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## Arboricultural Impact Assessment



**Glendalough Development  
St Kevin's College  
Lansell Road, Toorak VIC**

**5 March 2020**

**C91479b**

**ASSESSMENT & REPORT COMMISSIONED BY:**

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5 March 2020

Mr Ross Corstorphin  
St Kevin's College  
Glendalough Development  
Lansell Road  
Toorak VIC 3142

**Arboricultural Impact Assessment relating to fifty-eight (58) trees located within St Kevin's College Glendalough**

Dear Ross,

We are pleased to provide you with the following Arboricultural Impact Assessment of fifty-eight (58) trees within the grounds of St Kevin's College Glendalough.

Complete use of this report is authorised under the conditions limiting its use as stated in Appendix A Item 7 of "Arboricultural Reporting Assumptions and Limiting Conditions".

Should you have any queries relating to this report, its recommendations, or the options considered, please do not hesitate to contact us on 1300 272 671.

Regards,

Handwritten signature of Justin Herbert in black ink.

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## 1 Executive Summary

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- 1.1.1 The following Arboricultural Impact Assessment and Tree Protection Management Plan (Report) regards fifty-eight (58) trees located within the grounds of St Kevin's College (the Client). The subject site was identified by the Client as possessing trees that may be impacted by a proposed development.
- 1.1.2 In part, the project scope was to nominate subject trees that can be retained, or that may require removal to facilitate this development, as well as identify and reduce potential conflicts between subject trees and site development. Accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction have been provided.
- 1.1.3 An arborist inspection of the subject trees was undertaken on 28 May 2019, where tree data was collected.
- 1.1.4 Tree retention values have been determined based upon the assessment of the trees' health, structure, dimensions, age class, life expectancy, location and environmental amenity/significance in accordance with British Standard BS 5837-2012: *Trees in relation to design, demolition and construction*. The Tree Protection Zone (TPZ) method has been derived from Australian Standard AS 4970-2009: *Protection of Trees on Development Sites*. The TPZ is defined as a specified area above and below ground and at a given distance measured radially away from the centre of the tree's trunk and which is set aside for the protection of its roots and crown.
- 1.1.5 No trees were of Category A retention value. Typically trees in this category were of a significant size in the landscape, possess fair to good health and structure, a Useful Life Expectancy (ULE) of more than 25 years, made significant amenity contributions to the landscape and made high environmental contributions.
- 1.1.6 Thirty-one (31) trees were of Category B retention value. Trees in this category were typically of a medium size, have good to fair health and good to fair structure, and a Useful Life Expectancy (ULE) of more than 15 years. Moderate Retention Value trees made moderate amenity contributions to the landscape and made low to moderate environmental contributions. Category B retention value trees are 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 50, 51, 52, 53, 56, 59, 61, 62, 63, 64, 65, 66, 100 and 101 and have a Moderate Retention Value.
- 1.1.7 Twenty-six (26) trees were of Category C retention value. Trees in this category were typically of small-medium size, of low significance in the landscape, may have poor health or structure, are easily replaceable and do not warrant design consideration. Category C retention value trees are 39, 40, 41, 42, 43, 54, 57, 60, 95, 96, 98, 99, 107, 108, 109, 112, 113, 114, 115, 116, 117, 122, 123, 124, 125 and 127 and have a Low Retention Value.
- 1.1.8 One (1) tree was of Category U retention value. Trees in this category were typically of poor health and/or structure, of undesirable species and are recommended for removal irrespective of site development. The Category U retention value tree was 55.
- 1.1.9 Seventeen (17) would trees require removal to facilitate this development. These are:
- One (1) x Category B Tree 100.
  - Sixteen (16) x Category C Trees 95, 96, 98, 99, 107, 108, 109, 112, 113, 114, 115, 122, 123, 124, 125 and 127.

- 1.1.10 There are forty (40) mixed Category trees to be retained with specific or generic protection measures during the demolition process:
- Seven (7) Category B trees are to be retained with specific protection requirements during the development: 11, 12, 13, 51, 52, 53 and 101.
  - Thirty-three (33) mixed Category trees are to be retained with generic protection measures during the development: 8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40, 41, 42, 43, 50, 54, 56, 57, 59, 60, 61, 62, 63, 64, 65, 66, 116 and 117
- 1.1.11 Trees 51 and 52 may require minor pruning within the lower portion of the western canopy to facilitate works.

## 2 Introduction

- 2.1.1 ArborSafe Australia Pty Ltd was engaged by St Kevin's College in relation to completion of an Arboricultural Impact Assessment (report) on fifty-eight (58) trees located at St Kevin's College Glendalough.
- 2.1.2 The site is located within the school grounds and includes the existing administration building, the surrounding landscaped area between the administration building and the oval, the parking/loading zone area between the administration building and Lansell Road, the main pedestrian school access from Lansell Road, the existing drop off driveway and the existing turf oval.
- 2.1.3 This report is required to assist in the planning and design of new buildings and car parking that is proposed for construction within the site that may adversely affect site trees.
- 2.1.4 The report was intended to provide information on site trees and how they may pose a constraint on proposed development. Report findings and recommendations provided are based upon guidance provided within the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites* (Standards Australia, 2009).
- 2.1.5 Observations and recommendations provided within this report are based upon information provided by the client and an arborist site visit.

## 3 Scope

- 3.1.1 Carry out a visual examination of the nominated trees located within the vicinity of the proposed development.
- 3.1.2 Inspect the nominated trees and their growing environment in the context of the proposed development.
- 3.1.3 Provide an objective appraisal of the subject trees in relation to their species, estimated age, health, structural condition and viability within the landscape.
- 3.1.4 Based on the findings of this investigation, provide independent recommendations on the retention value of the trees.
- 3.1.5 Identify and reduce potential conflicts between tree protection and site development by providing accurate information on the area required for tree protection and the restricted activities within the area for each tree prior to any proposed construction
- 3.1.6 Provide information on restricted activities within the area nominated for tree protection, as well as suitable construction methods to be adopted during construction.



## 4 Methodology

### 4.1 Data Collection

- 4.1.1 Justin Herbert of ArborSafe Australia Pty Ltd carried out a site inspection of the subject trees on 28 May 2019.
- 4.1.2 Trees that are the subject of this report were identified during discussions with the client and an onsite meeting with St Kevin's College staff.
- 4.1.3 The subject trees were inspected from ground level. No foliage or soil samples were taken. No aerial or internal investigations were undertaken.
- 4.1.4 Tree height and canopy width were estimated and have been provided to the nearest whole metre. Trunk diameter at breast height (DBH) was measured with a diameter tape and provided to the nearest centimetre.
- 4.1.5 Data collected on site was analysed by Andy Clark and Justin Herbert, collated into report format, and relevant recommendations were formulated.

### 4.2 Tree Protection Zones

- 4.2.1 The Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) methods have been derived from the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.
  - 4.2.2 The TPZ is defined as a specified area above and below ground and at a given distance measured radially away from the centre of the tree's trunk and which is set aside for the protection of its roots and crown. It is the area required to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development. The radius of the TPZ is calculated by multiplying its DBH by 12 (Note DBH is nominally measured as 1.4m from ground level).
- TPZ radius = DBH × 12
- 4.2.3 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 and is expressed by its radius in metres.

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

### 4.3 Retention Values

- 4.3.1 Retention values are determined based upon the British Standard BS 5837–2012: *Trees in Relation to Design, Demolition and Construction*. This standard categorises tree retention value based upon assessment of the tree's quality (health and structure), and life expectancy. Other criteria such as its physical dimensions, age class, location and its Amenity, Heritage and Environmental significance are also considered. A breakdown of attributes required for each category can be obtained from Appendix B – Explanation of Tree Assessment Terms.

### 4.4 Images and Site Photographs

- 4.4.1 All photographs were taken at the time of the site inspection by the inspecting arborist. Photographs have been altered for brightness and/or cropped only.

## 5 Observations

### 5.1 Aerial Images



Figure 1. The image identifies the approximate location of all trees which may be impacted by the proposed development (red ovals) and the approximate outline of the proposed development site (yellow box). (Nearmap, May 2019).

### 5.2 Site Details

5.2.1 The proposed development site is located within the grounds of the St Kevin's College as depicted in Figure 1. Specifically, the site is located within the current turf oval frontage with Lansell Road and the current entry to the administration building.

5.2.2 The soil landscape for the site is likely to be disturbed which is typical of an urban site. Soil type is therefore expected to deviate from its natural state due to extensive previous site development and its location within an urban area.

