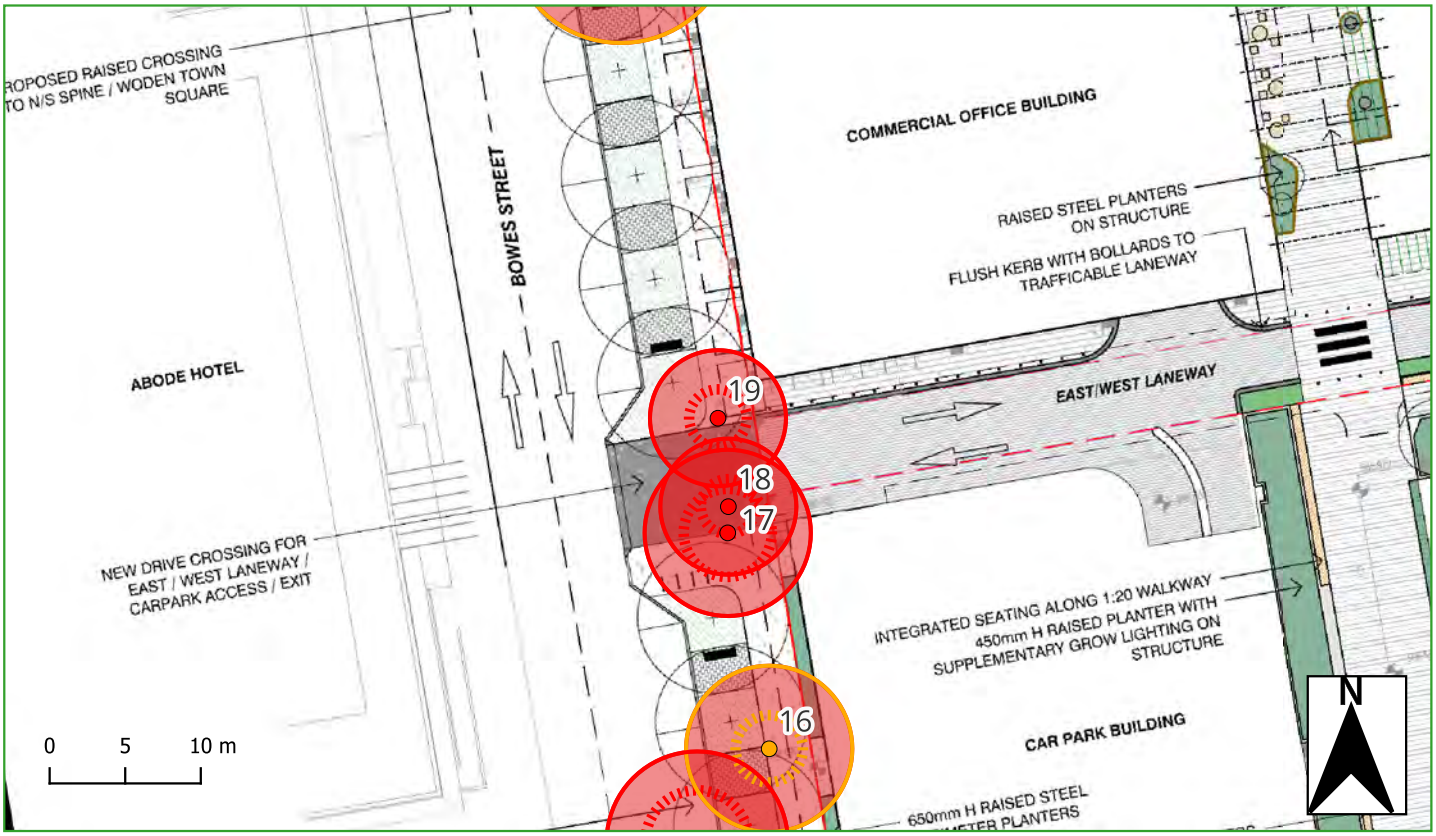
Botanical Name:	*Eucalyptus leucoxylon*
Common Name:	Yellow Gum
Origin:	Australian Native
Height and Width (m):	7 x 5
DBH (cm):	22
Health:	Poor
Structure:	Poor
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	5
SRZ Radius (m)	1.8
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 19

