SEASONED TREE CONSULTING

ARBORICULTURAL IMPACT ASSESSMENT REPORT

+ Root Mapping Investigation Report

Prepared for

Du Plessis Architects

Site address

80 Peacock Street
Seaforth

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LIST OF OTHER APPENDICES

1. INTRODUCTION

1.1 This report has been commissioned by Du Plessis Architects to provide an Arboricultural Impact Assessment Report in relation to trees located on or close to the site that may be affected by a proposed development.

TABLE 1: **DOCUMENTS PROVIDED FOR THE ASSESSMENT**

Title	Author	Date	Reference on document
Site Survey Plan	Donovan Associates	22.08.2019	Rev-A
Architectural drawings- DA architectural set	Du Plessis Architects	09.07.2021	Issue E.1

1.2 One site inspection was carried out for the purpose of this assessment om 15th March 2021. The site inspection was undertaken to collect tree and site data.

1.3 The weather during of the site inspection was sunny with good visibility.

2. SCOPE OF THE REPORT

2.1 **This report has been undertaken to meet the following objectives.**

2.2 Conduct a visual assessment from ground level of all trees located on or close to the site.

2.3 Determine the trees estimated contributing years, remaining useful life expectancy and award the tree a retention value.

2.4 Provide an assessment of the potential impact the proposed development is likely to have on the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).

2.5 Undertake root investigation works to understand the impact to tree's root systems to be retained from the proposed plans.

2.6 Recommend methods to mitigate development impacts where appropriate.

2.7 Recommend pragmatic tree protection measures for any tree to be retained in accordance with AS4970 Protection of Trees on Development Sites - 2009.

3. LIMITATIONS

3.1 Observations and recommendations are based on the single site inspection. 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.

3.3 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.

3.4 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.

3.5 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.

3.6 All diagrams, plans and photographs included in this report are visual aids only and are not to scale unless otherwise indicated.

3.7 Seasoned Tree Consulting neither guarantees, nor is responsible for, the accuracy of information provided by others that is contained within this report.

3.8 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.

3.9 Where trees are stated as retainable under the current proposal, this will only become a reality if all recommendations and specifications are followed exactly.

3.10 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.

3.11 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).

4.2 Tree common name

4.3 Tree botanical name

4.4 Tree age class

4.5 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres.

4.6 Estimated height - metres

4.7 Estimated crown spread (Radius of crown) - metres

4.8 Health

4.9 Structural condition

4.10 Amenity value

4.11 Estimated remaining contribution years (SULE)[1]

4.12 Retention value (Tree AZ)[2]

4.13 Notes/comments

4.14 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).[3]

4.15 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.

4.16 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.

4.17 Details of how the observations in this report have been assessed are listed in the appendices.

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

5. SITE LOCATION AND BRIEF DESCRIPTION OF PROPOSAL

5.1 The site is located in the suburb of Seaforth in the Northern Beaches Council LGA. This assessment has been carried out in accordance with the following documents and legislation;

5.1.1 Manly Local Environmental Plan 2013

5.1.2 Manly (DCP) 2013- as amended 01 Dec 2019

5.1.3 State Environmental Planning Policy (Vegetation in Non-Rural Areas 2017).

5.2 The site is zoned R2 (Low density residential) and is approx. 726sq m in size. The site has an existing house and garage with lawn, shrubs and trees. The site has large areas of sandstone bedrock throughout the site that may have severely restricted and changed the predicted spread of tree roots. The site has no environmental protection values nor any form of heritage protection.

5.3 The proposal consists of demolition of the existing house and structures, construction of a new 3 storey house including garage, driveway, pool and installation of services and landscaping.

Tile 1: Site location [5]

[5] *https://maps.six.nsw.gov.au/*

6. OBSERVATIONS AND GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES

6.1 **Tree information**: Details of each individual tree assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in appendix 2, where the indicative tree protection zone (TPZ) for the subject trees has been calculated. The TPZ and SRZ should be measured in radius from the centre of the trunk. Trees have been awarded a retention value based on site observations. The system used to award the retention value is Tree AZ. 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. A field sheet of Tree AZ categories sheet (Barrell Tree Consultancy) has been included at the end of the report 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.

6.2 **Site plans:** Appendix 1 contains an existing site plan identifying tree locations. Appendix 1A contains the proposed site plans, trees retained through the development and tree protection advice.

6.3 **Tree protection zone (TPZ)**: The TPZ is 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 AS4970-2009 to be the extent 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 tree protection also incorporates the SRZ (see below for more information about the SRZ). The TPZ of palms, other monocots, cycads and tree ferns has been calculated at one metre outside the crown projection. Appendix 4 contains additional information about the TPZ including information about calculating the TPZ and examples of TPZ encroachment.

6.4 **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. 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. See appendix 5 for more information about the SRZ.

6.5 **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.

6.6 **Major encroachment into TPZ**: Where encroachment of more than 10% of the overall TPZ area is proposed an 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.

7. ASSESSEMENT OF CONSTRUCTION IMPACTS

7.1 **Table 2:** The table below contains a summary of the impact of proposed development impact to all trees included in the assessment.

Tree ID	Common name	Retention value	TPZ radius (m)	SRZ Radius (m)	TPZ Area (sq m)	TPZ Encroachment See Appendix 1A	Discussion/ Conclusion	Recommendation
1	Camellia- Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
2	Oleander- Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
3	Umbrella tree- Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
4	Tree Fern - Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
5	*No tree here- Stump in ground*	n/a					-	To be removed.
6	*Ficus* - Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
7	*Phoenix Palm* - Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
8	*No tree here- Stump in ground*	n/a					-	To be removed.

Tree ID	Common name	Retention value	TPZ radius (m)	SRZ Radius (m)	TPZ Area (sq m)	TPZ Encroachment See Appendix 1A	Discussion/ Conclusion	Recommendation
9	*Murraya*- Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
10	*Vine covered Bottlebrush* - Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
11, 12, 13	*3 x Camellias*- - Exempt (Under 5m in height)	n/a					Exempt under the Northern beaches Council Tree Preservation Order	To be removed.
14	*Melaleuca quinquenervia,* Broad-leaved paperbark	A2	9.72	3.1	296.8	87.1 sq m (= 29.4%) Theoretically calculated to be a Major encroachment	The subject trees TPZ and SRZ has been calculated in accordance with the Australian Standard 4970 Protection of Trees on Development Sites – 2009 (the standard). The same standard makes an allowance for variations in the TPZ and the SRZ from existing structures altering the path of root spread. It is highly likely the TPZ and SRZ of the subject tree is largely contained within the neighbours garden due to the solid concrete wall deflecting the spread of the root system (See image k and image l on pages 15 and 16) Approximately a 29.4% encroachment into the TPZ from the proposed pool, pool terrace and associated footings and walls. This is considered to be a major encroachment and the severance of structural roots has the capacity to destabilize the tree. Following this calculation, root investigation was undertaken to identify if there are woody roots in the proposed building areas. This root investigation work is described in detail on page 18 and 19.	Retain and protect + Root investigation to be undertaken to understand the impact to the trees root system from the proposed plans.

