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Warringah Council Civic Centre Car Park, 36-48 Kingsway, Dee Why

Arborist Report

Prepared for
Warringah Council
12 February 2014

DOCUMENT TRACKING

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Abbreviations

Abbreviation	Description
AS (or SA)	Australian Standard
CRZ	Critical Root Zone
DBH	Diameter at Breast Height
ELA	Eco Logical Australia
LEP	Local Environment Plan
LGA	Local Government Area
SRZ	Structural Root Zone
SULE	Safe Useful Life Expectancy
TPO	Tree Preservation Order
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment

Executive summary

Eco Logical Australia Pty Ltd (ELA) was engaged by FJMT to carry out a tree assessment at a car park located at 36-48 Kingsway, to the north of the Civic Centre, Dee Why. The report was requested by the client to provide an understanding of the current tree cover, to describe the conditions of individual trees and to identify trees that are proposed for retention or removal in order to accommodate the construction of a community centre and car park within the central portion of the existing car park

The tree survey was undertaken on 20th January 2014 using the Visual Tree Assessment (VTA) method (see Mattheck and Breloer 2003) This report outlines the findings of the survey and the retention values for the subject trees by using the Safe Useful Life Expectancy (SULE) matrix, as described by Barrell (2001) Two hundred and sixty four trees were assessed predominately in the proposed building footprint as well as in adjacent areas where existing trees may be retained to provide visual screening. Tree species were mostly indigenous to the Warringah LGA or to other parts of the Sydney Basin, with a small number of environmental weed species Most of the trees in the car park are early mature (20-25 years old) and a few mature specimens occur, particularly in the south-east portion of the subject site No over-mature specimens containing hollows or having heritage significance occur in the car park.

The Tree Protection Zone (TPZ) has been calculated for those trees which are indicated in "Landscape and Public Domain, Sheet Numbers 302-306", prepared by FJMT (2014), as capable of being retained within the constraints of excavation and construction To achieve the successful retention of trees at the site, it is recommended that the prescribed TPZs are implemented throughout the period of excavation and construction, and that steps are taken to ensure that the existing hydrology and soil level within the TPZs are not altered Further advice may need to be obtained from an arborist if, once excavation commences, it is found that large supporting roots or extensive feeder root systems of retained trees require removal

1 Introduction

1.1 Purpose of the report

Eco Logical Australia Pty Ltd (ELA) was commissioned by FJMT to undertake a tree assessment of several groups of planted trees within a Council car park located to the north-west of the Council Civic Centre. The purpose of the report is to describe the trees growing in the subject site, to allocate a Safe Useful Life Expectancy (SULE) for each tree assessed and to outline mitigation measures for trees considered retainable The indicative Tree Protection Zone (TPZ) for trees proposed for retention is calculated following the Australian Standard (SA 2009) to guide tree protection during the construction of a building located in the central portion of the car park (refer to Section 1 4). The information provided in this report reflects the condition of trees at the time of inspection and covers solely the trees assessed

1.2 Subject site

The subject site is located at 36-48 Kingsway Dee Why, in the Warringah Local Government Area (LGA) The subject site consists of a car park which includes islands of planted trees. The subject site includes some foot path planting along Kingsway, to the north and along Fisher Road, to the west. Access to the car park is provided off Civic Drive Warringah Civic Centre is located to the south-east of the subject site Small remnant patches of native vegetation extend along the south-eastern portion of the subject site. The subject site is mostly gently inclined to level, with a northerly aspect A series of sandstone terraces in the south-east section of the subject site have been modified to allow additional parking spaces

1.3 Vegetation and soils

The original vegetation on the subject site would have consisted of a gradient between Coastal Sandstone Ridgetop Woodland and Coastal Sandstone Gully Forest (see Tozer *et al* 2010). Neither of these vegetation types is listed as an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995* (TSC Act) or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Some of the planted species in the subject site are consistent with these vegetation types, although the majority of the specimens are not indigenous to Warringah LGA

Large-scale mapping of Soil Landscape Groups indicate the occurrence of the Gymea Soil Landscape Group throughout most of the subject site with soils of the Hawkesbury Group occurring on the rocky terrace along the south-eastern part of the subject site (see Chapman and Murphy 1989) Soils of the Gymea Group are derived from Hawkesbury Sandstone and consist of shallow to moderately deep earthy sands on crests and inside of benches and shallow to moderately deep siliceous sands and leached sands along drainage lines.

1.4 Description of the proposal

A large proportion of the trees on the subject site will require clearing to accommodate the construction of a building which will include several levels of parking space The trees which occur around the outer boundaries of the subject site may be retained, although problems associated with the retention and protection of these trees are discussed within this report

Figure 1: Study area and building envelope

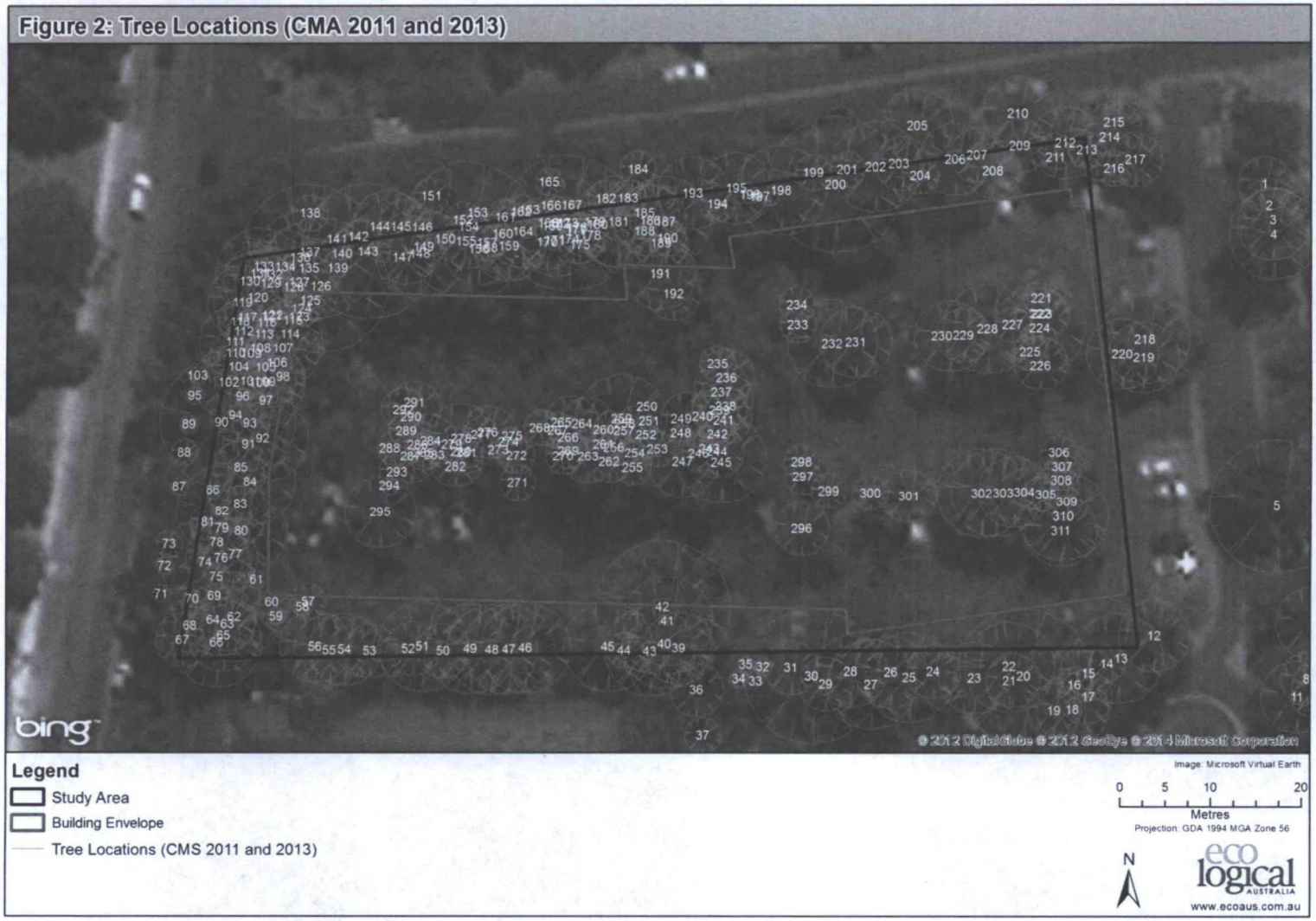

Figure 2: The subject site and tree locations after CMS Surveyors (2011 and 2013)

Figure 3: The subject site and zones after Goldstein (2010)

2 Methods

A site assessment was undertaken on 20th January 2014. The extent of the subject site was determined during a site meeting with the Project Manage for Warringah Council, Mr Kim Stewart. The subject site includes all trees occurring between Kingsway, Fisher Road and Civic Drive, as well as a narrow line of trees occurring on the eastern side of Civic Drive and the car parks to the south of Zones 72 and 61. All trees with a diameter at breast height (DBH) of >10 cm or with a height exceeding 6 m were assessed by conducting a ground based Visual Tree Assessment (VTA). No diagnostic equipment was used. No aerial inspection (climbing) or tree root mapping was undertaken, although evidence of tree roots growing beneath asphalt surfaces was noted. Trees were assessed individually and the SULE determined.

