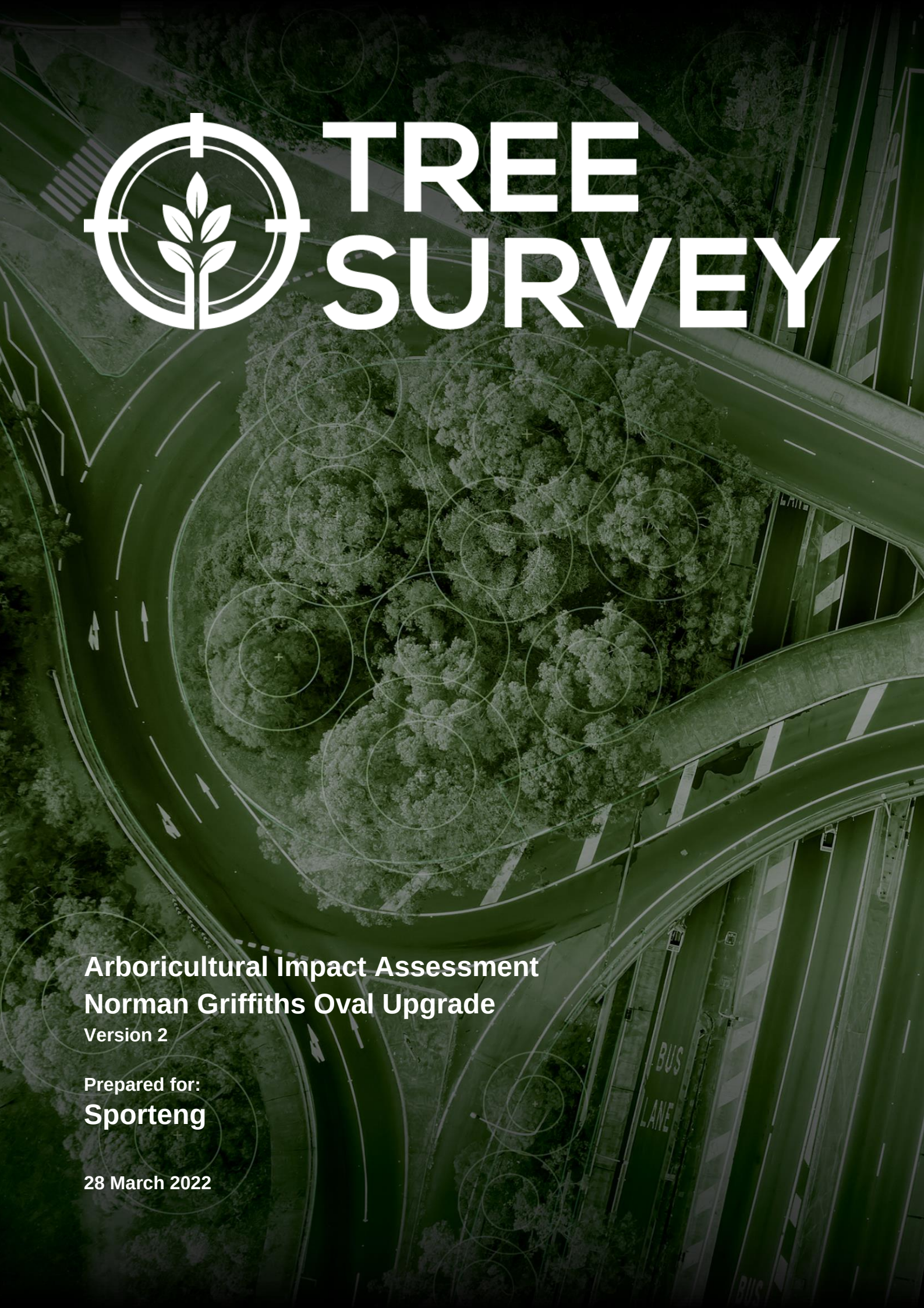

Arboricultural Impact Assessment
Norman Griffiths Oval Upgrade

Version 2

Prepared for:

Sporteng

28 March 2022

Document information

Title:	Norman Griffiths Oval Upgrade
Report type:	Arboricultural Impact Assessment (AIA)
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Document status

Document status	Date	Revision description
Version 1	08/02/22	Updates to the proposed site layout
Version 2	28/03/22	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 Sporteng to prepare an Arboricultural Impact Assessment (AIA) for the proposed upgrade of Norman Griffiths Oval. This AIA only covers the assessment of twelve (12) trees identified specifically by the client and does not provide a complete assessment of tree impacts.

The purpose of this report is to:

- 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:

- Upgrade of the Norman Griffiths Sports Oval.
- Construction of pathways and landscaping.

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 documents/plans listed in **Table 1**.

Table 1: Documents and plans

Document	Author	Version	Date
Civil Plans	Sporteng	G	11/03/22
Detail Survey	Bee & Lethbridge	00	12/03/18
-	-	-	-

The site plan and survey have been used as map layers in the **Arboricultural Impact Assessment**.

