Arborist Report

Client: Aveo Pty Ltd
Address: Vale Street,
Shortland N.S.W 2287

Bradley Magus
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1.0 Executive Summary

- It is recommended that Aveo Pty Ltd embark on a management program for one hundred and seventy eight (178) trees (Trees 1 – 178) before commencement of the construction works as follows:

- It is recommended that Trees 1 – 161, 167 – 169, 172 & 173 (166 in total) be removed immediately (before commencement of building works) by a qualified arborist (minimum certificate 2 in arboriculture). It is recommended that professional indemnity and public liability insurances be current and sighted before commencement of works begin. The level of cover has to be one in agreement between Aveo Pty Ltd and the arborist.

- It is recommended that Trees 162 – 166, 170, 171 & 174 – 178 (12 in total) be retained and incorporated into the development. No excavation, buildings, site sheds or any works above or below ground is to occur within the SRZ of retained trees. Any excavation works that may need to be undertaken within the TPZ of retained trees is to be undertaken with the supervision of an AQF 5 arborist.

- It is recommended that the soil changes be kept to a minimum within the TPZ of retained trees within three (3) metres of the civil/construction works and be raised by no more than 200mm. No soil changes are to occur within the SRZ of retained trees.

- It is recommended that protection measures be put in place that aid in the preservation of trees that are not part of the development however are within three (3) metres to the proposed civil/construction works. It is recommended that 1.8 metre inter locking chain wire fencing be installed before commencement of building works on site as indicated in figure 17. Protection fencing is to be installed to all sides a minimum of three (3) metres from the trunk. Any pruning works to trees within close proximity to the construction/civil works is to be undertaken in accordance with Australian Standards 4373 – 2007.

- It is recommended that all civil contractors that enter the site are made aware of the importance of preserving the remaining trees on site and understand the tree protection measures that are put in place to preserve trees within three (3) metres of the proposed civil/construction works

- All stockpile sites to be maintained a minimum 5 metres away from the trunk of all retained trees and all trees that come under the requirements of Newcastle City Councils' Tree Preservation order.

- It is recommended that all parking of vehicles & machinery be kept a minimum five (5) metres from retained trees during construction works.

- This report is not for publication to the internet and submission of this report in the submission phase set out by Council is to be taken down upon completion of the development application.

2.0 Arborist Details

Bradley Magus **Contact Details:** P.O Box 333 Newcastle 2300 Ph: 0425 203 049 Email: abacustrees@gmail.com or bradmagus1@bigpond.com Web: www.abacustreeservices.com	**Qualifications** 1. Diploma Horticulture (1993) 2. Bachelor of Horticulture Science (1996) 3. Masters Land Economics (2002) 4. Diploma Horticulture (Arboriculture) (AQF 5) 2007 (Dux) 5. International Society of Arboriculture Certified Arborist (2007) 6. QTRA Assessor – 2011 & 2013

2.1 Introduction

Abacus Tree Services was commissioned by Aveo Pty Ltd to assist in the preparation of an arborist report. An assessment was made on one hundred and seventy eight (178) trees located within the confines of Shortland Waters Golf Course (Vale Street, Shortland). There is in total one hundred and seventy eight (178) trees located at Shortland Waters Golf Course (Vale Street, Shortland) that were assessed as per the applicant's instructions.

The purpose of this report is to provide information and guidance to the applicant in relation to one hundred and seventy eight (178) trees only. The information in this report is to be used in correlation with other reports identified by Newcastle City Council and will provide Newcastle City Council with a framework for determining the development application.

This report and its recommendations are based upon a physical site inspection undertaken on the 8, 13 & 14th June 2017.

The photographs included in this report were taken at the time of the inspection on the 8, 13 & 14th June 2017.

2.2 Aims of this report/Procedure

The aim of this report is to assess the health and condition of one hundred and seventy eight (178) trees (Trees 1 - 178). The condition of the trees was assessed from ground level using the VTA (Visual Tree Assessment) method as outlined by Mattheck & Breloer (1999). The following criteria will be assessed within this report –

- An assessment of the dimensions (age, class, height and Diameter at Breast Height (D.B.H)
- An assessment of the health and condition of the trees;
- An assessment of the Useful Life Expectancy (U.L.E)
- Compilation of an appropriate report detailing the results of the above assessments
- Trees earmarked for retention to be assessed as per Australian Standards 4970-2009
- Hazard Rating, Recommendations for each tree

The (U.L.E) method of tree assessment, as outlined by Jeremy Barrell (1999) has been adopted within this report. U.L.E categories give an indication of the useful life expectancy anticipated for the tree that has been adopted for this report. Several factors are considered in determining this rating such as species, location, age, condition and health of the tree. The five U.L.E categories are outlined in detail within Appendix 2.

3.0 Disclaimer

This assessment has been prepared for the exclusive use of the applicant (Aveo Pty Ltd), for the preparation of a development application submission. Information in this report relates to one hundred and seventy eight (178) trees within the premises of Shortland Waters Golf Course (Vale Street, Shortland) only and should not be used in conjunction with any other property.

This assessment was carried out from the ground, and covers what was reasonably able to be assessed and available to the assessor at the time of the inspection. The assessor carried out no aerial inspections. Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of the inspection; furthermore the inspection was limited to a visual examination of the subject trees without dissection, excavation, probing or coring. Trees are living things and there condition will change over time. Therefore there is no guarantee that problems or deficiencies of the subject tree may not arise in the future.

3.1 Site Map

Figure 1
Location: All trees are located within Shortland Waters Golf Course (Vale Street, Shortland)
Source: www.googlemaps.com.au

3.2 Site Description

Trees assessed for the requirements of proposed fairways 4 & 9 are located wholly within Vale Street, Shortland (Shortland Waters Golf Club). The site is located in the municipality of Newcastle City Council. The species on site have been assessed against the requirements set out in Newcastle City Council's Tree Preservation Order. The species on site have been assessed against the requirements set out in Newcastle City Council's Local Environmental Plan (2012) pursuant to Section 5.9 & 5.9AA & Development Control Plan (2012) & associated Technical Manual (Urban Forestry Technical Manual – UFTM). All information is assessed per the requirements as set out within section 5.03 Tree Management. I have assessed the property against Schedule 5 (Environmental Heritage) within NCC LEP. The property is not listed in accordance with Part 1 (Heritage Items).

The site is set on a gently undulating with the immediate area being dominated by Newcastle University & wetlands including overgrown land to the north. The nearest major arterial road is the Pacific Highway to the north east. Trees that require removal for the construction of fairways 4 & 9 will require the inspection of 178 (Trees 1 – 178) within the subject property identified as Vale Street, Shortland (Shortland Waters Golf Club). Trees 1 - 178 are located next to the current fairway (Figures 2 & 3) associated with Shortland Waters Golf Club within close proximity to the subject property & proposed development.

Figure 2 – Location of subject property identified as Shortland Waters Golf Course (Vale Street, Shortland). The first layer of trees alongside the existing green include Trees 1 - 15

Figure 3 – showing the location of the next cluster of trees that include Trees 16 - 86. These trees are located next to the artificial pond next to the green.

Figure 4 – The remainder of the trees are located next to the fairway and comprise of Trees 87 – 92 that are in the open field area and Trees 93 – 178 are in a cluster on a small mound next to the fairway.

3.4 Soil Considerations

From a visual observation there has been minimal soil disturbance in the last few years within the subject property. From a visual observation there has been no recent excavation works in and around Trees 1 - X. The trees are situated within a grassed area within a moderately steep slope. There was no debris present or within the Structural Root Zone (S.R.Z) at the time of inspection. A root investigation would need to be undertaken if any roots have been damaged or diseased.

