Arboricultural Impact Assessment

Prepared for the Australian Turf Club
Site Address: 77-79 Alison Road Randwick
11th February 2022

Date	Revision	Change	Stage
15/2/2022	A	Plan	DA

Member of Arboriculture Australia, Registered Consulting Arborist No. 1286

Member of International Society of Arboriculture No. 157768

Bachelor of Horticultural Science, University Sydney.

AQF Level 2, 3 & 5 Diploma in Arboriculture

Graduate Certificate AQF Level 8 University Melbourne

Tree Risk Assessment Qualification (TRAQ)

Statement

Bradshaw Consulting Arborists is a company that exclusively provides tree consultancy within the tree industry. There is no conflict of interest concerning the recommendations outlined in this report.

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Contents

1 Introduction

This report has been prepared by Tristan Bradshaw of Bradshaw Consulting Arborists for the Australian Turf Club at Randwick racecourse, 77-79 Alison Road Randwick. The report request was to inspect twenty trees throughout the property.

The trees' characteristics have been listed in Table 1 page 6. The aim is to determine the health and condition of the trees and the impact of the proposed night racing. The potential impact is the siting of light posts within Tree Protection Zones (TPZ) of the existing trees. The inspection of the site was undertaken on 1st February 2022.

It is proposed 79 columns, 750mm diameter are constructed. They will be of varying heights from 18.3 metres to 40 metres. The positions of the light posts is critical in preventing glare and darkened areas, this may affect surrounding trees. The positions located on the site plan are the preferred positions, but they can reportedly be altered up to 2 metres. Of the 79 light posts eleven numbered A1, A11, A12, A13, C1, C4, C5, C6, C20, C23 and C24 are within the TPZ of existing trees. See sections 8 showing the light post locations and tree locations.

The report was completed on 11th February 2022.

The site's trees are managed under Randwick Council's Urban Tree Management Policy.

The property is not bushfire prone and not within the RFS 10/50 vegetation entitlement clearing area.

The racecourse is of local heritage significance notably the official stand and tree plantings.

Many of the older tree plantings are listed on council's significant tree register.

The property is not mapped as having Terrestrial Biodiversity, however there are some remnant trees of *Xylomelum* pyriforme (Woody Pear) part of the eastern Suburbs Banksia Scrub native vegetation. These are unaffected.

1.1 Plans used in this assessment

Consultant	Company	Date	Revision
Survey	Rygate & Company Surveyors	8/10/2021	
Architectural	Urbis – Lightpole Locations	29/11/2021	
Government refusal letter	Department of Planning and Environment	24/12/2021	
Architect	Urbis – Environmental Impact Statement	7/8/2021	

1.2 The Site

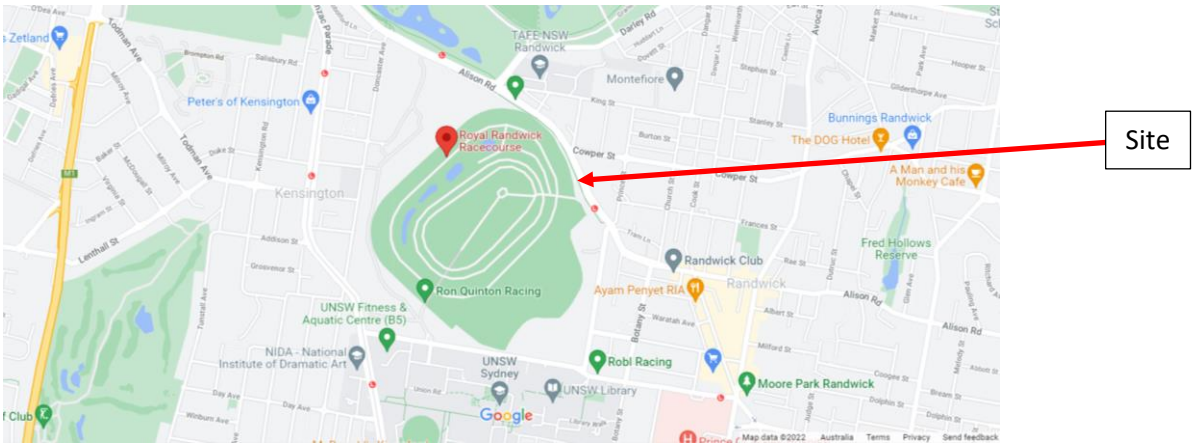


Figure 1 Site location (Google Maps 2022)

1.3 Method

The inspection of the site was undertaken on 1st February 2022

The inspection method used was the Visual Tree Assessment (VTA) method (Mattheck & Breloer 2010). This method involves inspecting the trees from ground level, using binoculars to aid in identification of any external's signs of decay, physical damage, growth related structural defects and the site conditions where the tree is growing. This method will ascertain whether there is need for a more detailed inspection of any part of the tree. No aerial or subterranean inspections were carried out. See appendix A for the complete flow chart.

The Diameter at Breast Height (DBH) was measured with a diameter tape measure. The height of the measurement was at 140 cm above the ground unless stated.

The height of the tree was estimated.

The canopy spread of the tree was estimated.

Health: Based on vigour, callus development, % of deadwood, dieback, fruiting levels, internode lengths

(E) Excellent

(G) Good

(F) Fair

(P) Poor

(D) Dead

Age Class: (Y) Young=Recently Planted

(S) Semi mature <20% of life expectancy

(M) Mature 20-80% of life expectancy

(O) Over Mature >80% of life expectancy

Condition: Based on the structural integrity of the tree, cavities, fungal decay, branch failure, branch taper, sap or Kino exudate, fruiting bodies, root condition.

(E) Excellent

(G) Good

(F) Fair

(P) Poor

(D) Dead

Landscape Significance and Retention Value see sections 6.2 and 6.3.

Safe Useful Life Expectancy (SULE)

In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. SULE is a system designed to classify trees into a number of defined categories so that information regarding tree retention can be concisely communicated in a non-technical manner. SULE categories are easily verifiable by experienced personnel without great disparity.

A tree's SULE category is the life expectancy of the tree modified by its age, health, condition, safety and location (to give safe life expectancy), then by economics (i.e. cost of maintenance; retaining trees at an excessive management cost is not normally acceptable), effects on better trees, and sustained amenity (i.e. establishing range of age classes in a local population).

SULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with short SULE may at present be making a contribution to the landscape but their value to the local community will decrease rapidly towards the end of this period, prior to their being removed for safety or aesthetic reasons. For details of SULE categories see Appendix A, adapted from Barrell (1993 and 1996).

Visual Habitat

This assessment is based on a visual observation of the tree, included in the VTA method.

Habitat trees are trees that provide microhabitats, these can include hollows, deeply fissured bark, cracks, epiphytes or forms of decay (Bütler, R., Lachat, T., Larrieu, L., & Paillet, Y., 2013).

Tree Protection Zone (TPZ) – A specified area above and below ground and at a given distance from the trunk, set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree that is to be retained where it is potentially subject to damage by development.

Structural Root Zone (SRZ) - The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in

metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.

2 Body Observations Results

Table 1 Individual tree characteristics

Tree Number	Botanical Name	DBH (mm)	DAB (mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition/ Structure	SULE	Visual Habitat	Landscape significance	Retention Value	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage TPZ Incursion	Retain or Remove notes
1	*Ficus macrophylla* (Morton Bay Fig)	1600 @500mm	1800	13	13	13	13	15	E	M	E	>40	No	Significant	High	4.2	15	<10%	Retain
2	*Ficus rubiginosa* (Port Jackson Fig)	1550 @400mm	1700	9	9	9	9	16	F	M	G	>40	No	Significant	High	4.1	15	<10%	Retain
3	*Ficus rubiginosa* (Port Jackson Fig)	1410 @400	1500	11	11	11	11	14	G	M	G	>40	No	Significant	High	3.9	15	0%	Retain
4	*Platanus acerifolius* (Plane Tree)	620	700	8	8	0	12	17	F	M	G	>40	No	Significant	High	2.8	7.4	0%	Retain
5	*Ficus microcarpa* Var *hillii* (Hills Weeping Fig)	1600 @300	1600	10	12	8	14	18	E	M	G	>40	No	Significant	High	4.0	15	<10%	Retain
6	*Platanus acerifolius* (Plane Tree)	1070	1100	10	10	10	10	17	G	OM	G	>40	No	Significant	High	3.4	12.8	<10%	Retain
7	*Platanus acerifolius* (Plane Tree)	1180	1250	12	12	12	12	20	G	OM	G	>40	No	Significant	High	3.6	14.2	<10%	Retain

Tree Number	Botanical Name	DBH (mm)	DAB (mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition/ Structure	SULE	Visual Habitat	Landscape significance	Retention Value	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage TPZ Incursion	Retain or Remove notes
8	*Platanus acerifolius* (Plane Tree)	1020	1100	12	12	12	12	20	G	OM	F	>40	Yes	Significant	High	3.4	12.2	<10%	Retain
9	*Platanus acerifolius* (Plane Tree)	820	890	10	10	10	10	17	G	OM	G	>40	No	Significant	High	3.2	9.8	0%	Retain
10	*Eucalyptus* sp.	370	370	6	6	6	6	13	P	M	P	<5	No	Moderate	Very Low	2.2	4.4	0%	Can be Retained as no impact. Due to poor health Remove
11	*Eucalyptus scoparia* (Wallangra White Gum)	700	800	11	4	5	5	14	F	OM	F	5-15	Yes	Moderate	Low	3.0	8.4	<10%	Retain
12	*Ficus microcarpa* Var *hillii* (Hills Weeping Fig)	1320	1450	15	15	15	15	17	E	M	E	>40	No	Significant	High	3.9	15	0%	Retain
13	*Ficus microcarpa* Var *hillii* (Hills Weeping Fig)	1050	1150	13	13	13	13	17	E	M	E	>40	No	Significant	High	3.5	12.6	<10%	Retain
14	*Ficus microcarpa* Var *hillii* (Hills Weeping Fig)	1140	1250	15	15	15	15	17	E	M	E	>40	No	Significant	High	3.6	13.7	<10%	Retain

Tree Number	Botanical Name	DBH (mm)	DAB (mm)	Canopy N	Canopy S	Canopy E	Canopy W	Height	Health	Age	Condition/ Structure	SULE	Visual Habitat	Landscape significance	Retention Value	Structural Root Zone (SRZ)	Tree Protection Zone (TPZ)	Percentage TPZ Incursion	Retain or Remove notes
15	*Schinus molle* (Peppercorn Tree)	400	400	3	3	3	3	7	P	O M	F	5-15	No	Moderate	Low	2.3	4.8	0%	Retain
16	*Schinus molle* (Peppercorn Tree)	400	450	3	3	3	3	7	P	O M	F	5-15	No	Moderate	Low	2.4	4.8	<10%	Retain
17	*Schinus molle* (Peppercorn Tree)	350	380	3	3	3	3	7	P	O M	F	5-15	No	Moderate	Low	2.2	4.2	<10%	Retain
18	*Schinus molle* (Peppercorn Tree)	200	200	2	2	2	2	5	P	O M	P	<5	No	Moderate	Very Low	1.7	2.4	<10%	Retain
19	*Fraxinus raywoodii* (American Ash)	210	240	3	3	3	3	5	E	S M	E	>40	No	Moderate	Moderate	1.8	2.5	<10%	Retain
20	*Fraxinus raywoodii* (American Ash)	210	240	3	3	3	3	5	E	S M	E	>40	No	Moderate	Moderate	1.8	2.5	<10%	Retain

3 Discussion

Twenty trees have been included in this assessment.

