ArborSafe
TREE CONSULTANCY AND MANAGEMENT SYSTEMS

Arboricultural Impact Assessment

Chapel and Function Centre Development
Frenchs Forest Bushland Cemetery (FFBC)
1 Hakea Avenue
Davidson NSW 2085

27 March 2020

C91793

ASSESSMENT & REPORT COMMISSIONED BY:

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27 March 2020

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Ref: Frenchs Forest Bushland Cemetery – Chapel and Function Centre Development

Arboricultural Impact Assessment for fifty-seven (57) trees located within Frenchs Forest Bushland Cemetery, 1 Hakea Avenue, Davidson, NSW

Dear Oscar,

We are pleased to provide you with the following Arboricultural Impact Assessment for fifty-seven (57) site trees within the grounds of the Frenchs Forest Bushland Cemetery site.

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

Andy Clark
Consulting Arborist
Dip. Hort. (Arb.), AQF Level 5

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TREE CONSULTANCY AND MANAGEMENT SYSTEMS

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1 Executive Summary

1.1.1 The following Arboricultural Impact Assessment (Report) regards fifty-seven (57) trees located within the grounds of Frenchs Forest Bushland Cemetery. 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 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 17 March 2020, 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 Four (4) 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. Category A retention value trees are 204 207 281 285 and have High Retention Value.

1.1.6 Twenty-One (21) trees were of Category B retention value. Trees in this category were typically of a medium size, had 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 196 198 203 205 206 212 213 214 217 220 221 223 282 283 286 287 291 292 1568 1569 1621 and have a Moderate Retention Value.

1.1.7 Twenty-Five (25) 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 199 200 202 211 222 1529 1530 1570 1571 1572 1573 1622 1624 1625 1626 1627 1628 1629 1630 1633 1635 1658 1659 1660 1661 and have a Low Retention Value.

1.1.8 Seven (7) trees were 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. Category U retention value trees are 208 209 284 1623 1631 1632 1634.

1.1.9 Seven (7) trees were recommended for removal irrespective of future development on the site. These are trees 208 209 284 1623 1631 1632 1634.

1.1.10 Six (6) trees would require removal to facilitate this development. These are:

- One (1) High retention value (Category A) tree – 207
- Two (2) Moderate retention value (Category B) trees – 206 and 217
- Three (3) Low retention value (Category C) trees – 1658, 1659 and 1660.

2 Introduction

2.1.1 ArborSafe Australia Pty Ltd was engaged by Oscar Guzman on behalf of Frenchs Forest Bushland Cemetery (the Client) to complete an Arboricultural Impact Assessment (report) on fifty-seven (57) trees located within or adjacent to the Frenchs Forest Bushland Cemetery at 1 Hakea Avenue, Davidson, NSW.

2.1.2 The site is located within the grounds of the Frenchs Forest Bushland Cemetery (FFBC) and includes the existing Function centre, residential building and surrounding areas of managed landscape.

2.1.3 The report has been requested as part of a Development Application (DA) that involves the refurbishment of the existing function centre and surrounding landscape and the demolition of an existing residential building and the reconstruction of a new chapel building across a similar but expanded footprint.

2.1.4 The report was intended to provide information on site trees and how they may be impacted by the proposed development. Report findings and recommendations provided are based upon guidance provided within Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.

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 Nominate subject trees that can be retained or require removal to facilitate this development.

3.1.6 Review the proposed development in the context of the Northern Beaches Council (NBC) development controls (Warringa LEP 2000 & DCP 2011 - NBC 2020).

3.1.7 Identify and reduce potential conflicts between subject trees and site development by providing accurate information on the area required for tree retention and methods/techniques suitable for tree protection during construction.

3.1.8 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 Tom Axford of ArborSafe Australia Pty Ltd carried out a site inspection of the subject trees on 17 March 2020.

4.1.2 Trees that are the subject of this report were identified during discussions with the Client and associated emailed plans.

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 Andrew Clark, 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. TPZ radius = DBH × 12. (Note "Breast Height" is nominally measured as 1.4m from ground level).

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. 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* (The British Standards Institution, 2012). 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. Other images used within this report have been sourced from ArborPlan or via the internet. The source of all images has been referenced accordingly.

5 Observations

5.1 Aerial Images

Figure 1. Aerial image showing subject site. The larger red line delineates the perimeter of the Cemetery site, while the smaller square identifies the approximate area containing the subject trees that may be impacted by the proposed development. (SIX Maps 2020).

5.2 Site Details

5.2.1 The site was located within the grounds of Frenchs Forest Bushland Cemetery (Figure 1). Specifically, the proposed chapel/function centre area is located close to the main entrance from Hakea Avenue.

5.2.2 Hakea Avenue borders the cemetery to the south-east, with Ashmore Road to the north and Kambora Avenue to the south-west. Residential properties border the western boundary of the cemetery.

5.2.3 The chapel and function centre are on opposing sides of the internal access way, Darwin Avenue, in an area previously used for similar purposes. The northern function centre site is surrounded by existing carparks, memorial areas (north), managed grass areas and landscaped bushland areas. The area of the proposed chapel has an existing building situated on it, along with existing sheds, driveways, landscaped areas and a watercourse along its western boundary, adjacent to Kanooka Way.

5.2.4 The site is located within the Northern Beaches Council Local Government Area (LGA).

5.2.5 The soil landscape is likely to be disturbed, either from previous building, access road development or internment, which is typical of this type of site.

5.3 Heritage/ Botanical/ Environmental Status

5.3.1 The trees were not considered to form part of any heritage listing at a state or local level (NBC, 2020).

5.3.2 The subject tree species were considered common in the local area and as such hold no significant botanical importance.

5.3.3 The proposed development site is within a mapped area of *Waterways and Riparian Lands* and is also part of a designated wildlife corridor. The bush area to the north of the proposed chapel site has been mapped as containing *threatened and high conservation habitat* (NBC, 2020)

Figure 2. Aerial image showing area of mapped threatened and high conservation habitat (NBC, 2020)

5.4 Proposed Construction

5.4.1 Plans of the existing site (Figure 3) and of the proposed development were provided to ArborSafe on 23 March 2020 and include:

- Site Plan – Event Area, FFBC, Issue 6, Hector Abrahams Architects, Oct 2019

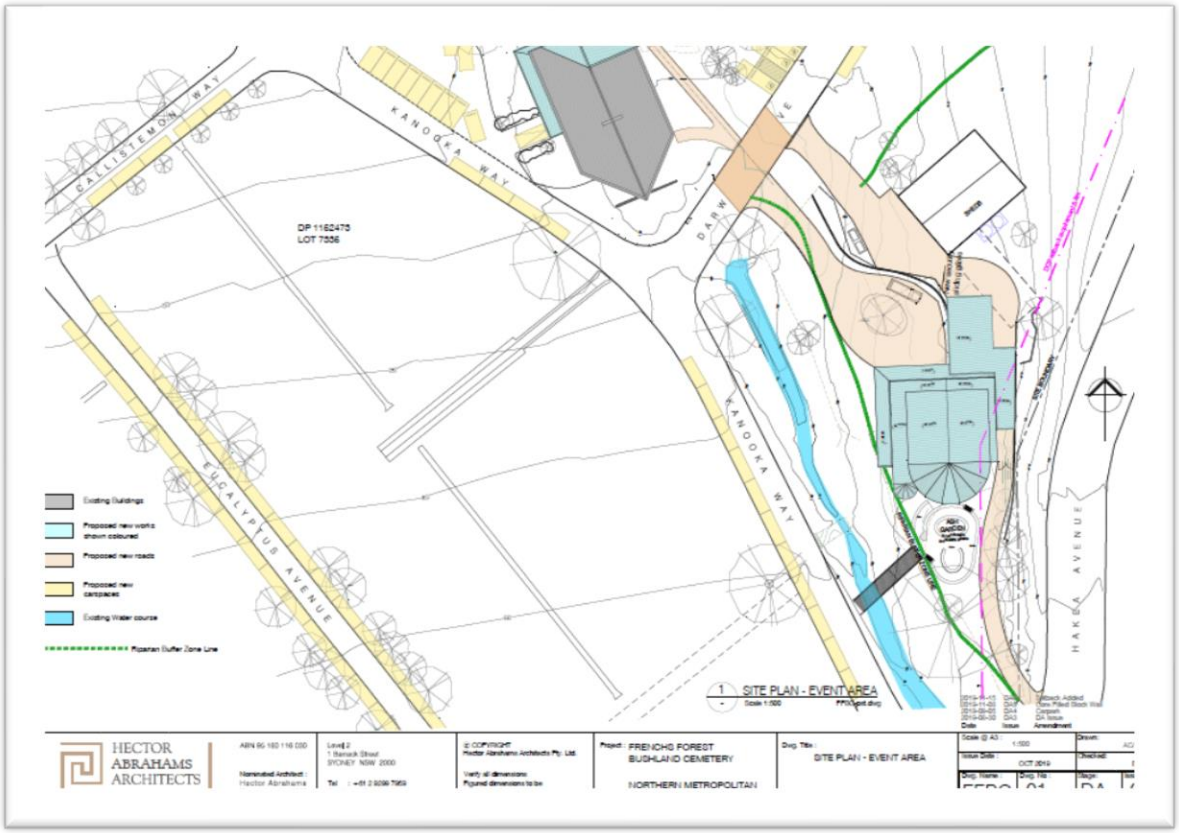


Figure 3. Excerpt from proposed Site Plan – event area (plan no. FFBC, issue 6). (Client, 23 March 2020)

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

- The demolition of the existing residential building and its reconstruction with a new chapel building located across a similar, but expanded, footprint, including a new northern entrance driveway,
- The refurbishment of the existing function centre, including alterations to the northern open courtyard area,
- Resurfacing works on various driveways and carpark areas,
- Landscaping works, including the installation of various pedestrian paths and a pedestrian bridge from the chapel to Kanooka Way,
- The establishment of a new 'Ash Garden', to the south of the proposed chapel.

5.4.3 No proposed underground service locations have been reviewed in the preparation of this report.

5.5 Site Trees

5.5.1 Fifty-seven (57) 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 The project scope has been used in conjunction with the Northern Beaches Council control plans to identify subject trees within the site that require inclusion into the report. Small trees/shrubs within the site may have been omitted from the report based on their species, current size and/or potential future size and contribution to local amenity.

5.5.3 The subject trees form a subset of the existing ArborPlan Tree Management System for the entire Frenchs Forest Bushland Cemetery site. Trees can be identified on site using white tree tags which are typically located at approximately 2.0m from ground level on the southern side of the trunk. All subject trees were located within the grounds of Frenchs Forest Bushland Cemetery.

5.5.4 All subject trees identified within this report are shown in Figure 4.

Figure 4. Site map showing subject trees. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, March 2020).

6 Tree Retention Values

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 based on 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 Four (4) trees were determined to be Category A Trees and are shown in Figure 5. Typically trees in this category are of a 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 but do however possess significant heritage or ecological value. Trees of this retention value warrant design consideration and amendment to ensure their viable retention.

6.2.2 Category A trees are numbered 204 207 281 285.

Figure 5. Aerial image showing location of High Retention Value Trees. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, March 2020).

6.2.3 Tree 204 was a mature *Angophora costata* (Smooth-barked apple myrtle). The tree was located to the south of the proposed chapel site and provides significant amenity value within the landscape.

6.2.4 Tree 204 was of good health and structure and has a life expectancy of greater than fifty years (>50 years).

6.2.5 The TPZ for Tree 204 was 9.6m, with an SRZ of 3.0m, measured at a radial distance from the centre of the trunk.

Figure 6. View to the west of Tree 204 (Smooth-barked apple myrtle) in its growing environment. (Tom Axford, December 2018).

6.2.6 Tree 207 was a mature *Eucalyptus pilularis* (Blackbutt). This was a large tree that provided significant amenity value within the immediate landscape

6.2.7 Tree 207 was of good health and fair structure and has a life expectancy of 25–50 years.

6.2.8 The TPZ for Tree 207 was 15.0m, with an SRZ of 4.1m, measured at a radial distance from the centre of the trunk.

Figure 8. View to the north of Tree 207 (Blackbutt) in its growing environment. (Tom Axford, December 2018).

6.2.9 Tree 281 was an *Angophora costata* (Smooth-barked apple myrtle). The tree was located to the east of the proposed function centre site and provided significant amenity value within the landscape

6.2.10 Tree 281 was of good health and structure and has a life expectancy of 25–50 years.

6.2.11 The TPZ for Tree 281 was 6.6m, with an SRZ of 2.9m, measured at a radial distance from the centre of the trunk.

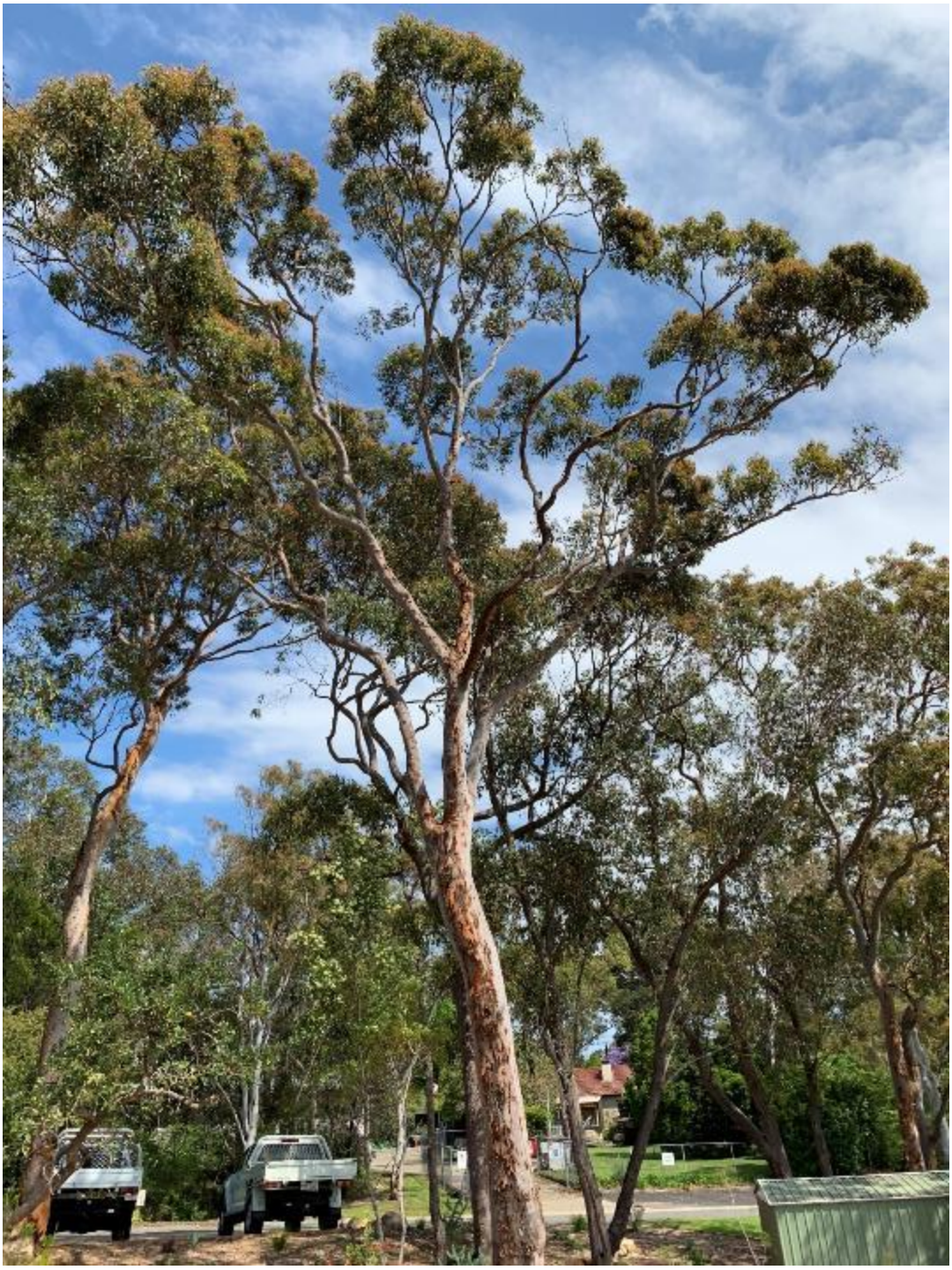


Figure 9. View to the east of Tree 281 (Smooth-barked Apple Myrtle) in its growing environment. (Tom Axford, December 2018).

6.2.12 Tree 285 was an *Angophora costata* (Smooth-barked apple myrtle). The tree was located to the east of the proposed function centre site and provided significant amenity value within the landscape.

6.2.13 Tree 285 was of good health and structure and has a life expectancy of 25–50 years.

6.2.14 The TPZ for Tree 285 was 5.4m, with an SRZ of 2.6m, measured at a radial distance from the centre of the trunk.

Figure 10. View to the north of Tree 285 (Smooth-barked apple myrtle) in its growing environment. (Tom Axford, December 2018).

6.3 Category B Trees (Moderate Retention Value)

6.3.1 Twenty-One (21) trees were considered to have a Moderate Retention Value and are shown in Figure 11. 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 10 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 196 198 203 205 206 212 213 214 217 220 221 223 282 283 286 287 291 292 1568 1569 1621.

Figure 11. Aerial image showing location of Moderate Retention Value Trees. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, March 2020).

6.3.3 Tree 220 is a mature *Eucalyptus scoparia* (Wallangarra white gum). It provided amenity value and shading to the edge of the carparking area to the west of the proposed function centre.

6.3.4 Tree 220 is of moderate size with fair health and good structure with a ULE of 15–25 years.

6.3.5 The TPZ for Tree 220 was 6.6m, with an SRZ of 2.9m, measured at a radial distance from the centre of the trunk.

Figure 12. View to north of Tree 220 (Wallangarra White Gum) in its growing environment. (Tom Axford, December 2018).

6.3.6 Tree 217 is a mature *Eucalyptus scoparia* (Wallangarra white gum). It provided amenity value and shading to the north of the existing chapel building.

6.3.7 Tree 217 is of moderate size with good health and fair structure with a ULE of 15–25 years.

6.3.8 The TPZ for Tree 217 was 7.4m, with an SRZ of 3m, measured at a radial distance from the centre of the trunk.

Figure 14. View to east of Tree 217 (Wallangarra White Gum) in its growing environment. (Tom Axford, December 2018).

6.3.9 Tree 206 is a mature *Syzygium paniculatum* (Magenta brush cherry). It provided amenity value and shading to the south of the existing chapel building along the edge of a natural drainage depression.

6.3.10 Tree 206 is of moderate size with good health and fair structure with a ULE of 25–50 years.

6.3.11 The TPZ for Tree 206 was 4.8m, with an SRZ of 2.4m, measured at a radial distance from the centre of the trunk.

Figure 15. View to the north of Tree 206 (Magenta brush cherry) in its growing environment. (Tom Axford, December 2018).

6.4 Category C Trees (Low Retention Value)

6.4.1 Twenty-Five (25) trees were identified as being Category C Trees and are shown in Figure 17. 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 199 200 202 211 222 1529 1530 1570 1571 1572 1573 1622 1624 1625 1626 1627 1628 1629 1630 1633 1635 1658 1659 1660 1661.

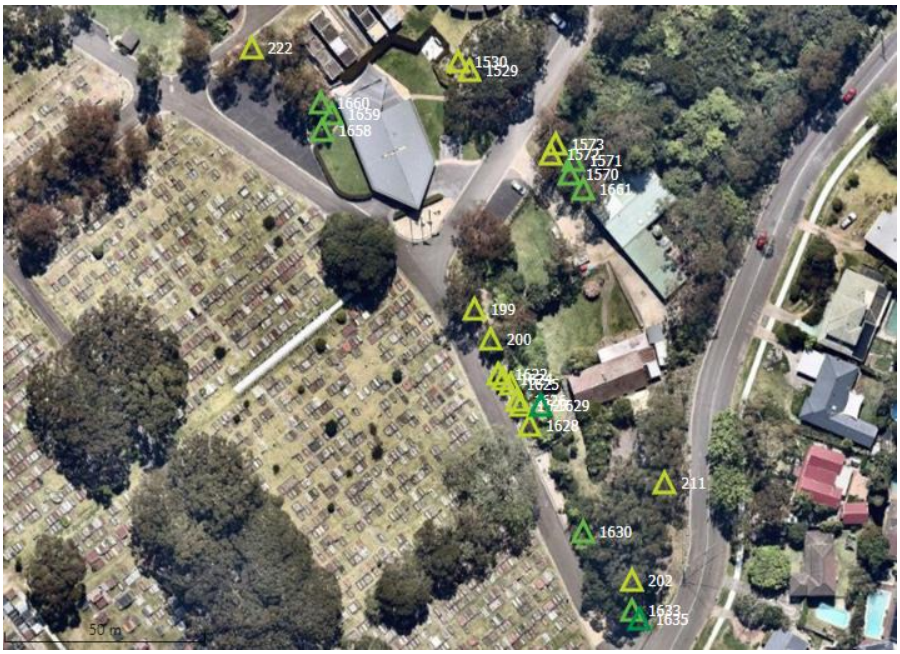


Figure 17. Aerial image showing location of Low Retention Value Trees. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, March 2020).

6.5 Category U Trees (Unsuitable for Retention)

6.5.1 Seven (7) trees were found to be in such a condition that they cannot realistically be retained as viable trees in the context of the current land use for longer than five years. These trees may be dead and/or of a species recognised as a weed that resulted in them being unretainable. These trees should be removed irrespective of any future development on the site and are shown in Figure 18.

6.5.2 Category U Trees were 208 209 284 1623 1631 1632 1634.

Figure 18. Aerial image showing location of Remove Retention Value Trees (Nil/No Retention Value). Note icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, March 2020).

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 careful construction 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 design has been undertaken in the context of tree retention and removal across the site.

7.2.2 The proposed development will significantly impact six (6) site trees identified within this report, either through major encroachment or direct design conflict, to the point they would require removal.

7.2.3 Trees 1658, 1659 and 1660 are juvenile a *Eucalyptus sp*. within the footprint of the function centre, front entrance awning installation or hard landscaping works. These trees could be easily replaced within 3 years and as such are recommended for removal.

7.2.4 Tree 217 is a semi-mature *Eucalyptus scoparia* (Wallangarra white gum) (Figure 14) growing in an inappropriate location to the north of the proposed chapel and adjacent the work shed concrete parking area. It will have a major TPZ encroachment from the proposed new chapel driveway and landscaping works and as such is recommended for removal.

7.2.5 Trees 206 is a mature *Syzygium paniculatum* (Magenta brush cherry) (Figure 15) while Tree 207 is a mature *Eucalyptus pilularis* (Blackbutt) (Figure 8) growing to the south of the proposed chapel. The trees would have a direct footprint conflict with the proposed new Ash Garden and as such have been recommended for removal.

7.2.6 The remainder of the subject trees are outside any direct development areas and can be excluded from any work zones with the use of either perimeter fencing or individual tree protection fencing.

Figure 19. Aerial image showing location of the six (6) trees requiring removal due to major TPZ encroachment Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, 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 should be undertaken using sensitive construction methods such as manual excavation, hydro-vac or air spade.

8 Recommendations

8.1 Tree Removal

8.1.1 Six (6) trees would require removal to facilitate this development. These are:

- One (1) x High retention value (Category A) tree – 207
- Two (2) x Moderate retention value (Category B) trees – 206 and 217
- Three (3) x Low retention value (Category C) trees – 1658, 1659 and 1660.

8.1.2 Seven (7) trees were recommended for removal irrespective of future development on the site. These are trees 208, 209, 284, 1623, 1631, 1632 and 1634.

8.2 Tree Retention

8.2.1 The tree protection methodology for the remaining trees will be exclusion. No retained trees require specific protection measures during construction, to ensure they remain viable following the completion of works, other than to exclude their TPZ from the active work site with the use of either the perimeter fence or individual tree protection fencing.

8.2.2 Any unexpected 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 No specific pruning is required to facilitate this development. Minor canopy reduction pruning may be required to facilitate access.

8.3.2 All pruning is to be undertaken in accordance with the Australian Standard AS 4373–2007: *Pruning of Amenity Trees* (Standards Australia, 2007) and undertaken by a suitably qualified arborist (minimum AQF 3 arborist).

8.3.3 Reduction pruning should 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

8.6.1 Protective fencing is to be installed as far as practicable from the trunk of any retained trees. Fencing should be erected as per the image below before any machinery or materials are brought to site and before commencement of works (including demolition).

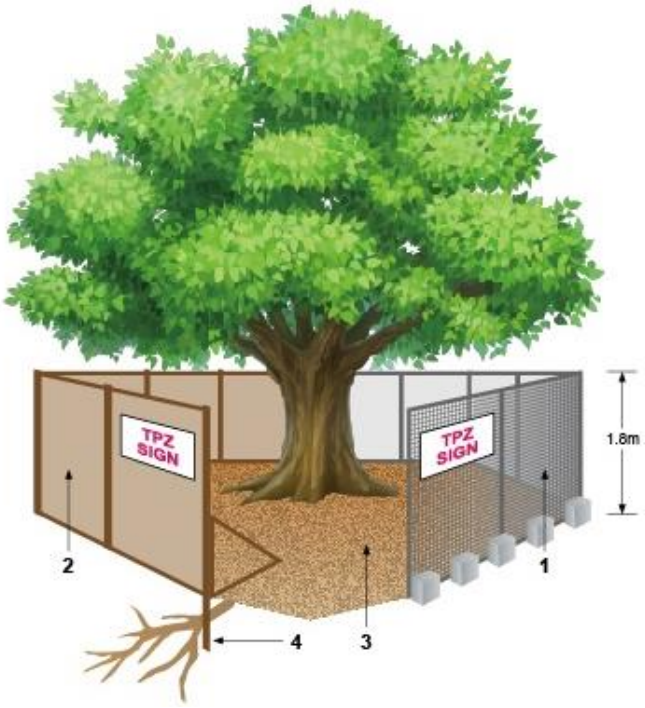
8.6.2 In some areas of the site (i.e. protection of trees on neighbouring properties) existing boundary fencing may be used as an alternative to protective fencing.

8.6.3 Once erected, protective fencing must not be removed or altered without approval from the project arborist. The TPZ fencing should 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 – an example is shown in Figure 20. Fence posts and supports should have a diameter greater than 20mm and should ideally 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 should avoid damaging roots.

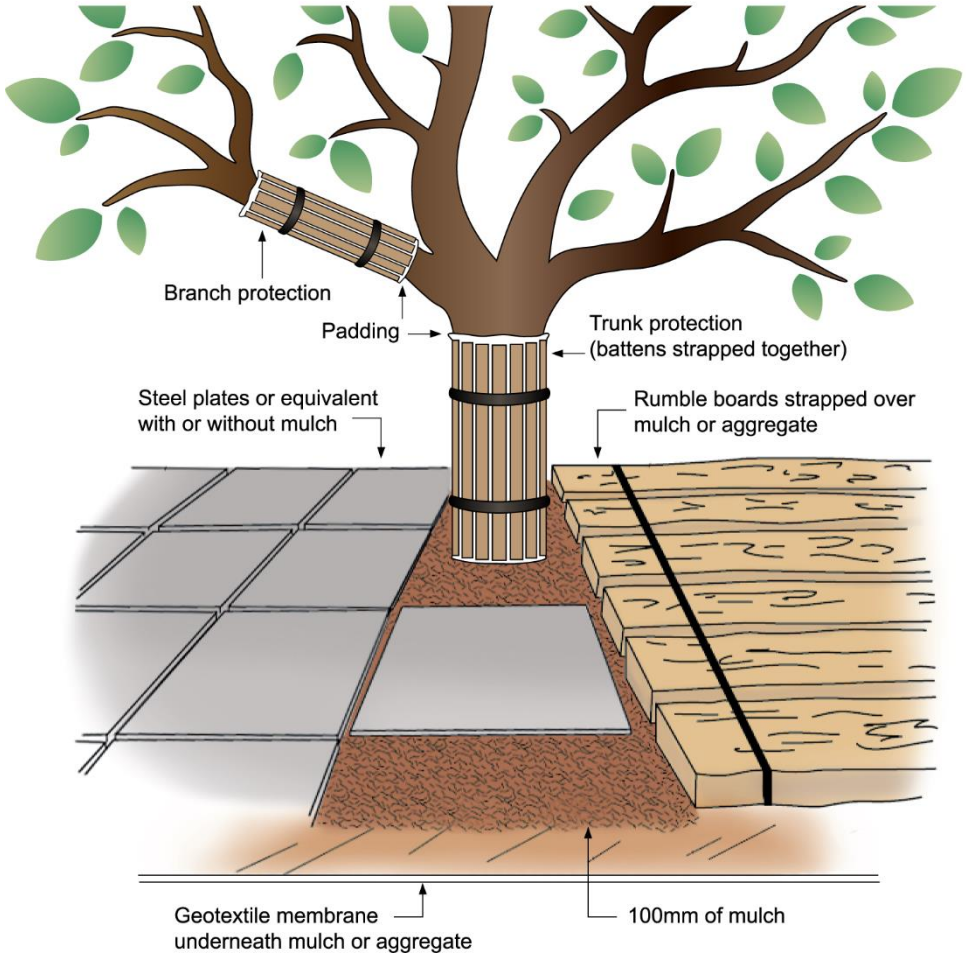
Figure 20. Depicts standard fencing techniques. (AS 4970–2009)

8.7 Trunk and Ground Protection

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 should 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 as shown in Figure 21.

8.7.3 Trunk and ground protection should 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 should be of a suitable thickness to prevent soil compaction and root damage.

Figure 21. Depicts trunk and ground protection techniques. (AS 4970–2009).

8.8 Tree Protection Signs

8.8.1 Signs identifying the TPZ should be placed at 10m intervals around the edge of the TPZ and should be visible from within the development site. An example is shown below in Figure 22.

Figure 22. 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.

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	. 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	Frequency to be determined by the project arborist but suggested to be on a monthly basis. The first inspection is to be at completion of perimeter and TPZ protective fencing installation.	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 should certify whether or not the works have been completed in compliance with the consent relating to tree protection.

8.11.2 These reports should 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 should 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 should contain clear remedial action specifications to minimise any adverse impact on any subject tree.

8.12 Offset Tree Planting

8.12.1 Offset planting should reflect the number of trees removed and the initial loss of amenity and biomass. New trees should 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 arborist supervision is required. Works should 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
3. Excavation using an Air Spade with vacuum truck.

8.13.2 Machine excavation should be prohibited within the TPZs of retained trees unless undertaken at the direct consent from the project arborist and/or the responsible authority.

8.13.3 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.

9 References

- Northern Beaches Council, N. B., 2020. *Planning and Development.* [Online]
  Available at: https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/planning-controls
  [Accessed 24 3 2020].
- Standards Australia, 2007. *AS4373–2007: Pruning of Amenity Trees,* Sydney: Standards Australia.
- Standards Australia, 2009. *AS4970–2009: Protection of Trees on Development Sites,* Sydney: Standards Australia.
- The British Standards Institution, 2012. *BS5837–2012: Trees in relation to design, demolition and construction,* London: BSI Standards Limited.

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 should 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

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.

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

Tree Retention Value: (based upon BS 5837–2012: *Trees in relation to design, demolition and construction* – recommendations)

Category and definition	Criteria (including sub-categories where appropriate)		
Category U			
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.	• Trees that have a severe structural defect that are not remediable such that their failure is expected within 12 months. • 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). • Trees that are dead or are showing signs of significant, immediate and irreversible overall decline. • Trees infected with pathogens of significance to the health and or safety of other trees nearby • Low quality trees suppressing adjacent trees of better quality. • Noxious weeds or species categorised as weeds within the local area. **Note:** Category U trees can have existing or potential conservation value* which might make it desirable to preserve.		
	1. Arboricultural Qualities	**2. Landscape qualities**	**3. Cultural and environmental values**
Category A			
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).
Category 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).
Category C			
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.*

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.*

10.3 Appendix C – Tree Assessment Data

Tree no.	*Botanical Name*	Common Name	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
196	Eucalyptus scoparia	Wallangarra White Gum	1	55	66	6.6	136.85	2.8	10-15	10-15	Fair	Fair	Mature	10-15	Bird browsing damage;Co-dominant stems;Deadwood/stubs < 30mm;Dieback;Epicormic growth;Pests/Insects;Previous failure(s);Wound(s);	Attractive landscape feature;Amenity value/shade;	Northern & eastern TPZ covered/influence by existing carpark & internal rd. 17-03-2020 : tomasafe : Recent 1st order failure upper southern canopy, stub is consistent with storm damage. Unbroken reaction growth surrounds trunk wound which was free from fungal fruiting bodies.	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
198	Eucalyptus capitellata	Brown Stringybark	1	70	70	8.4	221.67	2.8	15-20	10-15	Good	Fair	Mature	15-25	Deadwood/stubs < 30mm;Epicormic growth;Mechanical damage;Poor pruning;Soil grade changes;	Attractive landscape feature;Amenity value/shade;Significant due to age/size;		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
199	Ceratopetalum gummiferum	NSW Christmas Bush	1	35	60	4.2	55.42	2.7	5-10	<5	Fair	Poor	Mature	10-15	Cavity(s);Co-dominant stems;Crossing/rubbing branches;Decay;Epicormic growth;Poor pruning;Weak union(s);Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
200	Ceratopetalum gummiferum	NSW Christmas Bush	1	50	86	6.0	113.10	3.1	5-10	<5	Fair	Poor	Mature	10-15	Cavity(s);Co-dominant stems;Crossing/rubbing branches;Decay;Epicormic growth;Poor pruning;Weak union(s);Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
202	Angophora costata	Smooth-barked Apple Myrtle	1	110	117	13.2	547.39	3.5	5-10	<5	Fair	Poor	Senescent	10-15	Cavity(s);Decay;Epicormic growth;Resin exudation/Kino;Wound(s);	Significant habitat - nests/hollows;Suitable to site conditions;Active nesting by fauna;Significant due to age/size;	30-10-2019 : wdunlop : Tree assessed. Hollowed stem observed to be an active bird habitat. Retain stem for habitat provision.	C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
203	Angophora costata	Smooth-barked Apple Myrtle	1	35	42	4.2	55.42	2.3	5-10	5-10	Fair	Fair	Semi-Mature	15-25	Deadwood/stubs > 30mm;Epicormic growth;Previous failure(s);Suppressed;	Amenity value/shade;		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
204	Angophora costata	Smooth-barked Apple Myrtle	1	80	81	9.6	289.53	3.0	20-30	10-15	Good	Good	Mature	>50	Borers/termites;Mechanical damage to root(s);Previous failure(s);Resin exudation/Kino;Soil compaction;Wound(s);	Suitable to site conditions;Amenity value/shade;Attractive landscape feature;Significant due to age/size;	Care required during driveway resurfacing works. 30-10-2019 : wdunlop : Tree assessed. Compacted ground surface over northern SRZ associated with heavy vehicle access.	A	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
205	Angophora costata	Smooth-barked Apple Myrtle	1	50	74	6.0	113.10	2.9	10-15	10-15	Good	Fair	Mature	25-50	Deadwood/stubs > 30mm;Resin exudation/Kino;Soil erosion;Suppressed;	Amenity value/shade;	Care required during driveway resurfacing works. 30-10-2019 : wdunlop : Tree assessed. No signs of root plate instability. 5-09-2017 : nicknmct : 2017 SEPT Monitor undermining and bank stability.	B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
206	Syzygium paniculatum	Magenta Brush Cherry	1	45	45	5.4	91.61	2.4	10-15	10-15	Good	Fair	Mature	25-50	Deadwood/stubs > 60mm;Hanger(s);Previous failure(s);Soil erosion;Soil problems;Suppressed;Wound(s);	Amenity value/shade;	Impacted by proposed chapel, ash garden, driveway upgrade and associated landscape works.	B	2	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
207	Eucalyptus pilularis	Blackbutt	1	140	170	15.0	706.86	4.1	20-30	20-30	Good	Fair	Mature	25-50	Borers/termites;Deadwood/stubs > 30mm;Epicormic growth;Included bark;Previous failure(s);Resin exudation/Kino;Wound(s);	Dominant landscape feature;Significant due to age/size;Particularly old/venerable;Amenity value/shade;Attractive landscape feature;Outstanding example of species;	Impacted by proposed chapel, ash garden, driveway upgrade and associated landscape works.	A	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
208	Eucalyptus pilularis	Blackbutt	1	35	42	4.2	55.42	2.3	5-10	5-10	Good	Fair	Semi-Mature	10-15	Epicormic growth;Included bark;Mechanical damage;Suppressed;Wound(s);	Amenity value/shade;	jamienmct : 2015 - Tree has little long term potential as its heavily suppressed by dominant adjacent tree. Given the defects and limited potential, removal is recommended.	U		Remove tree irrespective of future development.
209	Callistemon salignus	Willow Bottlebrush	1	40	38	4.8	72.38	2.2	5-10	5-10	Fair	Poor	Semi-Mature	<5	Deadwood/stubs > 30mm;Dieback;Epicormic growth;Poor pruning;Previous failure(s);		9-11-2015 : jamienmct : 2015 - Poor specimen with little long term potential.	U		Remove tree irrespective of future development.
211	Eucalyptus scoparia	Wallangarra White Gum	10	35	40	4.2	55.42	2.3	10-15	5-10	Good	Fair	Semi-Mature	10-15	Epicormic growth;Pests/Insects;Poor pruning;Suppressed;Wound(s);	Amenity value/shade;	Suppressed tree growing over power lines.	C	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
212	Eucalyptus scoparia	Wallangarra White Gum	1	55	63	6.6	136.85	2.7	15-20	10-15	Good	Fair	Mature	15-25	Co-dominant stems;Deadwood/stubs < 30mm;Pests/Insects;Poor pruning;Suppressed;Wound(s);	Amenity value/shade;		B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
213	Corymbia maculata	Spotted Gum	1	35	39	4.2	55.42	2.2	10-15	5-10	Good	Fair	Semi-Mature	15-25	Suppressed;Wound(s);	Amenity value/shade;		B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
214	Eucalyptus saligna x botryoides	Hybrid Sydney Blue Gum	1	50	70	6.0	113.10	2.8	15-20	10-15	Good	Good	Semi-Mature	25-50	Deadwood/stubs > 30mm;Wound(s);	Amenity value/shade;		B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
217	*Eucalyptus scoparia*	Wallangarra White Gum	1	65	82	7.8	191.13	3.0	15-20	10-15	Good	Fair	Semi-mature	10-15	Borers/termites;Co-dominant stems;Deadwood/stubs < 30mm;Mechanical damage to root(s);Pests/Insects;Wound(s); inappropriate location	Attractive landscape feature;Amenity value/shade;	Impacted by Chapel driveway upgrade. 17-03-2020 : tomasafe : Basal borer damage increasing.	B	12	Remove - tree located within proposed development footprint or has major encroachment into its TPZ.
220	*Eucalyptus scoparia*	Wallangarra White Gum	1	65	75	7.8	191.13	2.9	10-15	10-15	Fair	Good	Semi-mature	15-25	Deadwood/stubs > 30mm;Epicormic growth;Pests/Insects;Previous failure(s);Wound(s);	Attractive landscape feature;Suitable to site conditions;Amenity value/shade;	17-03-2020 : tomasafe : Recent 1st order failure upper western canopy, stub is consistent with storm damage.	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).

Tree no.	*Botanical Name*	Common Name	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
221	*Eucalyptus sieberi*	Black Ash	1	95	135	**11.4**	408.28	**3.8**	10-15	10-15	Good	Fair	Mature	10-15	Co-dominant stems;Deadwood/stubs < 30mm;Epicormic growth;Mechanical damage to root(s);Poor pruning;Soil compaction;Wound(s);	Amenity value/shade;	17-03-2020 : tomasafe : Specimen displaying strong vigour. No alternation to structure observed. 30-10-2019 : wdunlop : Tree assessed. No signs of root plate instability. Continue to monitor.	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
222	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	1	25	35	**3.0**	28.27	**2.1**	5-10	5-10	Good	Fair	Semi-Mature	10-15	Co-dominant stems;Deadwood/stubs < 30mm;Included bark;Pests/Insects;Previous failure(s);Soil problems;Wound(s);	Amenity value/shade;		C	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
223	*Eucalyptus scoparia*	Wallangarra White Gum	1	25	39	**3.0**	28.27	**2.2**	10-15	5-10	Good	Good	Semi-Mature	25-50	Co-dominant stems;Resin exudation/Kino;Soil problems;Wound(s);	Amenity value/shade;		B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
281	*Angophora costata*	Smooth-barked Apple Myrtle	1	55	75	**6.6**	136.85	**2.9**	10-15	10-15	Good	Good	Mature	25-50	Co-dominant stems;Epicormic growth;Previous failure(s);Resin exudation/Kino;Wound(s);	Attractive landscape feature;Significant due to age/size;Amenity value/shade;	17-03-2020 : tomasafe : Recent 1st order failure upper northern canopy, stub is consistent with storm damage.	A	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
282	*Angophora costata*	Smooth-barked Apple Myrtle	1	65	87	**7.8**	191.13	**3.1**	10-15	10-15	Good	Fair	Semi-Mature	25-50	Cavity(s);Co-dominant stems;Decay;Resin exudation/Kino;Soil grade changes;Wound(s);	Attractive landscape feature;Amenity value/shade;	29-10-2019 : wdunlop : Tree assessed. Good reaction wood growth around decayed and hollowing stem wound.	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
283	*Eucalyptus capitellata*	Brown Stringybark	1	70	55	**8.4**	221.67	**2.6**	10-15	10-15	Fair	Fair	Mature	5-10	Co-dominant stems;Deadwood/stubs > 30mm;Dieback;Epicormic growth;Soil grade changes;Wound(s);	Attractive landscape feature;Amenity value/shade;	17-03-2020 : tomasafe : Canopy density ~60% with terminal decline developing.	B	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
284	*Corymbia gummifera*	Red Bloodwood	1	15	14	**2.0**	12.57	**1.5**	5-10	<5	Good	Poor	Juvenile	<5	Girdling root(s);Soil grade changes;Suppressed;Wound(s);	Amenity value/shade;	28-08-2018 : tomasafe : Tree assessed. Tree is loose in the ground.	U		Remove tree irrespective of future development.
285	*Angophora costata*	Smooth-barked Apple Myrtle	1	50	54	**6.0**	113.10	**2.6**	10-15	5-10	Good	Good	Mature	25-50	Co-dominant stems;Deadwood/stubs > 30mm;Resin exudation/Kino;	Attractive landscape feature;Significant due to age/size;Amenity value/shade;		A	12	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
286	*Angophora costata*	Smooth-barked Apple Myrtle	1	48	52	**5.8**	104.23	**2.5**	15-20	10-15	Good	Good	Mature	25-50	Deadwood/stubs > 30mm;Wound(s);	Attractive landscape feature;Amenity value/shade;		B	1	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
287	*Eucalyptus sieberi*	Black Ash	2	53	61	**6.4**	127.08	**2.7**	10-15	5-10	Good	Fair	Mature	15-25	Borers/termites;Cavity(s);Deadwood/stubs < 30mm;Decay;Wound(s);	Attractive landscape feature;Amenity value/shade;	29-10-2019 : wdunlop : Tree assessed. No termites were observed during the assessment. Minor signs of termite damage persist. No obvious sign of termite treatment.	B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
291	*Eucalyptus scoparia*	Wallangarra White Gum	1	30	36	**3.6**	40.72	**2.2**	10-15	5-10	Good	Fair	Semi-Mature	15-25	Co-dominant stems;Deadwood/stubs < 30mm;Epicormic growth;Pests/Insects;Wound(s);	Amenity value/shade;	Care required during driveway resurfacing works. 30-10-2019 : wdunlop : Tre assessed. No fungal fruiting bodies present, good wound occlusion. No monitoring required.	B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
292	*Eucalyptus scoparia*	Wallangarra White Gum	1	30	38	**3.6**	39.99	**2.2**	10-15	5-10	Good	Fair	Semi-Mature	15-25	Co-dominant stems;Deadwood/stubs < 30mm;Epicormic growth;Mechanical damage to root(s);Soil grade changes;Wound(s);	Amenity value/shade;Attractive landscape feature;	Care required during driveway resurfacing works.	B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1529	*Eucalyptus sieberi*	Black Ash	1	25	45	**3.0**	28.27	**2.4**	5-10	5-10	Good	Fair	Semi-Mature	15-25	Cavity(s);Epicormic growth;Suppressed;	Amenity value/shade;	29-10-2019 : marcfasafe : Tree assessed. Small stem cavity developing on northern side at 4 meters.	C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1530	*Eucalyptus globoidea*	White Stringybark	1	30	35	**3.6**	40.72	**2.1**	5-10	5-10	Good	Fair	Semi-Mature	15-25	Deadwood/stubs < 30mm;Epicormic growth;Previous failure(s);Suppressed;Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1568	*Angophora costata*	Smooth-barked Apple Myrtle	1	50	56	**6.0**	113.10	**2.6**	15-20	5-10	Good	Fair	Semi-Mature	25-50	Deadwood/stubs < 30mm;Wound(s);	Amenity value/shade;	Care required during driveway resurfacing works.17-03-2020 : tomasafe : Existing TPZ influenced by building and concrete footpath.	B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1569	*Eucalyptus globoidea*	White Stringybark	1	48	51	**5.8**	104.23	**2.5**	10-15	10-15	Fair	Fair	Semi-Mature	15-25	Co-dominant stems;Deadwood/stubs > 100mm;Epicormic growth;Wound(s);	Amenity value/shade;	Care required during driveway resurfacing works.	B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1570	*Allocasuarina littoralis*	Black She-oak	1	11	12	**2.0**	12.57	**1.5**	5-10	<5	Good	Good	Semi-Mature	25-50	Suppressed;Wound(s);	Amenity value/shade;	Care required during driveway resurfacing works.	C	1	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1571	*Allocasuarina littoralis*	Black She-oak	1	12	13	**2.0**	12.57	**1.5**	5-10	<5	Good	Fair	Semi-Mature	15-25	Included bark;Wound(s);	Amenity value/shade;	Care required during driveway resurfacing works.	C	1	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1572	*Eucalyptus sp.*	Eucalypt	1	8	9	**2.0**	12.57	**1.5**	5-10	<5	Fair	Poor	Young	5-10	Abnormal lean;Girdling root(s);Heaved root plate;Suppressed;Uncharacteristic form;Wound(s);	Amenity value/shade;	5-09-2018 : tomasafe : Tree assessed. Tree with short term retention due to heaved root plate.	C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1573	*Eucalyptus sp.*	Eucalypt	1	13	14	**2.0**	12.57	**1.5**	5-10	5-10	Good	Poor	Young	<5	Abnormal lean;Girdling root(s);Heaved root plate;Suppressed;Wound(s);	Amenity value/shade;	5-09-2018 : tomasafe : Tree assessed. Tree with short term retention due to heaved root plate.	C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).

Tree no.	*Botanical Name*	Common Name	Trees in group	DBH Total (cm)	DRB (cm)	Radial TPZ (m)	TPZ area (m2)	Radial SRZ (m)	Tree Height (m)	Canopy (m)	Health	Structure	Age	TLE (Yrs.)	Defects	Significance	Arborist comments	Tree Quality Score	Tree Retention value subcategory	Recommendation
1621	*Eucalyptus scoparia*	Wallangarra White Gum		45	52	**5.4**	91.61	**2.5**	15-20	10-15	Good	Fair	Mature	15-25	Deadwood/stubs < 30mm;Epicormic growth;Pests/Insects;Suppressed;Wound(s);	Amenity value/shade;		B	2	Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1622	*Ceratopetalum gummiferum*	NSW Christmas Bush		15	15	**2.0**	12.57	**1.5**	<5	<5	Fair	Poor	Mature	5-10	Cavity(s);Co-dominant stems;Crossing/rubbing branches;Decay;Epicormic growth;Poor pruning;Weak union(s);Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1623	*Melia azedarach*	White Cedar		15	17	**2.0**	12.57	**1.6**	5-10	<5	Fair	Fair	Juvenile	5-10	Dieback;Epicormic growth;Poor pruning;Soil erosion;Undesirable species;	Weed species;	- 29-10-2019 : marcfasafe : Tree assessed. Self-sown tree on bank, remove.	U		Remove tree irrespective of future development.
1624	*Ceratopetalum gummiferum*	NSW Christmas Bush		15	19	**2.0**	12.57	**1.6**	<5	<5	Good	Poor	Mature	5-10	Cavity(s);Co-dominant stems;Crossing/rubbing branches;Decay;Epicormic growth;Poor pruning;Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).
1625	*Ceratopetalum gummiferum*	NSW Christmas Bush		15	18	**2.0**	12.57	**1.6**	<5	<5	Good	Poor	Mature	5-10	Cavity(s);Deadwood/stubs < 30mm;Decay;Epicormic growth;Poor pruning;Wound(s);	Amenity value/shade;		C		Retain tree with generic protection requirements (i.e. protective fencing and restriction of activities within the TPZ).

10.4 Appendix D – Proposed Tree Protection Plan

Figure 23. Site map showing subject trees recommended for retention. The red lines indicate the proposed location of the perimeter/TPZ fencing which exclude the trees from the work site. Note that icon colour indicates trees current risk rating (not Retention Value). Tree attributes are to be obtained from Appendix C – Tree Assessment Data. (ArborPlan, March 2020).