

9) Appendix I

Arboricultural Impact Assessment
Prepared by
EcoLogical Australia

A stylized topographic map with green contour lines is positioned on the left side of the page, extending from the top to the bottom. The lines represent elevation changes, with some forming circular peaks and others following a more irregular path.

679-685 Old Northern Road, Dural – Arboricultural Impact Assessment

Healing ONR Pty Ltd

DOCUMENT TRACKING

Project Name	679-685 Old Northern Rd, Dural – Arboricultural Impact Assessment
Project Number	20SUT-17253
Project Manager	Kirsten McLaren
Prepared by	David Bidwell & Kirsten McLaren
Reviewed by	Beth Medway / Deanne Hickey
Approved by	Beth Medway / Deanne Hickey
Status	Final
Version Number	V4
Last saved on	7 April 2022

This report should be cited as 'Eco Logical Australia 2021. 679-685 Old Northern Rd, Dural – Arboricultural Impact Assessment. Prepared for Healing ONR Pty Ltd.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Healing ONR Pty Ltd.

Disclaimer

This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and Healing ONR Pty Ltd. The scope of services was defined in consultation with Healing ONR Pty Ltd, by time and budgetary constraints imposed by the client, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.

Template 2.8.1

Contents

1. Background	1
2. Method	4
2.1 Definition of a tree.....	4
2.2 Visual tree assessment	4
2.3 Retention value & landscape significance.....	5
2.4 Protection zones.....	5
2.4.1 Tree protection zone (TPZ)	5
2.4.2 Structural root zone (SRZ)	5
2.5 Potential impacts	6
3. Results and discussion	8
4. Tree protection plan	10
5. Hold points, inspection and certification	11
6. References	12
6.1 General references	12
6.2 Project specific references.....	12
Appendix A Tree retention assessment method	13
A1 Tree Significance Assessment Criteria - STARS©	13
A2 Matrix assessment - STARS©	14
Appendix B Encroachment into tree protection zones - AS 4970-2009.....	15
Appendix C Maps	16
Appendix D Tabulated results of arboricultural assessment	20
Appendix E Tree protection guidelines	22
E1 Tree protection fencing	22
E2 Crown protection.....	22
E3 Trunk protection	22
E4 Ground protection.....	23
E5 Root protection and investigation	24
E6 Underground services.....	24
Appendix F Indicative concept plan (Health Projects International 2022)	25
Appendix G Site photos	26

List of Figures

Figure 1: Location of the Subject Land.....	3
Figure 2: Representative tree structure and indicative TPZ and SRZ.....	6
Figure 3: Tree locations map.....	16
Figure 4: Tree retention values	17
Figure 5: Arboricultural impact assessment.....	18
Figure 6: Proposed action	19
Figure 7: Tree 1.....	26
Figure 8: Tree 2.....	27
Figure 9: Tree 3.....	27
Figure 10: Tree 4.....	28
Figure 11: Tree 5.....	28
Figure 12: Tree 6.....	29
Figure 13: Tree 7	29
Figure 14: Tree 8.....	30
Figure 15: Tree 14.....	30
Figure 16: Tree 15.....	31
Figure 17: Tree 16.....	31
Figure 18: Tree 17.....	32
Figure 19: Tree 18	32
Figure 20: Tree 19.....	33
Figure 21: Tree 21.....	33
Figure 22: Tree 23.....	34
Figure 23: Tree 24.....	34
Figure 24: Tree 27.....	35
Figure 25: Tree 28.....	35
Figure 26: Tree 29.....	36
Figure 27: Tree 30.....	36
Figure 28: Tree 31.....	37
Figure 29: Tree 32 and 33.....	37
Figure 30: Tree 34.....	38
Figure 31: Tree 35.....	38

List of Tables

Table 1: Study area.....	1
Table 2: Proposed activity	1
Table 3: Summary of tree retention values and impacts	8
Table 4: Summary of tree retention values and proposed impact	8
Table 5: Summary of tree protection measures	10

Abbreviations

Abbreviation	Description
APU	Additional Permitted Use
AQF	Australian Qualifications Framework
AS	Australian Standards
DA	Development Application
DAB	Diameter at Base
DBH	Diameter at Breast Height
ELA	Eco Logical Australia
GIS	Geographic Information Systems
m	Metre
mm	Millimetre
NDE	Non-Destructive Excavation
NO	Number
NSW	New South Wales
PP	Planning Proposal
SP	Species
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment

1. Background

Eco Logical Australia Pty Ltd (ELA) was commissioned by Healing ONR Pty Ltd to prepare an Arboricultural Impact Assessment (AIA) for a proposed health services facility in Dural. For the purpose of the proposal, the AIA has assessed the indicative concept design plan and ELA understands that this report will accompany a bushfire advice letter and Flora and Fauna Assessment, also prepared by ELA for submission with the proposed Planning Proposal.

The planning proposal seeks an Additional Permitted Use (APU) on the site to enable a health services facility and an increase in building height from 10.5 metres to 14 metres. It is recommended that this report be updated to assess impacts at the detailed design phase prior to submitting the Development Application (DA). The address of the subject site, along with additional information is detailed in Table 1, with the location of the subject site mapped in Figure 1. The purpose of this report is to:

- identify the trees within the site that are likely to be affected by the proposed works
- undertake a visual tree assessment of the subject trees
- assess the current overall health and condition of the subject trees
- evaluate the retention value of the subject trees
- identify trees to be removed, retained or transplanted
- determine the likely impacts on trees to be retained
- recommend tree protection measures to minimise adverse impacts.

Features of the study area are tabulated below.

Table 1: Study area

Criteria	Description
Street address	679-681 and 683-685 Old Northern Road, Dural
Lot and DP	Lot 3, DP395437 and Lot 1, DP120004
Local Government Area	Hornsby Shire Council
General land use	RU2 Rural Landscape & SP2 Infrastructure

The description of the proposed activity in Table 2 is based on information available at the time of preparing this report.

Table 2: Proposed activity

Activities that can impact trees	Description of proposed activities
Clearing trees	Yes, in accordance with the indicative concept plan 19 trees are proposed to be cleared.
Mitigation measures for tree retention	To ensure the viable retention of the three (3) trees (Trees 1, 32 and 33) root mapping is required to be undertaken by an AQF level 5 consulting arborist. Construction methods are also recommended to be in consultation with the project arborist (AQF Level 5) prior to construction so that specific mitigation measures can be considered (if required).
Pruning vegetation	No

Activities that can impact trees	Description of proposed activities
Earthworks including regrading, excavation and trenching	Yes, the indicative concept plan which includes buildings, basement and roads
Compaction	Yes, all onsite parking, storage of materials, installing of structures, stockpiling fill or materials will be positioned outside of the TPZ of trees to be retained.
Refuelling and chemical use (e.g., herbicides)	No
Erection of scaffolding	Yes, erection of scaffolding for the construction of buildings will be positioned within the impact area outlined in Appendix C.
Vehicle movements	Yes, access for construction machinery will be positioned within the impact area outlined in Appendix C.
Changes to stormwater management	No
Landscaping	Yes, no excavation, levelling/regrading works will be completed within the landscaping area. All landscaping works will be positioned outside of the TPZ of trees to be retained.



Figure 1: Location of the Subject Land

2. Method

2.1 Definition of a tree

A tree is defined under the Australian Standard, *AS 4970-2009, Protection of Trees on Development Sites* as a long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks.