Tree ID	Common name	Retention value	TPZ radius (m)	SRZ Radius (m)	TPZ Area (sq m)	TPZ Encroachment See Appendix 1A	Discussion/ Conclusion	Recommendation
15	*Jacaranda mimosifolia*, Jacaranda	A1					As of 27th May 2021 this tree has been removed by the neighbour.	Already removed

8. CONCLUSIONS

8.1 **Table 3:** Summary of the impact to trees during the development;

Impact	Reason	A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, trees in poor condition, or for the creation of the APZ	None	None
Retained trees that will be subject to TPZ encroachment	Removal of existing surfacing/structures and/or installation of new surfacing/structures	None	None
Trees to be retained that will not be subject to TPZ encroachment	Space for development	None	None
Trees requiring further investigation (Root Mapping)	Soil characteristics, topography and level changes within the TPZ	T14 (1 Tree)	None

8.2 ***** T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13 are all to be removed but are not classified as trees.**

8.3 ***** As of 27th May 2021, Tree 15 has been removed**

9. PHOTOGRAPHS

Image a: Tree 1 Camellia (Exempt)

Image b: Tree 2 Oleander (Exempt), Tree 3 Umbrella tree (Exempt)

Image c: Tree 4 Tree Fern (Exempt)

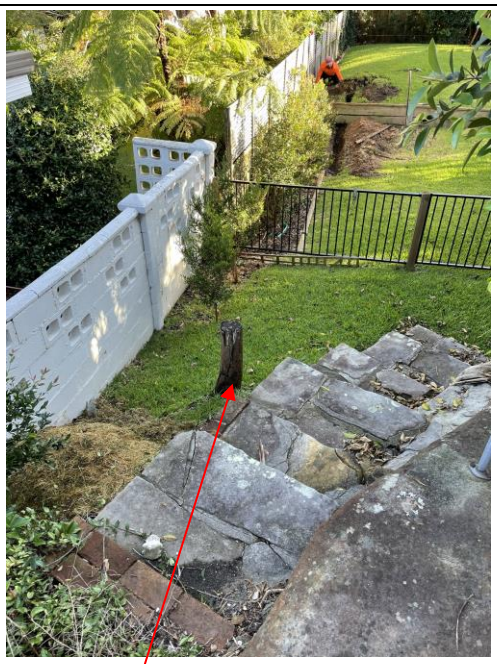


Image d: Tree 5 (stump exempt)

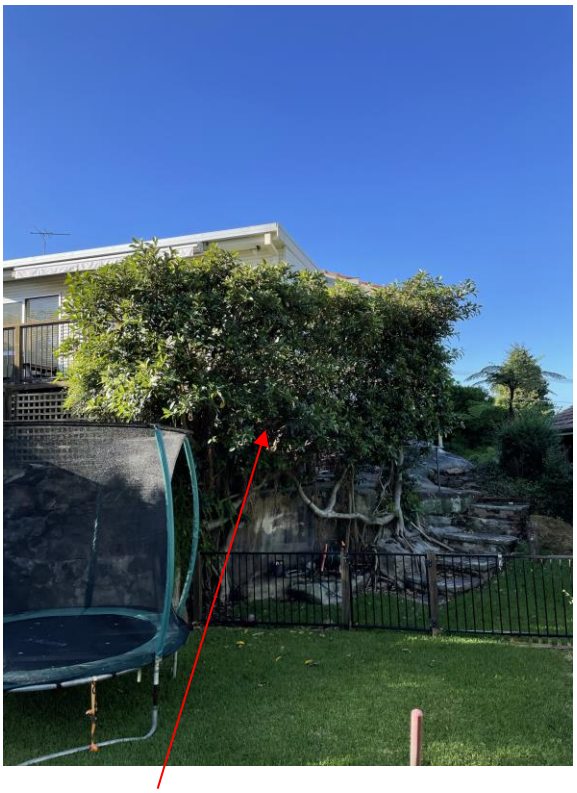


Image e: Tree 6- Ficus (exempt)

Image f: Tree 7- Phoenix Palm (Exempt), Tree 8- (stump exempt)

Image g: Tree 9 Murraya (exempt) Tree 10 Bottlebrush (exempt)

Image h: Tree 11, 12, 13 Camellias (exempt)

Image i: Tree 14 Paperbark, Tree 15 Jacaranda (**has been removed as of 27th May 2021)**

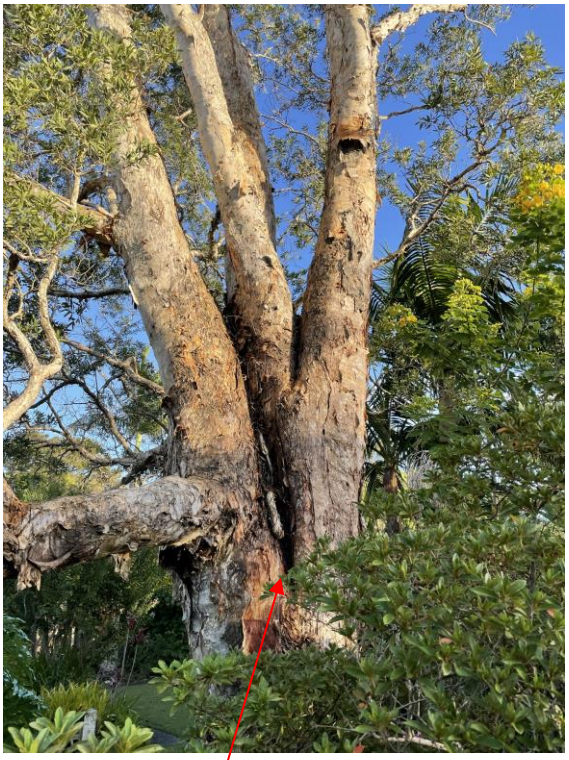


Image j: Tree 14 showing a fair structural condition due to codominant unions with included bark.