1.4 Council tree preservation

The Ku-ring-gai Development Control Plan (DCP) defines a protected tree as:

- Any perennial plant with at least one self-supporting woody, fibrous stem, whether native or exotic, of 5 metres or more in height.
- Any plant that has a trunk diameter of 150mm or more measured at ground level.

Trees and vegetation that fall within these specifications are protected unless listed as an exempt species. Trees that do not meet the prescribed dimensions have generally not been included in this report.

1.5 The subject trees

A total of **12** 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 (where access to the trees was available). 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 **Appendices**). 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):

- **Nil 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.**

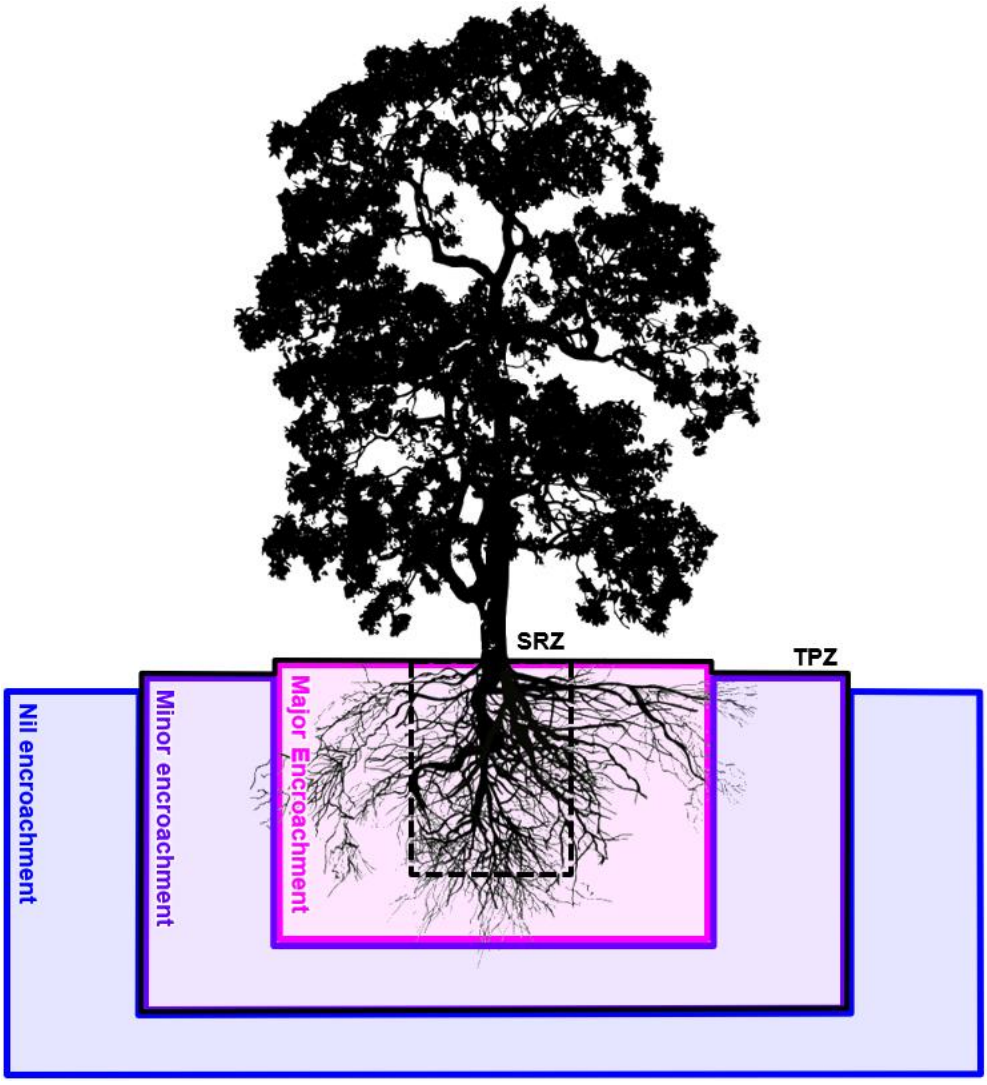


Figure 1: Three (3) levels of encroachment

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 2: Mitigation measures

Encroachment	Mitigation Measures
Nil 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 work within the TPZ. • Tree protection must be installed.

3 Results

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

3.1 Encroachment within the TPZ

A summary of trees impacted directly by the proposed construction footprint are outlined below:

- **Nil encroachment (0%):** A total of **11** trees are located outside the construction footprint.
- **Minor encroachment (<10%):** A total of **0** trees will be subject to a minor encroachment.
- **Major encroachment (>10%):** A total of **1** tree will be subject to a major encroachment.

3.2 Tree removal and retention

A summary of the total proposed tree removals is outlined below :

- **Retain:** A total of **11** trees are proposed for retention.
- **Remove:** A total of **1** tree is proposed for removal.