Hornsby Shire Council defines a tree as:

‘a long lived woody perennial plant with one or relatively few main stems with the potential to grow to a height greater than 3 m’ (Hornsby Shire Council 2013).

2.2 Visual tree assessment

The health and condition of the subject trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck and Breloer (1994) and practices consistent with modern arboriculture.

A total of **35 subject trees** were inspected in November 2020 by AQF Level 5 Consulting Arborist, David Bidwell. ELA understands that after the Tree Risk Assessment (TRA) prepared on 2 December 2020 Hornsby Shire Council approved the removal of five Trees 13, 19, 22, 25 and 26 (TA/37/2021). ELA further understands that post inspection, four trees pertaining to the exempt tree species *Syagrus romanzoffianu* (also known as *Arecastrum romanzoffianum*) (Trees 9, 10, 11 and 12) were removed, as advised by the client. It is understood these trees were removed in accordance with the Hornsby Development Control Plan 2013 (HDCP 2013) and being exempt trees, did not require a permit. Therefore, these nine trees have been excluded from this report, reducing the number of trees assessed in the AIA to 26 (see Table 3).

The following limitations apply to this methodology:

- Tree height was measured using a laser clinometer.
- Diameter at breast height (DBH) was measured using DBH tape.
- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing.
- Trees were inspected within limits of site access.
- The locations of the subject trees were recorded by ELA in the field using hand-held GPS units. Tree locations were subsequently matched to the Richards and Loftus (2019) survey where possible. The remaining tree survey locations were matched to Near map (2021) aerial imagery using geographic information systems (GIS) techniques.
- Tree canopy was measured by stepping out the distance within the dripline.
- No aerial inspections or root mapping was undertaken.
- Tree identification was based on broad taxonomical features present and visible from ground level at the time of inspection.

2.3 Retention value & landscape significance

The retention value or importance of a tree or group of trees, is determined in accordance with the Institute of Australian Consulting Arborists (IACA) Significance of a Tree Assessment Rating System (STARS®), which is summarised in Appendix A. The method considers the Safe Useful Life Expectancy (ULE) and landscape significance of a tree. Trees are provided one of the following ratings:

- **High - priority for retention:** These trees are considered important and should be retained and protected. Design modification or relocation of building/s should be considered to accommodate the setbacks as prescribed by Australian Standard *AS 4970–2009 Protection of trees on development sites*.
- **Medium - consider for retention:** These trees are moderately important for retention. Their removal should only be considered if adversely affected by the proposed works and all other alternatives have been considered and exhausted.
- **Low - consider for removal:** These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
- **Priority for removal:** These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

2.4 Protection zones

2.4.1 Tree protection zone (TPZ)

The TPZ is a specific radius area above and below ground and at a distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by the development. The TPZ (as defined by AS 4970-2009) requires restriction of access during the development process. Groups of trees with overlapping TPZs may be included within a single protection area. Tree sensitive measures must be implemented if works are to proceed within the TPZ. The TPZ radius is determined by multiplying its DBH by 12 however, the TPZ of palms and monocots should not be less than 1 metre outside the crown projection.

2.4.2 Structural root zone (SRZ)

The SRZ is the area of the root system (as defined by AS 4970-2009) used for stability, mechanical support and anchorage of the tree. It is critical for the support and stability of trees. Severance of roots within the SRZ is not recommended as it may lead to the destabilisation and/or decline of the tree. The SRZ does not apply for palms and monocots (as outlined in AS 4970-2009).

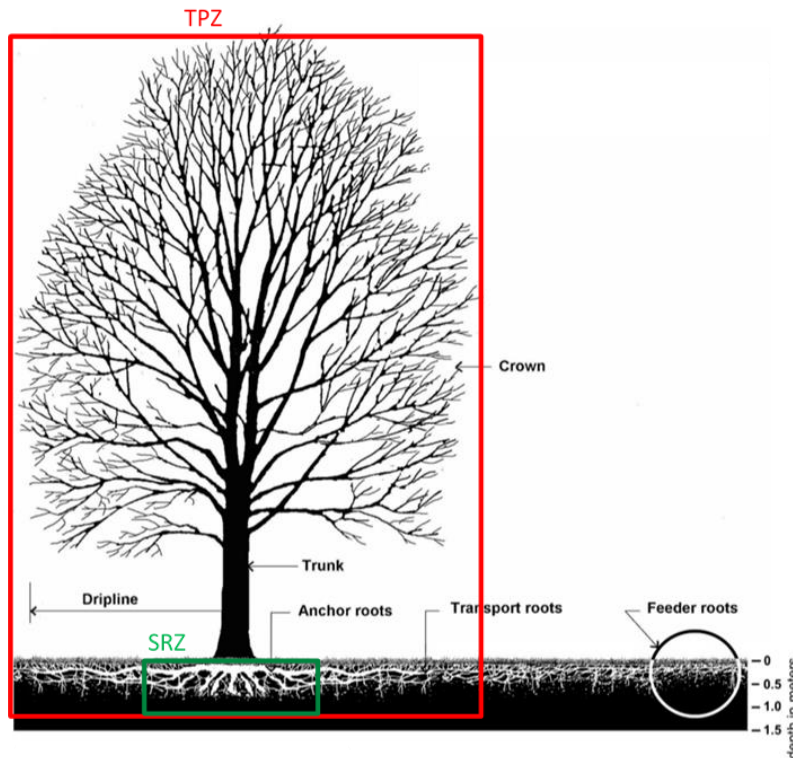


Figure 2: Representative tree structure and indicative TPZ and SRZ

2.5 Potential impacts

Trees may be impacted by physical or chemical damage to roots or above tree parts. Examples include impacts associated with site grading, soil compaction, excavation, stock piling within TPZ as well as changes in site hydrology, changes in soil level and site contamination. The extent of encroachment to the TPZ and SRZ determines the level of potential impact. AS 4970-2009 defines types of encroachment as follows and as illustrated in Appendix B:

- **Major encroachment** - If the proposed encroachment is greater than 10% of the TPZ or inside the SRZ, the project arborist must demonstrate that the tree(s) would remain viable. The location and distribution of roots may be determined through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), Air Spade or manual extraction. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.
- **Minor encroachment** – If the proposed encroachment is less than 10% of the TPZ, and outside of the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

For the purposes of this Arboricultural Impact Assessment, impacts were calculated using GIS techniques and defined as follows:

- **High impact:** The SRZ is directly affected or the proposed encroachment is greater than 20% of the TPZ. Trees may not remain viable if they are subject to high impact. These trees cannot be retained unless the proposal is changed.

- **Medium impact:** If the proposed encroachment is greater than 10% of the TPZ (but less than 20% of the TPZ) and outside of the SRZ, the project arborist may require detailed root investigation to demonstrate that the tree(s) would remain viable. These trees may be retained subject to further investigation and mitigation measures.
- **Low impact:** If the proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ, detailed root investigations should not be required. These trees can be retained.
- **No impact:** No likely or foreseeable encroachment within the TPZ. These trees can be retained.

3. Results and discussion

Results of the arboricultural impact assessment are summarised in Table 3 and proposed actions summarised in Table 4. Detailed results are included in Appendices C and D. Tree protection guidelines are provided in Appendix E and the indicative concept site plan is outlined in Appendix F. Site photos are provided in Appendix G.

