

REVISION: C

PROJECT ADDRESS:

9 Wakooka Avenue, Elanora Heights, NSW
Consulting Arboricultural Assessment Report



PURPOSE:

This arboricultural assessment is for **22 trees** (trees including palms) that are located within the front or adjacent to the front of the site at **9 Wakooka Ave, Elanora Heights** under **The Northern Beaches Council**.

This arborist assessment includes a summary table of the tree assessment data, arborist retention plan and impact plans (**Arb 601 and Arb_602**), as well as written recommendations and measures for tree protection under the proposed development application.

The trees and their context were assessed on the 16th of July 2018, by Elke Haege to the requirements outlined by **The Northern Beaches Council Development Control Plan, DCP Part E, 2011¹**

PROJECT TEAM:

Client: **Antje Kuehnast and Markus Bisping (owners)**

Architect: **Envirostructure.**

Consulting arborist AQF Level 5: **Elke Haege**

Landscape Architect: **Elke Haege**

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The information contained in this assessment report is considered accurate at the time of tree inspection. The condition of the trees and site conditions may change over time.

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¹ <https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/pages/plan/book.aspx?exhibit=DCP>
Arboricultural Development Impact Assessment. Elke Haege Landscape Architect and Consulting Arborist AQF 5.

Contents

1	Abstract/ Summary	3
2	Introduction.....	5
3	Assessment Methodology	7
	<i>Australian Standards and Data Collection Documents.....</i>	<i>7</i>
	<i>Not Assessed and items awaiting assessment:</i>	<i>8</i>
	<i>Planning search:.....</i>	<i>8</i>
4	Tree Data.....	10
5	Tree Assessment Schedule:	10
6	Impact, Discussion and Recommendations.....	11
7	Ground Protection Measures	14
8	Tree Protection Fencing Specificaitons and Recommendations.....	16
9	Additional Site Photos.....	18
10	Discussion and Conclusion.....	22
11	References.....	23
12	Relevant Appendices.....	23
	<i>Appendix 1: Landscape Significance Rating</i>	<i>23</i>
	<i>Appendix 6: ISA Tree Risk Assessment.....</i>	<i>23</i>
	<i>Appendix 2: Safe Useful Life Expectancy.....</i>	<i>24</i>
	<i>Appendix 3. Retention Rating</i>	<i>26</i>
	<i>Appendix 4a. AS 4970. Development of Trees on Protection Sites:</i>	<i>26</i>
	Tree Protection Zone (TPZ).....	26
	Determining the TPZ	26
	Structural Root Zone (SRZ)	27
	<i>Appendix 4b AS 4970. Development of Trees on Protection Sites: Acceptable Incursions.....</i>	<i>27</i>
	<i>Appendix 5: Tree Retention Priorities</i>	<i>28</i>

1 [Abstract/ Summary](#)

- 1.1 The following table is a summary of the tree assessment. Refer to [Table A](#) in this report for more detail. The table includes trees that are adjacent the site (outside the boundary).

	Number of trees	Tree reference number
Trees proposed for removal	4 trees	T6, T7, T20, T12
Trees proposed for retention	18 trees	T1-T5, T8-T11, T13-T19, T21-T22
Total number of trees assessed:	22	

Number of trees	Retention Value	Proposed for retention	Proposed for removal
7	High	7	0
10	Medium	9	1
5	Low	2	3
Total trees: 22		18	4

- 1.2 The proposal is for a new secondary dwelling in the front setback of 9 Wakooka Avenue, Elanora Heights.
- 1.3 The proposal has been designed with the arboricultural constraints provided at the beginning of the design process and collaborated with the architect, Envirotecture, so that the structure is proposed to be:
- constructed as an elevated/cantilevered building with pier footings to reduce the impact to the tree protection zones (TPZ's) as well as
 - no changes or other disturbances to the exiting ground, and
 - with services recommended to be either outside the TPZs or suspended on the underside of the elevated structure (i.e. no trenching).
- 1.4 Proposed for removal: Two juvenile Alexander palms, and a dying (in decline) tea tree and one Lilly pilly tree is proposed to be removed with the retention of the other eighteen (18) trees.
- 1.5 There are partial encroachments to trees to be retained as shown on plan [Arb_602](#), however these encroachments are minimal and are acceptable under the [Australian Standard AS4970-2007](#) in that the encroachments shown is the proposed cantilevered building which is above the existing ground (by approximately 1.5m above the existing ground level on the eastern side of the proposed structure and approximately 500mm above ground level on the western side of the proposed structure). Within the encroachments shown however are proposed footings.

1.6 The main recommendations for this site are around and include:

- At the site set up, inspection and sign off for the tree protection measures.
- the supervision on site of the consulting arborist during the set out and installation of the proposed posts to ensure both the below and above ground impacts to the existing trees are acceptable.
- That any approved tree removal is to not include stump grinding².
- Any pruning, or other works to trees is to be with the prior written approval of the project arborist and all reasonable directions by the project arborist are to be followed.
- Written sign off by the project arborist is to be at the following phases:
 - 1. At site set up (prior to any works including clearing of vegetation) to inspect and certify the suitable erection of tree protection fencing and other tree protection measures per the recommendations in this report (and as approved by council);
 - 2: during the post/footing placement and installation/digging,
 - 3: mid-way through construction to certify that no materials are being stored or other impacts during construction are occurring.
 - 4: at the completion of the project (which will provide permission to remove tree protection measures and final project arborist certification). This is to also include any further council-imposed items relevant to tree protection per a Development Application consent.

Note: Tree protection is not just about retaining roots, the protection of the soil zone in order to sustain (water, nutrients, oxygen) is important for the viability and resilience of the trees. The TPZ is a nominal zone that ensures viability of the exiting tree in its current maturity/size.

1.7 [Chapter 6. Impact, Discussion and Recommendations](#). Explains in further detail the tree protection and retention recommendations / mitigations and any offsets by way of the arborist recommendations.

1.8 The arborist plans and Table A outlines data about the trees' condition and calculations. Refer to [Table A: Tree Schedules and Plan Arb_601 and Arb_602](#).

² As recommended under the 10/50 Vegetation Clearing Code of Practice.

2 Introduction

- 2.1 This arborist assessment forms part of development application for 9 Wakooka Ave, Elanora Heights (within The Northern Beaches Council)
- 2.2 This assessment contains this arborist report, arborist plans Arb [601 and Arb 602](#), and the [tree assessment schedules \(Table A\)](#).
- 2.3 Elke Haege visually assessed and inspected the trees from ground level on the [16th July 2018](#). The Visual Tree Assessment Method was used ([after Mattheck 8.4 p 118, fig. 74](#)).
- 2.4 The proposal of the secondary dwelling is within the front zone only of the property. Only trees within the front zone (including adjacent trees on the street verge and northern neighbouring property) were assessed in relation to the potential constraints for a proposed secondary dwelling and impact to the trees that the proposal may have.
- 2.5 Natural Landscape context: The proposed zone of the proposed secondary dwelling is currently an informal garden zone with larger trees along the frontage of the site (9 Wakooka Ave) / western side, there are some retaining walls, embankments on the west and north boundaries, flattened out area in the centre of the proposed zone (front garden) which has stepping stone pavers, driveways north and south and concrete pads indicating that the soil zone has been modified. In addition, the ground is predominantly naturally mulched (with leaf litter) and the vegetation is native, however appears to be mostly planted or self-seeded, possibly with the exception of T1, the angophora (on the NW boundary) which may be endemic, or at least is representative of the vegetation community surrounding. Deep Creek Reserve is located to the south and adjacent the site. A creek/drainage way runs north/south through the site.
- 2.6 Topography: The front of the site slopes from the west (Wakooka Ave) down to the east and into the drainage creek (half way through the site) which diverts surface water to Deep Creek Reserve (immediately south of the site).
- 2.7 [Figures 1 to 3](#) below shows the site context and location.



Figure 1. Contextual aerial map: The site shown with the red box. Source. Deep Creek Reserve is to the south of the site: Northern Beaches Council Mapping: Date accessed: 3rd December 2018



Figure 2. 1943 contextual aerial map: The site shown with the red box (yellow fill) from an aerial photo shows the suburb was largely undeveloped in 1943. Source. NSW Government maps: Date accessed: 4th December 2018.

