TREE SURVEY
ARBORICULTURAL CONSULTANTS

ARBORICULTURAL IMPACT ASSESSMENT & TREE PROTECTION PLAN

TAFE Meadowbank - Block J Car Park

Version 3

Prepared for:

Hansen Yuncken Pty Ltd

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Document information

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Document status

Document status	Date	Revision description
Version 1	06/04/20	Updates to the proposed building footprint
Version 2	21/07/20	Updates to the proposed building footprint
Version 3	21/10/20	Final version

Abbreviations

Abbreviation	Description
AQF	Australian Qualifications Framework
AS	Australian Standards
DBH	Diameter at Breast Height
Id	Identification
m	Metre
mm	Millimetre
NDE	Non-Destructive Excavation
NO	Number
NSW	New South Wales
sp.	Species
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment

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1 Background

1.1 Introduction

Tree Survey was commissioned by Hansen Yuncken Pty Ltd on behalf of TAFE NSW to prepare an Arboricultural Impact Assessment (AIA) for the construction of a multi-story car park.

The purpose of this report is to:

- Identify the trees within and adjacent to the proposed construction footprint.
- Assess the current health and condition of the subject trees.
- Assess the potential impacts of the development on the subject trees.
- Evaluate the significance of the subject trees and assess their suitability for retention.

1.2 The proposal

The key features of the proposal are summarised as follows:

- Demolition of existing structures and the removal of trees.
- Construction of a multi-story car park.

1.3 Documents and plans referenced

The conclusions and recommendations of this report are based on the Australian Standard, AS 4970-2009, Protection of Trees on Development Sites, the findings from the site inspections, and analysis of the following documents/plans:

- Architectural Plans prepared by Gray Puksand, dated 11/08/20.
- Detail Survey and Ground Floor Carpark Plan provided by Hansen Yuncken as DWG files.

The Detail Survey and Site Layout Plan has been used as map layers in the **Arboricultural Impact Assessment** and **Tree Protection Plan**. Specifically, the detail survey was used for accurate locations of trees**.**

1.4 Context of the version 3 report amendments

The version 2 report was issued on 21/7/20; page 5 noted the encroachment of Tree 212 and 216 was considered to be a low impact and that these trees could be successfully retained.

On 29/7/20, DPIE issued SSD draft conditions Rev 1/ condition B1 requested the car park building to be relocated away from See Street. Architectural and landscape layouts were revised to reflect the changes. The version 3 arboricultural impact assessment (this report) has been updated in accordance with the updated layouts. Tree 212 and 216 have been recommended for removal based on the new location of the car park.

1.5 The subject trees

The subject trees were inspected between 18th April and 1st June 2019. A total of **26** trees were assessed and included in this report. The subject trees were assessed in accordance with a visual tree assessment (VTA) as formulated by Mattheck & Breloer (1994)[1], and practices consistent with modern arboriculture. The following limitations apply to this methodology:

- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing. Trees within adjacent properties or restricted areas were not subject to a complete visual inspection (i.e., defects and abnormalities may be present but not recorded).
- Diameter at breast height (DBH) has been accurately measured using a diameter tape. Tree height and canopy spread were estimated unless otherwise stated.
- Tree protection zones have been calculated in accordance with Australian Standard, AS 4970-2009, Protection of Trees on Development Sites using the DBH measurements.

A tree retention assessment has been undertaken in accordance with the Institute of Australian Consulting Aboriculturalists (IACA) Significance of a Tree, Assessment Rating System (see **Appendix I**). Further information, observations, and measurements specific to each of the subject trees can be found in **Chapter 3**.

[1] VTA is an internationally recognised practice in the visual assessment of trees as formulated by Mattheck & Breloer (1994). Principle explanations and illustrations are contained within the publication, Field Guide for Visual Tree Assessment by Mattheck, C., and Breloer, H. Arboricultural Journal, Vol 18 pp 1-23 (1994).

2 Arboricultural Impact Assessment (AIA)

2.1 Impact assessment

There are two types of zones (as defined by AS 4970-2009) that need to be considered when undertaking an arboricultural impact assessment:

- **Tree protection zone (TPZ):** The TPZ is the optimal combination of crown and root area (as defined by AS 4970-2009) that requires protection during the construction process so that the tree can remain viable. The TPZ is calculated by measuring the diameter at breast height (DBH) and multiplying it by twelve (12). The resulting value is applied as a radial measurement from the centre of the trunk to delineate the TPZ.
- **Structural root zone (SRZ):** The SRZ is the area of the root system used for stability, mechanical support, and anchorage of the tree.

Encroachment within the TPZ is acceptable, providing that the arborist can demonstrate that the tree will remain viable. There are three (3) levels of encroachment (as defined by AS 4970-2009):

- **No encroachment (0%): No encroachment within the TPZ.**
- **Minor encroachment (<10%): The encroachment is less than 10% of the TPZ.**
- **Major encroachment (>10%): The encroachment is greater than 10% of the TPZ.**