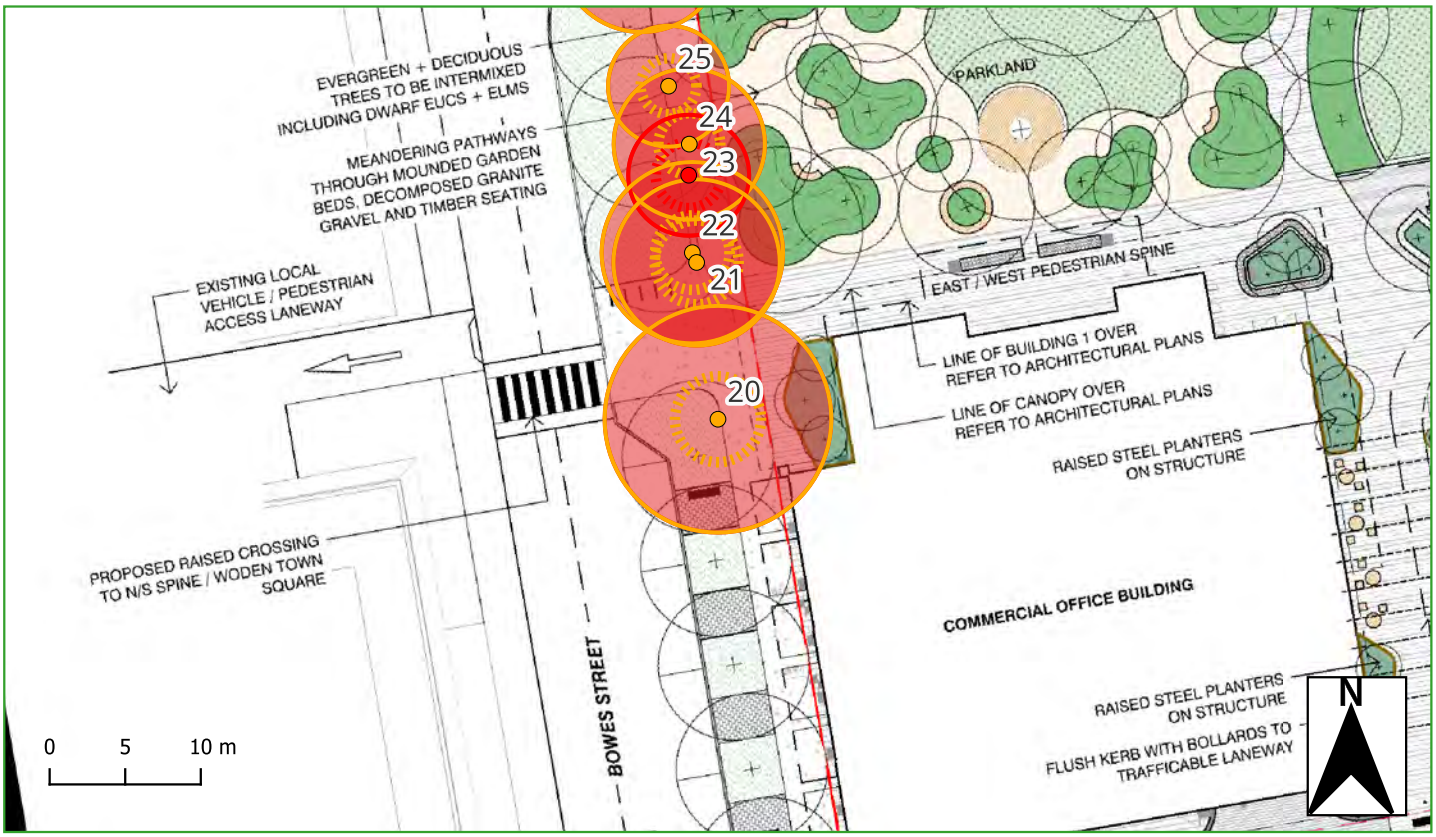
Botanical Name:	*Eucalyptus melliodora*
Common Name:	Yellow Box
Origin:	Indigenous
Height and Width (m):	6 x 5
DBH (cm):	25
Health:	Poor
Structure:	Poor
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	5
SRZ Radius (m)	1.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 20

Botanical Name:	*Ulmus parvifolia*
Common Name:	Chinese Elm
Origin:	Exotic
Height and Width (m):	10 x 11
DBH (cm):	45
Health:	Good
Structure:	Fair
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	8
SRZ Radius (m)	2.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

