



REPORT:

**Arborist Impact and Tree Risk
Assessment Report**

REPORT COMMISSIONED FOR:

**NSW Department of Education
and School Infrastructure**

Lindfield Learning Village

100 Eton Road,
Lindfield NSW 2070

Phone: 9415 8006

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OVERVIEW

This Arborist Impact and Tree Risk Assessment report has been prepared by McArdle Arboricultural Consultancy Pty Ltd on behalf of the NSW Department of Education and School Infrastructure, NSW (the Applicant). It accompanies a Response to Submissions report in support of State Significant Development Application (SSD 16_8114) for Lindfield Learning Village (the site).

On the 24th of October, 2018, the Minister for Planning granted partial development consent to SSD 8114 for Phase 1 construction and operation of a new school for 350 students. The remainder of SSD 8114 (as originally proposed) has not yet been granted consent and has been subject to further investigation, assessment and engagement with the relevant agencies (DPE, RFS, OEH, RMS, TfNSW) and Council.

The Response to Submissions and supporting documents seek approval for the remainder of SSD 8114, being:

Phase 2(a) of construction:

- Minor internal works within the approved Phase 1 area to accommodate an additional 35 students.
- The additional 35 students (a total of 385 enrolled students) is needed for Day 1 Term 1 2020, prior to Phase 2(b) being completed.

Phase 2(B) of construction:

- Works to accommodate 1,050 students (including the approved 350).
- Repurposing of the Phase 1 area.
- A loop road around the southern portion of the site for emergency vehicles, buses and drop off and pick up vehicles.

Phase 3 of construction:

- Works to accommodate an additional 950 students in the western wing of the building.

The aim of this Arborist Impact and Tree Risk Assessment report is to consider trees fit for purpose.

RESPONSE TO SUBMISSIONS

This Arborist Impact and Tree Risk Assessment report has considered the issues raised by agencies during exhibition of SSD 8114 and subsequent Response to Submissions for Phase 1.

1.0 ABSTRACT

1.1 An Arborist Impact Assessment and Tree Risk Assessment report was commissioned by NSW Department of Education and School Infrastructure NSW, in relation to the proposed landscaping and development on site at 100 Eton Road, Lindfield NSW 2070. A Visual Tree Assessment (VTA) was conducted on the 8th of August, 2019 for one hundred and thirteen (113) trees/tree groups on site. Thirty-two (32) trees of this group are proposed to be removed, including ten (10) impacted trees and twenty-two (22) in poor health.

1.2 The retention value of one hundred and thirteen (113) trees/tree groups on site were assessed as follows:

- three (3) trees are of HIGH retention value.
- eight (8) trees are of MODERATE to HIGH retention value.
- thirty-seven (37) trees are of MODERATE retention value.
- twenty-nine (29) trees are of LOW to MODERATE retention value.
- thirty-six (36) trees/tree groups are of LOW retention value.

1.3 From the assessment the following intervention works are required for one hundred and thirteen (113) trees in this proposal:

IMPLICATIONS	Tree Numbers
Remove – Poor Health (Condition)	81, 86, 97, 103, 104, 106, 108, 114, 123, 124, 133, 194, 513, 518, 520, 521, 525, 532, 538, 540, 574 & 585
Remove – Impacted from loop-road	66, 68, 71, 72, 75, 128, 139, 159, 162.
Remove Impacted from landscaping	119.
Retain & Protect	63, 69, 70, 73, 78, 82, 83, 87, 88, 89, 90, 91, 92, 92a, 93, 96, 99, 100, 102, 105, 107, 109, 110, 111, 112, 113, 115, 116, 117, 118, 120, 121, 122, 126, 127, 130, 131, 132, 134, 135, 136, 137, 138, 140, 160, 161, 192, 195, 196, 512, 514, 515, 516, 519, 522, 523, 524, 526, 526a, 527, 530, 531, 536, 537, 539, 541, 542, 543, 544, 544a, 545, 570, 571, 572, 573, 575, 581, 583, 584, 578 & 579.
Sensitive Construction <i>AQF Level 5 Supervision TPZ</i>	63, 78, 82, 92, 93, 91, 96, 99, 100, 105, 111, 112, 115, 118, 120, 122, 130, 131, 135, 136, 137, 160, 514, 519, 524, 539, 541, 542, 581, 583.
Tree Trunk Protection - Retained	63, 69, 70, 73, 78, 82, 83, 87, 88, 90, 91, 92, 93, 96, 99, 105, 110, 111, 112, 115, 118, 120, 122, 130, 131, 135, 137, 138, 160, 514, 519, 524, 536, 539, 541, 542, 581, 583, 584.
Ground Protection - Retained	63, 70, 91, 93, 96, 105, 110, 111, 112, 115, 118, 120, 122, 130, 131, 135, 160, 192, 515, 519, 536, 539, 541, 542, 583, 584, 578 & 579.
Prune by AQF 3 arborist-Retained	70, 93, 96, 105, 110, 111, 118, 121, 122, 126, 130, 131, 132, 138, 160, 196, 512, 519, 524, 526, 530, 531, 541, 543, 570, 571, 575, 581, 584.

1.4 Tree Protection Systems are required and must be installed, prior to commencement of the development for all retained trees and certified compliant by an AQF level 5 arborist. Replenishment is required for ten (10) trees being removed due to impacts. The replenishment is to be of three (3) 30 litre *Eucalyptus resinifera* Red Mahogany, three (3) 30 litre *Eucalyptus saligna* Sydney Blue Gum, two (2) 30 litre *Casuarina glauca* She Oak and two (2) 30 litre *Elaeocarpus reticulatus* Blueberry Ash.

