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Arboricultural Impact Assessment Report V 3.0

Client: Taylor Developments Group Pty Ltd

Job Address: Castle Cove Country Club, 68 Deepwater Road, Castle Cove. NSW. 2069.

Date: 29 November, 2023

RBTS Ref: 17006

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AQF 5 (Diploma of Arboriculture)

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1. Introduction

1.1. This Arboricultural Impact Assessment Report was commissioned by Taylor Developments Group Pty Ltd for the demolition of the existing Castle Cove Country Club clubhouse and the construction of Independent Living Units (ILU) and new clubhouse at 68 Deepwater Road, Castle Cove.

1.2. This report will identify and collect relevant tree data of all surrounding site and any neighbouring trees and discuss the impact of the proposed development on them. The report will include ULE and STARS ratings (IACA Institute of Australian Consulting Arborists, 2019), Tree Protection Zone (TPZ), Structural Root Zone (SRZ) and recommendations for removal, retention and/ or pruning. The architectural designs are preliminary and the information contained within this report will be considered to aid the final design of the development.

2. Methodology

2.1. A site inspection was undertaken on Monday the 7th November 2022 by Principal Arborist Stuart Rennie (AQF Level 5 Consulting Arborist) and Vicki Stride (AQF Level 5 Consulting Arborist) using the method of Visual Tree Assessment (VTA) (Barrell, 2009); industry standard arboricultural assessment methodology. An initial Preliminary Arboricultural Assessment Report was submitted on the 26th November, 2022. This Arboricultural Impact Assessment Report has been updated with revised Architectural Plans. A further site inspection was conducted on Tuesday the 28th November, 2023.

2.2. The tree assessment was undertaken using International Society of Arboriculture (ISA) guidelines.

a. Species were identified using known attributes (e.g. capsules and buds).
b. Tree height was estimated.
c. Diameter at Breast Height (DBH) was measured using diameter tape.
d. Crown spread measurements were paced out.
e. A visual inspection of the condition and vigour of the tree was completed from ground level. No aerial inspection was undertaken. Refer to Appendix A: Tree Data and Assessment Table.

2.3. The client has provided the following documents and/or plans:

a. <u>Architectural Plans:</u>

Company:	ANTONIADES ARCHITECTS
Client:	Castle Cove Country Club
Revision:	A
Project:	22015DA

Drawing	Sheet Name	Revision
DA3.01	Site Plan Overall	A
DA3.02	Club - Ground Level	A
DA3.03	Club - Top of Ground Level	A
DA3.04	Club - Level 1	A
DA3.05	Club – Roof Level	A
DA3.20	Club - Sections	A
DA4.01	Club - South & East Elevations	A
DA4.02	Club – North & West Elevations	A
DA4.51	ILU – Basement Level	A
DA4.52	ILU – Lower Ground	A
DA4.53	ILU – Ground Level	A
DA4.54	ILU – Level 01	A
DA4.55	ILU – Level 02	A
DA4.56	ILU – Roof Level	A
DA5.01	ILU – Sections	A
DA5.02	ILU - Ramp Section	A
DA5.20	ILU – South & East Elevations	A
DA5.21	ILU – North & West Elevations	A
DA6.33	ILU – Soil Calculations	A

b. Survey
   Company: LTS
   Contact: 1300 587 000
   Date: 9/1/2020
   Ref: 50906 001DT 0720 2
   Sheets: 1 to 8
   Project: Plan of Detail and Levels over various Lots. Castle Cove Golf Club

c. Stormwater plans have not been sighted.

2.4. The system used to determine the priority for retention of each tree is the IACA Significance of a Tree Assessment Rating System (STARS), which combines the Useful Life Expectancy and Landscape Significance of all trees assessed. Details can be found in Appendix C: Useful Life Expectancy (ULE) and Appendix D: IACA Significance of a Tree Assessment Rating System (STARS).

2.5. The zones of protection (Structural Root Zone - SRZ and Tree Protection Zone - TPZ) are calculated using the formulas found in the Australian Standard AS 4970-2009 *Protection of trees on development sites* (Standards Australia, 2009). Refer to Appendix C: Useful Life

Expectancy (ULE) and Appendix D: IACA Significance of a Tree Assessment Rating System (STARS).

2.6. The tree protection measures in this report are based on those found in the Australian Standard AS4970-2009 *Protection of trees on development sites* (Standards Australia, 2009). An excerpt from AS 4970-2009 has been provided in Appendix E: Tree Protection.

2.7. This report refers to the Willoughby Council Environmental Plan 2012; the Willoughby City Council Development Control Plan 2006, Part C. 9. Natural Resource Vegetation Management, Willoughby City Council Development Control Plan (Willoughby City Council, 2020); Willoughby City Council Vegetation Management Guidelines (Willoughby City Council, 2020).

2.8. Replacement trees: Where Council consents to the removal of an existing tree it will require the replanting of trees at a rate of 3:1. Replacement trees are to be cared for by the landowner until established to a size which is covered by the vegetation controls (Willoughby City Council, 2020).

2.9. Photographs are provided in Appendix F: Photographs.

2.10. Plans are provided in Appendix G: Plans.

3. Standards

3.1 *Rennie Bros* Tree Surgeons provide an ethical, unbiased approach to all assignments.

3.2 All tree works recommended in this report are to be in accordance with the appropriate authorities and comply to relevant Australian Standards.

3.3 Standards used during this assessment and referred to throughout this report are the Australian Standards:

- AS 4970-2009 *Protection of trees on development sites* (Standards Australia, 2009) and
- AS 4373-2007 *Pruning of Amenity Trees* (Standards Australia, 2007).

3.4 Any tree works recommended in this report are to be conducted in accordance with:

- Australian Standard AS 4373-2007 *Pruning of Amenity Trees* (Standards Australia, 2007).
- Work Health and Safety Act 2011 (WHS Act) and Work Health and Safety Regulations 2011 (WHS Regulation) (Australian Government, 2011).

4. Assessment

4.1. The Proposed Development: This Preliminary Arboricultural Assessment Report was commissioned by Taylor Developments Group Pty Ltd for the demolition of existing Castle Cove Country Club clubhouse and the construction of Independent Living Units (ILU) also referred to as Seniors Living Development (SLD) and new clubhouse at 68 Deepwater Road, Castle Cove.

The ILU or Seniors Living Development will be positioned on the upper elevated area of the site with access via Deepwater Road through an access vehicle ramp and pedestrian walkway adjacent to a neighbouring property on the eastern boundary. It is currently proposed that the building will consist of 17 ILU's across two levels and a basement carpark.

The golf clubhouse will be constructed on the lower portion of the site, directly adjacent to Deepwater Road for ease of access to the facility. It is proposed to have an on-grade ground floor carpark with access via Deepwater Road. There will be one single upper level above the carpark that will serve as the main club area and include facilities such as a function / dining space, kitchen, bathroom amenities, pro shop, buggy store and workshop. The Club on the upper level will sit at consistent levels with the existing golf course for ease of access on and off the course (Taylor Developments Group Pty Ltd, 2022).

4.2. Site Description: The site is currently occupied by three-level brick building on the upper area of the site. There is a rock embankment behind the clubhouse with a neighbouring two-storey unit development situated in an elevated position. There is a bitumen carpark below a large rocky outcrop at street level. There is a senior's development under construction to the east adjacent to the upper level of the site.

4.3. Summary of Trees:

a. This report considers forty-five (45) trees:

i. There are twenty-seven (27) site trees:

Tree 2- *Tristaniopsis laurina* Tree 3- *Tristaniopsis laurina*
Tree 4- *Tristaniopsis laurina* Tree 5- *Tristaniopsis laurina*
Tree 6- *Tristaniopsis laurina* Tree 7- *Tristaniopsis laurina*
Tree 8- *Eucalyptus saligna* Tree 9- *Tristaniopsis laurina*
Tree 27- *Salix species* Tree 28- *Jacaranda mimosifolia*
Tree 29- *Lagerstroemia indica* Tree 30- *Tristaniopsis laurina*
Tree 31- *Ligustrum lucidum* Tree 32- *Ficus rubiginosa*
Tree 33- *Allocasuarina littoralis* Tree 34- *Oleo europaea subsp. cuspidata*
Tree 35- *Cotoneaster species* Tree 36- *Oleo europaea subsp. cuspidata*
Tree 37- *Oleo europaea subsp. cuspidata* Tree 38- *Eucalyptus species*
Tree 39- *Casuarina species* Tree 40- *Banksia integrifolia*
Tree 41- *Acacia mearnsii* Tree 42- *Acacia mearnsii*
Tree 43- *Corymbia gummifera* Tree 44- *Acacia mearnsii*
Tree 45- *Cupressus macrocarpa* Brunniana

ii. There are seventeen (17) Council trees:

Tree 1- *Callistemon viminalis*
Tree 10- *Banksia integrifolia*
Tree 11- *Tristaniopsis laurina*
Tree 12- *Melaleuca quinquenervia*
Tree 13- *Banksia integrifolia*
Tree 14- *Banksia integrifolia*
Tree 15- *Casuarina cunninghamiana*
Tree 16- *Eucalyptus species*
Tree 17- *Casuarina cunninghamiana*
Tree 18- *Casuarina cunninghamiana*
Tree 19- *Banksia integrifolia*
Tree 20- *Banksia integrifolia*
Tree 21- *Casuarina cunninghamiana*
Tree 22- *Casuarina cunninghamiana*
Tree 23- *Banksia integrifolia*
Tree 24- *Casuarina cunninghamiana*
Tree 25- *Banksia integrifolia*

iii. There is one (1) neighbouring tree:
Tree 26- *Eucalyptus scoparia*

b. Retention Value of Trees Assessed:
The trees were assessed utilising the IACA Significance of a Tree, Assessment Rating System (STARS)©. The ULE and landscape significance of an individual tree are then cross-referenced in a matrix to determine the retention value of a tree, refer to Appendix C: Useful Life Expectancy (ULE) and Appendix D: IACA Significance of a Tree Assessment Rating System (STARS).

i. One (1) tree was considered to have a High STARS Rating: T8.
Trees with a High Priority for Retention trees are considered important for retention as they are of medium or high significance and have a medium to long useful life expectancy. These trees are considered important for retention and should be retained and protected. Tree sensitive construction measures must be implemented, e.g. pier and beam, etc. if works are to proceed within the Tree Protection Zone. Refer to Retention Value Plan in Appendix G: Plans.

ii. Twenty (20) trees were considered to have a Medium STARS Rating: T1, T2, T3, T4, T5, T6, T7, T9, T10, T11, T12, T13, T14, T17, T18, T20, T23, T25, T26, T40.
Trees with a Medium STARS Rating are trees that should be considered for retention. These are considered less critical; however, their retention should remain a priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted. Refer to Retention Value Plan in Appendix G: Plans.

iii. Twenty-four (24) trees were considered to have a Low STARS Rating: T15, T16, T19, T21, T22, T24, T27, T28, T29, T30, T31, T32, T33, T34, T35, T36, T37, T38, T39, T41, T42, T43, T44, T45.
These trees by definition are not considered important for retention, nor require special works or design modifications to be implemented for their retention. These trees have a shorter life expectancy, and many are small/young enough to be replaced. Refer to Retention Value Plan in Appendix G: Plans.

4.4. The Proposed Development and Impact to Trees: The Australian Standard AS 4970-2009 `*Protection of Trees on Development Sites'* is used to calculate each tree's zone of protection (TPZ and SRZ). The Tree Protection Zone (TPZ) is the area surrounding the tree, measured as a radius, required to maintain tree vigour and the Structural Root Zone (SRZ) is the area required for tree stability. These nominal calculations are to be used as a guide to aid design and need to be considered on a case-by-case basis due to asymmetric root patterns, sloping sites, natural rocky outcrops and elevation changes. Refer to TPZ Encroachment Plan in Appendix G: Plans.