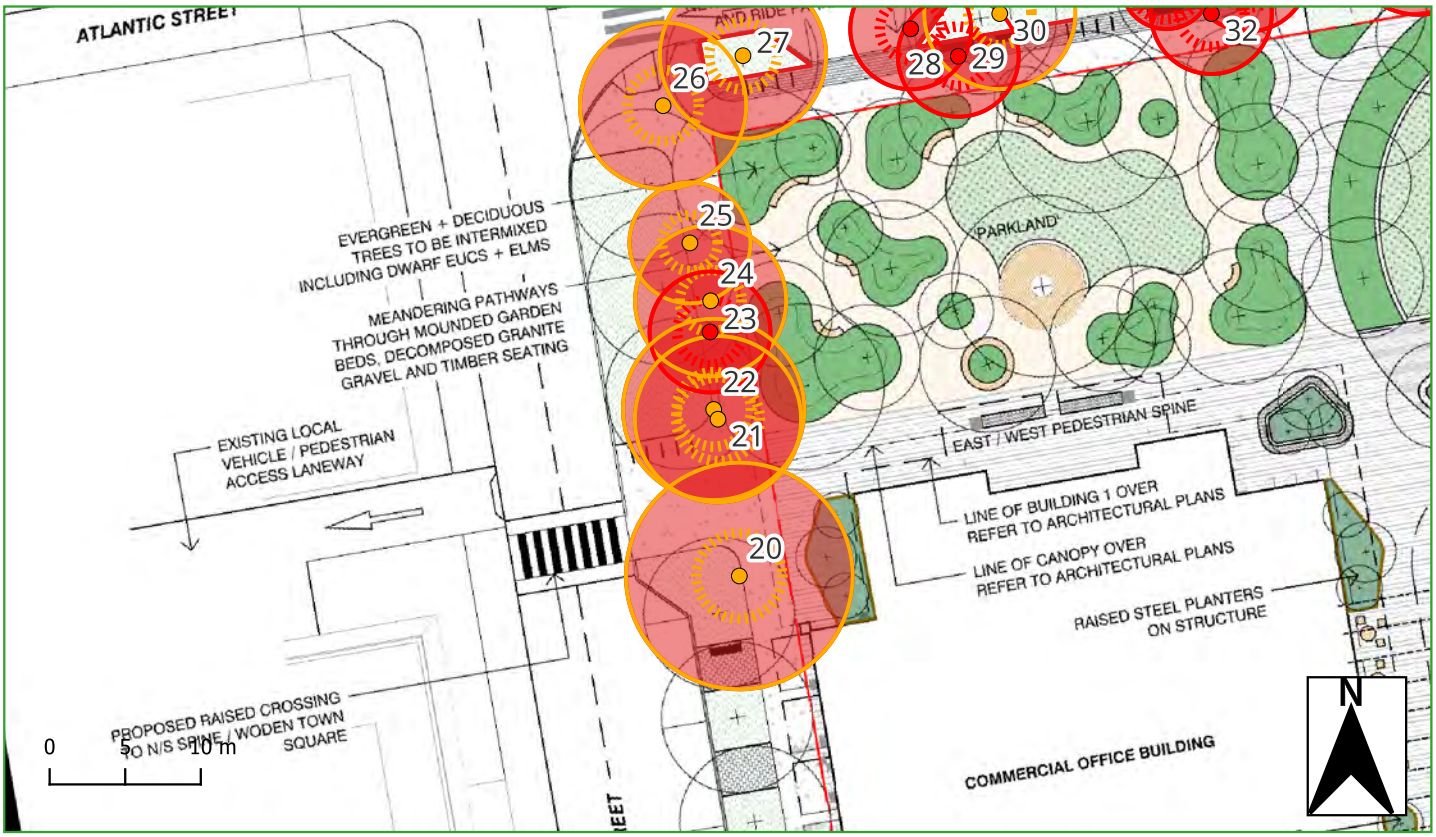


Appendix 3. Individual Tree Data

Tree Number: 21

Botanical Name:	*Ulmus parvifolia*
Common Name:	Chinese Elm
Origin:	Exotic
Height and Width (m):	11 x 7
DBH (cm):	35
Health:	Good
Structure:	Fair
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	6
SRZ Radius (m)	2.8
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:

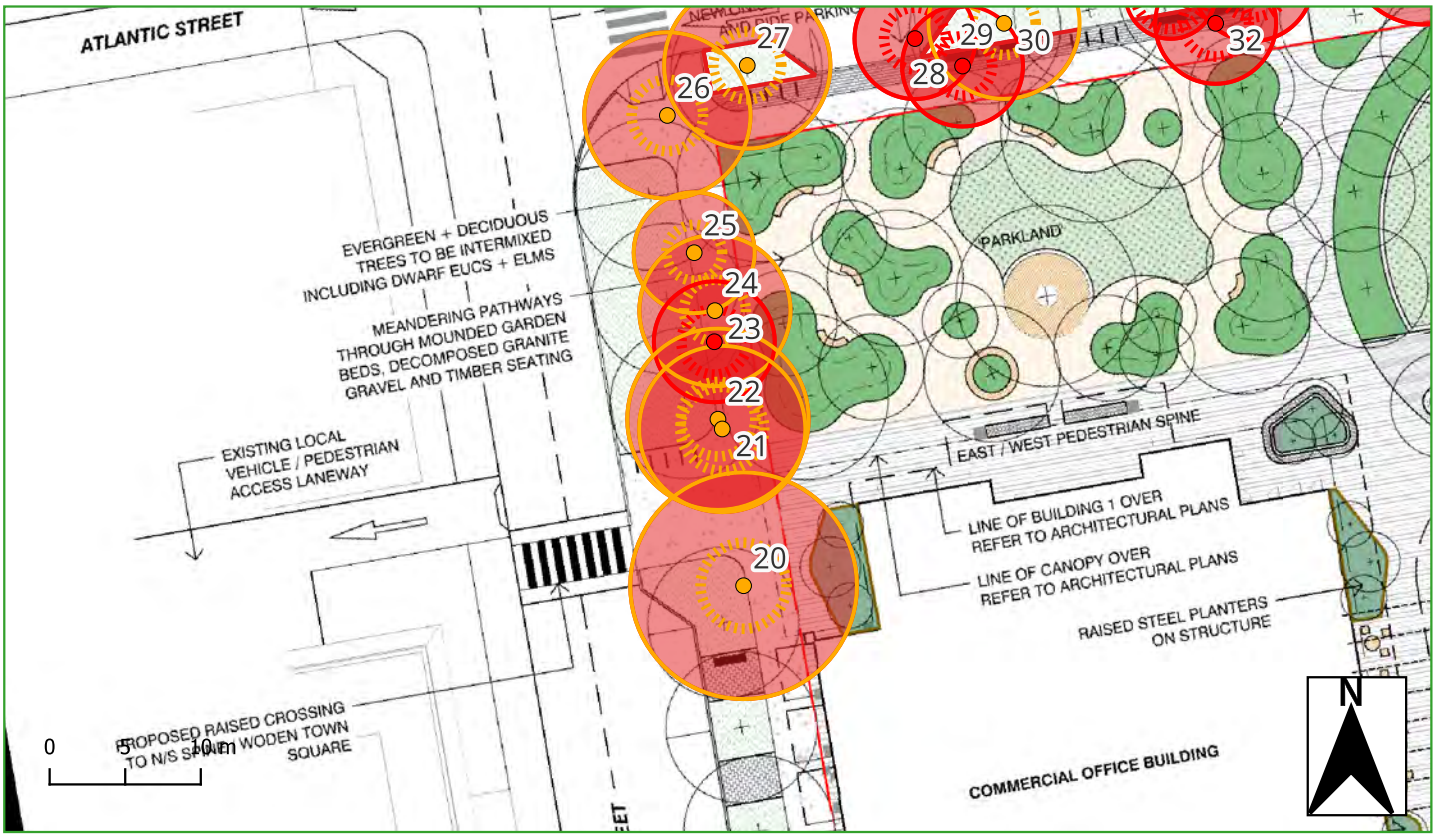


Appendix 3. Individual Tree Data

Tree Number: 22

Botanical Name:	*Ulmus parvifolia*
Common Name:	Chinese Elm
Origin:	Exotic
Height and Width (m):	11 x 8
DBH (cm):	30
Health:	Good
Structure:	Fair
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	6
SRZ Radius (m)	2.5
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

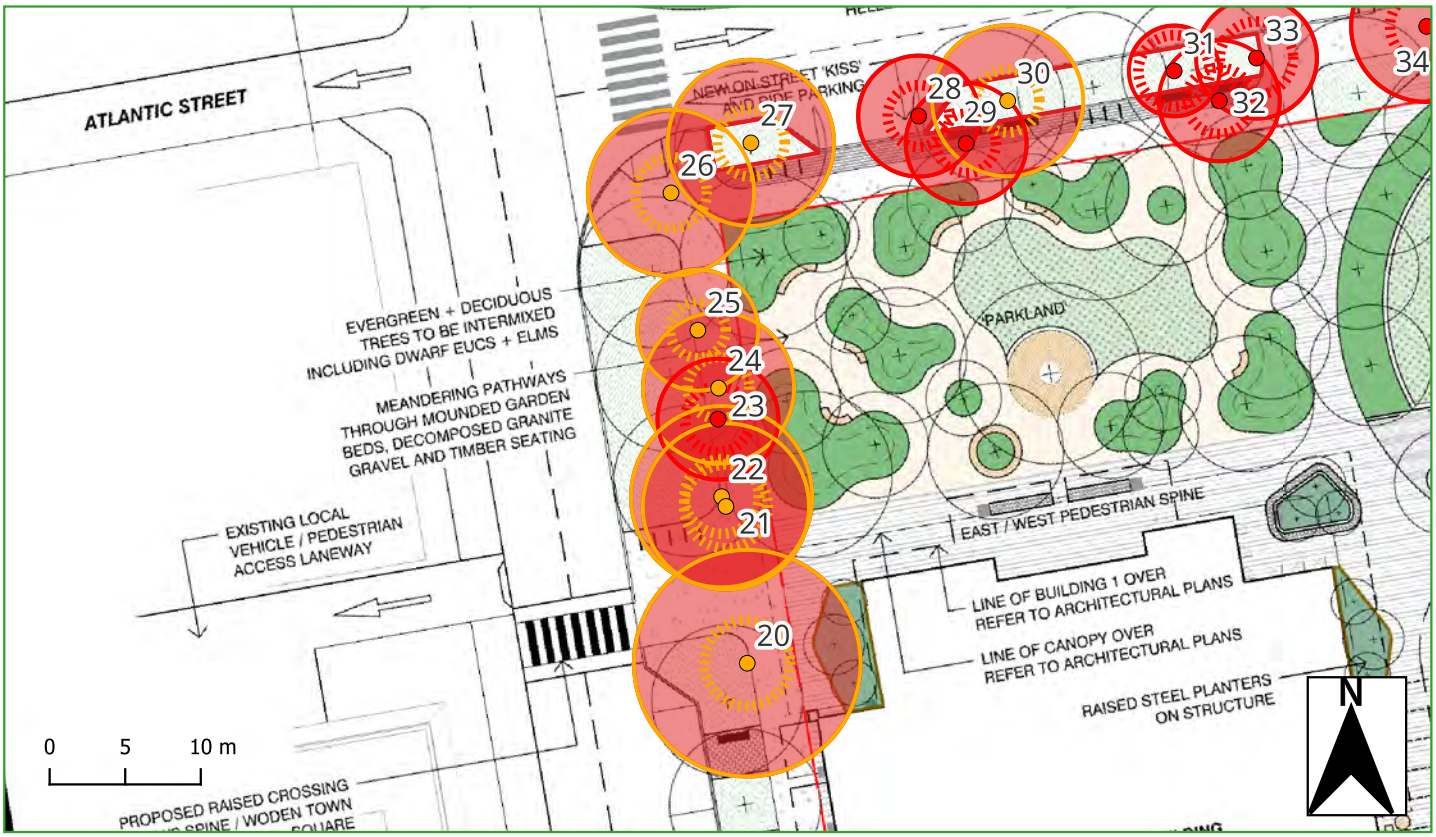
Comment:



Appendix 3. Individual Tree Data

Tree Number: 23

Botanical Name:	*Eucalyptus leucoxylon*
Common Name:	Yellow Gum
Origin:	Australian Native
Height and Width (m):	6 x 4
DBH (cm):	22
Health:	Poor
Structure:	Poor
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	15
SRZ Radius (m)	2.2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