Location data for individual trees were determined by reference to a Tree Plan prepared in 2009 and 2013 by CMS Surveyors and a Tree Assessment Area prepared by Jason Goldstein, Warringah Council in January, 2010. In this report, the tree numbers in the 2009 Tree Plan are used and cross-referenced with the zones indicated in the Tree Assessment Area plan. As some trees which appear in the Tree Plan have since been removed, the numbers are not sequential in the Tree Table prepared for this report (**Appendix C**). The subject site includes all zones indicated in the Tree Assessment Area, as well as the car park to the south of Zones 72 and 61. The footpath trees adjacent to Kingsway and Fisher Road were also assessed.

The height and crown spread of trees were estimated and the DBH measured using a DBH measuring tape. These data were then compared with height, crown spread and DBH listed for each tree in the 2009 Tree Plan, in order to confirm identification and location (allowing for increases in dimensions over the following four years). For each tree, the SULE was determined based on the health and structure of the subject tree (adapted from Barrell 2001). SULE is a commonly used rating system that describes the timeframe a tree can be usefully retained (see **Appendix A** for a SULE code description). It should be noted that the SULE ratings have been determined according to the existing conditions in which each tree occurs. It is apparent that the conditions will alter as soon as clearing, excavation and construction have commenced.

Table 1: Items used to determine tree structure and health

Structural considerations	
Presence/absence of cankers (surface injuries caused by fungi or bacteria)	Evidence of 'end weight' (accumulation of mass at the end of a branch)
Presence/absence of cavities (open wound characterised by decay)	Presence/absence of epicormic shoots (shoots arising from latent or adventitious buds)
Presence/absence of co-dominant stems (Stems or branches of equal diameter, often weekly attached)	Presence/absence of previous branch or trunk failure
Presence/absence of conks (fruiting body of decay fungi e.g. Bracken Fungus)	Evidence of girdling roots (roost that encircle the base (above ground) of the stem)
Presence/absence of decay (degradation of wood by fungi / bacteria)	Leaning trunk
Evidence of decline (loss of vigour)	Low canopy (branches that are close to ground may require heavy pruning for construction clearance)
Evidence of dieback (necrosis of foliage, twigs and branches)	Presence/absence of wounds (injuries on the surface of a stem or branch)
Health Considerations	
Presence/absence of pest and diseases	Deadwood percentage
extension growth	Absence/presence of epicormic growth
Density of canopy	Foliage size and colour

* Adapted from Matheny & Clark (1998).

The estimate of a tree's age was based on the definitions outlined by Draper and Richards (2009). Trees were considered young (juvenile) if they were judged to be of an age <20% of their life expectancy *in situ*. Trees of mature age are defined as trees being aged between 20 to 80% of their life expectancy *in situ*, while trees aged >80% of their life expectancy *in situ* were considered over-mature (Draper & Richards 2009). The calculation of the TPZ was based on the tree's DBH as outlined in *Australian Standard 4970 'Protection of Trees on Development Sites'* (SA 2009).

The traditional calculation of SRZ is rendered difficult because most trees growing on shallow sandstone soils have broad root plates which extend across rock surfaces or down into rock fissures. The exposed roots along the Kingsway footpath illustrate this tendency.

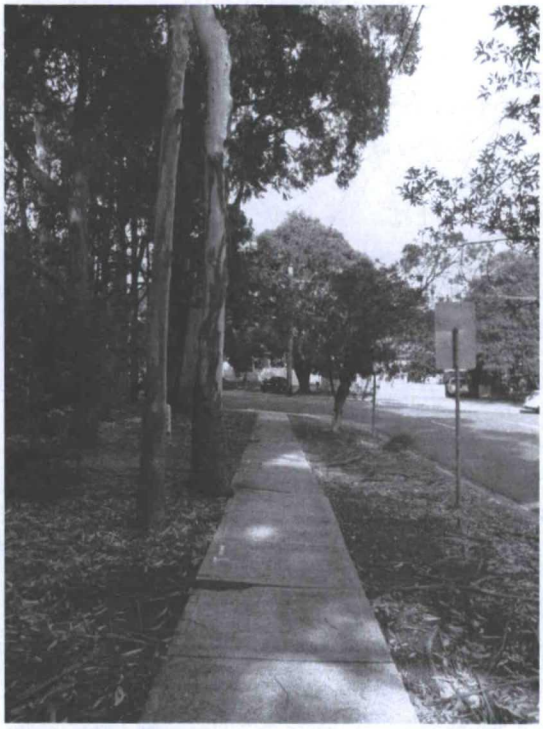

Photo 1 – Roots extending from car park across footpath and beneath the road.

3 Results

3.1 Tree species on site

Most of the trees growing on the site appear to have been planted 20 to 25 years ago. There are also several specimens which are more than 40 years old, although as they are located within garden beds, it is likely that they are artefacts of earlier plantings, rather than natural occurrences. There are, however, several mature *Angophora costata* (Smooth-barked apple) on the sandstone terrace in the south-eastern portion of the subject site, one of which (Tree 318) may be naturally occurring or a self-recruitment, although the adjacent line of younger *Angophora costata* (Trees 321 to 324) has obviously been planted. These trees have been identified in Sheet 303 (FJMT 2014) as being significant. Although the trees are located at a reasonable distance from the proposed construction area, this report and the accompanying Tree Construction Impact Statement propose protection measures for them during all phases of construction.

The most common tree species are two Eucalypt species which are indigenous to the Sydney basin, but not indigenous to the Warringah LGA: *Eucalyptus grandis* (Flooded Gum) and *E. microcorys* (Tallowwood). The southern limit of distribution of *E. microcorys* is Morisset and Newcastle for *E. grandis* (see Klaphake 2010). Indigenous species include *E. punctata* (Grey Gum), *E. botryoides* (Bangalay), *Corymbia gummifera* (Red Bloodwood), *Casuarina glauca* (Swamp Oak), *Angophora costata* and *Banksia integrifolia* subsp. *integrifolia* (Coast Banksia). Thickets of *Glochidion ferdinandi* var. *ferdinandi (*Smooth Cheese-tree) and several individuals of *Pittosporum undulatum* (Brush Daphne) are probably the result of self-recruitment.

Two specimens of the threatened species *Eucalyptus nicholii* (New England Black Peppermint) (Trees 20 and 30) occur near the proposed building envelope adjacent to Zone 72. These two trees are well outside their known range and they are listed as vulnerable under the *Threatened Species Conservation Act 1995.* The intent of the Act is that these do not require assessments of significance because they are both planted and well outside their range. Both specimens of New England Black Peppermint have poor form and should be removed and replaced with more appropriate species.

It is apparent that a number of trees have been removed since the 2009 and 2010 surveys. **Table 2** lists the trees recorded during this survey, according to the zones outlined by Jason Goldstein.

Table 2: Trees recorded by Goldstein (2009-2010)

Zone Number	Located within Proposed Building Envelope	Number of Trees Surveyed
61	Yes	4
62	Partly	3
63	Partly	10
65	Partly	10
66	Partly	24 (+9 street trees)
67	Partly	28
68	Partly	33 (+2 street trees and one dead specimen)
69	Partly	15 (+2 street trees)

Zone Number	Located within Proposed Building Envelope	Number of Trees Surveyed
70	Partly	2
71	Yes	11
72	Yes	10
73	Yes	50
East of Civic	No	11
South of 72	(Possibly) Partly	40

Photo 2 – Two specimens of *Eucalyptus nicholii*

Photo 3 – Zones 71 and 72 (Goldstein 2010)

Photo 4 – Zone 73 (Goldstein 2010)

Sheet 305 – "removed trees" (FJMT 2014) indicates a number of groups of trees inside and outside the proposed building envelope which have been proposed for removal "....subject to Arborist Detail Review". Sheet 306 – "retained trees" (FJMT 2014) indicates a number of trees growing beyond the proposed construction area which may be retained. It is ELA opinion that as many trees as possible be retained, in order to form a visual screen between the proposed building and public space.

It is, however, likely that many of the trees which occur along the outer margins of the proposed building footprint would not survive in the long term for the following reasons:

- The CRZ of most of the trees are probably wider than the Australian Standards calculations, because of the shallow, sandy soils. Therefore, there is greater potential for loss of a significant proportion of SRZ, either from excavation or from compaction by machinery;
- Lower branches will probably require removal to accommodate machinery access during excavation and construction. The removal of branches tends to reduce a tree's stability by increasing mass damping during strong winds (see James, Haritos and Ades 2006; Sterken 2005);
- Stress factors would probably be increased as a result of factors such as alterations to light levels and moisture regime, as well as a reduction in activity from beneficial organisms and, possibly increased activity of harmful organisms, especially insects, fungi and bacteria; and
- Vortex effects created by the finished building may result in increased branch and stem failure (see Oke 1988).