Table 3: Summary of tree retention values and impacts

Retention value	High Impact	Medium Impact	Low Impact	No impact	Total
Priority for retention (High)	5	1	-	-	6
Consider for retention (Medium)	4	-	1	-	5
Consider for removal (Low)	12	-	1	2	15
Total	21	1	2	2	26

Table 4: Summary of tree retention values and proposed impact

Retention value	Remove	Retain	Potential to be retained subject to mitigation measures	Total
Priority for retention (High)	5	0	1	6
Consider for retention (Medium)	2	1	2	5
Consider for removal (Low)	12	3	-	15
Total	19	4	3	26

TREES PROPOSED FOR REMOVAL (HIGH IMPACT)

A total of **19** trees are proposed to be removed as they will be subject to major TPZ encroachment. These trees will be subject to high impact (>20% TPZ encroachment) from the proposed development. Tree IDs and retention values are as follows:

- **High retention: five** high retention value trees (Trees 2, 3, 4, 6 and 18)
- **Medium retention: two** medium retention value trees (Trees 5 and 27)
- **Low retention: 12** low retention value trees (Trees 7,8, 15, 17, 20, 21, 23, 24, 28, 29, 31 and 35).

Permission to remove trees located outside the site boundary is to be sought by the landowner prior to construction. Approval to remove any of the subject trees must be granted from the relevant consent authority prior to construction. Any loss of trees should be offset with replacement planting as determined in the conditions of consent.

TREES PROPOSED TO BE RETAINED (LOW/NO IMPACT)

A total of **four (4) trees** are proposed to be retained as they will be subject to minor TPZ encroachment. Of these, two trees will be subject to low impact (<10% TPZ encroachment) and two trees will be subject to no impact (0% TPZ encroachment) from the indicative concept design. Tree IDs and retention values are as follows:

Low impact (<10% TPZ encroachment)

- Medium retention: one medium retention value tree (Tree 34)
- Low retention: one low retention value tree (Tree 14)

No impact (0% TPZ encroachment)

- Low retention: two low retention value trees (Trees 16 and 30)

The tree protection plan for these trees is provided in Section 4 and tree protection guidelines are provided in Appendix E.

TREES POTENTIALLY TO BE RETAINED SUBJECT TO MITIGATION MEASURES

A total of **three (3) trees** have potential to be retained subject to further investigation. Of these, trees (Tree 1) will be subject to medium impact (<20% TPZ but >10% TPZ encroachment) and two trees will be subject to high impact (>20% TPZ encroachment) indicative concept design. In order to demonstrate that these trees can be viably retained further investigations (i.e. root mapping) is required to be completed prior to construction. Once root mapping is undertaken the Project Arborist may require additional mitigation measures pending the outcome. Tree IDs and retention values are as follows:

- **High retention value:** one high retention value tree (Tree 1)
- **Medium retention:** two medium retention value trees (Tree 32 and 33)

RECOMMENDATIONS

As the concept design is only indicative, it is recommended that this Arboricultural Impact Assessment (AIA) be updated at the detailed design phase.

4. Tree protection plan

- All tree pruning and removal is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture.
- All tree work must be in accordance with Australian Standard *AS 4373-2007, Pruning of Amenity Trees* and the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).
- Permission must be granted from the relevant consent authority prior to removing or pruning of any of the subject trees. Approved tree works should not be carried out before the installation of tree protection measures.
- Any additional construction activities within the TPZ of the subject trees must be assessed and approved by the project arborist and must comply with *AS 4970-2009 - Protection of trees on development sites*.

Tree protection measures are summarised in Table 4 and further information is in Appendix E.

Table 5: Summary of tree protection measures

Type	More details	Comment
Signage	Appendix E1	Prominently sign posted with 300 mm x 450 mm boards stating, "NO ACCESS - TREE PROTECTION ZONE".
Tree protection fencing	Appendix E1	Protective cyclone chain wire link fence to be erected around the TPZ to protect and isolate retained trees from the construction works. Existing boundary fencing may be used.
Crown protection	Appendix E2	Where required, crown protection may include the installation of a physical barrier, pruning selected branches to establish clearance, or the tying/bracing of branches.
Trunk and branch protection	Appendix E3	When fencing is not practical or prior to any activities within the TPZ, trunk protection is required and consist of a layer geotextile fabric or similar followed by 1.8 m lengths of softwood timbers spaced evenly around the trunk and secured with a galvanised hoop strap.
Ground protection	Appendix E4	Install and maintain 100mm thick layer of mulch around tree in TPZ. For machine or vehicle access within TPZ geotextile fabric beneath crushed rock or rumble boards may be required.
Soil moisture		Soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within TPZ.
Root protection and investigation	Appendix E5	If incursions/excavation within the TPZ are unavoidable, root investigation may be needed to determine the extent and location of roots within the area of construction activity using non-destructive excavation (NDE) methods.
Underground services	Appendix E6	All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they should be installed using horizontal directional drilling (HDD), non-destructive excavation (NDE) methods such as hydro-vacuum, Air Spade or manually excavated trenches.

5. Hold points, inspection and certification

An AQF Level 5 Consulting Arborist needs to be engaged to supervise work within the TPZ of trees to be retained, provide advice regarding tree protection and monitor compliance. Once each stage is reached, the work will be inspected and certified by the project arborist and the next stage may commence. Alterations to this schedule may be required due to necessity, however, this shall be through consultation with the project arborist only.

A copy of this report must be available on-site prior to the commencement of works, and throughout the entirety of the project. Hold points have been specified in the schedule of works below to ensure trees are adequately protected during construction. It is the responsibility of the principal contractor to complete each of the tasks.

Pre-construction

Detailed design: To ensure the viable retention of the three (3) trees (Trees 1, 32 and 33) root mapping is required to be undertaken by an AQF level 5 consulting arborist. Construction methods are also recommended to be in consultation with the project arborist (AQF Level 5) prior to construction so that specific mitigation measures can be considered (if required).

Prior to construction: Permission to remove trees located outside the site boundary is to be sought by the landowner prior to construction and permission must be granted from the relevant consent authority prior to removing any of the subject trees.

Prior to any construction, an onsite meeting should be conducted with attendees including but not limited to the project arborist (AQF Level 5 Consulting Arborist), site manager and construction personnel team to walk through the tree protection measure requirements. All trees approved for removal are to be indicated clearly with spray paint on trunks.

During construction

Monthly inspection of trees by the project arborist (or other timing as agreed with the project arborist). Notification to be given prior to the commencement of work within the TPZ, with supervision by the project arborist of any work undertaken in this zone.

Post-construction

Final inspection of trees by project arborist after all major construction has ceased and following the removal of tree protection measures.