4.0 Tree Schedule

Species & dimension requirements on Pages 11 - 19. This page intentionally left blank

Tree No	Scientific Name	Common Name	DBH (MM)	Height (M)	AGE CLASS	Vigour	SPREAD N.E.S.W.	ULE	Comments
1	Eucalyptus siderophloia	Ironbark	445	10	YNM	G	4,7,5,4	2d	Symmetrical, LCR = 95 – 100%. No immediate works
2	Eucalyptus punctata	Grey Gum	325	10	YM	G	2,3,5,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
3	Eucalyptus siderophloia	Ironbark	510	15	M	G	7,3,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
4	Corymbia maculata	Spotted Gum	630	17	M	G	7,5,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works, MDW in all four quadrants.
5	Corymbia maculata	Spotted Gum	460	10	YM	G	7,7,1,0	2d	MDW in all four quadrants, minor asymmetry,
6	Eucalyptus sideroxylon	Narrow Leaved Ironbark	510	12	YM	G	4,7,6,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
7	Corymbia maculata	Spotted Gum	340	9	SM	G	2,5,6,4	2d	Mechanical wound to the S at 2 metres, Symmetrical, LCR = 95 – 100%. No immediate works
8	Eucalyptus sideroxylon	Narrow Leaved Ironbark	510	15	M	G	6,5,6,4	2d	Symmetrical, LCR = 95 – 100%. No immediate works
9	Acmena smithii	Lilly Pilly	670	12	M	G	7,6,5,9	2d	MDW in all four quadrants Symmetrical, LCR = 95 – 100%. No immediate works
10	Eucalyptus sideroxylon	Narrow Leaved Ironbark	795	15	M	G	8,7,3,10	2d	MDW in all four quadrants Symmetrical, LCR = 95 – 100%. No immediate works
11	Melaleuca quinquenervia	Broad Leaved Paperbark	600,390	8	M	A	4,6,4,6	3d	Minor sparse canopy, Symmetrical, LCR = 70 - 75%. No immediate works
12	Melaleuca quinquenervia	Broad Leaved Paperbark	535	6	M	A	5,5,4,5	3d	Minor sparse canopy, Symmetrical, LCR = 70 - 75%. No immediate works
13	Callistemon viminalis	Bottlebrush	160,240, 145, 210	4.5	M	G	3.2.3.3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
14	Melia azaderach	White Cedar	460	5	M	G	5,5,6,6	3d	Deciduous species Symmetrical, LCR = 50 - 55%. No immediate works
15	Melia azaderach	White Cedar	605	5	M	G	6,5,5,8	3d	Deciduous species Symmetrical, LCR = 50 - 55%. No immediate works. 1st order scaffold has failed at 1.4 metres above ground level.
16	Eucalyptus punctata	Grey Gum	200	7	SM	G	4,2,3,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
17	Casuarina glauca	Sheoak	210	8	SM	G	3,3,3,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
18	Eucalyptus punctata	Grey Gum	320,390	6.5	SM	G	0,2,5,1	3d	Major tropism over the pond, Symmetrical, LCR = 95 – 100%. No immediate works
19	Casuarina glauca	Sheoak	365	7	SM	G	2,3,3,2	3d	On lake edge, Symmetrical, LCR = 95 – 100%. No immediate works

20	Eucalyptus punctata	Grey Gum	395	11	YM	G	4,2,5,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
21	Casuarina glauca	Sheoak	320	12	YM	G	3,3,4,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
22	Eucalyptus punctata	Grey Gum	450	11	YM	G	4,1,9,8	2a	Symmetrical, LCR = 95 – 100%. No immediate works
23	Eucalyptus punctata	Grey Gum	545	15	YM	G	5,6,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
24	Eucalyptus punctata	Grey Gum	200	9	SM	G	4,2,2,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
`25	Eucalyptus punctata	Grey Gum	280	11	SM	G	5,3,1,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
26	Eucalyptus punctata	Grey Gum	185	7	SM	G	7,2,0,3	2d	Moderate tropism to the N quadrant, LCR = 95 – 100%
27	Eucalyptus punctata	Grey Gum	400	13	YM	G	6,2,4,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
28	Eucalyptus punctata	Grey Gum	340	13	YM	G	4,1,2,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
29	Eucalyptus punctata	Grey Gum	170,115	8	SM	G	3,3,2,3	2a	Bifurcated at 0.3 metres, Symmetrical, LCR = 95 – 100%. No immediate works
30	Eucalyptus punctata	Grey Gum	255	13	YM	G	4,3,3,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
31	Eucalyptus punctata	Grey Gum	160	.5	SM	G	4,0,0,2	2a	Moderate tropism to the N quadrants, Symmetrical, LCR = 95 – 100%. No immediate works
32	Corymbia maculata	Spotted Gum	195	7	SM	G	4,1,0,5	2a	Moderate tropism to the N quadrant, Symmetrical, LCR = 95 – 100%. No immediate works
33	Eucalyptus punctata	Grey Gum	310	4	OM	A	5,0,0,0	4a	Apical dominant leader lost at 4.2 metres, Symmetrical, LCR = 95 – 100%. No immediate works
34	Eucalyptus punctata	Grey Gum	240	11	SM	G	3,3,4,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
35	Eucalyptus punctata	Grey Gum	190	9	SM	G	5,0,0,4	2d	Moderate tropism to the NE, Symmetrical, LCR = 95 – 100%. No immediate works
36	Eucalyptus punctata	Grey Gum	225	9	SM	G	3,0,4,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
37	Eucalyptus punctata	Grey Gum	170	9	SM	G	1,0,2,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
38	Casuarina glauca	Sheoak	270	10	M	G	4,3,3,3	3d	Bifurcated at 3 metres, not growing true to form, large included fork union
39	Eucalyptus punctata	Grey Gum	205	9	SM	G	2,2,1,1	2a	Symmetrical, LCR = 95 – 100%. No immediate works
40	Eucalyptus punctata	Grey Gum	170	7	SM	A	3,2,3,3	3d	Symmetrical, LCR = 70 - 75%. No immediate works
41	Eucalyptus robusta	Swamp Mahogany	180	5	SM	G	0,2,6,4	2d	Tropism to the S quadrant, Symmetrical, LCR = 95 – 100%. No immediate works
42	Eucalyptus punctata	Grey Gum	270	7	SM	G	4,2,5,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
43	Casuarina glauca	Sheoak	155	7	SM	G	1,2,5,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
44	Casuarina glauca	Sheoak	10	9	SM	G	3,3,2,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
45	Casuarina glauca	Sheoak	330	12	YM	G	4,3,4,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
46	Casuarina glauca	Sheoak	225	9	YM	G	3,3,2,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works

47	Casuarina glauca	Sheoak	305	9	YM	G	4,3,4,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
48	Corymbia maculata	Spotted Gum	315	9	YM	A	5,5,2,5	3d	Symmetrical, LCR = 80 - 85%. Moderately sparse canopy in all four quadrants. No immediate works
49	Corymbia maculata	Spotted Gum	245	10	YM	G	4,4,3,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
50	Corymbia maculata	Spotted Gum	360	12	YM	G	6,6,4,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
51	Corymbia maculata	Spotted Gum	220	11	YM	G	7,3,2,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
52	Corymbia maculata	Spotted Gum	190	12	YM	G	3,2,2,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
53	Corymbia citriodora	Lemon Scented Gum	300	10	YM	G	6,6,1,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
54	Corymbia citriodora	Lemon Scented Gum	300	14	YM	G	5,5,6,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
55	Corymbia citriodora	Lemon Scented Gum	275	13	YM	G	7,4,3,4	2a	Symmetrical, LCR = 95 – 100%. Kino exudation noted from 7 metres above ground level to base. No immediate works
56	Corymbia citriodora	Lemon Scented Gum	355	13	YM	G	6,7,6,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
57	Corymbia citriodora	Lemon Scented Gum	315	11	YM	G	6,6,6,7	2a	Symmetrical, LCR = 95 – 100%. No immediate works
58	Corymbia citriodora	Lemon Scented Gum	265	12	M	G	5,5,4,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
59	Corymbia citriodora	Lemon Scented Gum	315	13	YM	G	6,5,3,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
60	Corymbia citriodora	Lemon Scented Gum	360	13	YM	G	5,4,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
61	Casuarina glauca	Sheoak	235,300	9	YM	G	4,2,5,3	2a	Bifurcated at 1 met, Symmetrical, LCR = 95 – 100%. No immediate works
62	Casuarina glauca	Sheoak	230	9.5	YM	A	2,2,2,2	3d	Symmetrical, LCR = 65 - 70%. Moderately sparse canopy & not fit for long term retention. No immediate works
63	Eucalyptus nicholii	Peppermint	275	8.5	OM	A	0,4,3,1	4a	Symmetrical, LCR = 40 - 45%. Poor condition. No immediate works
64	Casuarina glauca	Sheoak	165,130, 280, 125	10	M	A	2,4,3,4	2d	Symmetrical, LCR = 60 - 65%. No immediate works
65	Casuarina glauca	Sheoak	300	11	M	A	2,4,3,3	2d	Symmetrical, LCR = 70 – 75%, Located 1 metre from the water's edge. No immediate works
66	Corymbia citriodora	Lemon Scented Gum	390	13	YM	G	5,5,6,5	2d	Large included fork union, Symmetrical, LCR = 95 – 100%. No immediate works