### 5.3 Heritage Status

5.3.1 No structures or trees with associated heritage status were identified within the subject site.

### 5.4 Proposed Construction

5.4.1 Various plans of the proposed development were provided to ArborSafe during September and October 2019 and March 2020, and include (but not limited to):

- *Preliminary Tree Protection Site Plan*, TP25, Chandler Architects and Interior Design, 27 August 2019
- *Proposed Ground Floor Plan*, TP12, Chandler Architects and Interior Design, 27 August 2019
- *Proposed Playground Plan*, TP16, Chandler Architects and Interior Design, 27 August 2019
- *Preliminary Tree Protection Site Plan*, TP25, Rev C, Chandler Architects and Interior Design, 6 March 2020
- *Schematic Design Report*, Project 319-0457, Revision 4, Tract Design, 26 February 2020



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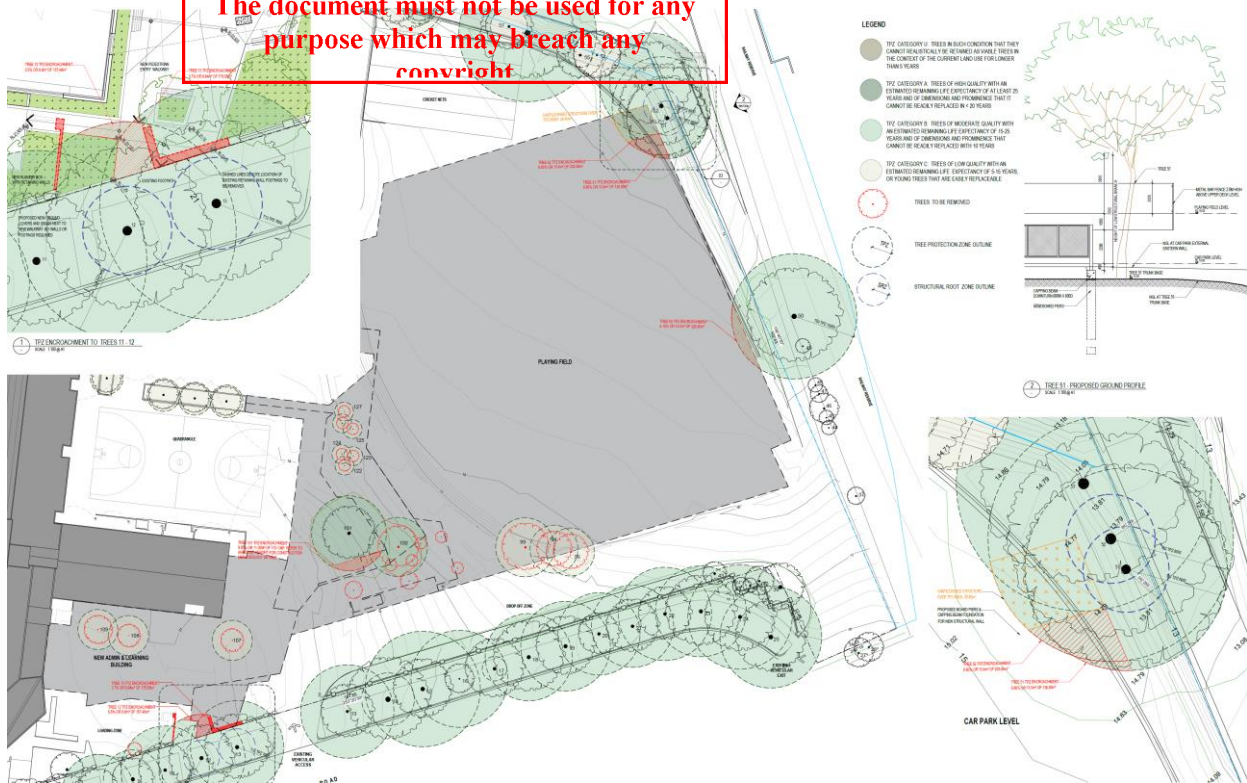


Figure 2. Excerpt from the *Tree Protection Site Plan, TP25, Revision C.* (Chandler Architecture and Interior Design, March 2020).

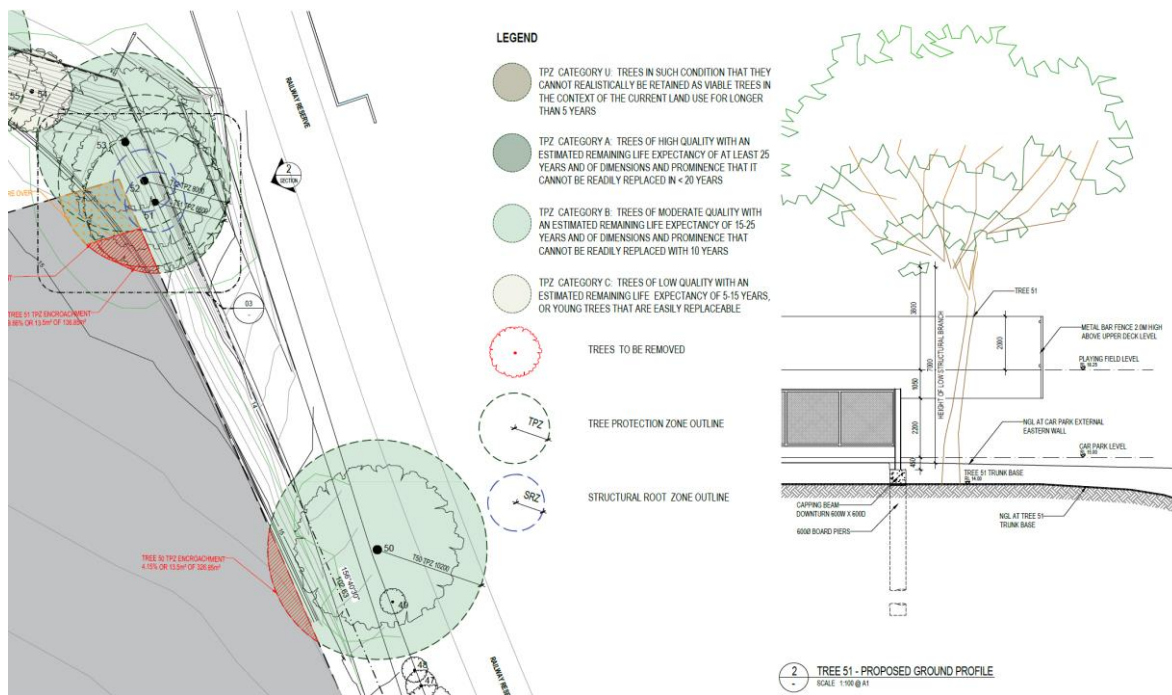


Figure 3. Excerpt from the *Preliminary Tree Protection Plan, TP25* showing detail around Trees 50, 51 and 52. (Chandler Architecture and Interior Design, 27 August 2019).



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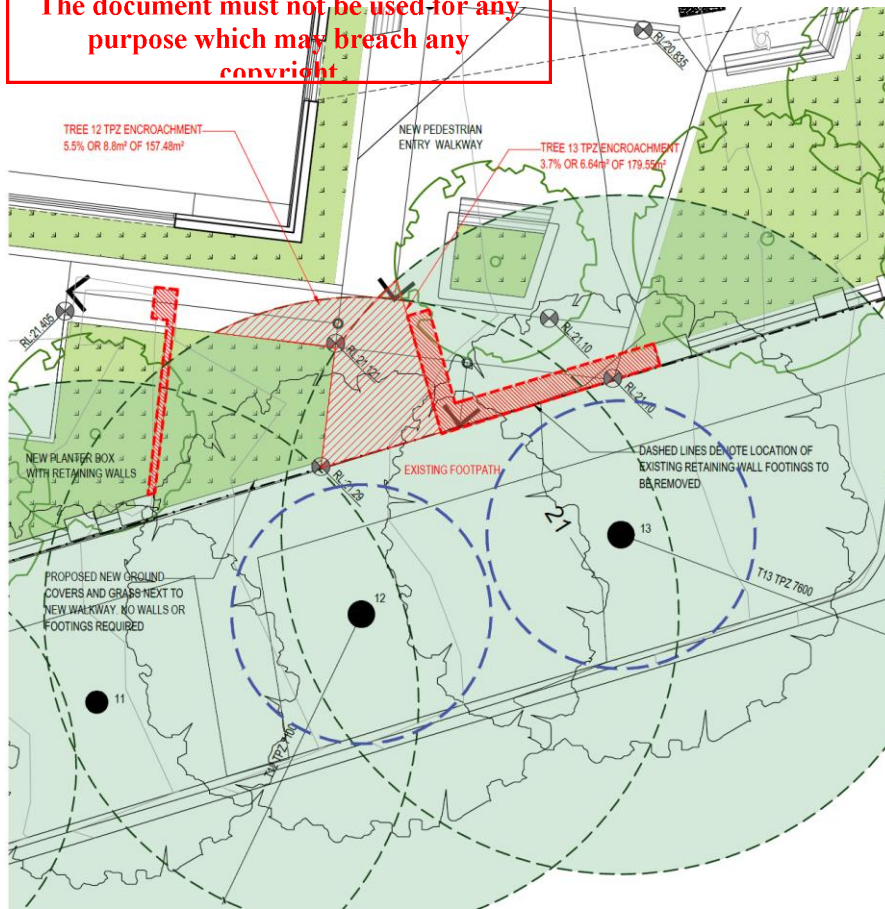


Figure 4. Excerpt from the *Preliminary Tree Protection Plan*, TP25. (Chandler Architecture and Interior Design, 27 August 2019).