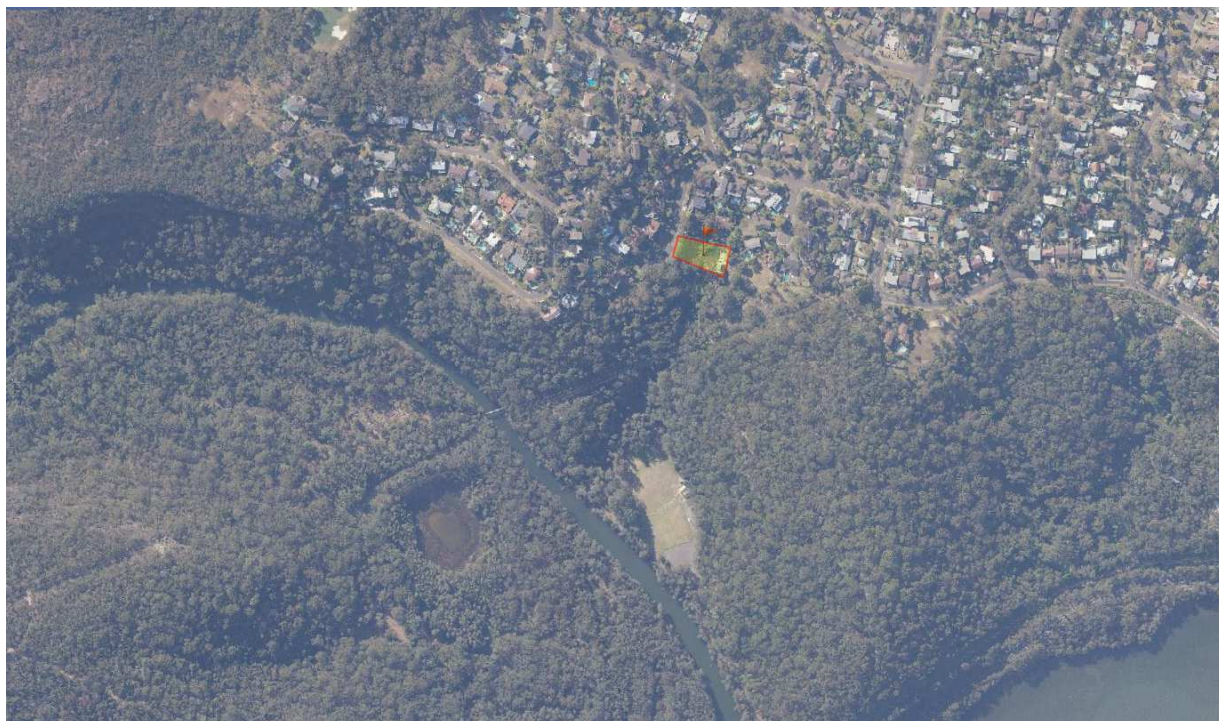


Figure 3. Aerial photo (present time): The site is shown with the red box (yellow fill) showing the site is at the southern edge of Elanora Heights. Source. NSW Government maps: Date accessed: 4th December 2018.

3 [Assessment Methodology](#)

The following industry accepted and recognised methodologies have been used to visually assess the health and condition of the tree. Results are shown in [Table A](#).

SUMMARY OUTLINE OF TREE ASSESSMENT METHODOLOGIES			
Refer to:	Category of Assessment	Methodology Name + description	Sources
Table A Arb_601	Visual Tree Assessment (VTA). On site measurements and calculations	Visual Tree Assessment (VTA) Procedure and strategy. Refer to Table A ³	<i>Claus Mattheck and Breloer 2006. And David Lonsdale's Tree Assessment Strategy.</i>
Table A	Landscape Significance Rating	Determining Landscape Significance Rating	<i>Developed from: Earthscape Horticultural Services, December 2011</i>
Table A	SULE	Safe Useful Life Expectancy Procedure	<i>Jeremy Barrell 1996 from BS5837</i>
Arb_601 Table A	Retention Value	Determining Retention Value	<i>Developed from: Earthscape Horticultural Services, December 2011⁴</i>
Arb_601 Table A	Tree Protection Zones	Tree Protection Zones (TPZ's) and Structural Root Zones (SRZ's)	<i>AS 4970, Protection of Trees on Development Sites.</i>
Table A	Tree Retention Priorities	Analysing the implications for Proposed Development	<i>Earthscape Horticultural Services, December 2011</i>
	Australian Standards AS4790-2009	Protection of Trees on Development Sites. Determining permissible tree protection zones, encroachments, protection, fencing, incursions, terminology and recommendations	<i>AS 4790-2009</i>

1. Table above outlines the Methodologies used.

[Australian Standards and Data Collection Documents](#)

The Australian Standard, [AS 4790-2009 'Protection of Trees on Development Sites'](#) has been used as the guiding standard reference to provide recommendations of the assessed trees. The Australian Standard, [AS 4373-2007 'Pruning of Amenity Trees'](#) has also been referred to in this assessment letter within the recommendations section.

3 [Claus Mattheck and Helge Breloer. Visual Tree Assessment and David Lonsdale's Tree Assessment Strategy.](#)

4 Modified from: Couston, Mark and Howden, Melanie, 2001, Tree Retention Values table, Footprint Green Pty., Ltd., Sydney, Australia.

Not Assessed and items awaiting assessment:

Any changes to the proposed works will need tree re-assessment. A visual tree assessment inspection from ground only was conducted. No invasive or destructive testing was conducted.

Collaboration of the project arborist with relevant sub-consultants such as bushfire, stormwater and geotechnical consultants is recommended.

Planning search:

The following zoning and overlays ⁵ and planning items for the property exist.

Draft Bushfire Prone Land

Geotechnical Hazard Mapping 2007 - GHD

Flood Risk Management Policy 2017 - High Risk

Flood Risk Management Policy 2017 - Low Risk

Flood Risk Management Policy 2017 - Medium Risk

Bushfire Prone Land - Certified June 2013

Bushfire Prone Land

Pittwater 21 Development Control Plan

Sec 94 Plan for Residential Development

Land Application Map

Land Zoning Map - R2 Low Density Residential

Bushfire:

The property is within the 10/50 Bushfire area. The proposal zone is not within 10m of a dwelling.

The Pittwater Planning Maps show that the site is in a Bushfire Prone Land, Vegetation Category 1 (2013). The definition for this vegetation category is as follows:

Vegetation Category 1 Vegetation Category 1 is considered to be the highest risk for bush fire. It is represented as red on the bush fire prone land map and will be given a 100m buffer. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production. Vegetation Category 1 consists of: › Areas of forest, woodlands, heaths (tall and short), forested wetlands and timber plantations. (NSW Rural Fire Service: Guide for Bush Fire Prone Land Mapping, Nov 2015, pg. 11⁶)

⁵

<https://eservices.northernbeaches.nsw.gov.au/ePlanning/live/Public/XC.Track/SearchProperty.aspx?id=410110>

⁶ https://www.rfs.nsw.gov.au/_data/assets/pdf_file/0011/4412/Guideline-for-Councils-to-Bushfire-Prone-Area-Land-Mapping.pdf

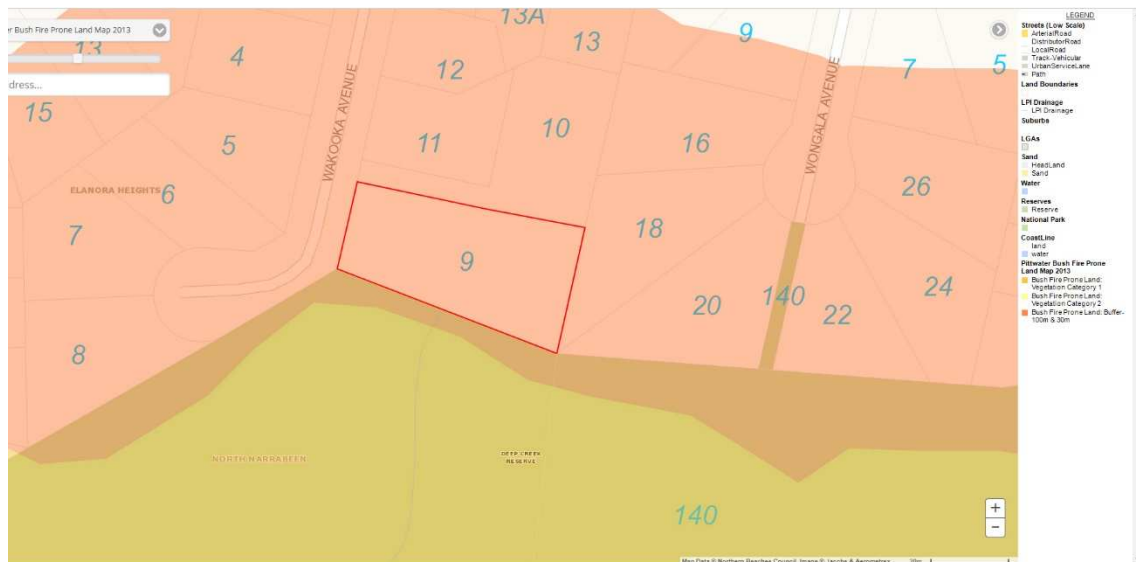


Figure 4. Diagram showing the Pittwater Planning Map for Bushfire prone land. The site is indicating a category 1 prone zone (as described above). Date accessed: 03.12.18

The Pittwater Planning maps show Deep Creek Reserve immediately to the south of the site is listed as 'Archaeological'⁷ In addition, the planning map shows that the site is within a Geotechnical Hazard H1 zone, class 5 for Acid sulphate soils, medium and high flood risk in the west zone of the site proposed for the secondary dwelling (Pittwater Flood Risk Planning Map), Any changes to the proposed works will need tree re-assessment.