Only those trees where the light pole locations transect their Tree Protection Zones (TPZ) have been recorded. Services connecting each of the lights will not be by open trench, but by tunnel boring. This will reduce damage of tree roots from existing trees.

Light pole locations have been estimated on the plan shown below and their position reportedly can be altered by 10% or 2 metres. The exact impact of the light posts can only be determined after their positions have been marked by a registered surveyor and selected root mapping undertaken when required. The preferred footing method is a concrete pier, this reduces the width of the footing and hence the potential damage to surrounding tree roots.

Access will be required to drill the concrete pier and to erect the light poles.

Pruning of selected trees is required to fit the light poles within some tree canopies.

Light Pole locations A11, A12, A13 and trees 1, 2 and 3.

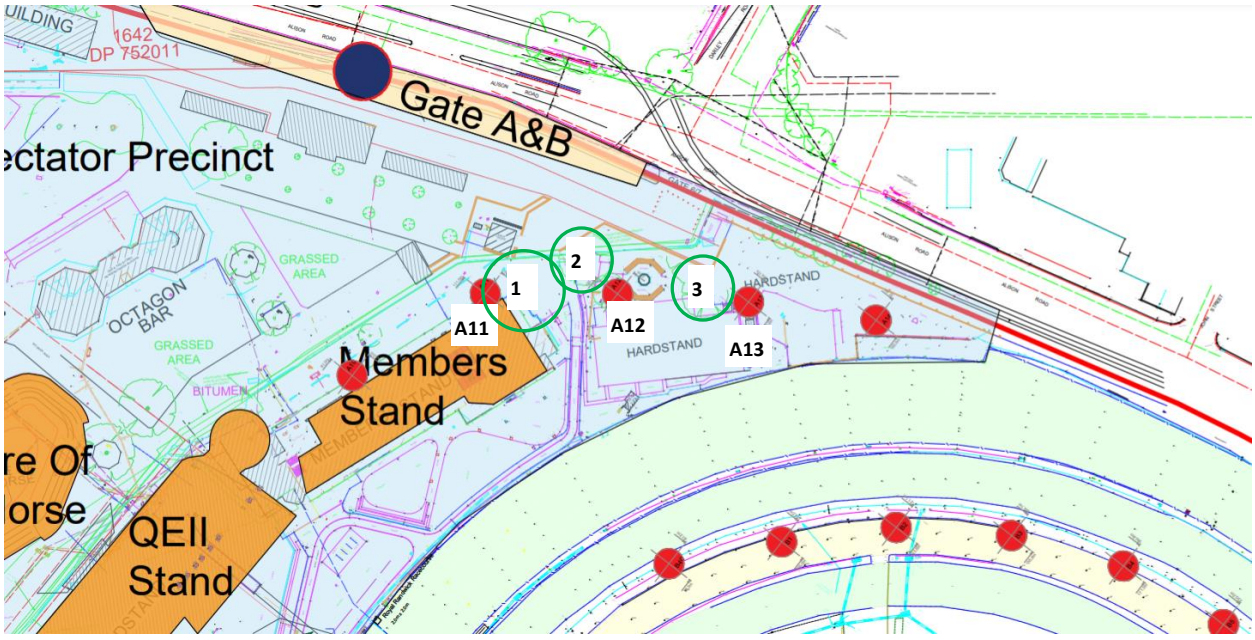


Figure 2 Light Pole locations A11, A12, A13 and trees 1, 2 and 3

Tree 1, light post A11

The position of the light post is approximately 8 metres from this tree. The light post is within the (Tree Protection Zone) TPZ of 15 metres and outside the SRZ (Structural Root Zone). The estimated impact to this tree is less than 10% and this conforms to the Australian Standard 4970-2009. As this is an assumption, exploratory excavation should be undertaken prior to construction to ensure that no major tree roots are severed for this project.

Pruning of the canopy will be required to install the light post. It is likely less pruning will be undertaken, however the removal of the large limb pictured below will clear all vegetation from the

light post position. The amount of foliage to be pruned is less than 4% of the canopy. See figures 3, 4 5 and 6 below.

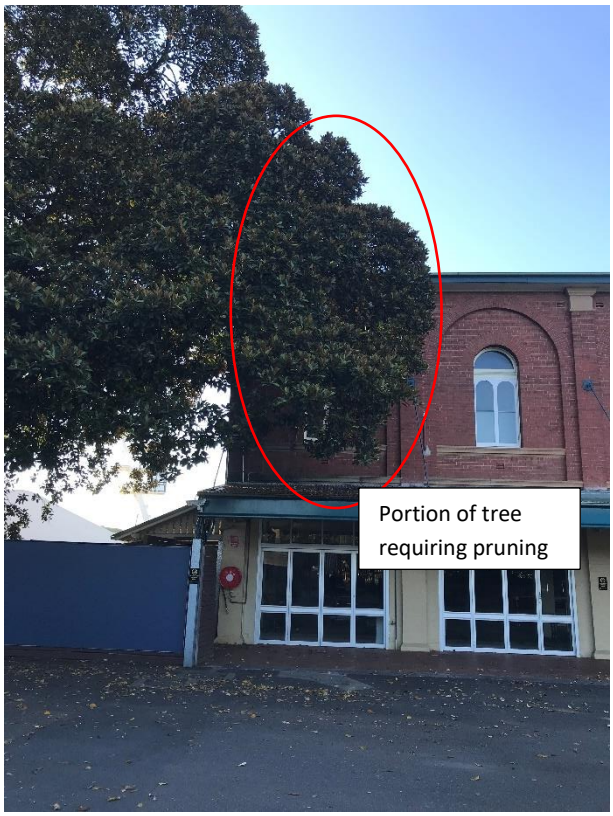


Figure 4 Tree 1 and light post position

Figure 3 Possible pruning required

Figure 6 Surface tree roots from tree 1

Figure 5 Estimated light post position

Tree 2, light post A12

The position of the light post is approximately 12 metres from this tree. The light post is within the (Tree Protection Zone) TPZ of 15 metres and outside the SRZ (Structural Root Zone). The estimated impact to this tree is less than 10% and this conforms to the Australian Standard 4970-2009. As works are at the periphery of the TPZ, prior excavation to locate tree roots is not necessary.