2.0 INTRODUCTION

2.1 An Arborist Impact and Tree Risk Assessment report was commissioned by NSW Department of Education and School Infrastructure NSW, in relation to the proposed landscaping and development on site at 100 Eton Road, Lindfield NSW 2070. One hundred and thirteen (113) trees/tree groups on site were assessed by Ms. Caryssa Jones B.BioCons MQ, Dip Arb AQF L5 (*pending*), Tree Risk Assessor; and Ms. Michelle Chapman, M.Cons.Biol MQ, B.Sc USYD – under the supervision of Mr. Jim McArdle B.Ed. Sc ACU, Dip Arb AQF L5 Ryde, QTRA, TRA Assessor and TCAA President – who attended the site on the 8th of August, 2019.

2.2 The retention value of one hundred and thirteen (113) trees/tree groups on site were assessed as follows:

- Three (3) trees – a *Eucalyptus botryoides* (Bangalay), *Angophora costata* (Smooth-Barked Apple), and *Eucalyptus racemosa* (Scribbly Gum) – are native to the Sydney region and are of considerable size. These trees have HIGH retention value and are numbered 70, 138, & 583.
- Eight (8) trees are native to the Sydney region and are of MODERATE to HIGH retention value. These trees are numbered 71, 73, 93, 96, 136, 159, 160, 581.
- Thirty-seven (37) trees are of MODERATE retention value and are numbered 63, 66, 68, 69, 75, 105, 110, 111, 115, 116, 118, 119, 120, 121, 123, 128, 131, 132, 135, 137, 140, 162, 196, 512, 515, 519, 526, 530, 531, 536, 537, 542, 545, 570, 578, 579, 584.
- Twenty-nine (29) trees are of LOW to MODERATE retention value and are numbered 72, 78, 83, 91, 112, 113, 117, 124, 126, 127, 130, 134, 139, 161, 195, 514, 516, 522, 523, 524, 526a, 527, 539, 541, 544, 544a, 571, 572, 573.
- Thirty-six (36) trees/tree groups are immature, dead, or have a number of defects and are of LOW retention value. These trees are numbered 81, 82, 86, 87, 88, 89, 90, 92, 92a, 97, 99, 100, 102, 103, 104, 106, 107, 108, 109, 114, 122, 133, 192, 194, 513, 518, 520, 521, 525, 532, 538, 540, 543, 574, 575, 585.

2.3 As a result of the assessment, eighty-one (81) trees will require retention and protection, with thirty (30) trees requiring sensitive construction and supervision within the TPZ by an AQF level 5 arborist. Twenty-nine (29) trees require pruning as specified.

2.4 The proposed landscaping and development will have anticipated impacts on seventy-one (71) trees and will require the removal of ten (10) trees for the proposed works. Twenty two (22) trees are in poor condition and are to be removed. Replenishment is required for these ten (10) trees being removed from impacts. The replenishment is to be of three (3) 30 litre *Eucalyptus resinifera* Red Mahogany, three (3) 30 litre *Eucalyptus saligna* Sydney Blue Gum, two (2) 30 litre *Casuarina glauca* She Oak and two (2) 30 litre *Elaeocarpus reticulatus* Blueberry Ash.

2.5 Tree Protection and mulch 75mm depth over the TPZ of all retained trees is required. There is to be no work within the TPZ of the retained trees unless supervised by an AQF Level 5 arborist. All work within the TPZ of trees is to be carried out as specified in the discussion.

2.6 Five (5) trees with potential hollows to be removed, numbered 81, 518, 525, 538, & 574, will require five nesting boxes to be made and installed according to RMS standards by an AQF Level 5 prior to clearing. Habitat checking can be completed prior to removal by a competent person.

2.7 A logged induction for the tree protection and management with footpath for employees utilising the area is essential for biosecurity to be maintained within the area (See Appendix G). All soils and mulches are to be certified pest and disease free by a competent person.

2.8 McArdle Arboricultural Consultancy Pty Ltd prepared the report. The Arboricultural Impact Assessment report is developed to assess the trees at the above address for health and status. Ms Caryssa Jones B.Bio.Cons MQ, Tree Risk Assessor, Dip Arb AQF L5 (pending); and Ms. Michelle Chapman, *M.Cons.Biol MQ, B.Sc USYD* – under the supervision of Mr James McArdle B.Ed. Sc ACU, Dip Arb AQF L5 Ryde, QTRA, Tree Risk Assessor and TCAA President, conducted the evaluation using Visual Tree Assessment (VTA) according to Claus Mattheck and Breloer's (1994) method for biological and lower level mechanical functions. The systems are in accordance with industry best practice and impact assessments are based upon the Australian Standards AS4970-2009 *Protection of Trees on Development Sites*, Australian Standards 4373-2007 *Pruning of Amenity Trees*, Australian Standards. Risk assessments are based on AS4970-2009, *Risk Management As/NZS ISO 31000-2009* and American National Standard ANSI A300 (Part 9) *Tree Risk Assessment*.

REFERENCES

Ku-ring-gai Local Environmental Plan 2015

Tree Risk Assessment 2018, McArdle Arboricultural Consultancy Pty Ltd, dated 22nd January 2018.

Tree Analysis Plan 3 Author Design Inc. DWG No. LA-2-4001. Dated 5th August 2019.

3.0 AIMS

The aim of the report is to:

3.1 To assess the health, status, potential hazards and risks of one hundred and thirteen (113) trees on site at Lindfield Learning Village, 100 Eton Road, Lindfield NSW 2070, according to the methodologies presented in this report.

3.2 To give recommendations with professional opinion and management of these trees, utilising *Australian Standards AS4970-2009 – Protection of Trees on Development Sites* and *AS/NZS ISO 31000-2009 – Risk Management – Principles and Guidelines*.