An optimal number of trees surveyed which may possibly be retained, according to Sheet 306, have a recommended Tree Protection Zone (TPZ) in the tree table (**Appendix C**), although a large proportion of these specimens will probably also require removal.

3.2 Tree assessment

The report describes the condition of the subject trees within the subject site and the predicted life expectancy by using the SULE matrix (**Appendix A**). Generally, the trees are early mature and mostly in good condition. It is apparent that the trees are occasionally pruned and the ground surface is well-protected by a thick layer of wood-chip mulch.

Although a large proportion of the most recently planted trees are not indigenous to the Warringah LGA, it is apparent that they have adapted to the situation and are mostly in good health and form. Some older trees have structural problems which are probably associated with factors such as their location, the shallow topsoil, crowding and the narrow width of the garden beds. Many of the trees growing close to the edge of tree groups either grow with a bias away from the tree group or have asymmetrical canopies.

A few older trees display evidence of damage by longicorn beetles.

Evidence of use by native fauna include scratches and chew marks on several specimens of *Eucalyptus punctata*. Some trees which are growing close to paved surfaces have created trip hazards.

The following photographs provide examples of these factors:

Photo 5 – Scratches on *Eucalyptus punctata.*

Photo 6 – Chew marks on *Eucalyptus punctata.*

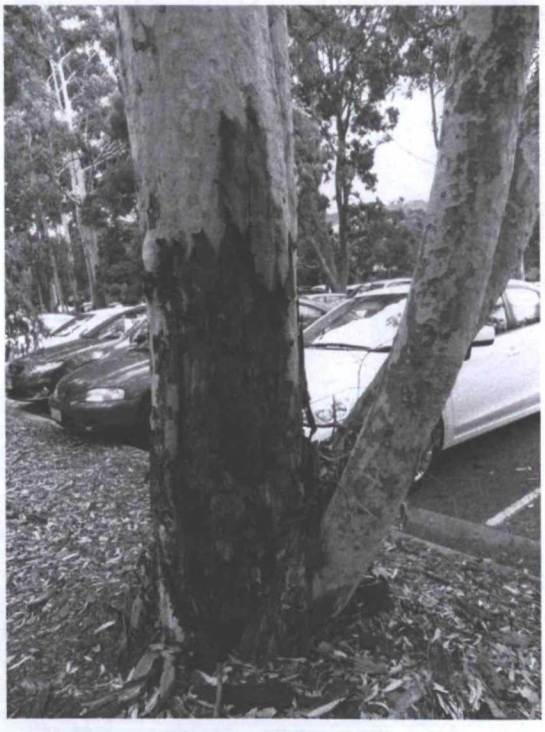

Photo 7 – Longicorn damage at base of *Angophora costata.*

Photo 8 – *Banksia integrifolia* subsp. *integrifolia* leaning away from tree group.

Three specimens listed in **Appendix C** are environmental weeds:

- Tree 7 is an *Olea europaea* subsp. *cuspidata* (African Olive)
- Tree 37 is a *Grevillea robusta* (Silky Oak)
- Tree 38 is a *Cinnamomum camphora* (Camphor Laurel)

Other environmental weeds which have self-recruited recently include a number of *Phoenix canariensis* (Canary Island Palm) seedlings along the fence line in Zone 63 and *Acacia podalyriifolia* (Queensland Wattle) in the car park to the south of Zone 72. These specimens should be removed, in accordance with Warringah Council's TPO.

3.3 Tree protection zones

3.3.1 TPZ

The TPZ intends to protect the trees identified for retention from development impacts and maintain their health and vigour during and post development The TPZ was calculated for each of the assessed trees (see **Appendix C**) The provision of the TPZ in this report can guide development layout to preserve individual trees The TPZ, as well as the SRZ, are prescribed in SA (2009)

The TPZ is an area (above and below ground) isolated from construction disturbance at a given distance from the trunk It is set aside for the protection of a tree's root system and crown to ensure the viability and stability of a tree to be retained where there is potentially subject to damage by development (SA 2009) The TPZ must be delineated with a fence that should be erected before any machinery or materials are brought onto the site See **Appendix B** for an example of tree protection fencing. The calculation for the TPZ radius is as follows·

TPZ radius = DBH x 12

where·

DBH = Diameter at breast height (in metres)

Some encroachments of the TPZ may be possible If minor encroachment of the TPZ is required (i.e. 10 % of the TPZ's area and is outside of the SRZ) detailed root investigation should not be required (**Figure 4**) The area lost to this encroachment should be compensated for elsewhere and be contiguous with the TPZ.

If major encroachment of the TPZ is proposed (i e > 10 % of the TPZ's area or inside the SRZ), a detailed root investigation by the project arborist, using non-destructive methods (e g hand digging), is required to determine the size and extent of the affected root structure by the proposed encroachment.

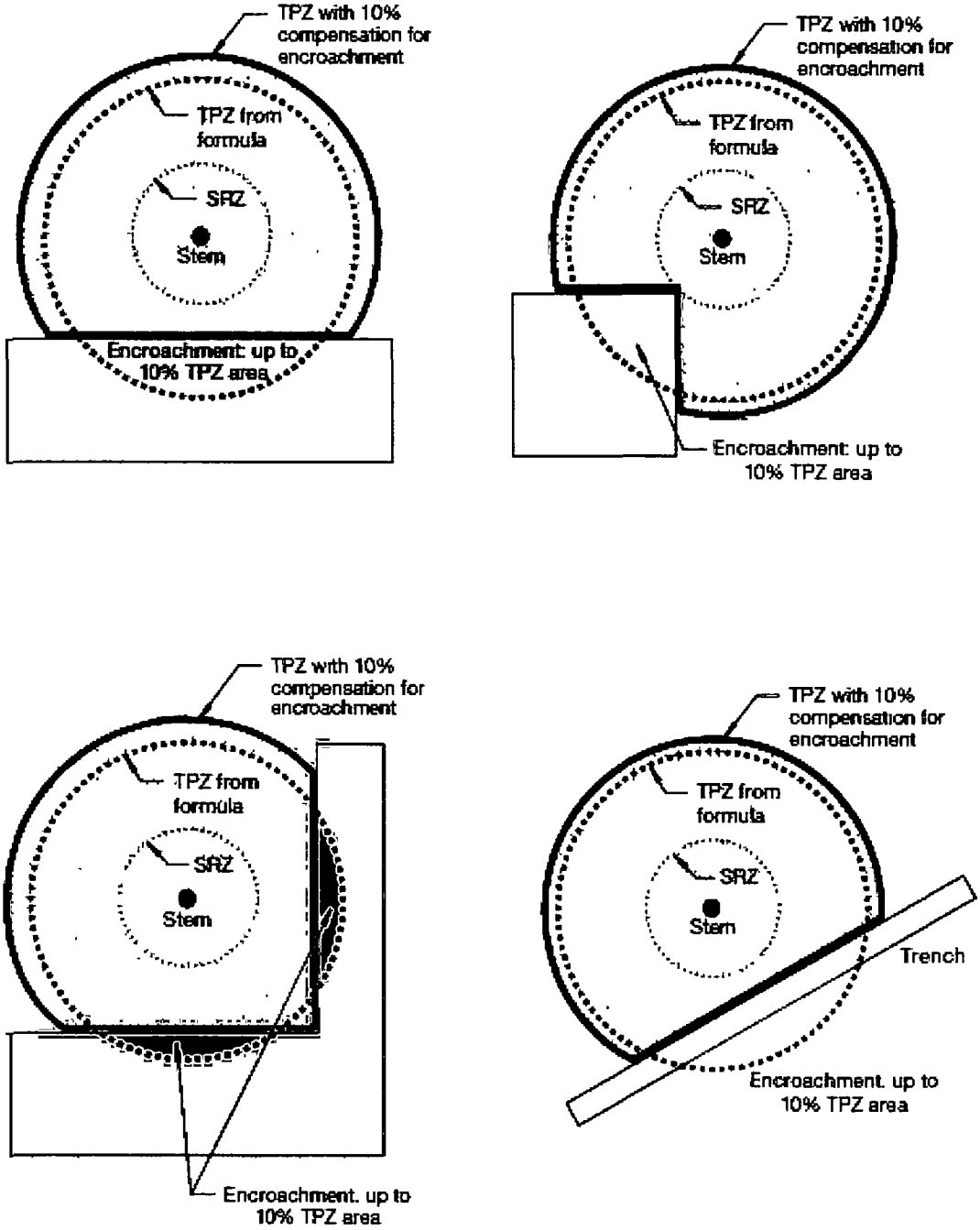

Figure 4: Examples of minor TPZ encroachment and relevant compensatory increasing of the TPZ elsewhere (Source: SA 2009)

To protect soil within the TPZ, a layer of mulch may be applied (no less than 75 mm thick) Any mulch used should comply with the Australian Standard – Composts, soil conditioners and mulches AS4454-2012 (SA 2012). Irrigation systems may be installed if an extended period of drought occurs. As a guide, watering should occur at least once per week and allow deep soil penetration The specific watering requirements will depend, however, on the climatic conditions

The following TPZ specifications are applicable for successful tree retention and should be adhered to during the construction phase:

- The TPZ are not to be used as a storage facility and should to be kept free at any time As a guide, the following activities should be excluded unless otherwise stated
- Storage of materials, plants or equipment
- Installation of site sheds or portable toilets
- Excavations, trenching, ripping or cultivation of soils
- Modification of existing soil level changes or adding fill materials
- Disposal of waste materials and chemicals (both solid or liquid)
- Mechanical removal of vegetation
- Pedestrian or vehicular movement
- Any root pruning required within the TPZ should be approved by the project arborist and any digging and pruning of roots to be pruned (only roots < 5 cm may be pruned) within the TPZ should be conducted by hand for a clean cut

3.3.2 SRZ

The SRZ is 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 (assuming a symmetrical canopy) and is expressed by its radius in metres. The SRZ considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which is usually a much larger area (SA 2009) (see **section 4.3.1** above) The calculation for the SRZ radius is as follows

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64,$$

where:

D = trunk diameter (in metres) measured above the root buttress.