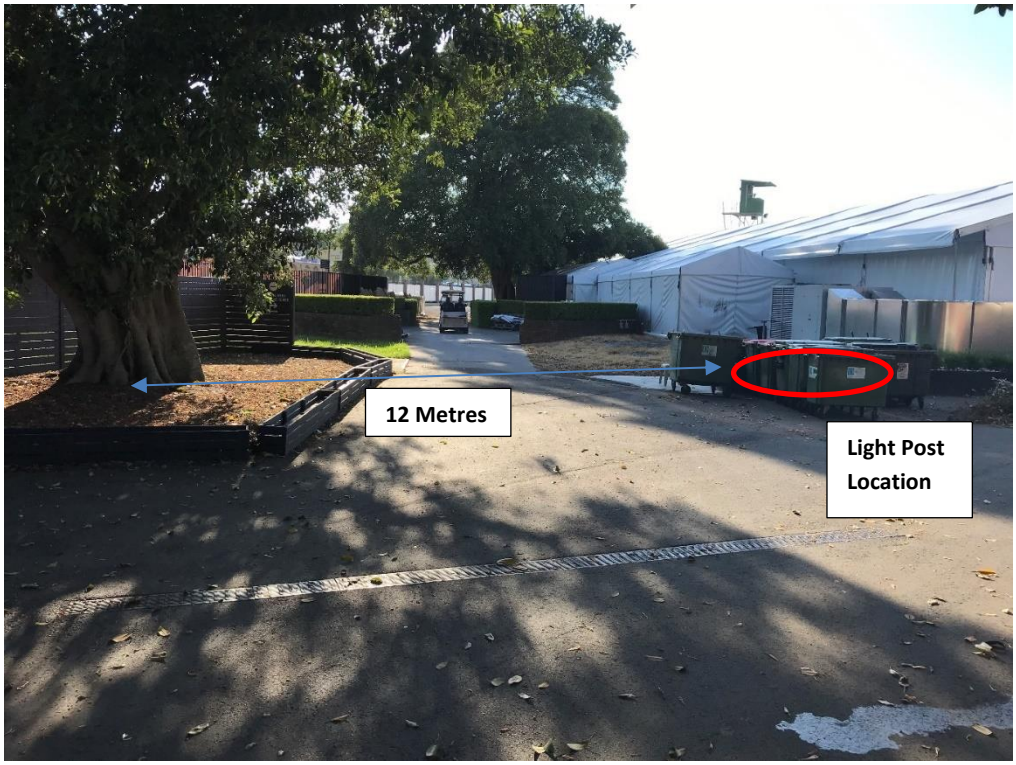


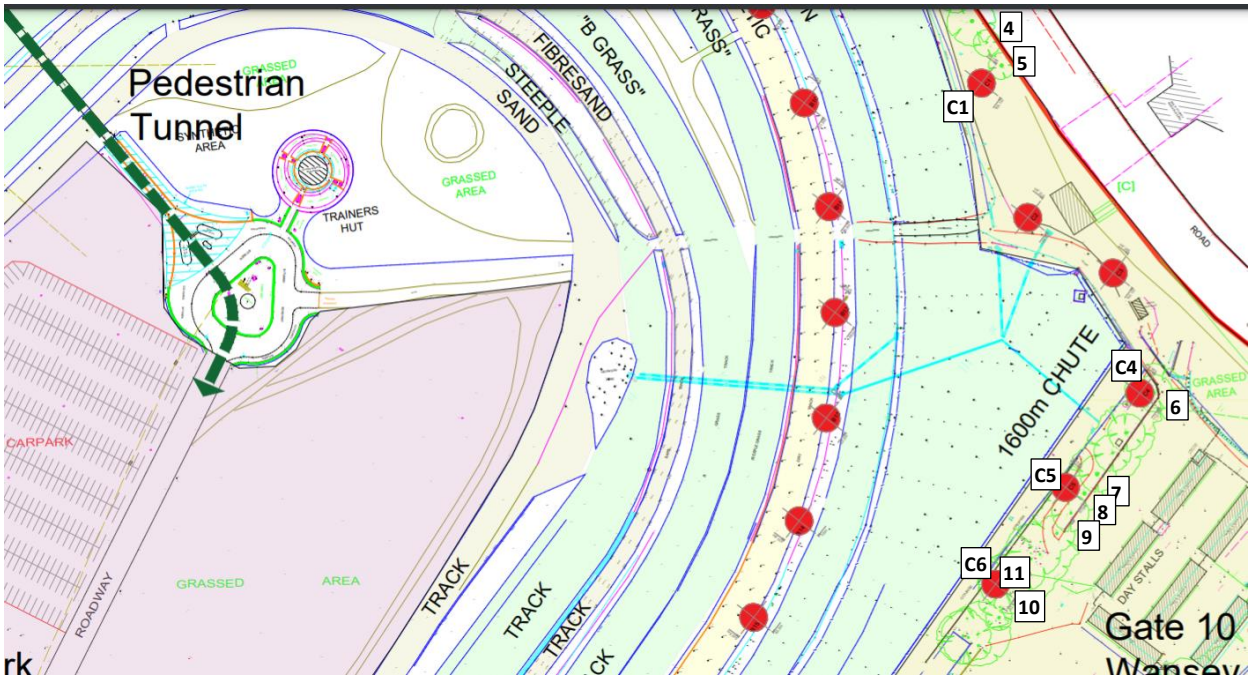
Figure 7 Tree 2 and light post position A12

Tree 3, Light post A13

The position of the light post is approximately 16 metres from this tree. The light post is outside the (Tree Protection Zone) TPZ of 15 metres and outside the SRZ (Structural Root Zone). There is likely to be no impact to this tree. As works are outside the TPZ, prior excavation to locate tree roots is not necessary. See Figure 8 below.

Figure 8 Tree 3, light post A13

Trees 4, 5, 6, 7, 8, 9, 10, 11 and light posts C1, C4, C5 and C6



Trees 4 and 5 and light post C1

The position of the light post is approximately 17 metres from tree 4 and 14 metres from tree 5. The light post is outside the TPZ of tree 4 and at the periphery of tree 5. There will not be any impact to tree 4 and unlikely to be any impact to tree 5. As works are outside the TPZ or at its periphery, prior

excavation to locate tree roots is not necessary. Tree 5 will require canopy pruning to accommodate the light structure. See Figure 9, Figure 10, Figure 11 and Figure 12 below.

Figure 9 Trees 4 and 5 beside proposed light post C1

Figure 11 Prune upper canopy limb that potentially affects light post

Figure 10 Prune upper canopy limb that potentially affects light post

Figure 12 Prune lowest branch from tree 5 back to the trunk

Tree 6 and light post C4

The position of the light post is approximately 4 metres from tree 6. The light post is within the TPZ of tree 6, yet outside the SRZ of this tree. This tree species is tolerant of tree root disturbance and Figure 14 shows the estimated incursion of a 2 metre hole 4 metres from the tree. The incursion is less than 10% and complies with Australian Standard 4970-2009. The diagram assumes that tree roots radiate out from the trunk in an even manner, this is one of the assumptions used when assessing tree impact against AS4970-2009. As tree root growth is unpredictable a tree root survey should be undertaken to identify any roots. Any proposed works must be outside the SRZ. Tree 6 will require canopy pruning to accommodate the light structure.

Figure 13 Tree 6 and light post C3

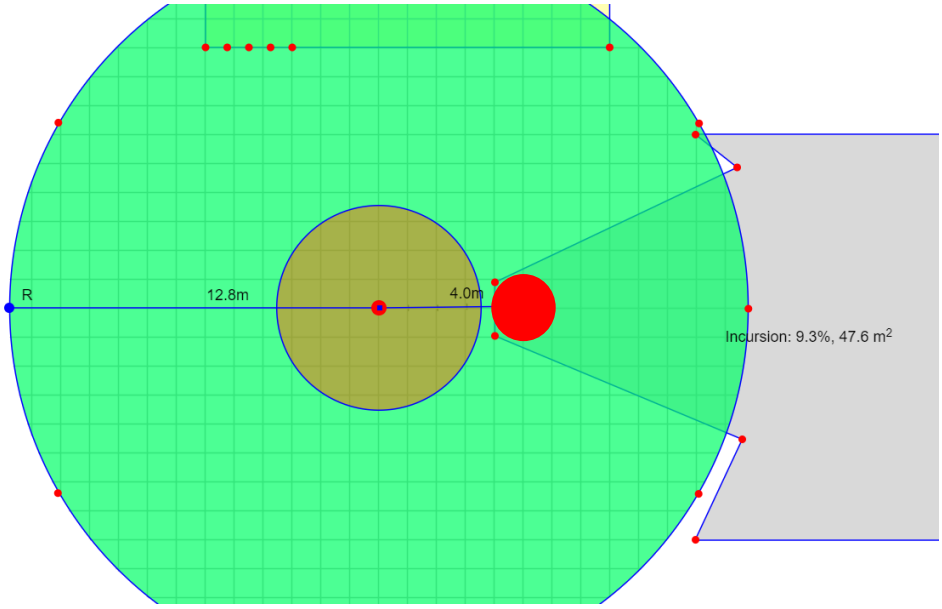


Figure 14 Diagram showing incursion of TPZ of light post

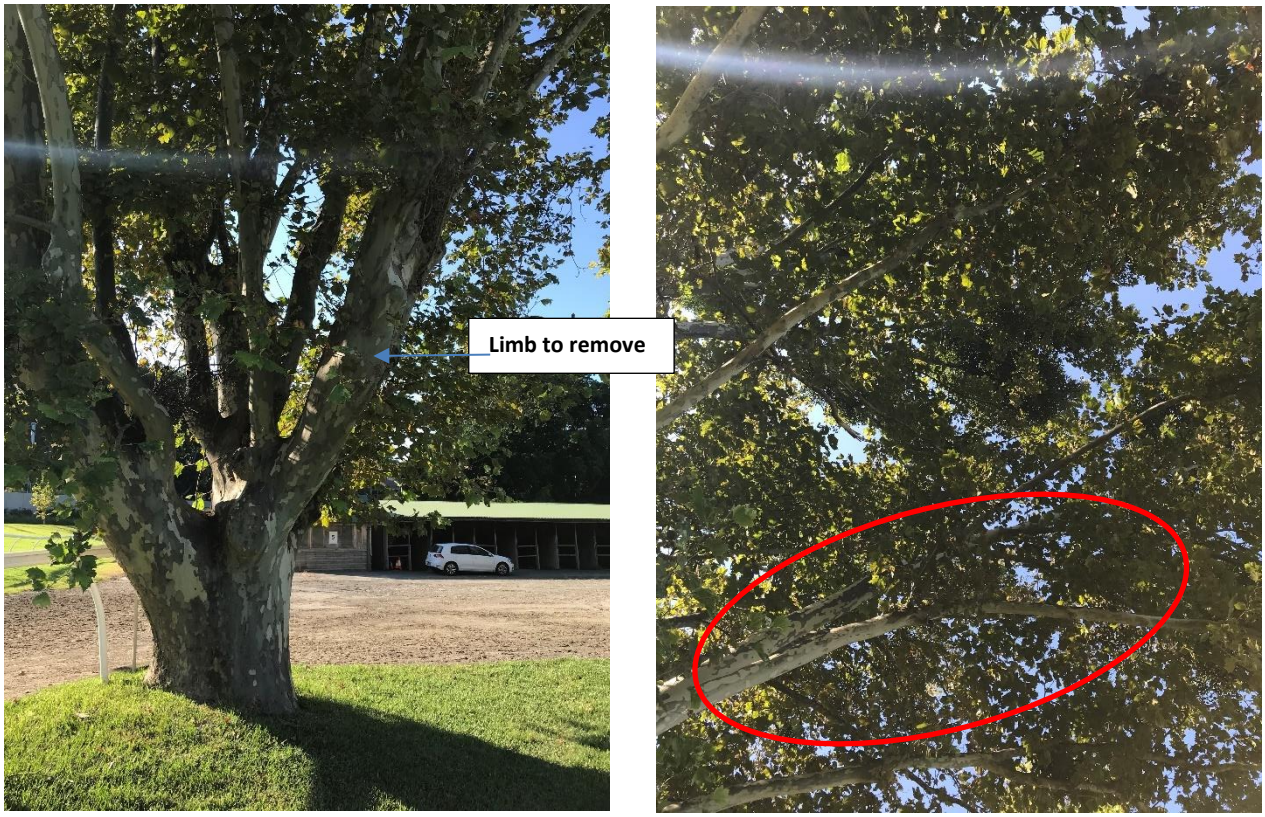


Figure 15 Limb to remove

Figure 16 Decaying limb requiring removal

Trees 7, 8 and 9 and light post C5

The position of the light post is approximately 5 metres from trees 7 and 8 and 12 metres from tree 9. The light post is within the TPZ of tree 7 and 8, yet outside the TPZ of the 9. There is unlikely to be any affect to tree 9 as works are outside the TPZ. This tree species (Trees 7 and 8) is tolerant of tree root disturbance and the estimated incursion is less than 10% this complies with Australian Standard 4970-2009. As tree root growth is unpredictable a tree root survey should be undertaken to identify any roots. Any proposed works must be outside the SRZ. Trees 7 and 8 will require canopy pruning to accommodate the light structure. See Figure 17, Figure 18 and Figure 19.