4.0 METHODOLOGY

4.1 A ground Visual Tree Assessment (VTA) method was employed in this report. The VTA is a method used to identify visible signs on trees that indicate health and potential hazards; and is based on the theory of tree biology, physiology, tree architecture, and structure. This system is based on Mattheck's (1994) 'The Body Language of Trees', and uses the Health and Structural Condition of Tree-Visual (see Appendix B). The tree risk assessment matrix is developed using *AS/NZS ISO 31000:2009 Risk Management - Principles and Guidelines* and translates similar information from these documents.

4.2 The collection of data is performed in the field by an AQF Level 5 Arborist. The assessment summarises the species, height and diameter, health and structural condition, TULE life expectancy, and retention value categories assigned to each tree.

4.3 Testing on site may include mallet sounding, non-invasive testing for hollows, and probing for cavities and white ant infestation. Invasive tests will determine the depth of decay around cavities. All testing is ground-based and options may include further investigation.

4.4 Impact assessment data was recorded in the Tree Survey Table (Table 1) with various assessment methods. The structural setbacks are calculated according to *Australian Standards AS 4970 2009 – Protection of Trees on Development Sites*. Including:

Appendix A: Tree Useful Life Expectancy TULE 2014. Gives an extra assessment of life expectancy. *Adapted from Jeremy Barrell 2014.*

Appendix B: Health & Structural Condition of Tree Assessment. This describes the vigour and vitality of the tree. *Mattheck 1994 The Body Language of Trees.*

Appendix C: Retention Values. Some trees have special restrictions including cultural, scientific, historical or threatened categories and may be reviewed as part of this report or further reporting. *Morton, 2006 Determining Landscape Significance Rating.*

Appendix C1: Tree Risk Assessment Matrix., it positions a tree assessment into foreseeable risk statements. Adopted for TCAA 2014 by B Sullivan.

Appendix D: Tree Protection Notes. With figures and prohibitions from *Australian Standards AS 4970 2009 – Protection of Trees on Development Sites*.

Appendix E: Tree Planting Specifications. Plants supplied must be council-compliant, be in the container sizes and within the approved plant heights specified, according to *Australian Standards AS 2303 2015 – Tree Stock for Landscape Use* (amended in 2018).

Appendix F: Tree Retention and Management Plan.

Appendix G: Inducted Designated Area.

5.0 PLANNING GUIDELINES AND SPECIFIC LEGISLATION

5.1 Tree management measures are in place for Ku-ring-gai Council under the provisions of the trees and vegetation preservation for properties covered under the Ku-ring-gai Local Environmental Plan 2015.

5.2 According to the NSW Planning Portal, land zoning is classified as **B4: Mixed Use, E3: Environmental Management** and **R1: General Residential**; and the site is located on bushfire prone land classified as **Vegetation Category 1** and **Vegetation Buffer**. The site also occurs on a key site at **Crimson Hill**, which has **Terrestrial Biodiversity** value and **Class 5** acid sulfate soils.

5.3 A search of local and state heritage registers, tree registers and determination of landscape significance were carried out for trees identified in the survey. The UTS Ku-ring-gai campus is of state heritage significance, with a main building, gymnasium and footbridge of local heritage significance.

5.4 SIGNIFICANCE IN THE ENVIRONMENT

Trees are subject to the following legislation:

Biodiversity Conservation Act NSW (BIO Act 2016): Provides provisions for conserving biodiversity.

Threatened Species Conservation Act NSW (1995 TCS Act): Provides provisions for conserving threatened species, populations and ecological communities of animals and plants, as well as managing key threatening processes.

Environmental Protection and Biodiversity Conservation Act NSW (EPBC Act 1999): Provides provisions to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.

Biosecurity Act NSW (BIO Act 2015): Refers to the protection of native plant communities, reducing the risk to human's health and the risk to agricultural production from invasive weeds.

NSW Bushfire Brigade 10/50 Legislation is enforced for this site; however, this site may exclude or otherwise restrict clearing under the 10/50 Code.

5.5 SIGNIFICANCE IN THE LANDSCAPE

Trees are generally categorised as either:

- Significant in the landscape; based on a broad landscape perspective, including streetscape. HIGH retention value.
- Significant in the landscape; based on a neighbourhood perspective. Retained due to its status but may have some conditions or health issues. HIGH retention value.
- Significant in the landscape; based on an adjacent area surrounding the site. HIGH retention value.
- Good and worthy of preservation; retained due to its status, but may have minor conditions or health issues. MODERATE retention value.
- Worthy of preservation; retained due to its status, but may have major conditions or health issues. MODERATE retention value (according to TULE).
- Retain if Possible. LOW retention value.
- Exempt. VERY LOW retention value.

REFERENCES

Retention Values Tables based on Melanie Howden and Andrew Morton.

Tree Useful Life Expectancy TULE Adapted from Jeremy Barrell for use by TCAA consultant arborists. Tree Contractor's Association of Australia TCAA.

6.0 ANALYSIS OF MAPPING CONTROLS



Figure 1: Acid Sulfate Soils.
Class 5 (yellow).



Figure 2: Bushfire Prone Land.
Vegetation Buffer (yellow).
Vegetation Category 1 (red).



Figure 3: Heritage.
UTS Ku-ring-gai Campus (brown).