**3** EXISTING TREE TO BE RETAINED  
*Fraxinus oxycarpa* ssp. *angustifolia* (Deert Ash)

**4** NATURE BASE PLAY AREA AROUND EXISTING TREE  
 Boulders rock & Stepping logs

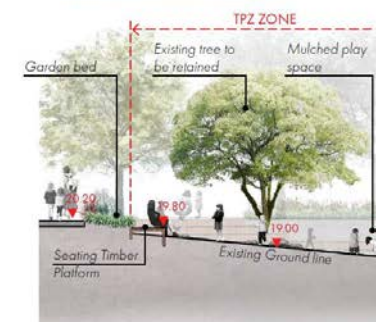


Figure 5. Excerpt from the *Schematic Design Report*. (Tract Design, March 2020).

5.4.2 The proposed development has been reviewed and in summary consists of:

- The refurbishment and extension of the existing administration and learning building
- An upgrade to the main school entrance area situated between the administration building and Lansell Road, including the main pedestrian gateway and pathway and the adjacent parking/loading zone area
- The complete renovation of the existing turf oval to incorporate a new parking area under a rooftop playing surface.

5.4.3 The proposed sewer line realignment was the sole underground service reviewed in the preparation of this report.

## 5.5 Site Trees

5.5.1 A total of fifty-eight (58) trees were inspected and are the subject of this report. Complete attributes for each tree can be found in Appendix C – Tree Assessment Data.

5.5.2 Trees to be included in the report were detailed by the client in an onsite project briefing in May 2019. No trees beyond the scope outlined by the client have been inspected as part of this report.

5.5.3 Subject trees are located within the grounds of St Kevin's College, adjacent railway reserve and within the Council nature strip along Lansell Rd.

5.5.4 The seventeen (17) trees within the Council nature strip are an avenue planting of mature *Ulmus procera* (English Elm) numbered between 8 and 26.

5.5.5 The single tree situated within the railway verge is a mature *Schinus areira* (Peppercorn) numbered 50.

5.5.6 The subject trees form part of the existing ArborPlan Tree Management System for the entire site and as such have been tagged, positioned on aerial imagery and visually assessed annually since January 2014.

5.5.7 The subject trees have been numbered in line with the existing ArborPlan tree numbering system. Trees can be identified on site using tree tags which are typically located at approximately 2.0m from ground level on the southern side of the trunk.



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Figure 6. Trees subject to this report as represented in the ArborPlan Tree Management system. Note tree icon colour represents existing risk status (not Retention Value). (ArborPlan, September 2019).



## 6 Tree Retention Values

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### 6.1 Determining Tree Retention Values

- 6.1.1 Tree Retention Value has been determined based on a combination of tree attributes. Tree retention value is categorised as per a modified version of the British Standard BS 5837–2012: *Trees in Relation to Design, Demolition and Construction*. Attributes considered when determining the retention value include tree health, structure and form, life expectancy, suitability of the tree in the context of local landscape. Arboricultural, Cultural, Environmental and Heritage significance are all also considered within the subcategories identified.
- 6.1.2 Collectively tree attributes are reviewed and used to categorise tree value in a development context. Additional information explaining Tree Retention Value can be found in Appendix B – Explanation of Tree Assessment Terms.

### 6.2 Category A Trees (High Retention Value)

- 6.2.1 No trees were determined to be Category A Trees. Typically trees in this category are of high quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years. The tree may make significant amenity contributions to the landscape and may make high environmental contributions. In some cases, trees within this category may not meet the above criteria, however, possess significant heritage or ecological value. Trees of this retention value warrant design consideration and amendment to ensure their viable retention.

**6.3 Category B Trees (Moderate Retention Value)**

- 6.3.1 ~~Thirty-one (31) trees were considered to be Category B trees and have a Moderate Retention Value.~~ Typically trees in this category are of moderate quality with an estimated remaining life expectancy of 15–25 years and prominence of size dimensions that cannot be readily replaced within ten years. They may make moderate amenity contributions to the landscape and make low/moderate environmental contributions. Trees with this retention value warrant minor design consideration in an attempt to allow for their retention.
- 6.3.2 Category B trees are numbered 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 50, 51, 52, 53, 56, 59, 61, 62, 63, 64, 65, 66, 100 and 101.



Figure 7. Aerial image showing location of Moderate Retention Value Trees. The red arrows identify 6 x trees recommended for retention with specific protection measures. The yellow arrow identifies 1 x tree that cannot be retained under the current proposal. (ArborPlan, September 2019).



- 6.3.3 Trees 8 and 11–26 are mature examples of *Ulmus procera* (English Elm) located within the nature strip of Lansell Road. The trees are the assets of the City of Stonnington. The trees are of moderate size and in fair health and fair to poor structure. They provide considerable amenity and character to Lansell Road and the surrounding landscape. Trees with poor structure as a result of cavities, decay and previous failures, such as Trees 15 and 16, have been allocated Category B retention based on their prominence within the street and the fact that they cannot be readily replaced within 10 years.
- 6.3.4 It is considered the proposed development would have little, if any, impact on the majority of these trees, due to the proposed development being well outside the trees TPZ, with generic protection measures recommended.
- 6.3.5 Three of the trees situated adjacent the main pedestrian entrance, identified as Trees 11, 12 and 13 within the report, will have works within the TPZ and are required to be retained with specific protection measures (Refer Figure 7).



Figure 8. View of Council owned *Ulmus procera* (English Elm) in Lansell Road. (Justin Herbert, May 2019).



- 6.3.6 Tree 51 is a *Eucalyptus cladocalyx* (Sugar Gum) while Tree 52 is a *Corymbia citriodora* (Lemon Gum) and are both located at the north-east corner of the existing turf oval. The trees have good health and fair structure and provide amenity, shade and screening within this portion of the site. The crown of Tree 52 was considered to be co-dependant with Tree 51, and as a result both trees are to be considered as one when recommendations are made.
- 6.3.7 The TPZ of Tree 51 was 6.6m, with an SRZ of 2.8m, measured at a radial distance from the centre of the trunk.
- 6.3.8 The TPZ of Tree 52 was 8m, with an SRZ of 2.9m, measured at a radial distance from the centre of the trunk.



Figure 9. View of Tree 51 on right and Tree 52 on left. (Justin Herbert, May 2019).

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- 6.3.9 Tree 56 is a *Eucalyptus bicostata* (Southern Blue Gum) tree located at the northern portion of the existing turf oval. The tree is of good health and fair structure and provides amenity, shade and screening within this portion of the site.
- 6.3.10 The trees TPZ was 11.2m, with an SRZ of 3.5m, measured at a radial distance from the centre of the trunk.



Figure 10. View of Tree 56. (Justin Herbert, May 2019).



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- 6.3.11 Tree 101 is a *Fraxinus angustifolia* ssp. *oxycarpa* (Desert Ash) and is located within a current play equipment area. The tree is of good health and fair structure and provides amenity and shade within this portion of the site.
- 6.3.12 The TPZ of tree 101 was 6.1m, with an SRZ of 2.6m, measured at a radial distance from the centre of the trunk.



Figure 11. View of Tree 101. (Justin Herbert, May 2019).



**6.4 Category C Trees (Low Retention Value)**  
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- 6.4.1 Twenty six (26) trees were identified as being Category C Trees with Low Retention Value. Trees in this category are of low quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable, may have poor health and/or structure, are easily replaceable, or are of undesirable species and do not warrant design consideration.
- 6.4.2 Category C trees are: Trees 39, 40, 41, 42, 43, 54, 57, 60, 95, 96, 98, 99, 107, 108, 109, 112, 113, 114, 115, 116, 117, 122, 123, 124, 125 and 127.