4 Discussion

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

4.1 Nil encroachment

A total of **11** trees will be subject to no encroachment within the TPZ:

- **Retain:** A total of **11** trees are located outside of the proposed construction footprint. No impacts on these trees are foreseeable under the current proposal.
- **Remove:** No trees within the category of “nil encroachment” are proposed for removal.

4.2 Minor encroachment

No trees will be subject to a minor encroachment of less than 10% within the TPZ:

4.3 Major encroachment

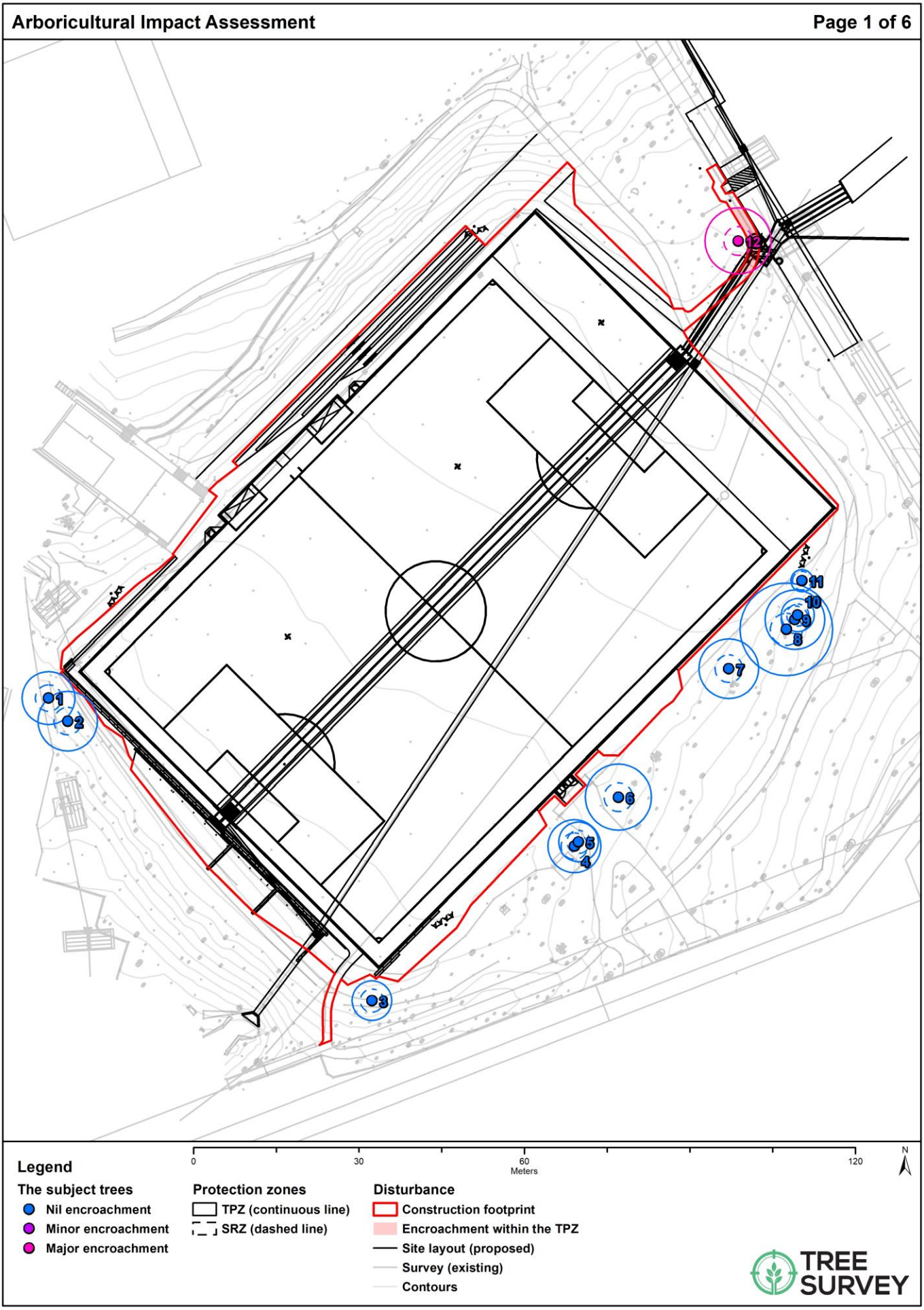
A total of **1** tree will be subject to a major encroachment of greater than 10% within the TPZ:

- **Retain:** No trees within the category of “major encroachment” are proposed for retention.
- **Remove:** A total of **1** tree will be subject to a major encroachment of greater than 20% within the TPZ. Encroachment of greater than 20% can begin to impact the structural root zone (SRZ) and is more likely to compromise tree stability” (Costello, Watson, and Smiley (2017, p.21[2]). 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 proposed construction footprint and cannot be retained under the current proposal.

[2] Costello, L., Watson, G. and Smiley, E., 2017. Root Management. International Society of Arboriculture.