Heritage: The following link was used to assess any heritage items, and none in the vicinity of the site were apparent. <https://www.environment.nsw.gov.au/heritageapp/heritagesearch.aspx>

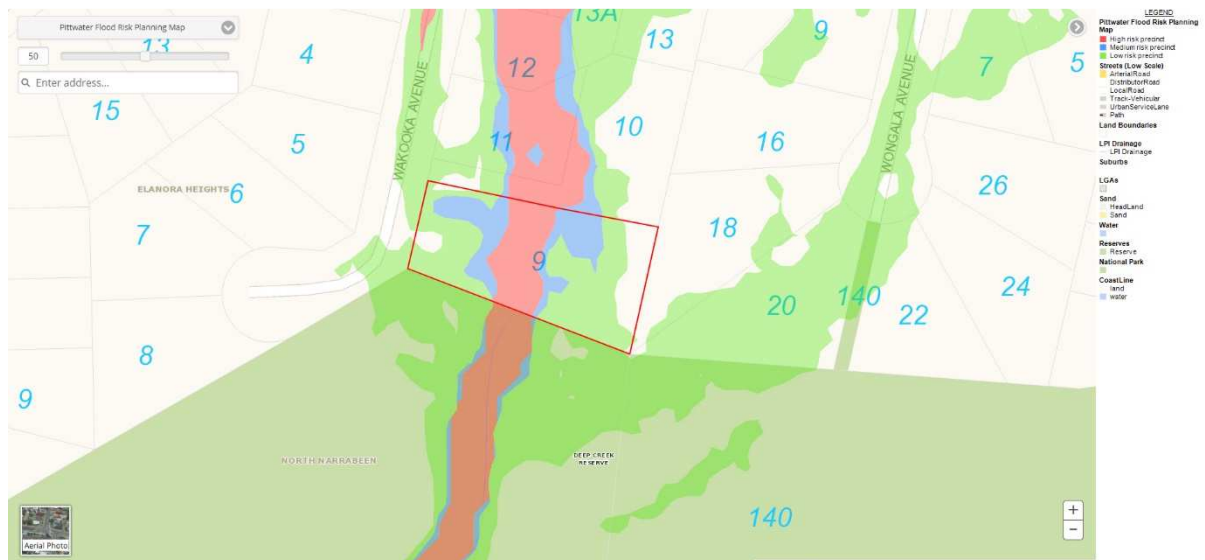


Figure 5. Diagram showing the Pittwater Planning Map for Flood prone land showing high (red), medium (blue) and low (green). Date accessed: 03.12.18

⁷ <https://services.northernbeaches.nsw.gov.au/icongis/index.html>

4 Tree Data.

Refer to the *Table A Schedule* on the following page for the tree condition description and tree data. Refer also to the '*Recommendations + Discussion*' chapter.

5 Tree Assessment Schedule:

Provided on the next page in this report is the following schedule:

- a. *Table A: Tree Schedules – A3 size, 2 sheets.*
Provides tree reference numbers, detail on health and structure, SULE rating, landscape and retention rating, SRZ's, TPZ's⁸ and relevant encroachment percentages.
- b. *Arborist Plan 601 and 602 on one sheet: A1 size at 1:100 scale:*
 - i. *Arb 601: Tree Retention Rating Plan (existing condition)*
 - ii. *Arb 602: Tree Impact Plan. (proposed underlay shown)*

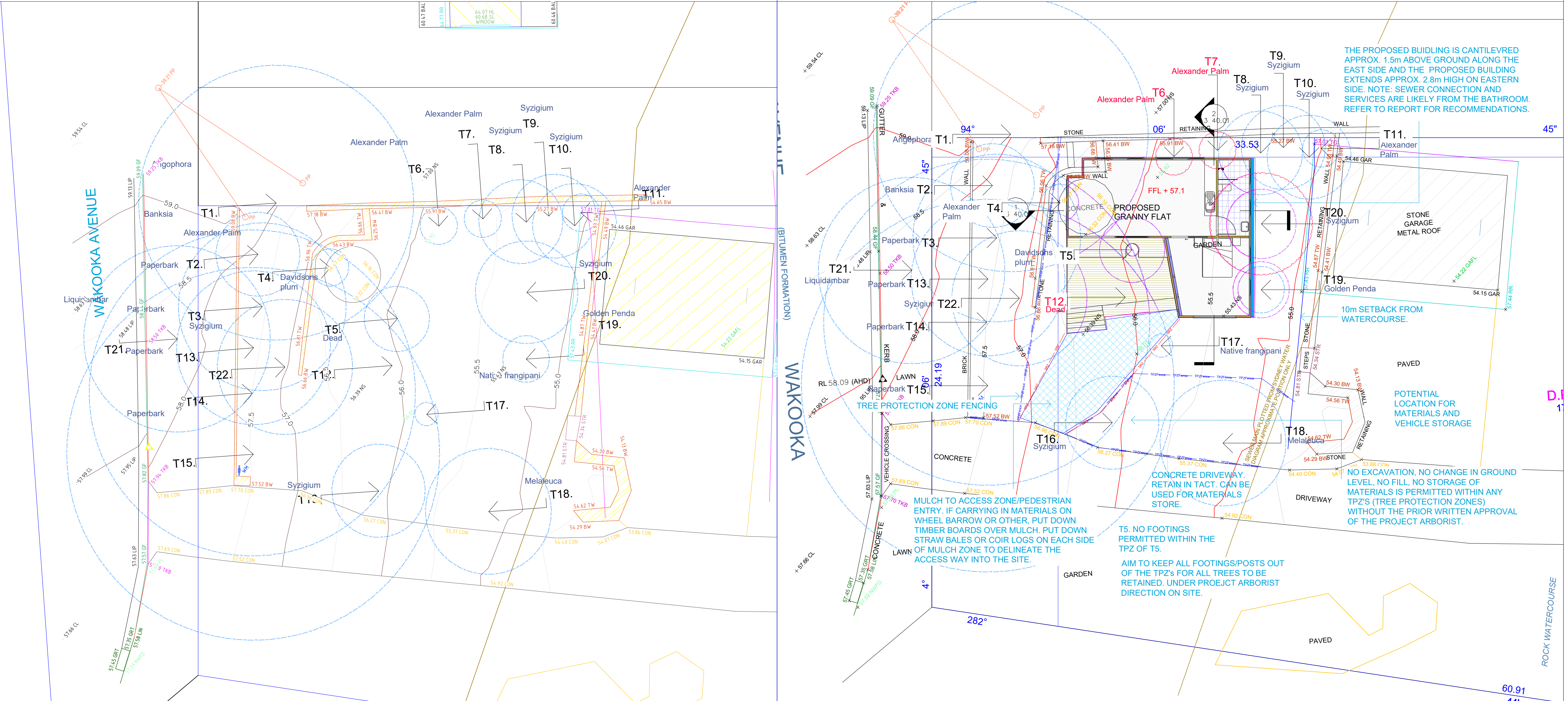


Figure 6. View looking south east from Wakooka Avenue towards site. T1, angophora is behind the power pole to the photos left. Date: 16.07.18.

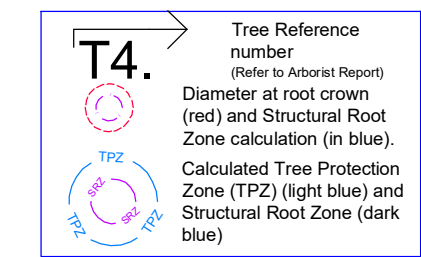
⁸ TPZ and SRZ's are calculated using AS4970-2009 (adapted from Matheney and Clarke's British Standard adaption method, 1991).