Figure 12. Aerial image showing location of Low Retention Value Trees. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from the Appendix C –Tree Assessment Data. (ArborPlan, September 2019).

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- 6.4.3 Trees 107 and 112 are *Pyrus calleryana* Chanticleer (Ornamental Pear) trees situated adjacent the main School pedestrian pathway. The trees are in good health and providing amenity to the locality but are young in age and small stature and could be easily replaced. The trees are similar to a number of similar species in the same area, some recommended for removal and some for retention.
- 6.4.4 The TPZ of all Ornamental Pears was 2m measured at a radial distance from the centre of the trunk.



Figure 13. View of Trees 107 and 112. (Justin Herbert, May 2019).



6.5 **Category U Trees (Unsuitable for Retention)**  
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6.5.1 One (1) tree was found to be in such a condition that it cannot realistically be retained as a viable tree in the context of the current land use for longer than five years. This tree may be dead and/or of a species recognised as a weed or very poor structure that resulted in it being unretainable. This tree may be removed irrespective of any future development on the site.

6.5.2 Category U Tree was numbered 55.



Figure 14. Aerial image showing location of Remove Retention Value Trees (Nil/No Retention Value). Tree attributes are to be obtained from the Appendix C –Tree Assessment Data. (ArborPlan, September 2019).

6.5.3 Tree 55 was a *Eucalyptus cladocalyx* (Sugar Gum) and was epicormic regeneration from a previous incomplete removal (cut stump).



## 7 Discussion

### 7.1 Major and Minor TPZ Encroachment

- 7.1.1 As per the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*, a major encroachment into the TPZ of any tree is considered to occur when it is beyond 10% of the total TPZ area. A minor encroachment is determined as being less than 10% of the total TPZ area.
- 7.1.2 Trees will require removal if they are located within the development footprint or have major encroachment into their TPZs.
- 7.1.3 Trees with minor or no encroachment may be retained with specific, generic or no protection requirements throughout the construction stage.
- 7.1.4 For the purposes of this report trees to be removed or retained have been identified as those:
- Requiring removal due to major encroachment into their TPZ
  - Retainable and requiring specific protection requirements throughout construction (i.e. generic requirements plus arborist supervision and root friendly excavation or demolition methods within their TPZ)
  - Retainable and requiring generic tree protection measures only (i.e. protective fencing and restriction of activities within the TPZ).

### 7.2 Impact of Proposed Development

- 7.2.1 Review of the proposed development work has been undertaken in the context of tree retention and removal across the site.
- 7.2.2 It is considered a major encroachment when more than 10% of the TPZ is impacted. Loss of tree health and potential effects of tree stability may render trees unviable for future retention if this occurs.
- 7.2.3 It is considered that the proposed development works may impact seventeen (17) site trees, identified within this report, to the point that they could not be retained under the current proposal.
- 7.2.4 The main impacts attributed to these proposed removals are:
- Direct conflict between the trees and the proposed new buildings – Trees 95, 96, 98, 99, 100, 107, 108, 109, 122, 123, 124, 125 and 127
  - Major TPZ encroachment during the demolition of existing infrastructure and/or the construction of the new infrastructure and surrounding upgraded hardscape areas – Trees 112, 113, 114 and 115.

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Figure 15. Aerial image showing location of all trees that cannot be retained under the current proposal. (ArborPlan, September 2019).

- 7.2.5 A further seven (7) trees would require specific protection measures during the proposed works. These trees are situated around the main entrance gate (Council Trees 11, 12 and 13), within the play equipment area (Tree 101) and the north-eastern area of the existing oval (Trees 51, 52 and 53) (refer to Figure 6).
- 7.2.6 The area around the three (3) Trees 51, 52 and 53 will be subject to excavation for the pier footings required for the new carpark and raised oval structure. Tree 51 is the closest to the excavation works and has an area of encroachment calculated to be 9.86% of the TPZ (refer Figure 3 and *Tree Protection Plan TP25*). The other trees have lesser encroachment areas but are still within the vicinity of the works and cantilevered upper playing field section.
- 7.2.7 The encroachment for Tree 51 is under the 10% threshold stipulated within the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites* as requiring specific protection, but was recommended for further protection due to the depth of incursion into the TPZ, which extends up to edge of the trees SRZ (refer to Figure 3). The design has been modified to not encroach the SRZ and to keep TPZ incursion below 10%. The potential for larger sized roots to be damaged is greater the closer to the SRZ the encroachment is, with the risks for overall tree stability and ongoing health issues similarly raised. Arborist supervision and root friendly excavation methods are recommended when working within the trees TPZ.
- 7.2.8 The lower level pier foundations have been placed in such a fashion to both limit TPZ encroachment and enable the upper playing field level to be cantilevered out over the remaining TPZ area with nil impact.
- 7.2.9 Minor pruning may be required within the lower crowns of Trees 51 and 52 to accommodate the development works.
- 7.2.10 Trees 11, 12 and 13 are all Council trees situated as an avenue planting along the Lansell Road verge.

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- 7.2.11 The works undertaken within the northern TPZ of Tree 11 will be limited to the removal of an existing line of kerbstones, smaller garden beds and pavement and the reinstatement with a grass area.
- 7.2.12 The works undertaken within the northern TPZ of Tree 12 are an approximate 20% encroachment. The works will be limited to the removal of the existing front gate and associated foundations, smaller garden beds and pavement. The area of encroachment will effectively be reduced as half this area will have the existing concrete pathway removed and the area reinstated to a grassed area more conducive to root growth.
- 7.2.13 Having the existing pavement and front entrance wall within the identified TPZ encroachment would also indicate a limited impact on the trees root system by the mere fact that less roots would be in these areas. Compacted soils, especially artificially compacted soils such as those found under existing concrete slab footpaths and rock structures, such as the front gate wall contain less available pore space for water and oxygen as well as a higher bulk density down to a deeper level of subsoil. Bulk density is the term used for describing the mass of soil per unit volume and the higher the density, the more stable the building platform, with less movement in expansion or contraction. A higher bulk density soil is compacted to reduce available pore space therefore reducing available area for air and water within the soil. The less pore space available and the denser the soil the more it inhibits root activity as water and oxygen are essential for root elongation and growth and as such, the lack of these properties is considered a major limiting factor of root activity within soil.
- 7.2.14 The works undertaken within the northern TPZ of Tree 13 are an approximate 20% encroachment. The works will be limited to the removal of the existing front gate and associated foundations, smaller garden beds and pavement. Having the existing pavement and front entrance wall within the identified TPZ encroachment would indicate a reduced impact on the trees root system by the mere fact that less roots would be in these areas as discussed in 7.2.13. It must also be noted that none of the proposed works are within the SRZ of any of the three trees and no major excavation is involved in the upgrade works. It was estimated that the combined effect of these mitigating points would reduce the effective TPZ encroachment to less than 10%.
- 7.2.15 A proposed sewer line re-alignment extends north to south between the existing buildings and the proposed new carpark/playing field structure, then west to east through the middle of the existing drop of driveway. The works will all be outside the TPZ of the adjacent Council street trees.
- 7.2.16 It is unknown whether any other existing underground services need to be removed to make way for the new building and services. The removal of services can cause more damage than installation as there is no chance for deviation when chasing existing infrastructure which is already in place. Tree roots can become entangled with the services making extraction problematic, with damage to the trees more likely. In certain circumstances, retaining redundant underground service infrastructure 'in situ', wherever a direct conflict or major encroachment across a trees TPZ occurs, would mitigate the significant root damage likely to occur and allow for tree retention rather than removal.
- 7.2.17 Design changes have resulted in the impacts upon Tree 101 being minimised and the tree can now be retained with a 9.6% TPZ encroachment to the south (Figure 16), less than the 10% outlined in the Australian Standard AS 4970–2009.
- 7.2.18 Figure 5 shows timber decking/seating inside the north and west portions of the TPZ for Tree 101. The impacts of the pier and beam construction method are not expected to impact the tree given their locations at the edge of the TPZ. Refer to the recommendations section for specific tree protection measures regarding this proposed construction.