Image k: Tree 14 showing a solid concrete low wall deflecting the path of structural root spread away from the proposed site

Image l: Tree 14 root deflection as per image k previous page

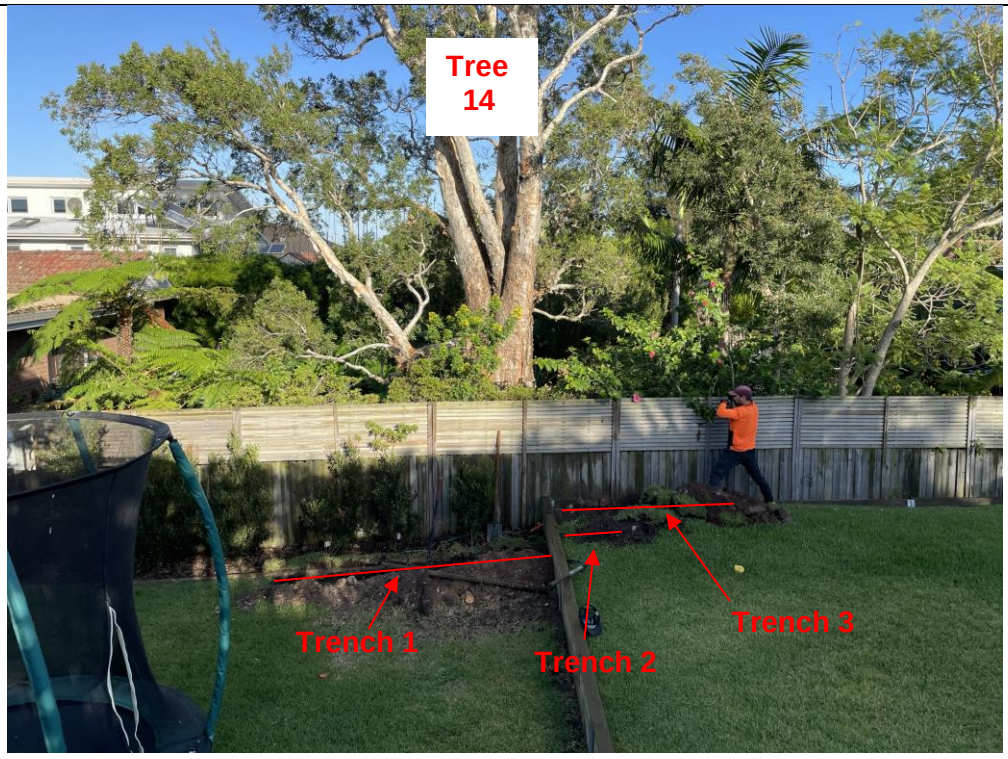


Image m: Tree 14- Overview of root investigation trenches dug in proximity to Tree 14.

Image n: Trench 1- no roots encountered- rock at bottom of trench

Image o: Trench 2- loose rubble and large amount of dead and decomposing roots from the large stump beside

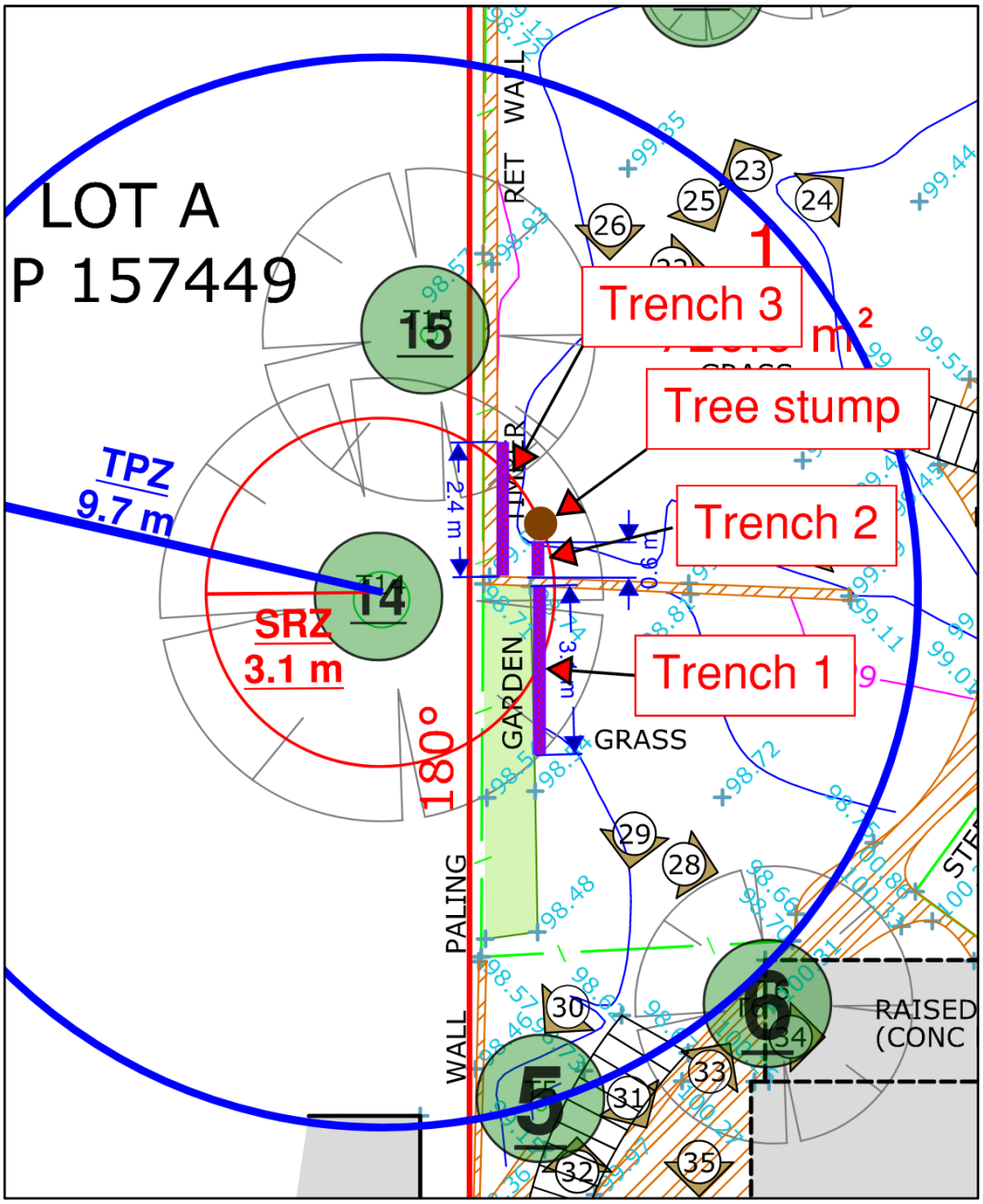
Image p: Trench 3- no roots encountered aside from dead and decomposing roots from the stump

Image q: Trench 3- no roots encountered aside from dead and decomposing roots from the stump

10. ROOT INVESTIGATION WORKS

10.1 Non-invasive root mapping was undertaken to identify the possible location of roots in relation to the proposed pool design and associated structures.