Trees identified for retention

It is proposed that any retained trees be monitored regularly (e.g biannually) after completion of the proposed works to inspect their health, vigour and identify potential hazards The monitoring should be carried out by a qualified arborist It is important to note that some defects, ill-health or decay in a tree are not always identifiable from the outside and thus are not identifiable using VTA In addition, there are occasions where yet healthy and defect-free trees may fail as a result of extreme storm activity This is described as a 'normal failure rate' by Mattheck and Breloer (2003) and is a function of the energy-saving, cost-effective and lightweight structure of trees. Therefore, every tree represents some potential danger of failure (Mattheck and Breloer 2003).

Recommended action and stages of tree management during development

In order to protect and maintain the trees identified for retention, the guidelines and stages of the tree management process as outlined in **Table 3** (adapted from the SA 2009) should be followed It is crucial that the design and planning team, as well as the people involved in site works appreciate the need for maintaining the area of protection around trees A project arborist may be appointed to monitor and supervise tree protection measures prior, during and post development works

Table 3: Stages in development and the management of trees (Source: SA 2009)

Stage in development	Tree management process	
	Matters for consideration	Actions and certifications
Planning		
Site acquisition	Legal constraints	
Detail survey	Council plans and policies Planning instruments and controls Heritage Threatened Species	Existing trees accurately plotted on survey plan
Preliminary tree assessment (this report)	Description of trees SULE	Evaluation of trees suitable for retention and mark on plan Provide preliminary arboricultural report and indicative TPZs to guide development layout
Preliminary development design	Conditions of trees Proximity to buildings Location of services Roads Level changes Building operations space Lon-term management	Planning selection of trees for retention Design review by proponent Design modification to minimise impact to trees
Development submission	Identify trees for retention through comprehensive arboricultural impact assessment of proposed construction Determine tree protection measures Landscape design	Provide arboricultural impact assessment including tree protection plan (drawing) and specification

Stage in development	Tree management process	
	Matters for consideration	Actions and certifications
Development approval	Development controls Condition of consent	Review consent conditions relating to trees
Pre-construction		
Initial site preparation	State based OHS requirements for tree work Approved retention/removal Refer to AS 4373 for the requirements on the pruning of amenity trees Specifications for tree protection measures	Compliance with conditions of consent Tree removal/tree retention/transplanting Tree pruning Certification of tree removal and pruning Establish/delineate TPZ Install protective measures Certification of tree protection measures
Construction		
Site establishment	Temporary infrastructure Demolition, bulk earthworks, hydrology	Locate temporary infrastructure to minimise impact on retained trees Maintain protective measures Certification of tree protection measures
Construction work	Liaison with site manager, compliance Deviation from approved plan	Maintain or amend protective measures Supervision and monitoring
Implement hard and soft landscape works	Installation of irrigation services Control of compaction work Installation of pavement and retaining walls	Remove selected protective measures as necessary Remedial tree works Supervision and monitoring
Practical completion	Tree vigour and structure	Remove all remaining tree protection measures Certification of tree protection
Post-construction		
Defects liability/maintenance period	Tree vigour and structure	Maintenance and monitoring Final remedial tree works Final certification of tree conditions

Note Certification of tree protection and condition should be carried out by the Project Arborist

3.4 Conclusion and Recommendations

Although most of the trees assessed in the car park have a satisfactory SULE rating and are capable of surviving in their current situation for more than 40 years (i e , given no changes to existing conditions), it is apparent that a large proportion of the trees are located either within the proposed building envelope or within the area of construction. Ideally, existing trees should be retained where possible to provide a visual screen between the building and public spaces, although the potential for increased stress factors which are outlined on Page 11, and the likelihood of necrosis or failure after construction should not be discounted. Recommendations for tree protection are provided in this report, although the removal of all trees from the site should be considered as a more ergonomic solution for the following reasons.

- There will be no interference from adjacent vegetation during erection of the scaffolding if all trees are removed, while retained trees will require pruning which may result in reduced stability and vigour;
- Retained trees may lose an unacceptable proportion of their root plates during excavation Because of the shallow topsoil, the root plates of the trees on the site are likely to be significantly broader than the theoretical Structural Root Zones and Critical Root Zones as outlined in Australian Standards (*AS 4970 - 2009);*
- Retained trees will be affected by loss of shelter from adjacent, removed trees and their root systems will be disrupted by the removal of adjacent trees,
- Soil moisture regimes may be altered by the adjacent earthworks, and
- Vortex effects from the completed building may cause branch or leader failure

Most of the trees are between 20 to 25 years old, with a small number of trees which are more than 40 years old No hollows or nests were recorded in any of the trees, therefore, the habitat opportunities for native fauna are limited Some scratches were observed on three *Eucalyptus punctata* which may have been the result of occasional visits by possums or goannas There is a narrow band of native habitat to the south of the subject site, although the patches of native vegetation are small, fragmented and isolated.

It is apparent from Sheet 306 (FJMT 2014) that a small proportion of the existing trees are proposed for retention in order to accommodate the proposed development. In some cases, for example the line of *E microcorys* (Tallowwood) (Trees 40 to 56) growing along the southern edge of Zone 63 may not survive for long after completion of construction, for the reasons outlined in 3 1 If these trees die after completion of construction, their removal from within the confined space between the new building and the existing block of flats may be difficult, as well as disruptive to new plantings For this reason, careful consideration is required to determine whether trees should be retained in such situations.

Trees 30 and 20, the two New England Black Peppermints should also be removed The form and growth habit is typical of this species when planted in Sydney In its natural habitat, with very cold winters and a lower annual rainfall, the growth rates are much slower, with the result that the tree form tends to be more symmetrical and structurally sound, in comparison with planted specimens in Sydney (especially on Hawkesbury Sandstone-derived soil groups). Despite its protected status, the species is listed in many Sydney Basin LGAs as an exempt species, implying that a specimen can be removed without obtaining Council permission

The leader of Tree 30 would require shortening back, to accommodate scaffolding This would not comply with Australian Standards for pruning (*AS 4373 – 2007)*, moreover the remaining tree platform would be unstable because of the epicormic regrowth which would develop around the cut.

The exposed roots of Tree 30 are not such a concern as they have obviously been exposed for at least ten years It is, however, apparent that the root plate is shallow, and that these exposed roots are providing counter-balancing support There would be potential for failure of the root plate if the surrounding surfaces (especially the sealed areas and garden edging) are disturbed

Tree 20 has an etiolated, distorted growth habit, possibly because it was growing close to trees which have since been removed. The tree is now isolated and probably has stability problems which would be exacerbated by the proposed development.

Trees 20 and 30, therefore should be removed Tree 28, a healthy *Eucalyptus botryoides* (Bangalay) with good form could be retained in preference to the two Peppermints.

Most of the trees proposed for retention on the northern and western sides of the proposed building are either Tallowwoods or Flooded Gums. The Flooded Gums are early mature and (in their natural habitat) have the capability of reaching a height of 55 m The Tallowwoods, the other non-indigenous Eucalypt species in this group reach heights of up to 60 m in their natural habitat (see Boland *et al* 1984) If specimens of Flooded Gum or Tallowwood are retained, it is likely that they would reach heights of 35 m at maturity, given the shallow topsoil and lower moisture regime, in comparison with natural habitat The relationship between the eventual height of these trees and the completed building needs to be considered It is not known whether very tall trees are proposed for the western and northern sides of the building

If there is a preference to retain some of these trees, it should be stressed that existing groups, rather than individuals should be retained, so that the potential for loss of roots and tree stability is reduced Trees located very close to the footpath, especially those with an outward bias (e.g. Trees 67, 140, 141, 144, 145 and 185) should not be retained.

