Arboricultural Impact Assessment

PREPARED FOR WOOLWORTHS LTD. 11-13 PERCY STREET, AUBURN 8.9.2020

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1.Introduction

Lee Hancock is a qualified arborist and under the Australian Qualification Framework (AQF) Level 5, she is registered as an AQF Level 5 Arborist. Lee Hancock is qualified to provide services including, providing tree inspections advice and reports, arboricultural impact assessments and monitoring tree conditions during the construction.

Lee Hancock Consulting Arborist AQF Level 5 was commissioned by Woolworths Ltd.to prepare an Arboricultural Impact Assessment (AIA) of trees positioned on 11 -13 Percy Street, Auburn for the proposed Woolworths Warehouse & Distribution Centre Auburn SSD – 10470. This report has been prepared as requested by Cumberland Councils Item 7 relating to SEARS.

1.1 The Proposal

Woolworths Ltd seeks approval to demolish existing warehouse and construct a Woolworths Warehouse & Distribution Centre Auburn SSD - 10470

1.2 Limitations

The supplied survey plan has not identified all trees onsite. Nor has the survey shown trees offsite along boundaries of 9 and 15 Percy street.

2. Aim

This report has been undertaken to meet the following objectives:

- Conduct a visual assessment of all trees where works will be undertaken for the proposed demolition and construction works of new warehouse.
- Recommend removal or retention of significant trees.
- Provide Tree protection specifications for the long-term viability of trees retained.

2.1 Measures necessary to protect the trees throughout all demolition and construction phases have been recommended and methodologies to minimise impacts on the retained trees, where there is encroachment into the TPZ (Tree Protection Zone) have also been included.

2.2 The author is aware of and will comply with the determining authorities Cumberland City Council Tree Management Controls – Former Holroyd Area. Holroyd City Council's Tree Management Controls. Councils Local Environmental Plan (LEP) 2013, (Clause 5.9) and Development Control Plan (DCP) 2013 (Part A – Section 4)

Documents Supplied	
Nettleton Tribe	SK038,SK039,SK032,SK034,SK035,SK036

3.Site Analysis

The site houses a large parcel of industrial land with 2 warehouses, the existing vegetation is found at the front of the warehouse and consists of native species. The rear of the site is an archaeological item no. A55 in the ALEP 2010, which is Haslam's Creek Canal.

4. Discussion

An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure. The subject trees were assessed from the ground. No aerial inspection has been undertaken as part of this assessment. The initial point of reference in assessing the impacts of the proposed development is AS4970 (2009) *'Protection of trees on development sites.* The trees are tagged to assist in identification and location.

4.1 Each tree has been provided with an identification number for reference purposes denoted on the Tree Location Plan. This discussion will focus primarily on the trees that will experience conflicts with the proposed development. This report will then guide the site layout and design process showing the spatial requirements and constraints the trees have imposed on the site.

4.2 Measures necessary to protect the trees throughout all demolition and construction phases have been recommended and methodologies to minimise impacts on retained trees, where there is encroachment into the TPZ (Tree Protection Zone) and SRZ (Structural Root Zone) have also been included.

Tree 1. *Melaleuca quinquenervia* (Paperbark)

Positioned at edge of existing warehouse, leaning at 30◦ Degree angle, large mature tree, minor soil lifting, tree is rated as moderate landscape significance amenity and ecological value. The severe lean of the tree warrants removal.

Tree 2. *Eucalyptus nicholli* (Willow Peppermint)

Mature tree positioned 900mm off existing warehouse wall, in fair form and vigour, 40% deadwood in canopy, tree qualifies for Councils 2m rule it is 900mm off the existing warehouse wall. Rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 3. *Melaleuca citrina* (Bottlebrush)

Young tree in fair form and vigour, rated as moderate landscape significance,amenity and ecological value.

Low retention value.

Tree 4. *Melaleuca citrina* (Bottlebrush)

Young tree in fair form and vigour, rated as moderate landscape significance amenity and ecological value.

Low retention value.

Tree 5. *Melaleuca quinquenervia* (Paperbark)

Mature tree in good form and vigour, positioned 400mm off existing warehouse wall, it does not seem feasible to retain tree, it will be adversely impacted upon by the demolition of the building and it qualifies for Councils 2m rule. Rated as high landscape significance amenity and ecological value. Low retention value.

Tree 6. *Melaleuca quinquenervia* (Paperbark)

Large mature tree positioned 400mm off existing warehouse wall. Tree appears in good form and vigour, rated as high landscape significance, amenity, and ecological value. The close proximity of the tree and warehouse existing wall will be adversely impacted upon by the proposed demolition of the building. Tree also qualifies for Council 2m Rule. Rated as Low retention value.

Tree 7. *Melaleuca citrina* (Bottlebrush)

Semi mature multi – stem tree, assessed as in fair form and vigour, appears structurally stable, tree is positioned 1.7m off existing wall and qualifies for Councils 2m rule. Removal is recommended.

Not considered

Young tree in fair form and vigour, appears structurally stable, not considered worthy of any special measures to retain tree. Rated moderate landscape significance, amenity, and ecological value. Low

Tree 9. *Allocasuarina littoralis* (Black She-Oak)

Mature tree positioned 2m from existing footpath, in good form and vigour, appears structurally stable, the supplied plans show tree will spatially conflict with the proposed development. Rated as moderate landscape significance, amenity and ecological value.

Tree 10. *Allocasuarina littoralis* (Black She-Oak)

Mature tree positioned 4m off existing wall, forming part of a stand of trees *A* **stand of trees** *is a contiguous community of* trees *sufficiently uniform in composition, structure, age, size, class, distribution, spatial arrangement, site quality, condition, or location to distinguish it from adjacent communities.* Tree rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 11. *Allocasuarina littoralis* (Black She-Oak)

Mature tree positioned 4.5m from existing wall, the proposed demolition will adversely impact upon the tree, rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 12. *Allocasuarina littoralis* (Black She-Oak)

Mature tree positioned 2m from existing wall, the proposed demolition will adversely impact upon the tree, rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 13. *Allocasuarina littoralis* (Black She-Oak)

Mature tree positioned 5.5m off existing warehouse wall, in fair form and vigour, appears structurally stable, rated as moderate landscape significance, amenity and ecological value. Rated as low retention value.