6. References

6.1 General references

- Barrell, J. 2001. 'SULE: Its use and status into the new millennium', in *Management of mature trees, Proceedings of the 4th NAAA Tree Management Seminar*, NAAA, Sydney.
- Brooker M.I.H, Kleinig D.A. 2006. *Field Guide to Eucalypts*. Volume 1, South-eastern Australia, 3rd ed Bloomings Books, Melbourne
- Draper, B. and Richards, P., 2009. *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.
- Harris, R.W., Matheny, N.P., and Clark, J.R., 1999. *Arboriculture: integrated management of landscape trees, shrubs, and vines*, Prentice Hall, Upper Saddle River, New Jersey.
- Mattheck, C. and Breloer, H. 1994. 'Field Guide for Visual Tree Assessment' *Arboricultural Journal*, Vol 18 pp 1-23.
- Mattheck, C. 2007. *Updated Field Guide for Visual Tree Assessment*. Karlsruhe: Forschungszentrum Karlsruhe.
- IACA 2010. *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturalists, Australia, www.iaca.org.au.
- Robinson L, 2003. *Field Guide to the Native Plants of Sydney*, 3rd ed, Kangaroo Press, East Roseville NSW
- Standards Australia 2003. *Composition, Soil and Mulches, AS 4454 (2003)*, Standards Australia, Sydney.
- Standards Australia 2007. *Australian Standard: Pruning of amenity trees, AS 4373 (2007)*, Standards Australia, Sydney.
- Standards Australia 2009. *Australian Standard: Protection of trees on development sites, AS 4970 (2009)*. Standards Australia, Sydney.

6.2 Project specific references

- Health Projects International 2022. *Dural Health Hub: Proposed Building Footprint*. Reference IPD-IPD-SP-2, Issue 4 dated 17.01.2022.
- Richards and Loftus 2019. *Plan of Detail Levels and Contours: Lot 3 DP 395437 & Lot 1 DP 120004 being Nos 679 & 685 Old Northern Road, Dural*. Reference 2646 DS, Issue A. Surveyed by Warren Eldridge (ID No. 993) dated 11.12.2019

Appendix A Tree retention assessment method

A1 Tree Significance Assessment Criteria - STARS©

The tree is to have a minimum of three criteria in a category to be classified in that group.

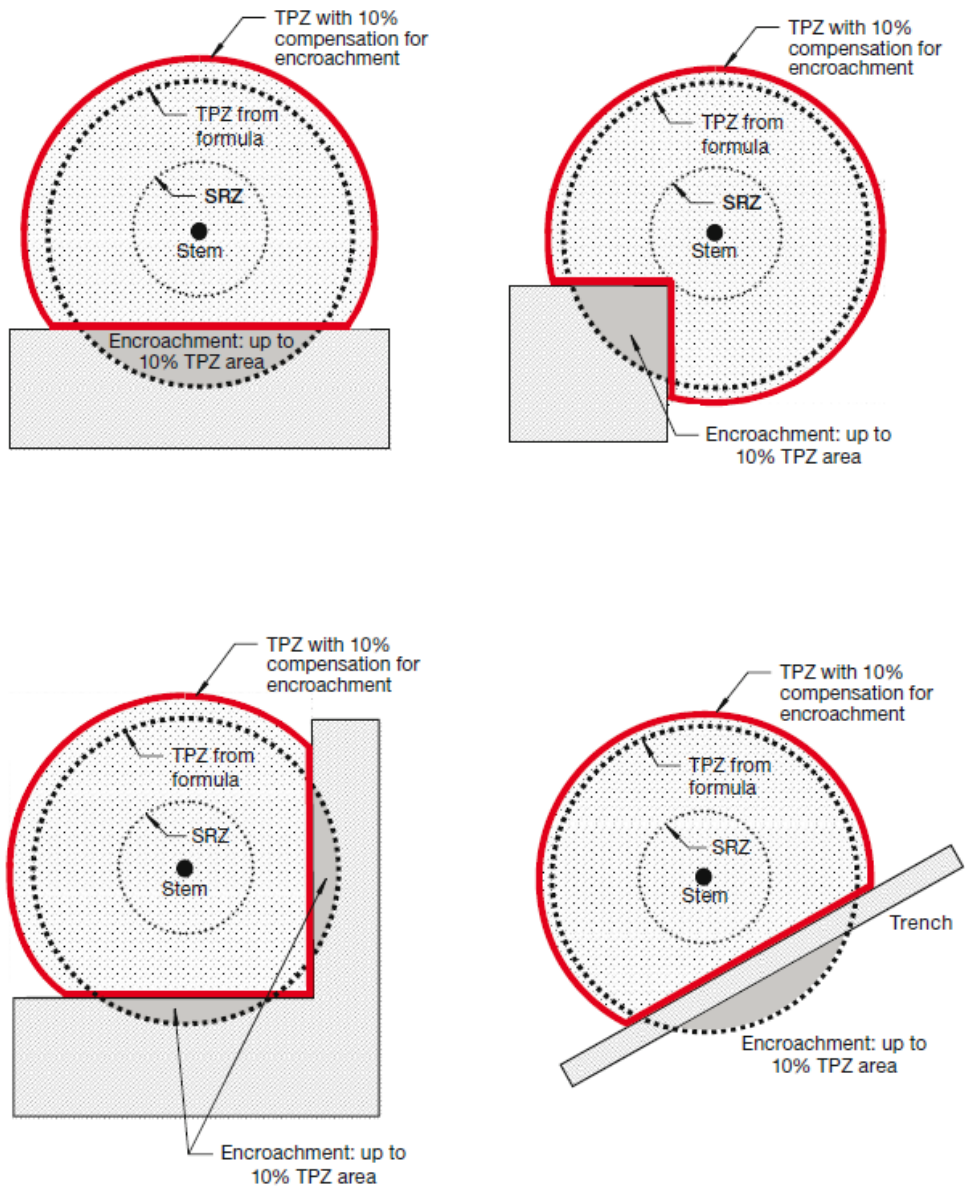
Low	Medium	High
<p>The tree is in fair-poor condition and good or low vigour.</p> <p>The tree has form atypical of the species</p> <p>The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings</p> <p>The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area</p> <p>The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen</p> <p>The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions</p> <p>The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms</p> <p>The tree has a wound or defect that has the potential to become structurally unsound.</p> <p>Environmental Pest / Noxious Weed</p> <p>The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation.</p> <p>Hazardous /Irreversible Decline</p> <p>The tree is structurally unsound and / or unstable and is considered potentially dangerous.</p> <p>The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.</p>	<p>The tree is in fair to good condition and good or low vigour</p> <p>The tree has form typical or atypical of the species</p> <p>The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area</p> <p>The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street</p> <p>The tree provides a fair contribution to the visual character and amenity of the local area</p> <p>The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ</p>	<p>The tree is in good condition and good vigour</p> <p>The tree has a form typical for the species</p> <p>The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age.</p> <p>The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on Council's significant tree register</p> <p>The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity.</p> <p>The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values.</p> <p>The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.</p>

A2 Matrix assessment - STARS©

		Tree significance				
		High	Medium	Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest/Noxious Weed Species	Hazardous/ Irreversible Decline
Useful Life Expectancy	Long >40 years					
	Medium 15-40 years					
	Short <1-15 years					
	Dead					

	Priority for retention (High): Tree considered important so should be retained and protected. Design modification or re-location of structure should be considered to accommodate the setbacks as prescribed by the <i>Australian Standard AS4970 Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.
	Consider for retention (Medium): Tree considered less important; however, retention should remain priority. Removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for removal (Low): Tree not considered important for retention, nor requiring special works or design modification to be implemented for their retention.
	Priority for removal: These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