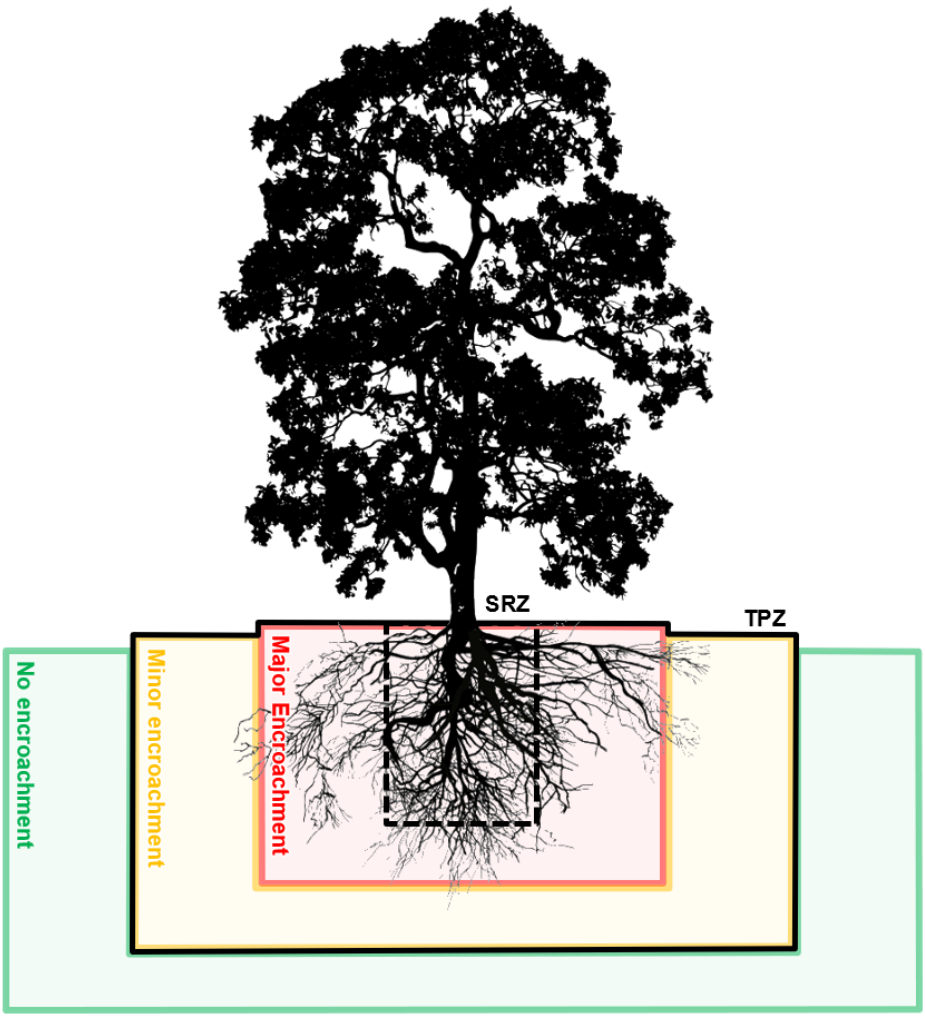

Figure 1: Indicative zones of encroachment within the TPZ

2.2 Mitigating the impacts

Encroachment within the TPZ should be compensated with a range of mitigation measures to ensure that impacts to the subject tree(s) are reduced or restricted wherever possible. Mitigation should be increased relative to the level of encroachment within the TPZ to ensure the subject tree(s) remain viable. The table below outlines requirements under AS 4970-2009 and mitigation measures required within each category of encroachment. These mitigation measures will only apply if trees are proposed to be retained.

Table 1: Mitigation measures

Encroachment	Mitigation Measures
No encroachment (0%)	• N/A
Minor encroachment (<10%)	• The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. • Detailed root investigations should not be required. • Tree protection must be installed.
Major encroachment (>10%)	• The project arborist must demonstrate the tree(s) would remain viable. • Root investigation by non-destructive methods may be required for any trees proposed for retention. • Consideration of relevant factors, including root location and distribution, tree species, condition, site constraints, and design factors. • The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. • The project arborist will be required to supervise any works within the TPZ. • Tree protection must be installed.

3 Results

Table 2 shows the results of the arboricultural assessment. Key points are:

3.1 Trees proposed for retention

No encroachment (0%): No likely or foreseeable encroachment within the TPZ:

- A total of **7** trees **(Tree 159, 160, 161, 162, 195, 196, 215)** are located outside of the proposed construction footprint. No impacts on these trees are foreseeable under the current proposal.

3.2 Trees proposed for removal

Minor encroachment (<10%): The proposed encroachment is less than 10% of the TPZ:

- A total of **1** tree **(Tree 212)** will be subject to a minor encroachment of less than 10% within the TPZ. The encroachment extends to the border of the SRZ, and impacts within the SRZ are likely given the proximity of the proposed works. Impacts within the SRZ are not recommended as it may lead to the destabilisation and/or decline of the tree. This tree is located directly adjacent to the construction footprint and cannot be retained under the current proposal.

Major encroachment (>10%): The proposed encroachment is greater than 10% of the TPZ:

- A total of **18** trees will be subject to an encroachment of greater than 20% within the TPZ. Encroachments of greater than 20% (of the total TPZ area) can begin to impact the structural root zone (SRZ) and is generally more difficult to mitigate. Impacts within the SRZ are not recommended as it may lead to the destabilisation and/or decline of the tree. These trees are located within or directly adjacent to the proposed construction footprint and cannot be retained under the current proposal.