Figure 17 Trees 7, 8 and light structure position C4

Figure 18 Proposed pruning of trees 7 and 8 to accommodate light structure

Figure 19 Active termites located on tree 8

Trees 10 and 11 and light post C6

The position of the light post is approximately 6 metres from tree 10 and 5 metres from tree 11. There is unlikely to be any affect to tree 10 as works are outside the TPZ. This tree however, is in very poor health and removal should be considered.

The light post is within the TPZ of tree 11 and outside the SRZ, yet within the TPZ. The incursion is less than 10% and complies with Australian Standard 4970-2009. As tree root growth is unpredictable a tree root survey should be undertaken to identify any roots. Any proposed works must be outside the SRZ. Tree 11 may require minor pruning to accommodate the light structure. See Figure 20,Figure 21,Figure 22 and Figure 23 below.

Figure 20 Trees 10 and 11

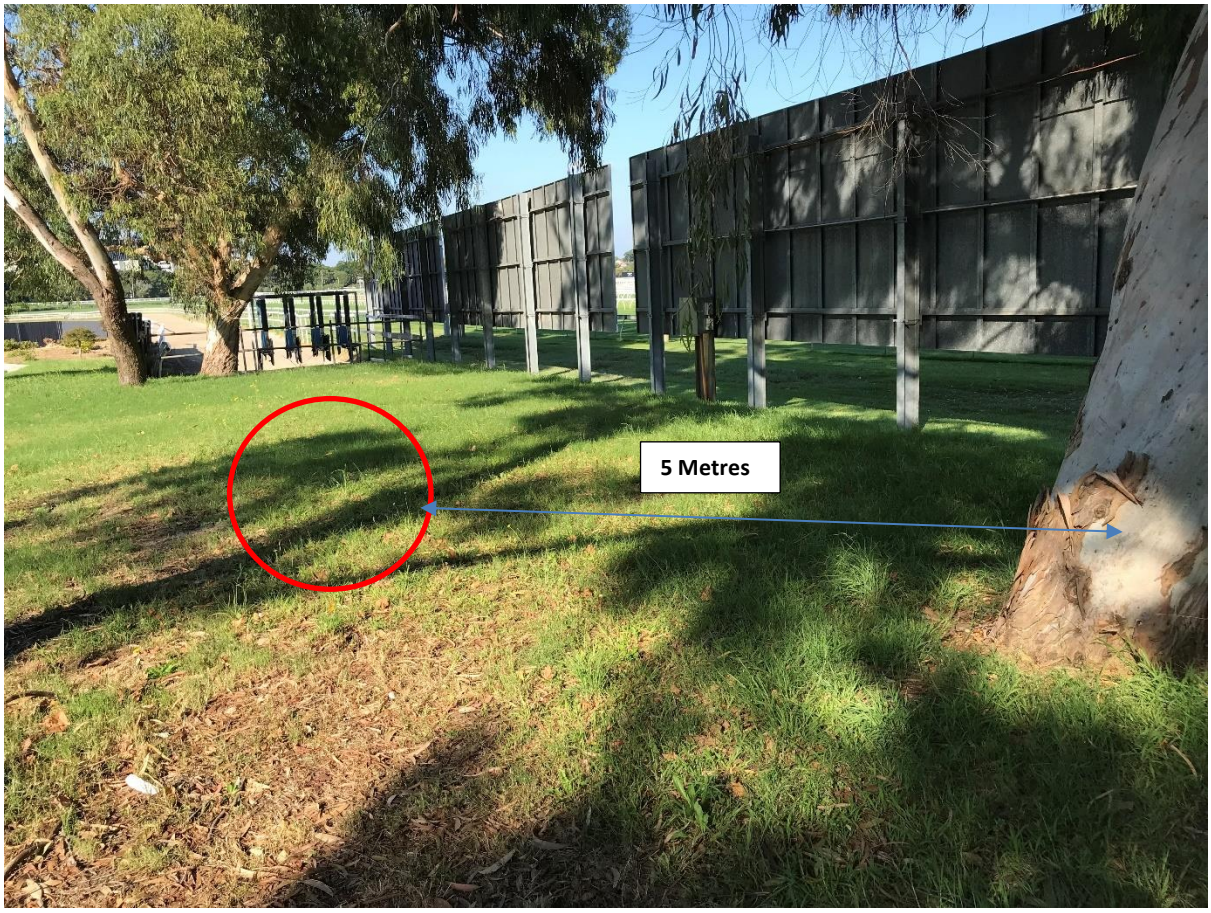


Figure 21 Tree 11 and light post C5

Figure 22 Tree 10, removal recommended due to poor health

Figure 23 Bee hive identified

Trees 12, 13, 14, 15, 16, 17, 19 and light posts C20, C23 and C24

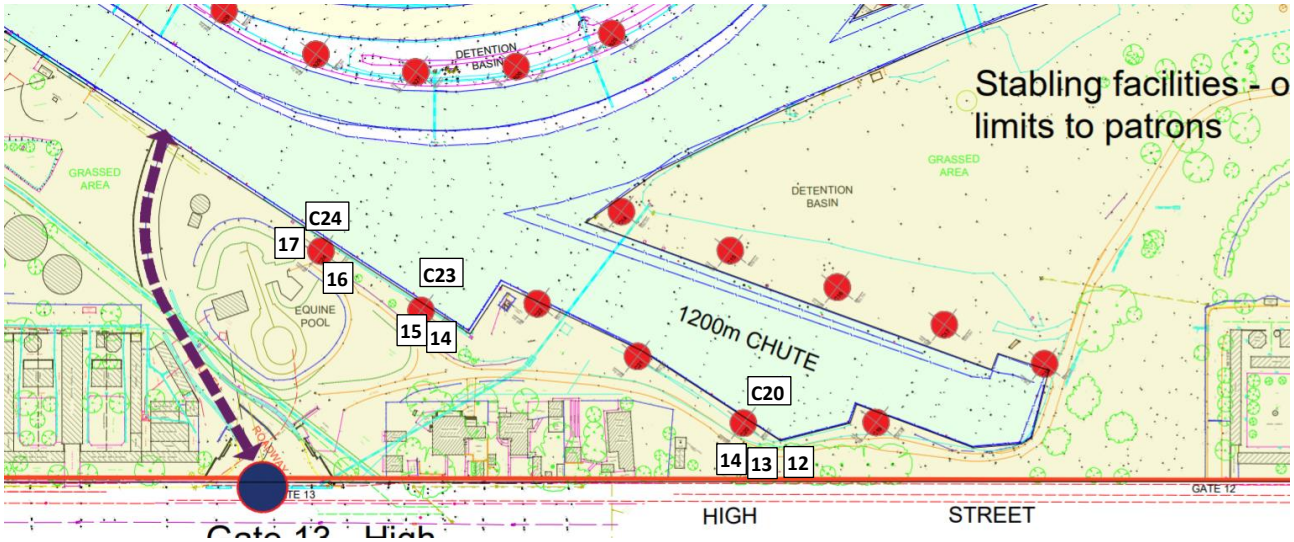


Figure 24 Light post positions C20, C23 and C24

Trees 12, 13 and 14 and light post C20

The position of the light post is approximately 12 metres from tree 13 and 14 and 17 metres from tree 12. There is unlikely to any affect to tree 12 as works are outside the TPZ.

The light post is within the periphery of TPZ of tree 13 and 14, it is unlikely these trees will be affected by the installation of the light post. A tree root survey is not required. The further the structure is from the tree the less the impact. Trees 13 and 14 will require minor pruning to accommodate the light tower. It is anticipated 2 x 120mm branches should be pruned from tree 13 and 3 80mm branches from tree 14. See Figure 25, Figure 26, Figure 27 and Figure 28.