Tree 14. *Casuarina cunninghamamiana* (River Oak)

Mature tree in good form and vigour, positioned 5m off wall, appears structurally stable, rated as moderate retention value, landscape significance, amenity, and ecological value. Low retention value.

Tree 15 *Casuarina cunninghamamiana* (River Oak)

Mature tree in good from and vigour, positioned 3m off existing building, appears structurally stable, rated as moderate retention value, landscape significance, amenity, and ecological value. Low retention value.

Tree 16. *Angophora costata* (Sydney Red Gum)

Mature tree in good form and vigour, heavily modified pruning to allow clearance overhead powerlines. Tree appears structurally stable. The supplied plans show tree will spatially conflict with the proposed development. Rated as moderate landscape significance amenity and ecological value.

Tree 17. *Casuarina cunninghamamiana* (River Oak)

Forming part of a Stand of Trees. Mature tree in fair form and vigour, positioned 5m off existing wall, appears structurally stable, rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 18. *Casuarina cunninghamamiana* (River Oak)

Forming part of a Stand of trees. Young tree in fair form and vigour, positioned 3m off existing wall, appears structurally stable, rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 19. *Allocasuarina* spp.

Forming part of a Stand of trees. Mature tree in good form and vigour, positioned 4m off wall. Appears structurally stable, rated as moderate landscape significance, amenity, and ecological value. Low retention value.

Tree 20. *Allocasuarina* spp.

Part of a Stand of trees Semi mature tree in good form and vigour, positioned 2m off wall tree qualifies for Councils 2m rule. Removal is recommended.

Tree 21. *Allocasuarina* spp.

Solitary mature tree in good from and vigour, appears structurally stable, positioned 2.5m off existing wall. The proposed demolition of building will adversely impact upon the tree, rated as moderate landscape significance, amenity, and ecological value. Rated as low retention value.

Tree 22. *Allocasuarina* spp.

Multi stem tree solitary specimen, in good form and vigour, positioned 4m off existing wall. The proposed demolition of building will adversely impact upon the tree, rated as moderate landscape significance amenity and ecological value. Rated as low retention value.

Tree 23. *Allocasuarina* spp.

Solitary tree positioned 3m off existing wall, tree appears structurally stable., in good form and vigour, rated as moderate landscape significance amenity and ecological value. Rated as low retention value.

Tree 24. *Corymbia citriodora* (Lemon Scented Gum)

Semi mature tree in good form and vigour, 3m off existing wall, appears structurally stable, tree is considered to be high landscape significance, however the supplied plans show a 69% incursion into the tree protection zone, which is an unacceptable incursion as stated in AS 4970. Removal is recommended

Tree 25. *Melaleuca quinquenervia* (Paperbark)

Tree positioned in close proximity to footpath, possible Council tree asset, in poor form and vigour, 40% deadwood in canopy, tree is not considered worthy of any special measures for it retention. Removal is recommended.

Tree 26 *Allocasuarina* spp.

Forming part of a Stand of trees. Tree has a included bark 2m from base of tree, *"Co-dominant stems with included bark is primarily a growth fault, it does not allow the total of the growth to provide support, commonly setting 2 or more branches against each other, rather than supporting each other in balance."*
"It occurs when the cambium turns inwards and is most common on co-dominant stems. Co-dominate stems with included bark and a downward stem bark have a weak union. This could allow splitting down the middle et.al. Fakes J. (1992)." Tree is recommended for removal.

Tree 27 *Allocasuarina* spp

Semi mature tree heavily pruned to allow clearance to vehicles and trucks onsite. Tree is not considered worthy of any special measures for its retention. Removal is recommended.

Tree 28 *Allocasuarina* spp

Trees appears in fair form and vigour, heavily pruned to allow clearance to vehicles and trucks onsite. Tree is not considered worthy of any special measures for its retention. Removal is recommended.

Tree 29 *Allocasuarina* spp.

Large mature tree in fair form and vigour, multiple branch failures have occurred over time, tree is not considered worthy of any special measures for its retention. Removal is recommended.

Tree 30. *Robinia pseudoacacia* (Robinia)

Young tree in fair form and vigour, positioned at southern entrance to site, rated as moderate landscape significance and amenity value. High retention value.

Tree 31. Washingtonia robusta (Fan Palm)

Young Palm in good from and vigour, positioned adjacent to tree 30 rated as moderate landscape significance and amenity value. High retention value.

Tree 32 *Schinus molle* (Peppercorn)

Positioned offsite along southern boundary behind fencing, tree is elevated by a retaining wall in a stairway to adjacent site. Tree appears in good health and vigour, rated as high landscape significance and amenity value. The proposed works should not impact upon the trees long-term useful life expectancy or its viability.

Tree 33. *Melaleuca citrina* (Bottlebrush)

Positioned offsite along southern boundary, appears structurally stable and in good form and vigour, rated as high landscape significance and amenity value. The proposed works should not impact upon the trees long-term useful life expectancy or its viability.

Tree 34. *Melaleuca citrina* (Bottlebrush)

Positioned offsite along southern boundary, appears structurally stable and in good form and vigour, rated as high landscape significance and amenity value. The proposed works should not impact upon the trees long-term useful life expectancy or its viability.

Tree 35 *Ligustrum lucidum* (Large Leaf Privet)

Positioned rear of site adjacent to Haslam Creek, tree is a nominated weed in the Biosecurity Act 2015, removal is recommended.

Tree 36 *Ligustrum lucidum* (Large Leaf Privet)

Positioned rear of site adjacent to Haslam Creek, tree is a nominated weed Biosecurity Act 2015, removal is recommended.

Tree 37 *Cinnamomum camphora* (Camphor Laurel) x 3

Large mature tree adjacent to Haslam Creek on site. Biosecurity weed. Removal is recommended.

Tree 38 *Eucalyptus molucanna* (Grey Gum) Stand of 5 trees

Positioned offsite 9 Percy street, adjacent to Haslam Creek southern boundary, a stand of Grey gums in fair form and vigour, rated as high landscape significance amenity and ecological value. High retention value.