Reference			(m)	(m)	AREA (m)											Refer to Appendix 4a and 4b				Refer to report.	
Id #	Species, Common Name	Age class	Estimated Height (m)	Trunk Diameter 1.4m DBH	Proposal to: retain and protect or remove	Canopy spread (m)				Diameter above root crown (RCB)	Health and Structural Condition	SULE (Appendix 2)	Landscape Rating (Appendix 1)	Retention Rating (Appendix 5)	Site Location	TPZ (m) Radius	TPZ (m2) Area	SRZ Radius (m)	SRZ (m2) Area zone	% TPZ Encroac hment	% SRZ encroach ment
						N	E	S	W												
1	Angophora costata	M	21	0.59	Retain and Protect	5	6	5	6	0.78	Located on the boundary and at front of site (NW corner) with a boundary wall and fence within 1.5m of trunk. Ground is steeply sloped at base with trunk base growth to compensate. Driveway of northern neighbour to north. Circular concrete pad with low wall within site on the south eastern side. Small dead branches being held onto by tree. Otherwise tree form appears sound. Other trees, mostly native located within TPZ (somewhat crowded/competition).	L	H	H	WP, E	7.08	157.48	2.98	27.93	8.6% cantilever	0.0%
	Red Gum													1							
2	Banksia integrifolia	M	5.5	0.18	Retain and Protect	3	3	3	3	0.25	Twisted form, multi branched specimen, suppressed under canopy of surrounding trees (T1 to the north). Located within sloping garden bed. Boundary wall to the west. T2 in flower/spikes. Low wall to the east.	L	H	H	WP, E	2.16	14.66	1.85	10.74	0.0%	0.0%
	Banksia													2							
3	Melaleuca quinquinervia	M	16	0.36	Retain and Protect	4	4	4	4	0.8	located close to boundary wall on west within sloped garden bed. West trunk has been removed and form of remaining trunk is straight. 1xt branch to the east is 4m from the elevated ground.	M-L	H	H	E (to east)	4.32	58.63	3.01	28.53	<4% cantilever ed	0.0%
	Paperbark													3							
4,6,7,11	Archontophoenix alexandrae	J	4 and 6m	0.08	Retain & Protect T4, T11. Remove T6, T7	1.5	1.5	1.5	1.5	0.1	Small and likely self seeded palms. Provides vegetated character. Somewhat shaded growing zones. T6 and T7 within proposal footprint.	M	L	L	E	0.96	2.90	1.26	4.97	24.7% cantilever	0.0%
	Alexander Palm													5 to 6							
5	Davidsonia pruriens var. jerseyana or sp.	SM	11	0.14	Retain and Protect	2.5	1.5	1.5	1.5	0.23	Tall and straight form with foliage starting at approx. 9.5m high (central leader till approx. 9m). Surface roots visible. Unencumbered rooting zone. Slight signs of possum (or other) scratches on trunk - presumably for food source.	L	H	H	WP	1.68	8.87	1.79	10.01	No footings permitted. Cantilever only.	
	Davidsons plum													2							
8,9,10	Syzigium sp.	SM	8	0.18	Retain and Protect	3	3	3	3	0.2	Provides a good visual screen from approx. 1.8m high to top for the northern neighbouring property. Sparse foliage below 1.8m	M	M	M-L	E	2.16	14.66	1.68	8.90	17.5% T8: cantilever ed	0.0%
	Lilly Pilly													5							
12	Melaleuca decora (or sp)	OM/ ST	5	0.13	proposed removal (in decline)	1.5	1.5	1.5	1.5	0.21	Dying/in decline. Very sparse foliage and dying. Small number of epicormic shoots at base indicating stress response and recession of vigour.	T	Exempt	L	WP	1.56	7.65	1.72	9.27	0.0%	0.0%
	dead/dying Teatree													6 to 7							
13	Melaleuca quinquinervia	M	16	0.33	Retain and Protect	4	4	4	4	0.5	Concrete steps located to southern side with visible conflict with the root crown base. Front (west) boundary wall in brick very close to trees. All the paperbark trees along this front wall will eventually outgrow their space and location, however are all mature (and full grown) specimens.	M	H	H	E	3.96	49.27	2.47	19.22	0.0%	0.0%
	Paperbark													3							
Age Class		(Diameter at Breast Height) DBH used in TPZ calculation.				Dia. is used in SRZ calculation				Retain = retain and protect		SULE		LANDSCAPE RATING		RETENTION Rating		Site Location		Measured in CAD. Encroachment based on root zone encroached as a % of TPZ. Canopy incursion based on incursion as a % of canopy. Highlighted where over allowable limit. See discussion for details. Na= where tree is not of significant SULE rating/has been recommended for removal due to extaeneous reasons.	
ST (Senescent)		Health, Pests, Disease				Condition				Remove - only with approval		Long(> 40 Years)		S (Significant)		H - high 1 to 3		O Inconspicuous /obscured location			
OM (Over Mature)		1. Foliar Insect Infest.				1. Bark Inclusion				12. Evid. Decay		Medium(15-40 Years)		VH (Very High)		M - moderate 4 to 5					
M (Mature)		2. Borer				2. Unstable				13. Wound		s hort(5-15 Years)		H (High)		Consider retain		M Moderate location, not obscuring		P Prominent position	
SM (Semi-Mature)		3. Termite Activity				3. Root Damage/exposed				14. Branch Loss		τ (Transient < 5)		M (Moderate)		L -low 6					
J (Juvenile)		4. Ivy/Vines				4. Prev. Lopped				15. Fracture/cracks		h (Hazardous/Dead)		L (Low)		Consider Removal		E (Edges) Periphery of si			
		5. Parasitic Plant				5. Mech. Damage				16. Lightning				VL (Very Low)		VL - very low 7				WP Within Development Potential	
		6. Root Rot				6. Storm damage				17. Prominent Lean		IN (Insignificant)		Priority Removal		OB Outside Boundary					
		7. Path. Fungal Infect.				7. Cavity				18. Prev. cut to GL		Ex (Exempt TPO)									
		8. Dieback				8. Epicormic Sprouts				19. Stability Suspect											
		9. Epicormic Growth				9. Structural Defect				20. exposure to wind											
		10. Sparse Canopy				10. Canopy Distort.				21. bulges/ribs											
		11. Deadwood (%)				11. Soil Level change				23. branches subsiding											
		12. supressed canopy																			

Reference			(m)	(m)	AREA (m)						Refer to Appendix 4a and 4b								Refer to report.																																																																																																																																																																																																																																																																			
Id #	Species, Common Name	Age class	Estimated Height (m)	Trunk Diameter 1.4m DBH	Proposal to: retain and protect or remove	Canopy spread (m)				Diameter above root crown (RCB)	Health and Structural Condition	SULE (Appendix 2)	Landscape Rating (Appendix 1)	Retention Rating (Appendix 5)	Site Location	TPZ (m) Radius	TPZ (m2) Area	SRZ Radius (m)	SRZ (m2) Area zone	% TPZ Encroac hment	% SRZ encroach ment																																																																																																																																																																																																																																																																	
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14	Melaleuca quinquinervia	M	18	0.7	Retain and Protect	4	4	4	4	0.82	Concrete steps located between T13 and T14 as well as brick wall to the west is somewhat constraining further size development.	M	H	H	E	8.40	221.67	3.04	29.12	7.4%	0.0%																																																																																																																																																																																																																																																																	
	Paperbark													3																																																																																																																																																																																																																																																																								
15	Melaleuca quinquinervia	M	16	0.8	Retain and Protect	5.5	5.5	5.5	5.5	0.88	Brick wall to west, concrete driveway to south are both constraints. All paperbark trees T3, 13, 14 and T15 are upright in form and the garden bed grades down from the boundary wall. The verge adjacent is turf / permeable.	M	H	H	E	9.60	289.53	3.14	30.90	5.7% cantilever ed	0.0%																																																																																																																																																																																																																																																																	
	Paperbark													3																																																																																																																																																																																																																																																																								
16	Syzigium sp.	SM	4.5	0.2	Retain and Protect	2.8	2.8	2.8	2.8	0.11	moderately dense foliage and provides a good screen, lush feel and shade.	M	M	M	E	2.40	18.10	1.31	5.39	0.0%	0.0%																																																																																																																																																																																																																																																																	
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17	Hymenosporum flavum	J	4.5	0.05	Retain and Protect	3.5	3.5	3.5	3.5	0.18	Co-dominant form at DBH, Good dense foliage and form. Retain.	M-L	M	M	E/WP	0.60	1.13	1.61	8.15	0.0%	0.0%																																																																																																																																																																																																																																																																	
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18	Melaleuca decora or sp.	M	4.5	0.27	Retain and Protect	5.5	5.5	5.5	5.5	0.3	New foliage present, open habit , 4 multiple 1st order trunks. Likely will continue open habit	M	M	M	M	3.24	32.98	2.00	12.51	0.0%	0.0%																																																																																																																																																																																																																																																																	
	White feather honey myrtle													2																																																																																																																																																																																																																																																																								
19	Xanthostemon chrysanthus	SM	5.5	0.1	Retain and Protect	4	4	4	4	0.14	Form is symmetrical with good clearance and branching form. Foliage density is good. Recommendation to keep all footings outside of the TPZ and SRZ for this tree (and all retained trees).	M-L	M	M	E/WP	1.20	4.52	1.45	6.60	32.3% cantilever ed	36.36% cantilevered																																																																																																																																																																																																																																																																	
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20	Syzigium sp.	M	7	0.22	proposed removal	3	5	3	25	0.23	Tall, straight, closely located to garage and possible sewer zone. Proposed removal due to likelihood of proposed sewer/services within this zone. Replacement with a syzigium is possible in similar location. Retention may be resultant as determined by arborist on site during construction. Even though tree is proposed for removal, keep all footings outside the TPZ for this tree if at all possible.	M	M	M	E, WP	2.64	21.90	1.79	10.01	43.5% cantilever ed	39.3% cantilever																																																																																																																																																																																																																																																																	
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21	Lipuidambar styraciflua	M	12	0.4	Retain and Protect	5	5	5	5	0.56	Tall form, street tree. Tree avoids power lines. Verge is grass.	M	M	M		4.80	72.38	2.59	21.14	0.0%	0.0%																																																																																																																																																																																																																																																																	
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22	Syzigium sp.	M	8.5	0.29	Retain and Protect	5	5	5	5	0.47	Straight with visually strong form/architecture.	M-L	M	M	E	3.48	38.05	2.41	18.25	8.46% cantilever ed	0.0%																																																																																																																																																																																																																																																																	
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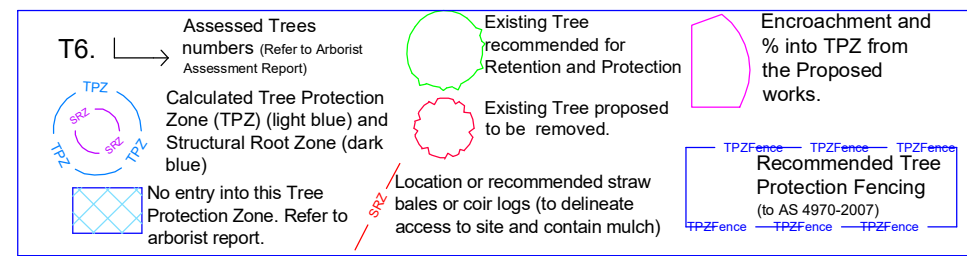