Table 1: 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 1 (millimetres diameter)	DBH 2 (millimetres diameter)	DBH 3 (millimetres diameter)	DBH Combined (millimetres diameter)	DRB (millimetres diameter)	TPZ (metres radius)	SRZ (metres radius)	Encroachment	% Encroachment within TPZ	Other notes	Proposal
1	*Eucalyptus pilularis*	20	12	Good	Good	Mature	High	Medium	High	400	-	-	400	450	4.8	2.4	**Nil**	**0%**	-	**Retain**
2	*Eucalyptus pilularis*	22	12	Good	Good	Mature	High	Medium	High	450	-	-	450	500	5.4	2.5	**Nil**	**0%**	-	**Retain**
3	*Eucalyptus sp.*	22	10	Good	Good	Semi-mature	Medium	Medium	Medium	300	-	-	300	350	3.6	2.1	**Nil**	**0%**	-	**Retain**
4	*Syncarpia glomulifera*	20	8	Good	Good	Semi-mature	High	Medium	High	400	-	-	400	450	4.8	2.4	**Nil**	**0%**	-	**Retain**
5	*Syncarpia glomulifera*	20	8	Good	Good	Semi-mature	High	Medium	High	300	-	-	300	350	3.6	2.1	**Nil**	**0%**	-	**Retain**
6	*Eucalyptus pilularis*	26	16	Good	Good	Mature	High	Medium	High	500	-	-	500	550	6.0	2.6	**Nil**	**0%**	-	**Retain**
7	*Eucalyptus pilularis*	26	16	Good	Good	Mature	High	Medium	High	450	-	-	450	500	5.4	2.5	**Nil**	**0%**	-	**Retain**
8	*Eucalyptus pilularis*	36	20	Good	Good	Mature	High	Medium	High	700	-	-	700	750	8.4	2.9	**Nil**	**0%**	-	**Retain**
9	*Syncarpia glomulifera*	20	10	Good	Good	Mature	High	Medium	High	450	-	-	450	500	5.4	2.5	**Nil**	**0%**	-	**Retain**
10	*Syncarpia glomulifera*	12	8	Good	Good	Semi-mature	Medium	Medium	Medium	250	-	-	250	300	3.0	2.0	**Nil**	**0%**	-	**Retain**
11	*Angophora costata*	10	3	Good	Good	Semi-mature	Medium	Medium	Medium	150	-	-	150	200	2.0	1.7	**Nil**	**0%**	-	**Retain**
12	*Melia azedarach*	16	12	Good	Good	Mature	Medium	Medium	Medium	500	-	-	500	550	6.0	2.6	**Major**	**36%**	This tree is located directly adjacent to the construction footprint	**Remove**