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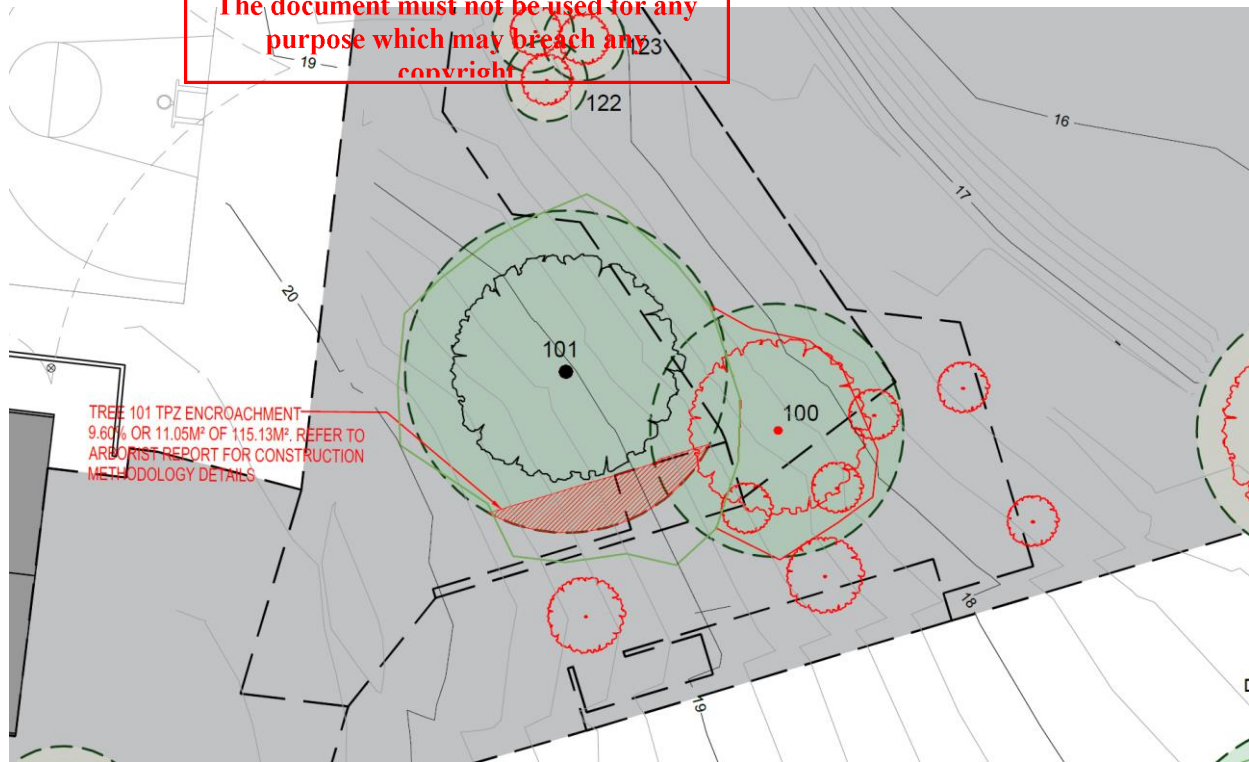


Figure 16. Excerpt from the *Tree Protection Site Plan*, TP25, Revision C. (Chandler Architecture and Interior Design, March 2020).

### 7.3 Additional Excavation/Trenching within TPZs

- 7.3.1 In the event additional excavation is required within the TPZs of retained trees identified within this report, or any other site trees, arborist involvement will be required to ensure works are undertaken in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.
- 7.3.2 Excavation/trenching within the TPZs of retained trees must be undertaken using sensitive construction methods such as manual excavation, hydro-vac or air spade.

## 8 Recommendations

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### 8.1 Tree Removal

- 8.1.1 Seventeen (17) trees would require removal to facilitate this development. These are trees 95, 96, 98, 99, 100, 107, 108, 109, 112, 113, 114, 115, 122, 123, 124, 125 and 127.
- 8.1.2 Tree 100 cannot be retained under the current design proposal. Transplant costs have been investigated and considered to be prohibitive. It was therefore recommended that an advanced tree of the same species and size be replanted, in addition to all of the new trees to be planted, at a location within the site.
- 8.1.3 One (1) tree was recommended for removal irrespective of future development on the site. This was Tree 55.

### 8.2 Tree Retention

- 8.2.1 Seven (7) trees, numbered 11, 12, 13, 51, 52, 53 and 101 were recommended for retention and require specific protection measures during construction to ensure they remain viable following the completion of works. These trees have some degree of encroachment within the TPZ.
- 8.2.2 Any excavation within the TPZ of Tree 101 must be completed using hand tools only and under the direct supervision of the project arborist. Given the location of the proposed piers it is unlikely that any roots of significance will be found, however supervision is imperative to the long term viability of the tree post construction.
- 8.2.3 Thirty-three (33) trees, numbered 8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 39, 40, 41, 42, 43, 50, 54, 56, 57, 59, 60, 61, 62, 63, 64, 65, 66, 116 and 117 were recommended for retention and require generic protection measures (TPZ fencing, signs) during construction to ensure they remain viable following the completion of works.

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Figure 17. Aerial image showing location of the combined forty (40) trees recommended for retention. (ArborPlan, March 2020).

- 8.2.4 Any excavation is to be carried out only under arborist supervision. No excavation is to occur within the SRZ of any retained trees. It was recommended that any proposed excavation commence at the outer extent of the TPZ and move inwards to minimise root damage to the trees.
- 8.2.5 Works must be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:
- Excavation with vacuum truck using an air spade or hand excavation
  - Excavation by hand alone
  - Machine operation with additional spotter (specific approval required from the project arborist).
- 8.2.6 If machine excavation with spotter is deemed appropriate by the project arborist a secondary person is to be positioned as a spotter to give warning of larger roots (> 40mm) being exposed when excavation is in progress. If required, it is recommended that any excavation commence at the outer extent of the TPZ and move inwards to minimise root damage to the trees. Consultation with the site arborist would be required if larger roots were identified.
- 8.2.7 Roots discovered are to be treated with care and minor roots (<40mm diameter) pruned with a sharp, clean handsaw or secateurs. All significant roots (>40mm diameter) are to be recorded, photographed and reported to the project arborist.



- 8.2.8 Other proposed surfacing within the TPZ is to be installed above existing grade and be of a permeable nature to allow the passage of air and moisture. If the surfacing is to be load bearing, then it is suggested that a geogrid/web or similar is incorporated to ensure the rooting area below does not become compacted.

### 8.3 Tree Pruning

- 8.3.1 Pruning of minor branches may be required from trees 51 and 52. Minor pendulous branches to ~40mm diameter may require pruning to accommodate works within the south west facing portion of their crowns. All pruning must be undertaken in accordance with the Australian Standard AS 4373–2007: Pruning of Amenity Trees and undertaken by a suitably qualified arborist (minimum AQF 3 arborist).
- 8.3.2 Reduction pruning must focus on the removal of smaller diameter branches where feasible and remove no greater than 10% of the total crown. Branches no greater than 50mm diameter are to be removed unless specifically approved by the project arborist.

### 8.4 Protection and Reporting Measures During Construction

- 8.4.1 All trees to be retained require protection during the construction stage. Tree protection measures include a range of:
- Activities restricted within the TPZ
  - Protective fencing
  - Trunk and ground protection
  - Tree protection signage
  - Involvement from the project arborist
  - Project milestones
  - Compliance reporting

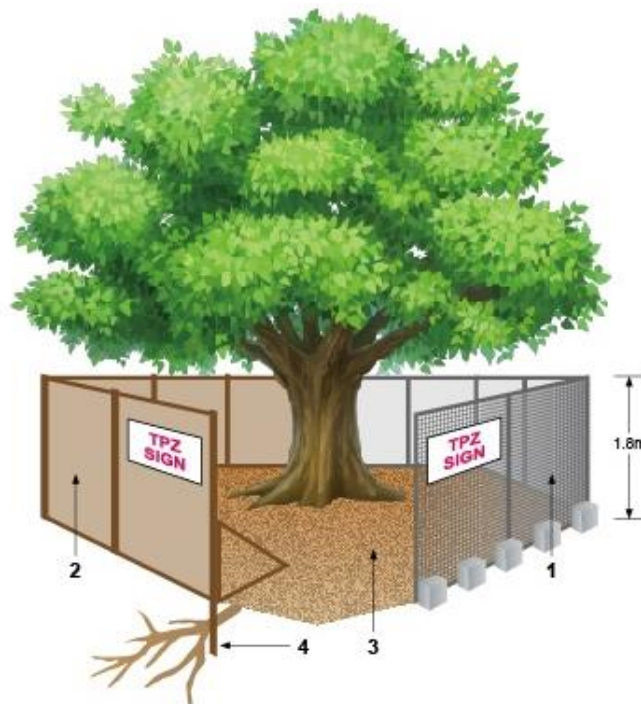
### 8.5 Activities Prohibited within the TPZ

1. Machine excavation including trenching
2. Storage
3. Preparation of chemicals, including cement products
4. Parking of vehicles and plant
5. Refuelling
6. Dumping of waste
7. Wash down and cleaning of equipment
8. Placement of fill
9. Lighting of fires
10. Soil level changes
11. Temporary or permanent installation of utilities and signs
12. Physical damage to the tree

**8.6 Protective Fencing Specification**

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- 8.6.1 Protective fencing is to be installed as far as practicable from the trunk of any retained trees. Fencing must be erected as per the image below before any machinery or materials are brought to site and before commencement of works (including demolition).
- 8.6.2 In some areas of the site (i.e. protection of trees on neighbouring properties) existing boundary fencing may be used as an alternative to protective fencing.
- 8.6.3 Once erected, protective fencing must not be removed or altered without approval from the project arborist. The TPZ fencing must be secured to restrict access.
- 8.6.4 TPZ fencing is to be a minimum of 1.8m high and mesh or wire between posts must be highly visible. Fence posts and supports must have a diameter greater than 20mm and must be freestanding, otherwise be located clear of the roots. See image below.
- 8.6.5 Tree protection fencing must remain intact throughout all proposed construction works and must only be dismantled after their conclusion. The temporary dismantling of tree protection fencing must only be done with the authorisation of a consulting arborist and/or the responsible authority.
- 8.6.6 The subject trees themselves must also not to be used as a billboard to support advertising material. Affixing nails or screws into the trunks of trees to display signs of any type is not a recommended practice in the successful retention of trees.