Table 2. Tree Health and Retention Value

Tree	Genus & Species	Height	DBH/ DAGL	Crown Spread	Maturity	Health and Vigour	Landscape Significance Rating	Useful Life Expectancy	Retention Value
1	*Melaleuca quinquenervia* (Paperbark)	7m	580/500mm	30m2	Mature	Good	Moderate	Medium 15 – 25 Years	Low
2	Eucalyptus nicholii (Weeping Peppermint)	13m	520/600mm	30m2	Mature	Fair	High	Medium 15 – 25 Years	Low
3	*Melaleuca citrina* (Bottlebrush)	6m	130/190mm	10m2	Semi Mature	Fair	High	Long greater than 40 years	Low
4	*Melaleuca citrina* (Bottlebrush)	7m	140x120/270 mm	10m2	Semi Mature	Fair	Moderate	Long greater than 40 years	Low
5	*Melaleuca quinquenervia* (Paperbark)	12m	530/650mm	40m2	Mature	Good	High	Long greater than 40 years	Low
6	*Melaleuca quinquenervia* (Paperbark)	20m	900/1100mm	50m2	Mature	Good	High	Long greater than 40 years	Low
7	*Melaleuca citrina* (Bottlebrush)	5m	120x170x120/ 300mm	10m2	Young	Fair	Moderate	Medium 15 – 25 Years	Low
8	*Melaleuca citrina* (Bottlebrush)	5m	150/210mm	5m2	Young	Fair	Moderate	Medium 15 – 25 Years	Low
9	*Allocasuarina littoralis* (Black She-Oak)	16m	440/500 mm	20m2	Mature	Good	Moderate	Long greater than 40 years	Low
10	*Allocasuarina* spp.	16m	430/570mm	20m2	Mature	Good	High	Long greater than 40 years	Low
11	*Allocasuarina* spp.	16m	360/400mm	20m2	Mature	Good	High	Long greater than 40 years	Low
12	*Allocasuarina* spp.	16m	420/500mm	20m2	Mature	Good	High	Long greater than 40 years	Low
13	*Allocasuarina* spp.	17m	390/420mm	25m2	Mature	Good	High	Long greater than 40 years	Low
14	Casuarina cunninghamiana	15m	400/480mm	25m2	Mature	Good	High	Long greater than 40 years	Low
15	Casuarina cunninghamiana	15m	420/480mm	20m2	Mature	Good	High	Long greater than 40 years	Low

Tree	Genus & Species	Height	DBH/ DAGL	Crown Spread	Maturity	Health and Vigour	Landscape Significance Rating	Useful Life Expectancy	Retention Value
16	*Angophora costata* (Sydney Red Gum)	13m	1020/1000mm	40m2	Mature	Good	Moderate	Long greater than 40 years	Low
17	Casuarina cunninghamiana	13m	370/430mm	25m2	Mature	Good	High	Long greater than 40 years	Low
18	Casuarina cunninghamiana	11m	230/290	15m2	Semi mature	Good	High	Long greater than 40 years	Low
19	*Allocasuarina* spp.	20m	430/560mm	25m2	Mature	Good	High	Long greater than 40 years	Low
20	*Allocasuarina* spp.	9m	250/310mm	15m2	Semi mature	Good	High	Long greater than 40 years	Low
21	*Allocasuarina* spp.	12m	420/560mm	20m2	Semi mature	Good	High	Long greater than 40 years	Low
22	*Allocasuarina* spp.	11m	260x280x290/ 550mm	20m2	Semi mature	Good	High	Long greater than 40 years	Low
23	*Allocasuarina* spp.	10m	400/470mm	25m2	Semi mature	Good	High	Long greater than 40 years	Low
24	*Corymbia citriodora* (Lemon Scented Gum)	22m	640/730mm	40m2	Semi mature	Good	High	Long greater than 40 years	Low
25	*Melaleuca quinquenervia* (Paperbark)	7m	470/520mm	20m2	Mature	Fair	High	Medium 15-25 Years	Low
26	Allocasuarina spp.	20m	390/ 410mm	40m2	Mature	Fair	High	Medium 15-25 Years	Low
27	Allocasuarina spp.	21m	440/510mm	40m2	Mature	Fair	High	Medium 15-25 Years	Low
28	Allocasuarina spp.	20m	470/570mm	40m2	Mature	Fair	High	Medium 15-25 Years	Low
29	Allocasuarina spp.	22m	560/670mm	40m2	Mature	Fair	High	Medium 15-25 Years	Low

Tree	Genus & Species	Height	DBH/ DAGL	Crown Spread	Maturity	Health and Vigour	Landscape Significance Rating	Useful Life Expectancy	Retention Value
30	Robinia pseudoacacia. (Robinia)	7m	230/330 mm	15m2	Semi mature	Good	High	Long greater than 40 years	High 15 Percy street offsite
31	*Washingtonia robusta* (Fan Palm)	5m	_____	15m2	Young	Good	High	Long greater than 40 years	High offsite 15 Percy Street
32	*Schinus molle* (Peppercorn)	8m	300/340mm	20m2	Semi mature	Good	High	Long greater than 40 years	High offsite 15 Percy Street
33	*Melaleuca citrina* (Bottlebrush)	4m	Shrub form	15m2	Semi mature	Good	High	Long greater than 40 years	High Offsite 15Percy Street
34	*Melaleuca citrina* (Bottlebrush)	4m	Shrub form	15m2	Semi mature	Good	High	Long greater than 40 years	High Offsite 15 Percy Street
35	*Ligustrum lucidum* (Large Leaf Privet)	8m	_____	20m2	Mature	_____	_____	_____	Haslam creek Very Low
36	*Ligustrum lucidum* (Large Leaf Privet)	9m	_____	20m2	Mature	_____	_____	_____	Haslam creek Very Low
36A	Casuarina cunninghamiana	8m	250/320mm	15m2	Young	Good	Moderate	Long greater than 40 years	Low
37	*Cinnamomum camphora* (Camphor Laurel)	11m	_____	30m2	Mature	_____	_____	_____	Haslam creek Very Low
38	*Stand of 5 Eucalyptus molucana*	15m	No access	30m3	Mature	Good	High	Long greater than 40 years	Haslam creek High Offsite 15 Percy Street
39	*Stand of Casuarina cunninghamiana*	17m	No access	30m3	Mature	Good	High	Long greater than 40 years	High Offsite 9 Percy Street