Arboricultural Impact Assessment
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Legend
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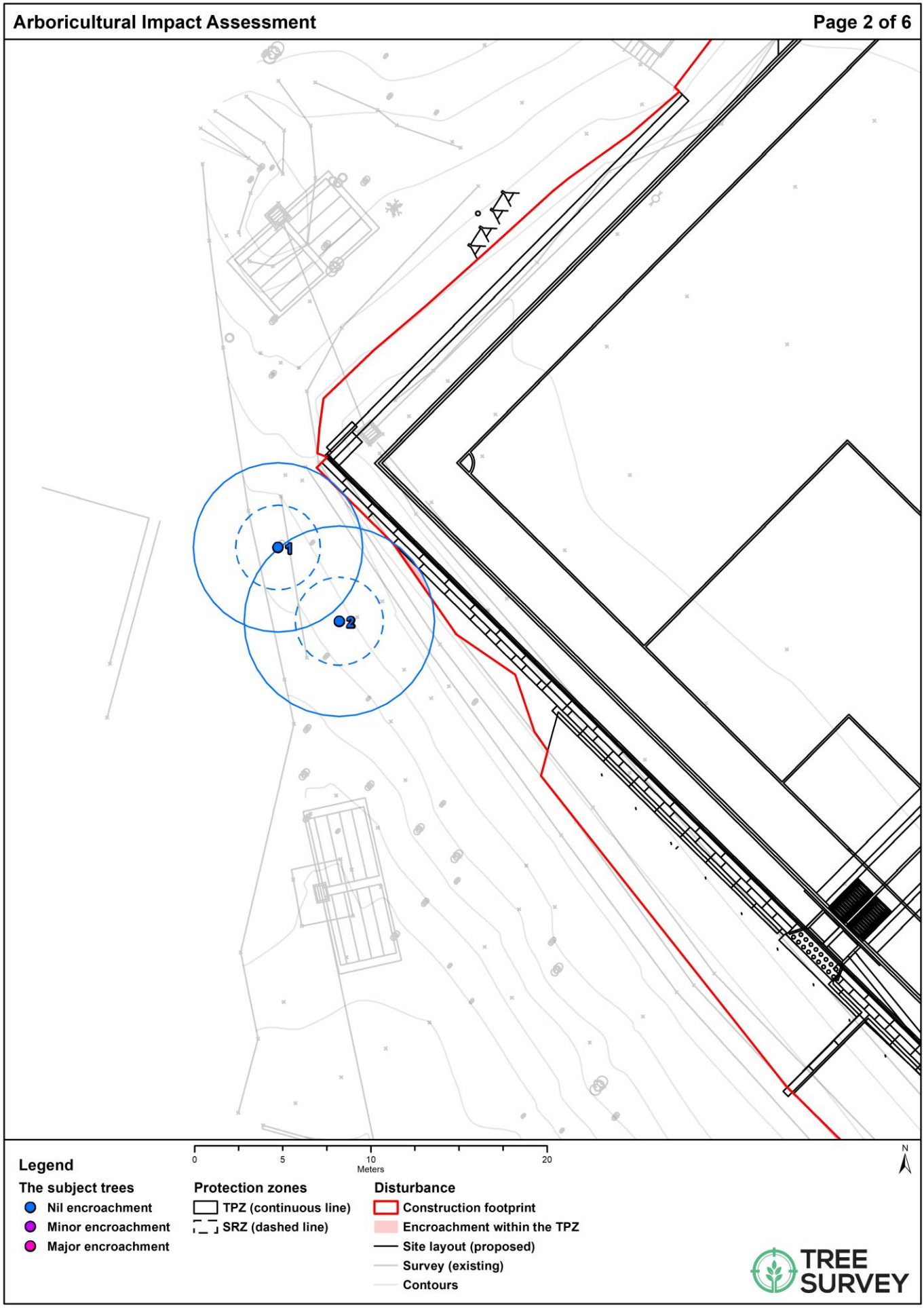
The subject trees
Nil encroachment
Minor encroachment
Major encroachment
Protection zones
TPZ (continuous line)
SRZ (dashed line)
Disturbance
Construction footprint
Encroachment within the TPZ
Site layout (proposed)
Survey (existing)
Contours
TREE SURVEY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The subject trees
Nil encroachment
Minor encroachment