67	Corymbia citriodora	Lemon Scented Gum	270	13	YM	G	6,5,6,4	2a	Symmetrical, LCR = 95 – 100%. No immediate work
68	Corymbia citriodora	Lemon Scented Gum	220	12	YM	G	2,2,2,2	2a	Symmetrical, LCR = 90 - 95%. No immediate works. Extensive water crack from the base to 5 metres above ground level
69	Corymbia maculata	Spotted Gum	190	13	YM	G	4,3,4,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
70	Corymbia maculata	Spotted Gum	210	12	YM	G	5,3,3,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
71	Corymbia citriodora	Lemon Scented Gum	450	12	YM	G	8,7,8,6	2a	Bifurcated at 1.8 metres, minor included for union, Symmetrical, LCR = 95 – 100%. No immediate works
72	Corymbia citriodora	Lemon Scented Gum	180	11	YM	G	5,2,0,4	2a	Tropism to the N quadrant, Symmetrical, LCR = 95 – 100%. No immediate works
73	Corymbia citriodora	Lemon Scented Gum	190	6.5	YM	G	5,2,1,4	2a	Extensive water crack to the W quadrant. Symmetrical, LCR = 95 – 100%. No immediate works
74	Corymbia citriodora	Lemon Scented Gum	195	8.5	YM	G	1,2,2,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
75	Corymbia citriodora	Lemon Scented Gum	275	12	YM	G	3,3,3,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
76	Corymbia citriodora	Lemon Scented Gum	370	13	YM	G	7,6,6,7	2a	Symmetrical, LCR = 95 – 100%. No immediate works
77	Corymbia citriodora	Lemon Scented Gum	300	12	YM	G	6,6,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
78	Corymbia citriodora	Lemon Scented Gum	245	5	SM	P	5,3,4,3	4a	Apical dominant leader lost.
79	Corymbia citriodora	Lemon Scented Gum	230	8	SM	G	5,4,3,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
80	Corymbia citriodora	Lemon Scented Gum	170	7	SM	G	2,2,1,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works
81	Eucalyptus punctata	Grey Gum	420	9	OM	F	6,4,4,4	4a	Moderately sparse canopy, MDW in all four quadrants, Symmetrical, LCR = 60 - 65%.
82	Corymbia citriodora	Lemon Scented Gum	380	14	YM	A	7,5,5,5	2a	Major kino exudation at the included fork union at 6 metres, Symmetrical, LCR = 95 – 100%. No immediate works
83	Corymbia citriodora	Lemon Scented Gum	390	15	YM	G	7,4,6,6	2a	Large hanging branch at 7 metres above ground level (5 metres long). Symmetrical, LCR = 95 – 100%. No immediate works
84	Corymbia citriodora	Lemon Scented Gum	330	12	YM	G	7,7,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
85	Corymbia citriodora	Lemon Scented Gum	375	10	YM	G	7,8,5,5	2a	Bifurcated at 1.7 metres above ground level, Symmetrical, LCR = 95 – 100%. No immediate works

86	Corymbia citriodora	Lemon Scented Gum	170,230	7	YM	G	6,7,3,5	4a	Large included fork union at the base, not growing true to form. Symmetrical, LCR = 95 – 100%. No immediate works
87	Corymbia citriodora	Lemon Scented Gum	230	10	YM	G	4,5,4,4	2a	Bifurcated at 4.5 metres, Symmetrical, LCR = 95 – 100%. No immediate works
88	Eucalyptus robusta	Swamp Mahogany	140,385, 210	7	YM	A	3,6,6,2	3d	Minor epicormic growth, trifurcated at ground level, Symmetrical, LCR = 95 – 100%. No immediate works
89	Eucalyptus punctata	Grey Gum	380,455, 380	9	YM	A	7,5,7,6	2a	MDW in all four quadrants, Trifurcated at 1 metre, Symmetrical, LCR = 95 – 100%. No immediate works
90	Eucalyptus robusta	Swamp Mahogany	300	6	YM	G	4,3,4,3	2a	Minor epicormic growth, Symmetrical, LCR = 95 – 100%. No immediate works
91	Eucalyptus punctata	Grey Gum	570	9	YM	G	8,7,8,3	4a	Standalone tree, large crack in scaffold at 4.0 metres, not growing true to form, Symmetrical, LCR = 95 – 100%. No immediate works
92	Eucalyptus botryoides	Bangalay	660	11	M	G	9,8,7,8	2a	Minor sawfly blister & pin hole borer, Symmetrical, LCR = 95 – 100%. No immediate works
93	Eucalyptus robusta	Swamp Mahogany	300, 280	9	YM	G	3,5,4,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
94	Eucalyptus robusta	Swamp Mahogany	340	9	YM	A	5,4,2,4	3d	Bifurcated at 2.5 metres, MDW in all four quadrants, Symmetrical, LCR = 85 - 90%. No immediate works
95	Eucalyptus robusta	Swamp Mahogany	190,230	7	SM	A	5,5,1,4	2d	Minor tropism to the N quadrant, Bifurcates at 1.7 metres, Minor asymmetry, LCR = 95 – 100%. No immediate works. Not growing true to form
96	Eucalyptus robusta	Swamp Mahogany	240,160	6	SM	A	4,4,5,3	3d	Minor epicormic growth in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works
97	Eucalyptus microcorys	Tallowood	165	5	Y	G	3,3,3,1	2a	Symmetrical, LCR = 95 – 100%. No immediate works
98	Eucalyptus robusta	Swamp Mahogany	140,110, 180	7	SM	A	3,3,3,2	2a	Trifurcated at 1.6 metres, Symmetrical, LCR = 80 - 85%. No immediate works
99	Eucalyptus robusta	Swamp Mahogany	300	6.5	SM	A	5,3,1,2	3d	Twin leaders are fused, MDW in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works
100	Eucalyptus punctata	Grey Gum	320	9	SM	G	4,5,2,1	2a	MDW in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works
101	Eucalyptus punctata	Grey Gum	325	9	SM	G	4,3,3,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
102	Eucalyptus microcorys	Tallowood	355	11	YM	G	5,5,4,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works