The trees have been grouped according to their geographical site locations to simplify the discussion. Trees requiring removal will require Council approval unless they are listed as exempt species or less than 4m in height as determined by Council. Tree locations are based on the survey provided and the Arborist has plotted some extra trees. The locations are detailed in the Tree Location Plan in Appendix G: Plans.

a. Group 1 includes nine (9) trees: T1, T2, T3, T4, T5, T6, T7, T8, T9. These site trees form an informal row of trees along the western side of the existing carpark on Deepwater Road. These trees are not visually prominent.
   i. Eight (8) trees within this group are conflicted by the proposal and require removal: T1, T2, T3, T4, T5, T6, T7, T8. The author considers the Water Gums not to be visually prominent and could be replaced with more suitable long-lived specimens elsewhere on site. T9 is the best specimen of the group of Water Gums, is not impacted by the proposal and can be retained.
   ii. One (1) tree T8 Sydney Blue Gum has a High retention value, however is semi-mature and could be replaced with an advanced specimen (minimum 3mH) of the same species in a location suitable for long-term growth.

b. Group 2 includes sixteen (16) trees: T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25. These Council trees are growing within the grass verge along Deepwater Road. The trees are over-crowded by adjacent trees with many self-sown *Casuarina*'s arising from the parent *Casuarina,* T18. These trees have a Low to Medium retention values and due to their fair to poor condition and smaller size could easily be replaced with more suitable, longer-lived species in alternative locations on site.
   i. All of these trees can be retained due to the proposal except for T12 which will be conflicted by the driveway entrance and requires removal. Council approval is required for removal.
   ii. The Arborist recommends this group of trees are replaced with longer-lived species to improve the landscape design of the site. All of these trees have a Low STARS rating and are not important to retain. The trees could be replaced with longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.

c. Group 3 includes five (5) trees: T26, T27, T28, T29, T30.

i. Four (4) trees will be conflicted by the proposal and require removal, T27, T28, T29 and T30. T27 is an exempt species and can be removed without Council approval (Willoughby City Council, 2020), Council approval will be required to remove T28, T29 and T30.

ii. T26 is a neighbouring tree with a Medium retention value. The tree will have a TPZ encroachment of 27.4% due to the driveway, crossover and entrance pathway. This is a major TPZ encroachment as defined by AS 4970-2009 Protection of trees on development sites (Standards Australia, 2009). The drawing 'Section Through Ramp-Excavation' in Appendix G: Plans shows the planned excavation ranges from 360mm at the southern end of the TPZ to 1480mm at the northern edge of the TPZ. It is likely this tree would be impacted by the proposal. For this tree to be retained, the Arborist recommends the following;

    1 Any excavated encroachment within the TPZ should be reduced to less than 10%. This is defined as a minor and allowable TPZ encroachment by AS 4970-2009 Protection of trees on development sites (Standards Australia, 2009).

    2 Maintain as much of the existing levels within the TPZ as possible to prevent root severance and compaction.

    3 Remove the existing carpark bitumen carefully within the TPZ to prevent damage within the zone where the majority of roots occur. Deviations were observed in the surface of the bitumen indicating the presence of tree roots close to the surface. A large fraction of the root systems of trees are concentrated in the surface soil layers (within 1 metre of the ground surface) and substantial amounts of the root system can occur well beyond the perimeter of the leaf canopy. These features of the root system mean that the root systems of trees are vulnerable to any form of excavation within the zone where the majority of roots occur. Because of the concentration of tree roots in surface soils, even minor digging without due care can cause significant damage to the root system of a tree.

    4 Design the driveway, crossover and entrance pathway on the existing grade or supported on piers to provide a minimum clearance of 100mm above the roots, ideally creating a void between the ground and roots. This design will allow for the essential exchange of gases between the soil air and the atmosphere (aeration) and the removal of excess water from the soil (drainage). The roots must be protected to prevent damage by blue metal and the alkaline impact of wet cement. A suitable material to cover the roots is polyethylene expandable joint and space filler (for example AbelFlex). Roots should be protected prior to the construction of the driveway and crossover.

    5 Pruning will be required to remove two (2) lower secondary branches extending to the north-west to provide clearance for vehicles using the driveway. Further pruning may be required to provide access for small trucks to a maximum of 2.8mH. Pruning should provide minimal clearances only, be completed by an AQF Level 3 qualified Arborist (minimum

requirement) and be in accordance with AS 4373-2007 Pruning of amenity trees (Standards Australia, 2007).

6 If this tree is to be removed, then Council and neighbour approval is required.

d. Group 4 includes eight (8) trees: T31, T32, T33, T34, T35, T36, T37, T38. These site trees are growing on or below a steep embankment below the existing brick clubhouse at the rear of the site. The trees are over planted in an area with limited soil volume. All trees have a Low retention value, are not important to retain and could be replaced with better specimens.
   i. Four (4) trees will be conflicted by the proposal and require removal: T31, T32, T33 and T35. All other trees in this group are not impacted by the proposal, however, all have Low retention values, are not important to retain and could be replaced with longer-lived species.
   ii. Five (5) trees T31, T34, T35, T36, T37 are exempt species and can be removed without Council approval.
   iii. T38 is a semi-mature *Eucalyptus species* growing on the side of an embankment with limited soil volume. The Arborist recommends replacing this tree with a better specimen in a location suitable for long-term growth. Council approval is required for removal.

e. Group 5 includes seven (7) trees: T39, T40, T41, T42, T43, T44, T45. These site trees are growing on or below a rocky embankment along the northern boundary behind the existing three storey brick clubhouse and access road.
   i. All seven (7) trees are conflicted by the proposal and require removal.
   ii. One (1) tree T39 is dead and can be removed without Council approval.
   iii. One (1) tree T41 has borer damage and is in poor condition.
   iv. There trees could be replaced with longer-lived indigenous or endemic species in locations suitable for long-term growth.
   v. Council approval is required for removal.

4.5. Replacement trees:

a. It is noted that where Council consents to the removal of an existing tree it will require the replanting of trees at a rate of 3:1. Replacement trees are to be cared for by the landowner until established to a size which is covered by the vegetation controls (Willoughby City Council, 2020). Council approval is required for removal for all trees other than trees that are exempt due to species or size.

b. Suitable tree species will provide long-term softening of the built form as well as providing habitat for local birds and wildlife.

Recommended replacement species include those listed by Willoughby City Council and include:

Acacia linifolia, *Acmena smithii, Acmena smtihii var. minor, Allocasuarina littoralis, Angophora costata, Angophora hispida, Backhousia myrtifolia, Banksia ericifolia, Banksia integrifolia, Banksia marginata, Banksia serrata, Callistemon spp; Ceratopetalum gummiferum, Corymbia gummifera, Eucalyptus capitellata, Eucalyptus crebra, Eucalyptus haemastoma, Eucalyptus piperita, Eucalyptus racemosa, Eucalyptus sieberi, Glochidion ferdinandi, Jacaranda mimosifolia* and *Tristaniopsis laurina spp* (Willoughby Council, 2014), (Willoughby Council, 2022).

5. Conclusion

5.1. This Arboricultural Assessment Report was commissioned by Taylor Developments Group Pty Ltd for the demolition of the existing Castle Cove Country Club clubhouse and the construction of Independent Living Units and new clubhouse at 68 Deepwater Road, Castle Cove. A Preliminary Arboricultural Assessment Report was submitted on 26th November, 2022 to provide design recommendations. This report considers the impact to forty-five (45) trees:

a. There are twenty-seven (27) site trees: T2, T3, T4, T5, T6, T7, T8, T9, T27, T28, T29, T30, T31, T32, T33, T34, T35, T36, T37, T38, T39, T40, T41, T42, T43, T44 and T45.
b. There are seventeen (17) Council trees: T1, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24 and T25.
c. There is one (1) neighbouring tree: T26.

5.2. The trees were assessed utilising the IACA Significance of a Tree Rating System (STARS).

a. One (1) tree has a High STARS rating: T8.
b. Twenty (20) trees have a Medium STARS rating: T1, T2, T3, T4, T5, T6, T7, T9, T10, T11, T12, T13, T14, T17, T18, T20, T23, T25, T26, T40.
c. Twenty-four (24) trees have a Low STARS rating: T15, T16, T19, T21, T22, T24, T27, T28, T29, T30, T31, T32, T33, T34, T35, T36, T37, T38, T39, T41, T42, T43, T44, T45.

5.3. The following trees can be retained under the proposal;

a. Five (5) site trees: T9, T34, T36, T37, T38 will not be impacted by the proposal and can be retained.
    i. Three (3) of these trees are exempt species, T34, T36, T37 and can be removed without Council approval.
    ii. One (1) of these trees, T38 is growing on the side of an embankment with limited soil volume. This tree could be considered for removal and replacement. Council approval is required for removal.
    iii. Tree protection requirements are noted in Section 6. Tree Protection Requirements.
b. Fifteen (15) Council trees can be retained however, will be restricted in reaching their full potential as they are growing in overcrowded zones with limited soil volume: T10, T11, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25. These trees could be considered for removal and replacement with indigenous or endemic species listed by Willoughby Council in locations suitable for long-term growth (Willoughby Council, 2014), (Willoughby Council, 2022).

5.4. The following trees would need to be removed under the proposal;

a. Twenty-four (24) trees: T1, T2, T3, T4, T5, T6, T7, T8, T12, T27, T28, T29, T30, T31, T32, T33, T35, T39, T40, T41, T42, T43, T44, T45 are conflicted by the proposal and require removal.
    i. Three (3) of these trees are exempt species and can be removed without Council approval: T27, T31, T35.
    ii. One (1) tree, T39 is dead and does not require Council approval for removal.
    iii. One (1) tree, T41 is in poor condition with borer damage and is recommended for removal and replacement regardless of the proposal. Council approval is required for tree removal.

5.5. The following tree will have its Tree Protection Zone (TPZ) encroached upon; T26

a. One (1) neighbouring tree, T26 will have an excavated TPZ encroachment of 27.4% due to the driveway, crossover and entrance pathway and will be impacted by the proposal. This is a major TPZ encroachment as defined by AS 4970-2009 Protection of trees on development sites (Standards Australia, 2009). Refer to Drawing 'Section Through Ramp – Excavation' and 'TPZ Encroachment Plan' in Appendix G: Plans for the depth of excavation and TPZ encroachment percentage. The TPZ and SRZ can tolerate encroachment, however, a limitation of encroachment exists before detriment occurs. This is based on the AS4970, *major/minor encroachment* for the zones of protection. A tree is not expected to remain viable beyond a 10% loss of its TPZ without due consideration and/or tree sensitive construction/ demolition techniques (Standards Australia, 2009). It is likely that this tree would be impacted by the proposal.
b. To retain this tree the following design changes are recommended:
    i. Reduce the excavated encroachment within the TPZ to less than 10%. This is defined as a minor and allowable TPZ encroachment by AS 4970-2009 Protection of trees on development sites (Standards Australia, 2009).
    ii. Maintain as much of the existing levels within the TPZ as possible to prevent root severance and compaction.
    iii. Remove the existing carpark bitumen carefully within the TPZ to prevent damage within the zone where the majority of roots occur. Deviations were observed in the surface of the bitumen indicating the presence of tree roots close to the surface. A large fraction of the root systems of trees are concentrated in the surface soil layers (within 1 metre of the ground surface) and substantial amounts of the root system can occur well beyond the perimeter of the leaf canopy. These features of the root system mean that the root systems of trees are vulnerable to any form of excavation within the zone where the majority of roots occur. Because of the concentration of tree roots in surface soils, even minor digging without due care can cause significant damage to the root system of a tree.
    iv. Design the driveway, crossover and entrance pathway on the existing grade or supported on piers to provide a minimum clearance of 100mm above the roots, ideally creating a void between the ground and roots. This design will allow for the essential exchange of gases between the soil air and the atmosphere (aeration)

and the removal of excess water from the soil (drainage). The roots must be protected to prevent damage by blue metal and the alkaline impact of wet cement. A suitable material to cover the roots is polyethylene expandable joint and space filler (for example AbelFlex). Roots should be protected prior to the construction of the driveway and crossover.

v. Pruning will be required to remove two (2) lower secondary branches extending to the north-west to provide clearance for vehicles using the driveway. Further pruning may be required to provide access for small trucks to a maximum of 2.8mH. Pruning should provide minimal clearances only, be completed by an AQF Level 3 qualified Arborist (minimum requirement) and be in accordance with AS 4373-2007 Pruning of amenity trees (Standards Australia, 2007).
vi. If this tree is to be removed then Council and neighbour approval is required for removal.

5.6. Replacement tree species: Suitable tree species will provide long-term softening of the built form as well as providing habitat for local birds and wildlife. Recommended replacement species include those listed by Willoughby City Council and include:
Acacia linifolia, *Acmena smithii, Acmena smtihii var. minor, Allocasuarina littoralis, Angophora costata, Angophora hispida, Backhousia myrtifolia, Banksia ericifolia, Banksia integrifolia, Banksia marginata, Banksia serrata, Callistemon spp; Ceratopetalum gummiferum, Corymbia gummifera, Eucalyptus capitellata, Eucalyptus crebra, Eucalyptus haemastoma, Eucalyptus piperita, Eucalyptus racemosa, Eucalyptus sieberi, Glochidion ferdinandi, Jacaranda mimosifolia* and *Tristaniopsis laurina spp* (Willoughby Council, 2014), (Willoughby Council, 2022).

6. Tree Protection Requirements

The following recommendations are required to ensure successful tree protection for any tree to be retained.

6.1 Prior to commencement of works;

a. An AQF 5 Project Arborist shall be enlisted and engaged prior to and throughout the construction. A site meeting prior to commencement of works is recommended between the Site Manager to discuss the necessary Tree Protection Plan. Tree protection is to form part of all site worker's induction.
b. Tree Protection Fencing is to be installed as much of the TPZ of T9, T10, T11, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25 and T26 as practical (if trees are retained). See the excerpt from AS4970 in Appendix E. Fencing shall be 1.8m high chain mesh material temporary fencing. The purpose of the fencing is to protect the trees' roots, trunk and branches, and minimize the impact on the trees during construction.
c. Fasten a sign on the fencing stating `Tree Protection Zone - Do not enter' so contractors are aware. Signage to also include the Arborist's contact details.
d. The builder must confirm the location of a material storage area outside the TPZ of trees to be retained. This is to ensure there is no damage to trees to be retained.
e. The Project Arborist must certify that the above measures are in place prior to commencement of works.