Table 2: Results of the arboricultural assessment

Id.	Botanical name	Height (metres)	Spread (metres diameter)	Health	Structure	Age class	Tree significance	Useful life expectancy	Priority for retention	DBH (millimetres diameter)	TPZ (metres radius)	SRZ (metres radius)	Encroachment	% Encroachment within TPZ	Other notes	Proposal
159	*Eucalyptus tereticornis*	16	10	Good	Good	Mature	Medium	Medium	High	350	4.2	2.1	No	**0%**		**Retain**
160	*Eucalyptus tereticornis*	16	12	Good	Good	Mature	Medium	Medium	High	450	5.4	2.4	No	**0%**		**Retain**
161	*Eucalyptus tereticornis*	16	12	Good	Good	Mature	Medium	Medium	High	450	5.4	2.4	No	**0%**		**Retain**
162	*Ficus microcarpa*	16	20	Good	Good	Mature	Medium	Medium	High	1000	12	3.3	No	**0%**		**Retain**
190	*Lophostemon confertus*	12	14	Good	Good	Mature	Medium	Medium	High	450	5.4	2.4	Major	**43%**	Tree is located adjacent to the disturbance footprint	**Remove**
191	*Eucalyptus globulus 'bicostata'*	12	14	Good	Fair	Mature	Medium	Medium	High	650	7.8	2.8	Major	**66%**	Tree is located inside the disturbance footprint	**Remove**
192	*Eucalyptus mannifera*	14	12	Good	Good	Mature	Medium	Medium	High	400	4.8	2.3	Major	**20%**	Tree is located adjacent to the disturbance footprint	**Remove**
193	*Eucalyptus mannifera*	12	12	Fair	Fair	Mature	Medium	Medium	High	400	4.8	2.3	Major	**59%**	Tree is located inside the disturbance footprint	**Remove**
195	*Eucalyptus mannifera*	16	14	Fair	Good	Mature	Medium	Medium	High	500	6	2.5	No	**0%**		**Retain**
196	*Lophostemon confertus*	10	12	Good	Fair	Mature	Medium	Medium	High	350	4.2	2.1	No	**0%**		**Retain**
202	*Eucalyptus haemastoma*	14	12	Good	Good	Mature	Medium	Medium	High	450	5.4	2.4	Major	**90%**	Tree is located inside the disturbance footprint	**Remove**
203	*Eucalyptus melliodora*	10	6	Fair	Good	Mature	Low	Medium	Medium	250	3	1.9	Major	**100%**	Tree is located inside the disturbance footprint	**Remove**
204	*Eucalyptus haemastoma*	12	14	Fair	Good	Mature	Medium	Medium	High	500	6	2.5	Major	**59%**	Tree is located inside the disturbance footprint	**Remove**
206	*Eucalyptus sideroxylon*	12	18	Good	Fair	Mature	Medium	Medium	High	800	9.6	3	Major	**73%**	Tree is located inside the disturbance footprint	**Remove**
208	*Eucalyptus saligna*	14	12	Good	Good	Mature	Medium	Medium	High	350	4.2	2.1	Major	**100%**	Tree is located inside the disturbance footprint	**Remove**
209	*Eucalyptus globulus 'bicostata'*	14	16	Good	Poor	Mature	Medium	Medium	High	950	11.4	3.2	Major	**77%**	Tree is located inside the disturbance footprint	**Remove**
210	*Corymbia maculata*	18	16	Good	Good	Mature	Medium	Medium	High	650	7.8	2.8	Major	**31%**	Tree is located adjacent to the disturbance footprint	**Remove**
211	*Corymbia maculata*	12	8	Fair	Fair	Mature	Medium	Medium	High	300	3.6	2	Major	**74%**	Tree is located inside the disturbance footprint	**Remove**
212	*Corymbia maculata*	10	6	Good	Fair	Semi-mature	Low	Medium	Low	150	2	1.5	Minor	**5%**	Tree is located adjacent to the disturbance footprint	**Remove**
215	*Corymbia maculata*	8	4	Good	Fair	Semi-mature	Low	Medium	Medium	200	2.4	1.7	No	**0%**		**Retain**
216	*Lophostemon confertus*	10	10	Good	Good	Mature	Medium	Medium	High	550	6.6	2.6	Major	**32%**	Tree is located adjacent to the disturbance footprint	**Remove**
218	*Callistemon viminalis*	8	6	Fair	Fair	Mature	Low	Medium	Medium	200	2.4	1.7	Major	**76%**	Tree is located inside the disturbance footprint	**Remove**
219	*Koelreuteria paniculata*	8	12	Good	Good	Mature	High	Medium	High	350	4.2	2.1	Major	**98%**	Tree is located inside the disturbance footprint	**Remove**
220	*Jacaranda mimosifolia*	10	8	Fair	Fair	Mature	Medium	Medium	High	300	3.6	2	Major	**100%**	Tree is located inside the disturbance footprint	**Remove**
224	*Eucalyptus saligna*	20	22	Good	Fair	Mature	High	Medium	High	850	10.2	3.1	Major	**64%**	Tree is located inside the disturbance footprint	**Remove**
751	*Corymbia maculata*	14	8	Good	Good	Mature	Medium	Medium	High	200	2.4	1.7	Major	**36%**	Tree is located adjacent to the disturbance footprint	**Remove**