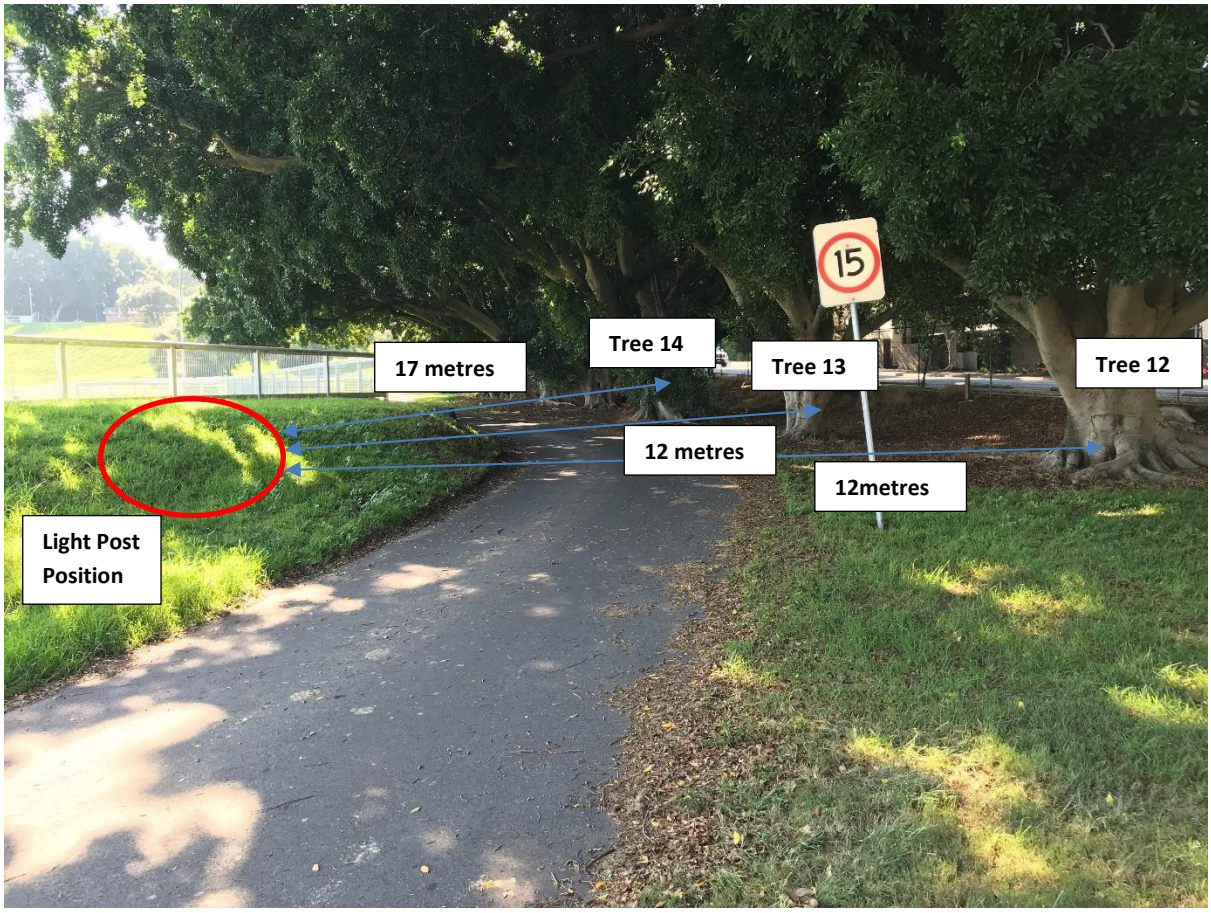


Figure 25 Trees 12, 13, 14 and light post C20

Figure 27 Prune canopy of tree 13

Figure 26 Pruning canopy of tree 14

Figure 28 Prune lower canopy of tree 13

Trees 15 and 16 and light post C23

The position of the light post is approximately 8 metres from tree 15 and 4.5 metres from tree 16. There is unlikely to any affect to tree 15 as works are outside the TPZ.

The light post is within the TPZ of tree 16 yet at the periphery, it is unlikely these trees will be affected by the installation of the light post. A tree root survey is not required. The further the structure is from the tree the less the impact. No pruning is required. See figure Figure 29.

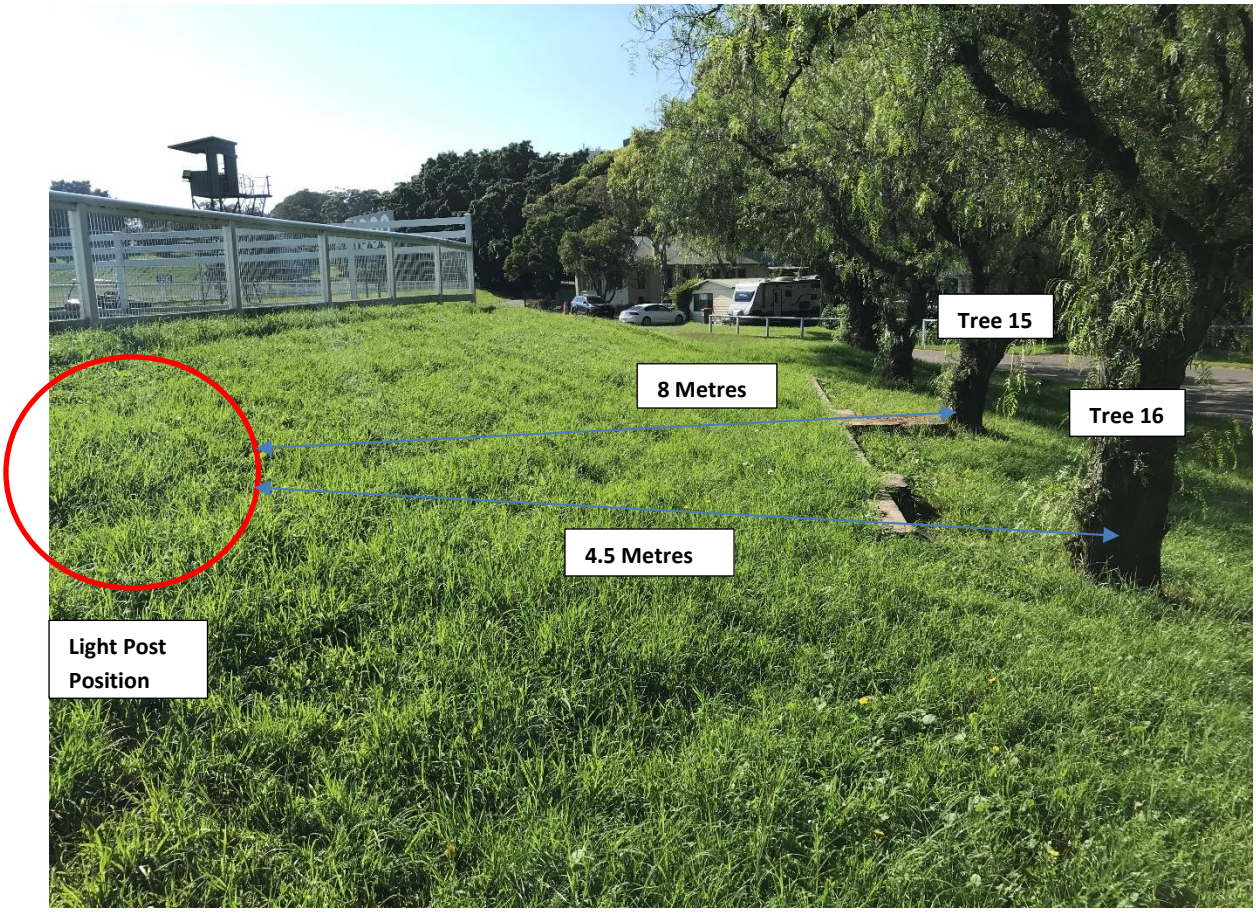


Figure 29 trees 16, 17 and light post C23

Trees 17 and 18 and light post C24

The proposed light post is within the TPZ of trees 17 and 18, it is also within the SRZ of tree 17. The expected impact to these trees will be minimal as only a minor portion of the TPZ is being affected. To confirm the effects a tree root survey should be undertaken to determine the exact impact. See Figure 30.