6.2 During works;

a. The contractors shall ensure that during site works, the following activities shall not take place within the TPZ to prevent toxicity to the soil; preparation of chemicals, including cement products, refuelling, dumping of waste, wash down and cleaning of equipment or physical damage to any part of a tree.
b. Retain existing levels within the TPZ of trees to be retained. The reason for this is that tree roots are generally a lot closer to the surface than what is commonly thought and raising soil levels is likely to suffocate roots.
c. The Project Arborist must oversee critical works within the Tree Protection Zones (TPZ) of all trees to be retained. If roots greater than 50mm in diameter are exposed, the Arborist will decide if roots can be cut. Roots to be cut should be done so cleanly using hand tools, then covered in hessian and kept moist to prevent them from drying out.
d. Underground services should be routed outside of the TPZ if possible. If underground services are required through the TPZ such as stormwater and other utilities (gas, water, optic fibre, electricity), Arborist Supervision will be necessary during excavation to determine whether roots will be affected and whether the loss of those roots, if any, are likely to affect tree vigour and/or stability. Hand digging and/or under boring may be necessary.
e. During earthworks and construction, it is important to irrigate the area within the TPZ at least twice a week or when required. To further help improve the conditions for trees being retained, apply Seasol to the soil within the dripline at the rate prescribed by the label. Seasol will promote root growth and help minimise any impact caused by the development.

6.3 Post construction;

a. The Project Arborist should assess trees upon completion of all construction and landscaping and certify that the completed works have been carried out to the tree protection specifications.
b. Once all construction has been completed remaining tree protection measures can be removed.
c. Provide recommendations for any remedial works if required.

Please feel free to contact the Author if you have any questions.

Regards

Stuart Rennie
AQF 5 (Diploma of Arboriculture)

Disclaimer: The inspection undertaken by our qualified staff relies on visual attributes of tree vigour and structure, which can be assessed from a ground-based inspection. Hidden defects, which are not readily visible, may not be detected. We therefore cannot wholly guarantee the condition and safety of the trees inspected beyond what can be reasonably assessed from the procedure used.

Any protection or preservation methods recommended are not a guarantee of tree survival or safety but are designed to improve vigour and reduce risk. Timely inspections and reports are necessary to monitor the trees' condition. No responsibility is accepted for damage or injury caused by the trees and no responsibility is accepted if the recommendations in this report are not followed.

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

Any tree work recommended in this report is to be conducted in accordance with: Australian Standards – AS4373; `Pruning of Amenity Trees', Work Health and Safety Act 2011 (WHS Act) and Work Health and Safety Regulation 2011 (WHS Regulation). All tree works recommended in this report must be carried out under the supervision of a minimum AQF 3 Arborist. All tree work recommended in this report are to be in accordance with the appropriate authorities.

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Appendix A: Tree Data and Assessment Table

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T1	*Callistemon viminalis* Weeping Bottlebrush Native	Multi DBH= 0.25	6	M	G	F	C SYM 6 x 6	A2	Medium	Medium	1.9	3.0	Remove, conflicted by the proposal
Assessment: • Council tree located to north-western corner of the lower bitumen carpark on Deepwater Road. Photo 1. • The tree is codominant at 1m and has been pruned on the south-eastern aspect at 0.5m. The upper branches have been pruned at 2m. • The tree is part of an informal row of trees along the western side of the carpark. • The tree is conflicted by the proposal and will require removal. • The tree could be replaced with a species selected from the Willoughby Council native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T2, T3, T4, T5, T6	*Tristaniopsis laurina* Water Gum Native	Multi DBH=0.3	6	M	G	F	C SYM 6 x 6	A2	Medium	Medium	2.0	3.6	Remove, conflicted by the proposal
Assessment: • Site trees located on the western side of the lower bitumen carpark on Deepwater Road. Photos 1, 2. • The trees are part of an informal row of trees. • This species is a recommended street tree species by Willoughby Council, however, the trees are not visually prominent and could be replaced with longer-lived species selected from the Willoughby Council native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • The trees will be conflicted and require removal due to the proposal. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T7	*Tristaniopsis laurina* Water Gum Native	Multi DBH=0.3	5	M	G	F	C SYM 6 x 6	A2	Medium	Medium	2.0	3.6	Remove, conflicted by the proposal
Assessment: • Site tree located on the western side of the lower bitumen carpark on Deepwater Road. Photos 1, 2. • The tree is part of an informal row of trees. • This species is a recommended street tree species by Willoughby Council, however, the trees are not visually prominent and could be replaced with longer-lived species selected from the Willoughby Council native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • The tree is conflicted by the proposal and will require removal. • Council approval is required for removal.													
T8	*Eucalyptus saligna* Sydney Blue Gum Native	0.3	10	SM	G	G	D SYM 8 x 8	A1	Medium	High	2.0	3.6	Remove, conflicted by the proposal
Assessment: • Site tree located on the western side of the lower bitumen carpark on Deepwater Road. Photos 1, 2. • The tree is semi-mature and less than 15 years old. • The tree is growing behind (to the west) of the row of Water Gums. • The tree is conflicted by the proposal and will require removal. The Arborist recommends replacing with a mature specimen of the same species (minimum 3m High) in a location suitable for long-term growth. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T9	*Tristaniopsis laurina* Water Gum Native	0.4	8	M	G	G	C SYM 7 x 7	A2	Medium	Medium	2.3	4.8	Retain not impacted by the proposal
Assessment: • Site tree located on the western side of the lower bitumen carpark on Deepwater Road. Photo 2. • This is the largest of the Water Gums and is at the southern end of the informal row of trees. • The tree is not impacted by the proposal and can be retained.													
T10	*Banksia integrifolia* Coastal Banksia Native	0.45	10	M	G	F	C SYM 7 x 7	A2	Medium	Medium	2.5	5.4	Retain due to the proposal. Consider replacement.
Assessment: • Council tree located on the grass verge on Deepwater Road. Photos 2, 3. • The tree is not growing in a location suitable for long-term growth due to overcrowding by adjacent trees and could be replaced with a species selected from the Willoughby Council native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • The tree is not impacted by the proposal and can be retained.													
T11	*Tristaniopsis laurina* Water Gum Native	0.35	8	M	G	G	C SYM 6 x 6	A2	Medium	Medium	2.0	4.2	Consider removal and replacement
Assessment: • Council tree located on the grass verge on Deepwater Road. Photos 2, 3. • The tree is located up against the concrete gutter on Deepwater Road with limited soil volume to enable adequate growth. The tree is over-crowded by adjacent trees. It is noted that this tree is opposite the main clubhouse entry and may cause problems with pedestrian access and flow. • This species is a recommended street tree species by Willoughby Council, however, could be replaced with a longer-lived species selected from the Willoughby Council native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T12	*Melaleuca quinquenervia* Broad Leaved Paperbark Native	0.4	7	SM	G	G	C SYM 5 x 5	A2	Medium	Medium	2.3	4.8	Remove conflicted by the proposal
Assessment: • Council tree located on the Council verge on Deepwater Road. Photo 4. • The tree will be conflicted by the driveway and will require removal to the carpark for the new clubhouse. • The tree could be replaced with a tree species listed by Willoughby Council, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T13	*Banksia integrifolia* Coastal Bankia Native	0.25	7	M	G	F	C SYM 3 x 3	A2	Medium	Medium	1.92	3.0	Consider removal and replacement
Assessment: • Council tree located on the Council verge on Deepwater Road. Photo 4. • This tree is part of the group of trees along Deepwater Road. They are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T14	*Banksia integrifolia* Coastal Bankia Native	0.3	7	M	G	G	C SYM 5 x 5	A2	Medium	Medium	2.0	3.6	Consider removal and replacement
Assessment: • Council tree located on the Council verge on Deepwater Road. Photo 4. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T15	*Casuarina cunninghamiana* River She-Oak Native	0.1	6	Y	F	F	C SYM 1 x 1	A3	Low	Low	1.5	2.0	Consider removal and replacement
Assessment: • Council tree located on the Council verge on Deepwater Road. Photo 4. • This is a young specimen and could easily be replaced with an indigenous or endemic species in a location suitable for long-term growth. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T16	*Eucalyptus species* Gum Tree Native	0.22	12	M	F	F	C	C3	Medium	Low	1.8	2.6	Consider removal and replacement
Assessment: • Council tree located on the Council verge on Deepwater Road. Photo 4. • The tree is codominant with a sparse upper canopy. This tree could be replaced with a better specimen. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T17	*Casuarina cunninghamiana* River She-Oak Native	0.22	12	SM	G	G	C SYM 5 x 5	A2	Medium	Medium	1.8	2.6	Consider removal and replacement
Assessment: • Council tree located on the Council verge on Deepwater Road. Photo 4. • The tree is self-sucker from the parent tree, T18. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T18	*Casuarina cunninghamiana* River She-Oak Native	0.35	16	M	G	G	C SYM 8 x 8	A2	Medium	Medium	2.2	4.2	Consider removal and replacement

Assessment:

- Council tree located on the Council verge on Deepwater Road. Photo 4.
- This is the parent Casuarina with five (5) sucker trees surrounding close to the main trunk.
- This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth.
- The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.
- Council approval is required for removal.

T19	*Banksia integrifolia* Coastal Bankia Native	0.17	6	SM	G	F	C SYM 3 x 3	A3	Low	Low	1.6	2.0	Consider removal and replacement

Assessment:

- Council tree located on the council verge on the roadside of the parent *Casuarina*. Photo 4.
- This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth.
- The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.
- Council approval is required for removal.

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T20	*Banksia integrifolia* Coastal Bankia Native	0.35	10	M	G	G	C SYM 8 x 8	A2	Medium	Medium	2.2	4.2	Consider removal and replacement
Assessment: • Council tree located on the council verge on Deepwater Road. Photos 4, 5. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T21	*Casuarina cunninghamiana* River She-Oak Native	0.17	10	SM	F	F	C SYM 4 x 4	A3	Low	Low	1.6	2.0	Consider removal and replacement
Assessment: • Council tree located on the council verge on Deepwater Road. Photos 4, 5. • This tree is growing up through the canopy of adjacent trees. This species readily self-seeds and this tree is a sucker from the parent *Casuarina*, T18. As an individual tree, this tree has fair vigour and fair condition and is not suitable to retain. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T22	*Casuarina cunninghamiana* River She-Oak Native	0.17	10	SM	F	F	C SYM 4 x 4	A3	Low	Low	1.6	2.0	Consider removal and replacement
Assessment: • Council tree located on the council verge on Deepwater Road. Photos 4, 5. • This tree is growing up through the canopy of adjacent trees. This species readily self-seeds and this tree is a sucker from the parent *Casuarina*, Tree 18. As an individual tree, this tree is not suitable to retain. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T23	*Banksia integrifolia* Coastal Banksia Native	0.22	7	SM	G	G	C SYM 3 x 3	A2	Medium	Medium	1.8	2.6	Consider removal and replacement
Assessment: • Council tree located on the council verge on Deepwater Road. Photo 4, 5. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T24	*Casuarina cunninghamiana* River She-Oak Native	0.17	10	SM	G	F	C SYM	A2	Low	Low	1.6	2.0	Consider removal and replacement
Assessment: • Council tree located on the council verge on Deepwater Road. Photo 4, 5, 6. • Group of three (3) to four (4) suckers growing in a constricted location up against the roadside gutter and overcrowded by adjacent trees. • These trees are not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T25	*Banksia integrifolia* Coastal Banksia Native	0.18	7	M	G	F	C SYM 5 x 5	A2	Medium	Medium	1.7	2.2	Consider removal and replacement
Assessment: • Council tree located on the council verge on Deepwater Road. Photos 4, 6. • This tree is part of the group of trees along Deepwater Road. The trees are overcrowded with limited available soil volume to enable adequate growth. • The tree is not impacted by the proposal and can be retained, however could be replaced by a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T26	*Eucalyptus scoparia* Wallangara White Gum Native	1.03	18	M	G	F	D SYM 24 x 24 N10.4, S12.2, E9.1, W12	B2	Medium	Medium	3.5	12.4	Major TPZ encroachment Tree sensitive design required for retention

Assessment:

- Neighbouring tree located on the eastern side of the existing bitumen carpark, in the front yard of no. 76 Deepwater Road, Castle Cove. Photos 7, 8, 21, 22, 23, 24, 25, 26.
- The tree is growing in a slightly elevated garden bed, 300mm above the bitumen car park.
- The tree has a broad trunk to 2 metres, branching to 3 leaders. The tree canopy forms a broad weeping crown.
- There is small deadwood throughout the canopy and a number of larger dead branches evident since the first inspection. There are also numerous branch stubs indicating previous branch failures.
- The southern side of the trunk and underside of another leader has wounds. One of these leaders extends to the north-east and the other extends to the south over Deepwater Road. The leader that extends to the south over the road has a wound that extends down to the trunk. The wound on the trunk has a *Phellinus robustus* fungal decay pathogen (bracket fungus) within the wound, refer to photo 23. The presence the bracket fungus indicates internal decay (International Society of Arboriculture, 2017) and causes a reduction in strength of the heartwood caused by the pathogen.
- The Useful Life Expectancy rating is B2: The tree may live for 15 to 40 years and may require removal in the future due to safety or nuisance reasons.
- An assessment of the tree's root flare shows that it is perhaps dominant towards the eastern side. The surrounding carpark within the client's property is bitumen. Deviations exist in the surface of the bitumen which suggests that roots extend within the site.
- The driveway, crossover and pathway to the ILU will create a 27.4% encroachment. The tree will be impacted as this is a major TPZ encroachment as defined by AS 4970-2009 Protection of trees on development sites (Standards Australia, 2009). For estimated excavation within the TPZ refer to Drawing: Section through ramp – Excavation in Appendix G: Plans. Pruning will also be required to remove a lower primary limb at 2.5mH as well as a higher secondary limb to provide clearance for vehicles using the driveway. Further canopy pruning may be required to provide access for delivery trucks to a maximum height of 2.8m.
- It is likely this tree would be impacted by the proposal and tree sensitive design and construction techniques are required to ensure successful tree retention. If the tree is to be removed then neighbour and Council approval is required. Refer to Section 4.4.c(ii) for design recommendation to enable the tree to be retained.