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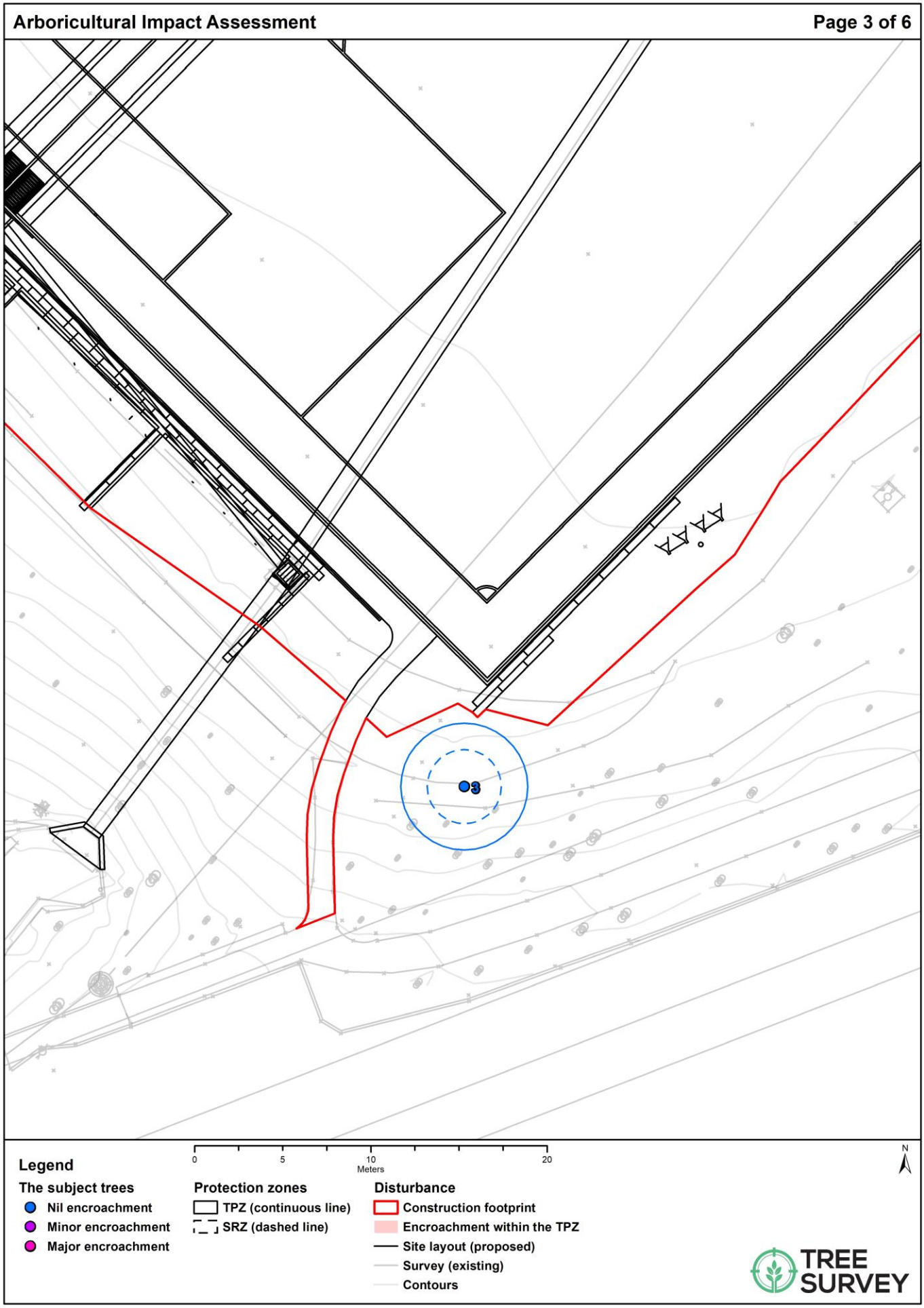
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Page 3 of 6
3
Legend
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The subject trees
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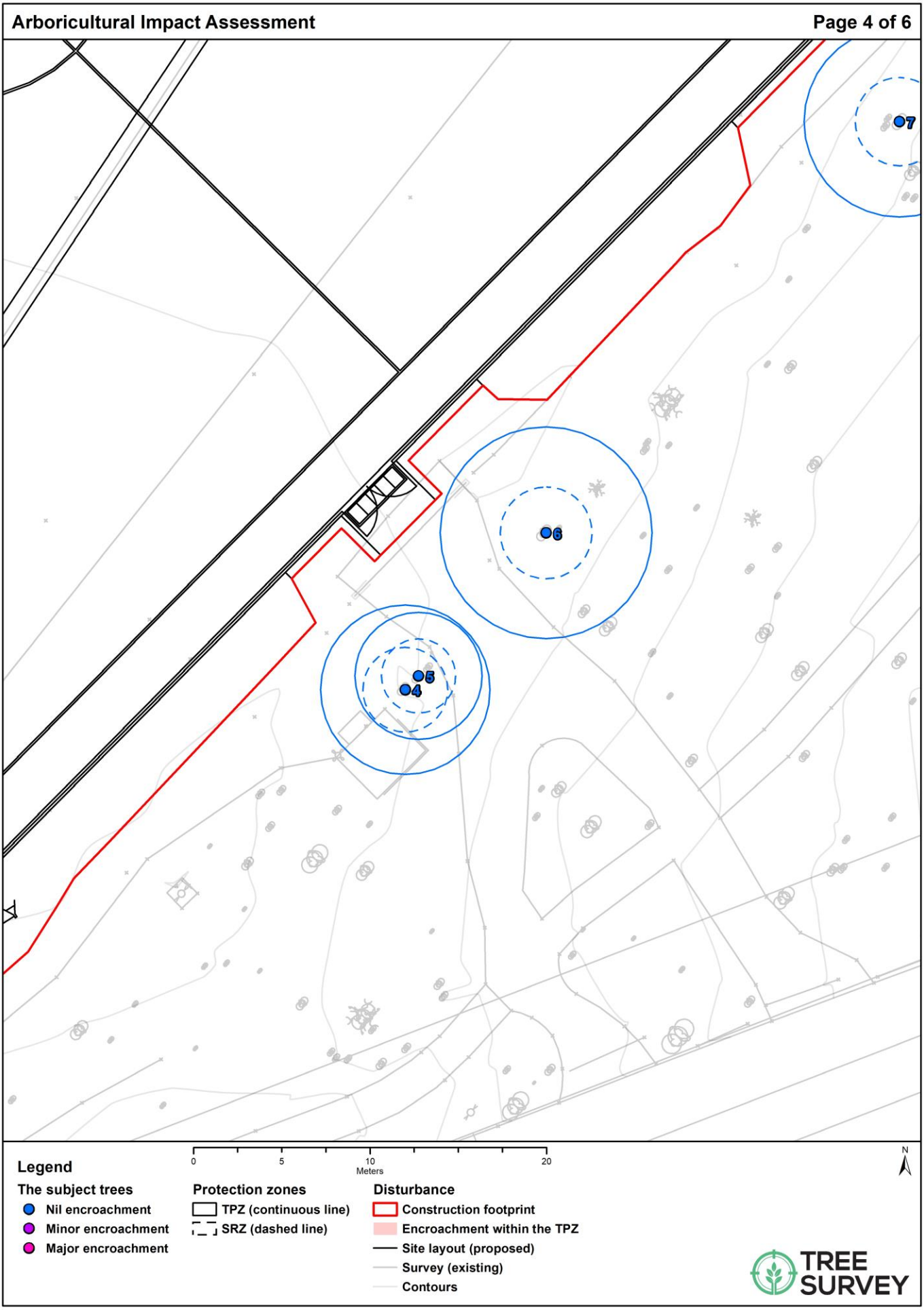
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The subject trees
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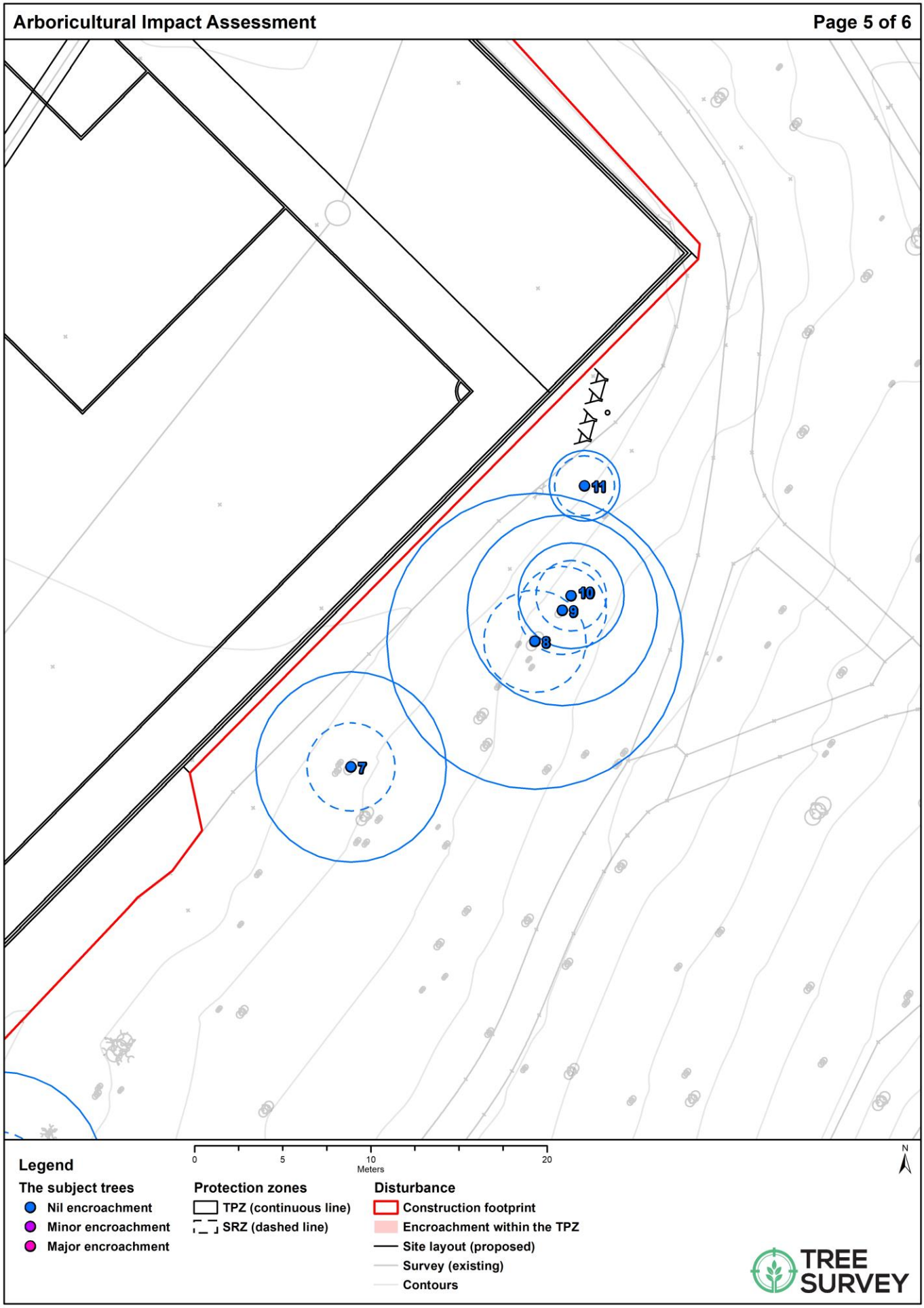
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Page 5 of 6
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Legend