1A	Casuarina cunninghamiana	3.5m	150/200mm	10m2	Young	Good	Moderate	Long greater than 40 years	High off-site 15 Percy Street
Tree	Genus & Species	Height	DBH/ DAGL	Crown Spread	Maturity	Health and Vigour	Landscape Significance Rating	Useful Life Expectancy	Retention Value
2A	Casuarina cunninghamiana	20m	450/550mm	30m2	Semi mature	Good	High	Long greater than 40 years	High off site15 Percy Street
3A	Casuarina cunninghamiana	22m	330x350/570 mm	30m2	Semi mature	Good	High	Long greater than 40 years	High off site

5. Conclusion

To conclude the Arboricultural Impact Assessment has collected all relevant data in assessing trees onsite and 3 trees offsite. An assessment of their health and vigour, estimated life expectancy and their significance in the landscape and amenity value have been recorded.

6. Recommendation

The proposed development will necessitate the removal of trees 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,11,12, 13,14, 15, 16, 17,18,19,20, 21,22,23, 24, 25, 26, 27, 28, 29, 35, 36, 36A and 37. Trees will be adversely impacted upon by the proposed demolition and construction of the development. The trees growing extremely to the existing front building, the presence of numerous woody surface roots running towards the existing building footprint from the *Allocasuarina* and *Casuarina* species, will be detrimentally impacted upon by the proposed demolition of the existing building. Therefore, it is recommended the afore mentioned trees are removed, subject to Council approval.

Approved removal shall be undertaken by an experienced Certified AQF Level 3 Arborist in accordance with Safe Work Australia Code of Practice 'Guide to Managing Risks of Tree Trimming and Removal Work'.

6. 1 Tree offsite on boundary of 9 Percy street, shall be retained for the proposed development. and protected throughout all stages of the development.

Trees offsite 15 Percy Street shall be retained for the proposed development. and protected throughout all stages of the development.

6.2 The stand of *Eucalyptus molucanna* offsite southern boundary 15 Percy Street. The proposed OSD tank is to be excavated in close proximity to the stand of trees. Prior to the installation of the OSD tank. It is recommended that root investigation by Non -Destructive Excavation (NDE) such as hydro-vacuum excavation (Sucker Truck), air spade and manual excavation (Hand Tools). Root mapping will reveal the location and distribution of any woody roots. If any woody roots less than 40 mm in diameter are encountered, they shall be cut cleanly with a sharp instrument. Any woody roots greater than 40mm shall be retained and Project Arborist to provide recommendations.

6.3 The proposed new crossover and driveway works shall be installed at or above existing grade and utilise existing sub - base materials if present, no excavation into existing sub-base layers or beyond the rear of the existing kerb should be undertaken. To ensure trees along northern and southern boundary

6.4 To compensate for the loss of amenity replacement planting of trees as specified by the project Geoscapes Landscape Architects plan should be considered.

All new trees to be planted shall:

- Be located in such a way that at maturity the canopies will be clear of the projected mature canopies

of existing trees.

- Tree stock will be grown in accordance with AS2373 *Tree Stock and Specifications for Landscape Uses* and the supplying nursery shall provide certification in relation to compliance.
- Planted by an AQF Level 3 Arborist or AQF Level 3 Horticulturalist
- Maintained and watered as required by an AQF Level 3 Arborist or AQF Level 3 Horticulturalist after planting for 12 months.
- All excavation within the Tree Protection Zone (TPZ) of any tree shall be undertaken as directed by the Project Arborist.

7. Images

Plate 1. Tree 1. *Melaleuca quinquenervia* (Paperbark)

Plate 2.

Trees 1 *Melaleuca quinquenervia* (Paperbark), 2 *Eucalyptus nicholli* 3 *Melaleuca citrina* 4 *Melaleuca citrina* and 5 *Melaleuca quinquenervia* (Paperbark),

Plate 3. Tree 6. *Melaleuca quinquenervia* (Paperbark)

Plate 4. Trees 7. *Melaleuca citrina* 8. *Melaleuca citrina*

Plate 5. Tree 9. *Allocasuarina littoralis*

Plate 6.

Tree 10 *Allocasuarina* spp. 11. *Allocasuarina* spp. 12. *Allocasuarina* spp. 13. *Allocasuarina* spp. 14. *Casuarina cunninhamiana* 15. *Casuarina cunninhamiana*

Stand of Trees Below

Plate 7. Tree 16. *Angophora costata* (Sydney Red Gum) (Not shown on Survey)

Plate 8.

Trees 17 *Casuarina cunninhamiana*, 18 *Casuarina cunninhamiana,* 19 *Allocasuarina* spp. 20 *Allocasuarina* spp. 21 *Allocasuarina* spp.

Plate 9.

Tree 22. *Allocasuarin*a spp.

Plate 10.

Tree 23. Allocasuarina spp.

Plate 11.

Tree 24 *Corymbia citriodora* (Lemon Scented Gum)

Plate 12

Tree 24**.** *Corymbia citriodora* (Lemon Scented Gum)

Plate 13

Tree 25. *Melaleuca quinquenervia* (Paperbark)

Plate 14 Trees 26,27,28 and 29 *Allocasuarina* spp.

Plate 15

Trees Offsite Tree 30 *Robinia pseudoacacia* (Robinia) & Tree 31 *Washingtonia robusta* (Fan Palm) 9 Percy Street.