LEGEND. ARBORIST VALUES PLAN - EXISTING CONDITIONS - SURVEY SHOWN AS UNDERLAY



EXISTING SURVEY SHOWN AS BASE UNDERLAY

LEGEND. PROPOSED ARBORICULTURAL IMPACT PLAN



PROPOSED ARCHITECTURAL PLAN SHOWN AS BASE

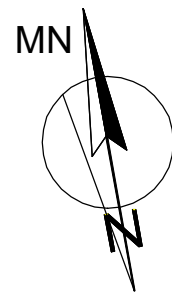
© 2019 Elke Haeghe Landscape Architects A.B.N. 32828038804 All rights reserved. This drawing is copyright and shall not be reproduced or copied in any form or by any means (graphic, electronic or mechanical including photocopy) without the written permission of Elke Haeghe Landscape Architects. Any license, expressed or implied, to use this document for any purpose whatsoever is restricted to the terms of the written agreement between Elke Haeghe Landscape Architects and the instructing party.

Registered Landscape Architect AILA (#001539)

The contractor shall check and verify all work on site (including work by others) before commencing the landscape installation. Any discrepancies are to be reported to the Project Manager or Landscape Architect prior to commencing work. Do not scale this drawing. Any required dimensions not shown must be referred to the Landscape Architect for confirmation. The Contractor must not construct from this drawing unless it marked 'Issue for Construction'. The Contractor acknowledges this drawing may be one of a number of drawings which together document the landscape design and works.

Issue	Revision Description	Date
E	Development Application	30.01.19
D	Development Application	17.12.18
C	Development Application	04.12.18
B	Development Application	03.12.18
A	for Internal information only.	27.07.18

LEGEND



Development Application

Client: Antje Kuhenast and Markus Bisping

Architect: Envirotecure Consulting arborist: Elke Haeghe

Project: 9 Wakooka Ave, Elanora Heights, NSW

Drawing Name: **Arboricultural Tree Retention Values and Trees Impact Plans.**

This plan forms part of the consulting arboricultural assessment for DA

Scale: 1: 100 @A1

Scale bar: 0 1 2 4 6 10m

Drawn: EDH Approved: EDH

Job Number: 1807_c Drawing Number: Arb_601 & 602 Issue: E

6 Impact, Discussion and Recommendations

6.1 General impact and summary: Four (4) trees are proposed for removal and the remaining eighteen (18) trees are proposed for retention as outlined below.

6.2 Refer also to [Table A](#) in this report for more detail. The table includes trees that are adjacent the site (outside the boundary).

	Number of trees	Tree reference number
Trees proposed for removal	4 trees	T6, T7, T20, T12
Trees proposed for retention	18 trees	T1-T5, T8-T11, T13-T19, T21-T22
Total number of trees assessed:	22	

6.3 Trees were assessed for their retention value which is a value prescribed through the SULE rating⁹ Landscape rating¹⁰.

Number of trees	Retention Value	Number of trees Proposed for retention	Number of trees Proposed for removal
7	High	7	0
10	Medium	9	1
5	Low	2	3
Total trees: 22		18	4

6.4 The proposal is for a new secondary dwelling in the front setback of 9 Wakooka Avenue, Elanora Heights.

6.5 The proposal has been designed with the arboricultural constraints provided at the beginning of the design process and collaborated with the architect, Envirotecture, so that the structure is proposed to be:

- constructed as an elevated/cantilevered building with pier footings to reduce the impact to the tree protection zones (TPZ's) as well as
- no changes or other disturbances to the exiting ground, and
- with services recommended to be either outside the TPZs or suspended on the underside of the elevated structure (i.e. no trenching).

6.6 Proposed for removal: Two juvenile Alexander palms, and a dying (in decline) tea tree and one Lilly pilly tree is proposed to be removed with the retention of the other eighteen (18) trees.

⁹ Refer to Appendix 2.

¹⁰ Refer to Appendix 1.

- 6.7 There are partial encroachments to trees to be retained as shown on plan [Arb_602](#), however these encroachments are minimal and are acceptable under the [Australian Standard AS4970-2007](#) in that the encroachments shown is the proposed cantilevered building which is above the existing ground (by approximately 1.5m above the existing ground level on the eastern side of the proposed structure and approximately 500mm above ground level on the western side of the proposed structure). Within the encroachments shown however are proposed footings.
- 6.8 Recommendations for the protection and retention of the trees and their soil zones include both tree protection fencing (as shown on plan [Arb_602](#)) and a mulch protection zone bordered with straw bales or coir logs to define the access into the site (as shown plan on [Arb_602](#)).
- 6.9 The following hold points/sign offs: are recommended given that work is within close proximity of existing trees to be retained. Project arborist inspections with written certification at the following phases is to ensure suitable protection of the exiting trees and their associated soil zone for tree viability.

Project phase	Description	Is Sign off / inspection required:
Following DA, prior to CC	At site set up (prior to any works including clearing of vegetation) to inspect and certify the suitable erection of tree protection fencing, signage, mulch, bales, and other tree protection measures per the recommendations in this report (and as approved by council); To ensure that approved tree removal is to not include stump grinding ¹¹ .	yes
During construction	During the post/footing placement and installation/digging (the supervision on site of the consulting arborist during the set out and installation of the proposed posts to ensure both the below and above ground impacts to the existing trees are acceptable)	yes
All times including prior to DA approval.	Prior to any pruning, or other works to trees is to be with the prior written approval of the project arborist and all reasonable directions by the project arborist are to be followed for tree protection.	yes
During construction	mid-way through construction to certify that no materials are being stored or other impacts during construction are occurring.	yes
Nearing the end of the construction phase.	at the completion of the project (which will provide permission to remove tree protection measures and final project arborist certification). This is to also include any further council-imposed items relevant to tree protection per a Development Application consent.	yes
Additional / All times	Any additional requirements outlined by council as a result of the DA approval conditions.	yes

¹¹ As recommended under the 10/50 Vegetation Clearing Code of Practice.



Figure 7. The photos above and one below show the proposed site zone from west to east. The top photo shows the entry driveway with T15 by the brick pillar. The photo above is a view looking directly into the site. .
Photo date: 16th July 2018



Figure 8 The photo above shows the eastern edge of the proposed site footprint to the right of the photo (roughly where the round low table is). T17 in the foreground (to be retained). It is recommended that the stepping stone pavers be retained. Photo date: 16th July 2018.