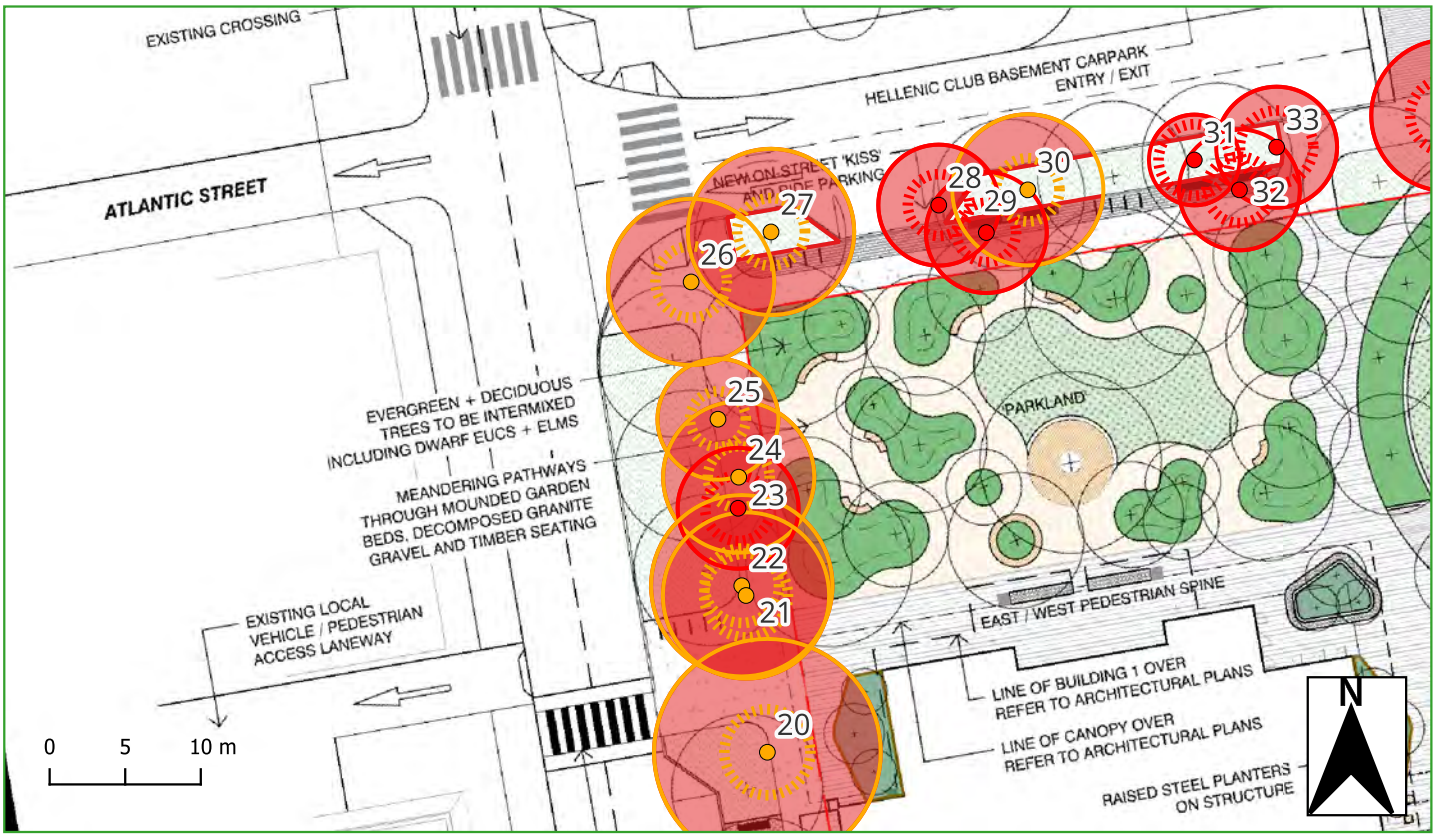
Tree Number: 24

Botanical Name:	*Ulmus parvifolia*
Common Name:	Chinese Elm
Origin:	Exotic
Height and Width (m):	8 x 6
DBH (cm):	24
Health:	Good
Structure:	Good
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	5
SRZ Radius (m)	2.1
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

Appendix 3. Individual Tree Data

Tree Number: 25

Botanical Name:	*Fraxinus angustifolia subsp. angustifolia*
Common Name:	Desert Ash
Origin:	Exotic
Height and Width (m):	7 x 4
DBH (cm):	16
Health:	Good
Structure:	Good
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	12
SRZ Radius (m)	1.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