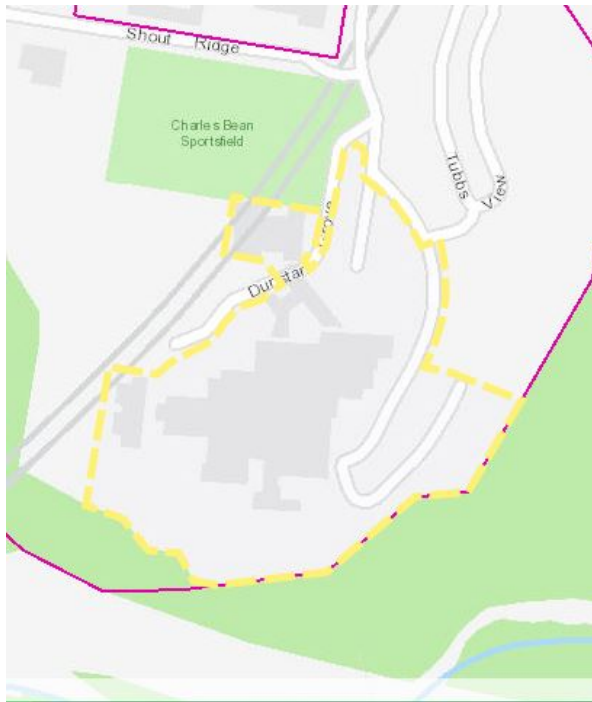


Figure 4: Key Sites
Crimson Hill (purple line).



Figure 5: Land Zoning.
B4: Mixed Use (grey).
E3: Environmental Management (beige).
R1: General Residential (green).

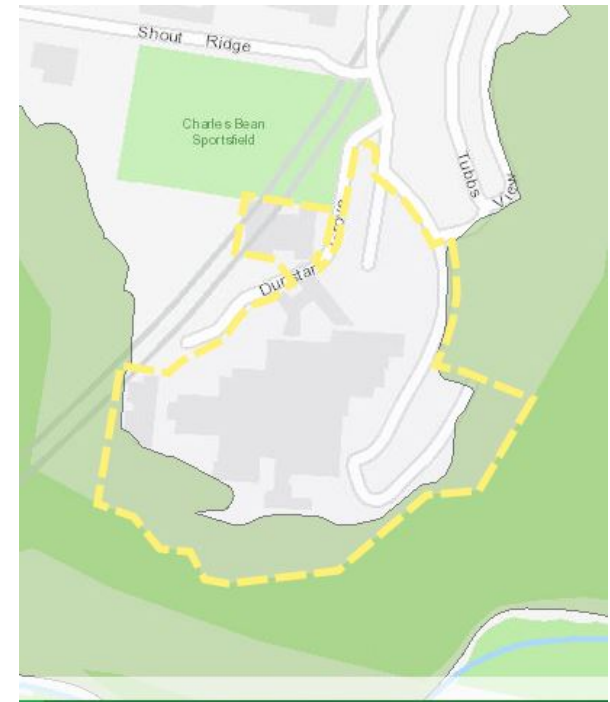


Figure 6: Terrestrial Biodiversity.
Biodiversity (green).