10.2 3 trenches were dug (to the measurements depicted on the marked-up site survey below) using a shovel and trowel within the area proposed for the pool and associated structures. Root investigation work was undertaken on Monday 15th March 2021. Photos taken are shown in the preceding pages.



10.3 The proposed design within the TPZ of Tree 14 consists of a pool and associated structures. Existing site features (which include the neighbours low solid concrete retaining wall and the sandstone bedrock throughout the subject site) have severely limited the spread and development of the tree's structural root system.

ROOT MAPPING FINDINGS-

Trench #	**Trench** **Width x Depth x Length** **(in metres)**	**Roots encountered from the neighbouring Paperbark?**	**Recommendations**
1	0.3m x 0.4m x 3.1m	Nil	Proposed development to proceed in its current form due to no tree roots encountered. A project arborist is to be engaged to supervise the demolition and excavation work within the TPZ and SRZ of Tree 14.
2	0.3m x 0.4m x 0.6m	Nil	
3	0.3m x 0.6m x 2.4m	Nil	

11. RECOMMENDATIONS

11.1 This report assesses the impact of a proposed development at the site on 15 trees located close to the site in accordance with AS4970 Protection of trees on development sites (2009).

11.2 13 trees (T1 to T13) are all exempt species and can be removed. Tree 15 has already been removed.

11.3 It is recommended that Tree 14 be retained and protected.

11.4 A project arborist must be appointed prior to attaining the construction certificate and must supervise excavation works within the TPZ of tree 14.

11.5 Replanting of 2 trees that are native to the Northern Beaches LGA is recommended within the deep soil zones of the site.

11.6 All construction activity is to comply with Australian Standard AS4970 Protection of Trees on Development Sites (2009), sections 7, 11 and 12 of this report.

11.7 This report does not provide approval for tree removal or pruning works. All recommendations in this report are subject to approval by the relevant authorities and/or tree owners. This report should be submitted as supporting evidence with any tree removal/pruning or development application.

12. ARBORICULTURAL WORK METHOD STATEMENT (AMS) AND TREE PROTECTION REQUIREMENTS

12.1 **Use of this report:** All contractors must be made aware of the tree protection requirements prior to commencing works at the site and be provided a copy of this report.

12.2 **Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.

12.3 **Tree work:** All tree work must be carried out by a qualified and experienced Arborist with a minimum of AQF level 3 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).

12.4 **Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. I recommend regular site inspections on a frequency based on the longevity of the project, this is to be agreed in the initial meeting.

12.5 **Site Specific Tree Protection Recommendations:**

Table 4: Individual tree protection requirements, see Appendix 1B for locations and further guidance.

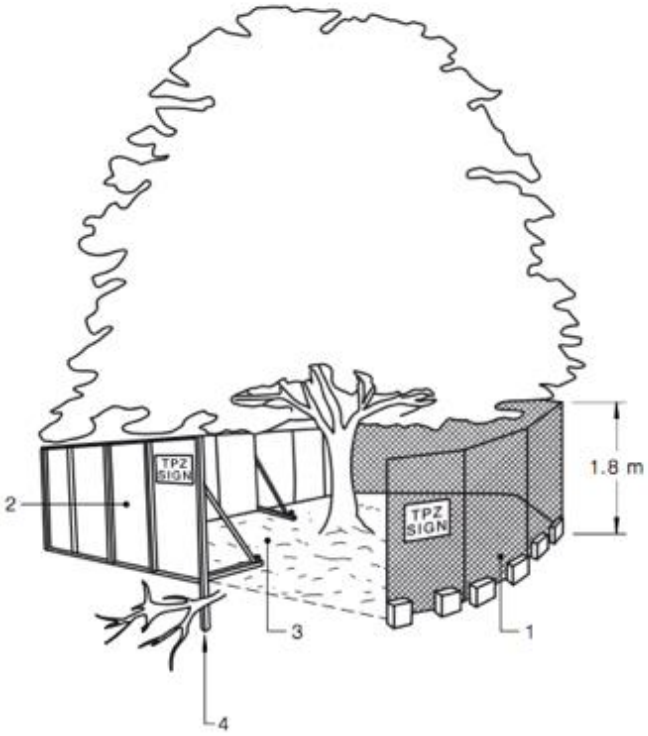
Tree Number	Protection specification
14	- Arboricultural supervision of removal of any existing structures (retaining walls etc) within the TPZ and SRZ , and of any excavation within the TPZ and SRZ - Sediment fencing to stop overland runoff into the neighbours yard

12.6 **Tree protection Specifications:** It is the responsibility of the principle contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing.

12.7 **Protective fencing:** Where it is not feasible to install fencing at the specified location due to factors such restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Where the installation of fencing in unfeasible due to restrictions on space, trunk and branch protection will be required (see below). The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing must only be removed for the landscaping phase and must be authorised by the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.

12.8 **TPZ signage:** Tree protection signage is to be attached to the protective fencing, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:

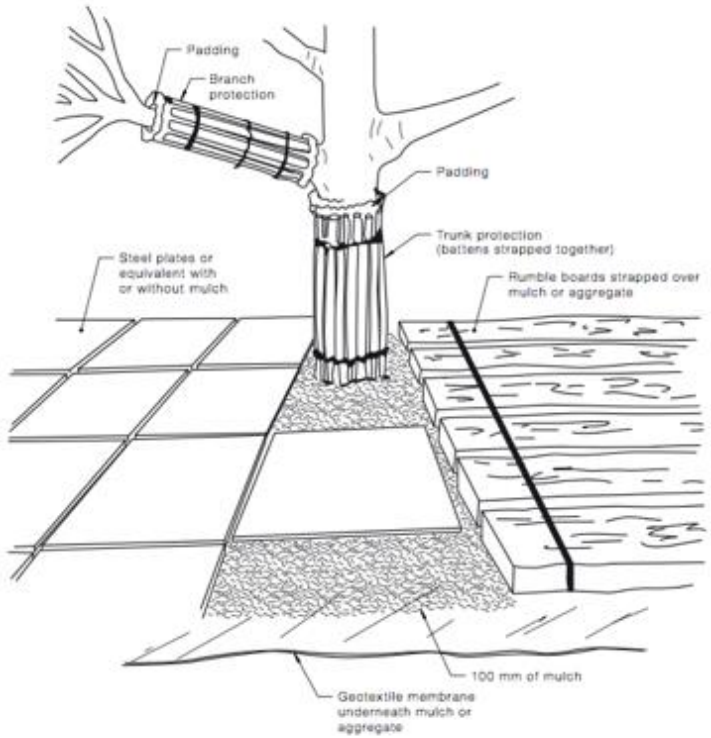
- Tree protection zone/No access.
- This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
- The name, address, and telephone number of the developer/builder and project Arborist



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

An image from AS4970-2009,[6] with example tree protection.