Plate 17 Tree 32 *Schinus molle* (Peppercorn Tree) 15 Percy Street

Plate 18. Tree 33 *Melaleuca citrina* (Bottlebrush) Tree 34 *Melaleuca citrina* (Bottlebrush) 15 Percy Street

Plate 19 Tree 35 *Ligustrum lucidum* (Large Leaf Privet) onsite Haslam's Creek

Plate 20 Tree 36 *Ligustrum lucidum* (Large Leaf Privet) onsite Haslam's Creek

Plate 21 Tree 36A *Casuarina cunninghamiana* (River Oak) onsite

Plate 22 No Image Tree 37 Cinnamomum camphora (Camphor Laurel)

Plate 23 Stand of *Eucalyptus molucanna* (Grey Gum) offsite 15 Percy Street.

Plate 24

Trees offsite Trees 1A,2A.3A *Casuarina cunninghamamiana* (River Oak) 9 Percy Street.

Plate 25 Trees offsite Trees *Casuarina cunninghamamiana* (River Oak) 9 Percy Street.

8. References

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Disclaimer

The author, Lee Hancock Consulting Arborist takes no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent modifications to its growing environment either above or below ground contrary to our advice.

This report is a recommendation only. In no way does it guarantee any particular actions by the determining authorities.

9. Methodologies

9.1 Visual Tree Assessment (VTA)

A technique developed by (Mattheck & Breloer) was carried out on all trees from the ground. The technique involves, identification of the Genus and Species of trees on the site. The Diameter at Breast Height (DBH) 1.4m above ground level determined from the circumference of the trunk divided by *pi* (π).
Tree height (m) Diameter at Ground Level (DAGL), Canopy spread (m) in four cardinal points (north, south, east, west) Structural integrity, Amenity value, Indigenous/ Endemic value, health and vigor of trees.

9.2 Useful Life Expectancy (ULE)
An assessment procedure has been developed by (Barrell, J.D.) 1993 'by which trees on a site are accurately recorded and designated according to their suitability for retention in the short, medium or long term'. This methodology is a measure of the "sustainability" of the remaining contribution in years that the tree can provide in the context of the site.

9.3 Landscape Significance
The significance of trees in the landscape is assessed in determining their retention values in 3 categories. Heritage Value reflects Historical significance, Ecological Value maintains biodiversity values and Amenity value contributes to the character of the landscape.

9.4 Tree Retention Values
A rating was given to each tree on site; the information gathered was then processed by evaluating the health and vigour, the remaining useful life expectancy (ULE), plus their significance in the landscape. A retention value for each tree was then evaluated ranging from High, Moderate, Low and Very Low.
9.5 Structural Root Zones

9.5.1 As defined in AS 4970 Section 1.4.5 the SRZ is 'the area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright.' The SRZ area has been calculated as specified in Section 3.3.5 of AS 4970.

9.5.2 Structural Root Zone (SRZ)

SRZ is the measurement of the area around the base of the tree. Measurements are taken at the centre of the trunk; a radial measurement is calculated in meters. This process determines the trees structural stability. The formula is SRZ radius = (D x 50) x 0.64 D = trunk diameter, in metres.

9.6 Tree Protection Zone (TPZ)

This area is specified above and below the ground at a given distance from the trunk to protect tree roots and canopy to protect the viability and stability of a tree retained on site where there is a potential for the tree to be damaged by development

9.6.1 Determining Tree Protection Zones

As defined in AS 4970 Section 1.4.7 the TPZ is 'a specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown (canopy) to provide for the viability and stability of a tree to be retained where it can potentially cause damage by development'. The TPZ is the root zone/canopy area required for vigour and long - term viability. The TPZ area has been calculated as specified in Section 3.2 of AS 4970.

9.6.2 Variations to the TPZ – Minor

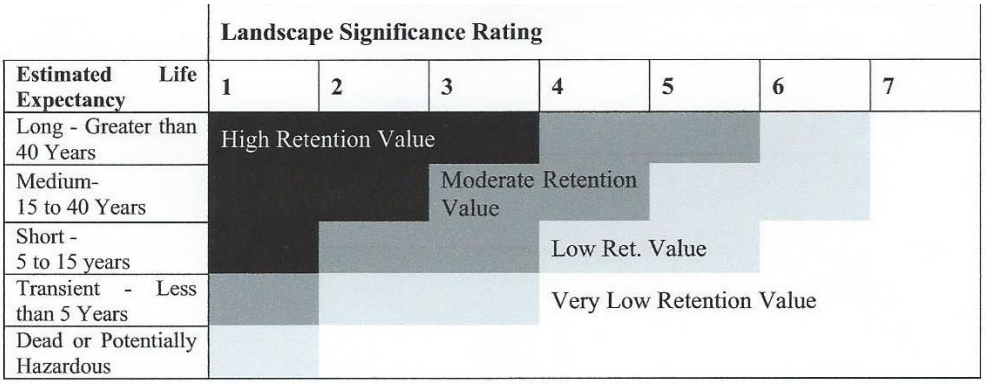
If there are no other options a minor encroachment (≤10%) into the TPZ area may be acceptable provided the incursion does not impact the SRZ. Examples of how minor encroachments can be configured. Refer to Section 3.3.2 of AS 4970 for additional details relating to minor encroachments.

AS 4970 states that the area lost to the encroachment must be compensated for elsewhere and must be contiguous with the TPZ.

9.6.3 Variation to the TPZ – Major

Should major encroachments (> 10%) of the TPZ be proposed it must be demonstrated by The Project Arborist that the tree will remain viable into the long term. Demonstration of viability may include non - destructive methods of root investigation and should be made in consideration of the following factors as listed in Section 3.3.4 of AS 4970:

Retention Values.



Retention Value Methodology

RETENTION VALUE	RECOMMENDED ACTION
"High"	These trees considered worthy of preservation and as such careful consideration should be given to their retention as a priority. Proposed site design and placement of buildings and infrastructure should consider lessening any mitigating issues in relation to trees. In addition, the extent of the canopy (canopy dripline) 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"	These trees should be retained as part of any potential 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"	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 ULE. These trees should not be considered as a constraint to the potential development of the site.
"Very Low"	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.

10.Tree Protection Specifications

10.1 Specifications for Tree Protection

The tree protection measures included in this document are site specific and are to be implemented prior to, during and after the construction phase, including embellishment works. The project arborist will monitor the impacts of demolition, bulk earth works, installation of temporary infrastructure including bunding, sediment control and drainage works.