103	Eucalyptus robusta	Swamp Mahogany	210,30	6,5	SM	A	7,1,1,5	2a	Symmetrical, LCR = 80 - 85%. Bifurcated at 1.9 metres. No immediate works
104	Eucalyptus robusta	Swamp Mahogany	525	9	M	G	5,6,5,6	2a	Bifurcated at 1.5 metres that are fused. Symmetrical, LCR = 95 – 100%. No immediate works
105	Eucalyptus robusta	Swamp Mahogany	215	6.5	SM	G	4,3,3,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
106	Eucalyptus robusta	Swamp Mahogany	320	5	SM	A	5,3,4,3	2a	Symmetrical, LCR = 85 - 90%. No immediate works
107	Eucalyptus robusta	Swamp Mahogany	220	6.5	SM	A	5,3,0,2	2a	Symmetrical, LCR = 90 - 95%. No immediate works
108	Eucalyptus robusta	Swamp Mahogany	170	5	SM	A	3,4,2,0	3d	Symmetrical, LCR = 70 - 75%. No immediate works
109	Eucalyptus robusta	Swamp Mahogany	300	9	YM	G	4,5,5,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
110	Eucalyptus microcorys	Tallowood	310	12	YM	G	6,3,5,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
111	Eucalyptus robusta	Swamp Mahogany	310,300	12	YM	G	4,5,5,3	2a	MDW in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works
112	Eucalyptus robusta	Swamp Mahogany	465	9	YM	A	7,7,5,7	2a	Minor included fork union at 1.5 metres, MDW in all four quadrants.
113	Eucalyptus microcorys	Tallowood	320, 335	14	YM	G	7,3,6,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
114	Eucalyptus microcorys	Tallowood	330	15	YM	G	6,5,6,5	2a	Extensive vine on trunk, Symmetrical, LCR = 95 – 100%. No immediate works
115	Eucalyptus microcorys	Tallowood	335	13	YM	g	4,5,6,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
116	Eucalyptus microcorys	Tallowood	445	11	YM	G	6,4,5,6	2a	Four main leaders at 1.2 metres, Symmetrical, LCR = 95 – 100%. No immediate works
117	Eucalyptus microcorys	Tallowood	210,220	10	YM	G	4,3,1,2	2a	Bifurcated at 1.1 metres, Symmetrical, LCR = 95 – 100%. No immediate works
118	Eucalyptus microcorys	Tallowood	245	11	YM	G	5,4,3,2	2a	MDW in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works
119	Eucalyptus microcorys	Tallowood	225,240	10	YM	G	4,4,2,3	2a	Bifurcated at 1.3 metres, Symmetrical, LCR = 95 – 100%. No immediate works
120	Eucalyptus microcorys	Tallowood	330	10	YM	G	7,6,6,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works

121	Eucalyptus saligna	Blue Gum	170	9	Y	G	4,3,2,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
122	Eucalyptus microcorys	Tallowood	270	11	SM	G	4,3,3,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
123	Eucalyptus microcorys	Tallowood	250	11	SM	G	3,2,3,1	2a	Symmetrical, LCR = 95 – 100%. No immediate works
124	Eucalyptus robusta	Swamp Mahogany	410,345	9	M	A	6,7,5,6	2d	Aborted branch on the main leader to S quadrants at 5 metres, Symmetrical, LCR = 95 – 100%. No immediate works
125	Eucalyptus microcorys	Tallowood	540	17	M	G	7,5,6,7	2a	Included fork union at 1.6 metres, Symmetrical, LCR = 95 – 100%. No immediate works
126	Eucalyptus microcorys	Tallowood	460	13	SM	G	6,4,6,7	2a	Symmetrical, LCR = 95 – 100%. No immediate works
127	Eucalyptus robusta	Swamp Mahogany	230,395	6.5	M	F	7,7,3,4	3d	Symmetrical, LCR = 70 - 75%. No immediate works. Moderate epicormic growth in all four quadrants.
128	Eucalyptus punctata	Grey Gum	390	6.5	M	F	4,4,3,1	4a	Symmetrical, LCR = 60 - 65%. No immediate works, Extensive vine on trunk
129	Eucalyptus botryoides	Bangalay	385	10	YM	G	6,5,3,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
130	Eucalyptus microcorys	Tallowood	440	10	YM	G	6,5,4,4	2a	Minor epicormic growth, Symmetrical, LCR = 95 – 100%. No immediate works
131	Corymbia maculata	Spotted Gum	420	11	YM	G	5,4,3,4	3d	MDW in all four quadrants, Symmetrical, LCR = 85 - 90%. No immediate works.
132	Eucalyptus microcorys	Tallowood	455	11	YM	G	6,6,6,7	4a	Symmetrical, LCR = 95 – 100%. No immediate works, Extensive vine on trunk. Extensive vine coverage
133	Eucalyptus punctata	Grey Gum	260	7	YM	P	3,3,2,2	4a	Extensive vine on trunk, Symmetrical, LCR = 0 - 5%. No immediate works
134	Eucalyptus microcorys	Tallowood	410	9	YM	G	7,7,6,6,	2a	Symmetrical, LCR = 95 – 100%. No immediate works
135	Eucalyptus microcorys	Tallowood	390	9	YM	G	4,5,5,5	3d	Extensive vine on trunk, Symmetrical, LCR = 95 – 100%. No immediate works
136	Eucalyptus microcorys	Tallowood	410	8	YM	A	3,3,3,2	4a	Symmetrical, LCR = 95 – 100%. No immediate works. Vine covered
137	Eucalyptus microcorys	Tallowood	N/a	9	-	-	0,0,0,0	4a	Dead Tree
138	Eucalyptus tereticornis	Forest Red Gum	665	11	M	A	8,7,7,7	3d	Minor sparse canopy, MDW in all four quadrants, Located on the edge of the fairway. Symmetrical, LCR = 95 – 100%. No immediate works

139	Eucalyptus microcorys	Tallowood	390	12	YM	G	4,5,5,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
140	Eucalyptus microcorys	Tallowood	325,310	14	YM	G	6,6,7,6	2a	Bifurcates at 1.0 metre, Symmetrical, LCR = 95 – 100%. No immediate works
141	Eucalyptus microcorys	Tallowood	420	12	YM	G	6,6,4,4	2a	Located on the outer edge of the golf course, Symmetrical, LCR = 95 – 100%. No immediate works
142	Eucalyptus microcorys	Tallowood	370	11	YM	G	6,3,5,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
143	Eucalyptus microcorys	Tallowood	295,270	11	YM	G	7,6,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
144	Eucalyptus microcorys	Tallowood	315	10	YM	G	6,6,5,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
145	Eucalyptus microcorys	Tallowood	440	12	YM	G	6,7,5,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works
146	Eucalyptus microcorys	Tallowood	210	8	YM	A	4,2,2,2	3d	Symmetrical, LCR = 70 - 75%. No immediate works
147	Eucalyptus microcorys	Tallowood	430	13	YM	G	5,4,3,2	3d	Symmetrical, LCR = 95 – 100%. No immediate works Extensive vine on trunk
148	Eucalyptus microcorys	Tallowood	390	11	YM	G	6,6,5,4	2a	Included fork union and seam within trunk. Extensive vine on trunk
149	Eucalyptus microcorys	Tallowood	310	10	YM	G	4,5,6,3	2a	Extensive vine on trunk, Symmetrical, LCR = 95 – 100%. No immediate works
150	Eucalyptus microcorys	Tallowood	390	11	YM	G	4,5,3,2	2a	Extensive vine on trunk Symmetrical, LCR = 95 – 100%. No immediate works
151	Eucalyptus microcorys	Tallowood	395	9	YM	G	6,7,2,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works
152	Eucalyptus microcorys	Tallowood	280	10	YM	G	4,4,1,2	3d	Moderate included fork union, Symmetrical, LCR = 95 – 100%. No immediate works
153	Eucalyptus microcorys	Tallowood	225,230	11	YM	G	4,4,2,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works, bifurcated at 1.2 metres.
154	Eucalyptus microcorys	Tallowood	305,100	11	YM	G	5,5,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
155	Eucalyptus microcorys	Tallowood	455	11	YM	G	6,5,5,5	2a	MDW in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works

156	Eucalyptus microcorys	Tallowood	320	13	YM	G	4,4,4,6	2a	Symmetrical, LCR = 95 – 100%. No immediate works, Extensive vine on trunk
157	Eucalyptus microcorys	Tallowood	460	13	M	G	6,7,6,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works
158	Eucalyptus microcorys	Tallowood	310	12	OM	P	0,0,0,0	4a	Dead Tree
159	Eucalyptus microcorys	Tallowood	270	8	YM	A	1,4,5,4	3d	Extensive vine on trunk Symmetrical, LCR = 95 – 100%. No immediate works
160	Eucalyptus microcorys	Tallowood	435	12	M	G	7,6,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works
161	Eucalyptus microcorys	Tallowood	375	12	M	G	3,5,4,5	2a	MDW in all four quadrants, Symmetrical, LCR = 95 – 100%. No immediate works.
162	Eucalyptus microcorys	Tallowood	320	13	YM	G	4,5,2,3	2a	MDW in all four quadrants, Symmetrical, LCR = 80 - 85%. No immediate works. Can be retained & incorporated into the development
163	Eucalyptus microcorys	Tallowood	345	12	YM	G	6,4,3,2	2a	MDW in all four quadrants, Symmetrical, LCR = 80 - 85%. No immediate works. Tree is outside of works
164	Eucalyptus microcorys	Tallowood	370	9	YM	G	4,5,4,2	2a	Symmetrical, LCR = 95 – 100%. No immediate works Tree is outside of works
165	Eucalyptus microcorys	Tallowood	380	12	YM	G	4,5,5,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works
166	Eucalyptus microcorys	Tallowood	345	8	YM	G	5,6,7,5	2a	10% vine coverage, Symmetrical, LCR = 95 – 100%. No immediate works Tree is outside of works
167	Eucalyptus microcorys	Tallowood	320	11	YM	G	4,5,3,1	2a	Symmetrical, LCR = 95 – 100%. No immediate works, moderate bow & sweep.
168	Eucalyptus microcorys	Tallowood	420	13	YM	G	6,4,5,6	2a	MDW in all four quadrants Symmetrical, LCR = 95 – 100%. No immediate works
169	Eucalyptus microcorys	Tallowood	380	13	YM	G	3,5,4,4	2a	MDW in all four quadrants Symmetrical, LCR = 95 – 100%. No immediate works
170	Eucalyptus microcorys	Tallowood	430	13	YM	G	6,5,5,4	2a	MDW in all four quadrants Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works
171	Eucalyptus microcorys	Tallowood	440	8	YM	G	5,7,2,4	2a	Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works

172	Eucalyptus microcorys	Tallowood	410	9	YM	P	5,4,5,4	4a	Dead Tree, 0 – 5% LCR. Tree is outside of works
173	Eucalyptus microcorys	Tallowood	310	9	M	G	4,4,4,5	2a	MDW in all four quadrants Symmetrical, LCR = 95 – 100%. No immediate works. Tree located in dense vegetation.
174	Eucalyptus microcorys	Tallowood	490	11	M	G	5,6,5,5	2a	Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works
175	Eucalyptus microcorys	Tallowood	340	8	YM	G	1,5,4,3	2a	Symmetrical, LCR = 95 – 100%. No immediate works, minor sparse canopy. Tree is outside of works
176	Eucalyptus microcorys	Tallowood	545	11	M	G	4,3,5,4	2a	MDW in all four quadrants, Fused leaders, Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works
177	Eucalyptus microcorys	Tallowood	380	6.5	YM	G	4,2,6,4	2a	Right on road edge, Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works
178	Eucalyptus microcorys	Tallowood	190.180, 160	10	YM	G	5,6,6,6	2a	MDW in all four quadrants, trifurcated at ground level, 5- 10% vine coverage, Symmetrical, LCR = 95 – 100%. No immediate works. Tree is outside of works

Key:

Age class: Young = Y, Semi mature = SM, Mature = M, Over mature = OM
DBH = Diameter at Breast Height LCR = Live Crown Ratio
Vigour = Excellent = E, Good = G, Fair = f, Poor = P
LDW = large deadwood over 40mm, MDW = Minor deadwood less than 40mm
N= north, E = east, W = west, S = south MS = multiple Stems
ULE = Useful Life Expectancy (See appendix 2 for guidelines)

4.1 Trees & Impact on Development

Trees are living organisms and their root systems play an integral role in stability and providing nutrient storage as well as water uptake. The majority of tree roots for Dicotyledons occur within the first metre of the soil. Therefore construction works can have a profound effect on their health and longevity as well as their structural stability. Tree distances from excavation works must be taken into consideration at the planning stage to ensure that the tree is not damaged.

There are several main factors that occur at the construction phase that can have a negative impact on the trees health and stability. These practices can include but are not limited to –

- Parking of vehicles and heavy machinery within the drip line of the tree.
- Stockpiling of materials within the drip line of the tree.
- Excavating within the drip line and damaging the structural root system.
- Raising soil levels in and around the base of the tree therefore reducing the trees ability for gaseous exchange.
- Damage to the tree due to heavy machinery and equipment resulting in large bark tears or loss of branches and scaffolds.

To reduce the effects of construction it is imperative to provide an area underneath the tree where no works are undertaken. The area where supervised works are undertaken is referred to as the structural root zone (SRZ). The S.R.Z is an area where no to minimal activities listed above should occur. All trees require a S.R.Z and will vary from species to species but for the purposes of this report the Australian Standards 4970 has now been adopted.

In conclusion the Australian Standards like similar methods for protecting trees is only a guide. To ensure the health and longevity of trees within construction sites it is imperative to provide a large protection zone taking into consideration that the tree will also grow over time. The greater area that can be put aside where no works occur will aid in the preservation of the tree. The activities listed above should be kept to a minimum and encroachment within the SRZ will require the supervision by a qualified AQF 5 arborist. These impacts will be taken into consideration in the discussion & recommendations section of this report.

5.0 Discussion & Compliance to Australian Standards 4970 – 2009, 4373 – 2007 & Rural Fire Service (RFS) 10:50 Code

Abacus Tree Services has been approached by Aveo Pty Ltd to undertake an arborist (assessment) report on Trees 1 – 178 in relation to construction and re-position of fairways 4 & 9. There are one hundred and seventy eight (178) trees that have been assessed within the subject property identified as Shortland Waters Golf Course (Vale Street, Shortland). There are one hundred and seventy eight (178) trees that have been assessed within the subject property identified as Vale Street, Shortland (Shortland Waters Golf Club). All trees have been tagged on site for ease of identification.

Abacus Tree Services has relied upon the sketch drawings of the proposed fairways/greens by (Turnpoint - Revision B) to formulate distances and setbacks in accordance with Australian Standards 4970 – 2009. I have relied upon this information to be true and accurate. Any changes to the sketching and drawings will require the calculations to be reassessed in accordance with Australian Standards 4970 – 2009.

Figure 5 – showing the location of the new fairway that will be raised by up to 1.5 metres and will therefore require the removal of several trees on site.

Figure 6 – the new fairway extends along the current grassed area as shown. Excavation works including batter of the site will require the removal of several trees on site. Trees 1 & 2 as shown will require removal as they will be located in the proposed fairway.

The proposed fairway indicated as Hole 9 will require the removal of several trees on site. This includes a cluster of trees to construct the green. The proposed putting green as seen by the existing greens on site will be raised by up to 1 metre from existing soil levels. The construction of the fairway will require the removal of Trees 1 – 5. In order for the development to proceed in its current format will require the removal of Trees 1 – 5.

A small cluster of trees that extend along the existing fairway as shown in Figures 2 & 3 will require removal in order to construct the new fairway and allow for the fairway to be constructed along the proposed route. This includes Trees 6 – 10 will require removal due to their location next to the fairway.

Trees 11 & 12 are located in the fairway as indicated in Appendix 1. In order to construct the fairway will require the removal of Trees 11 & 12. In order for the development to proceed in its current format will require the removal of Trees 11 & 12.

Trees 13 – 15 are native species that have been planted on site. Trees 13 – 15 will be located in the middle of the proposed fairway and therefore in order for the development to proceed in its current format will require the removal of Trees 13 – 15.

Trees 16 – 86 commences the beginning of all trees next to the artificial water course as indicated in Appendix 1. Trees 16 – 87 will be required for removal to construct the proposed fairway. This includes for excavation and construction of the proposed green. There are several trees in this section that have been given a ULE rating of 4a. This includes Trees 33, 63, 78, 81 & 86 (5 in total). These trees were structurally unsound and/or in poor health and condition.

Figure 7 – showing the location of the second area inspected by Abacus Tree Services that included Trees 16 – 86. This area had five (5) trees that were in poor health and condition. Majority of the trees in this area are semi mature with Trees 33, 63, 78, 81 & 86 in poor condition and have been given an ULE rating of 4a.

Figure 8 – showing the location of Tree 33 that has lost its main leader at 4 metres above ground level. The apical leader has snapped out and there is only 1 quadrant that has live canopy to the northern quadrant. This species has been given an ULE rating of 4a.