Arboricultural Impact Assessment

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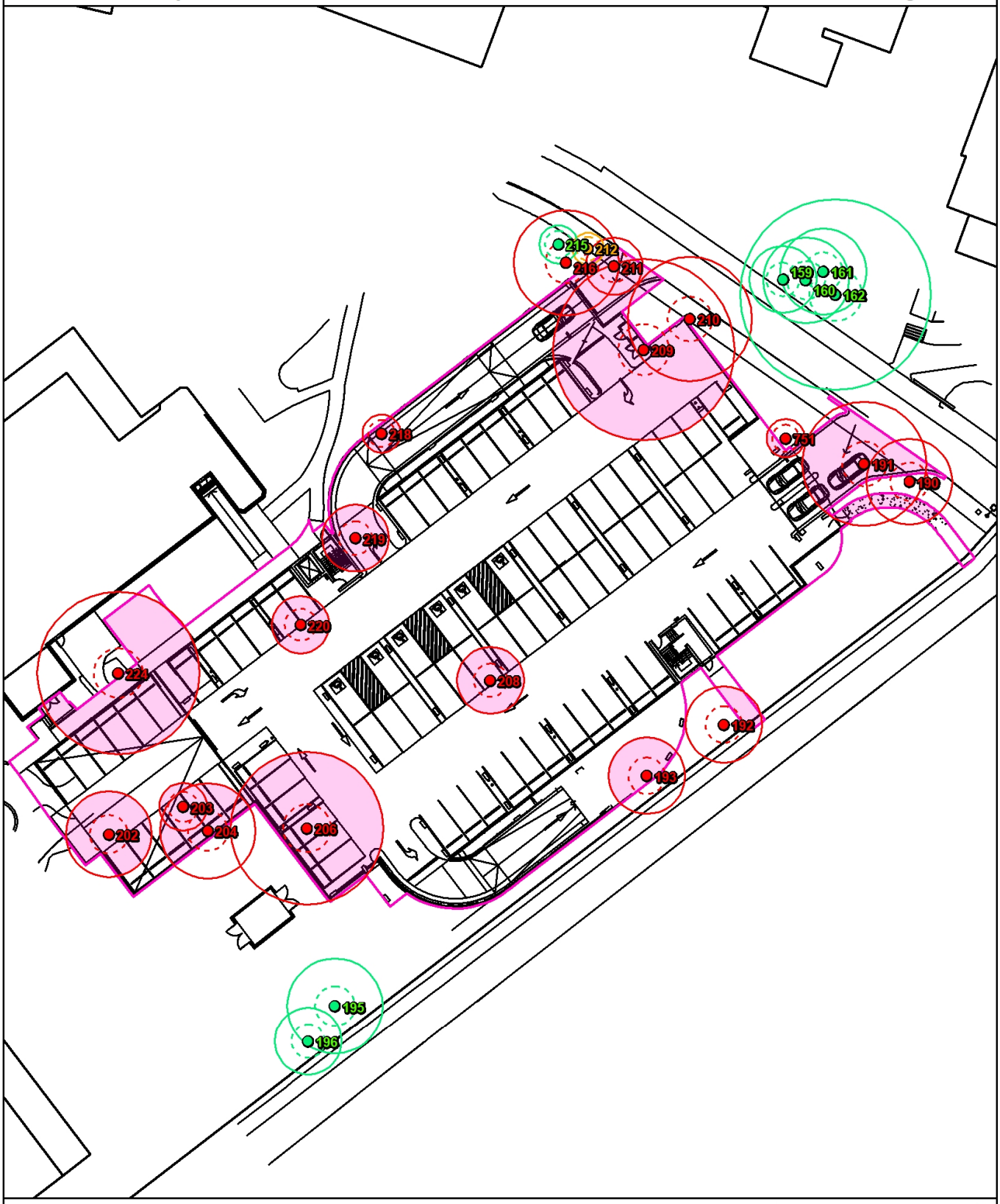

Legend

The subject trees
- No encroachment
- Minor encroachment
- Major encroachment

Protection zones
- TPZ (continuous line)
- SRZ (dashed line)

The subject site
- Site layout
- Distubance footprint
- Encroachment within the TPZ

0 5 10 20 Meters

N

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Arboricultural Impact Assessment

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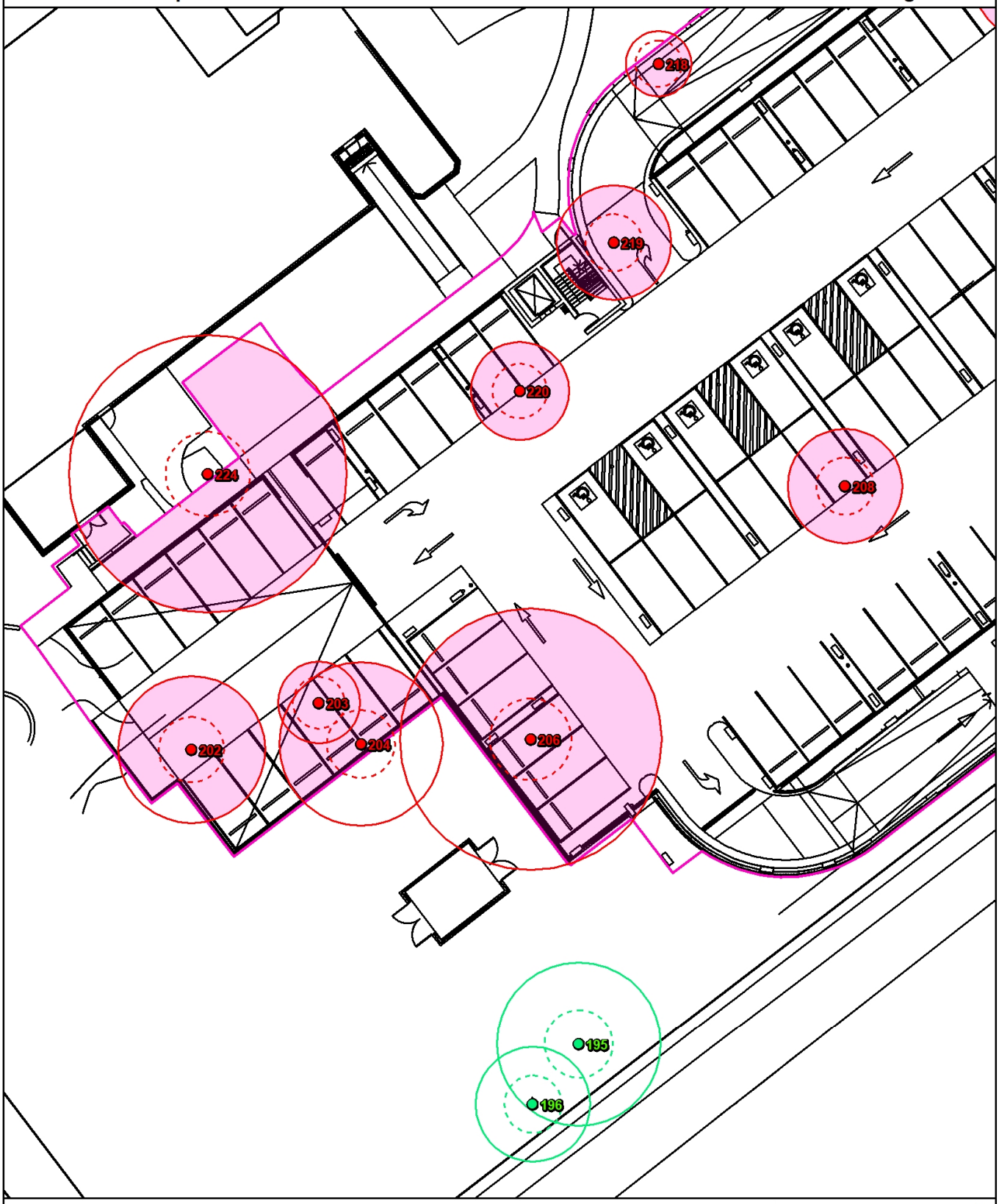