Another long-term difficulty associated with retention of these tall-growing trees relates to the extensive root systems which are already extending northwards, beneath the footpath and under the road (see Photo 1) If any of the trees are to be retained, an asphalt footpath with heavily mulched garden beds would be a safer solution, in order to reduce the potential for trip hazards It should, however be noted that the roots will continue to grow towards and beneath the road, especially after excavation and construction during which the southern portion of the trees' SRZ will have been greatly reduced As the trees grow, the road surface may be eventually affected

Trees 212, 215 and 217 are *Banksia integrifolia* subsp *integrifolia* (Coast Banksia) Although this species is indigenous to Warringah LGA, it is apparent that the form of these specimens is inappropriate for their location, in the context of the proposed development. The three individuals have asymmetrical growth which is typical of the species, especially on sandy coastal sites The specimens on site have co-dominant leaders and biased growth forms which have probably been exacerbated by the crowding from other specimens as well as by accelerated draughts associated with the location at the north-eastern end of the site It is apparent that Trees 215 and 217 would, if retained, continue to grow and further overhang sections of footpath and road The trees should either be removed, or heavily pruned, in order to remove overhanging sections of the leaders and laterals This species has the capability of resprouting after fire and wind damage, therefore pruning would approximate such a loss It should be noted that such pruning would not comply with Australian Standards *(AS 4373 – 2007).*

Sheet 306 (FJMT 2014) indicates the proposed retention of most of the *Tristaniopsis laurina* (Water Gum), (Trees 151, 165, 205, 210 and 216) which have been planted on the Kingsway footpath. Although these trees are growing beneath powerlines and have been subjected to unsympathetic pruning, they appear to have good health and vigour. Their proposed retention is supported This

species is indigenous to Warringah LGA and would have occurred in patches of Coastal Sandstone Gallery Rainforest (see Tozer *et al.* 2010) on sandstone batters Rainforest species have a shallow root system, which would suit the soil conditions on the site, moreover they are tolerant of lower light levels, which will occur in various parts of the site, once the building has been completed Indigenous rainforest species, therefore should be considered for inclusion in the Landscape Plan

The Landscape Plan for the development should be prepared with reference to the protection and continued healthy growth of any retained trees Plants growing over the root zones of retained native trees should be limited to native grass, forb and sedge species, such as, *Gahnia erythrocarpa, Lomandra longifolia, Lomandra filiformis, Patersonia glabrata, Caustis flexuosa, Cyathochaeta diandra* and *Hovea linearis* which have low water requirements and do not have vigorous root systems. Hybrids and cultivars of these native species are not acceptable because of the likelihood of hybridisation with adjacent native species.

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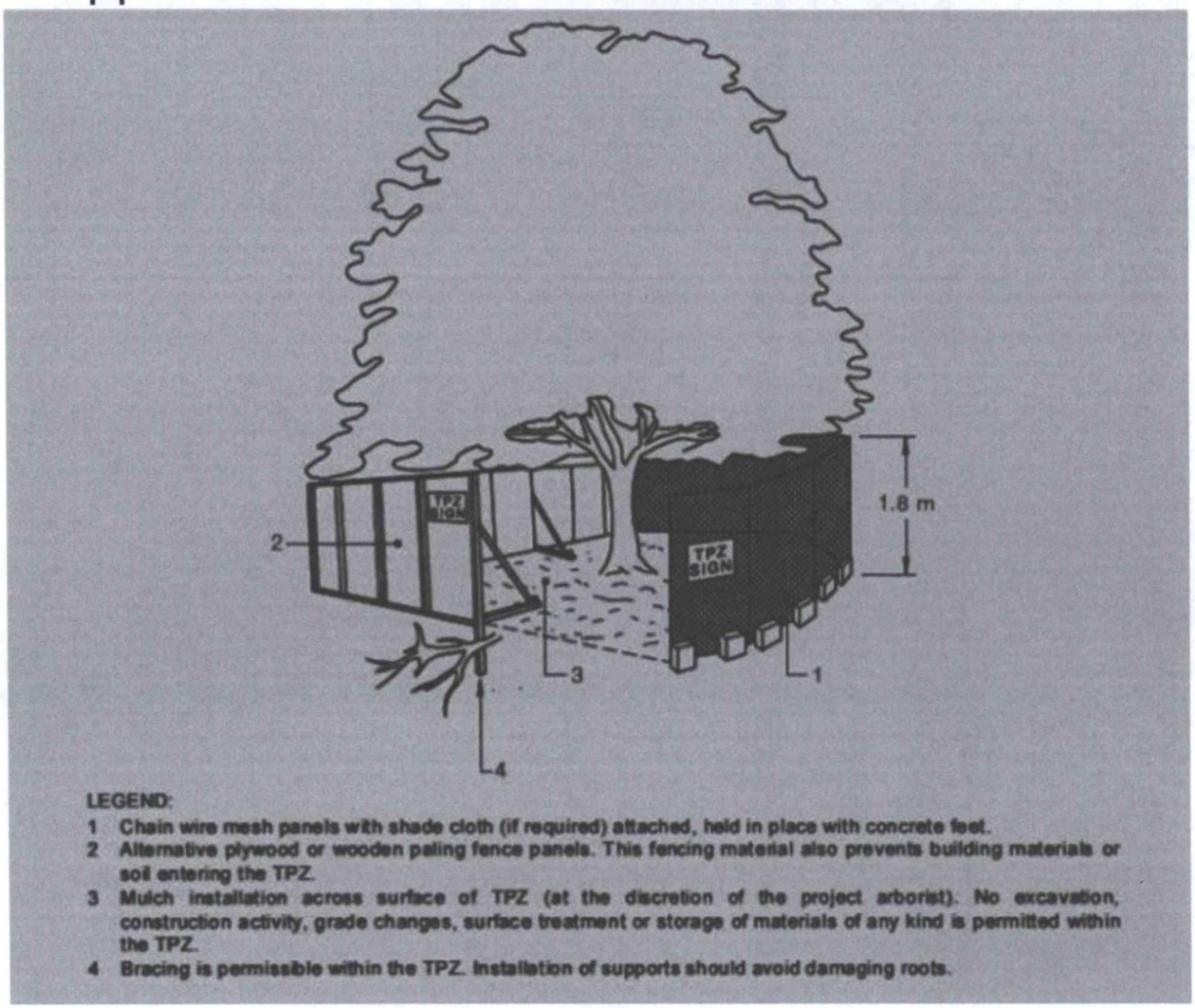
Appendix A: Safe Useful Life Expectancy (SULE) Matrix

The SULE value generated by the below matrix gives an indication of the time a tree is expected to be usefully retained. Adapted from Barrell (2001)

	1 Long SULE	2 Medium SULE	3 Short SULE	4 Removal	5 Move or Replace
A	Tree that appears to be retainable at the time of assessment for > 40 years with an acceptable degree of risk, assuming reasonable maintenance	Tree that appears to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance	Tree that appears to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance	Trees which should be removed within the next 5 years	Trees which can be readily moved or replaced
B	Structurally sound trees located in positions that can accommodate for future growth	Trees that may only live for 15-40 years	Trees that may only live for another 5-15 years	Dead, dying, suppressed or declining trees	Small trees <5 (m) in height
C	Trees that could be made suitable for retention in the long term by remedial tree care	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons	Dangerous trees because of instability or loss of adjacent trees	Young trees less than 15 years old but over 5m in height
D	Trees of special significance that would warrant extraordinary efforts to secure their long term retention	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting	Dangerous trees because of structural defects	
E		Trees that could be made suitable for retention in the medium term by remedial tree care	Trees that require substantial remedial tree care and are only suitable for retention in the short term	Damaged trees not safe to retain	
F				Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting	
G				Trees that are damaging or may cause damage to existing structures within 5 years	

Appendix B: Tree Protection Zone fence



LEGEND:

1. **Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.**
2. **Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.**
3. **Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.**
4. **Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.**

Source: Australian Standard: Protection of trees on development sites, AS 4770-2009.

Appendix C: Tree Table

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
Line of trees on eastern side of Civic Street											
1	*Casuarina glauca*	Swamp Oak	15	6	2x3	EM (early mature)	G (good)	G	A1	4	Multiple stems, Suckers arising from damaged surface roots
2	*Casuarina glauca*	Swamp Oak	15	6	3 av	EM	G	G	A1	4	Multiple stems, possibly sucker growth
3	*Casuarina glauca*	Swamp Oak	18	8	3 av	EM	G	G	A1	4	Multiple stems, possibly sucker growth
5	*Eucalyptus botryoides*	Bangalay	20	15	45	M (mature)	G	M (moderate)	C1	5	Bias to north, possible loss of roots from path construction
6	*Casuarina glauca*	Swamp Oak	15	8	4	M	G	G	A1	4	Bias towards road
7	**Olea europaea subsp cuspidata*	African Olive	5	4	1x3	M	G	G	F4	NA	Environmental weed
8	*Casuarina glauca*	Swamp Oak	8	6	2	EM	G	G	A1	3	
9	*Casuarina glauca*	Swamp Oak	10	6	25	EM	G	G	A1	3	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
10	*Casuarina glauca*	Swamp Oak	10	4	25	EM	G	G	A1	3	
11	*Casuarina glauca*	Swamp Oak	10	8	2	EM	G	G	A1	3	