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T27	*Salix sp.* *Willow* Exotic	0.4	6	-	-	-	-	-	Low	Low	-	-	Remove, conflicted by proposal - exempt species
Assessment: • Site tree located on the eastern side of the lower bitumen carpark. Photo 7. • This tree will be conflicted by the proposal. • This tree could be replaced with a more suitable indigenous or endemic species in a location suitable for long-term growth. The tree species and can be selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.													
T28	*Jacaranda mimosifolia* Jacaranda Exotic	0.2, 0.35 DBH=	10	M	G	F	C SYM 8 x 8	A2	Low	Low	2.4	4.8	Remove, conflicted by proposal
Assessment: • Site tree located adjacent to the eastern boundary. Photos 7, 9. • The tree has epicormic growth, the typical response to pruning for this species. The structure of the tree is unbalanced with the major leader having a significant stem bias to the south-west. • This tree will be conflicted by the proposal. • This tree could be replaced with a more suitable indigenous or endemic species in a location suitable for long-term growth. The tree species and can be selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
T29	*Lagerstroemia indica* Crepe Myrtle Exotic	Multi DBH= 0.45	7	M	G	F	C SYM 8 x 8	A3	Low	Low	2.5	5.4	Remove, conflicted by proposal
Assessment: • Site tree located adjacent to the eastern boundary. Photos 7, 10. • This is a multi-trunked specimen with lawn growing over the root crown. The tree is growing close to the eastern boundary fence with limited room for potential growth. • This tree will be conflicted by the proposal. • This tree could be replaced with a more suitable indigenous or endemic species in a location suitable for long-term growth. The tree species and can be selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T30	*Tristaniopsis laurina* Water Gum Native	0.3	7	M	G	F	C SYM 5 x 5	A3	Low	Low	2.0	3.6	Remove, conflicted by proposal
Assessment: • Site tree located adjacent to the eastern boundary. Photo 7. • This tree will be conflicted by the proposal. • This tree could be replaced with a more suitable indigenous or endemic species in a location suitable for long-term growth. The tree species and can be selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T31	*Ligustrum lucidum* Broad-Leaf Privet	-	-	-	-	-	-	-	Low	low	-	-	Remove, conflicted by proposal - exempt species

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
	Exotic												
Assessment: • Site tree, exempt species with Willoughby City Council. Photo 11. • The tree will be conflicted by proposal and required removal. • This species can be removed without Council approval (Willoughby City Council, 2020).													
T32	*Ficus rubiginosa* Port Jackson Fig Native	-	-	M	F	F	C SYM 8 x 8	A2	Low	Low	-	-	Remove, conflicted by the proposal
Assessment: • Site tree is located at the lower area of a cliff below the existing clubhouse. Photos 12, 13. • Measurements were not possible due to the inaccessible location. • The tree is overgrown by adjacent trees and is growing on a steep embankment with limited soil volume for future growth. • This tree will be conflicted by the covered walkway to the upper-level Seniors Living Development and will need to be removed. • Replacement is recommended with a species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T33	*Allocasuarina littoralis* Black She-Oak Native	-	-	M	G	F	-	A3	Low	Low	-	-	Remove, conflicted by the proposal

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
Assessment: • Site tree is located at the lower area of a cliff below the existing clubhouse. Photo 12, 13. • Measurements were not possible due to the inaccessible location. • This tree will be conflicted by the proposal. • Replacement is recommended with a species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T34	*Oleo europaea subsp. cuspidata* African Olive Exotic	-	-	M	G	F	-	C3	Low	Low	-	-	Consider removal– exempt species
Assessment: • Site tree is located at the lower area of a cliff below the existing clubhouse. Photo 14. • The tree is not impacted by the proposal and can be retained, however, this species is exempt with Willoughby City Council and can be removed without Council approval (Willoughby City Council, 2020). • Replacement is recommended with a species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.													
T35	*Cotoneaster sp.* Cotoneaster Exotic	-	-	M	G	F	-	C3	Low	Low	-	-	Remove, conflicted by the proposal – exempt species
Assessment: • Site tree is located at the lower area of a cliff below the existing clubhouse. Photo 14. • The tree is conflicted by the proposal and requires removal. This species is an exempt species with Willoughby City Council and can be removed without Council approval (Willoughby City Council, 2020).													

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
• Replacement is recommended with a species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.													
T36	*Oleo europaea subsp. cuspidata* African Olive Exotic	-	-	M	G	F	-	C3	Low	Low	-	-	Consider removal– exempt species
Assessment: • Site tree is located at the lower area of a cliff below the existing clubhouse. Photo 12. • The tree is not impacted by the proposal and can be retained, however, this species is exempt with Willoughby City Council and can be removed without Council approval (Willoughby City Council, 2020). • Replacement is recommended with a species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.													
T37	*Oleo europaea subsp. cuspidata* African Olive Exotic	-	-	M	G	F	-	C3	Low	Low	-	-	Consider removal– exempt species
Assessment: • Site tree is located at the lower area of a cliff below the existing clubhouse. Photo 12. • The tree is not impacted by the proposal and can be retained, however, this species is exempt with Willoughby City Council and can be removed without Council approval (Willoughby City Council, 2020). • Replacement is recommended with a species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting.													
T38	*Eucalyptus sp.* Gum Tree Native	0.18	8	SM	G	F	C SYM 6 x 6	A3	Low	Low	1.7	2.2	Consider removal and replacement

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
Assessment: • Site tree located on a cliff, on top of a rocky embankment against the brick clubhouse building. Photos 12, 15. • The location is not suitable to provide the space for future growth. There is limited soil volume and the location is within a steep embankment. The canopy is restricted by adjacent trees and in the long-term by the adjacent building. • The tree is not impacted by the proposal and can be retained, however, the tree could be replaced with a species from the Willoughby Council's native tree list and planted in a location suitable for long-term growth, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T39	*Casuarina sp.* River She-Oak Native	-	-	-	-	-	-	D4	Low	Low	-	-	Dead tree - remove
Assessment: • Site tree situated on the embankment in the northern area of the property. Photo 16. • The tree is conflicted by the proposal, however the tree is dead and does not require Council approval for removal.													
T40	*Banksia integrifolia* Coastal Banksia Native	0.15	7	SM	G	G	C SYM 3 x 3	A2	Medium	Medium	1.6	2.0	Remove, conflicted by the proposal
Assessment: • Site tree located on the top of the rocky outcrop that borders the site property to the northern adjacent to the two-storey unit block. Photo 17. • The tree is conflicted by the proposal and requires removal. • Council approval is required for removal.													
T41	*Acacia mearnsii* Black Wattle Native	0.25	8	M	F	P	C SYM 5 x 5	A3	Medium	Low	1.9	3.0	Remove, conflicted by the proposal

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
Assessment: • Site tree located on the top of a rocky embankment that borders the site property to the north below the brick boundary fence of a unit block. Photo 18. • The trunk has borer damage. The crown is sparse with dieback evident. • The tree is conflicted by the proposal and requires removal. The tree is in poor condition and could be replaced with a longer-lived species selected from Willoughby Council's native tree list, refer to Appendix H: Willoughby City Council Recommended Street Trees and Native Planting. • Council approval is required for removal.													
T42	*Acacia mearnsii* Black Wattle Native	0.16	8	M	G	F	C SYM 5 x 5	A3	Medium	Low	1.6	2.0	Remove, conflicted by the proposal
Assessment: • Site tree located on the top of a rocky embankment that borders the site property to the north below the brick boundary fence of the unit block. Photo 18. • The tree is conflicted by the proposal and requires removal. The is in fair condition and has a Low retention value. • Council approval is required for removal.													
T43	*Corymbia gummifera* Red Bloodwood Native	0.3	10	M	G	P	C SYM 6 x 6	A3	Medium	Low	2.0	3.6	Remove, conflicted by the proposal
Assessment: • Site tree located on the top of a rocky embankment that borders the site property to the north below the brick boundary fence of the unit block. Photos 19, 20. • This species is identified as a remnant native canopy species in the Willoughby Council Street Tree Master Plan, Precinct 11 Upper Middle Harbour Bushland and Residential (Willoughby Council, 2014). • The tree is in poor condition, has a Low retention value is conflicted by the proposal and requires removal. • Council approval is required for removal.													
T44	*Acacia mearnsii* Black Wattle Native	0.25	10	M	G	F	C SYM 6 x 6	A3	Medium	Low	1.9	3.0	Remove, conflicted by the proposal

Tree No.	Species 1. Botanical name 2. Common name 3. Origin	DBH (m)	Height (m)	Age	Vigour	Condition	Crown (m) 1. Class 2. Aspect 3. Spread	ULE Rating	Landscape Rating	STARS	SRZ (m)	TPZ (m)	Recommendation
Assessment: • Site tree located on the top of a rocky embankment that borders the site property to the north below the brick boundary fence of the unit block. Photo 20. • The tree is in fair condition, has a Low retention value is conflicted by the proposal and requires removal. • Council approval is required for removal.													
T45	*Cupressus macrocarpa Brunniana* Brunnings Cypress Native	0.35	12	M	G	G	C SYM 6 x 6	A2	Low	Low	2.2	4.2	Remove, conflicted by the proposal
Assessment: • Site tree located on the top of a rocky embankment that borders the site property to the north below the brick boundary fence of the unit block. Photo 20. • The tree is conflicted by the proposal and requires removal. • Council approval is required for removal.													

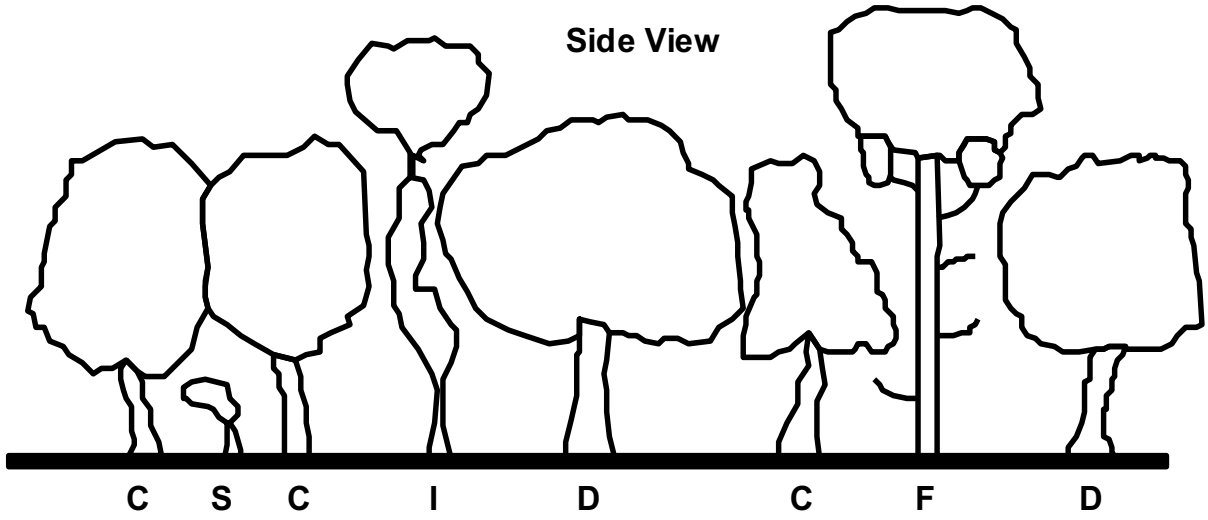
Appendix B: Glossary

AGE
Is the estimate of the tree age based upon the expected life span of the species. Divided into three stages.

Young - Trees less than 20% of life expectancy.
Mature - Trees aged between 20% to 80% life expectancy.
Over-mature - Trees aged over 80% of life expectancy (potential symptoms of senescence).

AQF Australian Qualification Framework

CROWN CLASS
Dominant - Crown is receiving uninterrupted light from above and sides, also known as emergent.
Codominant - Crown is receiving light from above and one side of the crown.
Intermediate - Crown is receiving light from above but not the sides of the crown.
Suppressed - Crown has been shadowed by the surrounding elements and receives no light from above or sides.
Forest - Characterised by an erect, straight stem (usually excurrent) with little stem taper and virtually no branching over the majority of the stem except for the top of the tree which has a small, concentrated branch structure composing the crown.