Appendix B Encroachment into tree protection zones - AS 4970-2009



Appendix C Maps



Figure 3: Tree locations map



Figure 4: Tree retention values

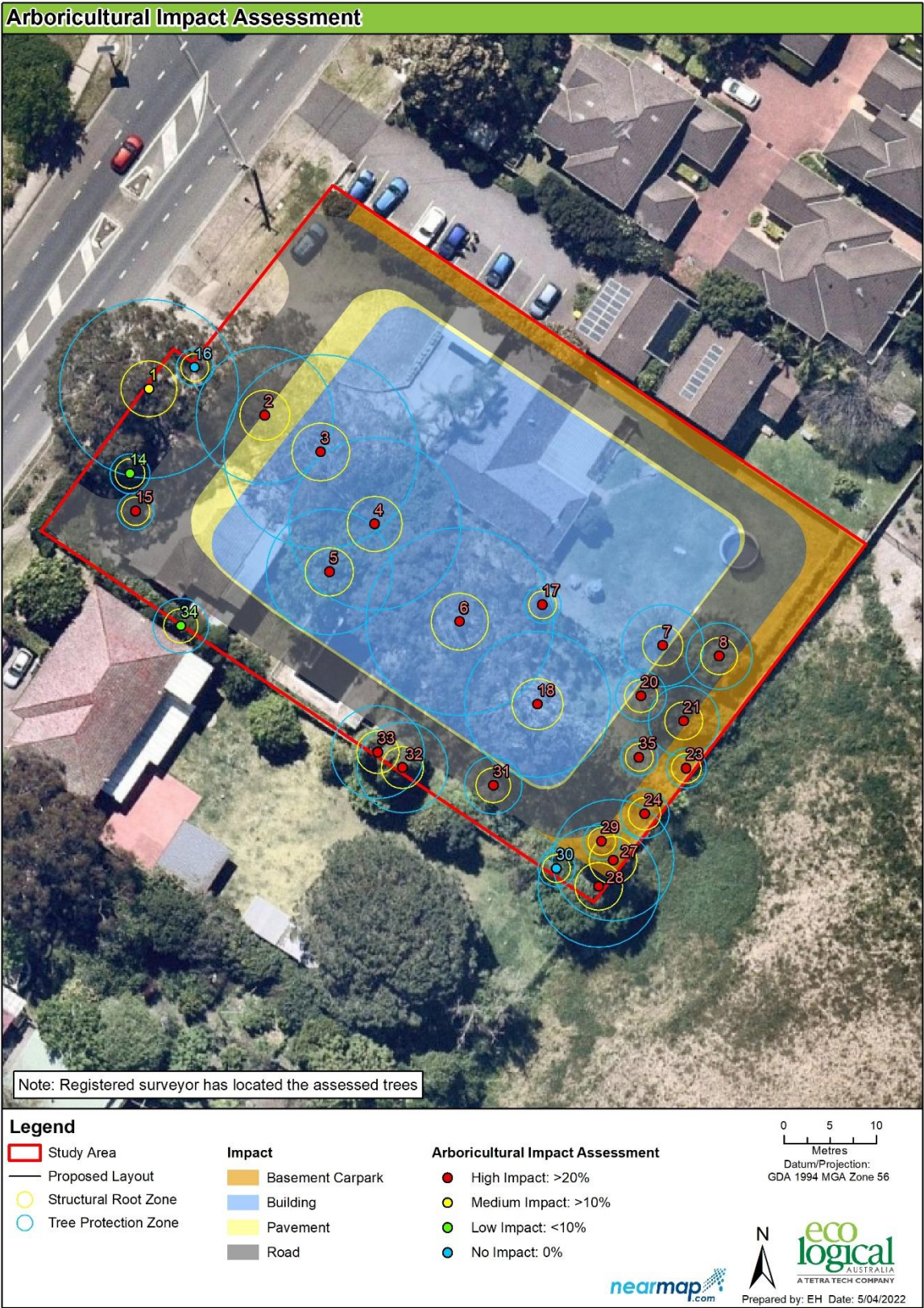


Figure 5: Arboricultural impact assessment

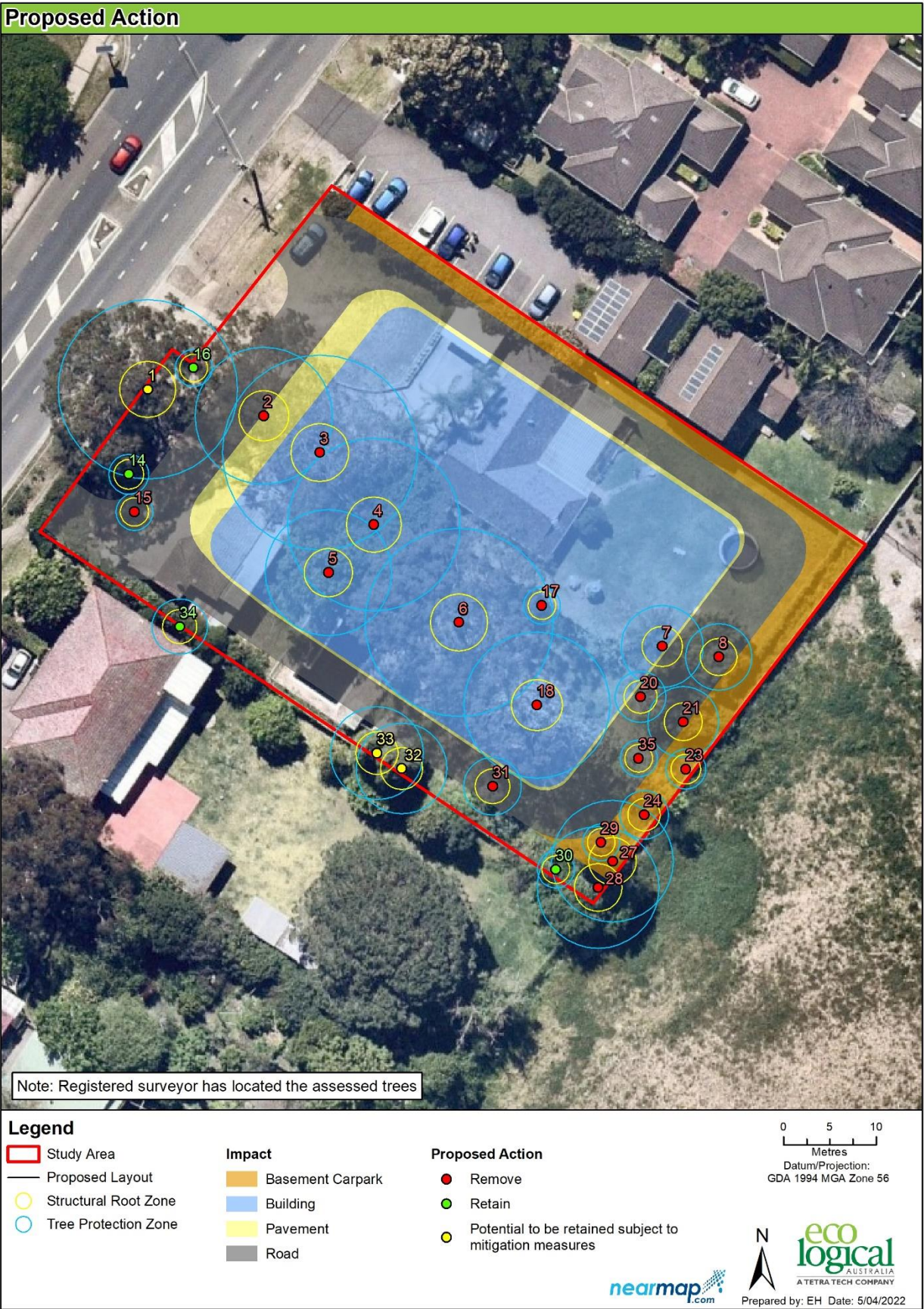


Figure 6: Proposed action

Appendix D Tabulated results of arboricultural assessment

Tree	Botanical name	Height (m)	Spread (m)	Health	Structure	ULE	DBH (mm)	TPZ (m)	SRZ (m)	Landscape significance	Retention value	TPZ% encroachment	SRZ encroachment	Impact	Proposed action	Notes
1	<i>Angophora costata</i>	26	17	Good	Good	Long (>40 years)	810	9.7	3.0	High	High	14	No	Medium Impact	Potential to be retained see Section 3	No defects observed, minor bifurcation in twin trunks
2	<i>Angophora costata</i>	18	15	Fair	Good	Long (>40 years)	620	7.4	2.7	High	High	94	Yes	High Impact	Remove	No defects observed, minor dead wood
3	<i>Eucalyptus globulus 'bicostata'</i>	20	16	Fair	Good	Long (>40 years)	880	10.6	3.1	High	High	100	Yes	High Impact	Remove	No defects observed, minor dead wood, raised buttress roots
4	<i>Quercus robur</i>	16	15	Good	Good	Long (>40 years)	780	9.4	3.0	High	High	100	Yes	High Impact	Remove	No defects observed, minor dead wood
5	<i>Liquidambar styraciflua</i>	18	11	Fair	Good	Long (>40 years)	570	6.8	2.6	Medium	Medium	100	Yes	High Impact	Remove	No defects observed, minor dead wood
6	<i>Angophora costata</i>	25	20	Fair	Good	Long (>40 years)	850	10.2	3.1	High	High	100	Yes	High Impact	Remove	No defects observed, minor dead wood
7	<i>Syagrus romanzoffianum</i>	13	8	Good	Good	Medium (15-40 years)	370	4.4	2.2	Low	Low	100	Yes	High Impact	Remove	
8	<i>Ficus benjamina</i>	5	8	Good	Fair	Medium (15-40 years)	300	3.6	2.0	Low	Low	100	Yes	High Impact	Remove	
14	<i>Juniperus virginiana</i>	5	8	Good	Fair	Medium (15-40 years)	180	2.2	1.6	Low	Low	4	No	Low Impact	Retain	
15	<i>Cordyline australis</i>	7	2	Good	Good	Medium (15-40 years)	160	2.0	1.5	Low	Low	99	Yes	High Impact	Remove	
16	<i>Lagerstroemia indica</i>	6	5	Fair	Fair	Medium (15-40 years)	150	2.0	1.5	Low	Low	0	No	No Impact	Retain	
17	<i>Angophora costata</i>	9	2	Good	Good	Medium (15-40 years)	100	2.0	1.5	Low	Low	100	Yes	High Impact	Remove	
18	<i>Angophora costata</i>	20	12	Fair	Fair	Long (>40 years)	660	7.9	2.8	High	High	100	Yes	High Impact	Remove	Wound on trunk, possible termite activity
20	<i>Jacaranda mimosifolia</i>	10	6	Fair	Fair	Long (>40 years)	230	2.8	1.8	Low	Low	100	Yes	High Impact	Remove	
21	<i>Morus nigra</i>	6	10	Good	Fair	Medium (15-40 years)	320	3.8	2.1	Low	Low	100	Yes	High Impact	Remove	Decay
23	<i>Acer negundo</i>	10	5	Fair	Fair	Medium (15-40 years)	180	2.2	1.6	Low	Low	73	Yes	High Impact	Remove	
24	<i>Melaleuca quinquenervia</i>	7	6	Fair	Fair	Medium (15-40 years)	220	2.6	1.8	Low	Low	82	Yes	High Impact	Remove	Leaning, asymmetric
27	<i>Cupressus sempervirens</i>	18	11	Fair	Fair	Medium (15-40 years)	549	6.6	2.6	Medium	Medium	42	Yes	High Impact	Remove	