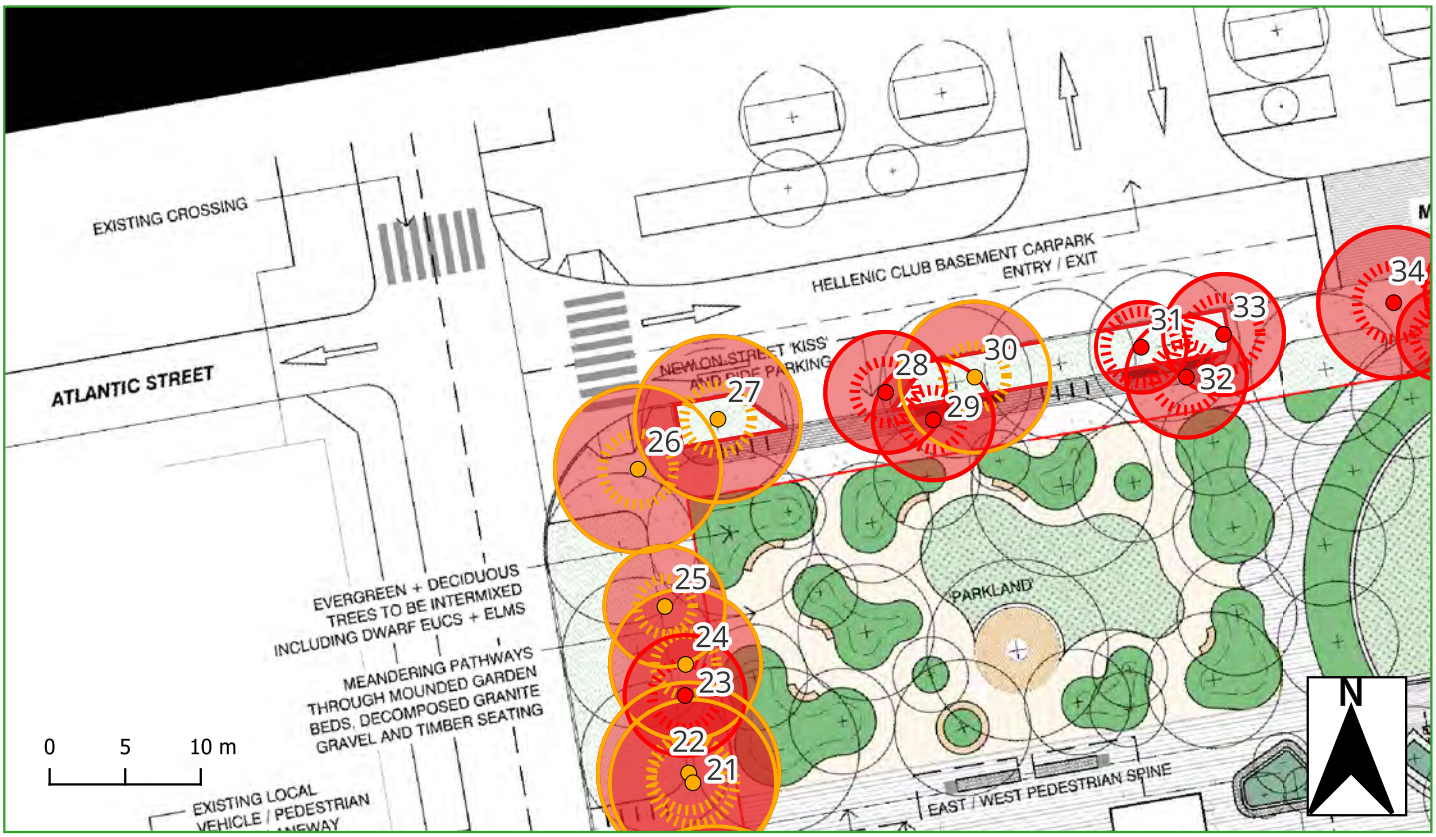
Tree Number: 26

Botanical Name:	*Fraxinus angustifolia subsp. angustifolia*
Common Name:	Desert Ash
Origin:	Exotic
Height and Width (m):	8 x 7
DBH (cm):	31
Health:	Good
Structure:	Good
ULE:	20-40 years
Retention Value:	Medium
TPZ Radius (m):	6
SRZ Radius (m)	2.4
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

Appendix 3. Individual Tree Data

Tree Number: 27

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	9 x 7
DBH (cm):	31
Health:	Good
Structure:	Good
ULE:	10-20 years
Retention Value:	Medium
TPZ Radius (m):	6
SRZ Radius (m)	2.3
TPZ Intrusion (%)	83
Arboricultural Impact	Major - not viable
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 28

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	7 x 4
DBH (cm):	18
Health:	Fair
Structure:	Good
ULE:	10-20 years
Retention Value:	Low
TPZ Radius (m):	13
SRZ Radius (m)	2.1
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

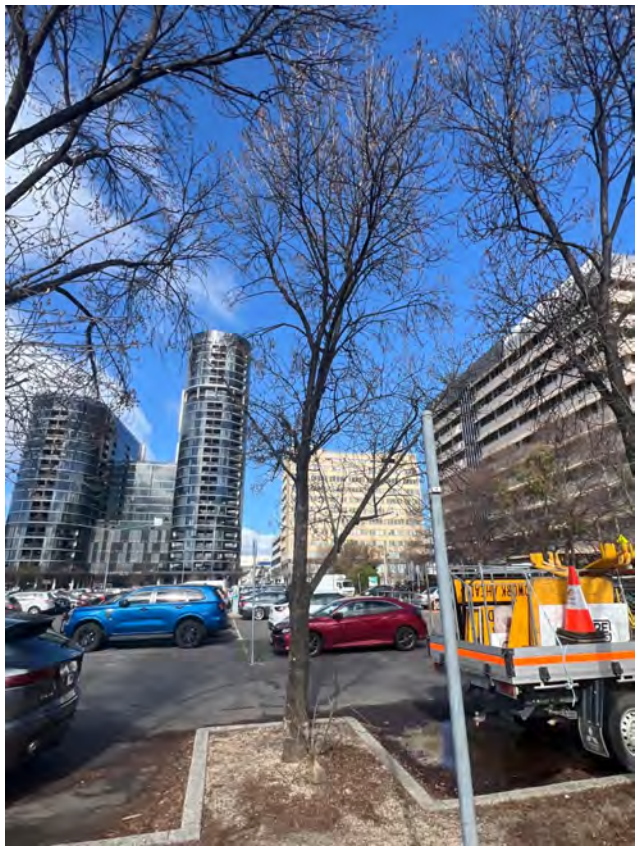
Comment:

Appendix 3. Individual Tree Data

Tree Number: 29

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	7 x 4
DBH (cm):	25
Health:	Good
Structure:	Fair
ULE:	10-20 years
Retention Value:	Low
TPZ Radius (m):	17
SRZ Radius (m)	2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:



Appendix 3. Individual Tree Data

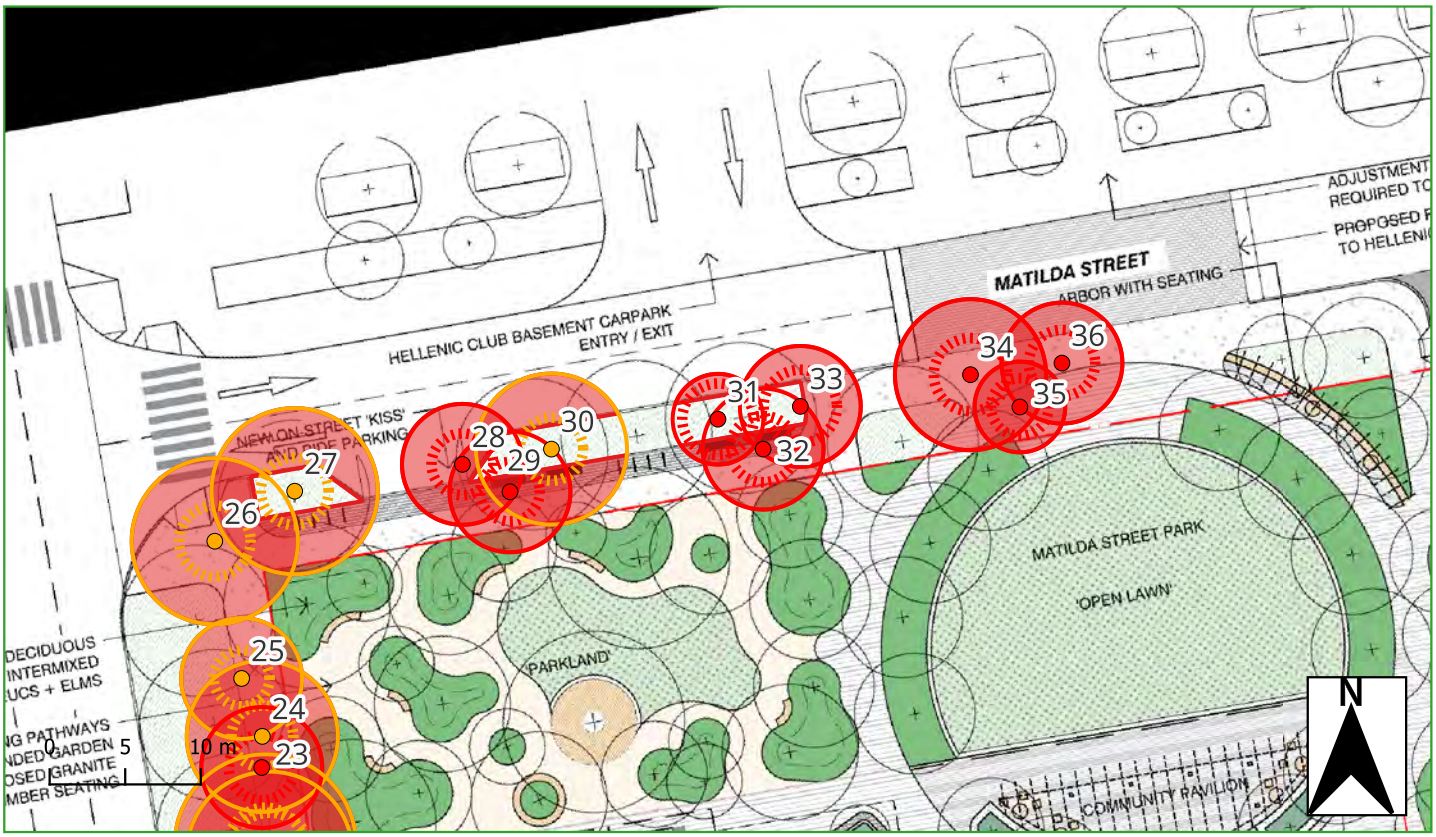
Tree Number: 30

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	8 x 6
DBH (cm):	25
Health:	Good
Structure:	Good
ULE:	10-20 years
Retention Value:	Medium
TPZ Radius (m):	5
SRZ Radius (m)	2.1
TPZ Intrusion (%)	67
Arboricultural Impact	Major - not viable
Comment:	

Appendix 3. Individual Tree Data

Tree Number: 31

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	4 x 2
DBH (cm):	24
Health:	Very poor
Structure:	Poor
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	16
SRZ Radius (m)	2.4
TPZ Intrusion (%)	43
Arboricultural Impact	Major - not viable
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 32