Note: Tree protection is not just about retaining roots, the protection of the soil zone in order to sustain (water, nutrients, oxygen) is important for the viability and resilience of the trees. The TPZ is a nominal zone that ensures viability of the exiting tree in its current maturity/size.

7 Ground Protection Measures

- 7.1 The [Australian Standard for Trees on Development Sites AS4970-2009](#) are the main source of methodology around tree data collection and recommendations in this report.
- 7.2 Watering / irrigation of the existing retained landscape and trees is recommended to be provided throughout the construction process
- 7.3 Ensure the project consulting arborist signs off on the installation of the tree protection zone fencing (usually prior to/as part of the issue of the construction certificate). A letter from the project arborist certifying the arborist tree protection zone fencing is to be submitted to the principal certifying authority (the PCA).

- 7.4 Soil Recommendations: Protecting the site soil within the TPZ' fenced zone will assist in the likelihood of sound protection of the retained trees and landscape as well as will reduce the cost of soil improvements that may otherwise be contaminated/require remediation by construction works.
- 7.5 In the front zone (northern garden): it is likely that no imported soil is needed, nor recommended, in that it is recommended that the soil: ground interface is largely kept the same and largely unchanged. It is recommended to retain the existing sandstone stepping stone pavers in situ for the same reason of retaining the ground and soil conditions as unchanged.
- 7.6 All soil (if being conditioned -as determined by the project arborist) is to fall within the phosphorus sensitive range according to [Leake and Haeger 2014, Part C, Example Soil Specifications](#).
- 7.7 Works within TPZ's. No proposed services can be located within the TPZ of any retained trees (including TPZ's of trees adjacent the site).
- 7.8 Proposed Stormwater and other services have not been assessed as part of this report/assessment. It is **recommended** that any new stormwater or any other services works are kept clear of the TPZ's for all retained trees.
- 7.9 Footing / post locations: **Screw piles** are being proposed as the method of construction. It is recommended that the project arborist consult together with the project engineer on the placement, size, number of screw piles needed and it is recommended that an allowance be made to allow for some small shifts in locations of footings be expected during construction on site with the project arborist to determine the best locations in regards to tree protection. Note: it is **recommended**, that the existing concrete zone (located in the northwest corner of the proposed building) be utilised for a footing to minimise ground disturbance). It is also **recommended** that all existing garden walls and fencing remain in place so as not to change the existing ground conditions.
- 7.10 The arborist plans and Table A outlines data about the trees' condition and calculations. Refer to [Table A: Tree Schedules and Plan Arb_601 and Arb_602](#).
-

8 Tree Protection Fencing Specifications and Recommendations

- 8.1 **Tree Protection Fencing:** Prior to any construction and as soon as possible in the site set up phase, Tree Protection Zone fencing (TPZ fencing) is recommended to be installed in the locations shown on the arborist plan: [Arb_602](#). TPZ fencing is to protect retained trees and their necessary soil zone by restricting the construction footprint that may unduly compact, damage, or disturb the tree soil zone and the tree root growing zone of trees.
- 8.2 **Type of Fence:** Tree or trunk protection fences (TPZF) are to comply with AS [4970-2009](#) and are recommended to be a minimum **2.4 m high**. This can be achieved with a standard 2.4 m high **chain link fence with non-penetrable footings**. E.g. **temporary site or event fencing with plastic or concrete pad footing pads (that do not penetrate the ground)**.
- 8.3 Erect signage on all sides of the fencing and in clear to read text size. Signage is to state the following:



Figure 9. Example of tree protection fencing and signage.
Note: do not move the fence from the location shown on the arborist plan.

***“Tree Protection Zone. Do not move this fence. Do not enter without prior written approval by the project arborist: 0410 456 404*”**

- 8.4 The site manager/builder is to ensure that all people and contractors on site know not to enter inside the tree protection fencing zone, not to shift the location of the fence, not store any materials inside the TPZ, and not to damage, cut, crush, or sever any foliage, branches or tree roots (roots over 40mm diameter) – regardless of if roots or tree parts are within the TPZ or not.

- 8.5 No pruning, cutting, shaving, or removing of any tree parts may occur, including tree roots >40mm, any trunk, branches, or foliage without the prior written consent of the project arborist.
- 8.6 It is recommended that a project arborist with *AQF Level 5* be appointed to the project to oversee the recommendations and protection of trees, incorporate any DA consent conditions, certify the erection of tree protection fencing and ground protection and assess the general health and stability of the trees during construction (including the landscape period).
- 8.7 Should tree roots >40mm be exposed or uncovered, immediately contact the project arborist for advice/direction (which may include root protection measures, root severance, tree removal, or other actions). The project arborist will advise on recommendations and implications at time of site inspection and make a record of the site visit which will be provided to the client.
-
- 8.8 **Excavation:** excavation and digging of footings is not to occur within any TPZs without the prior involvement of the arborist and written instructions.
- 8.9 **Commencement of Construction:** a written letter of the satisfaction of the arborist that the tree protection measures and TPZF has been erected suitably is to be obtained prior to demolition or excavation on site (usually at the beginning of the site set up phase). This certificate is usually then submitted to the certifier (PCA).
- 8.10 **If any Stormwater work** is proposed within the TPZ, discuss this with the project arborist prior to any work commencing (including trench works). Keep any drains, stormwater works outside the TPZ's.
- 8.11 **Removal of tree protection fences:** The TPZF is to remain erected and in place during the construction period and only be removed with the written approval of the arborist. The landscape contractor or any other person may not remove or enter into the TPZ fences without prior written approval from the arborist.
- 8.12 **Council and certifier conditions:** It is recommended that the recommendations in this report be adopted as part of the approvals required for this development to ensure tree protection and retention.
-

9 [Additional Site Photos.](#)

All site photos were taken on the 16th of July 2018 by Elke Haege during the site assessment.

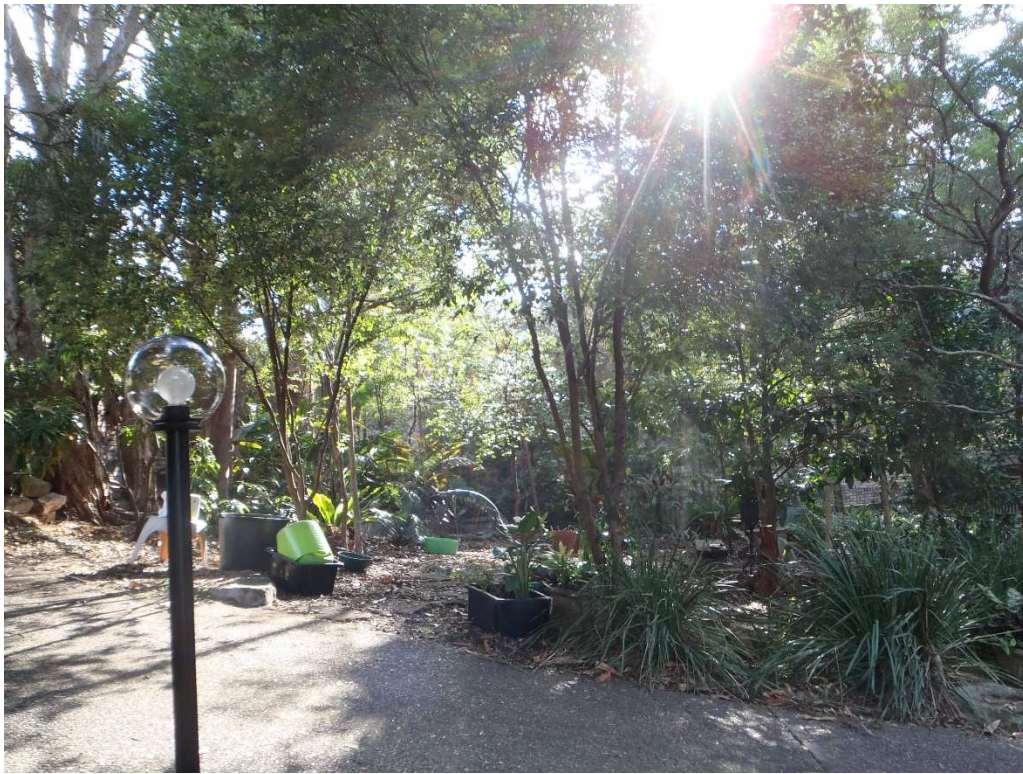


Figure 10. Photo above and below looking north across to the proposed site footprint. Wakooka Ave is to the left of the photo.