7.0 THE SITE

7.1 The site is located at 100 Eton Road, Lindfield NSW 2070.

7.2 SCALED SITE MAP

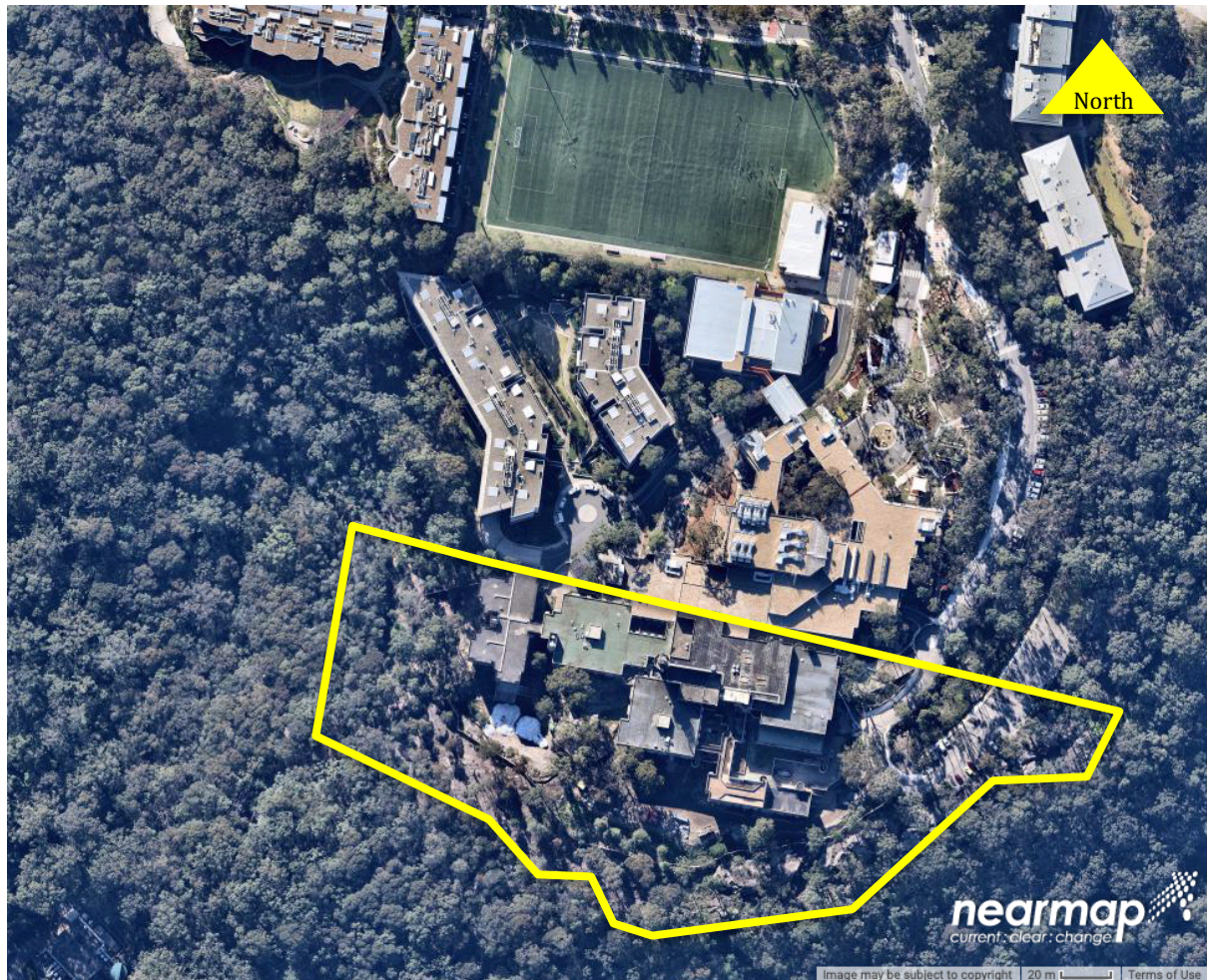


Figure 7: A scaled site map of Lindfield Learning Village at 100 Eton Road, Lindfield NSW 2070 (Scale: 20m = 5mm).

8.0 TREE SURVEY TABLE 1

Table 1: Tree Survey Table. This table lists the results of the ground VTA for this site.

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
63	-33.792717 151.162216	<i>Eucalyptus pilularis</i> Blackbutt	8	17	50 55	6.0 2.6	Immature, moderate condition, with root damage to the south and east, and an unbalanced canopy to the north.	2d	2c	Mod.	RETAIN & PROTECT Further investigation required.
66	-33.790466 151.159913	<i>Corymbia maculata</i> Spotted Gum	7	16	38 49	4.6 2.5	Immature, with girdling roots, an inclusion and physical damage at 8m height, and dead wood.	3d-2d	2c	Mod.	REMOVE & REPLENISH Due to impacts
68	-33.792656 151.161763	<i>Eucalyptus resinifera</i> Red Mahogany	12	17	45 48	5.4 2.4	Immature, good condition but poorly developed, with bracket fungi to the south at 4m height, an unbalanced canopy to the north, and epicormics.	3d-2d	2c	Mod.	REMOVE & REPLENISH Due to impacts
69	-33.792554 151.161967	<i>Eucalyptus botryoides</i> Bangalay	10	20	45 48	5.4 2.4	Immature, moderate condition, with a sparse foliage crown, physical damage, and epicormics.	2d	2c	Mod.	RETAIN & PROTECT Monitor.
70	-33.790493 151.159393	<i>Eucalyptus botryoides</i> Bangalay	15	26	87 95	10.4 3.2	Semi-mature, growing on rocks, with an inclusion at 6m height, a significant amount of dead wood, and epicormics.	2d	2a	High	RETAIN & PROTECT Prune dead wood west side at 5 and 5m, prune canopy weight east.
71	-33.792636 151.162674	<i>Eucalyptus haemastoma</i> Scribbly Gum	12	12	44 58	5.3 2.6	Immature, with an unbalanced canopy, physical damage and scarring at the base, a hollow at the base, and a cavity.	3d	2b	Mod.-High	REMOVE & REPLENISH Due to impacts
72	-33.798573 151.160019	<i>Eucalyptus piperita</i> Sydney Peppermint	4	7	50 58	6.0 2.6	An immature habitat tree , with a lean to the west and epicormics. The main stem is dead.	3d	2b	Low-Mod.	REMOVE & REPLENISH Due to impacts
73	-33.792786 151.162018	<i>Eucalyptus resinifera</i> Red Mahogany	8	18	54 62	6.5 2.7	Immature, with exposed roots, some root damage, a lean to the north, and dead wood.	2d	2c	Mod.-High	RETAIN & PROTECT
75	-33.792160 151.15533	<i>Syzygium smithii</i> Common Lilly Pilly	8	16	25/20/ 18 33	4.4 2.1	Immature, good condition, with three main stems, a cavity at the base, and exposed roots.	2d	2c	Mod.	REMOVE & REPLENISH Due to impacts
78	-33.790089 151.159454	<i>Banksia integrifolia</i> Coast Banksia	5	8	25 27	3.0 1.9	Immature, good condition but poorly developed, with a sparse foliage crown and a lean to the south.	2a	2c	Low-Mod.	RETAIN & PROTECT
81	-33.790550 151.159424	<i>Species unknown</i> (Stag)	-	8	50 -	6.0 -	Dead, with hollows. Stump broken off(15x15)	4a	2a	Low	REMOVE Poor Condition
82	-33.790707 151.159439	<i>Casuarina glauca</i> Swamp Oak	3	11	20 22	2.4 1.8	Immature, good condition but poorly developed, with an inclusion at 6m height.	2d	2d	Low	RETAIN & PROTECT
83	-33.790707 151.159439	<i>Casuarina glauca</i> Swamp Oak	3	12	20 26	2.4 1.9	Immature, excellent condition.	2a	2d	Low-Mod.	RETAIN & PROTECT