Illustrated Crown classes
Source: Hazard Tree Assessment Program, Recreation and Park Department, City of San Francisco, California, cited in Matheny, N. & Clark, J. R., 1998.

CROWN ASPECT In relation to the root crown, this refers to the aspect the majority of the crown is located. Symmetrical where the centre of the crown resides over the root crown or the cardinal direction the centre of the crown resides, being North, South, East or West.

CROWN SPREAD A two-dimension linear measurement (metres) of the crown plan. The first figure being the north-south span, the second being the east-west measurement.
Condition is the tree's crown form and growth habit. It can be categorised as:

Condition is the trees crown form and growth habit. It can be categorised as:

G- Good

F- Fair

P- Poor

D- Dead

DBH Diameter at Breast Height (approx. 1.4 metres above ground level)

ORIGIN
Refers to the natural occurrence of the tree species as referenced in Forest Trees of Australia. This may be summarised by one of the three terms:

Endemic: natural occurrence to the area the species is located (and possibly other areas).

Exotic: naturally occurs in another country but not in Australia.

Native: does not naturally occur within the area the species is located but is found elsewhere in Australia.

Remnant: natural occurrence within area, and part of the natural planting.

SRZ Structural Root Zone; disturbance within this area may affect stability of the tree ((D x50)0.42 x 0.64 expressed as a radius measured from the centre of trunk – source AS4970-2009 Section 3, pp. 11-14)

STARS IACA Significance of a Tree Assessment Rating System (STARS)©

TPZ Tree Protection Zone; tree may cope with minimal disturbance in this area, depends on underlying soil, existing structures, etc. (DBH x 12 expressed as a radius measured from the centre of trunk – source AS4970-2009 Section 3, pp. 11-14)

ULE Useful Life Expectancy (after Jeremy Barrel, 2009)

Vigour is the ability of a tree to sustain its life processes. It can be categorised as:
G- Good
F- Fair
P- Poor
Dec- Deciduous or dormant tree vigour

VTA: Visual tree assessment

A procedure of defect analysis developed by Mattheck and Breloer (1994), that uses the growth response and form of trees to detect defects.

Appendix C: Useful Life Expectancy (ULE)

After Jeremy Barrell, 2009, Barrelltreecare.co.uk

	1. Long	2. Medium	3. Short	4. Removal	5. Moved or Replaced
	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 15 – 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 5 – 15 years with an acceptable level of risk.	Trees that should be removed within the next 5 years.	Trees which can be reliably moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 years.	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small trees less than 5m in height.
B	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through instability on recent loss of adjacent trees.	Trees younger than 15 years but over 5m height
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.	Trees that may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Damaged trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial tree care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings.	
F				Trees that are damaging or may cause damage to existing structures within 5 years.	
G				Trees that will become dangerous after removal of other trees for reasons given in (A) to (F).	

Appendix D: IACA Significance of a Tree Assessment Rating System (STARS)

Criteria for Assessment of Landscape Significance

1. **High Significance in landscape**
   - The tree is in good condition and good vigour.
   - The tree has a form typical for the species.
   - The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age.
   - The tree is listed as a Heritage Item, Threatened Species or part of an Endangered ecological community or listed on Councils significant Tree Register.
   - The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity.
   - The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values.
   - The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ - tree is appropriate to the site conditions.

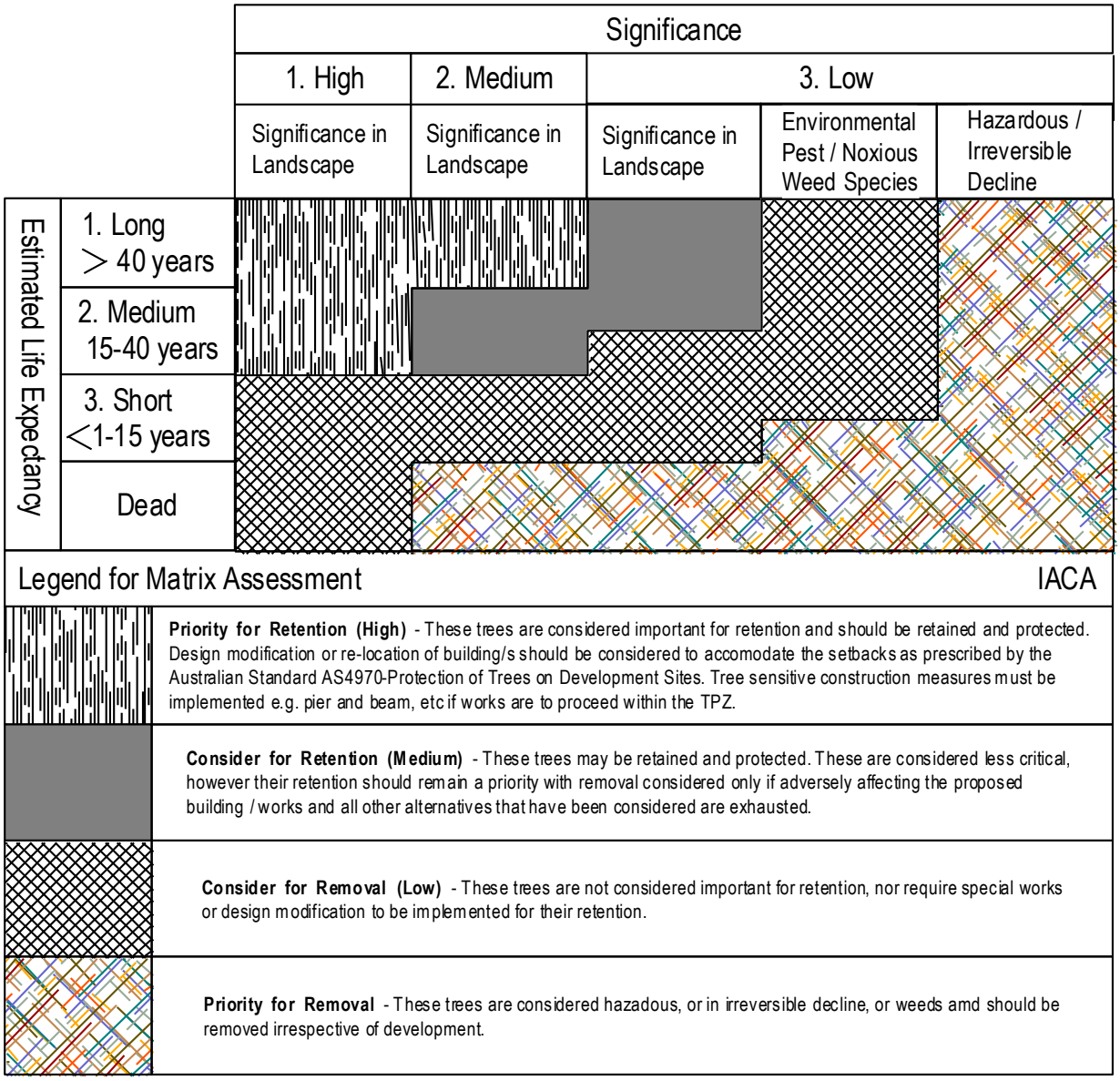
2. **Medium Significance in landscape**
   - The tree is in fair-good condition and good or low vigour.
   - The tree has form typical or atypical of the species.
   - The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area.
   - The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street.
   - The tree provides a fair contribution to the visual character and amenity of the local area.
   - The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ.

3. **Low Significance in landscape**
   - The tree is in fair-poor condition and good or low vigour.
   - The tree has form atypical of the species.
   - The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings.
   - The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area.
   - The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen.
   - The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ - tree is inappropriate to the site conditions.
   - The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms.
   - The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species
   -The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties.
   -The tree is a declared noxious weed by legislation.

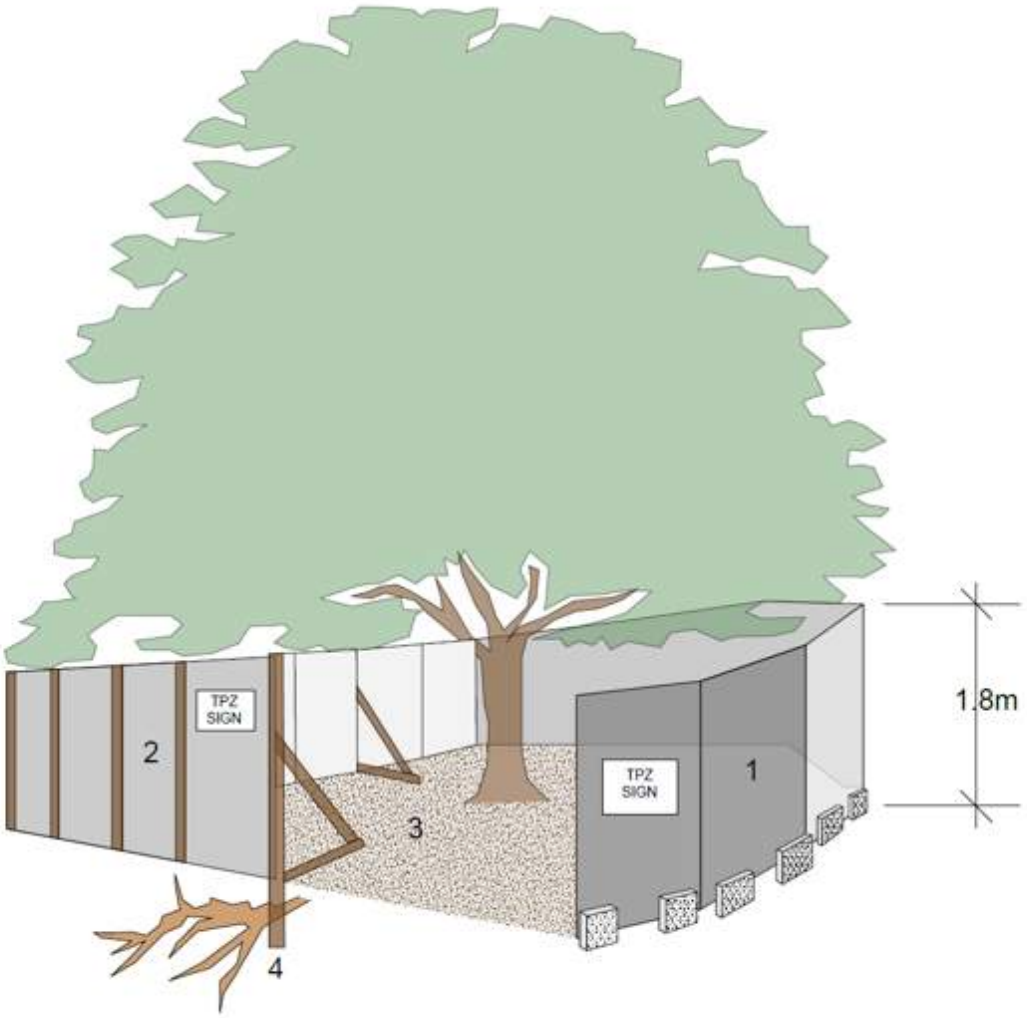
Hazardous/Irreversible Decline
   - The tree is structurally unsound and/or unstable and is considered potentially dangerous,
   - The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.
   - The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Tree Retention Values – Assessment Methodology



Appendix E: Tree Protection

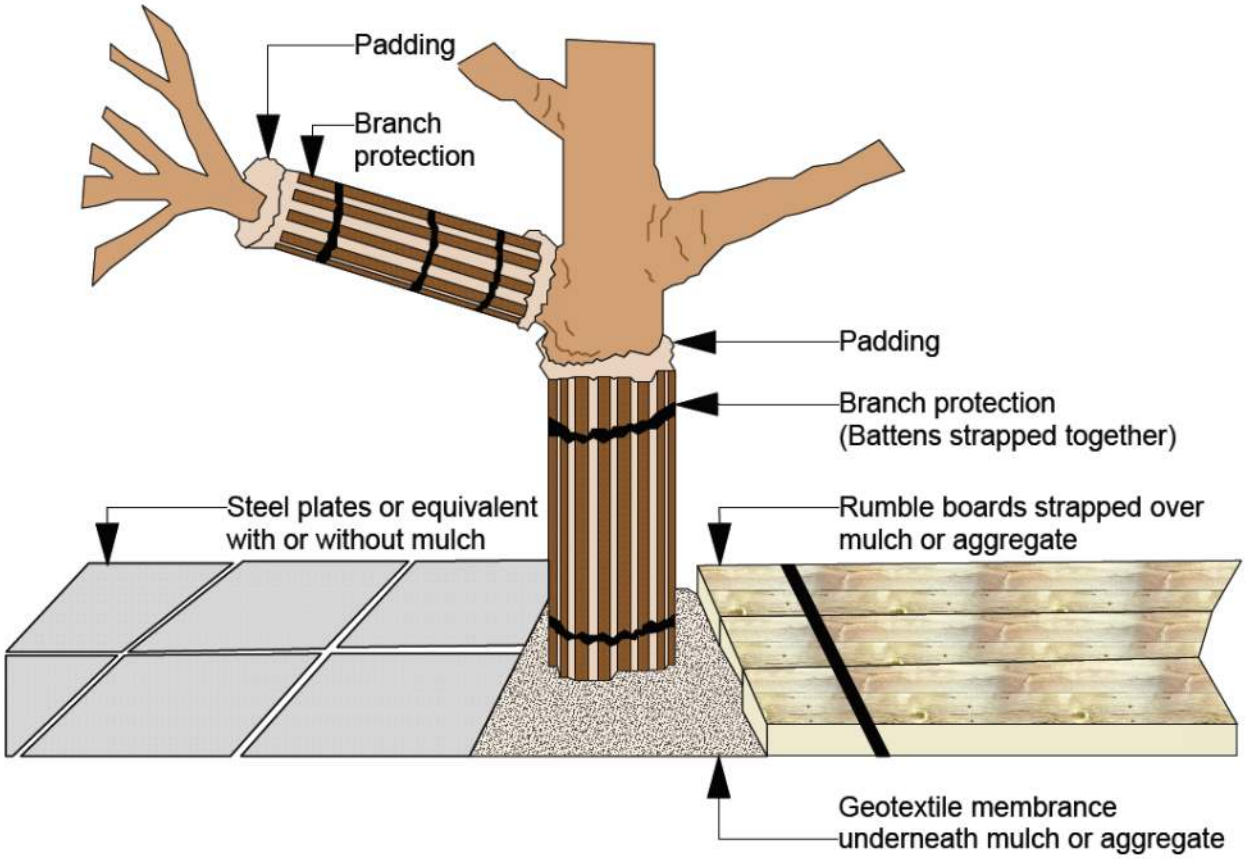
Protective Fencing



NOTES:

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

Root, Branch and Trunk Protection



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.

Appendix F: Photographs

Photo 1: T1- *Callistemon viminalis*; T2, T3, T4, T5, T6, T7- *Tristaniopsis laurina*, T8- *Eucalyptus saligna*

Photo 2: T5, T6, T7, T9- *Tristaniopsis laurina,* T8- *Eucalyptus saligna,* T10- *Banksia integrifolia,* T11- *Tristaniopsis laurina*

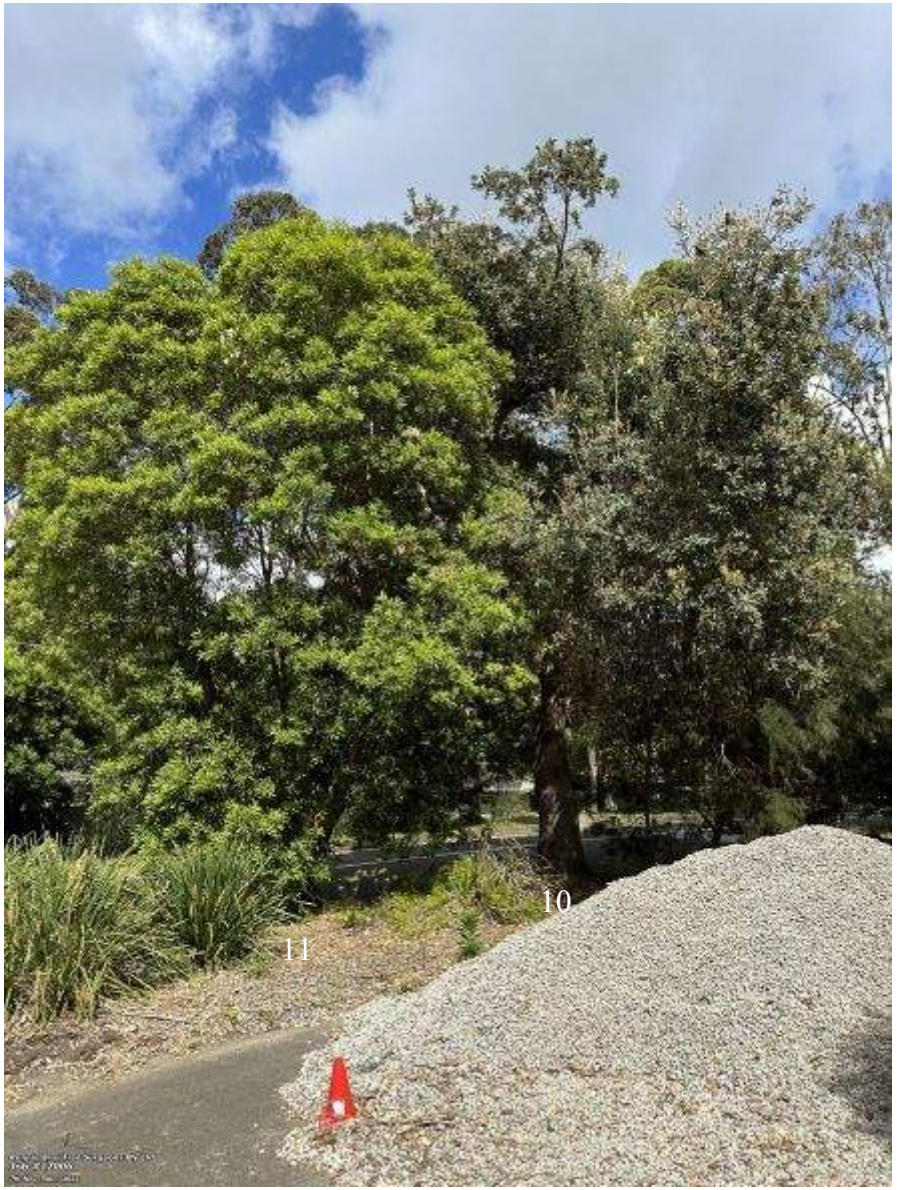


Photo 3: T10- *Banksia integrifolia*, T11- *Tristaniopsis laurina*

Photo 4: T12- *Melaleuca quinquenervia,* T13- *Banksia integrifolia,* T14- *Banksia integrifolia,* T15- *Casuarina cunninghamiana,*T16- *Eucalyptus species,* T17- *Casuarina cunninghamiana,* T18- *Casuarina cunninghamiana,* T19- *Banksia integrifolia,* T20- *Banksia integrifolia,* T21- *Casuarina cunninghamiana,* T22- *Casuarina cunninghamiana*, T23- *Banksia integrifolia*, T24- *Casuarina cunninghamiana,* T25- *Banksia integrifolia*

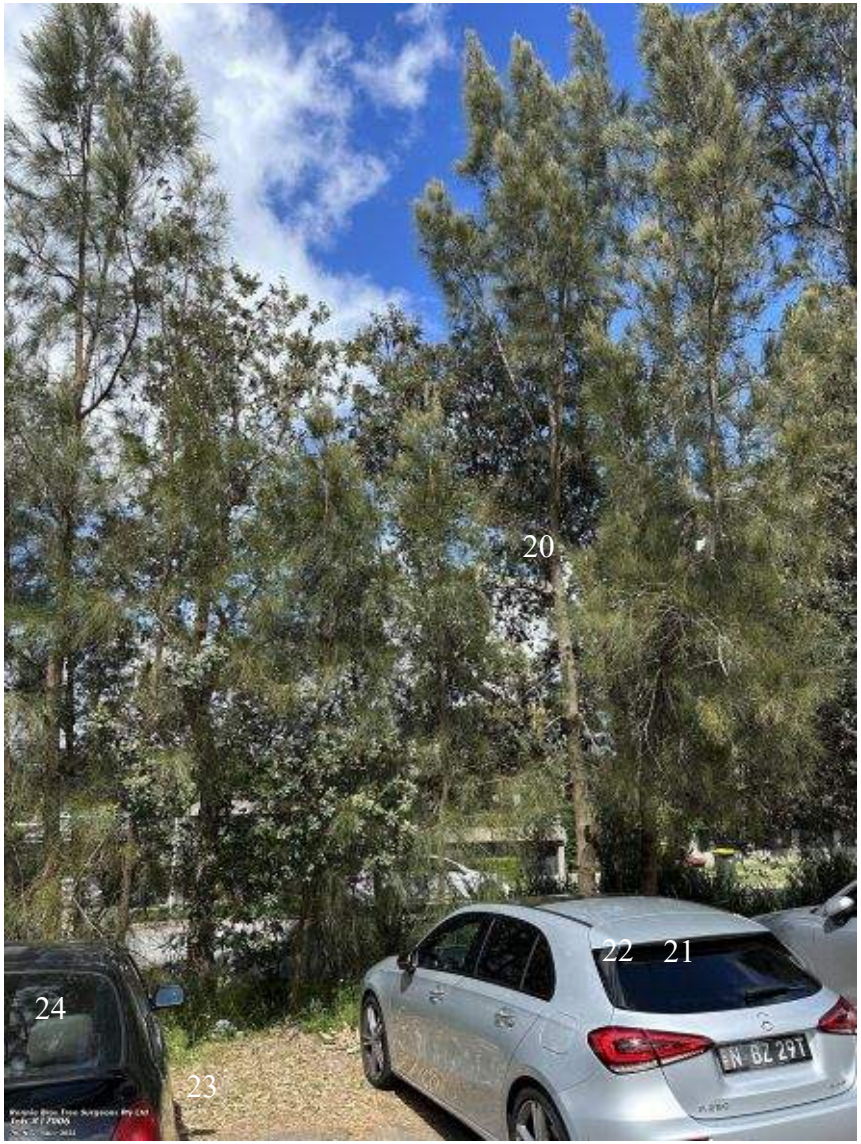


Photo 5: T20, T23 - *Banksia integrifolia,*
T21, T22, T24- *Casuarina cunninghamiana*

Photo 6: T24- *Casuarina cunninghamiana*, T25- *Banksia integrifolia*

Photo 7: T26- *Eucalyptus scoparia,* T27- *Salix species,* T28- *Jacaranda mimosifolia,* T29- *Lagerstroemia indica,* T30- *Tristaniopsis laurina*

Photo 8: Tree 26- *Eucalyptus scoparia,* pruning required back to collar

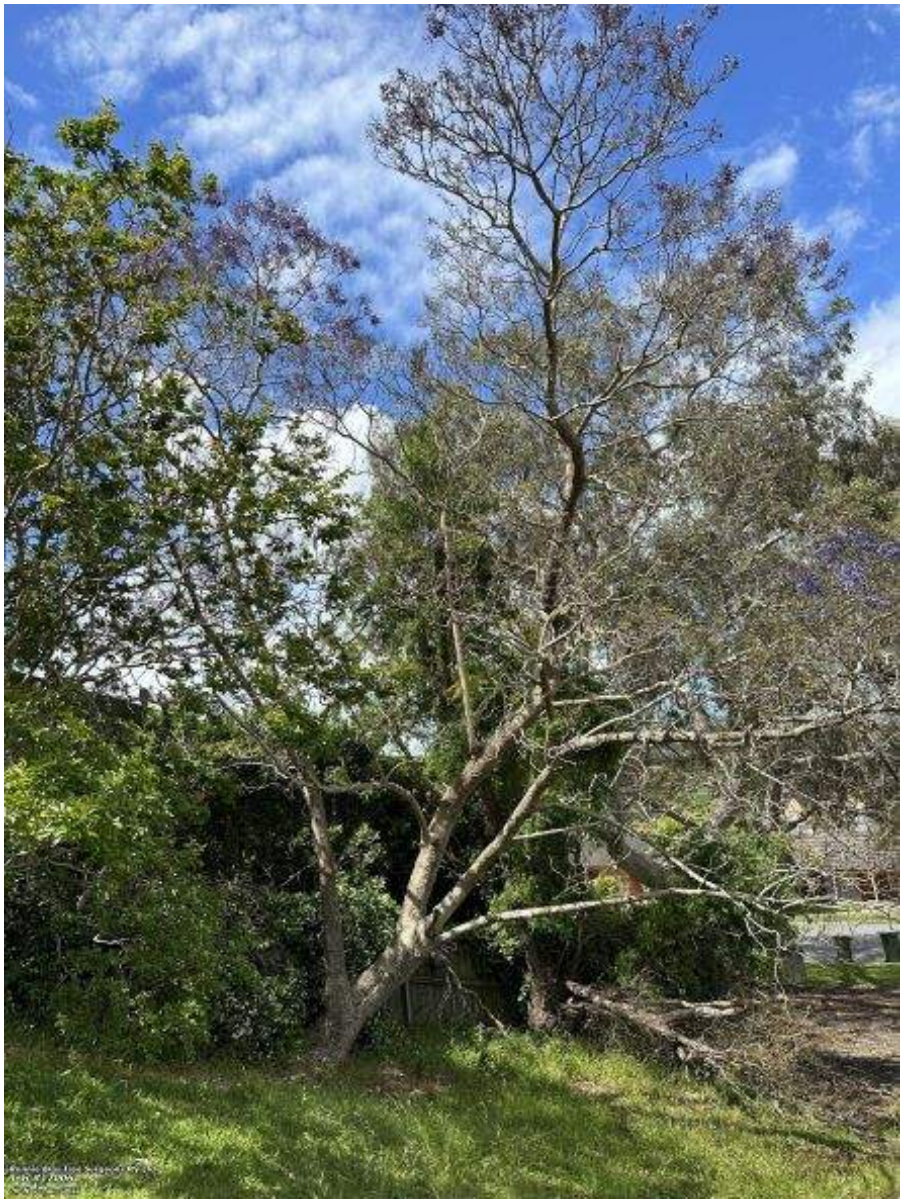


Photo 9: Tree 28- *Jacaranda mimosifolia*

Photo 10: T29- *Lagerstroemia indica*

Photo 11: Tree 31- *Ligustrum lucidum*

Photo 12: T32- *Ficus rubiginosa,* T33- *Allocasuarina littoralis;* T36, T37- *Oleo europaea subsp. cuspidata,* T38- *Eucalyptus species*