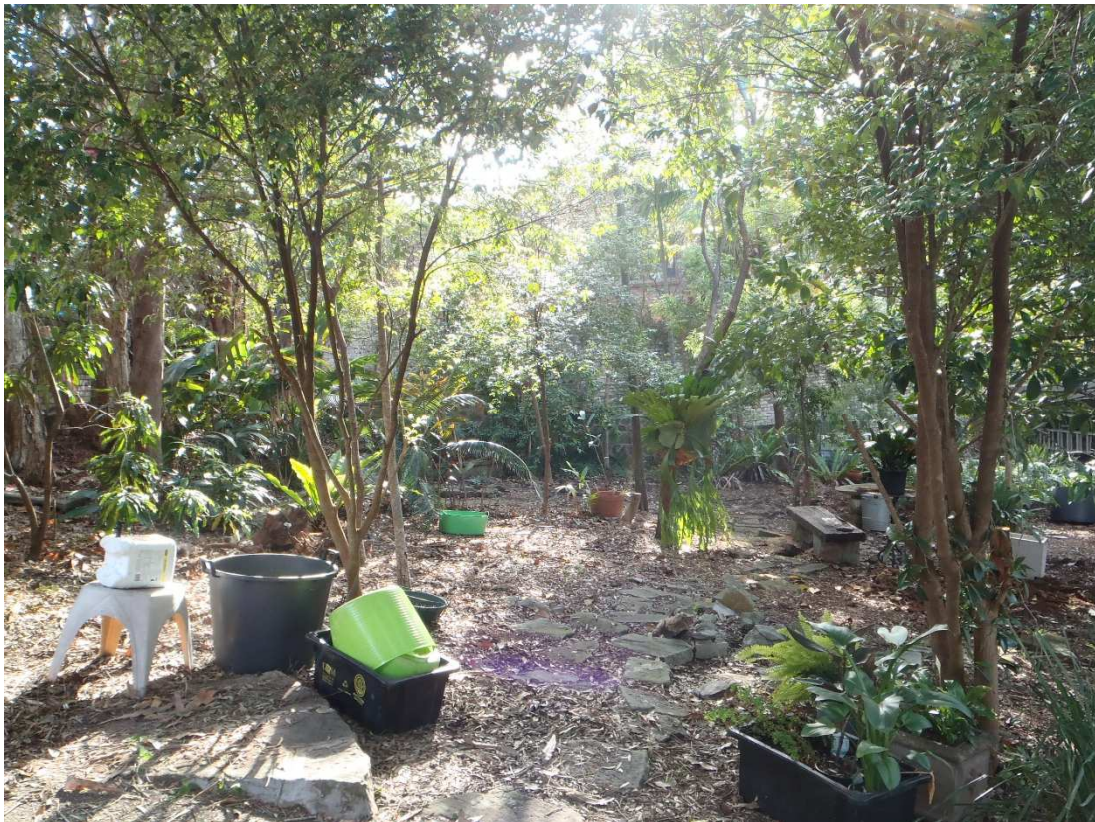


Figure 11. Closer up photo looking north into to the proposed site footprint. Wakooka Ave is to the left of the photo.



Figure 12. Photo of the site taken from Wakooka Ave, looking southeast. Behind the power pole is T1, the angophora (co-dominant trunk form). The mature paperbark trees (T3, T13, T14) are behind the brick boundary front wall, and the liquidambar (T21) on the street verge is next to the trailer.



Figure 13. A photo showing the whole of T1, the angophora.

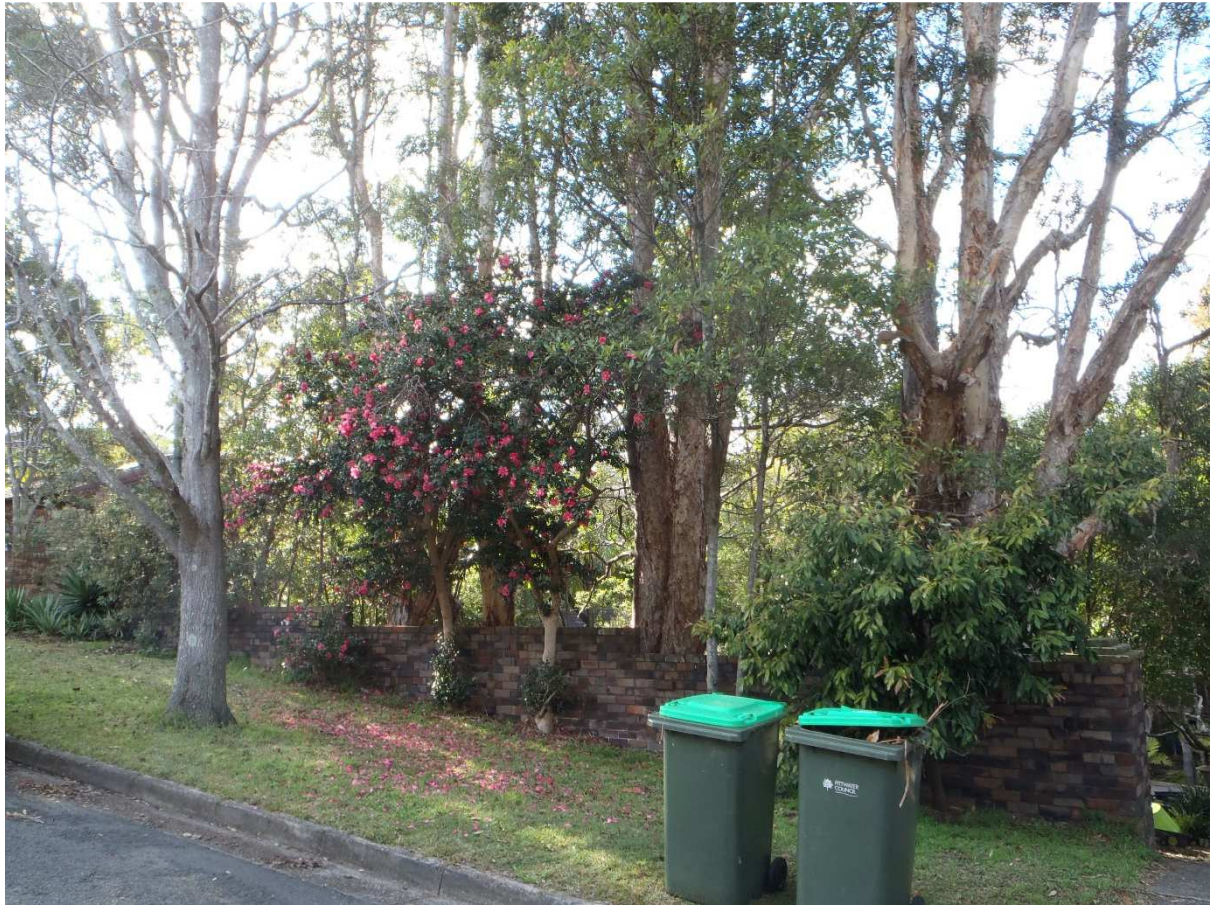


Figure 14. Photo taken from Wakooka Ave, looking east into the site / the proposed dwelling location.



Figure 15. The base of the Davidsons plum (T5) shown with the arrow to it (left of photo in foreground). This tree is proposed for an elevated deck built around it. The low retaining wall and circular concrete paved zone is visible beyond.



Figure 16. Photo (left) the upper canopy of T5, the Davidsons Plum. Photo (right): showing T6 and T7, both Alexander palms, proposed to be removed.

Figure 17. Photo (right): showing T6 and T7, both Alexander palms, proposed to be removed.

10 Discussion and Conclusion

- 10.1 The landscape character as defined by the existing trees are a feature of this part of the site and the design has been considered to retain the landscape character as much as possible for both retention of the trees as well as the trees being an asset to the proposed dwelling.
 - 10.2 Careful co-ordination and construction are the main focus of this arboricultural report's recommendation and Elke Haege, consulting arborist, believes that following the recommendations outlined in this report, that the preservation of the landscape character and trees proposed for retention and protection remain viable.
-

11 [References](#)

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12 [Relevant Appendices](#)

[Appendix 1: Landscape Significance Rating](#)

Refer to next page. As well this rating takes into consideration the context and relationship of the tree to its surrounds and contribution to the streetscape/site surrounds and character of the site, amenity, environmental, heritage and/or cultural values of the trees are considered.

[Appendix 6: ISA Tree Risk Assessment](#)

Methodology: ISA (International Society of Arboriculture, 2013)¹². Hazard potential (Risk rating matrix)

<i>Likelihood of Failure and Impact</i>	Consequences of Failure			
	Negligible	Minor	Significant	Severe
<i>Very likely</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>Extreme</i>
<i>Likely</i>	<i>Low</i>	<i>Moderate</i>	<i>High</i>	<i>High</i>
<i>Somewhat likely</i>	<i>Low</i>	<i>Low</i>	<i>Moderate</i>	<i>Moderate</i>
<i>Unlikely</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>	<i>Low</i>

¹² <http://www.isa-arbor.com/education/onlineresources/basicreeriskassessmentform.aspx>
Arboricultural Development Impact Assessment. Elke Haege Landscape Architect and Consulting Arborist AQF 5.