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
86	-33.79642 151.159622	<i>Casuarina glauca</i> Swamp Oak	2	12	15 18	2.0 1.6	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	REMOVE & REPLENISH
87	-33.79642 151.159622	<i>Casuarina glauca</i> Swamp Oak	3	14	20 28	2.4 1.9	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	RETAIN & PROTECT
88	-33.79642 151.159622	<i>Casuarina glauca</i> Swamp Oak	3	14	20 28	2.4 1.9	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	RETAIN & PROTECT
89	-33.79642 151.159622	<i>Casuarina glauca</i> Swamp Oak	2	12	15 18	2.0 1.6	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	RETAIN & PROTECT
90	-33.79642 151.159622	<i>Casuarina glauca</i> Swamp Oak	2	12	12 16	2.0 1.5	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	RETAIN & PROTECT
91	-33.79642 151.159622	<i>Casuarina glauca</i> Swamp Oak	3	10	20 26	2.4 1.9	Immature, good condition but poorly developed, with a sparse foliage crown, an inclusion at 5m height, and physical damage at 3m height.	2d	2d	Low-Mod.	RETAIN & PROTECT
92	-33.790562 151.159668	<i>Casuarina glauca</i> Swamp Oak	3	12	12 18	2.0 1.6	Immature, good condition but poorly developed, with an inclusion at 7m height.	2d	2d	Low	RETAIN & PROTECT
92a	-33.79642 151.159622	<i>Allocasuarina littoralis</i> Black She-Oak	2	13	15 24	2.0 1.8	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	RETAIN & PROTECT
93	-33.790665 151.159714	<i>Angophora floribunda</i> Smooth-Barked Apple	7	5	40/10 50	4.9 2.5	Immature, moderate condition, with an unbalanced canopy to the north and epicormics.	2a	2c	Mod.-High	RETAIN & PROTECT Prune dead wood.
96	-33.790710 151.159744	<i>Eucalyptus racemosa</i> Scribbly Gum	9	14	40 44	4.8 2.3	Immature, moderate condition, with epicormics and physical damage to the south at 1m height.	2d	2c	Mod.-High	RETAIN & PROTECT Prune dead wood, north side of canopy at 10m.
97	-33.791245 151.159714	<i>Elaeocarpus reticulatus</i> Blueberry Ash	3	11	5/10 20 -	2.8 -	Immature, with a lean and an unbalanced canopy to the north, and physical damage at the base.	3d	2b	Low	REMOVE & REPLENISH
99		<i>Eucalyptus spp.</i>	2	7	13 20	2.0 1.7	Immature, previously pruned at the base, with a lean and a sparse foliage crown.	2d-3d	2d	Low	RETAIN & PROTECT
100	-33.790890 151.159836	<i>Allocasuarina littoralis</i> Black She-Oak	2	6	15 18	2.0 1.6	Immature, good condition but poorly developed.	2d	2d	Low	RETAIN & PROTECT
102	-33.790905 151.159927	<i>Glochidion ferdinandi</i> Cheese Tree	3	5	8 10	2.0 1.5	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low	RETAIN & PROTECT
103	-33.790905 151.159927	<i>Glochidion ferdinandi</i> Cheese Tree	3	6	5/4/7 10	2.0 1.5	Immature, good condition but poorly developed, multi-stemmed at 0.5m height.	2d	2d	Low	REMOVE & REPLENISH
104	-33.790905 151.159927	<i>Glochidion ferdinandi</i> Cheese Tree	3	5	5/5/5 10	2.0 1.5	Immature, good condition but poorly developed, multi-stemmed at 0.5m height.	2d	2d	Low	REMOVE & REPLENISH
105	-33.790985 151.160004	<i>Eucalyptus piperita</i> Sydney Peppermint	8	15	36/33 60	5.9 2.7	Immature, with twin stems, a dead leader, and a cavity on the leader to the south.	2d	2c	Mod.	RETAIN & PROTECT Prune dead leader.

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
106	-33.790932 151.160034	<i>Eucalyptus piperita</i> Sydney Peppermint	7	13	50 58	6.0 2.6	Immature, with a lean and an unbalanced canopy, a cavity at the base and up the stem, and epicormics.	3d	2b	Low	REMOVE Poor Condition
107	-33.790985 151.160095	<i>Glochidion ferdinandi</i> Cheese Tree	5	9	20/17/ 15/15	4.1 -	Immature, good condition but poorly developed, multi-stemmed.	2d	2d	Low	RETAIN & PROTECT
108	-33.791424 151.160034	<i>Glochidion ferdinandi</i> Cheese Tree	4	7	19 24	2.3 1.8	Immature, good condition but poorly developed, heavily pruned at the base, with a sparse foliage crown.	2d	2d	Low	REMOVE & REPLENISH
109	-33.7847 151.160202	<i>Glochidion ferdinandi</i> Cheese Tree	6	8	13/17 30	2.5 2.0	Immature, with an inclusion and a cavity at the base.	3d	2c	Low	RETAIN & PROTECT
110	-33.790890 151.160080	<i>Eucalyptus piperita</i> Sydney Peppermint	8	12	40/50 68	7.7 2.8	Immature, with a sparse foliage crown, a central cavity, a girdling root, and dead wood.	2d	2b	Mod.	RETAIN & PROTECT Prune dead wood.
111	-33.791023 151.160172	<i>Eucalyptus piperita</i> Sydney Peppermint	9	10	50 65	6.0 2.8	Immature, with a lean and an unbalanced canopy to the south-west, dead wood, and a cavity to the south-east at the base.	2d	2b	Mod.	RETAIN & PROTECT Prune dead wood.
112	-33.791023 151.160172	<i>Eucalyptus piperita</i> Sydney Peppermint	6	10	30/45 60	6.5 2.7	Immature, on a rock ledge, with twin stems at the base, one dead leader, a sparse foliage crown.	3d	2b	Low-Mod.	RETAIN & PROTECT Monitor, habitat tree.
113	-33.791042 151.160385	<i>Elaeocarpus reticulatus</i> Blueberry Ash	3	10	14 20	2.0 1.7	Immature, good condition, with epicormics at the base.	2d	2d	Low-Mod.	RETAIN & PROTECT
114	-33.791103 151.16855	<i>Eucalyptus piperita</i> Sydney Peppermint	6	12	27/40 50	5.8 2.5	Immature, with a significant cavity at the base and borer damage.	3d	2a	Low	REMOVE Poor Condition
115	-33.791103 151.16855	<i>Eucalyptus piperita</i> Sydney Peppermint	7	12	40/40 100	6.8 3.3	A significant , semi-mature tree, with twin stems, a cavity at the base, a sparse foliage crown, dead wood, and some borers.	3d	2b	Mod.	RETAIN & PROTECT Monitor
116	-33.791412 151.16202	<i>Eucalyptus piperita</i> Sydney Peppermint	9	13	57/10 65	7.0 2.8	A semi-mature habitat tree , with a cavity at the base and fire damage on the stem.	3d	2c	Mod.	RETAIN & PROTECT Monitor
117	-33.791412 151.16202	<i>Eucalyptus piperita</i> Sydney Peppermint	7	14	35 45	4.2 2.4	Immature, good condition but poorly developed, with a hollow at the base.	2d	2c	Low-Mod.	RETAIN & PROTECT Monitor
118	-33.791042 151.160385	<i>Elaeocarpus reticulatus</i> Blueberry Ash	7	20	52 52	6.2 2.5	Immature, good condition but poorly developed, with an unbalanced canopy to the east.	2d	2c	Mod.	RETAIN & PROTECT Prune dead wood.
119	-33.791065 151.160385	<i>Eucalyptus grandis</i> Flooded Gum	4	28	34 40	4.1 2.3	Immature, with a sparse foliage crown, epicormics, dead wood, and physical damage at the base.	2d	2c	Mod.	REMOVE & REPLENISH Due to impacts of fill and bank for road.
120	-33.791134 151.160583	<i>Eucalyptus acmenoides</i> White Mahogany	6	16	46 50	5.5 2.5	Immature, heavily pruned, with a lean and an unbalanced canopy to the west, epicormics, and a hollow at the base.	3d	2b	Mod.	RETAIN & PROTECT Monitor, habitat tree.