[6] Council of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.



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.

An image from AS4970-2009,[7] with example tree protection.

12.9 **Restricted activities inside TPZ:** The following activities must be avoided inside the TPZ of all trees to be retained unless approved by the project Arborist. If at any time these activities cannot be avoided an alternative must be agreed in writing with the project Arborist to minimise the impact to the tree.

A) Machine excavation.
B) Ripping or cultivation of soil.
C) Storage of spoil, soil or any such materials
D) Preparation of chemicals, including preparation of cement products.
E) Refueling.
F) Dumping of waste.
G) Wash down and cleaning of equipment.
H) Placement of fill.
I) Lighting of fires.
J) Soil level changes.
K) Any physical damage to the crown, trunk, or root system.
L) Parking of vehicles.

[7] Council of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.

12.10 **Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the 'top down, pull back' method.

12.11 **Excavations and root pruning:** The project Arborist must supervise and certify that all excavations are in accordance with AS4373-2007 and AS4970-2009. For excavations within the TPZ, manual excavation is required along the edge of the structures closest to the subject trees.

12.12 **Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimize the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.

12.13 **Sediment and Contamination:** All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.

12.14 **Tree Wounding/Injury:** Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.

12.15 **Completion of Development Works:** After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

13. HOLD POINTS

13.1 **Hold Points:** Below is a sequence of hold points requiring project Arborist certification throughout the development process**.** It provides a list of hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development.

13.2 **Hold points applicable to the development have been shaded in grey.**

Hold Point	Stage	Responsibility	Certification	Complete Y/N and date
Project Arborist to hold pre construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise.	Prior to work commencing.	Principle contractor	Project Arborist	
Project Arborist to assess and certify that tree protection has been installed in accordance with section 11 and AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	Principle contractor	Project Arborist	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. I recommend site inspections every month for this site when in the demolition and excavation phase, and then every second month after that.	Ongoing throughout the development	Principle contractor	Project Arborist	
Project Arborist to supervise all excavations and demolition inside the TPZ of any tree to be retained.	Construction	Principle contractor	Project Arborist	
All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the project Arborist to minimize the impact to trees.	Landscape	Principle contractor	Project Arborist	

Hold Point	Stage	Responsibility	Certification	Complete Y/N and date
After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigor and authorize the removal of protective fencing. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of construction	Principle contractor	Project Arborist	
Any wounding or injury that occurs to a tree during the demolition/construction process will require the project arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. All remediation work is to be carried out by the project arborist, at the contractor's expense.	Ongoing throughout the development	Principle contractor	Project Arborist	

14. BIBLIOGRAPHY/REFERENCES

- Council of Standards Australia, *AS4970 Protection of trees on development sites* (2009).
- Council of Standards Australia, *AS4373 Pruning of amenity trees* (2007).
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- State Environmental Planning Policy (Vegetation in Non-Rural Areas 2017).

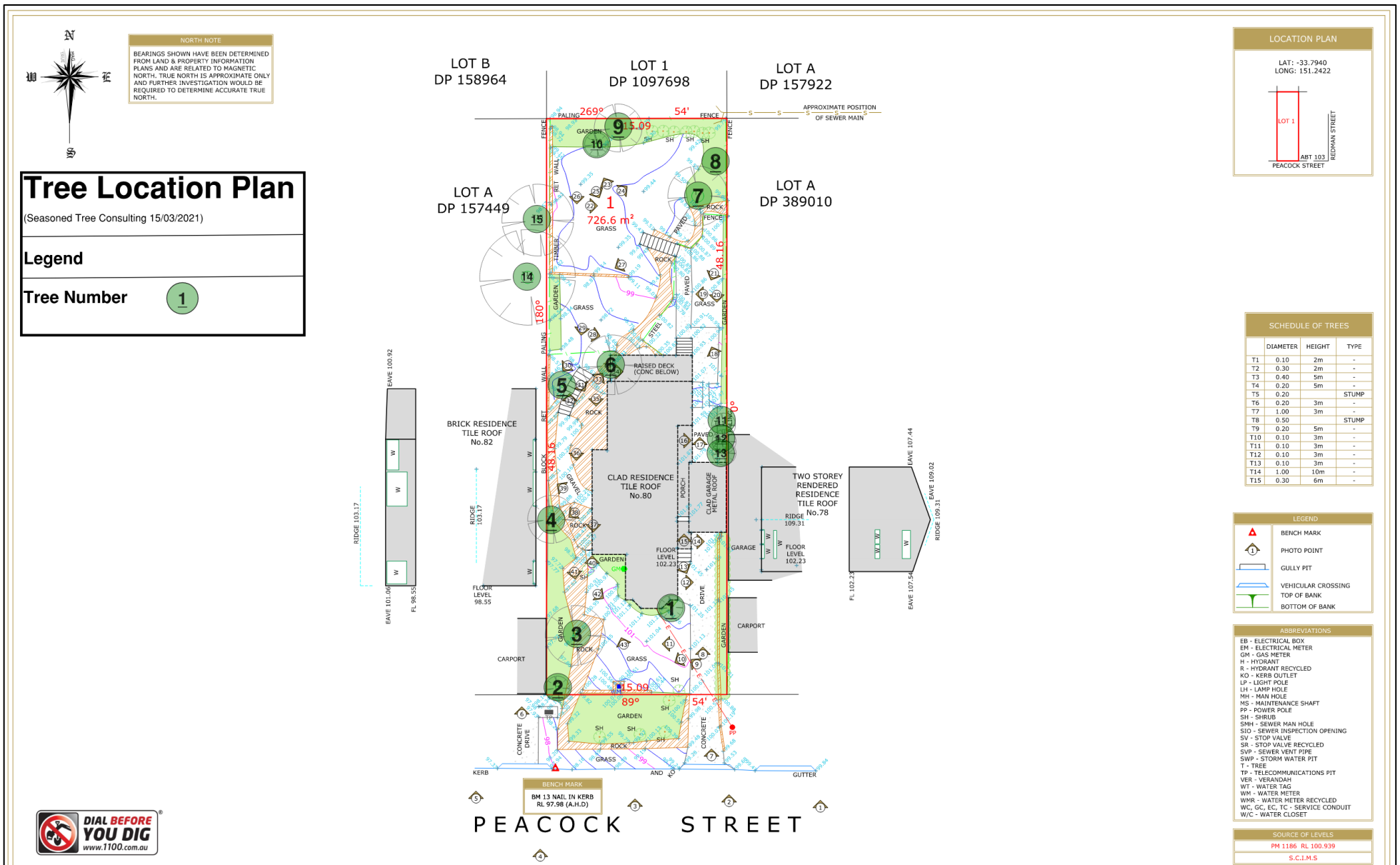
15. LIST OF APPENDICES

The following are included in the appendices:

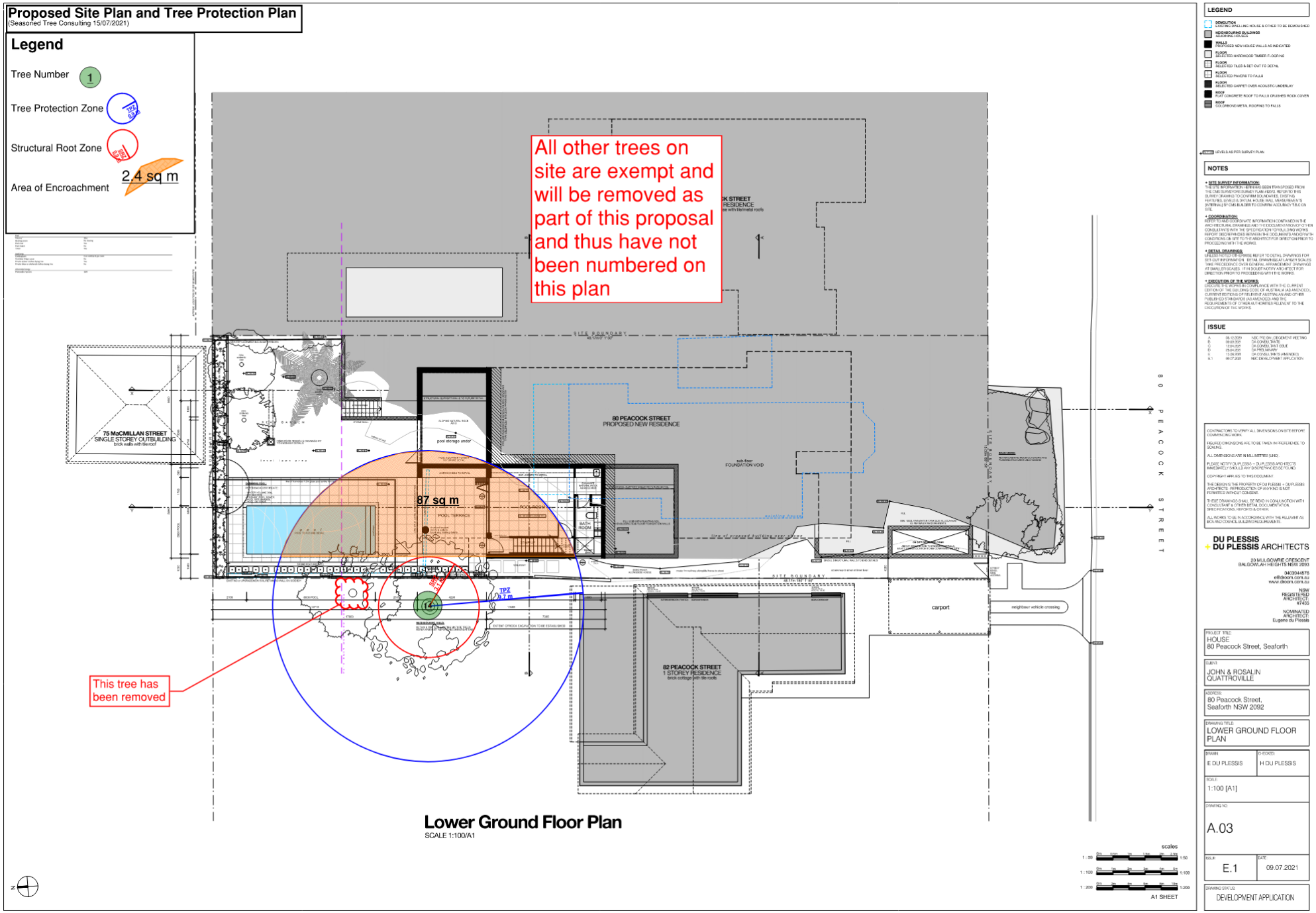
Appendix 1 - Existing Site Plan
Appendix 1A – Proposed Site Plan and Tree Protection Plan
Appendix 2 - Tree Inspection schedule
Appendix 3 - Tree Health
Appendix 4 – Tree Protection Zone
Appendix 5 – Structural Root Zone
Appendix 6 – Amenity Value
Appendix 7 – Age Class
Appendix 8 – Structural Condition
Appendix 9 – SULE Categories
Appendix 10 – Trees AZ

SEASONED TREE CONSULTING

APPENDIX 1 - SITE PLAN.



APPENDIX 1A – PROPOSED SITE PLAN WITH TREE PROTECTION PLAN



APPENDIX 2- TREE INSPECTION SCHEDULE

Tree Inspection Schedule

Tree Inspection Site: 80 Peacock St Seaforth

Surveyed by: David Gowenlock **Date of Inspection:** 15/03/2021 **Tagged:** No

Tree ID	Tree Species	DBH (CM)	TPZ radius (M)	TPZ Area (Sq.M)	DAB (CM)	SRZ radius (M)	Height (M)	Spread (M)	Age Class	Health	Structure	Amenity value	SULE (yrs.)	TreeAZ retention Value	Comments
1	Camellia- Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
2	Oleander- Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
3	Umbrella tree- Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
4	Tree Fern - Exempt (Under 5m in height)														Exempt height under the Northern beaches Council Tree Preservation Order
5	*No tree here- Stump in ground*														-
6	*Ficus* - Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
7	*Phoenix Palm* - Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
8	*No tree here- Stump in ground*														-
9	*Murraya*- Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
10	*Vine covered Bottlebrush* - Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
11, 12, 13	*3 x Camellias*- - Exempt (Under 5m in height)														Exempt under the Northern beaches Council Tree Preservation Order
14	*Melaleuca quinquenervia,* Broad-leaved paperbark	81	9.72	296.8	86	3.1	14	12	Mature	Good	Fair	High	Short (5 - 15 years)	A2	Included bark and codominant stems. Trunks weighted towards neighbours house, recommend weight reduction prune to lower risk of future branch or trunk failure towards the neighbours house. Roots have been deflected away from subject site by a large concrete retaining wall.
15	*Jacaranda mimosifolia,* Jacaranda	12*11 (=16)	2	12.6	20	1.7	5	4	Semi-mature	Good	Good	Low	Medium (15 - 40 years)	A1	