28	<i>Morus nigra</i>	10	15	Fair	Fair	Medium (15-40 years)	550	6.6	2.6	Low	Low	22	Yes	High Impact	Remove	
29	<i>Jacaranda mimosifolia</i>	8	5	Fair	Poor	Short (5-15 years)	140	2.0	1.5	Low	Low	100	Yes	High Impact	Remove	Leaning, heavily asymmetrical

Tree	Botanical name	Height (m)	Spread (m)	Health	Structure	ULE	DBH (mm)	TPZ (m)	SRZ (m)	Landscape significance	Retention value	TPZ% encroachment	SRZ encroachment	Impact	Proposed action	Notes
30	<i>Jacaranda mimosifolia</i>	10	8	Fair	Fair	Medium (15-40 years)	140	2.0	1.5	Low	Low	0	No	No Impact	Retain	
31	<i>Eucalyptus nicholii</i>	12	5	Poor	Fair	Short (5-15 years)	260	3.1	1.9	Medium	Low	83	Yes	High Impact	Remove	Fallen tree nearby
32	<i>Cupressus x leylandii</i>	12	6	Good	Fair	Medium (15-40 years)	410	4.9	2.3	Medium	Medium	22	No	High Impact	Potential to be retained see Section 3	Bifurcation
33	<i>Cupressus x leylandii</i>	12	6	Good	Fair	Medium (15-40 years)	420	5.0	2.3	Medium	Medium	22	No	High Impact	Potential to be retained see Section 3	Bifurcation
34	<i>Leptospermum petersonii</i>	12	6	Fair	Fair	Medium (15-40 years)	250	3.0	1.8	Medium	Medium	1	No	Low Impact	Retain	
35	<i>Jacaranda mimosifolia</i>	6	4	Fair	Poor	Short (5-15 years)	120	2.0	1.5	Low	Low	100	Yes	High Impact	Remove	Heavy lean, asymmetric

Appendix E Tree protection guidelines

The following tree protection guidelines must be implemented during the construction period if no tree-specific recommendations are detailed.

E1 Tree protection fencing

The TPZ is a restricted area delineated by protective fencing or the use of an existing structure (such as a wall or fence).

Trees that are to be retained must have protective fencing erected around the TPZ (or as specified in the body of the report) to protect and isolate it from the construction works. Fencing must comply with the Australian Standard, AS 4687-2007, Temporary fencing and hoardings.

Tree protection fencing must be installed prior to site establishment and remain intact until completion of works. Once erected, protective fencing must not be removed or altered without the approval of the project arborist.

If the protective fencing requires temporary removal, trunk, branch and ground protection must be installed and must comply with *AS 4970-2009, Protection of Trees on Development Sites*.

Tree protection fencing shall be:

- Enclosed to the full extent of the TPZ (or as specified in the Recommendations and Tree Protection Plan).
- Cyclone chain wire link fence or similar, with lockable access gates.
- Certified and Inspected by the Project Arborist.
- Installed prior to any machinery or material are brought to site and before the commencement of works.
- Prominently sign posted with 300 mm x 450 mm boards stating, “NO ACCESS - TREE PROTECTION ZONE”.

E2 Crown protection

Tree crowns/canopy may be injured or damaged by machinery such as; excavators, drilling rigs, trucks, cranes, plant and vehicles. Where crown protection is required, it will usually be located at least one meter outside the perimeter of the crown.