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
121	-33.791176 151.160629	<i>Angophora floribunda</i> Smooth-Barked Apple	10	16	30/35 80	5.5 3.0	Immature, with twin stems and a canker at the base.	3d-2d	2b	Mod.	RETAIN & PROTECT Prune dead wood.
122	-33.791153 151.49706	<i>Angophora floribunda</i> Smooth-Barked Apple	5	15	35/22 49	4.9 2.5	Immature, with twin stems at 0.5m height, some fire damage, dehydration, and a sparse foliage crown.	2d	2b	Low	RETAIN & PROTECT Prune dead wood.
123	-33.791161 151.160812	<i>Eucalyptus acmenoides</i> White Mahogany	10	15	67 75	8.0 2.9	An immature habitat tree , with a cavity on the entire trunk, a sparse foliage crown, and a lean.	3d	2b	Mod.	REMOVE Poor Condition
124	-33.791161 151.160812	<i>Eucalyptus acmenoides</i> White Mahogany	8	14	36 43	4.3 2.3	Immature, heavily pruned around the base, with a lean to the north, some epicormics, a sparse foliage crown, a hollow at the base, and a significant cavity.	3d	2c	Low-Mod.	REMOVE Poor Condition
126	-33.791046 151.160568	<i>Eucalyptus acmenoides</i> White Mahogany	6	10	30/12/ 15 54	4.3 2.6	Immature, previously pruned, with epicormics, no canopy, dead wood, and some dieback.	3d	2b	Low-Mod.	RETAIN & PROTECT Prune.
127	-33.7911214 151.160812	<i>Angophora costata</i> Rough-Barked Apple	6	15	21 24	2.5 1.8	Immature, with a sparse foliage crown, and minor physical damage at 4m height.	2d	2d	Low-Mod.	RETAIN & PROTECT
128	-33.792683 151.161255	<i>Corymbia maculata</i> Spotted Gum	10	18	33/40 60	6.2 2.7	Immature, good condition but poorly developed, with an inclusion at the base, a dead leader, a cavity, and epicormics.	3d-2d	2b	Mod.	REMOVE & REPLENISH Due to impacts
130	-33.791126 151.161011	<i>Eucalyptus acmenoides</i> White Mahogany	6	14	28/35 50	5.4 2.5	Immature, with twin stems, a sparse foliage crown, a hollow stem, epicormics, and a significant amount of dead wood.	3d	2b	Low-Mod.	RETAIN & PROTECT Monitor, Prune.
131	-33.791183 151.160134	<i>Eucalyptus grandis</i> Flooded Gum	9	23	57 49	6.8 2.5	Immature, moderate condition, with three main stems, and one dead leader.	2d	2a	Mod.	RETAIN & PROTECT Prune dead stems and dead wood.
132	-33.7911214 151.160812	<i>Eucalyptus acmenoides</i> White Mahogany	7	16	40/35 80	6.4 3.0	Semi-mature, with twin stems, one failed leader, epicormics, and a termite scar.	3d-2d	2b	Mod.	RETAIN & PROTECT Prune dead wood.
133	-33.791267 151.161057	<i>Eucalyptus acmenoides</i> White Mahogany	7	13	33/28 69	5.2 2.8	Immature, twin stems at 1m height, one dead stem, a hollow in the stem, a sparse foliage crown, and termite damage.	2d-3d	2b	Low	REMOVE Poor Condition
134	-33.791058 151.162224	<i>Angophora costata</i> Smooth-Barked Apple	8	15	34/26 40	5.2 2.3	Immature, growing on a rock shelf, with exudation, a significant amount of dead wood, and a sparse foliage crown.	2d	2b	Low-Mod.	RETAIN & PROTECT Monitor
135	-33.791103 151.161072	<i>Eucalyptus acmenoides</i> White Mahogany	10	14	70 67	8.4 2.8	Semi-mature, growing on rocks, with termite damage, epicormics, and habitat hollows.	3d	2b	Mod.	RETAIN & PROTECT Further Investigation required, habitat tree