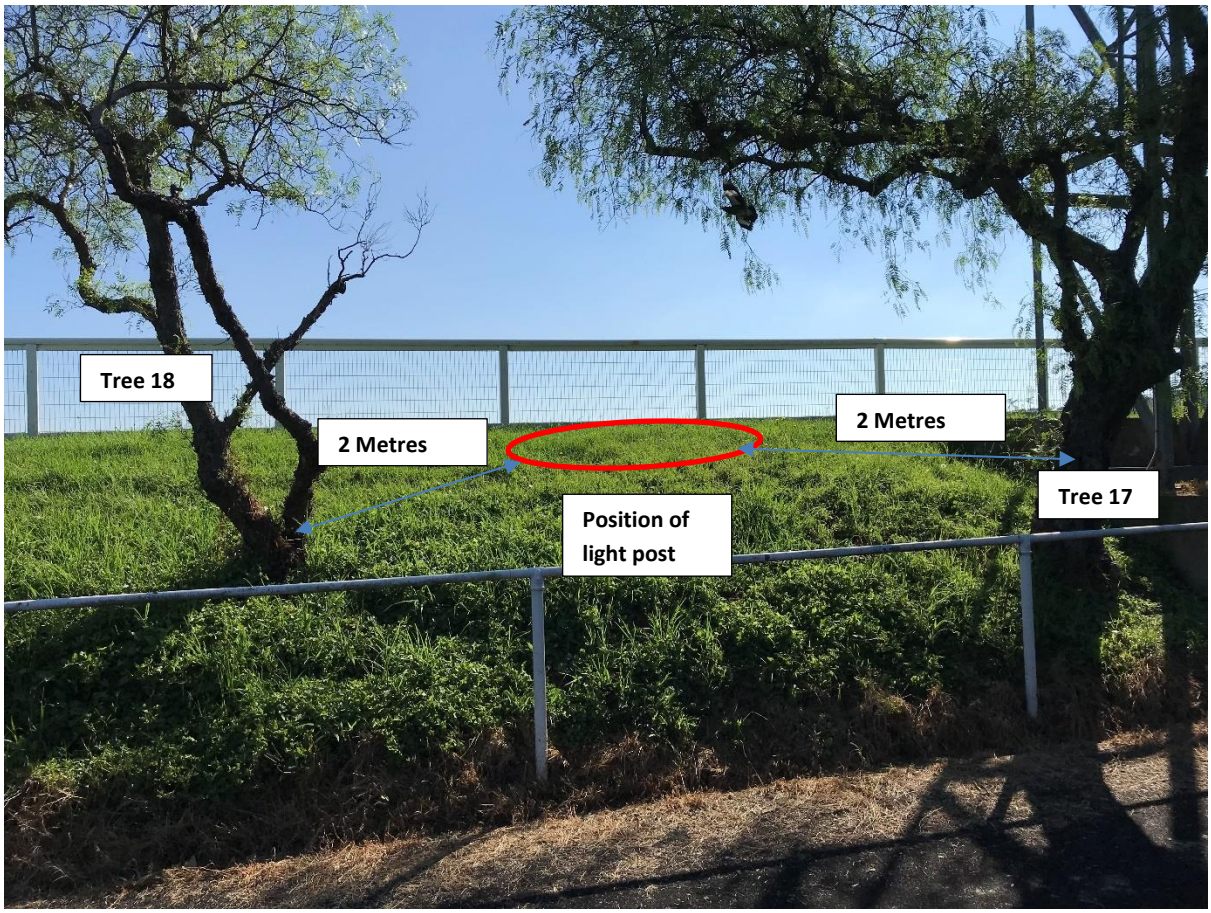


Figure 30 Trees 17, 18 and light post C24

Trees 19, 20 and light post D1

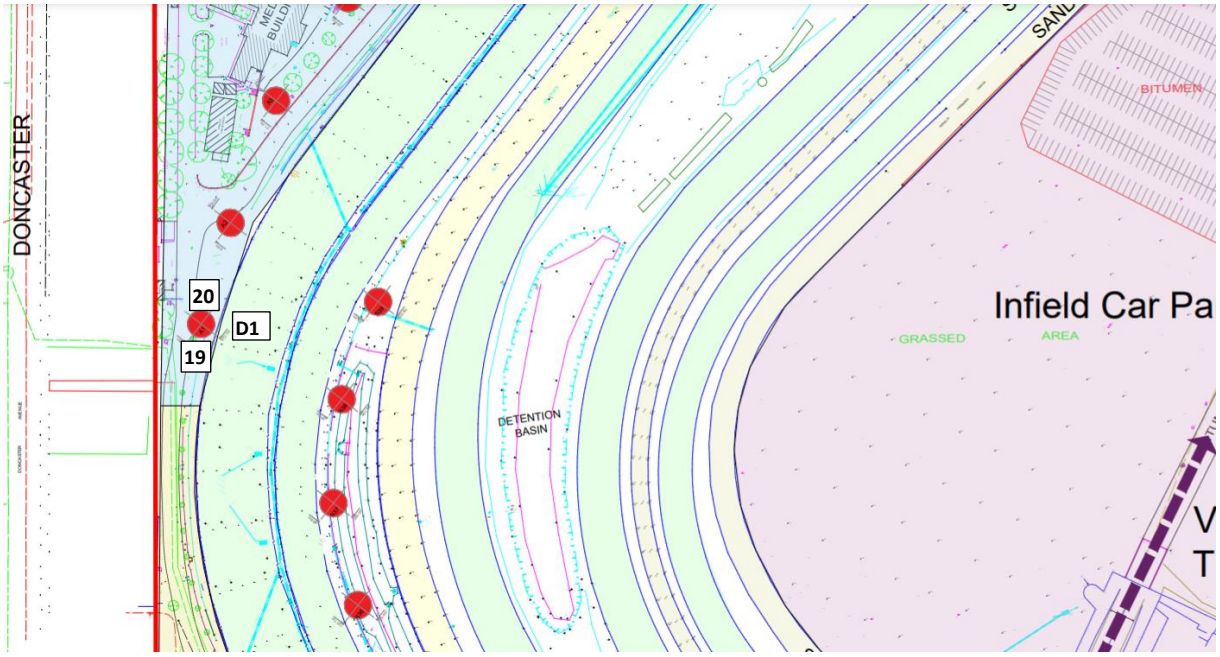


Figure 31 Light post D1

The proposed light post location is between trees 19 and 20. This is at the periphery of the TPZ for both trees. The impact to these trees is expected to be minimal as the percentage of the TPZ affected is low and these trees are young and can tolerate a greater level of tree root disturbance. A tree root survey is not required. See Figure 31 and Figure 32

Figure 32 Trees 19, 20 and light post A1

4 Recommendations

1. Retain trees 1-20, consider removal of tree 10 due to poor health.
2. Appoint project arborist. Minimum AQF Level 5 with 5 years' experience.
3. Survey light post locations and size of excavation required. Re-assess the potential impact to any surrounding trees.
4. Minor re location of light posts C4, C5 and C6 to minimise impacts to trees may be required.
5. Requirements prior to issuing a construction certificate.
   Request work method statement regarding the requirements to construct the light poles and tunnel boring. Items that must be addressed are;
   a) locations of open pits and depth of tunnel boring, ensuring this method is used throughout the project. Reassessment will be required if this method cannot be adopted.
   b) Size of excavation hole required for each light post addressed in this report. At present a 2 metre diameter hole has been assumed.
   c) Positions of machinery to undertake excavation and machinery to erect light posts.
   d) Amount and exact pruning requirements when positioning the light posts.

   Develop tree protection plan. Plan must be prepared to AS4970-2009 include but not limited to; Parts a and b must be done prior to construction certificate to determine tree roots potentially impacted.
   a) Excavation of the top 600mm of soil using tree sensitive techniques that include hand excavation, air spade or high-pressure water and the use of a vacuum truck.
   b) Contingency plan if tree roots greater than 60mm are to be severed.
   c) Locations of machinery and the use of ground protection and tree protection fencing where required.
   d) Documented tree pruning requirements.
   e) AQF level 5 Arborist supervision during any excavation within the TPZ of existing trees.
   f) AQF level 5 pruning supervision.
6. All trees must be retained and protected in accordance with Australian Standard 4970-2009. A tree protection plan has not been provided until further information regarding method of construction and tree root surveys are carried out. Section 10 Appendix G contains generic specifications for these tree protection measures.

5 Project Arborist Monitoring Stages

Project Arborist monitoring stages are imperative to the long-term health of those trees to be retained. These will be identified when the tree protection plan has been developed. The principal contractor (site builder) should be informed of these requirements as they often form the basis of the conditions of consent for the project.

Project arborist monitoring will be a critical component when works are conducted in and around retained trees.

6 References

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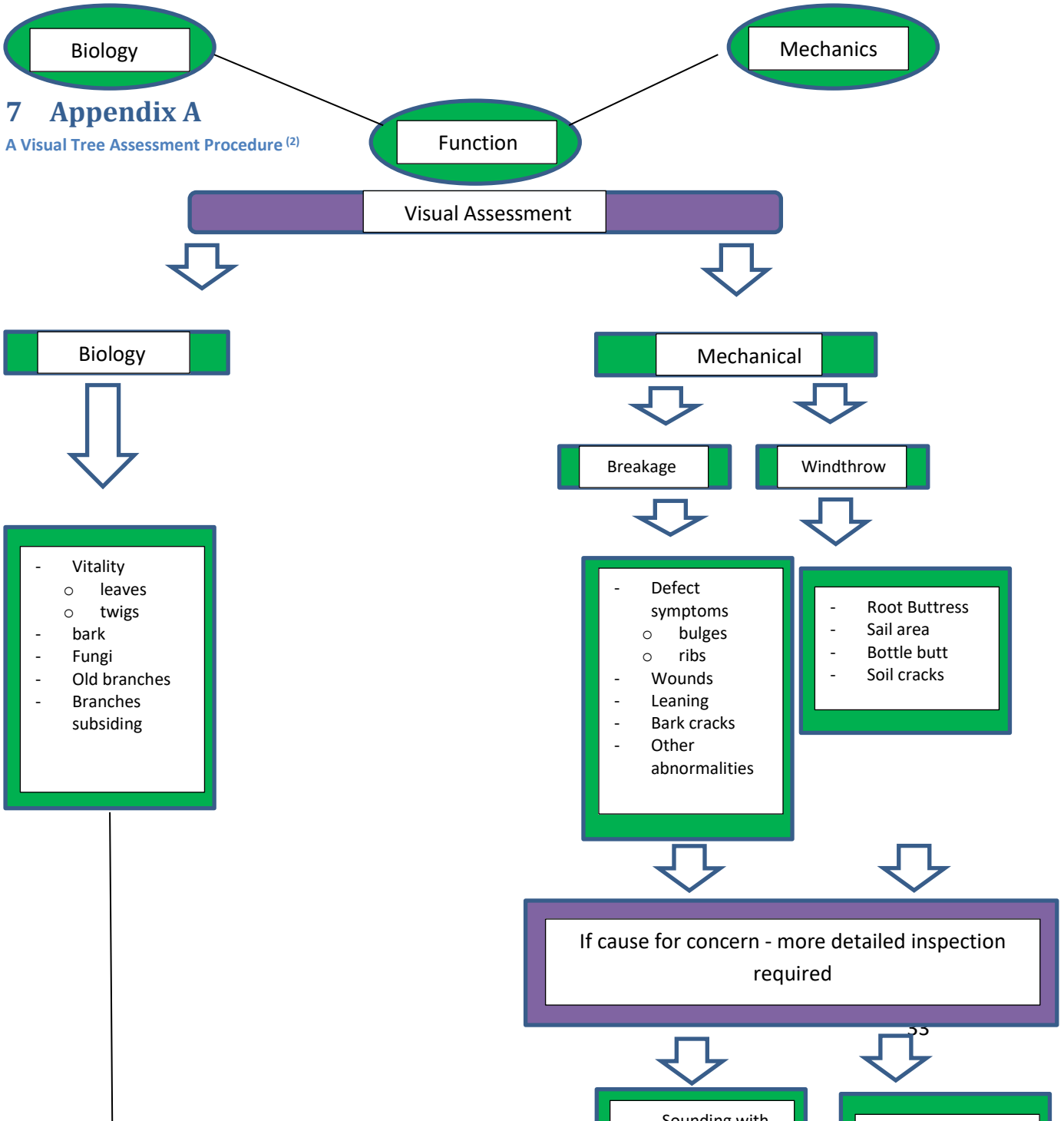
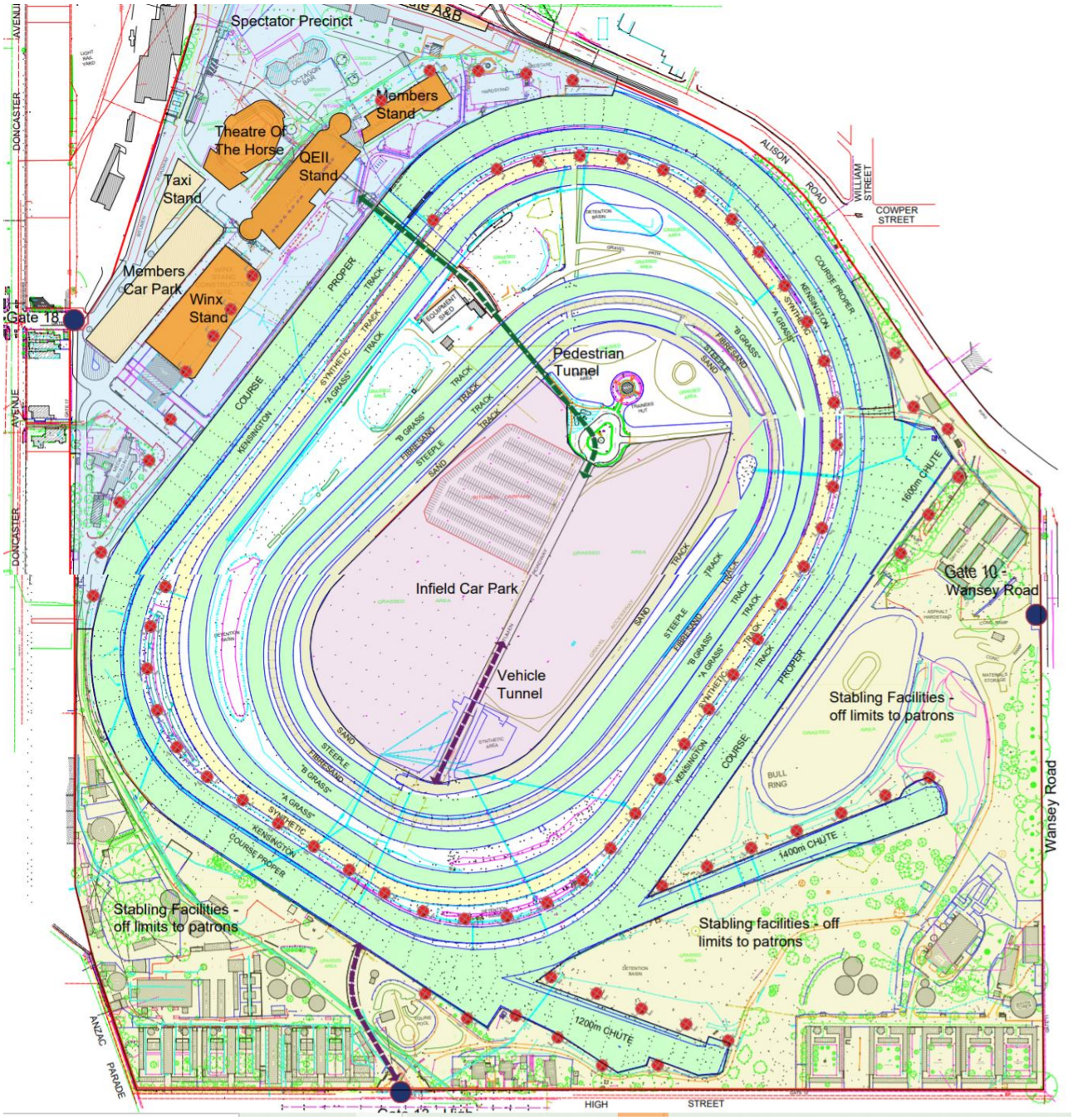
7 Appendix A