Appendix 2: Safe Useful Life Expectancy

Refer to next page

The following worksheet template shows the categories for SULE as derived from the attached appendices.

Life expectancy (LE)				Safe Life Expectancy LE				Safe Useful Life Expectancy			Final SULE	SULE Category
Age of tree	Average Lifespan	Lifespan modified by local factors	Life expectancy	LE modified by health	structure	LE modified by location	SLE	experience	Interference	Space for planting		
1	2	3	4	5	6	7	8	9	10	11	12	

**The SULE categories and classifications are subjective and based on the knowledge, experience and expertise of the assessor.*

Sule Categories and Sub-Categories

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

Ref: Barrell, Jeremy (1996)

Pre-development Tree Assessment

Proceedings of the International Conference on Trees and Building Sites (Chicago)

International Society of arboriculture, Illinois, USA

Appendix 3. Retention Rating

Tree retention priority. Refer to Plan 2.

	Landscape Significance Rating						
SULE	1	2	3	4	5	6	7
Long >40yrs	High Retention Value						
Medium 15-40 years			Moderate Retention Value				
Short 5-15 yrs				Low Retention Value			
Transient <5years				Very Low Retention Value			
Dead or Hazardous							

Reference modified from: Earthscape and Couston, Mark and Howden, Melanie, 2001, Tree Retention Values table, Footprint Green Pty. Ltd., Sydney Australia

Appendix 4a. AS 4970. Development of Trees on Protection Sites:

Tree Protection Zone (TPZ)

The tree protection zone (TPZ) is the principal 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 \times 12.

TPZ = DBH \times 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). Clause 3.3 covers variations to the TPZ. The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 m outside the crown projection.

Structural Root Zone (SRZ)

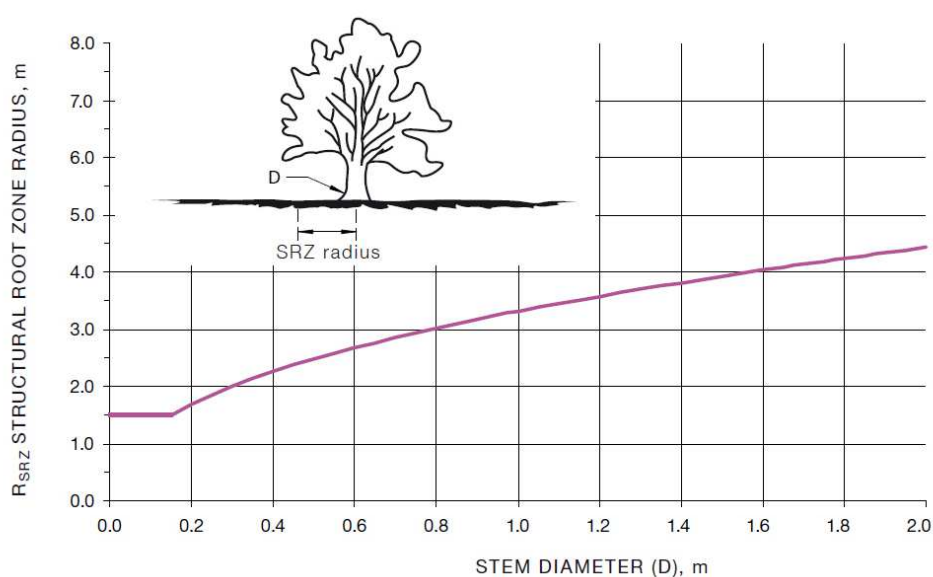
The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1.

Root investigation may provide more information on the extent of these roots.

SRZ radius = $(D \times 50)^{0.42} \times 0.64$ where D = trunk diameter, in m, measured above the root buttress



The curve can be expressed by the following formula:
 $R_{SRZ} = (D \times 50)^{0.42} \times 0.64$

NOTES:

- 1 R_{SRZ} is the calculated structural root zone radius (SRZ radius).
- 2 D is the stem diameter measured immediately above root buttress.
- 3 The R_{SRZ} for trees less than 0.15 m diameter is 1.5 m.
- 4 The R_{SRZ} formula and graph do not apply to palms, other monocots, cycads and tree ferns.
- 5 This does not apply to trees with an asymmetrical root plate.

FIGURE 1 STRUCTURAL ROOT ZONE CALCULATION

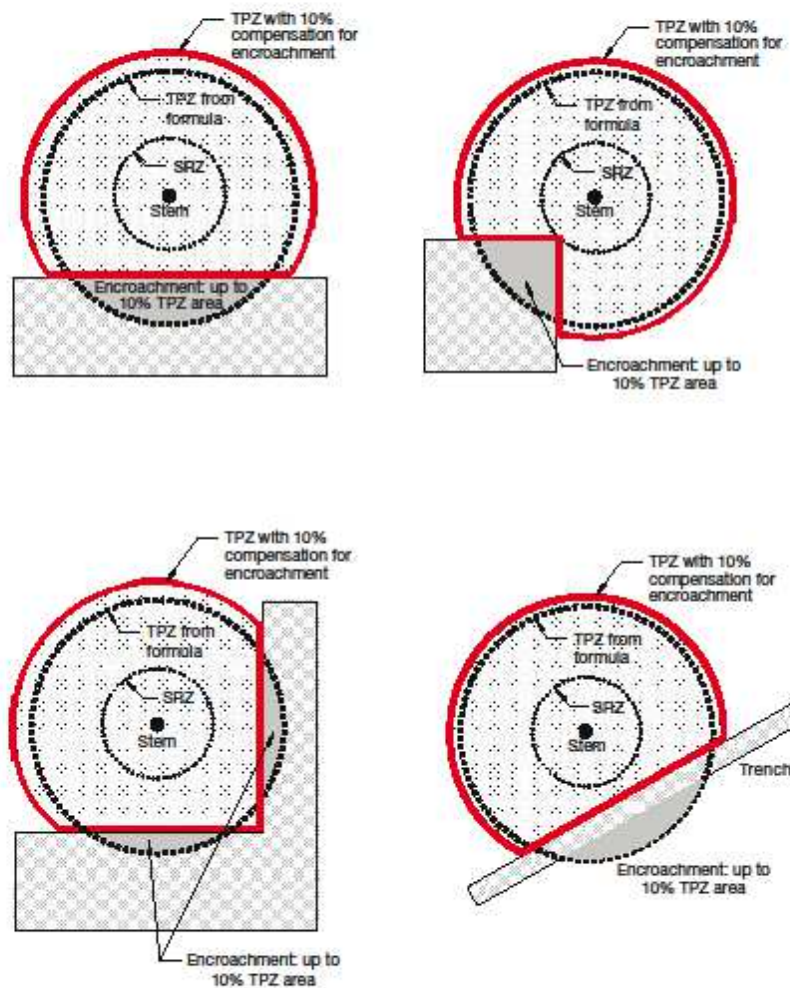
ISBN 978 0 7337 9447 6

NOTE: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see Figure).

Appendix 4b AS 4970. Development of Trees on Protection Sites: Acceptable Incursions

APPENDIX D
ENCROACHMENT INTO TREE PROTECTION ZONE
 (Informative)

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.

FIGURE D1 EXAMPLES OF MINOR ENCROACHMENT INTO TPZ

Appendix 5: Tree Retention Priorities

The following table describes the implications of the Retention Values on site layout and design. Refer to Plan 2: Tree Retention Values for direct correlations to table below.

Appendix 5

	Tree Retention Priorities
Retention Value	Recommended Action
"High"	<ul style="list-style-type: none"> • These trees are considered worthy of preservation; as such careful consideration, should be given to their retention as a priority. • Proposed site design and placement of buildings and infrastructure should consider the Tree Protection Zones as discussed in the following section to minimise any adverse impact. • In addition to Tree Protection Zones, the extent of the canopy (canopy drip line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
"Moderate"	<ul style="list-style-type: none"> • The retention of these trees is desirable. • These trees should be retained as part of any proposed development if possible; however, they trees are considered less critical for retention. • If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.
"Low"	<ul style="list-style-type: none"> • These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. • These trees should not be considered as a constraint to the future development of the site.
"Very Low"	<ul style="list-style-type: none"> • These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. • The removal of these trees is therefore recommended regardless of the implications of any proposed development.

Source: Derived from: Earthscape Horticultural Services, December 2011