The intention is to ensure that construction related issues and conflicts are resolved prior to the commencement of this project.

The aim is to ensure that specifications are site specific and that the previously approved masterplan Tree Management Plan can be implemented as part of the conditions of consent.

10.2 Certification Reporting

Following each stage, Demolition, Site establishment, Construction Stage and Landscape Construction. The Project Arborist shall prepare a statement of compliance certifying whether the works have been completed in accordance with this plan and the conditions of development consent granted by Cumberland Council.

10.3 Appointment of a Project Arborist

An Arborist with an AQF Level 5 Diploma in Arboriculture with experience in tree protection on construction sites should be engaged prior to the commencement of work on the site. Site monitoring will occur at each Hold Point. If conditions have been breached, remedial action shall be recommended to minimise any further adverse effect on the tree's health.

10.4 Tree Removal

Approved tree removal shall be obtained prior to the removal of the nominated Trees. Prior to site establishment. Tree removal work shall be carried out by an experienced Certified AQF Level 3 Arborist in accordance with Safe Work Australia Code of Practice 'Guide to Managing Risks of Tree Trimming and Removal Work'.

10.5 Trunk Protection Percy Street Trees opposite development

There are 7 Council street trees opposite the proposed development. They willl require trunk protection prior to site establishment.

Trunk Protection by way of Timber planks (50mmx 100mm or similar) with a geotextile fabric shall be placed around Street tree. The timber planks shall be spaced at 100mm intervals, and must be fixed against the trunk secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in anyway) to avoid mechanical injury or damage. Trunk protection should be installed prior to any site works and maintained in good

condition for the duration of the construction period. The hessian and timber planks must not be fixed to the tree in any instance or in any fashion.

10.5.1. Tree Protection Fence

Tree protection fencing shall be installed around trees 9,16, combined fence 30 & 31, combine fence for 1A,2A & 3A in a rectangular configuration, prior to commencement of any works on the subject site. Tree Protection fencing to be chain link fencing of 1.8m high suitably clamped and braced to prevent sideways movement held in place with concrete feet.

10.5.2 Unless otherwise stated, the following activities must not be carried out within the TPZ.

- Modification of existing soil levels
- Cultivation of soil
- Movement of natural rock
- Storage of materials, plant, or equipment
- Preparation of chemicals, including preparation of cement products
- Parking of vehicles and plant
- Refuelling
- Wash down and cleaning of equipment
- Physical damage to tree

10.5.3 Mulch

To be applied in TPZ minimum 75 -100mm using material that complies with Australian Standard® 4454-2003 *Composts, soil conditioners and mulches*

10.5.4 Signage - Tree Protection Zone

To be displayed around the edge of all TPZ fenced off areas and visible within the development site. Identifying the TPZ should be placed outside the edge of TPZ.

10.6 Ground Protection:

Ground protection if temporary access for machinery is unavoidable within the TPZ ground protection measures will be required. The purpose of ground protection is to avoid root damage and soil compaction. The area within the TPZ may be protected with mulch and geo textile fabric blanket or crushed rock below rumble boards to provide access of equipment.

Refer: Figure 1. Protection of the above and below ground parts.

Table 3 Impact Assessment Schedule

Tree	Genus Species	SRZ	TPZ	Recommendation
1	*Melaleuca quinquenervia* ((Paperbark)	2.6 mR	6.0 mR	Adverse impact Removal is recommended
2	*Eucalyptus nicholii,* (Willow Peppermint)	2.7 mR	6.2 mR	Adverse impact Removal is recommended
3	*Melaleuca citrina* (Bottlebrush)	1.6 mR	1.5 mR	Adverse impact Removal is recommended
4	*Melaleuca citrina* (Bottlebrush)	1.9 mR	2.2 mR	Adverse impact Removal is recommended
5	*Melaleuca quinquenervia* (Paperbark)	2.8 mR	6.3 mR	Adverse impact Removal is recommended
6	*Melaleuca quinquenervia* (Paperbark)	3.4 mR	10.8 mR	Adverse impact. Removal is recommended
7	*Melaleuca citrina* (Bottlebrush)	2.0 mR	2.8 mR	Adverse impact Removal is recommended
8	*Melaleuca citrina* (Bottlebrush)	1.7 mR	1.8 mR	Adverse impact Removal is recommended
9	Allocasuarina littoralis (River She-Oak)	2.5 mR	5.2 mR	Removal is recommended spatially conflicts with proposed development.
10	*Allocasuarina* Spp.	2.6 mR	5.1 mR	Adverse impact Removal is recommended
11	*Allocasuarina* Spp.	2.3 mR	4.3 mR	Adverse impact Removal is recommended
12	*Allocasuarina* Spp.	2.5 mR	5.0 mR	Adverse impact Removal is recommended
13	*Allocasuarina* Spp.	2.3 mR	4.6 mR	Adverse impact Removal is recommended
14	*Casuarina cunninghamiana* (River Oak)	2.4 mR	4.8 mR	Adverse impact Removal is recommended
15	*Casuarina cunninghamiana* (River Oak)	2.4 mR	5.0 mR	Adverse impact Removal is recommended