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	5 x 4
DBH (cm):	25
Health:	Poor
Structure:	Poor
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	17
SRZ Radius (m)	2.2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment:

Appendix 3. Individual Tree Data

Tree Number: 33

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 4
DBH (cm):	31
Health:	Poor
Structure:	Fair
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	20
SRZ Radius (m)	2.4
TPZ Intrusion (%)	77
Arboricultural Impact	Major - not viable
Comment:	

Appendix 3. Individual Tree Data

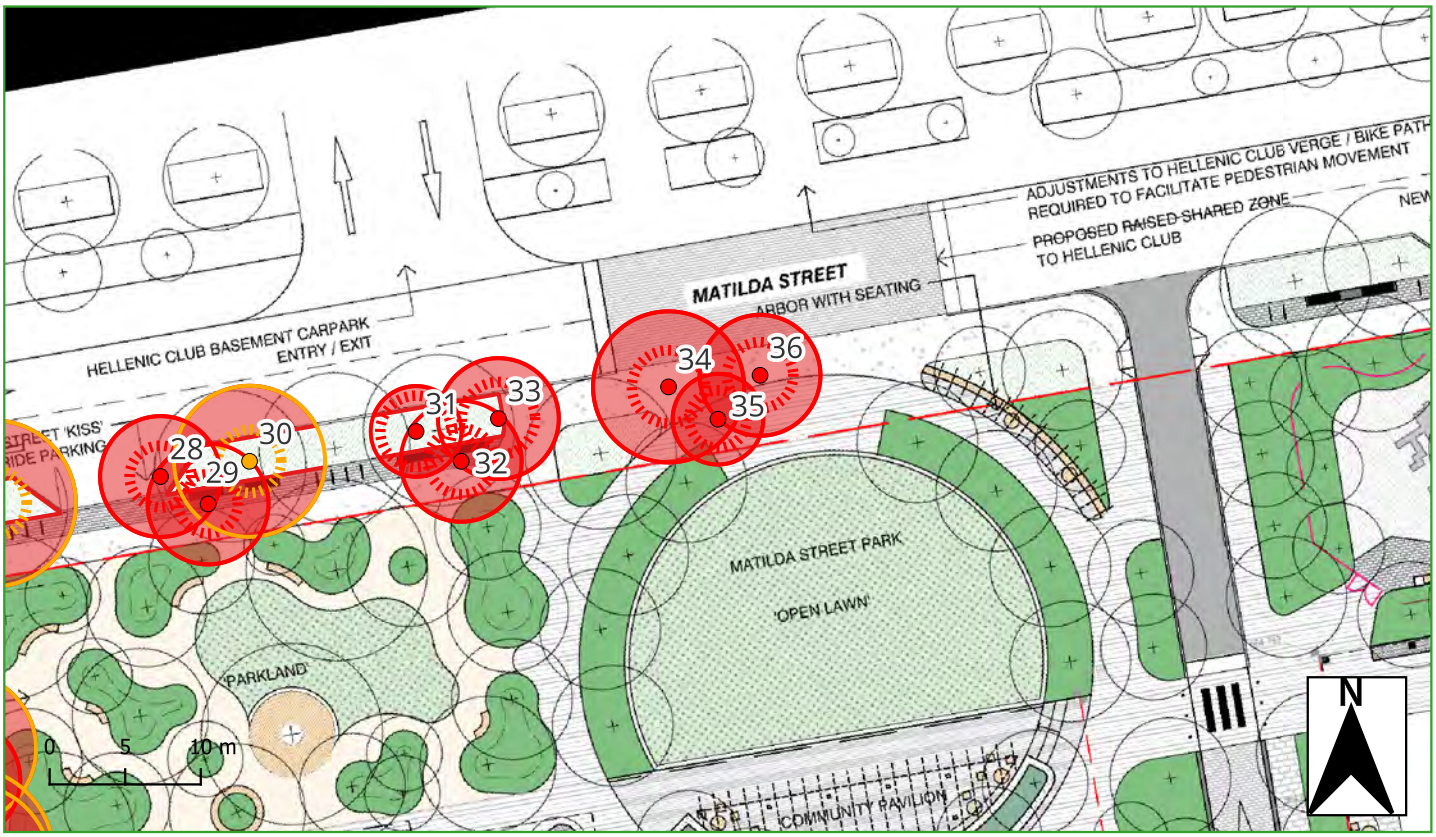
Tree Number: 34

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	8 x 6
DBH (cm):	35
Health:	Poor
Structure:	Fair
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	5
SRZ Radius (m)	2.4
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	

Appendix 3. Individual Tree Data

Tree Number: 35

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 2
DBH (cm):	18
Health:	Poor
Structure:	Fair
ULE:	1-5 years
Retention Value:	Low
TPZ Radius (m):	13
SRZ Radius (m)	1.9
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint
Comment:	



Appendix 3. Individual Tree Data

Tree Number: 36

Botanical Name:	*Fraxinus Raywood*
Common Name:	Claret Ash
Origin:	Exotic
Height and Width (m):	6 x 4
DBH (cm):	29
Health:	Poor
Structure:	Fair
ULE:	5-10 years
Retention Value:	Low
TPZ Radius (m):	19
SRZ Radius (m)	2.2
TPZ Intrusion (%)	100
Arboricultural Impact	Major - within construction footprint

Comment: