



HUGH
THE ARBORIST

Preliminary Arboricultural Assessment Report

Client Name: Manly Warringah Gymnastics Club
Site Address: 431 Pittwater Road North Manly NSW
Authors Details: Hugh Millington
Email: hugh@hughtheArborist.com.au
Phone: 0426836701
Date Prepared: 19th August 2023

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1. INTRODUCTION

- 1.1 This report has been commissioned by Terraneo Landscape Design on behalf of the client Manly Warringah Gymnastics Club to present data from an Arboricultural survey carried out at 431 Pittwater Road North Manly.
- 1.2 All trees assessed have been allocated retention values to assist with understanding the potential constraints posed by high value trees during the design process.

TABLE 1: DOCUMENTS PROVIDED FOR THE ASSESSMENT

Title	Author	Date	Reference on document
Site Survey	C&A Surveyors	17/2/2023	24279-23 DET/ID

- 1.3 This report has been prepared as a Preliminary Arboricultural Assessment Report intended to be used by planners and designers to assist in understanding the retention values, health and structural condition of the existing tree population located on and adjoining the site when proposing a new development.
- 1.4 The site inspection was carried out on 16th August 2023. Access was available to the subject site and adjoining public areas only. All tree data was collected during this assessment.
- 1.5 The weather at the time of the assessment was rain with average visibility.

2. SCOPE OF THE REPORT

- 2.1 This report has been undertaken to meet the following objectives.
 - 2.1.1 Conduct a visual assessment from ground level of trees located on and adjoining the site generally within five metres of the boundary.
 - 2.1.2 For the purpose of this report a significant tree is a tree with a height equal to or greater than 5 metres in height.
 - 2.1.3 Shrubs and trees under 5 metres in height are generally excluded from this assessment.
 - 2.1.4 Determine the trees estimated contribution years and remaining, useful life expectancy.
 - 2.1.5 Award each tree a retention value and determine the extent of the Tree Protection Zone.
 - 2.1.6 Provide information on trees Tree Protection Zones and Structural Root Zones in accordance with Australian Standards.

3. LIMITATIONS

- 3.1 The findings of this report are based on the observations and site conditions at the time inspection.
- 3.2 All observations were carried out from ground level. No detailed additional testing was carried out on trees or soil on site and none of the surrounding surfaces were lifted for investigation.
- 3.3 Where access was limited, trees have been assessed from one side only, these trees have been identified in the tree inspection schedule as 'inaccessible'.
- 3.4 Access was not available to several neighbouring trees, these trees dimensions have been estimated from within the property boundary.
- 3.5 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.
- 3.6 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.
- 3.7 Tree identification is based on accessible visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where tree species is unknown, it is indicated with a spp.
- 3.8 All diagrams, plans and photographs included in this report are visual aids only, and are not to scale unless otherwise indicated.
- 3.9 Hugh The Arborist neither guarantees, nor is responsible for, the accuracy of information provided by others that is contained within this report.
- 3.10 While an assessment of the subject trees estimated useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of trees at the site.
- 3.11 Where trees are stated as retainable under the current proposal, this will only become a reality if all recommendations and specifications are followed exactly.

- 3.12 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.
- 3.13 Alteration of this report invalidates the entire report.

4. METHODOLOGY

- 4.1 The following information was collected during the assessment of the subject tree(s).
- 4.1.1 Tree common name
 - 4.1.2 Tree botanical name
 - 4.1.3 Tree age class
 - 4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres. DBH and DAB has been estimated where access was limited.
 - 4.1.5 Estimated height - metres
 - 4.1.6 Estimated crown spread (Radius of crown) - metres
 - 4.1.7 Health
 - 4.1.8 Structural condition
 - 4.1.9 Amenity value
 - 4.1.10 Estimated remaining contribution years (SULE)¹
 - 4.1.11 Retention value (Tree AZ)²
 - 4.1.12 Notes/comments
- 4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).³
- 4.3 Tree diameter was measured using a DBH tape or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tools I used during the assessment were a digital camera and a Leica DistoD410 digital laser tape.

¹ Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, <http://www.treeaz.com/>.

² Barrell Tree Consultancy, *Tree AZ version 10.10-ANZ*, <http://www.treeaz.com/>.

³ Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (1994).

- 4.4 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009) ⁴ and in some cases estimated. See appendices for information.
- 4.5 Details of how the observations in this report have been assessed are listed in the appendices.

5. SITE LOCATION AND BRIEF DESCRIPTION OF PROPOSAL

- 5.1 The site is located in the suburb of North Manly within the Northern Beaches Local Government Area, this assessment has been carried out in accordance with the following legislation and policy.
 - 5.1.1 Manly Local Environmental Plan (LEP) 2013
 - 5.1.2 Manly Development Control Plan (DCP) 2013
 - 5.1.3 Northern Beaches Tree Management Controls
 - 5.1.4 State Environmental Planning Policy (Conservation and Biodiversity 2021)
- 5.2 The site, for the purpose of this report, is identified as at the corner of Pittwater and Kenneth Road. The site contains existing lawn bowling greens and several outbuildings. The site is largely flat with trees and shrubs mostly around the perimeter of varying value and maturity.
- 5.3 The site has not been identified as a Heritage Item or a Heritage Conservation Area. The site has not been identified as containing high levels of biodiversity or containing remnant vegetation according to the NSW Planning Portal Spatial Viewer mapping tool.⁵

⁴ Council of Standards Australia, *AS4970 Protection of trees on development sites* (2009).

⁵ <https://www.planningportal.nsw.gov.au/spatialviewerhistoric/#/find-a-property/address>

Tile 1: Site location



Report on trees at: 431 Pittwater Road North Manly NSW
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6. GENERAL INFORMATION FOR PROTECTING TREES ON DEVELOPMENT SITES.

- 6.1 **Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection. Additional information about the TPZ is included in appendix 3.
- 6.2 **Structural Root Zone (SRZ):** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula; $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ.
- 6.3 **Minor encroachment into TPZ:** Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

- 6.4 **Major encroachment into TPZ:** Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted. Root investigations may be required to identify roots that will be impacted during major TPZ encroachment.
- 6.5 **Variations to the TPZ & SRZ:** The TPZ and SRZ identified in AS4970-2009 are indicative only as number of factors can affect root growth patterns. Tree roots are adventitious and will seek out favourable growing conditions. Root growth can be affected by a number of factors including previous structures, obstacles such as rocky outcrops, soil characteristics including topography, soil volume and drainage. The lean and stability of a tree can also affect root growth as additional roots are likely to develop on the side of the root plate under tensile loading (roots on the opposite side to the direction of the lean). Trees on slopes will often produce additional root growth on the upper side of the tree. The only way to accurately identify the location of significant roots inside the TPZ and SRZ is to carryout non-invasive root investigations and prepare a root zone map (see section 6.7 for more information about root investigations). The root zone map can then be used by a qualified arborist to provide a higher level of accuracy of the potential impact to the viability of the tree.
- 6.6 **Changes to soil levels inside the TPZ:** Generally existing soil level should not be altered inside the TPZ of trees to be retained (unless root investigations have previous been undertaken to demonstrate that the changes to levels will not significantly impact the viability of the tree). Areas of fill should not exceed 100mm and fill material must be granular material that does not significantly inhibit the exchange of water and gases through the soil profile. The existing ground level must not be graded down or lowered inside TPZ without prior assessment of a consulting arborist in relation to the impact to the tree.

- 6.7 **Root investigations:** The root investigations should identify roots greater than 30mm in diameter that are located along the edge of the structures footprint or in the location of footings. Root investigations must be carried out using non-invasive methods (manual excavations). Any excavations for the root investigations must be carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.
- 6.8 **Underground services:** The location of all underground services must be clearly identified in the development proposal. If possible underground services should be located outside the TPZ of trees to be retained. Where this is not possible underground services should be installed using directional drilling methods or manual excavations to minimise the impact to trees identified for retention. Section 4.5.5 of AS4970-2009 says that 'The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees. For manual excavation of trenches the project arborist should advise on roots to be retained and should monitor the works'.⁶
- 6.9 **Landscape plans:** Where landscaping is proposed inside the TPZ of trees to be retained additional root disturbance should be avoided where possible. Tree sensitive landscaping may be required inside the TPZ of trees identified for retention to minimise further impact to the tree, such as avoiding retaining walls that will require additional excavations and areas of cut/fill. Advice may be required from the project arborist. General landscaping advice is provided below;
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 50mm or increased by more 100mm without assessment by a consulting Arborist.
 - New retaining walls should be avoided. Where new retaining walls are proposed inside the TPZ of trees to be retained, they should be constructed from tree

⁶ Council Of Standards Australia, *AS 4970 Protection of trees on development sites* (2009) page 18.

sensitive material, such as timber sleepers, that require minimal footings/excavations. If brick retaining walls are proposed inside the TPZ, consider pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.

- New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are proposed, they should be constructed on or above existing soil grades to minimise root disturbance and consider using a permeable surface. Footpath should be located outside the SRZ.
- Where fill/sub base is used inside the TPZ, fill material should be a coarse granular material that does not restrict the flow of water and air to the root system below. This type of material will also reduce the impact of soil compaction during construction.
- Generally under the LEP, the council will request that each protected tree removed is replaced with a minimum one tree that will grow to similar dimensions. The replacement trees should be specified in the landscape for the development. Any replacement tree should be planted at least 5m from any significant structures to prevent future issues occurring. Any replacement tree must be selected in accordance with AS2303-2015 Tree stock for landscape use.
- The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter.

6.10 Maintenance pruning: Maintenance pruning may be required for trees identified for retention in high use areas of the site. The maintenance pruning should include removing all deadwood greater than 25mm in diameter, rubbing/crossing branches and suspended branches. All tree works should be carried out by a qualified and experienced arborist, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).

6.11 Tree protection: Site specific tree protection measures must be included in the Arboricultural impact assessment for the development, including preparing a tree protection plan (TPP) and Arboricultural work method statement (AMS) for all trees at the site detailing the location of all tree protection and methods to minimise any impact to trees that are to be retained.

6.1 Tree Retention Value: The system used to award the retention value is Tree AZ. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The Tree AZ categories sheet (Barrell Tree Consultancy) is included in the appendices to assist with understanding the retention values. Using tree AZ, all trees assessed have been awarded a retention value from the following three categories.

<u>Category</u>	<u>Example recommendation</u>
AA	Every effort should be made to preserve and retain trees in this category.
A	The trees in this category should be retained if it is reasonably possible.
Z	The trees in this category should not cause a constraint on the development proposals. They should be retained only if they do not or will not cause a risk to people or property. Further investigations of defects, such as decay testing or root collar excavations, may be required to retain some trees in this category.

7. OBSERVATIONS AND TREE RETENTION VALUES ON SITE

- 7.1 **Refer to appendix 1, 1A and 2 to review the sites trees and retention values.**
- 7.2 **Tree information:** Details of each tree assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in Appendix 2, the indicative tree protection zone (TPZ) has been calculated for the subject trees. The TPZ and SRZ should be measured in radius from the centre of the trunk. The subject trees have been awarded a retention value based on observations taken on site. The system used to award the retention value is Tree AZ.
- 7.3 **Tree AZ** is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development has been included in the appendices. The Tree AZ categories sheet (Barrell Tree Consultancy) to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline.
- 7.4 **Site plans:** The following site plan have been included as appendices in the report:
- Appendix 1 – Tree Location Plan
 - Appendix 1A – Tree Retention Value Plan
- 7.5 **Table 2: Low value category Z trees.** The following table contains trees allocated a Z rating. These trees are in poor condition with a low improvement and generally a short useful life expectancy. Consideration is also given to applying the category Z rating if the tree can easily be replaced and reach the same size within 5 years of installing.

Tree Number	Common Name	Retention Value
4	Black Tea Tree	Z10
6	Swamp Oak	Z1
7	Broad Leaved Paperbark	Z10
18	Weeping Bottlebrush	Z10
23	Weeping Bottlebrush	Z10
25	Weeping Bottlebrush	Z10
28	Weeping Bottlebrush	Z10
30	Weeping Bottlebrush	Z1
31	Weeping Bottlebrush	Z1

7.6 **Table 3: Category Z trees Exempt Species.** The following table contains trees allocated a Z rating that are exempt from Council protection. These trees are listed as exempt species in the municipality and may be removed without application to Council as they are considered of low value in the locality. The exemption only applies to trees within the site boundaries unless the consent of the tree owner is provided.

Tree Number	Common Name	Retention Value
3	Cocos Palm	Z3
13	Cocos Palm	Z3
15	Broad Leaved Paperbark	Z2
16	Cheese Tree	Z2
19	Crepe Myrtle	Z3

7.7 **Table 4: Category A trees.** The following table contains trees allocated an A rating. These trees have been assessed as being free of or having only minor defects that could be addressed with remedial care.

Tree Number	Common Name	Retention Value
1	Weeping Bottlebrush	A1
2	Weeping Bottlebrush	A1
5	Black Tea Tree	A1
8	Black Tea Tree	A1
9	Broad Leaved Paperbark	A1
10	Black Tea Tree	A1
11	Black Tea Tree	A1
12	Weeping Bottlebrush	A2
14	Weeping Bottlebrush	A1
17	Frangipani	A1
20	Weeping Bottlebrush	A1
21	Swamp Cypress	A1
22	Swamp Cypress	A2
24	Weeping Bottlebrush	A1
26	Broad Leaved Paperbark	A1
27	Weeping Bottlebrush	A2
29	Swamp Oak	A2

8. CONCLUSIONS AND RECCOMENDATIONS

- 8.1 A total of 31 trees were surveyed across the site. Tables 2 and 3 provide a list of all trees assessed and their corresponding retention values.
- 8.2 Nine trees were assessed as category Z trees that are of ow value and in poor condition.
- 8.3 Five trees were assessed as category Z trees that are exempt from protection in the locality.
- 8.4 The remaining seventeen trees were assessed as category A trees there are protected in the locality and contain few or minor defects and can be retained in the long term.
- 8.5 Neighbouring trees may not be removed under the exemptions unless written permission is obtained from the landowner who is under no obligation to do so. This report does not give consent to prune or remove trees.

9. BIBLIOGRAPHY/REFERENCES

- Council of Standards Australia, *AS4970 Protection of trees on development sites* (2009).
- Council of Standards Australia, *AS4373 Pruning of amenity trees* (2007).
- Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (1994).
- Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, <http://www.treeaz.com/>.
- Barrell Tree Consultancy, *Tree AZ version 10.10-ANZ*, <http://www.treeaz.com/>.
- *Manly Local Environmental Plan 2013*
- *Manly Development Control Plan 2013*
- <https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=PDCP>.
- *Northern Beaches Council - Removing and Pruning Trees on Private Land*, <https://www.northernbeaches.nsw.gov.au/planning-development/tree-management/private-land>
- State Environmental Planning Policy (*Biodiversity and Conservation 2021*)

10. LIST OF APPENDICES

The following are included in the appendices:

- Appendix 1 – Tree Location Plan
- Appendix 1A – Tree Retention Value Plan (trees AZ)
- Appendix 2 - Tree inspection schedule
- Appendix 3 – Health
- Appendix 4 – Amenity Value
- Appendix 5 – Age Class
- Appendix 6 – Structural Condition
- Appendix 7 – SULE Categories
- Appendix 8 – Retention Values
- Appendix 9 – Trees AZ
- Appendix 10 – TPZ Encroachment

Hugh Millington



Diploma of Arboriculture (AQF5)
NC Forestry and Arboriculture III (UK)
RFS Tech. Cert. II (UK)
QTRA Registered User
ISA Tree Risk Assessment Qualification

0426836701

hugh@hughtheArborist.com.au

Hugh The Arborist Pty Ltd

hugh@hughthearborist.com.au
www.hughthearborist.com.au

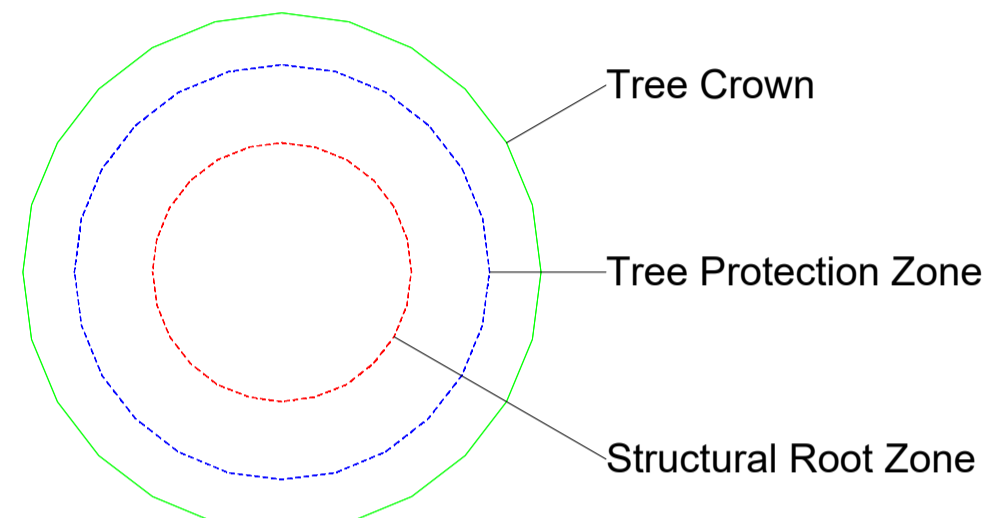
431 Pittwater Road North Manly NSW

SCALE : 1 : 250 @ A1 DATE : 19/08/2023

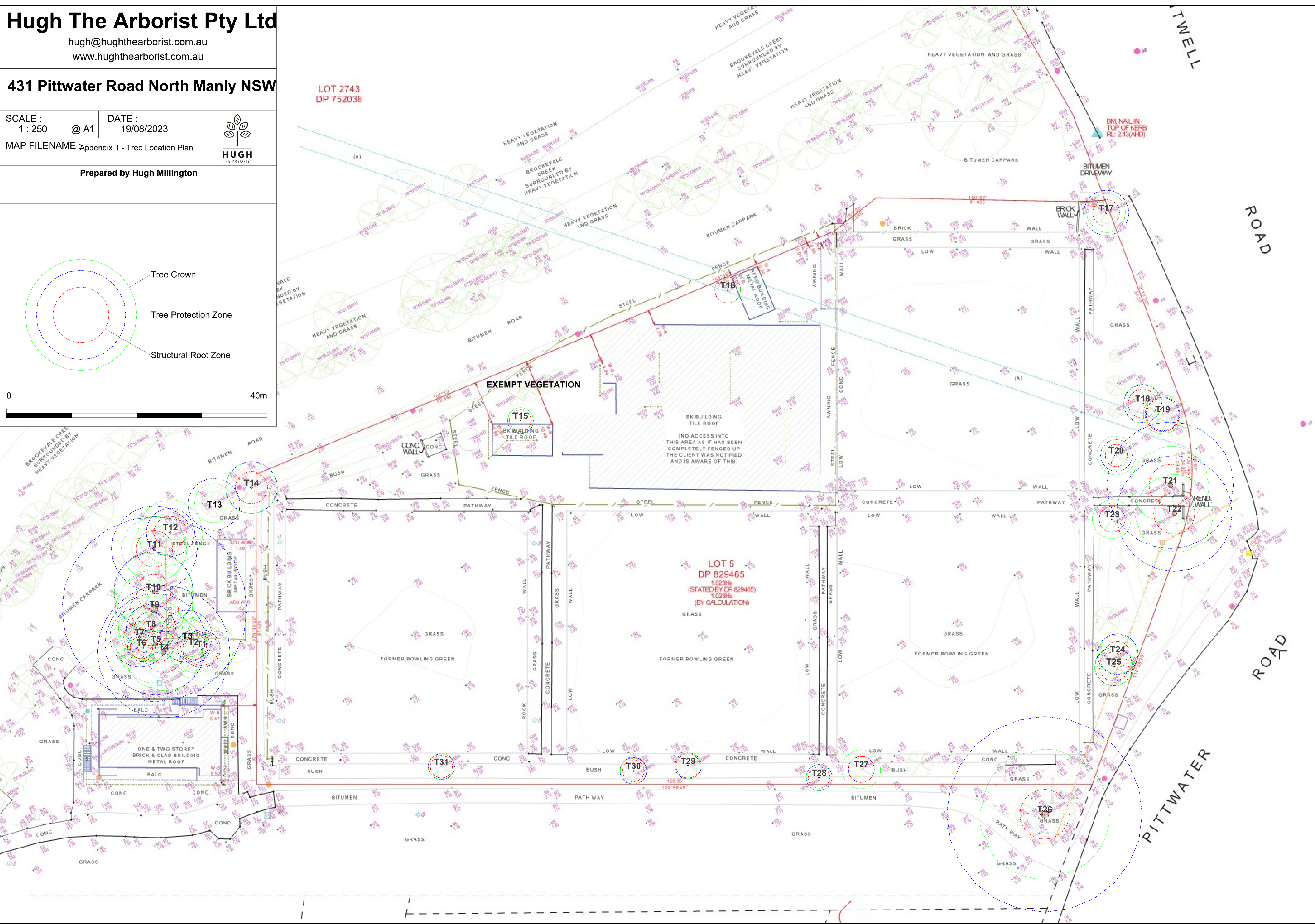
MAP FILENAME Appendix 1 - Tree Location Plan



Prepared by Hugh Millington



LOT 2743
DP 752038



LOT 5
DP 829465
1.023ha
(STATED BY DP 829465)
1.023ha
(BY CALCULATION)

EXEMPT VEGETATION

BM NAIL IN TOP OF KERB RL= 243.440

(NO ACCESS INTO THIS AREA AS IT HAS BEEN COMPLETELY FENCED UP THE CLIENT WAS NOTIFIED AND IS AWARE OF THIS)

Hugh The Arborist Pty Ltd

hugh@hughthearborist.com.au
www.hughthearborist.com.au

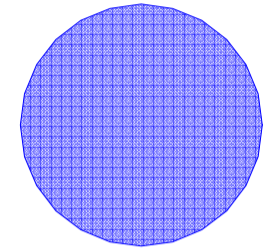
431 Pittwater Road North Manly NSW

SCALE : 1 : 250 @ A1 DATE : 19/08/2023

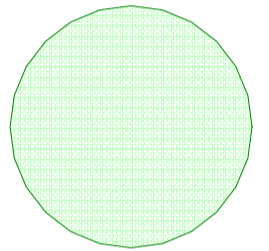
MAP FILENAME : Appendix 1A - Tree Retention Value Plan



Prepared by Hugh Millington



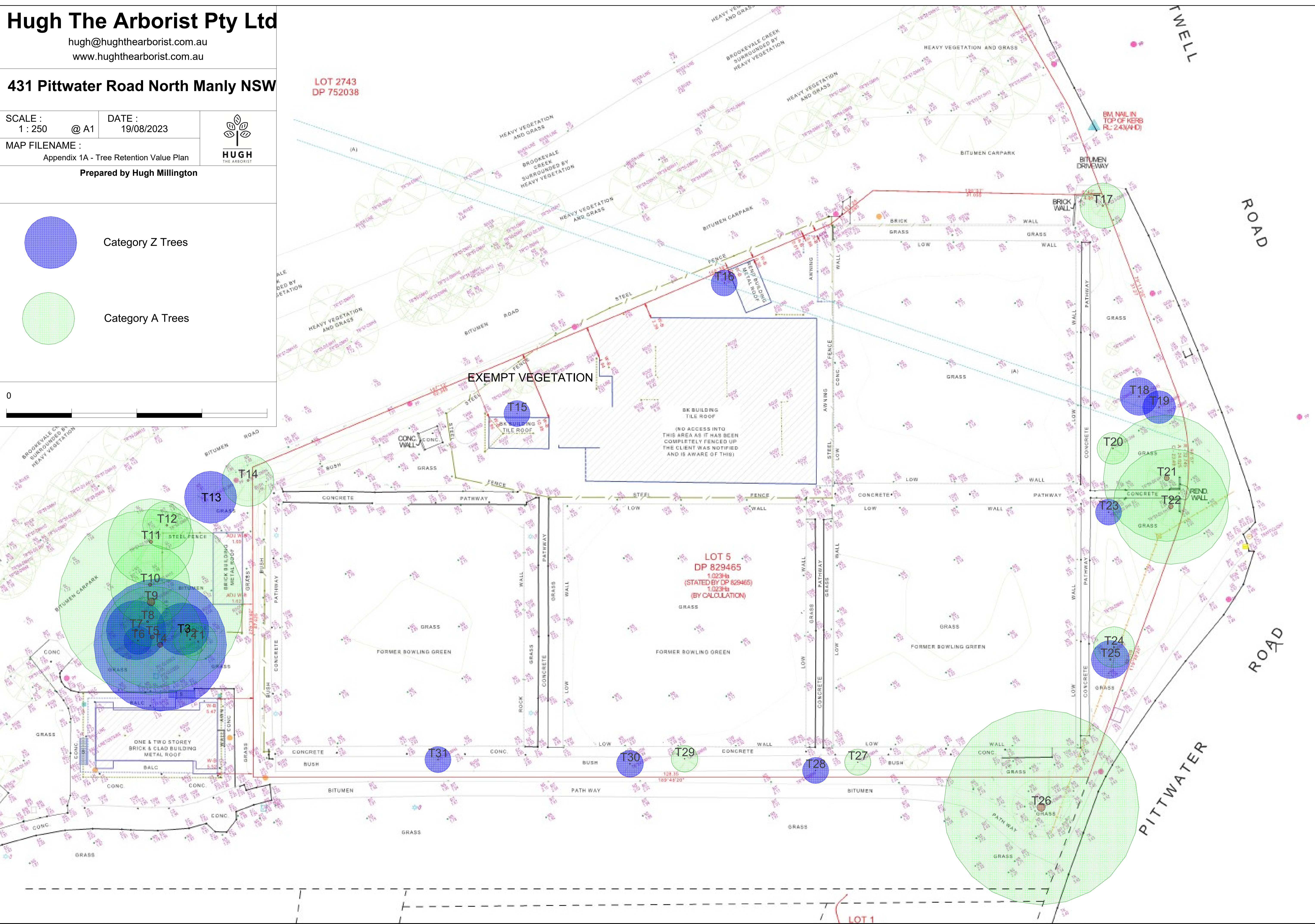
Category Z Trees



Category A Trees



LOT 2743
DP 752038



LOT 1

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1 (mm)	Stem 2 (mm)	Stem 3	Stem 4	Stem 5	Stem 6	DBH (mm)	DAB (mm)	Health	Structure	Landscape Value	SULE	Trees AZ Value	TPZ Radius (m)	SRZ Radius (m)	Notes
1	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	6	5	240						354	550	Good	Good	Moderate	1. Long	A1	4.2	2.6	
2	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	5	4	140	160					213	300	Good	Good	Moderate	1. Long	A1	2.6	2.0	
3	Cocos Palm	<i>Aracastum romanzoffianum</i>	Semi-mature	9	3	320						320	NA	Good	Good	Low	1. Long	Z3	3.8	4.0	
4	Black Tea Tree	<i>Melaleuca Bracteata</i>	Mature	11	6	620	580					849	900	Good	Poor	Low	3. Short	Z10	10.2	3.2	Split in between stems
5	Black Tea Tree	<i>Melaleuca Bracteata</i>	Semi-mature	11	6	650						650	700	Good	Good	Moderate	1. Long	A1	7.8	2.8	
6	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	7	2	180						180	210	Good	Good	Low	1. Long	Z1	2.2	1.7	Replaceable
7	Broad Leaved Paperbark	<i>Melaleuca quinquenervia</i>	Semi-mature	8	4	380						380	480	Good	Poor	Low	2. Medium	Z10	4.6	2.4	Heavy lean
8	Black Tea Tree	<i>Melaleuca Bracteata</i>	Semi-mature	8	5	250	190					314	470	Good	Good	Moderate	1. Long	A1	3.8	2.4	
9	Broad Leaved Paperbark	<i>Melaleuca quinquenervia</i>	Mature	18	6	680	690	680				1184	1300	Good	Good	High	1. Long	A1	14.2	3.7	
10	Black Tea Tree	<i>Melaleuca Bracteata</i>	Semi-mature	10	6	510						510	600	Good	Good	Moderate	1. Long	A1	6.1	2.7	
11	Black Tea Tree	<i>Melaleuca Bracteata</i>	Semi-mature	10	5	550						550	680	Good	Good	Moderate	1. Long	A1	6.6	2.8	
12	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	7	5	200	190	140				309	500	Good	Fair	Moderate	2. Medium	A2	3.7	2.5	
13	Cocos Palm	<i>Aracastum romanzoffianum</i>	Semi-mature	6	3	280						280	NA	Good	Good	Low	1. Long	Z3	3.4	4.0	
14	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	8	4	230	240					332	500	Good	Good	Moderate	1. Long	A1	4.0	2.5	
15	Broad Leaved Paperbark	<i>Melaleuca quinquenervia</i>	Young	6	2	100						100	200	Good	Good	Low	1. Long	Z2	2.0	1.7	Not on survey. Proximity exemption
16	Cheese Tree	<i>Glochidion ferdinandii</i>	Young	5	2	50	50	50	50	50		112	300	Good	Good	Low	1. Long	Z2	2.0	2.0	Not on survey. Proximity exemption
17	Frangipani	<i>Plumeria Spp.</i>	Mature	5	3	200	210					290	320	Good	Good	Low	1. Long	A1	3.5	2.1	
18	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	6	3	100	100	120	120	100		242	390	Fair	Fair	Low	3. Short	Z10	2.9	2.2	
19	Crepe Myrtle	<i>Lagerstroemia indica</i>	Semi-mature	6	3	100	100	90	90	90		210	600	Good	Good	Low	1. Long	Z3	2.5	2.7	
20	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	5	3	100	130	120				203	210	Good	Good	Moderate	1. Long	A1	2.4	1.7	
21	Swamp Cypress	<i>Taxodium distichum</i>	Mature	17	6	810						810	950	Good	Good	High	1. Long	A1	9.7	3.2	
22	Swamp Cypress	<i>Taxodium distichum</i>	Mature	16	6	740						740	900	Good	Fair	Moderate	2. Medium	A2	8.9	3.2	Mistletoe and apical small failure
23	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	5	3	108	100	50	50			163	300	Good	Poor	Low	3. Short	Z10	2.0	2.0	
24	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	5	3	180	190					262	290	Good	Good	Moderate	1. Long	A1	3.1	2.0	
25	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	5	3	100	50	50	210			243	400	Good	Poor	Low	3. Short	Z10	2.9	2.3	Cavity's in base
26	Broad Leaved Paperbark	<i>Melaleuca quinquenervia</i>	Mature	10	10	1300						1300	1400	Good	Good	High	1. Long	A1	15.6	3.8	
27	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	5	3	50	80	80	50	50		142	310	Good	Fair	Low	2. Medium	A2	2.0	2.0	Replaceable
28	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	4	2	80	80	70				133	190	Good	Poor	Low	3. Short	Z10	2.0	1.6	Failure at base
29	Swamp Oak	<i>Casuarina glauca</i>	Young	7	2	120	120					170	250	Good	Fair	Low	2. Medium	A2	2.0	1.8	Replaceable
30	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	4	2	140	50	50	50	50		172	200	Good	Good	Low	1. Long	Z1	2.1	1.7	Replaceable
31	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	4	2	120	60	60	60	50		166	210	Good	Good	Low	1. Long	Z1	2.0	1.7	Replaceable

Explanatory Notes

Tree Species - Botanical name followed by common name in brackets. Where species is unknown it is indicated with an 'spp'.

Age Class - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y), Dead (D).

Diameter at Breast Height (DBH) - Measured with a DBH tape or estimated at approximately 1.4m above ground level. Where DBH has been estimated it is indicated with an 'est'.

Diameter Above root Buttresses (DAB): Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.

Height - Height from ground level to top of crown. All heights are estimated unless otherwise indicated.

Spread - Radius of crown at widest section. All tree spreads are estimated unless otherwise indicated.

Tree Protection Zone (TPZ) - DBH x 12. Measured in radius from the centre of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 metre outside the crown projection.

Structural Root Zone (SRZ) - $(DAB \times 50)^{0.42} \times 0.64$. Measured in radius from the centre of the trunk. Rounded up to nearest 0.1m.

Health - Good/Fair/Poor/Dead

Structure - Good/Fair/Poor

Safe Useful Life Expectancy (SULE) - 1. Long (40+years), 2. Medium (15 - 40 years), 3. Short (5 - 15 years), 4. Remove (under 5 years), 5. Small/young.

Amenity Value - Very High/High/Medium/Low/Very Low.

(x) Indicates the measurement taken for the diameter at tree base above the buttress roots.

(E) Indicates estimated measurements.

Appendix 3 – Assessment of Health

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development. 	<ul style="list-style-type: none"> • The tree is in above average health and condition and no remedial works are required.
Fair	<ul style="list-style-type: none"> • The tree may be starting to dieback or have over 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be early signs of pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree. 	<ul style="list-style-type: none"> • The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	<ul style="list-style-type: none"> • The may be in decline, have extensive dieback or have over 30% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health. 	<ul style="list-style-type: none"> • The tree is displaying low levels of health and removal or remedial works may be required.
Dead	<ul style="list-style-type: none"> • The tree is dead or almost dead. 	<ul style="list-style-type: none"> • The tree should generally be removed.

Appendix 4 Landscape Value

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m ² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to Commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m ² ; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m ² ;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crowndensity of more than 50% (thinning to normal); and The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5--10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

Appendix 5 - Age class

Determining the exact age of a tree is difficult without carrying out potentially invasive testing. The age class of the subject tree has been estimated using the definitions below.

<u>Category</u>	<u>Description</u>
Young/Newly planted	<ul style="list-style-type: none">• Young or recently planted tree.
Semi Mature	<ul style="list-style-type: none">• Up to 20% of the usual life expectancy for the species.
Early mature/Mature	<ul style="list-style-type: none">• Between 20% - 80% of the usual life expectancy for the species.
Over mature	<ul style="list-style-type: none">• Over 80% of the usual life expectancy for the species.
Dead	<ul style="list-style-type: none">• Tree is dead or almost dead.