**Legend:**

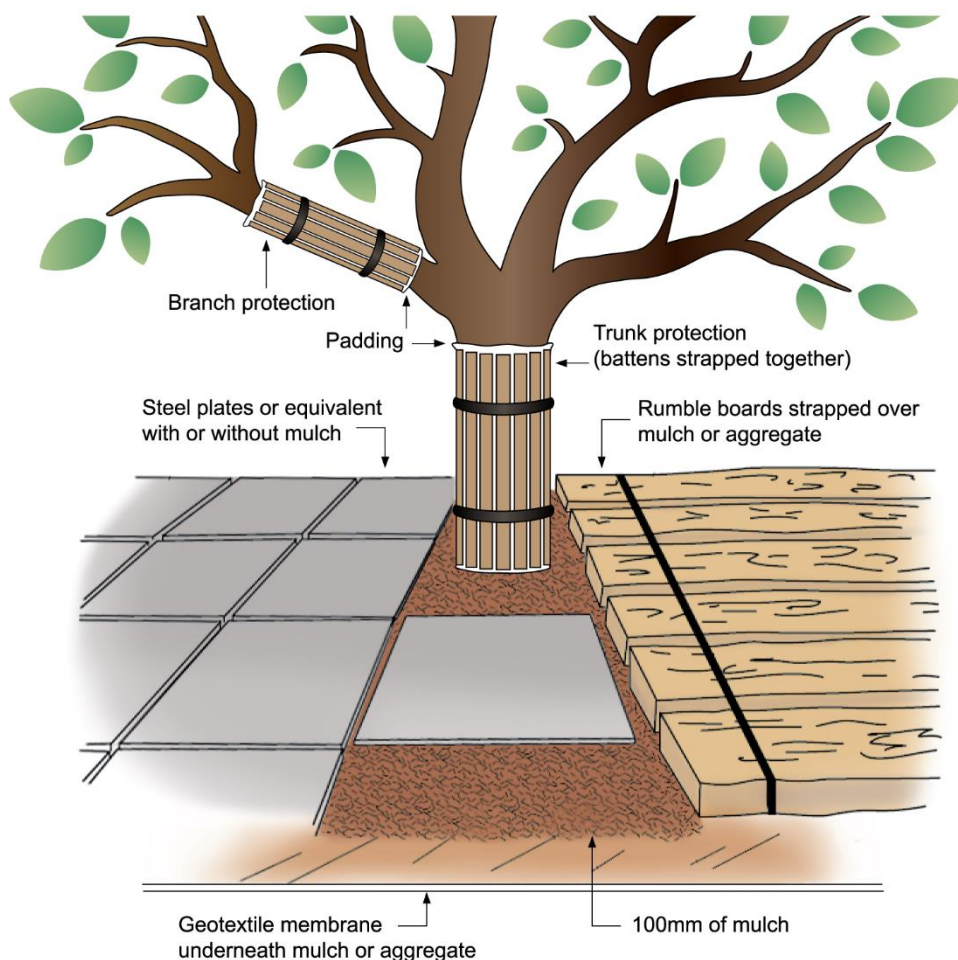
- 1. Chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet
- 2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ
- 3. Mulch installation across surface of TPZ (at discretion of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

Figure 18. Depicts standard fencing techniques. (AS 4970–2009).

**8.7 Trunk and Ground Protection**

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- 8.7.1 Given that proposed works are often within the TPZs of retained trees, standard protective fencing may not always be a viable method of protection. In these areas trunk protection and ground protection must be installed prior to the commencement of works and remain in place until after construction works have been completed.
- 8.7.2 Where construction access into the TPZ of retained trees cannot be avoided, the root zone of each tree must be protected using either steel plates or rumble board strapped over mulch/aggregate until such a time as permanent above ground surfacing (cellular confinement system or similar) is to be installed.
- 8.7.3 Trunk and ground protection must be undertaken in line with the Australian Standard AS 4790–2009: *Protection of Trees on Development Sites* as per the image below:



**Notes:**

- 1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
- 2. Rumble boards must be of a suitable thickness to prevent soil compaction and root damage.

Figure 19. Depicts trunk and ground protection techniques. (AS 4970–2009).



**8.8 Tree Protection Signs**

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- 8.8.1 Signs identifying the TPZ must be placed at 10m intervals around the edge of the TPZ and must be visible from within the development site.



Figure 20. Depicts standard fencing techniques. (AS 4970–2009).

**8.9 Project Arborist**

- 8.9.1 An official “Project Arborist” must be commissioned to oversee the tree protection, any works within the TPZ’s and complete regular monitoring compliance certification.
- 8.9.2 The project arborist must have minimum five (5) years industry experience in the field of arboriculture, horticulture with relevant demonstrated experience in tree management on construction sites, and Diploma level qualifications in arboriculture – AQF Level 5.
- 8.9.3 Inspections are to be conducted by the project arborist at several key points during the construction in order to ensure that protection measures are being adhered to during construction stages and decline in tree health or additional remediation measures can be identified.

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**8.10 Project Milestones**

8.10.1 The following visits and milestones were recommended as to when on-site tree inspection by the project arborist is required:

Item	Purpose of Visit	Timing of Visit(s)	Prerequisites
1	Pre-start induction	Following sign off from Item 1. Contractor to provide a minimum of five days advance notice for this visit.	Prior to commencement of works. All parties involved in the project to attend.
2	Supervision of works in TPZ's including all regrading and excavations	Whenever there is work planned to be performed within the TPZ's. Contractor to provide a minimum of five days advance notice for such visits.	
3	Regular site inspections	Minimum frequency monthly for the duration of the project.	The checklist must be completed by the Project Arborist at each site inspection and signed by both parties.
4	Final sign off	Following completion of works.	Practical completion of works and prior to tree protection removal.

**8.11 Compliance Reporting**

- 8.11.1 Following each inspection, the project arborist shall prepare a report detailing the condition of the trees. These reports must certify whether or not the works have been completed in compliance with the consent relating to tree protection.
- 8.11.2 These reports must contain photographic evidence where required to demonstrate that the work has been carried out as specified.
- 8.11.3 Matters to be monitored and included in these reports must include tree condition, tree protection measures and impact of site works which may arise from changes to the approved plans.
- 8.11.4 The reports and Compliance Statements shall be submitted to the Project Manager (as well as the Clients' nominated representative) following each inspection.
- 8.11.5 The reports and any Non-Compliance Statements shall be submitted to the Project Manager (as well as the Clients' nominated representative) if tree protection conditions have been breached. Reports must contain clear remedial action specifications to minimise any adverse impact on any subject tree.

**8.12 Offset Tree Planting**

- 8.12.1 Offset planting must reflect the number of trees removed and the initial loss of amenity and biomass. New trees must be of long-term potential and sourced from a reputable supplier.
- 8.12.2 Replacement tree species must suit their location on the site in terms of their potential physical size and their tolerance(s) to the surrounding environmental conditions. To avoid unethical or unprofessional tree selection and/or their placement within the landscape, replacement tree species must be selected in consultation with a consulting arborist, who can also assist in implementing successful tree establishment techniques.



- 8.12.3 Replacement tree species must have the genetic potential to reach a mature size potential of those trees removed to facilitate the development. As a guide, potential height will be a minimum of 10m (or more) and produce a spreading canopy so as they may provide amenity value to the property and contribute to the tree canopy of the surrounding area in the future.