Tree	Genus Species	SRZ	TPZ	Recommendation
16	*Angophora costata* (Sydney Red Gum)	3.4 mR	12.2 mR	Tree spatially conflicts with proposed development removal is recommended.
17	*Casuarina cunninghamiana* (River Oak)	2.3 mR	4.4 mR	Adverse impact Removal is recommended
18	*Casuarina cunninghamiana* (River Oak)	2.0 mR	2.7 mR	Adverse impact Removal is recommended
19	*Allocasuarina* Spp.	2.6 mR	5.0 mR	Adverse impact Removal is recommended
20	*Allocasuarina* Spp.	2.0 mR	2.7 mR	Adverse impact Removal is recommended
21	*Allocasuarina* Spp.	2.6 mR	5.0 mR	Adverse impact Removal is recommended
22	*Allocasuarina* Spp.	2.6 mR	5.7 mR	Adverse impact Removal is recommended
23	*Allocasuarina* Spp.	2.4 mR	4.8 mR	Adverse impact Removal is recommended
24	*Corymbia citriodora* (Lemon Secented Gum)	2.9 mR	7.6 mR	Adverse impact Removal is recommended
25	*Melaleuca quinquenervia* (Paperbark)	2.5mR	5.6mR	Possible Council Asset
26	*Allocasuarina* Spp.	2.3mR	4.6mR	Adverse impact Removal is recommended
27	*Allocasuarina* Spp.	2.5mR	5.2mR	Adverse impact Removal is recommended
28	*Allocasuarina* Spp.	2.6mR	5.6mR	Adverse impact Removal is recommended
29	*Allocasuarina* Spp.	2.8mR	6.7mR	Adverse impact Removal is recommended
30	*Robinia pseudoacacia* (Robinia)	2.1mR	2.7mR	Offsite Retain and protect Refer section 10.5.1 Tree Protection Specifications
31	*Washingtonia robusta* (Fan Palm)	1mR	2.0mR	Offsite Retain and protect Refer section 10.5.1 Tree Protection Specifications
32	*Schinus molle* (Peppercorn)	No access	No access	Offsite retain and protect Refer section 10 Tree Protection Specifications
33	*Melaleuca citrina* (Bottlebrush)	No access	No access	Offsite retain and protect Refer section 10 Tree Protection Specifications
34	*Melaleuca citrina* (Bottlebrush)	No access	No access	Offsite retain and protect Refer section 10 Tree Protection Specifications

Tree	Genus Species	SRZ	TPZ	Recommendation
35	*Ligustrum lucidum* (Large Leaf Privet)	_____	_____	Biosecurity Weed removal is recommended.
36	*Ligustrum lucidum* (Large Leaf Privet)	_____	_____	Biosecurity Weed removal is recommended.
36A	*Casuarina cunninghamiana* (River Oak)	2.1mR	3.0mR	Removal is recommended
37	Casuarina cunninghamiana	1.8mR	2.5mR	Adverse impact from proposed development Removal is recommended.
38	*Cinnamomum camphora* (Camphor Laurel)	----------	----------	Biosecurity weed Removal is recommended
39	*Stand of 5 Eucalyptus molucana*	No access	No access	To be protected offsite.15 Percy street.
40	*Stand of Casuarina cunninghamiana*	No Access	No access	To be protected offsite 9 Percy street
1A	*Casuarina cunninghamiana* (River Oak)	1.7 mR	1.8 mR	Offsite edge of exiting 15 Percy street driveway Refer: section 10.5.1Tree Protection Specifications
2A	*Casuarina cunninghamiana* (River Oak)	2.6 mR	5.4 mR	Offsite edge of exiting driveway Refer Section 10.5.1 Tree Protection Specifications
3A	*Casuarina cunninghamiana* (River Oak)	2.6 mR	5.7 mR	Offsite edge of exiting driveway Refer section 10.5.1 Tree Protection Specifications

HOLD POINT: Prior to Demolition Project Arborist to Assess Tree Protection installation and approved tree removal is compliant with AS4970 *Protection of Trees on Development Sites* (2009)

10.6.1 Demolition Phase

10.7 Temporary Infrastructure

Site sheds, Waste disposal and Stock piling areas to be placed outside the Tree Protection Zone.

10.7.1 Haul Route vehicles accessing site.

Haul route usage entry from Percy Street.

10.7.2 Plant and Equipment

Light weight plant equipment such as small rubber tracked excavators and the demolition material for excavations removed to stockpiling area using small tipper trucks (2-3 tonne maximum).

The landscape plan to be checked for compliance with the tree protection plan. Project Arborist to approve the staged removal of protection measures required to allow for landscape works.

10.7.3 Post Construction Phase

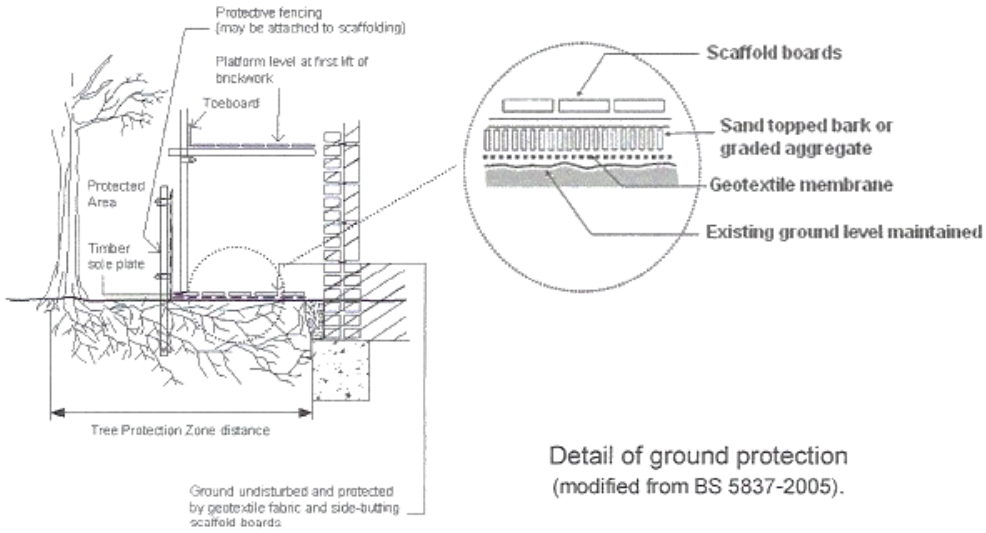
On completion of construction and landscaping works. Project Arborist to assess tree condition and provide certification of tree protection. Following final inspection Project Arborist should certify that the completed works have been carried out in compliance with the approved plans and specifications for tree pro

HOLD POINT: Project Arborist to Assess Tree Protection installation have remained intact throughout all stages of the proposed development.

Figure 1. Protection of the above and below ground parts.