Explanatory Notes

Tree Species - Botanical name followed by common name in brackets. Where species is unknown it is indicated with an '*spp*'.
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'.
Tree Protection Zone (TPZ) - DBH x 12. Measured in radius from the center of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 meter outside the crown projection.
TPZ Area (Sq.M)- The area of the TPZ calculated in square metres.
Diameter Above root Buttresses (DAB): Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.
Structural Root Zone (SRZ) - (DAB x 50) $^{0.42}$ x 0.64. Measured in radius from the center of the trunk. Rounded up to nearest 0.1m.
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.
Age Class - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y), Dead (D).
Health - Good/Fair/Poor/Dead
Structure - Good/Fair/Poor
Amenity Value - Very High/High/Medium/Low/Very Low.
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.
TreeAZ retention Value- See Appendix 10

Appendix 3 – Condition/Overall health

Category	Example condition	Summary
Good	• 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. • 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.	• The tree is in above average health and condition and no remedial works are required. • The tree is considered structurally good with well developed form.
Fair	• 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. • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health. • 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	• 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. • 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.	• The tree is displaying low levels of health and removal or remedial works may be required. • The identified defects are likely to cause either partial or whole failure of the tree.
Dangerous	• The tree is dead or almost dead. • The tree is an imminent danger to people or property.	• The tree should generally be removed.

Appendix 4 - Tree Protection Zone (TPZ)

The tree protection zone (TPZ) is the principle means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. The TPZ incorporates the structural root zone (SRZ).

Determining the TPZ

The radius of the TPZ is calculated for each tree by multiplying its DBH × 12.

TPZ = DBH × 12

Where

DBH = trunk diameter measured at 1.4 m above ground

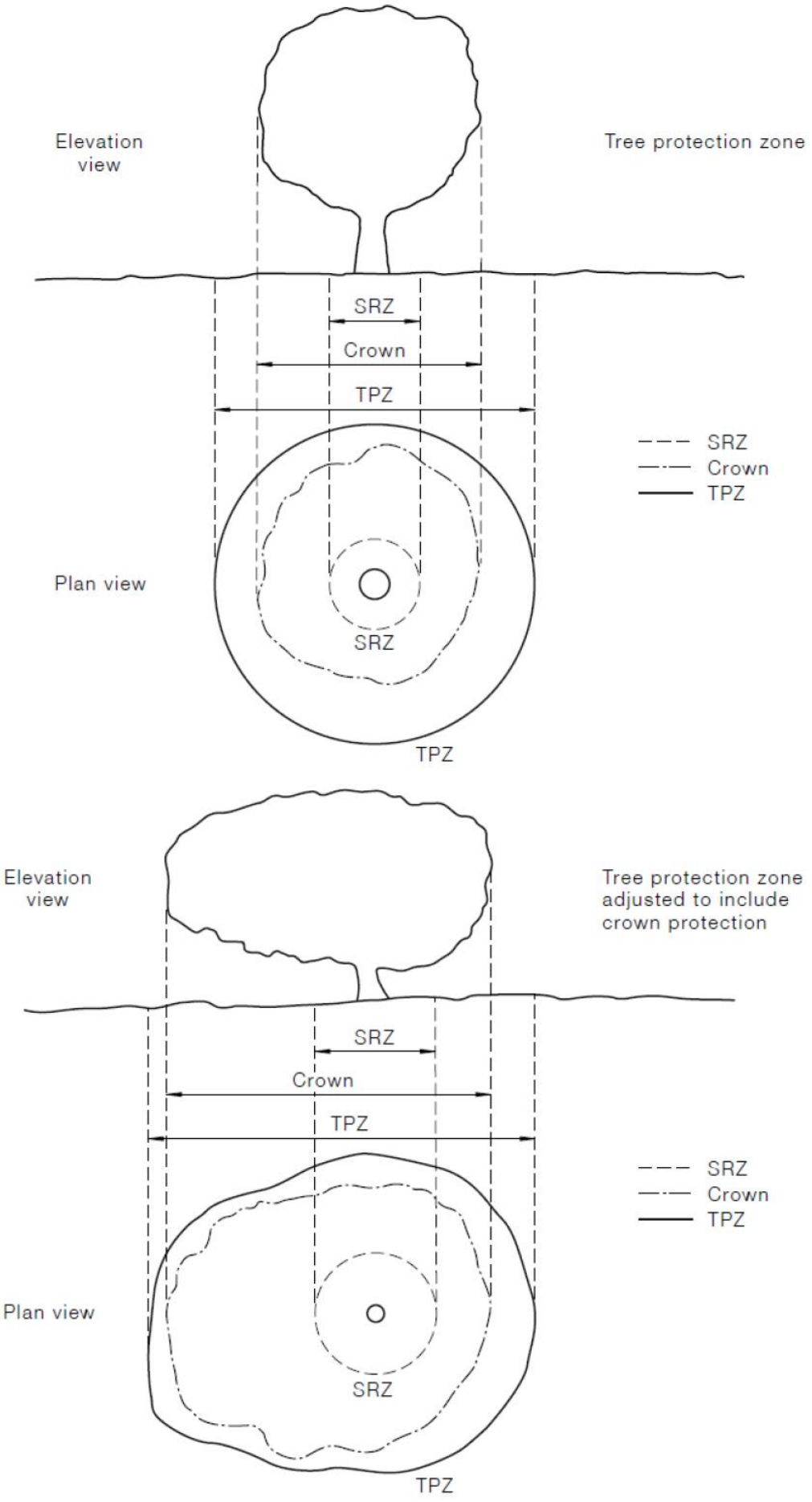
Radius is measured from the centre of the stem at ground level.
A TPZ should not be less than 2 m nor greater than 15 m (except where crown protection is required).