### 8.13 Trenching for Installation of Underground Services

- 8.13.1 Where excavation or trenching is required to facilitate installation of underground services within the TPZs of any site trees recommended for retention, arborist supervision is required. Works must be undertaken using techniques that are sensitive to tree roots to avoid unnecessary damage. Such techniques include:
1. Excavation by hand
  2. Excavation using a high-pressure water jet and vacuum truck
- 8.13.2 Machine excavation is prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.

## 9 References

- Standards Australia. (2007). AS 4373–2007: *Pruning of Amenity Trees*. Sydney: Standards Australia
- Standards Australia. (2009). AS 4970–2009: *Protection of Trees on Development Sites*. Sydney: Standards Australia
- The British Standards Institution. (2012). BS 5837–2012: *Trees in relation to design, demolition and construction*. London: BSI Standards Limited
- Up by Roots: Healthy soils and trees in the built environment, James Urban, 2008 ISA
- Arboriculture (4<sup>th</sup> edition): Integrated management of landscape, trees, shrubs and vines. R Harris, J Clark, N Matheny, 2004
- Reducing Infrastructure Damage by Tree Roots: A compendium of strategies, L.R. Costello & K.S. Jones, 2003.

## 10 Appendices

### 10.1 Appendix A – Arboricultural Reporting Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownership of any property are assumed to be good. No responsibility is assumed for matters legal in character.
2. It is assumed that any property/project is not in violation of any applicable codes, ordinances, statutes or other government regulations.
3. Care has been taken to obtain all information from reliable sources. All data has been verified in so far as possible, however, the consultant can neither guarantee nor be responsible for the accuracy of the information provided by others.
4. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.
5. Loss or alteration of any part of this report invalidates the entire report.
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone but the person to whom it is addressed, without the prior written consent of the consultant.
7. Neither all nor any part of the contents of this report, nor any copy thereof, shall be used for any purpose by anyone but the person to whom it is addressed, without the written consent of the consultant. Nor shall it be conveyed by anyone, including the Client, to the public through advertising, public relations, news, sales or other media, without the written consent of the consultant.
8. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
9. Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale and must not be construed as engineering or architectural reports or surveys unless expressed otherwise.
10. Information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection.
11. Inspection is limited to visual examination of accessible components without dissection, excavation or probing. There is no warranty or guarantee expressed or implied that the problems or deficiencies of the plants or property in question may not arise in the future.

**10.2 Appendix B – Explanation of Tree Assessment Terms**

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**Tree name:** Provides the botanic name, (*Genus, species, sub-species, variety and cultivar where applicable*) in accordance with the International Code of Botanical Nomenclature (ICBN), and an accepted common name.

**Age:** Refers to the life cycle of the tree

Category	Description
Young	Newly planted tree not fully established may be capable of being transplanted or easily replaced.
Juvenile	Tree is small in terms of its potential physical size and has not reached its full reproductive ability.
Semi-mature	Tree in active growth phase of life cycle and has not yet attained an expected maximum physical size for its species and/or its location.
Mature	Tree has reached an expected maximum physical size for the species and/or location and is showing a reduction in the rate of seasonal extension growth.
Senescent	Tree is approaching the end of its life cycle and is exhibiting a reduction in vigour often evidenced by natural deterioration in health and structure.

**Health:** Summarises the health and vigour of the tree

Category	Description
Excellent	Canopy full with dense foliage coverage throughout, leaves are entire and are of an excellent size and colour for the species with no visible pathogen damage. Excellent growth indicators, e.g. seasonal extension growth.
Good	Canopy full with minor variations in foliage density throughout, leaves are entire and are of good size and colour for the species with minimal or no visible pathogen damage. Good growth indicators.
Fair	Canopy with moderate variations in foliage density throughout, leaves not entire with reduced size and/or atypical in colour, moderate pathogen damage. Reduced growth indicators, visible amounts of deadwood/dieback, and epicormic growth.
Poor	Canopy density significantly reduced throughout, leaves are not entire, are significantly reduced in size and/or are discoloured, significant pathogen damage. Significant amounts of deadwood and/or epicormic growth, noticeable dieback of branch tips, possibly extensive.
Dead	No live plant material observed throughout the canopy, bark may be visibly delaminating from the trunk and/or branches.



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Table 1. ArborSafe Structure Descriptors

**Structure:** Summarises the structure of the tree from roots to crown

Category	Description
Good	Good form and branching habit. Minor structural defects that are insignificant and typical or common within the species. e.g. included bark, co-dominant stems. No fungal pathogens present. No visible wounds to the trunk and/or root plate.
Fair	Moderate structural defects present that impact longevity e.g. apical leaders sharing common union(s). Minor damage to structural roots. Small wounds present where decay could begin. No fungal pathogens present. A fair representation of the species.
Poor	Significant structural defects present that have a significant impact on longevity and result in a poor representation of the species e.g. Branch/stems with included bark with failure likely within 0–5 years. Wounding evident with cavities and/or decay present. Damage to structural roots.
Hazardous	Serious structural defects with failure determined to be imminent (<12 months). Defects may include active splits and/or partial branch or root plate failures. Tree requires immediate arboricultural works to alleviate the associated risk.

**Useful Life Expectancy (ULE):** Useful Life Expectancy refers to an expected period of time the tree can be retained within the landscape before its amenity value declines to a point where it may detract from the appearance of the landscape and/or becomes potentially hazardous to people and/or property. ULE values consider tree species, current age, health, structure and location. ULE values are based on the tree at the time of assessment and do not consider future changes to the tree’s location and environment which may influence the ULE value.

Category:
0–5 Years
5–10 Years
10–20 Years
20–30 Years
30–50 Years
>50 Years

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Tree Retention Value: (based upon BS 5837-2012: Trees in relation to design, demolition and construction – recommendations)  
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Category and definition	Criteria (including sub-categories where appropriate)		
<b>Category U</b>			
Trees in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than 5 years.	<ul style="list-style-type: none"> <li>Trees that have a severe structural defect that are not remediable such that their failure is expected within 12 months.</li> <li>Trees that will become unviable after removal of other Category U trees (e.g. where for whatever reason the loss of companion shelter cannot be mitigated by pruning).</li> <li>Trees that are dead or are showing signs of significant, immediate and irreversible overall decline.</li> <li>Trees infected with pathogens of significance to the health and or safety of other trees nearby</li> <li>Low quality trees suppressing adjacent trees of better quality.</li> <li>Noxious weeds or species categorised as weeds within the local area.</li> </ul> <p><b>Note:</b> Category U trees can have existing or potential conservation value* which might make it desirable to preserve.</p>		
	<b>1. Arboricultural Qualities</b>	<b>2. Landscape qualities</b>	<b>3. Cultural and environmental values</b>
<b>Category A</b>			
Trees of High Quality with an estimated remaining life expectancy of at least 25 years and of dimensions and prominence that it cannot be readily replaced in <20 years.	Trees that are particularly good examples of their species, especially if rare or unusual (in the wild or under cultivation); or those that are important components of groups or avenues.	Trees or groups of significant visual importance as arboricultural and/or landscape features. (e.g. feature and landmark trees).	Trees, groups or plant communities of significant conservation, historical, commemorative or other value (e.g. remnant trees, aboriginal scar trees, critically endangered plant communities, trees listed specifically within a Heritage statement of significance).
<b>Category B</b>			
Trees of Moderate Quality with an estimated remaining life expectancy of 15–25 years and of dimensions and prominence that cannot be readily replaced within 10 years.	Trees that might be included within Category A but are downgraded because of diminished condition such that they are unlikely to be suitable for retention beyond 25 years.	Trees that are visible from surrounding properties and/or the street but make little visual contribution to the wider locality.	Trees with conservation or other cultural value (trees within conservation areas or landscapes described within a statement of significance, locally indigenous species).
<b>Category C</b>			
Trees of Low Quality with an estimated remaining life expectancy of 5–15 years, or young trees that are easily replaceable.	Trees of very limited value or such impaired condition that they do not qualify in higher categories.	Trees offering low or only temporary/transient landscape benefits.	Trees with no material conservation or other cultural value.

\*Where trees would otherwise be categorised as U, B or C but have significant identifiable conservation, heritage or landscape value even though only for the short term, they may be upgraded, although they might be suitable for retention only.

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Table 2. Tree Quality

		Health**			
		Excellent/ Good	Fair	Poor	Dead
Structure	Good	A	B	C	U
	Fair	B	B	C	U
	Poor	C	C	U	U
	Hazard*	U	U	U	U

\*Structural hazard that cannot be remediated through mitigation works to enable safe retention.