Legend

The subject trees
- No encroachment
- Minor encroachment
- Major encroachment

Protection zones
- TPZ (continuous line)
- SRZ (dashed line)

The subject site
- Site layout
- Distubance footprint
- Encroachment within the TPZ

0 3.25 6.5 13 Meters

N

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Arboricultural Impact Assessment

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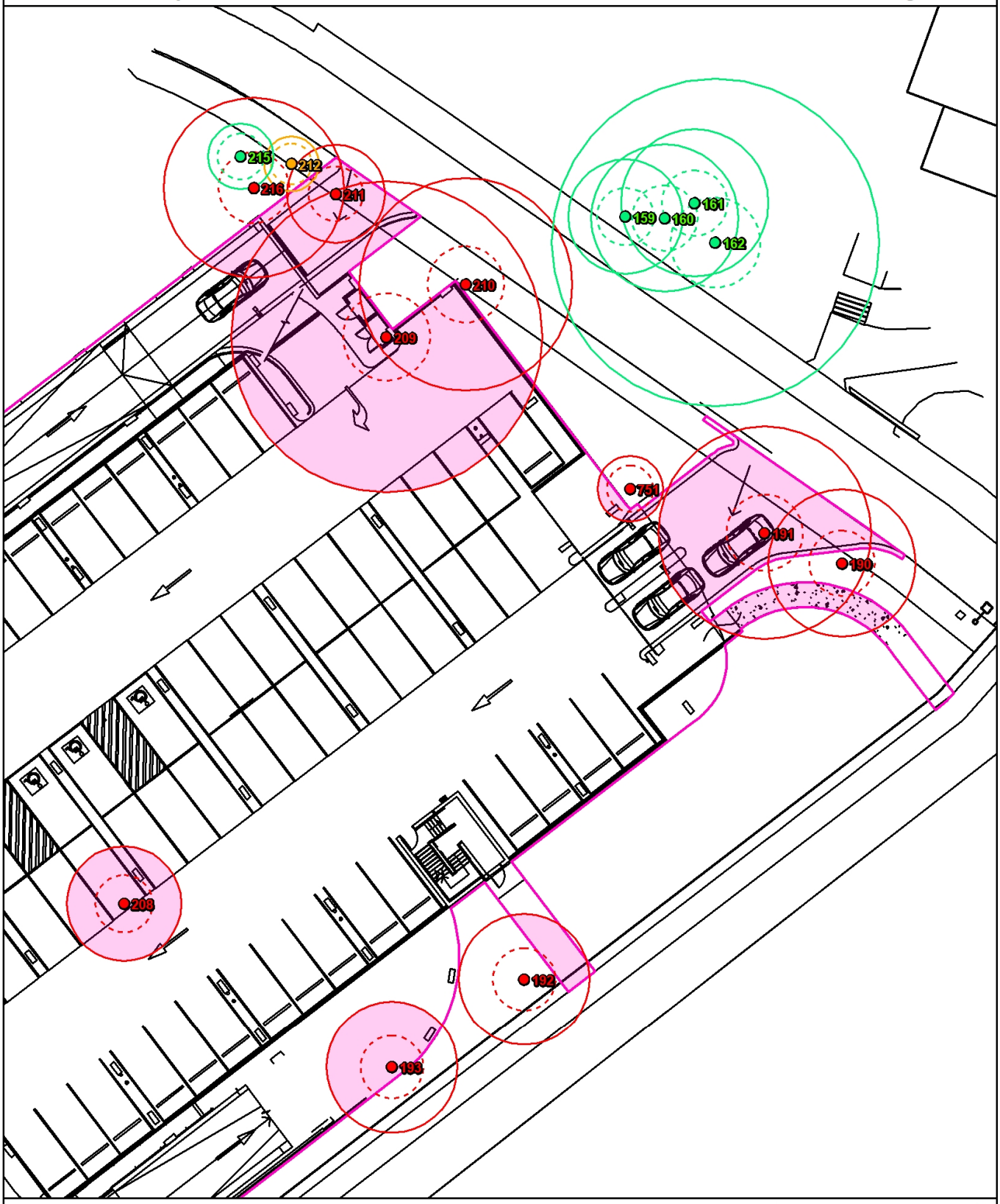

Legend

The subject trees
- No encroachment
- Minor encroachment
- Major encroachment

Protection zones
- TPZ (continuous line)
- SRZ (dashed line)

The subject site
- Site layout
- Distubance footprint
- Encroachment within the TPZ

0 3.25 6.5 13 Meters

N

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4 Tree Protection Plan (TPP)

4.1 Standard tree protection measures

Trees proposed for retention: A total of **7** trees are proposed for retention. The following recommendations apply to these trees:

- **Tree protection fencing:** Tree protection fencing must be established at the locations shown in the **Tree Protection Plan**. Existing fencing, site hoarding, or structures (such as a wall or building) may be used as tree protection fencing, providing the TPZ remains isolated from the construction footprint. Specifications for the tree protection fencing are as follows:
  - Temporary mesh panel fencing (minimum height 1.8m).
  - Installed prior to site establishment and remain intact until the completion of works.
  - Protective fencing must not be removed or altered without the approval of the project arborist.
  - Prominently signposted with 300mm x 450mm boards stating, “NO ACCESS - TREE PROTECTION ZONE.”
  - Certified and inspected by the project arborist.