Minor encroachment into the TPZ

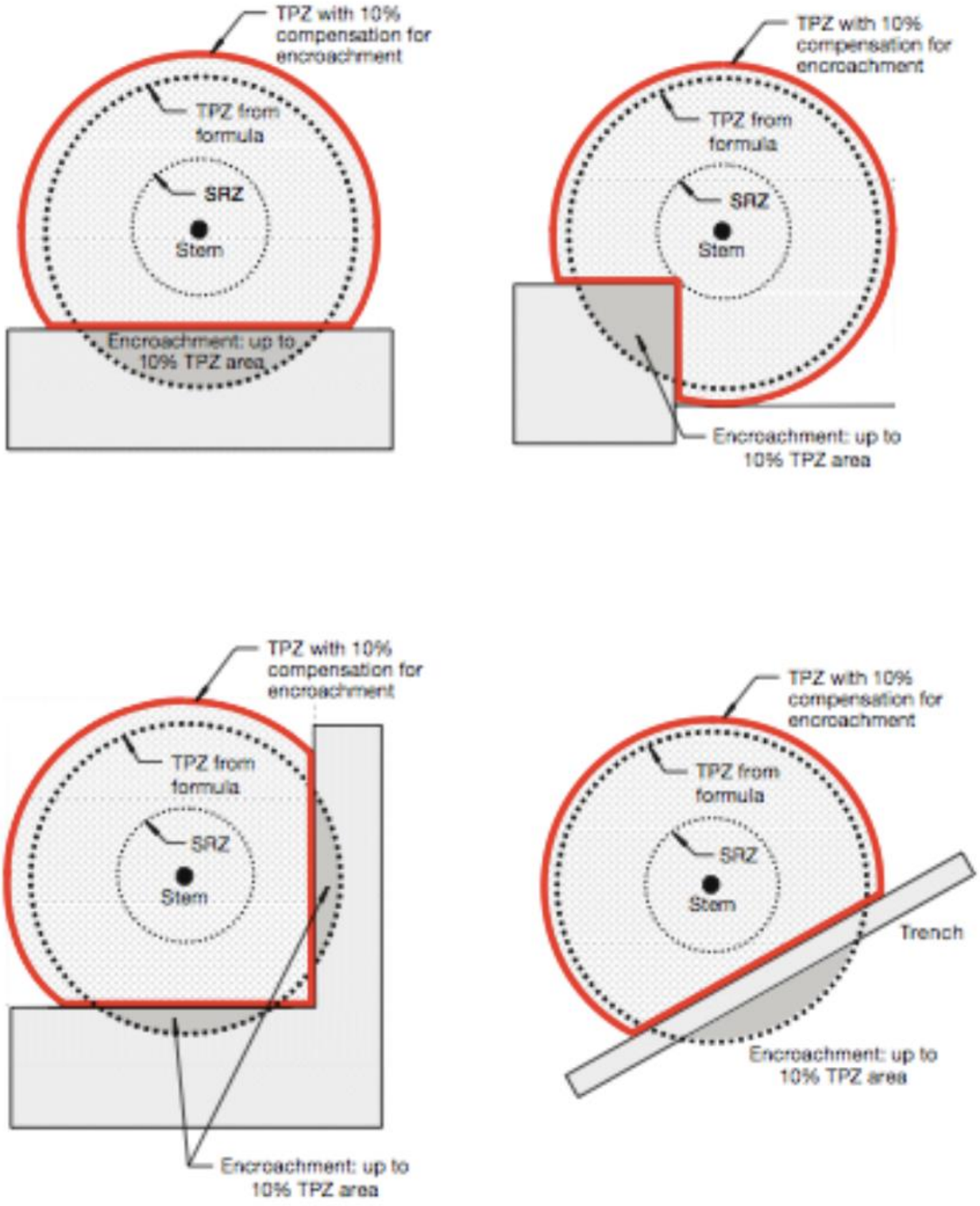
Where encroachment into the TPZ is unavoidable it is generally accepted that encroachment of under 10% of the total TPZ is possible without carrying out detailed root investigations. This minor loss of root area is normally compensated by the roots developing elsewhere.

Major encroachment into the TPZ

If an encroachment of more than 10% is proposed into the TPZ it would be necessary to demonstrate that the tree would remain viable. None destructive root investigations may be required to determine any potential impact the encroachment may have on the tree.


Elevation view
Tree protection zone
SRZ
Crown
TPZ
SRZ
Crown
TPZ
Plan view
SRZ
TPZ
Elevation view
Tree protection zone adjusted to include crown protection
SRZ
Crown
TPZ
SRZ
Crown
TPZ
Plan view
SRZ
TPZ

Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D1 provides examples of TPZ encroachment by area, to assist in reducing the impact of such incursions.



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

Appendix 5 - 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 need to be maintained to preserve a viable tree as it will only have a minor effect on the trees vigour and health. There are several factors that determine 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.

Determining the SRZ

An indicative SRZ radius can be determined from the diameter of the trunk measured immediately above the root buttresses. Root investigation could provide more information about the extent of the SRZ. The following formula should be used to calculate the SRZ.

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

where

D = trunk diameter in m, measured above the root buttress.

Note - The SRZ for trees with trunk diameters less than 0.15 will be 1.5m.

Appendix 6 - Amenity value

To determine the amenity value of a tree we assess a number of different factors which include but are not limited to the information below.

- The visibility of the tree to adjacent sites.
- The relationship between the tree and the site.
- Whether the tree is protected by any statuary conditions.
- The habitat value of the tree.
- Whether the tree is considered a noxious weed species.

Appendix 7 - Age class

If can be difficult to determine the age of a tree without carrying out invasive tests that may damage the tree, so we have categorised there likely age class which is defined below.

Category	Description
Young/Newly planted	• Young or recently planted tree.
Semi Mature	• Up to 20% of the usual life expectancy for the species.
Early mature/Mature	• Between 20% - 80% of the usual life expectancy for the species.
Over mature	• Over 80% of the usual life expectancy for the species.
Dead	• Tree is dead or almost dead.

Appendix 8 - Structural condition

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• The identified defects are likely to cause either partial or whole failure of the tree.

Appendix 9 - Safe Useful Life Expectancy (SULE), (Barrel, 2001)

A trees 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 - Over 40 years	(a) Structurally sound trees located in positions that can accommodate future growth. (b) Trees that could be made suitable for retention in the long term by remedial tree care. (c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.
2. Medium - 15 to 40 years	(a) Trees that may only live between 15 and 40 more years. (b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that could be made suitable for retention in the medium term by remedial tree care.
3. Short - 5 to 15 years	(a) Trees that may only live between 5 and 15 more years. (b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.
4. Remove - Under 5 years	(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions. (b) Dangerous trees because of instability or recent loss of adjacent trees. (c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form. (d) Damaged trees that are clearly not safe to retain. (e) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (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 the reasons given in (a) to (f). (h) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
5. Small/Young	(a) Small trees less than 5m in height. (b) Young trees less than 15 years old but over 5m in height. (c) Formal hedges and trees intended for regular pruning to artificially control growth.

Appendix 10- TreeAZ Categories

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 cannot 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 temporarily 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.