Crown protection may include the installation of a physical barrier, pruning selected branches to establish clearance, or the tying/bracing of branches.

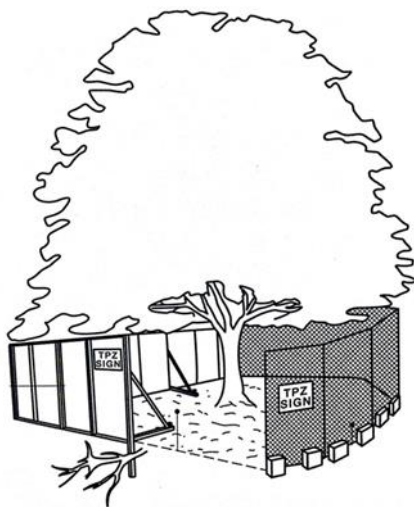
E3 Trunk protection

Where provision of tree protection fencing is impractical or must be temporarily removed, trunk protection shall be installed for the nominated trees to avoid accidental mechanical damage.

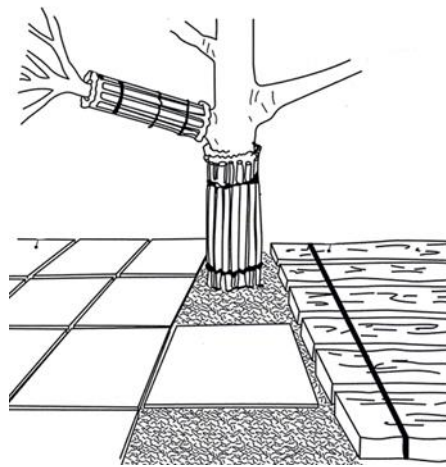
The removal of bark or branches allows the potential ingress of micro-organisms which may cause decay. Furthermore, the removal of bark restricts the trees' ability to distribute water, mineral ions (solutes), and glucose.

Trunk protection shall consist of a layer of either carpet underfelt, geotextile fabric or similar wrapped around the trunk, followed by 1.8 m lengths of softwood timbers aligned vertically and spaced evenly around the trunk (with an approx. 50 mm gap between the timbers).

The timbers must be secured using galvanised hoop strap (aluminium strapping). The timbers shall be wrapped around the trunk but not fixed to the tree, as this will cause injury/damage to the tree.



Tree protection fencing



Trunk protection fencing

E4 Ground protection

Tree roots are essential for the uptake/absorption of water, oxygen and mineral ions (solutes). It is essential to prevent the disturbance of the soil beneath the dripline and within the TPZ of trees that are to be retained. Soil compaction within the TPZ will adversely affect the ability of roots to function correctly.

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Maintain a thick layer of mulch around all retained trees to a depth of 100 mm using coarse pine bark or wood chip material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

For heavy vehicle access within TPZ, ground protection may include a permeable membrane such as geotextile fabric beneath a layer of crushed rock or rumble boards.

If the grade is to be raised within the TPZ, the material should be coarser or more porous than the underlying material.

E5 Root protection and investigation

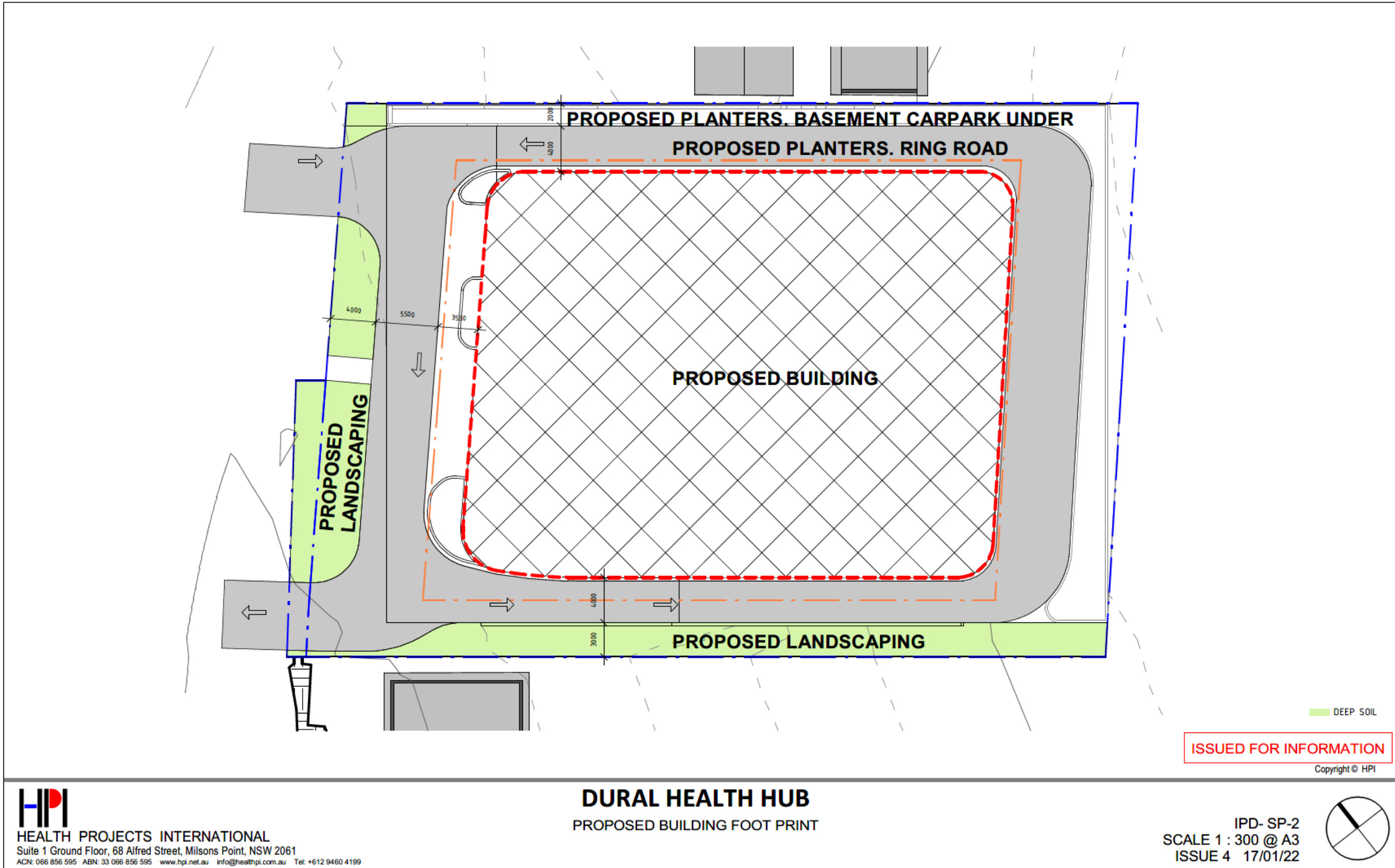
If incursions/excavation within the TPZ are unavoidable, root investigation may be needed to determine the extent and location of roots within the area of construction activity. The location and distribution of roots are found through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), air spade and manual excavation. Root investigation does not guarantee the retention of the tree.

If the project arborist identifies conflicting roots that requiring pruning, they must be pruned with a sharp implement such as; secateurs, pruners, handsaws or a chainsaw back to undamaged tissue. The final cut must be a clean cut.