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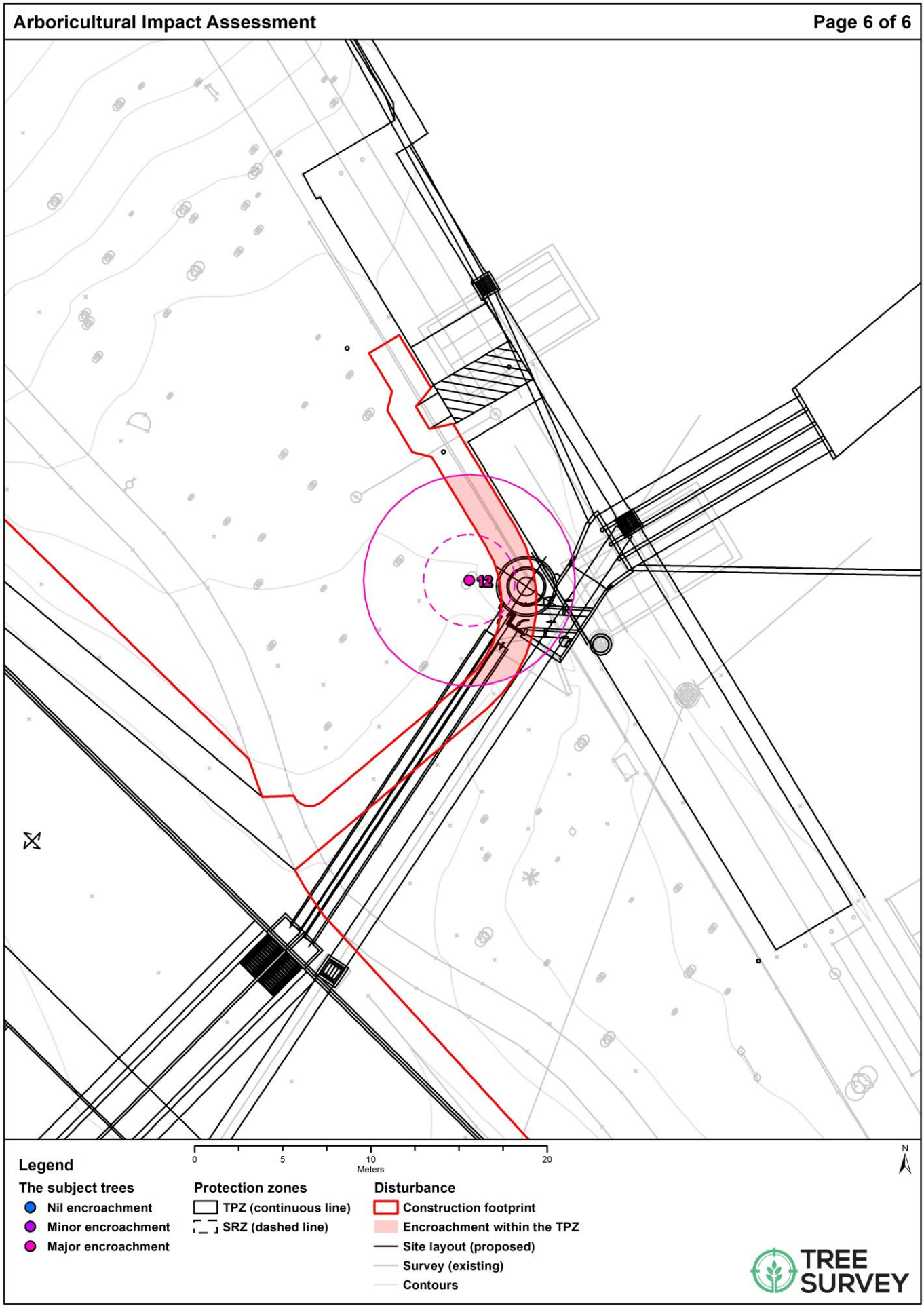
Arboricultural Impact Assessment
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12
Legend
The subject trees
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Minor encroachment
Major encroachment
Protection zones
TPZ (continuous line)
SRZ (dashed line)
Disturbance
Construction footprint
Encroachment within the TPZ
Site layout (proposed)
Survey (existing)
Contours
0
5
10
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Meters
N
TREE SURVEY