\*\* Trees of short term reduced health that can be remediated via basic, low cost plant health care works (e.g. mulching, irrigation etc.) may be designated in a higher health rating to ensure correct retention value nomination.



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## 10.3 Appendix C – Tree Assessment Data

Tree no.	Botanical Name	Common Name	Trees in group	DBH 1 (cm)	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ Area (m <sup>2</sup> )	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
8	<i>Ulmus procera</i>	English Elm	1	48	48	63	5.8	104.23	2.7	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
11	<i>Ulmus procera</i>	English Elm	1	53	53	68	6.4	127.08	2.8	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree situated around main pedestrian access	B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
12	<i>Ulmus procera</i>	English Elm	1	59	59	72	7.1	157.48	2.9	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree situated around main pedestrian access	B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
13	<i>Ulmus procera</i>	English Elm	1	63	63	77	7.6	179.55	3.0	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree situated around main pedestrian access	B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
14	<i>Ulmus procera</i>	English Elm	1	36	36	46	4.3	58.63	2.4	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
15	<i>Ulmus procera</i>	English Elm	1	78	78	90	9.4	275.23	3.2	10-15	10-15	Fair	Poor	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
16	<i>Ulmus procera</i>	English Elm	1	66	66	82	7.9	197.06	3.0	10-15	10-15	Fair	Poor	Mature	<5	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
17	<i>Ulmus procera</i>	English Elm	1	16	16	20	2.0	12.57	1.7	5-10	<5	Good	Fair	Young	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
18	<i>Ulmus procera</i>	English Elm	1	59	59	67	7.1	157.48	2.8	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
19	<i>Ulmus procera</i>	English Elm	1	61	61	73	7.3	168.33	2.9	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
20	<i>Ulmus procera</i>	English Elm	1	56	56	67	6.7	141.87	2.8	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
21	<i>Ulmus procera</i>	English Elm	1	56	56	73	6.7	141.87	2.9	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
22	<i>Ulmus procera</i>	English Elm	1	63	63	77	7.6	179.55	3.0	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
23	<i>Ulmus procera</i>	English Elm	1	62	62	71	7.4	173.90	2.9	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
24	<i>Ulmus procera</i>	English Elm	1	71	71	85	8.5	228.05	3.1	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
25	<i>Ulmus procera</i>	English Elm	1	69	69	87	8.3	215.38	3.1	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
26	<i>Ulmus procera</i>	English Elm	1	72	72	94	8.6	234.52	3.2	10-15	10-15	Fair	Fair	Mature	15-25	Amenity Value Shade	Council street tree	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
39	<i>Agonis flexuosa</i>	Willow Myrtle	1	25	29	65	3.4	37.32	2.8	5-10	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
40	<i>Callistemon citrinus</i>	Crimson Bottlebrush	1	15	18	26	2.2	14.70	1.9	<5	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
41	<i>Callistemon citrinus</i>	Crimson Bottlebrush	1	8	11	24	2.0	12.57	1.8	<5	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).

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Tree no.	Botanical Name	Common Name	Trees in group	DBH 1 (cm)	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ Area (m <sup>2</sup> )	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
42	<i>Callistemon citrinus</i>	Crimson Bottlebrush	1	5	11	20	2.0	12.57	1.7	<5	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
43	<i>Callistemon citrinus</i>	Crimson Bottlebrush	1	10	21	24	2.5	20.09	1.8	<5	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
50	<i>Schinus areira</i>	Peppercorn	1	85	85	100	10.2	326.85	3.3	10-15	10-15	Fair	Fair	Semi-mature	10-15	Amenity Value Shade	Peppercorn within railway reserve - encroachment under 5%	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
51	<i>Eucalyptus cladocaylx</i>	Sugar Gum	1	55	55	69	6.6	136.85	2.8	15-20	10-15	Good	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
52	<i>Corymbia citriodora</i>	Lemon Gum	1	67	67	75	8.0	203.08	2.9	15-20	10-15	Good	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
53	<i>Eucalyptus cladocaylx</i>	Sugar Gum	1	69	69	82	8.3	215.38	3.0	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
54	<i>Acacia mearnsii</i>	Black Wattle	1	24	32	36	3.8	46.01	2.2	5-10	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
55	<i>Eucalyptus cladocalyx</i>	Sugar Gum	1	16	16	20	2.0	12.57	1.7	5-10	<5	Fair	Poor	Semi-mature	<5		Cut Stump	U		Remove tree irrespective of future development.
56	<i>Eucalyptus bicostata</i>	Southern Blue Gum	1	93	93	115	11.2	391.27	3.5	15-20	10-15	Good	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
57	<i>Acacia mearnsii</i>	Black Wattle	1	25	25	30	3.0	28.27	2.0	5-10	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
59	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	23	23	28	2.8	23.93	1.9	10-15	5-10	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
60	<i>Eucalyptus macrandra</i>	Marlock	1	44	44	56	5.3	87.58	2.6	<5	5-10	Fair	Fair	Semi-mature	5-10	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
61	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	23	23	32	2.8	23.93	2.1	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
62	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	35	35	45	4.2	55.42	2.4	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
63	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	15	15	20	2.0	12.57	1.7	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
64	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	36	36	48	4.3	58.63	2.4	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
65	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	32	32	45	3.8	46.32	2.4	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
66	<i>Eucalyptus cladocaylx var. nana</i>	Dwarf Sugar Gum	1	51	51	62	6.1	117.67	2.7	10-15	10-15	Fair	Fair	Semi-mature	15-25	Amenity Value Shade		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
95	<i>Syzygium australe</i>	Brush Cherry	1	12	23	31	2.8	24.07	2.0	<5	5-10	Fair	Poor	Semi-mature	5-10	Amenity Value Shade	Major TPZ encroachment during underground carpark construction	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
96	<i>Callistemon viminalis</i>	Weeping Bottlebrush	1	10	19	33	2.3	16.47	2.1	<5	<5	Fair	Poor	Semi-mature	5-10	Amenity Value Shade	Major TPZ encroachment during underground carpark construction	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
98	<i>Corymbia ficifolia</i>	Flowering Gum	1	32	32	46	3.8	46.32	2.4	5-10	5-10	Fair	Poor	Semi-mature	15-25	Amenity Value Shade	Major TPZ encroachment during underground carpark construction	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.

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Tree no.	Botanical Name	Common Name	Trees in group	DBH 1 (cm)	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ Area (m <sup>2</sup> )	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
99	<i>Callistemon viminalis</i>	Weeping Bottlebrush	1	8	14	31	2.0	12.57	2.0	<5	5-10	Fair	Poor	Semi-mature	5-10	Amenity Value Shade	Major TPZ encroachment during underground carpark construction	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
100	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree	1	34	34	36	4.1	52.30	2.2	5-10	5-10	Good	Fair	Semi-mature	15-25	Amenity Value Shade	Major TPZ encroachment and level changes during landscaping upgrade and lift construction	B	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
101	<i>Fraxinus oxycarpa ssp. angustifolia</i>	Desert Ash	1	39	50	57	6.1	115.13	2.6	10-15	10-15	Good	Fair	Semi-mature	15-25	Amenity Value Shade	Major TPZ encroachment and level changes during landscaping upgrade and lift construction	B	12	Retain tree with specific protection requirements (i.e. Generic measures plus supervision of works within the TPZ and/or use of root sensitive construction techniques).
107	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	18	18	20	2.2	14.66	1.7	5-10	<5	Good	Fair	Young	10-15	Amenity Value Shade	Within footprint of proposed building extension	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
108	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	18	18	20	2.2	14.66	1.7	5-10	<5	Good	Fair	Young	10-15	Amenity Value Shade	Within footprint of proposed building extension	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
109	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	23	23	25	2.8	23.93	1.8	5-10	<5	Good	Fair	Young	10-15	Amenity Value Shade	Within footprint of proposed building extension	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
112	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	2	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping and level changes associated with upgrade around main pedestrian entranceway	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
113	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	13	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping and level changes associated with upgrade around main pedestrian entranceway	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
114	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	8	8	9	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping and level changes associated with upgrade around main pedestrian entranceway	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
115	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	8	8	9	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping and level changes associated with upgrade around main pedestrian entranceway	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
116	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
117	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	9	10	11	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
122	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping upgrade around existing redundant playground	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
123	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping upgrade around existing redundant playground	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
124	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping upgrade around existing redundant playground	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
125	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping upgrade around existing redundant playground	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
127	<i>Pyrus calleryana Chanticleer</i>	Ornamental Pear	1	10	10	12	2.0	12.57	1.5	<5	<5	Good	Fair	Young	15-25	Amenity Value Shade	Impacted by landscaping upgrade around existing redundant playground	C	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.