E6 Underground services

All underground services should be routed outside of the TPZ. If underground services need to be installed within the TPZ, they should be installed using horizontal directional drilling (HDD), non-destructive excavation (NDE) methods such as hydro-vacuum, Air Spade or manually excavated trenches. The horizontal drilling/boring must be at minimum depth of 600 mm below grade. Trenching for services is to be regarded as “excavation”. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

Appendix F Indicative concept plan (Health Projects International 2022)



Appendix G Site photos



Figure 7: Tree 1



Figure 8: Tree 2



Figure 9: Tree 3



Figure 10: Tree 4



Figure 11: Tree 5



Figure 12: Tree 6



Figure 13: Tree 7



Figure 14: Tree 8



Figure 15: Tree 14



Figure 16: Tree 15



Figure 17: Tree 16



Figure 18: Tree 17



Figure 19: Tree 18



Figure 20: Tree 19

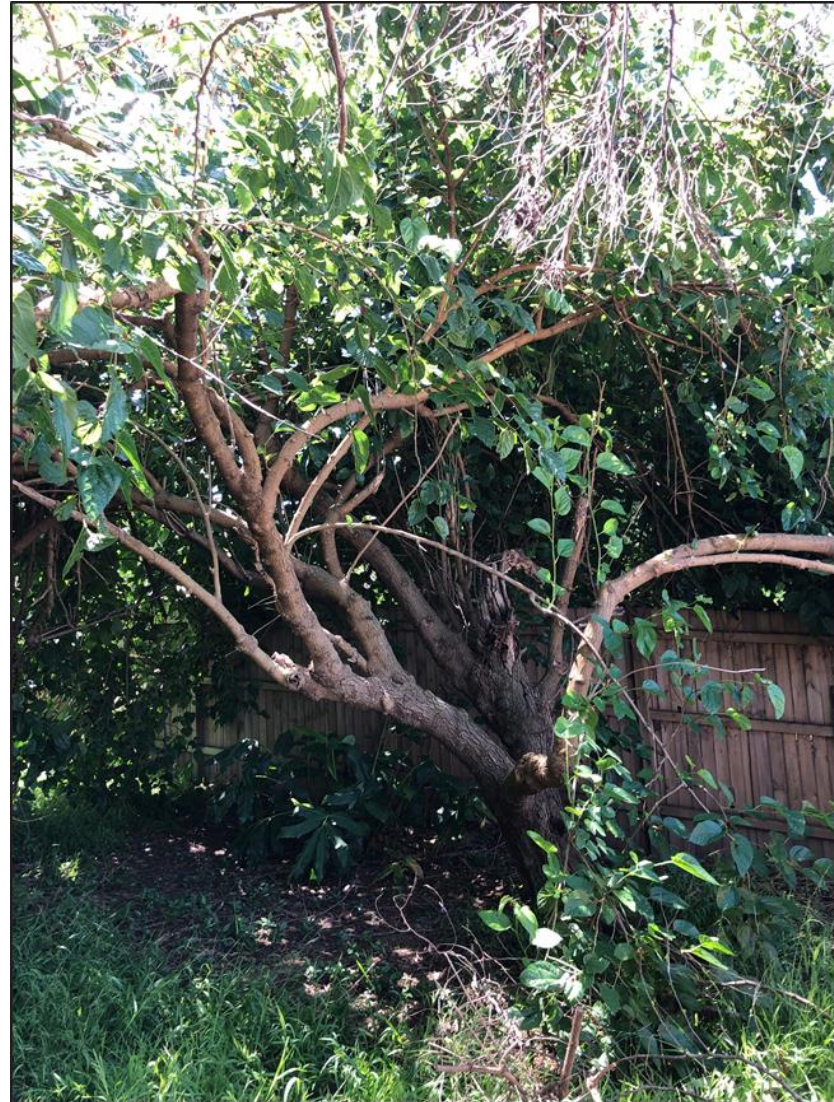


Figure 21: Tree 21



Figure 22: Tree 23



Figure 23: Tree 24



Figure 24: Tree 27



Figure 25: Tree 28



Figure 26: Tree 29



Figure 27: Tree 30



Figure 28: Tree 31



Figure 29: Tree 32 and 33



Figure 30: Tree 34

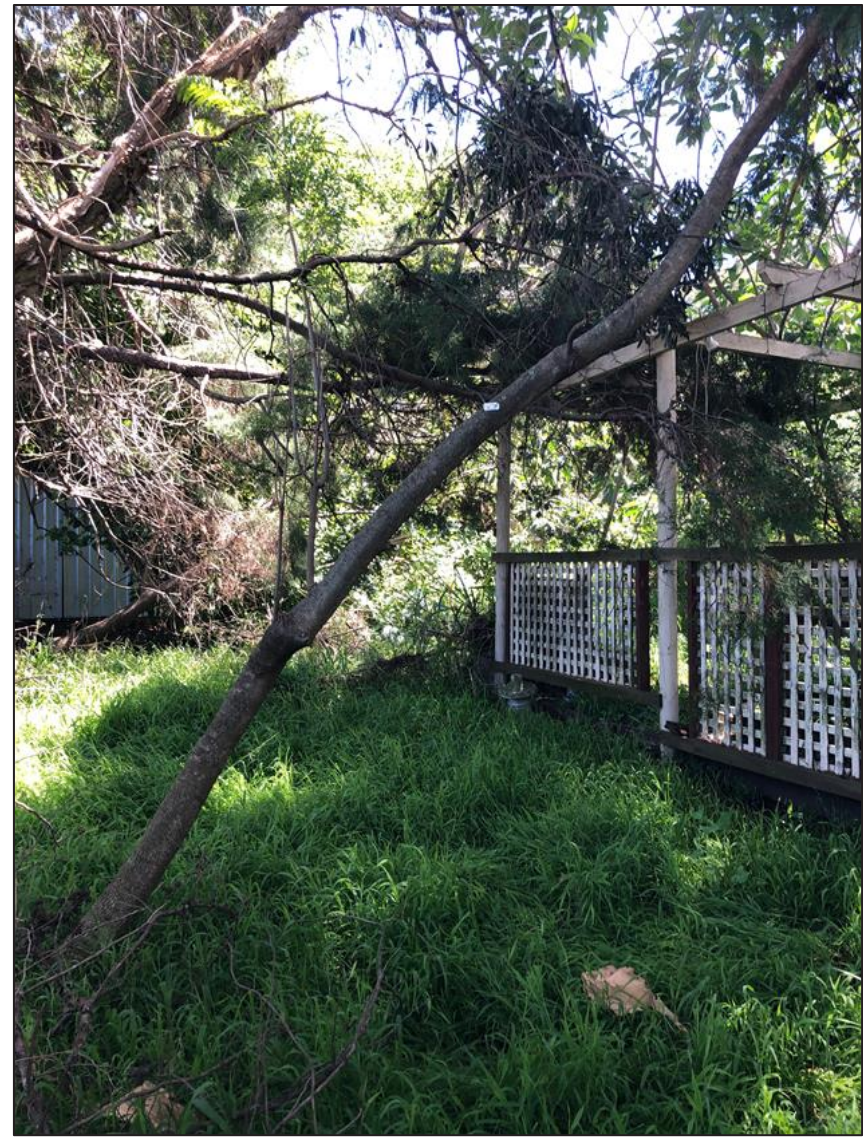


Figure 31: Tree 35