A Visual Tree Assessment Procedure [2]

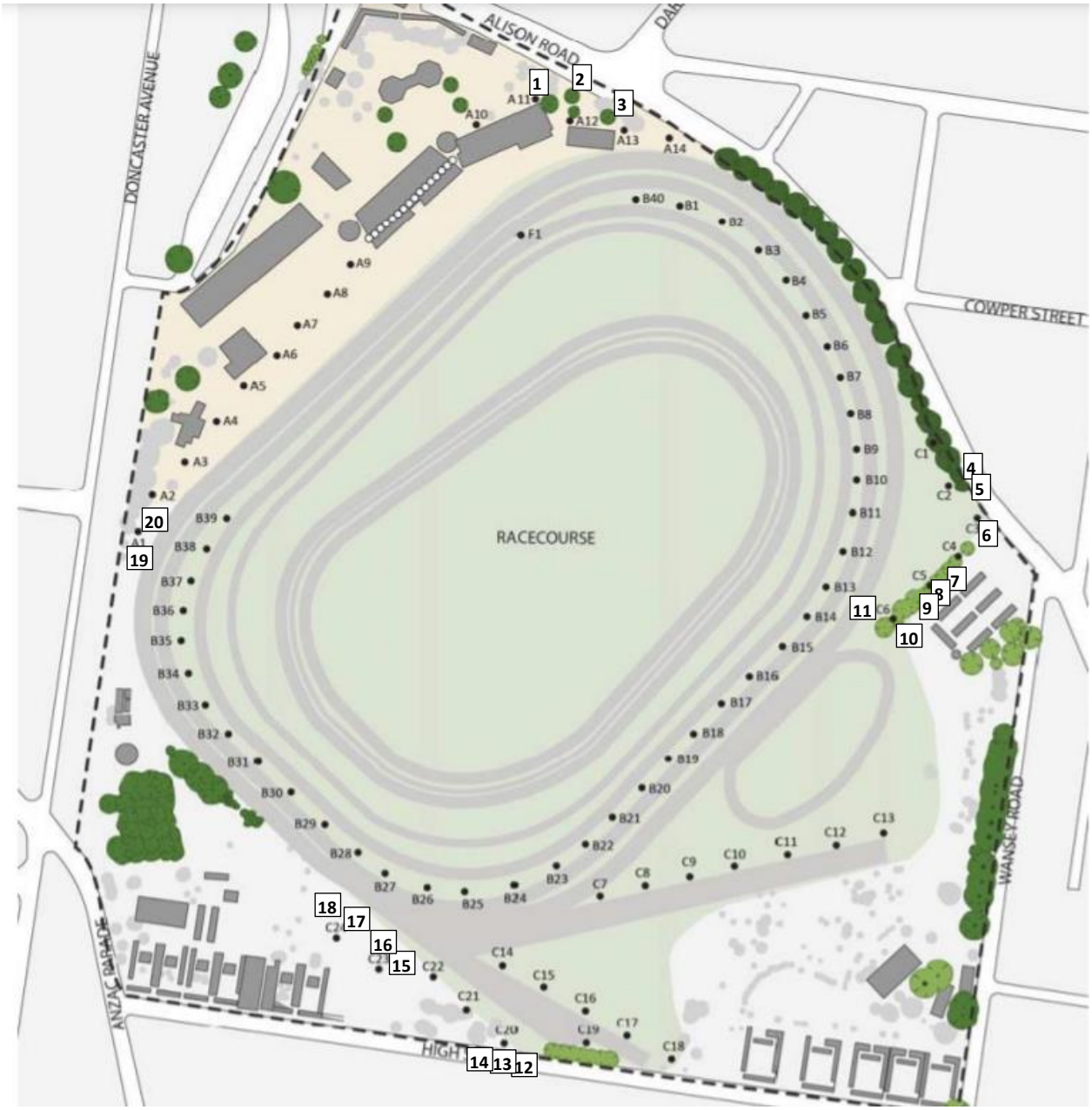


8 Appendix B Light Pole locations and numbering

8.1 Light Pole Locations and exisitng mature trees



8.2 Light Pole Numbering and Tree Locations



9 Appendix C Methodology for Determining Tree Retention Value

The aim of this process is to determine the relative value of each tree for retention (i.e. its Retention Value) in the context of development. This methodology assists in the decision-making process by using a systematic approach. The key objective of process is to ensure the retention of good quality trees that make a positive contribution to these values and ensure that adequate space is provided for their long term preservation. The Retention Value of a tree is a balance between its sustainability in the setting in which it is located (the 'landscape') and its significance within that setting (landscape significance).

Step 1: Determining the Landscape Significance Rating

The 'landscape significance' of a tree is a measure of its contribution to amenity, heritage, and ecological values. While these values are fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the Retention Value of each tree. To ensure in a consistent approach, the assessment criterion shown in Table 2 should be used. A Tree may be considered 'significant' for one or more reasons. A tree may meet one or more of the criteria in any value category (heritage, ecology or amenity) shown in Table 2 to achieve the specified rating. For example, a tree may be considered 'significant' and given a rating of 1, even if it is only significant based on the amenity criteria.

Based in the criterion in this table, each tree should be assigned a landscape significance rating as follows:

1. Significant
2. Very High
3. High
4. Moderate
5. Low
6. Very Low
7. Insignificant

Step 2: Determining Safe Useful Life Expectancy (SULE)

The sustainability of a tree in the landscape is a measure of its remaining lifespan in consideration of its current health, condition and suitability to the locality and site conditions. The assessment of the remaining lifespan of a tree is a fairly objective assessment when carried out by a qualified Consulting Arborist. Once a visual assessment of each tree is completed (using the Visual Tree Assessment criteria), the arborist can make an informed judgement about the quality and remaining lifespan of each tree. The Safe Useful Life Expectancy (SULE) methodology (refer to Table 3) can be used to categorise trees as follows:

- Long (Greater than 40 years)
- Medium (Between 15 and 40 years)
- Short (Between 5 and 15 years)
- Transient (less than 5 years)
- **Dead or Hazardous (no remaining SULE)**

The SULE of a tree is calculated based on an estimate of the average lifespan of the species in an urban area, less its estimated current age and then further modified where necessary in consideration of its current health, condition (structural integrity) and suitability to the site.

9.1 Appendix D Table 2 Step 1 Landscape Significance Rating

RATINGS	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage item under the Local Environment Plan (LEP) with a local, state, or national level of significance or is listed on Council's Significant Tree Register.	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conversation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999.	The subject tree has a very large live crown size exceeding 100m2 with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species.
	The subject tree forms part of the curtilage of a Heritage Item (building/structure/artefact as defined under the LEP) and has a known or documented association with that item.	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species.	The Subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity.
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event.	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area.	The tree is visually prominent in view form surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally indigenous species representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 60m2, a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence.	The tree is a locally indigenous and representative of the original vegetation of the area and the tree is located within a defined vegetation link/wildlife corridor or has known wildlife habitat value.	The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible form the street and/or surrounding properties and makes a positive contribution to the visual character and the amenity of the area.
4. MODERATE	The tree has no known or suspected historical association but does not detract or diminish the value the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of the DCP.	The subject tree has a medium live crown size exceeding 25m^2; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal).
			The tree is visible from surrounding properties but is not visually prominent- view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values and diminishes the value of the heritage item.	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown of less than 25m^2 and can be replaced within the short term (5-10 years) with new tree planting.
6. VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the Local Government Area, being invasive, or is a nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50%.