Photo 13: T32- *Ficus rubiginosa,* T33- *Allocasuarina littoralis*

Photo 14: T34- *Oleo europaea subsp. cuspidata,* T35- *Cotoneaster species*

Photo 15: T38 – *Eucalyptus species*

Photo 16: T39- Dead *Casuarina species*

Photo 17: T40- *Banksia integrifolia*

Photo 18: T41, T42- *Acacia mearnsii*

Photo 19: T43- *Eucalyptus gummifera*

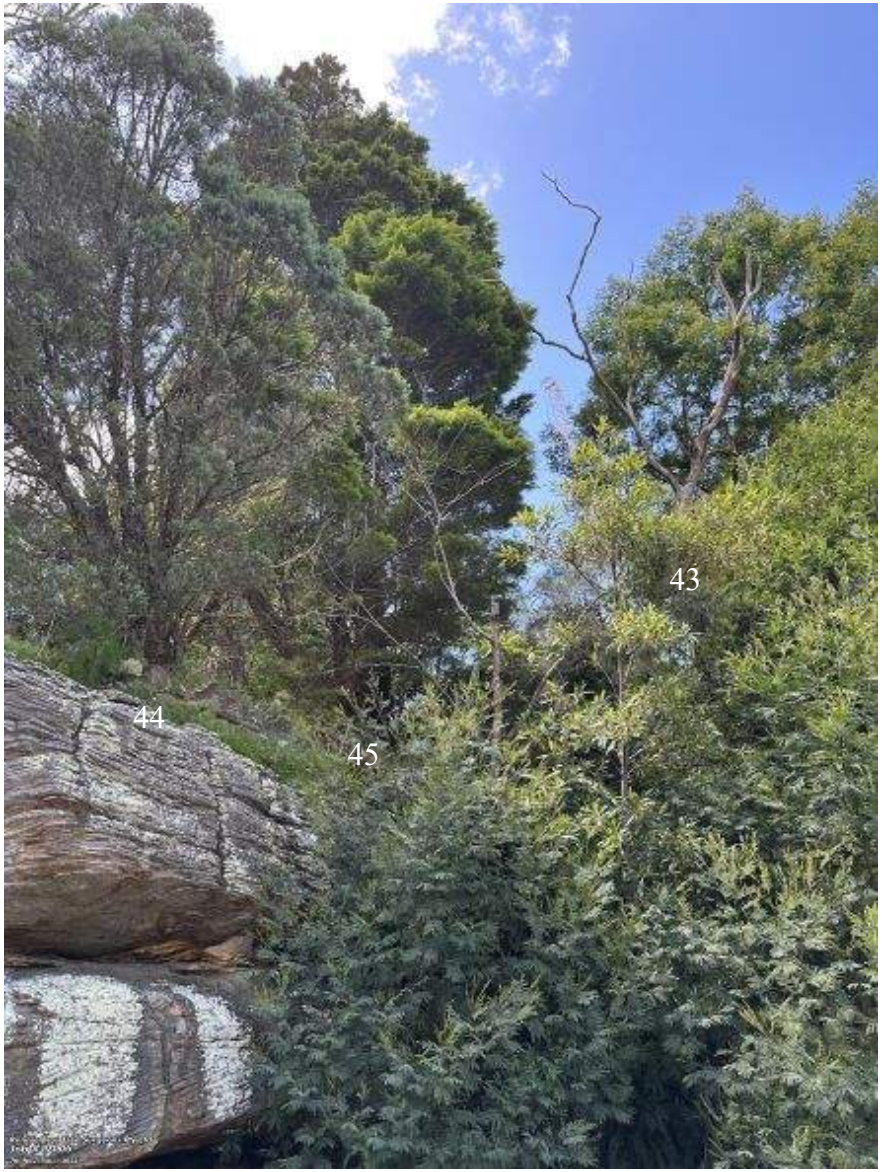


Photo 20: T43- *Eucalyptus gummifera*, T44- *Acacia mearnsii,* T45- *Cupressus macrocarpa* Brunniana

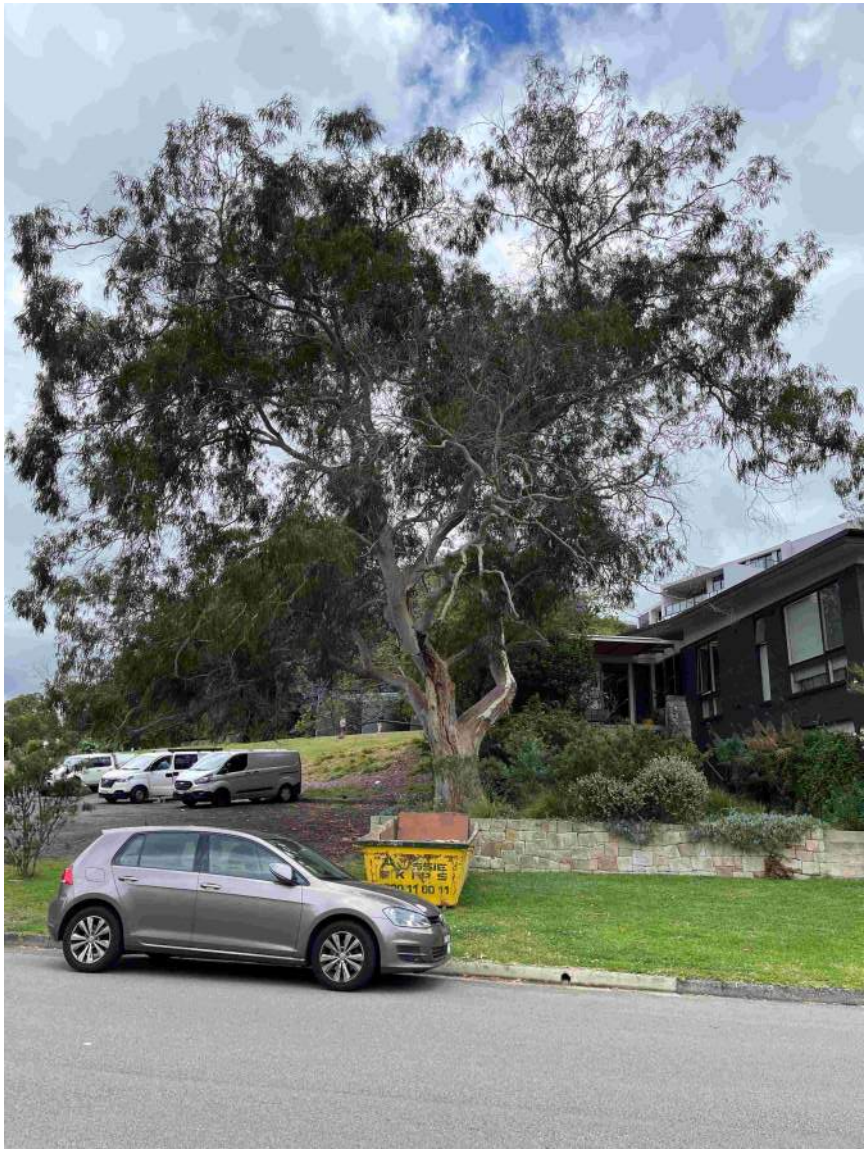


Photo 21: T26- *Eucalyptus scoparia* viewed from the south

Photo 22: T26- *Eucalyptus scoparia* viewed from the west. Surface roots have created cracks in the bitumen surface.

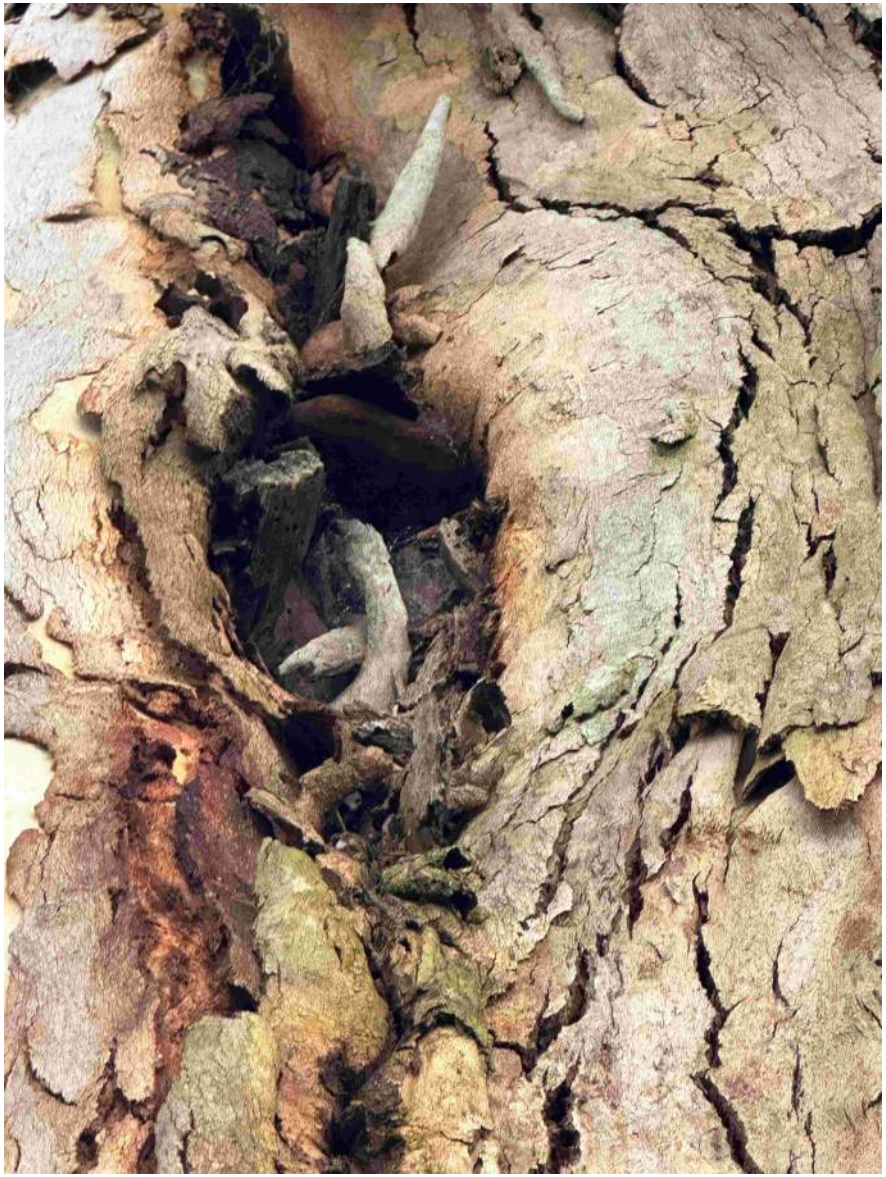


Photo 23: T26-*Eucalyptus scoparia*, *Phellinus robustus* located within wound on southern side of trunk