There are several trees with noted water cracks as indicated in Figure 6. These type of cracks are not structural cracks but are noted as water cracks when the xylem swells leading to the outer bark cracking as noted in red in Figure 6. These cracks will heal over time and are not major structural faults and therefore Tree 68 is not given an ULE rating of 4a. This species and majority of the Trees 16 – 87 are semi mature to young mature trees and therefore have moderate canopy sizes.

Figure 9 – showing the location of the water crack associated with Tree 68. The water crack is evident at the base and extends for 5 metres up the trunk on the south eastern side of the tree to five metres above ground level.

Tree 78 is in poor health and condition with its apical dominant leader failing in a wind storm event as indicated in Figure 7. The leader has snapped out at 5 metres above ground level and is not growing true to form. This has reduced the ULE of Tree 78 to a 4a. This species is not growing true to form as shown in Figure 7.

Figure 10 – showing the location of Tree 78 that is in poor health and condition. Tree 78 has lost its apical dominant leader and is not suitable for retention. This species has been given a short ULE of 4a. This species will be located inside the proposed fairway and therefore will require removal.

Tree 86 is a young mature tree with an extensive included fork union as shown in Figure 8. This species has an included fork union that extends a minimum 8 – 9 cm from the base. This structural fault will only increase as the tree continues to grow. This species is a young mature tree with potential for extensive future growth. I envisage that the included fork union will grow to a minimum of 12 – 13cm and reduce the life span of Tree 86. The included fork union is on both sides of the tree as indicated in Figure 11.

Figure 11 – showing the location of Tree 86 that has an included fork union at the base as shown in red. This has reduced the life span of Tree 86 and it has been given an ULE rating of 4a.

Trees 87 – 92 are located in between the trees situated alongside the waster course (Trees 16 – 87) & the cluster of trees alongside the existing fairway (Trees 88 – 178). Trees 87 – 92 are situated in between these two zones and the understorey associated with these trees is grassed and is managed.

Figure 12 – showing the location of Trees 87 – 90 that will require removal to construct the new fairway.

Tree 91 is a young mature tree that has a large structural fault in one of the three main leaders as indicated in Figure 13. Tree 91 has a partial failed leader at 2 metres above ground level to the eastern quadrant. There is an estimated 30 – 35% of the canopy above the cracked area. This species is compromised due to the failed leader and therefore has been earmarked for removal before the commencement of building works. Tree 91 has been given a short life span due to the structural fault.

Figure 13 - showing the structural fault located in the leader to the eastern quadrant at 2 metres above ground level.

The remainder of the trees are dominated by semi mature and young mature Eucalyptus microcorys with a few minor species in the wooded area. The removal of these trees is required to construct the new fairway (No 4). These trees are located and planted close together on a small mound as shown in Figure 14. These trees have all been previously planted over the past 15 – 20 years. There are several of these trees that are being overrun by ivy that will eventually consume the trees & stop them from photosynthesising.

Figure 14 – the remainder of trees are situated along the existing fairway. This cluster of trees will require removal to construct the new fairways that will include excavation works and raised areas. The wooded area as shown in red accommodates Trees 93 – 178. All trees in this area have been previously planted by Shortland Waters Golf Course.

There are several species that are completely vine covered and/or majority of the tree is covered in vines. This has reduced the trees ability to photosynthesis and the trees have lost vigour and reduced the life span. This includes but not limited to Trees 136 & 137 as shown in Figure 12. These trees as well as several others are now given a short life span due to the uptake of vine along the trunk and over the scaffolds.

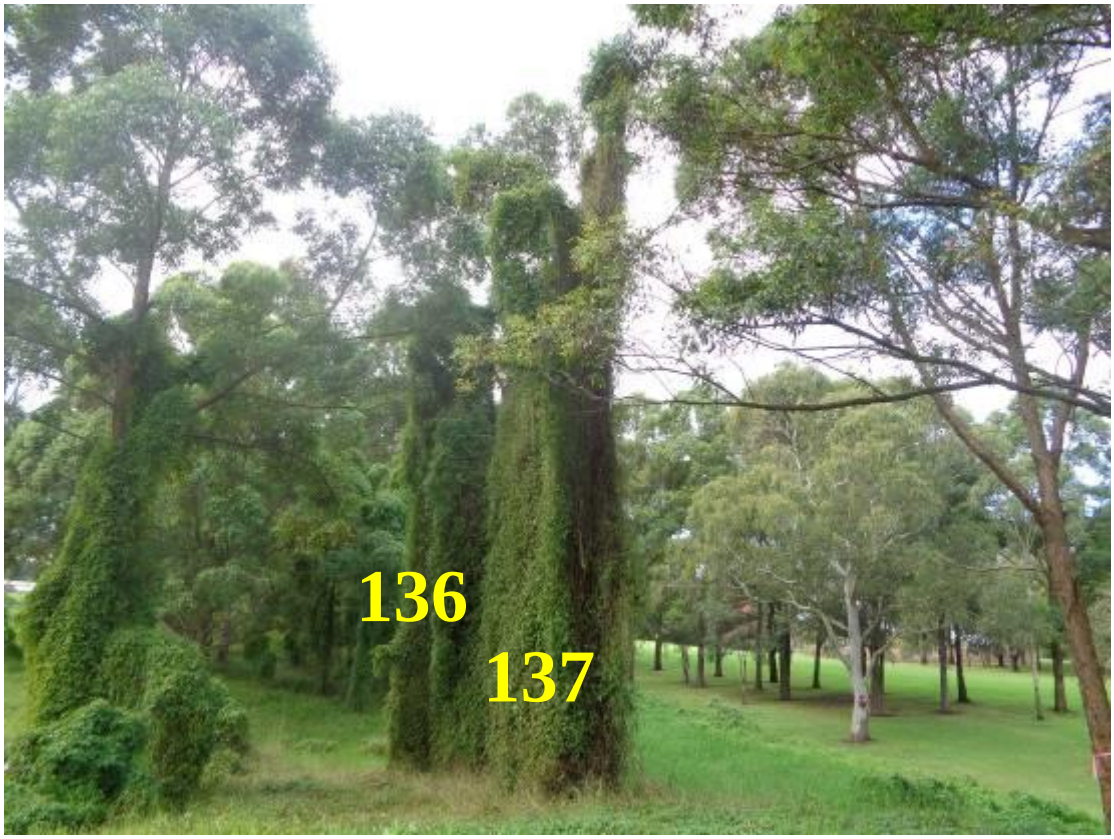


Figure 15 - showing the location of Trees 136 & 127 that are extensively covered in ivy. The trees have lost their ability to photosynthesis and are in poor condition. Trees 136 is 70 – 75% covered in ivy and Tree 137 is completely covered in ivy as indicated in yellow.

Trees 158 & 172 are dead trees and therefore have been given an ULE rating of 4a. Both these trees have no live crown ratio and no living tissue and therefore are earmarked for immediate removal.

Figure 16 – showing the location of Tree 172 that is dead and therefore requires immediate removal.

5.2 Tree Retention Values

Tree retention and values are part of the process when evaluating trees within NCC. The significance and the assessment criteria are to be assessed within the 7 step criteria set out within Urban Forestry Technical Manual. Section 6.4.2 of the UFTM also highlights the guide to compensatory planting on development sites. This section also looks at the total area of crown projection to be removed and the formula used to determine the canopy area. Trees of moderate to high retention value if earmarked for removal on private land will require compensatory replanting in accordance with Section 6.1 & 6.4.2 of the UFTM.

Trees with a canopy area of less than 40m2 and/or were in average to poor health and condition and placed into an ULE of 3a, 3d or 4a giving them a low to very low retention value. All other trees greater than this that were in good health and condition were given a moderate retention value. There is in total fifty one (51) trees with a low retention value. There is approximately thirteen (13) trees with a very low retention value. The remainder of the trees (114) have been given a moderate retention value. Trees 1 – 15 are mature trees and have larger canopy sizes overall. These trees require substantial replacements however the other two areas on site have semi mature to young mature trees with smaller canopies and therefore a smaller amount of tree replacements. All trees have been assessed in accordance with the UFTM that will highlight those with low to high retention value. Trees with a moderate retention value that are being retained have been excluded from the assessment against Section 6.4.2 of the UFTM.