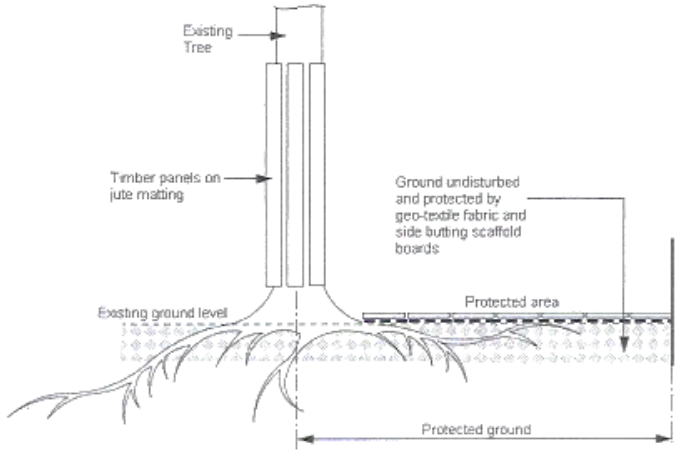
Root zone and trunk protection - Illustrative specification

Root zone protection: Where necessary, access through the TPZ can be achieved by laying aggregate and timber boards (or similar) over the root zone to protect roots. The ground beneath the boarding should be left undisturbed and should be protected with a porous geo-textile fabric covered with sand or mulch.



Detail of ground protection
(modified from BS 5837-2005).

Trunk protection: Where fencing cannot be installed, the vertical trunk of exposed trees shall be protected by the placement of 3.6m lengths of 50 x 100mm hardwood timbers, spaced vertically, at 150mm centres and secured by 2mm wire at 300mm wide spacing over suitable protective padding material e.g. Jute Matting. The trunk protection shall be maintained intact until the completion of all work on site.



Detail of trunk protection.

Appendix A. Tree Location Plan

EXISTING TREES SCHEDULE

TREE CODE	BOTANICAL NAME	COMMON NAME	TPZ (RADIUS)	SRZ (RADIUS)	TREATMENT
T1	*Melaleuca quinquenervia*	Paperbark Tree	6m	2.6m	Remove
T2	*Eucalyptus nicholii*	Willow Peppermint	6.2m	2.7m	Remove
T3	*Melaleuca citrina*	Bottlebrush	1.5m	1.6m	Remove
T4	*Melaleuca citrina*	Bottlebrush	2.2m	1.9m	Remove
T5	*Melaleuca quinquenervia*	Paperbark Tree	6.3m	2.8m	Remove
T6	*Melaleuca quinquenervia*	Paperbark Tree	10.8m	3.4m	Remove
T7	*Melaleuca citrina*	Bottlebrush	2.8m	2m	Remove
T8	*Melaleuca citrina*	Bottlebrush	1.8m	1.7m	Remove
T9	*Allocasuarina littoralis*	River She-ok	5.2m	2.5m	Retain
T10	*Allocasuarina spp.*	River She-ok	5.1m	2.6m	Remove
T11	*Allocasuarina spp.*	River She-ok	4.3m	2.3m	Remove
T12	*Allocasuarina spp.*	River She-ok	5m	2.5m	Remove
T13	*Allocasuarina spp.*	River She-ok	4.6m	2.3m	Remove
T14	*Casuarina cunninghamiana*	River Oak	4.8m	2.4m	Remove
T15	*Casuarina cunninghamiana*	River Oak	5m	2.4m	Remove
T16	*Angophora costata*	Sydney Red Gum	12.2m	3.4m	Retain
T17	*Casuarina cunninghamiana*	River Oak	4.4m	2.3m	Remove
T18	*Casuarina cunninghamiana*	River Oak	2.7m	2m	Remove
T19	*Allocasuarina spp.*	River She-ok	5m	2.6m	Remove
T20	*Allocasuarina spp.*	River She-ok	2.7m	2m	Remove
T21	*Allocasuarina spp.*	River She-ok	5m	2.6m	Remove
T22	*Allocasuarina spp.*	River She-ok	5.7m	2.6m	Remove
T23	*Allocasuarina spp.*	River She-ok	4.8m	2.4m	Remove
T24	*Corymbia citriodora*	Lemon Scented Gum	7.6m	2.9m	Remove
NS35	*Ligustrum lucidum*	Large Leaf Privet			Remove
NS36	*Ligustrum lucidum*	Large Leaf Privet			Remove
NS37	*Casuarina cunninghamiana*	River Oak			Remove
NS38	*Cinnamomum camphora*	Camphor Laurel			Remove

LEGEND: **Remove** **Retain** **TPZ** **SRZ**

Tree Protection Fence

Appendix B. Tree Management Plan.

This Tree Protection Plan outlines and provides guidance on the principles of tree protection measures, to assist in protecting Trees on site throughout all stages of the development. This information follows the Standards Australia AS4970-2009 *Protection of Trees on Development Sites* and

PRE-CONSTRUCTION	**MATERIALS**
Trees- • Before site establishment approved tree removal by AQF Level 3 Arborist • Root mapping undertaken rear of site. • Establish Trunk protection, 7 Street trees • Signage – No access into TPZ. • Education for Sub-contractors entering site. • Certification of compliance issued Certifying Authority once TPZ is installed.	• Tree Protection Fencing 1.8m chain wire fencing held in place with concrete feet • Trunk Protection by way of Timber planks (50mmx 100mm or similar) shall be placed around Street trees. The timber planks shall be spaced at 100mm intervals, and must be fixed against the trunk secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in anyway) to avoid mechanical injury or damage. • Signage identifying TPZ • Geo textile fabric to cover expose roots. • Irrigation equipment.
INSTALLATION PHASE	**COMPLIANCE**
• Materials stockpiling to be placed outside Tree Protection Fence.	• Project Arborist to oversee ongoing compliance of tree protection measures.
CONSTRUCTION	**COMPLIANCE**
• The construction management plan should be checked for compliance with Tree Protection Specifications. • Temporary infrastructure, demolition to be outside TPZ area. • Education for Sub-contractors entering site.	• To ensure that protection measures are being adhered to during the pre-construction and construction stages there should be a predetermined number of site inspections carried out by Project Arborist • Materials stockpiling to be placed outside Tree Protection Fence. • Maintain protective measures