Appendix 4 - Structural condition

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may have a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	<ul style="list-style-type: none"> • The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree.

Appendix 7 - Safe Useful Life Expectancy (SULE), (Barrel, 2001)

A tree's safe useful life expectancy is determined by assessing a number of different factors including the health and vitality, estimated age in relation to expected life expectancy for the species, structural defects, and remedial works that could allow retention in the existing situation.

Category	Description
1. Long	Useful life expectancy over 40 years
2. Medium	Useful life expectancy 15 to 40 years
3. Short	Useful life expectancy 5 to 15 years
4. Remove	Useful life expectancy under 5 years
5. Small/Young	Trees that could be transplanted or replaced with similar specimen.
6. Unstable	Tree has become hazardous or structurally unstable.

TreeAZ Categories (Version 10.04-ANZ)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

Z1	Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
Z2	Too close to a building, i.e. exempt from legal protection because of proximity, etc
Z3	Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

Z4	Dead, dying, diseased or declining
Z5	Severe damage and/or structural defects where a high risk of failure <u>cannot</u> be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
Z6	Instability, i.e. poor anchorage, increased exposure, etc

Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people

Z7	Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
Z8	Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

Z9	Severe damage and/or structural defects where a high risk of failure can be <u>temporarily</u> reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
Z10	Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
Z11	Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
Z12	Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

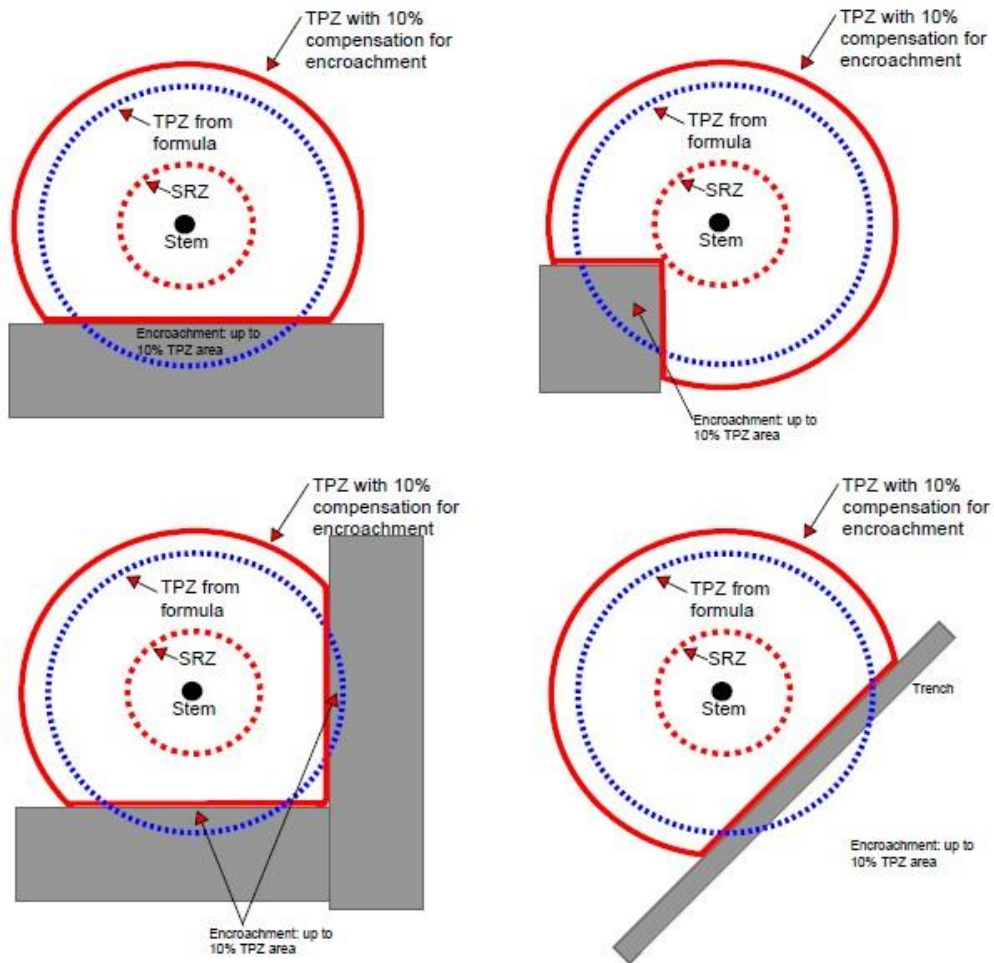
Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

A1	No significant defects and could be retained with minimal remedial care
A2	Minor defects that could be addressed by remedial care and/or work to adjacent trees
A3	Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
A4	Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

Appendix 10 – Examples of TPZ Encroachment

Encroachment into the Tree Protection Zone is sometimes unavoidable. The following diagram shows examples of acceptable levels of encroachment and how they may be compensated for by providing additional space contiguous to the TPZ area.



Note: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.