Car park to south of Zone 72

12	*Eucalyptus botryoides*	Bangalay	12	8	35	EM	G	M	C1	4	Asymmetrical canopy
13	*Eucalyptus botryoides*	Bangalay	12	10	35	EM	G	G	A1	4	
14	*Eucalyptus punctata*	Grey Gum	12	4	3	EM	G	G	A1	4	
15	*Eucalyptus punctata*	Grey Gum	10	6	25	EM	G	G	A1	4	
16	*Eucalyptus punctata*	Grey Gum	6	4	25	EM	G	G	A1	4	Bias to south, previous longicorn damage, now healed
17	*Eucalyptus punctata*	Grey Gum	10	6	3	EM	G	G	A1	4	previous longicorn damage, now healed
18	*Eucalyptus punctata*	Grey Gum	12	8	4	M	G	M	C1	5	Bias to south, previous longicorn damage, now healed

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
20	**Eucalyptus nicholii*	New England Black Peppermint	15	15	6	M	G	Fair to Poor	2E	NA	Extreme bias, co-dominant leaders, located very close to T22
22	*Eucalyptus botryoides*	Bangalay	15	10	5	M	M	Fair to Poor	2E	NA	Extreme bias
28	*Eucalyptus botryoides*	Bangalay	12	8	4	M	G	G	A1	5	
29	*Glochidion ferdinandi* var *ferdinandi*	Smooth Cheesetree	5	6	25	EM	G	G	A1	3 5	
30	**Eucalyptus nicholii*	New England Black peppermint	15	15	65	M	M	Fair to Poor	2E	NA	Extreme bias, sparse asymmetrical canopy, Proposed for removal
31	*Glochidion ferdinandi* var *ferdinandi*	Smooth Cheesetree	5	6	clump	EM	G	G	A1	2	
32	*Melaleuca quinquenervia*	Broad-leaved Paperbark	5	2	07	J (Juv-enile)	M	G	A1	2	Sparse canopy
34	*Melaleuca quinquenervia*	Broad-leaved Paperbark	8	2	1	J	M	G	A1	2	Sparse canopy
35	*Melaleuca quinquenervia*	Broad-leaved Paperbark	8	2	1	J	M	G	A1	2	Sparse canopy

Zone 61

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
36	*Pittosporum undulatum*	Brush Daphne	10	6	25	OM (over-mature)	Fair	fair	B4	3 5	Poor form with very sparse canopy
37	**Grevillea robusta*	Silky Oak	8	4	2	EM	NA	NA	F4	NA	Environmental Weed
38	**Cinnamomum camphora*	Camphor Laurel	10	10	8	M	NA	NA	F4	NA	Environmental Weed

Zones 62 and 63

39	**Eucalyptus microcorys*	Tallowwood	12	8	45	M	G	M	A2	NA	The Tallowwoods (39-55) have tall platforms, probably as a result of pruning Trees 39-41 and (?) 55 are proposed for removal The retained trees will probably require further pruning
40	**Eucalyptus microcorys*	Tallowwood	15	10	4	M	G	G	A1	NA	
41	**Eucalyptus microcorys*	Tallowwood	15	10	4	M	G	G	A1	NA	
42	**Eucalyptus microcorys*	Tallowwood	15	15	4	M	G	G	A1	5	
43	**Eucalyptus microcorys*	Tallowwood	15	10	35	M	G	G	A1	4	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
44	*Eucalyptus microcorys	Tallowwood	12	6	3	M	M	M	A3	4	Etiolated growth, sparse canopy
45	*Eucalyptus microcorys	Tallowwood	15	10	45	M	G	M	A2	5	Long lateral branches
46	*Eucalyptus microcorys	Tallowwood	15	10	4	M	G	G	A1	5	Remove Canary Island Date Palm seedlings
47	*Eucalyptus microcorys	Tallowwood	15	10	35	M	G	G	A1	4 5	
48	*Eucalyptus microcorys	Tallowwood	15	10	45	M	G	M	A2	5	
49	*Eucalyptus microcorys	Tallowwood	15	10	45	M	G	M	A2	5	
52	*Eucalyptus microcorys	Tallowwood	15	6	35	M	G	M	A2	4 5	
55	*Eucalyptus microcorys	Tallowwood	15	8	4	M	G	M	A2	NA	
					Zone 65						
56	*Eucalyptus microcorys	Tallowwood	10	8	3	EM	G	G	A1	4	Proposed for retention
57	Casuarina glauca	Swamp Oak	12	4	2	EM	G	G	A1	2 5	Proposed for retention
58	Casuarina glauca	Swamp Oak	8	2	1	EM	G	G	A1	NA	Proposed for removal
59	Casuarina glauca	Swamp Oak	10	2	15	EM	G	G	A1	NA	Proposed for removal