  Where approved works are required within the TPZ, fencing may be setback to provide construction access. Trunk, branch, and ground protection shall be installed and must comply with Australian Standard, AS 4970-2009, Protection of Trees on Development Sites. Any additional construction activities within the TPZ of the subject trees must be assessed and approved by the project arborist.
- **Site inspections:** In accordance with the Australian Standard, AS 4970-2009, Protection of Trees on Development Sites, inspections must be conducted by the project arborist at the following key project stages:
  - **Prior to construction:** Prior to any work commencing on-site (including demolition, earthworks, or site clearing) and following the installation of tree protection.
  - **During construction:** A minimum of once per month during the construction phase.
  - **After construction:** After all major construction has ceased, following the removal of tree protection.

4.2 Site-specific tree protection measures

Additional site-specific tree protection measures are not required due to the size of the site and location of the proposed works.

4.3 Trees proposed for removal

Trees proposed for removal: A total of **19** trees are proposed for removal. The following recommendations apply to these trees:

- All tree removal work is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture, in accordance with Australian Standard AS 4373-2007, Pruning of Amenity Trees, the Work Health and Safety Act 2011 and Work Health and Safety Regulations 2017.

Tree Protection Plan

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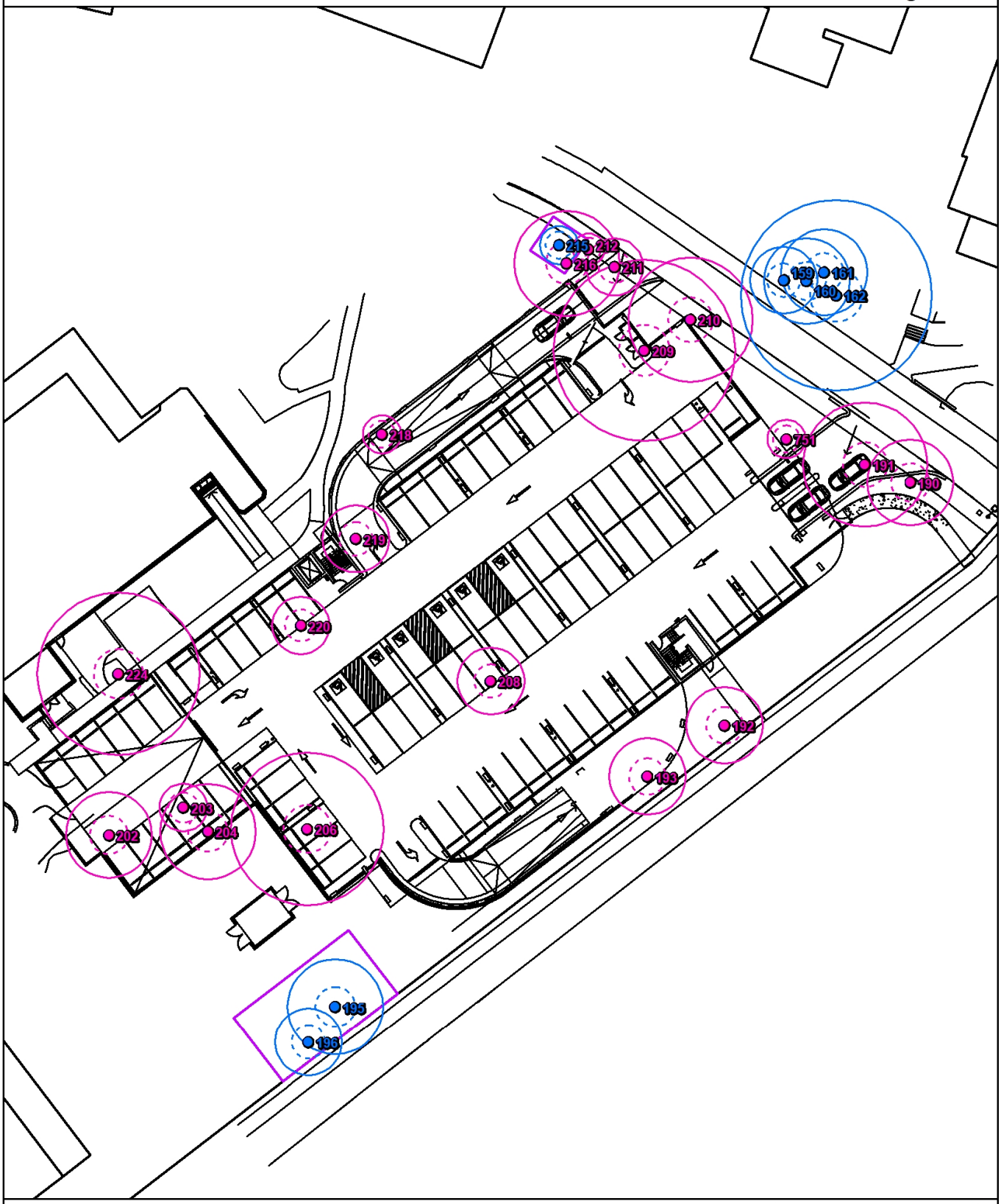