Trees with very low to low retention values have not been considered for replacement as this reflects the comments as outlined in Section 6.4.2 of the UFTM. Section 6.4.2 of the UFTM highlights that where it is not feasible to retain a tree of moderate or high value on private land, compensatory planting will be required. A guide to compensatory planting range for trees of moderate or high value is provided in accordance with Table 2 of the UFTM.

Tree Retention Value – As per 7 step criteria (Urban Forestry Policy)

Tree	ULE	Landscape Significance	Retention Value
33, 63, 78, 81, 86, 91, 128, 132, 133, 136, 137, 158, 172	4a	6	VL

Tree	ULE	Landscape Significance	Retention Value
11 – 19, 24, 31, 32, 35 – 41, 43 44, 48, 52, 62, 64, 65, 68, 72 – 74, 80, 88, 94, 96 – 99, 107, 108, 117, 123, 127, 131, 135, 138, 146, 147, 148, 152, 159 175	3d, 2a, 2d	5	L
1 – 10, 20 – 23, 25 – 30, 34, 42, 45 - 47, 49, 50, 51, 53 – 61, 66, 67, 69 – 71, 75 – 77, 79, 83 – 85, 87, 89, 92, 93, 100 – 106, 109 – 116, 118 – 122, 124 – 126, 129, 130, 134, 139 – 145, 149 – 151, 153 - 157, 160 – 171, 173, 174 & 176 - 178	2a, 2d	4	M

6.0 Conclusions

- Abacus Tree Services has been approached by Aveo Pty Ltd to undertake an arborist (assessment) report on Trees 1 – 178 in relation to construction and re-position of fairways 4 & 9. There are one hundred and seventy eight (178) trees that have been assessed within the subject property identified as Shortland Waters Golf Course (Vale Street, Shortland). There are one hundred and seventy eight (178) trees that have been assessed within the subject property identified as Vale Street, Shortland (Shortland Waters Golf Club). All trees have been tagged on site for ease of identification.

- Trees assessed for the requirements of proposed fairways 4 & 9 are located wholly within Vale Street, Shortland (Shortland Waters Golf Club). The site is located in the municipality of Newcastle City Council. The species on site have been assessed against the requirements set out in Newcastle City Council's Tree Preservation Order. The species on site have been assessed against the requirements set out in Newcastle City Council's Local Environmental Plan (2012) pursuant to Section 5.9 & 5.9AA & Development Control Plan (2012) & associated Technical Manual (Urban Forestry Technical Manual – UFTM). All information is assessed per the requirements as set out within section 5.03 Tree Management. I have assessed the property against Schedule 5 (Environmental Heritage) within NCC LEP. The property is not listed in accordance with Part 1 (Heritage Items).

- The subject site identified as Shortland Waters Golf Course is in the process of constructing two new fairways that have been earmarked as holes 4 & 9. Due to the construction of these fairways requires tree removal to take place. This will require the removal of 165 trees on site to construct the two fairways including changes in elevation to existing soil levels and sand bunkers. There are thirteen (13) trees that are in poor health and condition and/or structural faults that have short ULE's of 4a. There are an additional forty eight (48) trees that have a low retention value that are in average health and condition and/or have small canopies that could be replaced in the short term. The canopies assessed are less than 40m2 and therefore have a landscape significance rating of 5. The remainder have moderate retention values and will require replacement into a landscape plan. There are a total of two hundred and fifty four (254) trees that will require replacement into a landscape plan as per section 6.4.2 of the UFTM.

- It is also noted that all trees on site that are affected by proposed holes 4 & 9 have been previously planted by the Golf Course. Species on site are similar to those you would find on golf course constructions and could be re planted with similar species on site.

- There are an additional thirteen (13) trees that are able to be retained as the proposed green has been moved to retain trees on site near the existing SEPP 14 wetland. This includes the retention of Trees 162 – 166 & 170 – 172 & 174 – 178. Out of these trees there is two (2) trees that has a very low & low retention value (Trees 172 & 175). The remaining trees out of this cluster have been given a moderate retention value (11 in total). These trees can be retained and incorporated into the development on the proviso that no soil changes or excavation works occur in the SRZ & minimal excavation works occur in the TPZ.

- In accordance with the information as stipulated in NCC UFTM (Section 6.4.2) I have calculated the amount of trees that will require removal. I have calculated this on the amount of trees that require removal with a moderate to high retention value that is in accordance with NCC UFTM (Section 6.4.2). There is in total two hundred & and thirty four (234) trees that would require replanting to compensate for the loss of tree removal on site. This quantity of tree replanting would be impractical & onerous for the subject site. The nature of the subject site being a treed golf course focuses on trees inter mixed with green fairways. The subject site (Fairways 4 & 9) would not lend itself to the replanting of 234 trees. Replanting with a combination of trees, shrubs and grasses as highlighted in the landscape plan by a landscape architect is the preferred option of the arborist. Abacus Tree Services endorses a landscape plan with full layer plantings from grasses, shrubs and trees to make up for the loss of moderate retention value trees on site.

- The subject property identified as Vale Street, Wallsend (Shortland Waters Golf Club) is located in a Rural Fire Service (RFS) 10:50 area. The RFS mapping tool indicates although the subject site is mapped as fire prone and coming under the requirements of the RFS 10:50 legislation is also subject to the requirements of SEPP 14 (Coastal Wetlands). The applicant cannot use the 10:50 exemption to clear vegetation on this parcel of land without council consent. The search was undertaken on the 7 June 2017. Rules and regulations in relation to the RFS 10:50 can change and it is therefore up to the applicant to ensure they comply with the 10:50 code and any updates that may occur.

- Protection fencing for trees within three (3) metres of construction/civil works that are being retained for holes 4 & 9 is to be considered in accordance with Australian Standards 4970 – 2009.

7.0 Recommendations

- It is recommended that Aveo Pty Ltd embark on a management program for one hundred and seventy eight (178) trees (Trees 1 – 178) before commencement of the construction works as follows:

- It is recommended that Trees 1 – 161, 167 – 169, 172 & 173 (166 in total) be removed immediately (before commencement of building works) by a qualified arborist (minimum certificate 2 in arboriculture). It is recommended that professional indemnity and public liability insurances be current and sighted before commencement of works begin. The level of cover has to be one in agreement between Aveo Pty Ltd and the arborist.

- It is recommended that Trees 162 – 166, 170, 171 & 174 – 178 (12 in total) be retained and incorporated into the development. No excavation, buildings, site sheds or any works above or below ground is to occur within the SRZ of retained trees. Any excavation works that may need to be undertaken within the TPZ of retained trees is to be undertaken with the supervision of an AQF 5 arborist.

- It is recommended that the soil changes be kept to a minimum within the TPZ of retained trees within three (3) metres of the civil/construction works and be raised by no more than 200mm. No soil changes are to occur within the SRZ of retained trees.