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
60	*Casuarina glauca*	Swamp Oak	12	4	2	EM	G	G	A1	NA	Proposed for removal
61	*Eucalyptus punctata*	Grey Gum	7	2	1	EM	G	G	A1	NA	Proposed for removal
62	**Eucalyptus grandis*	Flooded Gum	20	10	45	M	G	G	A1	NA	Proposed for removal
63	*Casuarina glauca*	Swamp Oak	12	6	25	M	G	G	A1	NA	Proposed for removal
64	**Eucalyptus grandis*	Flooded Gum	20	8	25	M	G	G	A1	3	
67	*Eucalyptus punctata*	Grey Gum	8	6	2	EM	M	M	A2	3 5	Bias towards road
					Zone 66						
71	**Callistemon viminalis*	Weeping Bottlebrush	4	2	1	M	M	M	A5	1 5	Extensively pruned, all Bottlebrushes proposed for removal
72	**Callistemon viminalis*	Weeping Bottlebrush	4	2	1x2	M	M	M	A5	1 5	
73	**Callistemon viminalis*	Weeping Bottlebrush	4	3	2	M	M	M	A5	1 5	
74	**Eucalyptus microcorys*	Tallowwood	25	10	3	EM	G	G	A1	4	Most trees in this zone proposed for removal
75	**Eucalyptus grandis*	Flooded Gum	14	4	2	EM	G	M	A3	2 5	
76	**Eucalyptus grandis*	Flooded Gum	15	8	4	EM	G	G	A1	5	
77	**Eucalyptus microcorys*	Tallowwood	20	8	3	EM	G	G	A1	5	
78	**Eucalyptus microcorys*	Tallowwood	20	6	25	EM	G	G	A1	3	
79	**Eucalyptus microcorys*	Tallowwood	12	6	25	EM	G	G	A1	3	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
80	*Eucalyptus microcorys	Tallowwood	15	10	4	EM	G	G	A1	5	
81	*Callistemon viminalis	Weeping Bottlebrush	6	4	2	M	M	M	A5	1 5	
82	*Eucalyptus microcorys	Tallowwood	20	10	4	M	G	G	A1	5	
83	*Eucalyptus grandis	Flooded Gum	12	4	2	EM	G	G	A1	2 5	
84	*Eucalyptus microcorys	Tallowwood	20	10	3	EM	G	G	A1	4	
86	*Callistemon viminalis	Weeping Bottlebrush	4	2	1	M	M	M	A5	1 5	
87	*Callistemon viminalis	Weeping Bottlebrush	4	3	1 x 2	M	M	F	A5	1 5	Co-dominant leader
88	*Callistemon viminalis	Weeping Bottlebrush	3	2	1	M	M	M	A5	1 5	
89	*Callistemon viminalis	Weeping Bottlebrush	3	2	1	M	M	M	A5	1 5	
90	*Eucalyptus grandis	Flooded Gum	25	15	4	M	G	G	A1	5	
91	*Eucalyptus microcorys	Tallowwood	15	6	3	EM	G	G	A1	4	
92	*Eucalyptus microcorys	Tallowwood	20	10	.4	M	G	M	A2	5	Bias into car park
93	*Eucalyptus grandis	Flooded Gum	25	4	25	EM	G	G	A1	3	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
94	*Eucalyptus microcorys	Tallowwood	20	6	3	EM	G	G	A1	3 5	
95	*Callistemon viminalis	Weeping Bottlebrush	3	2	1	M	M	M	A5	1 5	
97	*Eucalyptus grandis	Flooded Gum	20	4	25	EM	G	G	A1	3	
99	*Eucalyptus microcorys	Tallowwood	25	6	3	EM	G	G	A1	3	
100	*Eucalyptus microcorys	Tallowwood	20	10	35	EM	G	G	A1	4	
102	*Eucalyptus grandis	Flooded Gum	15	8	25	EM	G	G	A1	3	
103	*Callistemon viminalis	Weeping Bottlebrush	3	2	1	M	M	M	A5	1 5	
107	*Eucalyptus grandis	Flooded Gum	15	8	3	EM	G	G	A1	3 5	
108	*Eucalyptus grandis	Flooded Gum	15	3	2	EM	G	G	A1	3	
109	*Eucalyptus grandis	Flooded Gum	20	2	15	EM	G	M	A2	2 5	Etiolated growth
111	*Eucalyptus microcorys	Tallowwood	25	8	35	EM	G	G	A1	4	Possibly proposed for retention
113	*Eucalyptus microcorys	Tallowwood	20	3	25	EM	G	G	A1	2 5	
114	*Eucalyptus grandis	Flooded Gum	20	8	25	EM	G	G	A1	3	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
Zone 67											
115	*Eucalyptus grandis	Flooded Gum	15	6	2	EM	G	G	A1	2 5	Most trees in this zone proposed for removal
116	*Eucalyptus microcorys	Tallowwood	12	2	2	EM	G	M	A2	2 5	Possibly proposed for retention, etiolated growth
117	*Eucalyptus grandis	Flooded Gum	20	2	15	EM	G	M	A2	2	etiolated growth
118	*Eucalyptus microcorys	Tallowwood	12	5	3	EM	G	G	A1	3 5	
119	*Eucalyptus microcorys	Tallowwood	20	8	35	EM	G	G	A1	4	Possibly proposed for retention
120	*Eucalyptus microcorys	Tallowwood	25	10	45	M	G	G	A1	5	
121	*Eucalyptus grandis	Flooded Gum	12	2	2	EM	G	G	A1	2 5	
122	*Eucalyptus grandis	Flooded Gum	8	2	2	EM	G	G	A1	2 5	
123	*Eucalyptus grandis	Flooded Gum	20	2	15	EM	G	M	A2	2	etiolated growth
124	*Eucalyptus grandis	Flooded Gum	14	4	2	EM	G	G	A1	2 5	
125	*Eucalyptus grandis	Flooded Gum	14	4	2	EM	G	G	A1	2 5	
126	*Eucalyptus microcorys	Tallowwood	20	15	45	M	G	G	A1	5	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
127	*Eucalyptus microcorys	Tallowwood	20	6	25	EM	G	G	A1	3	
128	*Eucalyptus grandis	Flooded Gum	12	3	2	EM	G	M	A2	2 5	
129	*Eucalyptus grandis	Flooded Gum	15	8	3	EM	G	G	A1	3 5	Possibly proposed for retention
130	*Eucalyptus microcorys	Tallowwood	12	6	3	EM	G	G	A1	3 5	
131	*Eucalyptus microcorys	Tallowwood	20	10	3	EM	G	G	A1	3 5	Possibly proposed for retention
132	*Eucalyptus grandis	Flooded Gum	12	4	2	EM	G	G	A1	2 5	
133	*Eucalyptus grandis	Flooded Gum	12	4	2	EM	G	G	A1	2 5	Branches near power lines
134	*Eucalyptus grandis	Flooded Gum	15	8	4	M	G	G	A1	5	
135	*Eucalyptus microcorys	Tallowwood	14	5	45	M	G	G	A1	5	
136	*Eucalyptus microcorys	Tallowwood	20	10	5	M	G	G	A1	6	
137	*Eucalyptus grandis	Flooded Gum	25	15	6	M	G	G	A1	7	
138	Tristaniopsis laurina	Water Gum	4	4	3	M	M	M	A3	3 5	Pruned beneath wires, proposed for retention
139	*Eucalyptus grandis	Flooded Gum	15	3	2	EM	G	M	A1	2 5	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
140	*Eucalyptus grandis	Flooded Gum	10	2	15	EM	G	M	A2	1 5	etiolated growth
141	*Eucalyptus grandis	Flooded Gum	10	2	15	EM	G	M	A2	2 5	etiolated growth
142	*Eucalyptus microcorys	Tallowwood	6	4	3	EM	G	G	A1	5	
					Zone 68						
143	*Eucalyptus grandis	Flooded Gum	20	15	4	M	G	G	A1	5	
144	*Eucalyptus grandis	Flooded Gum	20	8	35	EM	G	M	A4	NA	Lifting footpath,
145	*Eucalyptus grandis	Flooded Gum	15	6	2	EM	G	M	A4	NA	Lifting footpath, branches close to power lines
147	*Eucalyptus grandis	Flooded Gum	15	6	2	EM	G	G	A2	2 5	
148	*Eucalyptus grandis	Flooded Gum	20	10	3	EM	G	G	A1	3 5	
151	Tristaniopsis laurina	Water Gum	4	4	2	M	G	M	A3	2 5	Pruned beneath wires
154	*Eucalyptus grandis	Flooded Gum	20	15	45	M	G	M	A2	5	
156	*Eucalyptus grandis	Flooded Gum	15	8	25	EM	G	G	A1	3	
157	*Eucalyptus grandis	Flooded Gum	15	4	15	EM	G	G	A1	2	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
158	*Eucalyptus grandis	Flooded Gum	6	2	15	EM	G	G	A1	2	
159	*Eucalyptus grandis	Flooded Gum	15	8	3	EM	G	G	A1	3 5	
160	*Eucalyptus grandis	Flooded Gum	8	2	15	EM	G	G	A1	2	
161	*Eucalyptus grandis	Flooded Gum	7	4	15	EM	G	G	A1	2	
162	*Eucalyptus grandis	Flooded Gum	5	2	2	EM	G	M	A2	2 5	
163	*Eucalyptus grandis	Flooded Gum	4	2	15	EM	G	M	A2	2	
164	*Eucalyptus grandis	Flooded Gum	20	8	35	EM	G	G	A1	4	
165	Tristaniopsis laurina	Water Gum	3	3	15	M	M	M	A3	2	Pruned, under wires
167	*Eucalyptus grandis	Flooded Gum	12	6	25	EM	G	G	A1	3	
169	*Eucalyptus grandis	Flooded Gum	10	4	15	EM	G	M	A2	2	bias
170	*Eucalyptus grandis	Flooded Gum	15	6	25	EM	G	M	A2	3	bias
171	*Eucalyptus microcorys	Tallowwood	12	8	25	EM	G	G	A1	4	
172	*Eucalyptus microcorys	Tallowwood	12	6	2	EM	G	G	A1	3	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
174	*Eucalyptus microcorys	Tallowwood	12	2	2	EM	G	G	A1	3	
176	*Eucalyptus microcorys	Tallowwood	12	3	2	EM	M	G	A1	3	
179	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	3	
182	*Eucalyptus microcorys	Tallowwood	12	4	3	EM	M	G	A1	4	
183	*Eucalyptus punctata*	Grey Gum	11	4	2	EM	M	M	A3	3	Previous longicorn damage, heavily callused leader
184	*Tristaniopsis laurina*	Water Gum	4	4	2	NA	NA	NA	NA	NA	necrotic
185	*Eucalyptus grandis	Flooded Gum	15	6	25	EM	G	M	A2	4	bias
186	*Eucalyptus grandis	Flooded Gum	20	8	4	M	G	G	A1	5	
187	*Eucalyptus grandis	Flooded Gum	20	10	7	M	G	G	A1	8	
188	*Corymbia gummifera*	Red Bloodwood	7	2	15	EM	M	M	A3	2	Distorted growth, some longicorn damage
189	*Eucalyptus microcorys	Tallowwood	15	6	2	EM	G	G	A1	2 5	
190	*Eucalyptus grandis	Flooded Gum	12	4	2	EM	G	G	A1	2 5	
191	*Eucalyptus grandis	Flooded Gum	15	8	4	M	G	G	A1	5	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
192	*Eucalyptus grandis	Flooded Gum	15	6	2	EM	G	G	A1	2 5	
193	*Eucalyptus microcorys	Tallowwood	15	8	35	EM	G	G	A1	4	
					Zone 69						
194	Eucalyptus punctata	Grey Gum	10	4	2	EM	G	G	A1	2 5	Scratches on leader
199	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	2 5	
200	Angophora costata	Smooth-barked Apple	20	15	5	M	G	G	A1	6	
201	Angophora costata	Smooth-barked Apple	12	4	2	EM	G	G	A1	2 5	
203	Eucalyptus punctata	Grey Gum	12	6	3	EM	G	G	A1	4	
205	Tristaniopsis laurina	Water Gum	6	8	35	M	G	G	A3	4 5	
206	Eucalyptus punctata	Grey Gum	10	8	25	EM	M	M	A2	3	
207	Eucalyptus punctata	Grey Gum	10	6	25	EM	G	G	A1	3	
208	Eucalyptus punctata	Grey Gum	10	6	2	EM	G	G	A1	2 5	
209	Corymbia gummifera	Red Bloodwood	12	6	3	EM	M	G	A2	3 5	Some longicorn damage