0 5 10 20
Meters

N

Legend

The subject trees	Protection zones	Tree protection measures
Retain	TPZ (continuous line)	Tree protection fence
Remove	SRZ (dashed line)	

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Tree Protection Plan

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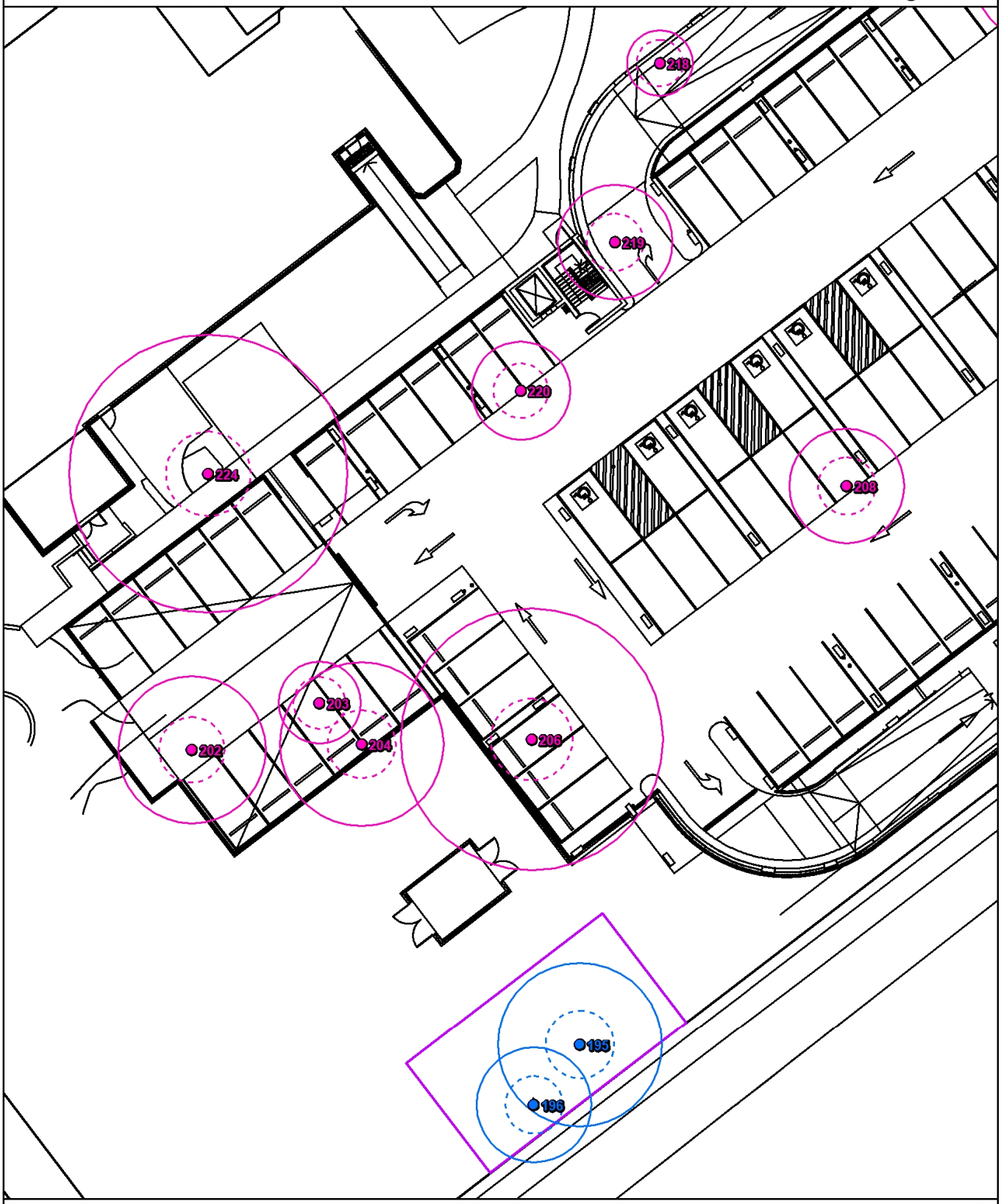

Legend

The subject trees
- Retain
- Remove

Protection zones
- TPZ (continuous line)
- SRZ (dashed line)