5 Recommendations

5.1 Tree removal and retention

A summary of the proposed tree removals is outlined below :

- **Retain:** A total of **11** trees are proposed for retention.
- **Remove:** A total of **1** tree is proposed for removal.

5.2 Tree removal

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.

5.3 Tree pruning

Minor vegetation trimming may be required to accommodate construction clearances. Standard pruning specifications are outlined below:

- Pruning must not exceed 10% of the overall canopy volume.
- No limbs greater than 50mm in diameter are to be removed.
- The final pruning cut shall be at the branch collar or growth point in accordance with the *Australian Standard AS 4373-2007, Pruning of Amenity Trees.*
- All tree pruning 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, and the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).

If proposed vegetation trimming does not meet the specifications outlined above, the project arborist must undertake an assessment of impacts on a case-by-case basis.

6 References

Australian Standard, AS 4970-2009, Protection of Trees on Development Sites

Australian Standard, AS 4373-2007, Pruning of Amenity Trees.

Costello, L., Watson, G. and Smiley, E., 2017. Root Management. International Society of Arboriculture.

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

Mattheck, C. (2007). Updated field guide for visual tree assessment. Karlsruhe: Forschungszentrum Karlsruhe.

Mattheck, C., Bethge, K. and Weber, K. (2015). The body language of trees. Karlsruhe: Karlsruher Inst. fuÌˆr Technologie.

Mattheck, C., Lonsdale, D. and Breloer, H. (1994). The body language of trees. London: H.M.S.O.

Roberts, J., Jackson, N. and Smith, D. (2006). Tree roots in the built environment.

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 Significance	Medium Significance	High Significance
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 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.
Environmental Pest / Noxious Weed		
The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation		
Hazardous / Irreversible Decline		
The tree is structurally unsound and/or unstable and is considered potentially dangerous. The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.		

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 Significance	Medium Significance	Low Significance	Environmental Pest / Noxious Weed	Hazardous / Irreversible Decline
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.
	Priority 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