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
210	*Tristaniopsis laurina*	Water Gum	8	8	3	M	G	M	A3	3 5	
211	*Corymbia gummifera*	Red Bloodwood	8	4	2	EM	M	G	A2	2 5	Some longicorn damage
212	*Banksia integrifolia* subsp *integrifolia*	Coast Banksia	12	8	3, 2	M	M	M	A3	4	Co-dominant leaders, extreme bias
213	*Pittosporum undulatum*	Brush Daphne	8	4	2	M	M	M	A3	2 5	
214	*Corymbia gummifera*	Red Bloodwood	10	10	3x2	M	M	M	A2	4	Co-dominant leaders
215	*Banksia integrifolia* subsp *integrifolia*	Coast Banksia	7	6	2	M	G	M	A3	2 5	Leader biased over road
216	*Tristaniopsis laurina*	Water Gum	5	4	2	M	G	M	A3	2 5	
217	*Banksia integrifolia* subsp *integrifolia*	Coast Banksia	10	6	4x2	M	G	M	A3	5	Co-dominant leaders, bias
				Zone 70							
218	*Eucalyptus botryoides*	Bangalay	12	10	35	M	G	G	A1	4 5	Trees in his zone probably proposed for removal
218a	*Eucalyptus botryoides*	Bangalay	10	5	25	M	M	M	A3	3	Growing very close to 218 and suppressed
219	*Angophora costata*	Smooth-barked Apple	10	8	3´	EM	G	G	A1	4	
220	*Eucalyptus botryoides*	Bangalay	12	8	45	M	G	G	A1	5	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
Zone 71											All trees are located within the building footprint
221	*Eucalyptus microcorys	Tallowwood	8	4	2 x 2	M	G	M	A1	NA	Co-dominant leaders
222	Corymbia gummifera	Red Bloodwood	10	6	2	EM	G	G	A1	NA	
223	Corymbia gummifera	Red Bloodwood	8	6	15	EM	G	G	A1	NA	
224	Corymbia gummifera	Red Bloodwood	15	10	35	M	G	G	A1	NA	
225	Corymbia gummifera	Red Bloodwood	8	4	15	EM	G	G	A1	NA	
226	Angophora costata	Smooth-barked Apple	15	6	5	M	M	G	A2	NA	Longicorn damage at base
229	Corymbia gummifera	Red Bloodwood	15	6	25	EM	G	G	A1	NA	
231	Angophora costata	Smooth-barked Apple	12	8	25	EM	G	G	A1	NA	
232	Corymbia gummifera	Red Bloodwood	10	10	3	EM	G	G	A1	NA	
233	Corymbia gummifera	Red Bloodwood	8	4	15	EM	M	M	A2	NA	
234	Corymbia gummifera	Red Bloodwood	12	4	2	EM	G	M	A2	NA	
Zone 73											All trees are located within the building footprint

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
235	*Eucalyptus grandis	Flooded Gum	15	4	25	EM	G	G	A1	NA	
237	*Eucalyptus microcorys	Tallowwood	10	6	25	EM	G	G	A1	NA	
238	*Eucalyptus microcorys	Tallowwood	15	6	35	EM	G	G	A1	NA	
239	*Eucalyptus microcorys	Tallowwood	12	6	25	EM	M	M	A2	NA	
240	*Eucalyptus grandis	Flooded Gum	15	6	35	EM	M	M	A2	NA	
241	*Eucalyptus grandis	Flooded Gum	14	6	3	EM	G	G	A1	NA	
242	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	NA	
243	*Eucalyptus microcorys	Tallowwood	11	3	2	EM	M	M	A2	NA	
244	*Eucalyptus grandis	Flooded Gum	14	6	3	EM	G	G	A1	NA	
245	*Eucalyptus grandis	Flooded Gum	15	10	35	EM	G	G	A1	NA	
246	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	NA	
247	*Eucalyptus microcorys	Tallowwood	12	8	35	EM	G	G	A1	NA	
249	*Eucalyptus grandis	Flooded Gum	12	6	3	EM	M	M	A2	NA	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
250	*Eucalyptus microcorys	Tallowwood	12	2	25	EM	G	G	A1	NA	
251	*Eucalyptus microcorys	Tallowwood	12	2	15	EM	M	M	A2	NA	
252	*Eucalyptus grandis	Flooded Gum	15	4	3	EM	G	G	A1	NA	
253	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	NA	
254	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	NA	
255	*Eucalyptus microcorys	Tallowwood	10	4	25	EM	G	G	A1	NA	
256	*Eucalyptus grandis	Flooded Gum	15	4	25	EM	G	G	A1	NA	
257	*Eucalyptus grandis	Flooded Gum	12	4	2	EM	G	G	A1	NA	
258	*Eucalyptus grandis	Flooded Gum	12	2	25	EM	M	G	A2	NA	
259	*Eucalyptus grandis	Flooded Gum	15	10	5	M	G	G	A1	NA	
260	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	G	A1	NA	
261	*Eucalyptus microcorys	Tallowwood	12	4	25	EM	G	M	A2	NA	
262	*Eucalyptus grandis	Flooded Gum	15	6	35	EM	G	G	A1	NA	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
263	*Eucalyptus grandis	Flooded Gum	12	6	25	EM	G	G	A1	NA	
264	*Eucalyptus microcorys	Tallowwood	12	6	23	EM	G	G	A1	NA	
265	*Eucalyptus microcorys	Tallowwood	10	6	25	EM	M	M	A2	NA	
266	*Eucalyptus grandis	Flooded Gum	15	4	3	EM	G	G	A1	NA	
267	*Eucalyptus grandis	Flooded Gum	12	4	25	EM	G	G	A1	NA	
268	*Eucalyptus grandis	Flooded Gum	12	4	25	EM	G	G	A1	NA	
269	*Eucalyptus grandis	Flooded Gum	15	4	3	EM	G	G	A1	NA	
270	*Eucalyptus grandis	Flooded Gum	10	4	2	EM	M	M	A2	NA	
272	*Eucalyptus microcorys	Tallowwood	12	4	3	EM	G	G	A1	NA	
274	*Eucalyptus microcorys	Tallowwood	15	4	25	EM	G	G	A1	NA	
277	*Eucalyptus microcorys	Tallowwood	15	4	25	EM	G	G	A1	NA	
278	*Eucalyptus microcorys	Tallowwood	15	8	3	EM	M	M	A1	NA	
279	*Eucalyptus microcorys	Tallowwood	12	2	2	EM	G	M	A1	NA	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
282	*Eucalyptus grandis	Flooded Gum	12	6	2	EM	G	G	A1	NA	
284	*Eucalyptus grandis	Flooded Gum	15	6	25	EM	G	G	A1	NA	
286	*Eucalyptus grandis	Flooded Gum	15	4	25	EM	M	M	A2	NA	
287	*Eucalyptus grandis	Flooded Gum	15	6	35	EM	G	G	A1	NA	
288	*Eucalyptus grandis	Flooded Gum	15	4	3	EM	G	G	A1	NA	
289	*Eucalyptus microcorys	Tallowwood	12	4	2	EM	G	M	A2	NA	Bias over carpark
291	*Eucalyptus grandis	Flooded Gum	12	6	25	EM	G	F	A3	NA	Distorted growth, bias over car park
294	*Eucalyptus grandis	Flooded Gum	12	2	25	EM	G	M	A1	NA	
295	*Eucalyptus microcorys	Tallowwood	15	8	3	EM	G	G	A1	NA	
Zone 72											All trees are located within the building footprint
296	*Eucalyptus microcorys	Tallowwood	12	6	3	EM	G	G	A1	NA	
297	*Eucalyptus microcorys	Tallowwood	12	4	25	EM	G	G	A1	NA	
301	Corymbia gummifera	Red Bloodwood	15	6	35	EM	M	M	A2	NA	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
302	*Angophora costata*	Smooth-barked Apple	12	10	35	EM	G	G	A1	NA	
303	*Angophora costata*	Smooth-barked Apple	12	10	45	M	G	M	A1	NA	
304	*Angophora costata*	Smooth-barked Apple	12	8	2	M	G	M	A1	NA	
306	*Eucalyptus punctata*	Grey Gum	8	4	2	M	M	M	A2	NA	Previous longicorn damage
307	*Corymbia gummifera*	Red Bloodwood	8	4	15	EM	M	G	A2	NA	Longicorn damage
308	*Eucalyptus punctata*	Grey Gum	8	4	15	EM	G	G	A1	NA	
311	*Corymbia gummifera*	Red Bloodwood	10	8	25	EM	G	M	A1	NA	
		Area upslope, south-east of main car park									
312	*Eucalyptus punctata*	Grey Gum	20	10	2, 1	EM	G	G	A1	3	Co-dominant leaders, previous longicorn damage, now healed
315	*Eucalyptus punctata*	Grey Gum	20	16	25	EM	G	G	A1	4	previous longicorn damage, now healed
316	*Eucalyptus capitellata*	Brown Stringybark	7	6	25	EM	M	M	A2	4	
317	*Eucalyptus capitellata*	Brown Stringybark	8	6	2	EM	G	M	A1	3	
318	*Angophora costata*	Smooth-barked Apple	11	14	6	M	G	G	A1	7	

Tree No	Species	Common Name	Height (m)	Spread (m)	DBH (m)	Age Class	Health	Structure	SULE	TPZ radius (m)	Comments
319	*Allocasuarina torulosa*	Forest Oak	7	6	25, 2	M	M	M	A3	4	
320	*Allocasuarina torulosa*	Forest Oak	7	4	15	EM	M	M	A3	2 5	
321	*Angophora costata*	Smooth-barked Apple	15	8	35	EM	G	G	A1	4 5	
322	*Angophora costata*	Smooth-barked Apple	15	8	25	EM	G	G	A1	4	
323	*Angophora costata*	Smooth-barked Apple	15	10	35, 4	M	G	G	A1	5	
324	*Angophora costata*	Smooth-barked Apple	15	10	4	M	G	G	A1	5	

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