9.2 Appendix E Table 3 Estimating Safe Useful Life Expectancy (SULE) Step 2

1	Estimate the age of the tree
2	Establish the average life span of the species
3	Determine whether the average life span needs to be modified due to local environmental situation
4	Estimate remaining life expectancy

Life Expectancy	=	average modified life span of species - age of tree

5	Consider how health may affect safety (& longevity)
6	Consider how tree structure may affect safety
7	Consider how location will affect safety
8	Determine safe life expectancy

Safe Life Expectancy	=	life expectancy modified by health, structure and location

9	Consider economics of management (cost vs benefit of retention)
10	Consider adverse impacts on better trees
11	Consider sustaining amenity - making space for new trees
12	Determine SULE

Safe Useful Life Expectancy	=	safe life expectancy modified by economics, effects on better trees and sustaining amenity

Ref: Barrell, Jeremy (1996)
Pre-development Tree Assessment
Proceedings of the International Conference on Trees and Building Sites (Chicago)
International Society of arboriculture, Illinois, USA

9.3 Appendix F Table 4 Determining Tree Retention Values

The Retention Value of a tree is increased or diminished based on its sustainability in the landscape, which is expressed as its SULE. A tree that has a high Landscape Significance Rating, but low remaining SULE, has a diminished value for retention and therefore has an appropriate Retention Value assigned. Conversely a tree with a low Landscape Significance Rating even with a long remaining SULE, is also considered of low Retention Value. This logic is reflected in the matrix shown in Table 1.

Once the landscape Significance Rating and SULE category have been determined, the following matrix can be used to determine a relative value (or priority) for retention:

TABLE 1 – DETERMINING TREE RETENTION VALUES

	Landscape Significance Rating						
SULE	1	2	3	4	5	6	7
Long - greater than 40 years	High Retention Value						
Medium - 15 to 40 years			Moderate Retention Value				
Short - 5 to 15 years				Low Retention Value			
Transient - less than 5 years				Very Low Retention Value			
Dead or Hazardous							

10 Appendix G Tree Protection specifications

Tree Protection Fencing (See Figure 33 below)

Tree protection is to be carried out on all trees to be retained on site.

All fencing should be at the perimeter of the Tree Protection Zone (TPZ).

The TPZ must be enclosed with a fully supporting chainmesh protective fencing. The fencing shall be secure and fastened to prevent movement. The fencing shall have a lockable opening for access. Roots greater than 30mm diameter are not to be damaged/severed during the construction of the fence. See Figure 33 Drawing taken from AS 4970-2009below.

The enclosed area must be free of weeds and grass, the application of a 75mm layer of leaf mulch to the tree protection zone (TPZ) must be maintained for the duration of works.

Two signs on either side of the fencing are to be erected showing the name and contact details of the site Arborist and the words NO ENTRY clearly written.

No work is to be undertaken within this Tree Protection Zone; this includes:

-No removal or pruning of trees

-No construction, stockpiling or storage of chemicals, soil, and cement. Or the movement of machinery, parking and personnel is to occur within the TPZ.

-No refuelling, dumping of waste, placement of fill or Soil level changes.

-No lighting of fires or physical damage to protected trees.

-No temporary or permanent installation of utilities or signs.

-No service trenches should pass through the TPZ, unless approved and supervised by the project arborist.

Example of tree protection fencing

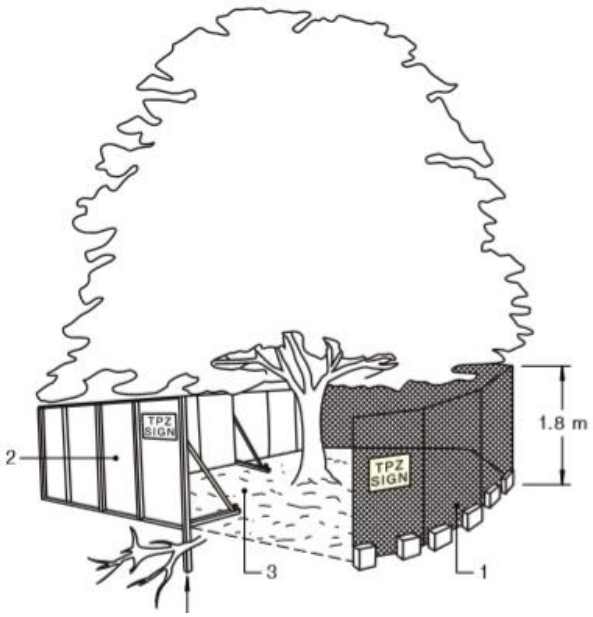


Figure 33 Drawing taken from AS 4970-2009

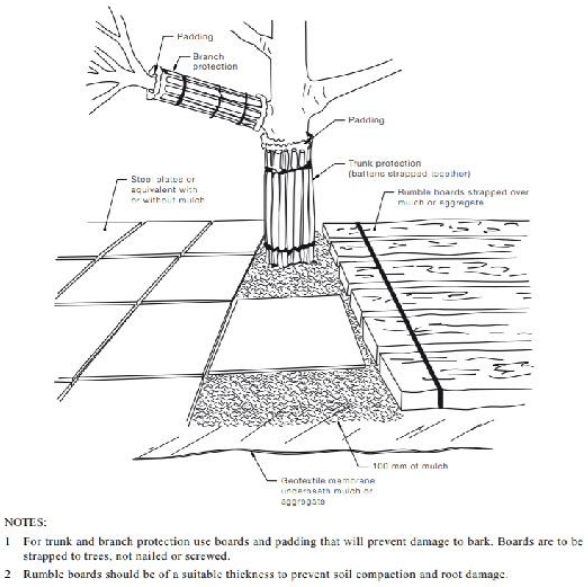


Figure 35 Trunk and branch Protection (AS 4970-2009)

Figure 34 Trunk Protection

Trunk/Branch Protection

Hessian or similar material is used as a wrap around the trunk/branch to a height of 2.6 metres from the base of the tree. Covering the hessian are timbers 100x50x2500mm These are to be spaced around the trunk with gaps of approximately 100mm. The timbers are to be secured with metal strapping. These materials are not to be directly fastened to the tree. See Figure 32 and 33 above.

Ground protection

This is used to protect the Tree Protection Zone (TPZ) from soil compaction. Soil compaction reduces the available pore spaces within the soil, this reduces water holding capacity, oxygen and carbon dioxide diffusion. It can cause water to runoff the soil surface reducing infiltration. Over time the root system in a soil that is compacted (High Bulk Density) reduces in size. As the root system of a tree declines so does its canopy. When soil compaction is severe the entire tree can die.

Where scaffolding, foot traffic or wheelbarrow access is required. The soil surface should be covered by Geotextile fabric followed by plywood sheets 1.2 x 2.4 metres x 18mm thick and then covered by 100mm of mulch to provide a trafficable surface. Driveways or areas that will have heavy vehicles over the soil surface should have geotextile fabric, 100mm of mulch or gravel followed by sleepers 100x 200 x 3000mm. The sleepers are spaced 150mm apart and the gaps filled with gravel or mulch. The sleepers are then strapped together with hoop pine to prevent movement.

10.1 Installation of underground services

All underground services must be routed outside the TPZ of any protected tree unless sensitive excavation methods adopted. The project arborist must be consulted (or council if required in DA conditions) if works pass through the TPZ of any tree. Methods such as thrust boring/directional drilling or hand excavation, during supervision by the project arborist are methods that reduce impact to surrounding trees. These are acceptable methods under AS 4970-2009.

11 Qualifications and Experience

TRISTAN BRADSHAW

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Industry Licence AL1286-1

Professional Memberships

Member of the International Society of Arboriculture. No: 157768

Member of Arboriculture Australia No. 1286

Qualifications

2016-2018 Graduate Certificate in Arboriculture AQF8 at Melbourne University.

2015 Tree Risk Assessment Qualification (TRAQ)

2013-2014 Diploma of Arboriculture AQF5 at Ryde TAFE. Distinction

2012 Certificate III in Arboriculture at Ryde TAFE

2011 Certificate IV in Occupational Health and Safety

2010 Aboriginal Sites Awareness Course by Aboriginal Heritage Office

1996-1999 Bachelor of Horticultural Science at University of Sydney. Honours+

Tristan Bradshaw has been involved in the Horticultural and Arboricultural Industry since 1995. The business Bradshaw Horticultural Services was formed and incorporated Horticultural consulting work and landscaping. In 2000 Tristan undertook the Level 2 Arboriculture course at Ryde TAFE. The business progressively specialised in consulting, tree removal, pruning and stump grinding works. Extensive hands-on knowledge was developed during the climbing of trees undertaking pruning or removal and during storm events understanding the tolerances of trees.

In 2009 the new business name Bradshaw Tree Services was registered to reflect works only being undertaken in the tree industry. The business operated throughout Sydney employing up to 25 people. Tristan Bradshaw's main role was as a consultant advising clients and writing reports. In 2019 Bradshaw Tree Services ceased operations and Tristan Bradshaw began Bradshaw Consulting Arborists exclusively undertaking tree consultancy.

Tristan Bradshaw with continued education has attained a Level 8 qualification, attends the annual Arboriculture conferences taking part in the seminars to broaden his knowledge.

This assessment was carried out from the ground and covers what was reasonably able to be assessed and available to this assessor at the time of inspection. No subterranean inspections were carried out. The preservation methods recommended where applicable are not a guarantee of the tree survival but are designed to reduce impacts and give the trees the best possible chance of adapting to new surroundings.

Limitations on the use of this report:

This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole or the original report is referenced in, and directly attached to that submission, report or presentation.

Assumptions:

Care has been taken to obtain information from reliable resources. All data has been verified insofar as possible: however, Bradshaw Consulting Arborists can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

-Information contained in this report covers only the tree/s that was/were examined and reflects the condition of the tree at the time of the assessment: and
-The inspection was limited to visual examination of the subject tree without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.
-The assessment does not identify hazards and associated risk; this report is not a risk assessment.

Yours sincerely,

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