Tree protection measures
- Tree protection fence

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Tree Protection Plan

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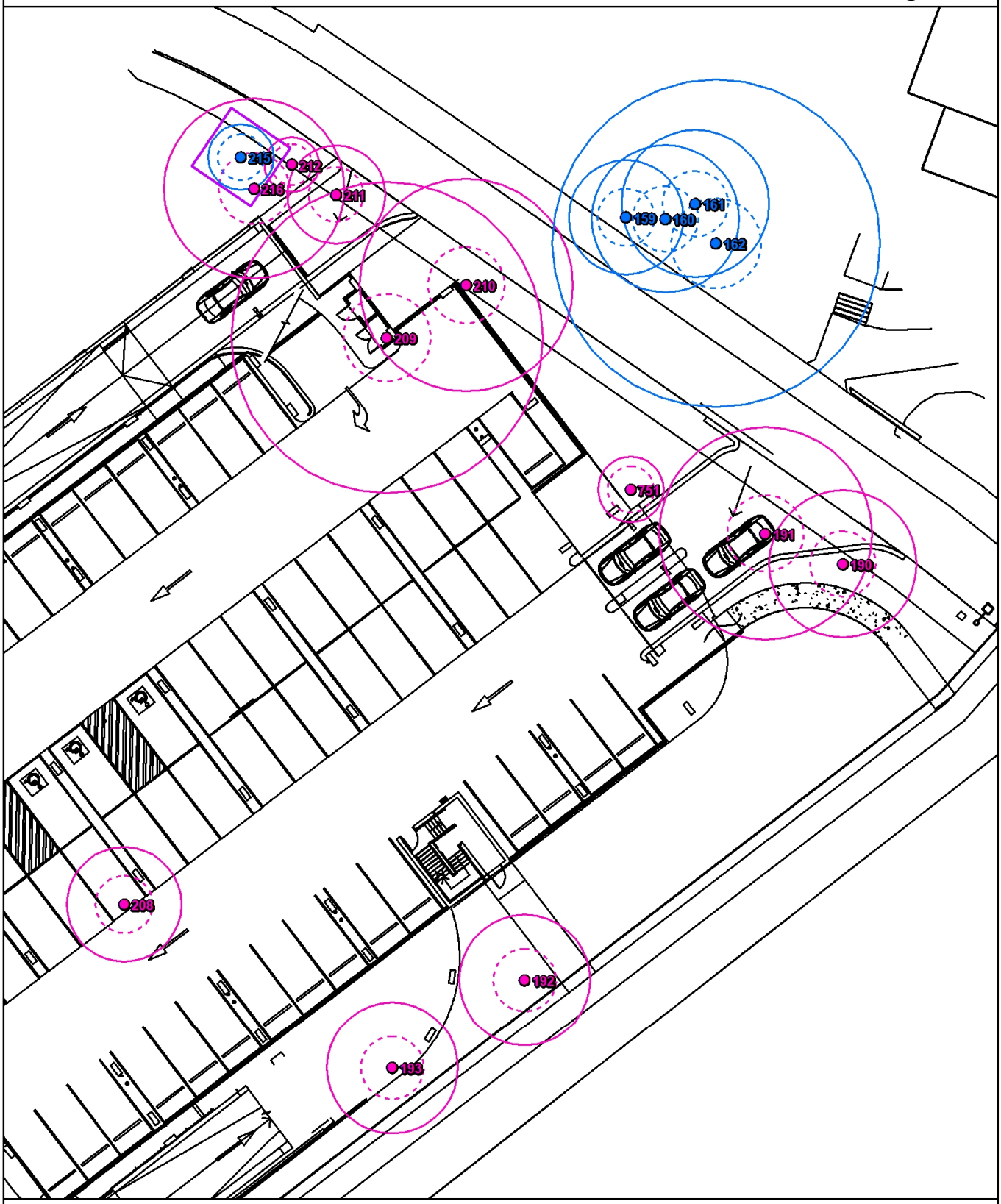

Legend

The subject trees	Protection zones	Tree protection measures
Retain	TPZ (continuous line)	Tree protection fence
Remove	SRZ (dashed line)	

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Appendix I - **STARS© assessment matrix**

The retention value of a tree or group of trees is determined using a combination of environmental, cultural, physical, and social values.

- **Low:** These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
- **Medium:** These trees are moderately important for retention. Their removal should only be considered if adversely affecting the proposed building/works, and all other alternatives have been considered and exhausted.
- **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 Australian Standard, AS4970-2009 Protection of trees on development sites.

This tree retention assessment has been undertaken in accordance with the Institute of Australian Consulting Aboriculturalists (IACA) Significance of a Tree, Assessment Rating System (STARS). The system uses a scale of High, Medium, and Low significance in the landscape. Once the landscape significance of a tree has been defined, the retention value can be determined. Each tree must meet a minimum of three (3) assessment criteria to be classified within a category.

Tree Significance - Assessment Criteria		
Low	**Medium**	**High**
The tree is in fair-poor condition and good or low vigour. The tree has form atypical of the species The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms The tree has a wound or defect that has the potential to become structurally unsound. The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation	The tree is in fair to good condition The tree has form typical or atypical of the species The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street The tree provides a fair contribution to the visual character and amenity of the local area The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ	The tree is in good condition and good vigour The tree has a form typical for the species The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age. The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on 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 makes a positive contribution to the local amenity. The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group, or has commemorative values. The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.

Useful Life Expectancy - Assessment Criteria			
Remove	**Short**	**Medium**	**Long**
Trees with a high level of risk that would need removing within the next 5 years. Dead trees. Trees that should be removed within the next 5 years. Dying or suppressed or declining trees through disease or inhospitable conditions. Dangerous trees through instability or recent loss of adjacent trees. Dangerous trees through structural defects, including cavities, decay, included bark, wounds, or poor form. Damaged trees that considered unsafe to retain. Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. Trees that will become dangerous after removal of other trees for the reasons.	Trees that appear to be retainable with an acceptable level of risk for 5-15 years. Trees that may only live between 5 and 15 more years. Trees that may live for more than 15 years but would be removed to allow the safe development of more suitable individuals. Trees that may live for more than 15 years but would be removed during the course of normal management for safety or nuisance reasons. Storm damaged or defective trees that require substantial remedial work to make safe and are only suitable for retention in the short term.	Trees that appear to be retainable with an acceptable level of risk for 15-40 years. Trees that may only live between 15 and 40 more years. Trees that may live for more than 40 years but would be removed to allow the safe development of more suitable individuals. Trees that may live for more than 40 years but would be removed during the course of normal management for safety or nuisance reasons. Storm damaged or defective trees that require substantial remedial work to make safe and are only suitable for retention in the short term.	Trees that appear to be retainable with an acceptable level of risk for more than 40 years. Structurally sound trees located in positions that can accommodate future growth. Storm damaged or defective trees that could be made suitable for retention in the long term by remedial tree surgery. Trees of special significance for historical, commemorative, or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.

Tree Significance

Useful Life Expectancy	High	Medium	Low		
Long >40 years					
Medium 15-40 years					
Short <1-15 years					
Dead					

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 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 the 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.
	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.

Reference

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