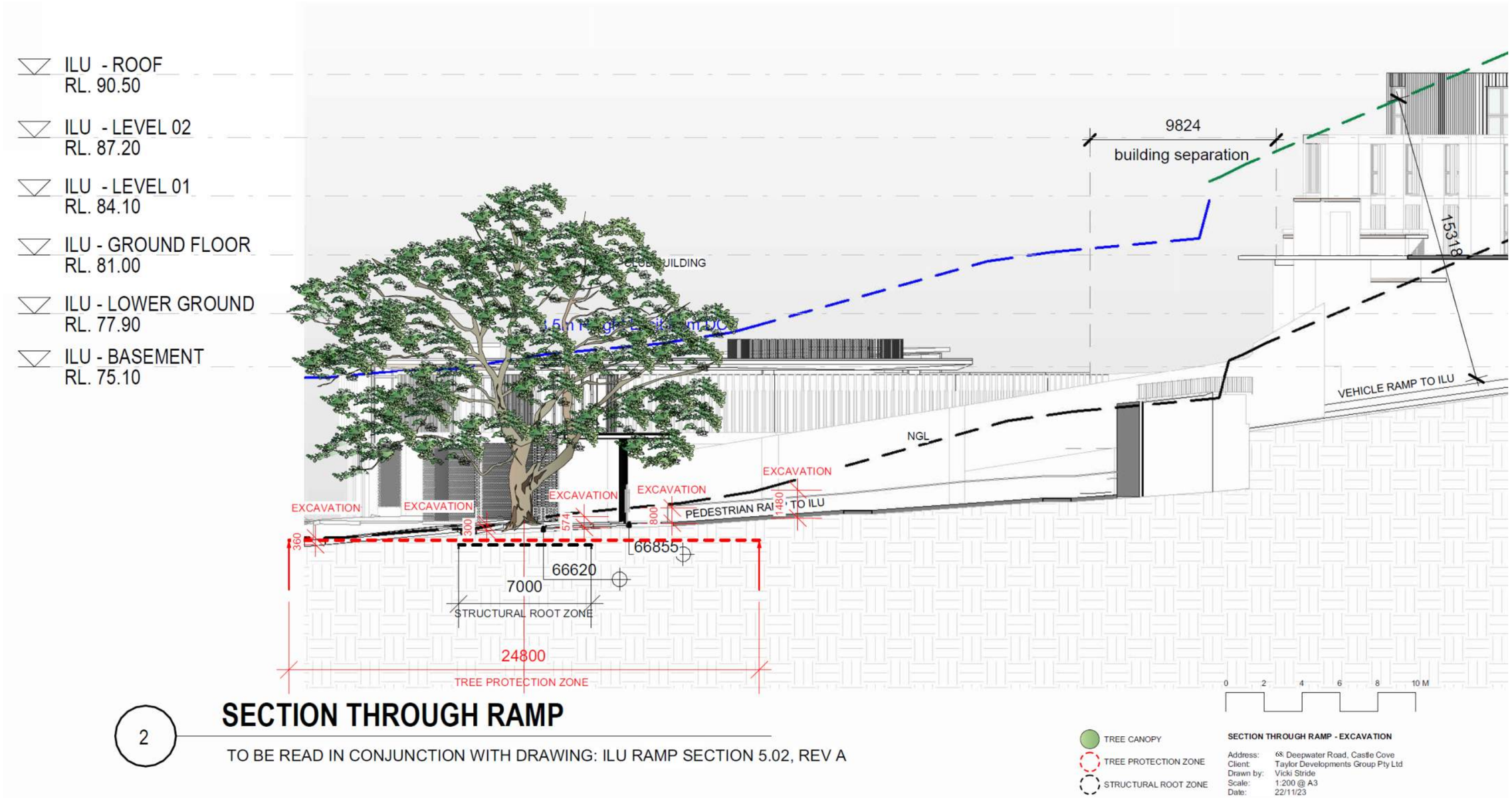
Photo 24: T26- *Eucalyptus scoparia*, root collar dominant towards the neighbouring property.

Photo 25: T26, wound on underside of branch

Photo 26: T26, dead branch extending south over Deepwater Road

Appendix G: Plans


GROUP 5
GROUP 4
GROUP 1
GROUP 3
GROUP 2
15 AMAROO AVENUE
12-15 AMAROO AVENUE
76 DEEPWATER RD.
DEEPWATER ROAD
ROAD
RL. 71.40
RL. 76.17
RL. 74.80
RL. 75.58
RL. 75.58
T45 CONFLICTED
Cupressus macrocarpa Brunniana
T44 CONFLICTED
Acacia mearnsii
T43 CONFLICTED
Eucalyptus gummifera
T42 CONFLICTED
Acacia mearnsii
T41 CONFLICTED
Acacia mearnsii
T40 CONFLICTED
Banksia integrifolia
T39 CONFLICTED
Casuarina sp.
T37
Oleo europaea subsp. cuspidata
T38
Eucalyptus species
T36
Oleo europaea subsp. cuspidata
T35 CONFLICTED
Cotoneaster sp.
T34
Oleo europaea subsp. cuspidata
T33 CONFLICTED
Allocasuarina littoralis
T32 CONFLICTED
Ficus rubiginosa
T31 CONFLICTED
Ligustrum lucidum
T30 CONFLICTED
Tristaniopsis laurina
T29 CONFLICTED
Lagerstroemia indica
T28 CONFLICTED
Jacaranda mimosifolia
T27 CONFLICTED
Salix sp.
T26 TPZ ENCROACHMENT 131.6m²=27.4%
Eucalyptus scoparia
T25
Banksia integrifolia
T24
Casuarina cunninghamiana
T22
Casuarina cunninghamiana
T21
Casuarina cunninghamiana
T23
Banksia integrifolia
T20
Banksia integrifolia
T18
Casuarina cunninghamiana
T19
Banksia integrifolia
CONFLICTED T01
Callistemon viminalis
CONFLICTED T02
Tristaniopsis laurina
CONFLICTED T03
Tristaniopsis laurina
CONFLICTED T04
Tristaniopsis laurina
CONFLICTED T05
Tristaniopsis laurina
CONFLICTED T08
Eucalyptus saligna
CONFLICTED T06
Tristaniopsis laurina
CONFLICTED T07
Tristaniopsis laurina
T09
Tristaniopsis laurina
T11
Tristaniopsis laurina
T10
Banksia integrifolia
T17
Casuarina cunninghamiana
CONFLICTED T12
Melaleuca quinquenervia
T13
Banksia integrifolia
T14
Banksia integrifolia
T16
Eucalyptus sp.
T15
Casuarina cunninghamiana
TREE CANOPY
TREE PROTECTION ZONE
STRUCTURAL ROOT ZONE
TPZ ENCROACHMENT
TPZ ENCROACHMENT TO BE MANAGED WITH ROOT MAPPING
0 2 4 6 8 10M
TPZ ENCROACHMENT PLAN
Address: 68 Deepwater Road, Castle Cove
Client: Taylor Developments Group Pty Ltd
Drawn by: Vicki Stride
Scale: 1:500 @ A2
Date: 22/11/23



2 **SECTION THROUGH RAMP**

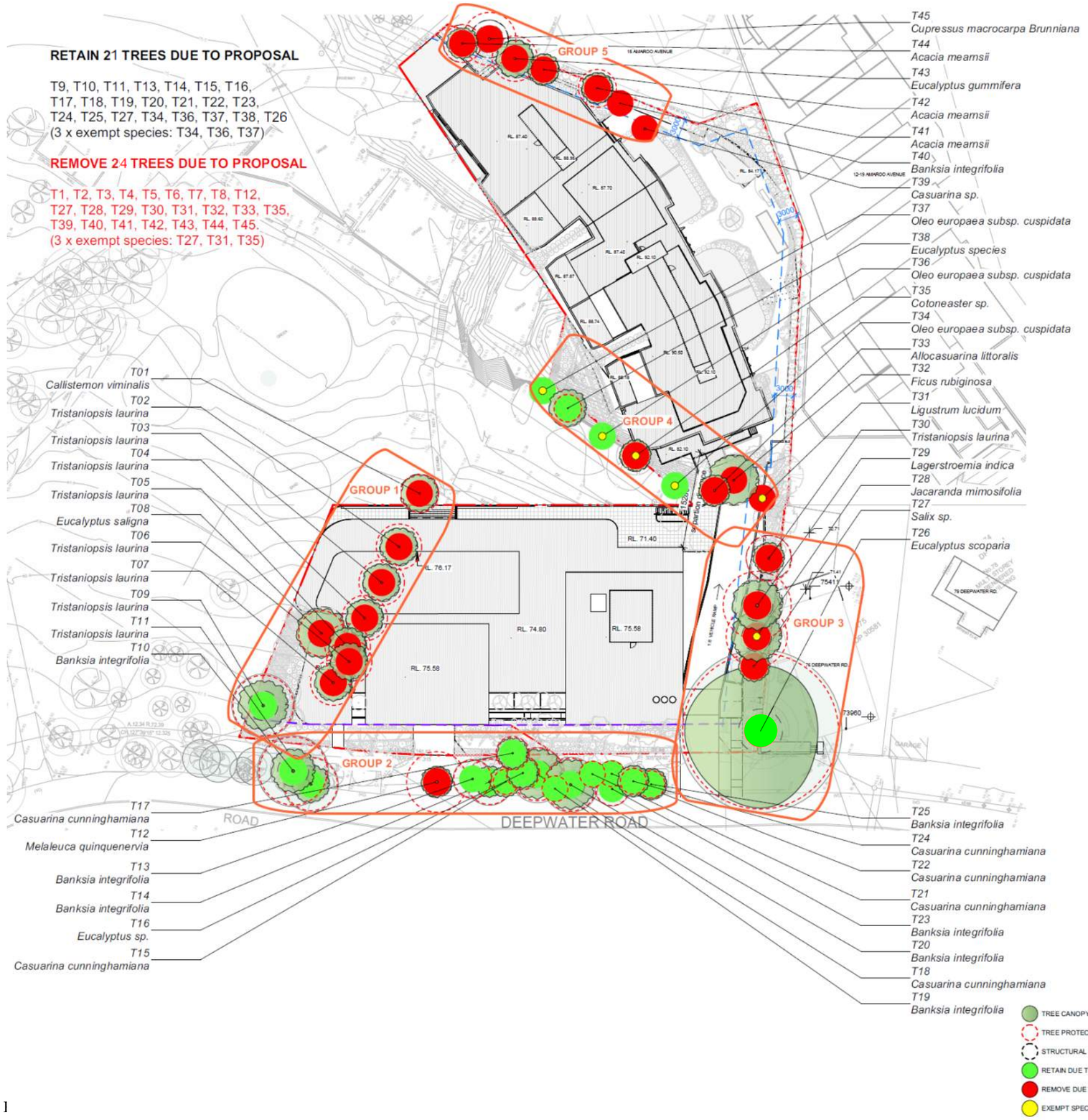
TO BE READ IN CONJUNCTION WITH DRAWING: ILU RAMP SECTION 5.02, REV A

RETAIN 21 TREES DUE TO PROPOSAL

T9, T10, T11, T13, T14, T15, T16,
T17, T18, T19, T20, T21, T22, T23,
T24, T25, T27, T34, T36, T37, T38, T26
(3 x exempt species: T34, T36, T37)

REMOVE 24 TREES DUE TO PROPOSAL

T1, T2, T3, T4, T5, T6, T7, T8, T12,
T27, T28, T29, T30, T31, T32, T33, T35,
T39, T40, T41, T42, T43, T44, T45.
(3 x exempt species: T27, T31, T35)



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Appendix H: Willoughby City Council Recommended Street Trees and Native Planting

PRECINCT 11: UPPER MIDDLE HARBOUR BUSHLAND & RESIDENTIAL
Proposed street tree species

Tree Species	Common Name	evergreen	deciduous	habit/form[1]	verge width[2]	power-lines[3]
Acmena smithii	Lilly Pilly	E	-	cr	N	N
Acmena smithii var. minor	Lilly Pilly (incl. cv)**	E	-	cr	N	Y
Angophora costata (SGF1/SRW)*	Smooth-barked Apple	E	-	os	M	N
Angophora hispida	Dwarf Apple	E	-	cr	M	Y
Backhousia myrtifolia (SGF1)*	Grey Myrtle	E	-	cr	N	Y
Banksia integrifolia	Coast Banksia	-	D	no cu	M	Y
Banksia serrata (SGF1/SRW)*	Saw-toothed Banksia	E	-	os	M	Y
Callistemon spp.	Bottlebrush	E	-	cn	M	Y
Ceratopetalum gummiferum	NSW Christmas Bush	E	-	cn	N	Y
Corymbia gummifera (SGF1/SRW)*	Red Bloodwood	E	-	os	M	N
Eucalyptus camfieldii (SRW)*	Heart-leaf Stringybark	E	-	os	N	Y
Eucalyptus capitellata (SRW)*	Brown Stringybark	E	-	os	M	N
Eucalyptus crebra	Narrow Leaved Ironbark	E	-	os	M	N
Eucalyptus haemastoma	Scribbly Gum	E	-	os	W	N
Eucalyptus piperita (SGF1/SRW)*	Sydney Peppermint	E	-	os	W	N
Eucalyptus punctata	Grey Gum	E	-	os	W	N
Eucalyptus racemosa (SGF1/SRW)*	Scribbly Gum	E	-	os	M	N
Eucalyptus sieberi (SGF1/SRW)*	Silvertop Ash	E	-	os	M	N
Glochidion ferdinandi	Cheese Tree	E	-	cs	M	Y
# *Jacaranda mimosifolia*	Jacaranda	-	D	os	M	N
Tristaniopsis laurina spp.	Water Gum	E	-	cr	M	Y

NOTES: Species are shown in alphabetical order and do not denote dominance or ranking.

* SGF1/SRW LOCAL NATIVE SPECIES recommended for most streets in this precinct.

SGF1 = Sydney Sandstone Gully Forest *(Eucalyptus piperita/ Angophora costata);*
SRW = Sydney Sandstone Ridgetop Woodland.

Willoughby Street Tree Master Plan
WILLOUGHBY CITY COUNCIL October 2014 LandArc Pty Limited
Int. Ref: 82741068

(Willoughby Council, 2014)

Sandstone ridges along Middle Harbour and Lane Cove

- Scribbly Gums - *Eucalyptus haemastoma*
- Red Bloodwood - *Eucalyptus gummifera*
- Northern Scribbly Gum - *Eucalyptus racemosa*
- Black She-oak - *Allocasuarina littoralis*
- Old Man Banksia - *Banksia serrata*
- Flax-leafed Wattle - *Acacia linifolia*
- Heath Banksia - *Banksia ericifolia*
- Silver Banksia - *Banksia marginate*
- Willow-leaved Crowea - *Crowea saligna*
- Coral Heath - *Epacris longiflora*
- Spiny-headed Mat-rush - *Lomandra longifolia*

(Willoughby Council, 2022)