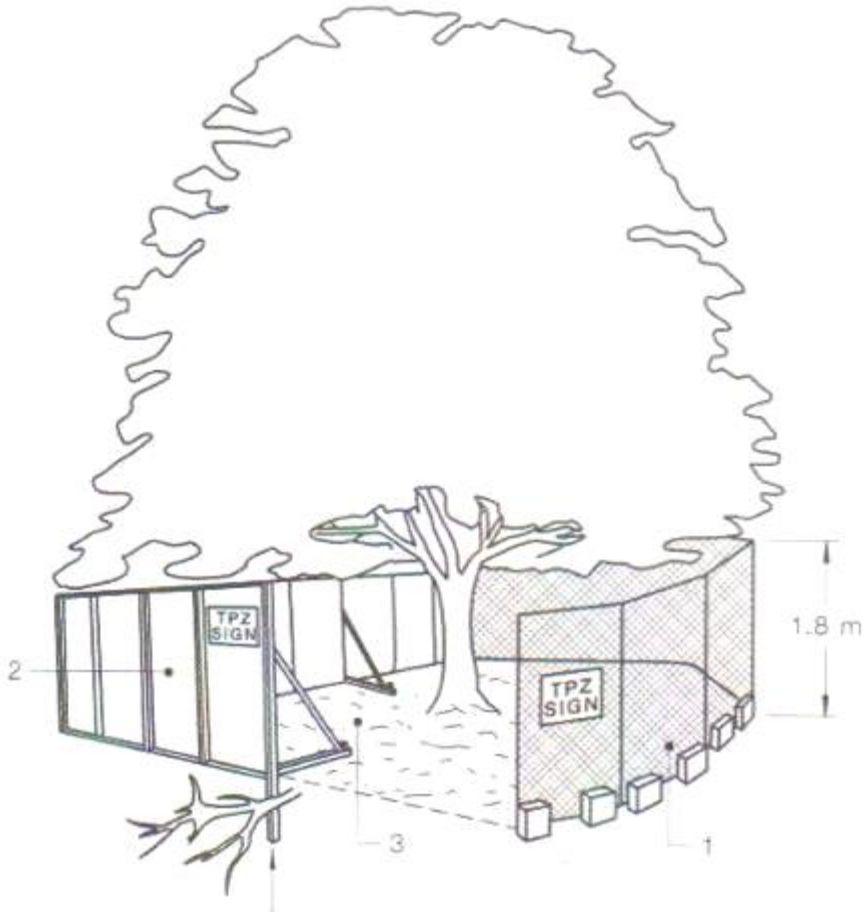
- It is recommended that protection measures be put in place that aid in the preservation of trees that are not part of the development however are within three (3) metres to the proposed civil/construction works. It is recommended that 1.8 metre inter locking chain wire fencing be installed before commencement of building works on site as indicated in figure 17. Protection fencing is to be installed to all sides a minimum of three (3) metres from the trunk. Any pruning works to trees within close proximity to the construction/civil works is to be undertaken in accordance with Australian Standards 4373 – 2007.

- It is recommended that all civil contractors that enter the site are made aware of the importance of preserving the remaining trees on site and understand the tree protection measures that are put in place to preserve trees within three (3) metres of the proposed civil/construction works

- All stockpile sites to be maintained a minimum 5 metres away from the trunk of all retained trees and all trees that come under the requirements of Newcastle City Councils' Tree Preservation order.

- It is recommended that all parking of vehicles & machinery be kept a minimum five (5) metres from retained trees during construction works.

- This report is not for publication to the internet and submission of this report in the submission phase set out by Council is to be taken down upon completion of the development application.



- Figure 17 – showing the proposed fencing that is to be put in place before the commencement of building works on site for trees within three metres of construction/civil works.
  Source: Australian Standards 4970 - 2009

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Bachelor of Horticulture Science

8.0 References

AS4373-2007 Pruning of Amenity Trees. Standards Australia

AS 4970 – 2009 Protection of trees on development sites

Clark R.J & Matheny N (1998) Trees & Development – A technical guide to Preservation of trees during land development: International Society of Arboriculture

Mattheck C., Breloer, (1999) The Body Language of Trees – a handbook for failure analysis 5th ed., London: The Stationery Office, U.K

Internet Sites

www.googlemaps.com.au

www.rfs.nsw.gov.au

www.ncc.nsw.gov.au

www.olg.nsw.gov.au

9.0 APPENDIX 1 Site Maps

Figure 18 - Close up of the subject site identified in red and location of Trees 1 - 178.
Not to scale
Source: (Turnpoint – Revision B)

APPENDIX 2 U.L.E (Useful Life Expectancy) Categories and Subgroups

Useful Life Expectancy – Classification

1. Long ULE > 40 Years

a. Structurally sound and can accommodate future growth
b. Long term potential with minor remedial treatment
c. Trees of special significance which warrant extra care

2. Medium ULE of 15-40years

a. Will live between 15 – 40 years
b. Will live for more than 40 years but would be removed for safety or other reasons
c. May live for more than 40 years but will interfere with more suitable specimens and need removal eventually
d. More suitable for retention in the medium term with some remedial care

3. Short ULE of 5-15 years

a. Trees that may only live between 5 – 15 more years
b. May live for more than 15 years but would need removal for safety or other reasons
c. Will live for more than 15 years but will interfere with more suitable specimens or provide space for replacement plantings
d. Require substantial remedial care but are only suitable for short term retention

4. Remove tree within 5 years

a. Dead, dying or seriously diseased
b. Dangerous trees through instability or loss of adjacent trees
c. Structural defects such as cavities
d. Damaged that are clearly not safe to retain
e. May live for more than 5 years but will need replacement to prevent interference or make space for more suitable trees
f. May or are causing damage to structures
g. That will become dangerous

5 Trees suitable to transplant

a. Small trees can be reliably moved or replaced
b. Young trees between 5 – 15 years
c. Trees that have been regularly pruned to control growth

APPENDIX 3 Notes on Tree Assessment

Key	Criteria	Comments
Tree no		
Species	Relates to the one hundred and seventy eight on the site plan	
Remnant /planted Self Sown	May be coded – See Key for details	
Special Significance	A – Aboriginal C- Commemorative Ha- Habitat Hi- Historic M- Memorial R- Rare U- Unique form O- Other	May require specialist knowledge
Age Class	Y- Young- Recently Planted S-Semi mature (<20% of life expectancy M- Mature (20-80% of life expectancy) O- Over mature (>80% of life expectancy)	
Height	In Metres	
Spread	Average diameter of canopy in metres	
Crown Condition	Overall vigour and vitality 0 – Dead 1 – Severe decline (<20% canopy, major deadwood 2 – Declining 20-60% canopy density, twig dieback 3- Average/low vigour (60-90% canopy density, twig dieback) 4- Good (90-100% crown cover, little or no dieback or other problems) 5- Excellent (100% crown cover, no deadwood or other problems	
Failure Potential	Identifies the most likely failure and rates the likelihood that the structural defects will result in failure within the inspection period. 1- Low – Defects are minor (eg dieback of twigs, small wounds with good wound development) 2 – Medium – Defects are present and obvious egg Cavity encompassing 10-25% of the circumference of the trunk) 3 High- Numerous and/or significant defects present (eg cavity encompassing 30-50% of the circumference of the trunk, major bark inclusions)	Requires specialist knowledge

	4- Severe- Defects are very severe (eg fruiting bodies, cavity encompassing more than 50% of the trunk)	
Size of defective part	Rates the size of the part most likely to fail. The larger the part that fails the greater the potential for damage. 1- Most likely failure less than 150mm in diameter 2- Most likely failure 150-450mm in diameter 3- Most likely failure 450-750mm in diameter 4- Most likely failure more than 750mm in diameter	
Target rating	Rates the use and occupancy that would be struck by the defective part: 1. Occasional use (jogging, cycle track 2. Intermittent use (e.g picnic area, day use parking 3. Frequent use, secondary structure (eg seasonal camping, storage facilities) 4. Constant use structures (year round use for a one hundred and seventy eight of hours each day, residences)	
Hazard rating	Failure potential + size of part + target rating Add each of the above sections for a one hundred and seventy eight out of 12	The final one hundred and seventy eight identifies the degree of risk. The next step is to determine a management strategy. A rating in this column does not condemn a tree but may indicate the need for more investigation and a risk management strategy.
Root Zone	C-Compaction D- Damaged/wounded roots E- Exposed roots Ga- Tree in graded bed Gi- Girdled roots Gr- Grass K-Kerb close to tree	

	L+- Raised soil level L- Lowered soil level M- Mulched Pa- Paving concrete bitumen Pr- Roots pruned O-Other	
Defects	B-Borers C-Cavity D-Decay Dw-Deadwood E-Epicormics I-Inclusions L- Lopped LDCMP- Leaf damage by chewing mouthpiece insects M- Mistletoe/parasites MBA- Multi branch attachments PD- Parrot damage PFS- Previous failure sites S-Splits/Cracks T-Termites TL- Trunk lean TW- Trunk wound O-Other	
Services/adjacent structures	Bs- Bus stop Bu- Building within 3 metres Hvo- High voltage open wire construction Hvb- High voltage bundled (ABC) Lvo- Low voltage open wire construction Lvb- Low voltage bundled (ABC) Na- No services above Nb- No services below ground Si- Signage SL- Street light T- Transmission U- Underground services O- Other	More than one of these may apply