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
136	-33.791100 151.182670	<i>Angophora costata</i> Smooth-Barked Apple	12	17	36 39	4.3 2.2	Immature, good condition but poor development, with an unbalanced canopy to the north-east.	2d	2d	Mod.-High	RETAIN & PROTECT
137	-33.791111 151.161285	<i>Eucalyptus grandis</i> Flooded Gum	7	25	40 48	4.8 2.4	Immature, tall due to rock shelf.	2d	2d	Mod.	RETAIN & PROTECT
138	-33.792656 151.162094	<i>Angophora costata</i> Smooth-Barked Apple	10	14	95 107	11.4 3.4	Mature, with a sparse foliage crown, epicormics, hollows, and habitat value.	2d	2c	High	RETAIN & PROTECT Prune dead wood.
139	-33.798033 151.161057	<i>Eucalyptus grandis</i> Flooded Gum	9	25	48 56	5.8 2.6	Immature, with exposed roots, epicormics, physical damage at the base, and a significant amount of dead wood.	2d	2b	Low-Mod.	REMOVE & REPLENISH Due to impacts
140	-33.7912 151.1619	<i>Eucalyptus camaldulensis</i> River Red Gum	8	11	25/30 42	4.7 2.3	Immature, with an unbalanced canopy to the south-east, and twin stems at 2m height.	2d	2c	Mod.	RETAIN & PROTECT
159	-33.792740 151.161850	<i>Corymbia maculata</i> Spotted Gum	12	20	66 75	7.9 2.9	Immature, good condition but poorly developed, with an unbalanced canopy to the north, dead wood, and an inclusion at 1m height.	2d	2c	Mod.-High	REMOVE & REPLENISH Due to impacts
160	-33.792770 151.161621	<i>Eucalyptus pilularis</i> Blackbutt	12	20	57 70	6.8 2.9	Semi-mature, with previous damage on the stem and cankers.	2d	2c	Mod.-High	RETAIN & PROTECT Prune hanging branch.
161	-33.797850 151.161535	<i>Banksia serrata</i> Old Man Banksia	3	7	18 20	2.2 1.7	Immature, good condition but poorly developed, with a lean and an unbalanced canopy to the south-west.	3d	2c	Low-Mod.	RETAIN & PROTECT
162	-33.792786 151.162018	<i>Elaeocarpus reticulatus</i> Blueberry Ash	8	15	43 50	5.2 2.5	Immature, moderate condition, growing on rocks, with a sparse foliage crown, and physical damage on the stem.	2d	2b	Mod.	REMOVE & REPLENISH Due to impacts
192	-33.790604 151.159790	<i>Ornamental spp.</i>	4	7	14/8 20	2.0 1.7	Immature, good condition but poorly developed, with twin stems, and epicormics at the base.	2d	2d	Low	RETAIN & PROTECT
194	-33.791065 151.159790	<i>Corymbia gummifera</i> Red Bloodwood	9	15	41 44	4.9 2.3	Immature, with twin stems at 2m height, an inclusion with swelling at 2m height, physical damage to the north-east at 2m height, and some dead wood.	4c	2b	Low	REMOVE & REPLENISH
195	-33.792866 151.161713	<i>Angophora costata</i> Rough-Barked Apple	6	15	20/22 28	3.6 1.9	Immature, good condition but poorly developed, with a sparse foliage crown, twin stems, and an unbalanced canopy.	2d	2d	Low-Mod.	RETAIN & PROTECT
196	-33.790772 151.161301	<i>Angophora costata</i> Rough-Barked Apple	8	14	37 40	4.4 2.3	A significant immature tree, previously impacted, with exposed roots.	3d	2b	Mod.	RETAIN & PROTECT Prune hanging branch south side. Monitor.

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
512	-33.791042 151.161362	<i>Angophora floribunda</i> Rough-Barked Apple	7	15	40 42	4.8 2.3	Immature, with an unbalanced canopy to the east, fire damage, an inclusion at 3m height, and some dead wood.	2d	2b	Mod.	RETAIN & PROTECT Prune dead wood.
513	-33.791042 151.161362	<i>Angophora costata</i> Smooth-Barked Apple	1	8	12 15	2.0 1.5	Immature, with a scar and cavity on the main stem, epicormics, and a sparse foliage crown.	4a	2b	Low	REMOVE Poor Condition
514	-33.791100 151.182670	<i>Eucalyptus grandis</i> Flooded Gum	4	16	22 25	2.6 1.9	Immature, with an unbalanced canopy to the east, a kink in the main stem, epicormics.	2d	2c	Low-Mod.	RETAIN & PROTECT
515	-33.791103 151.161072	<i>Eucalyptus acmenoides</i> White Mahogany	12	14	55/35 70	7.8 2.9	Semi-mature, with many cavities, twin stems, an unbalanced canopy to the south-east, epicormics, a dead stem, and hollows at the base.	3d	2b	Mod.	RETAIN & PROTECT Further Investigation Possibly remove, habitat tree.
516	-33.791183 151.161102	<i>Angophora costata</i> Smooth-Barked Apple	3	15	22 26	2.6 1.9	Immature, with a sparse foliage crown, and an unbalanced canopy to the east.	2d	2d	Low-Mod.	RETAIN & PROTECT
518	-33.791126 151.161011	<i>Species unknown</i> (Stag)	-	6	30 -	3.6 -	Dead, with hollows. Stump with hollow(15x10cm)	4a	2a	Low	REMOVE Poor Condition
519	-33.791126 151.161011	<i>Eucalyptus grandis</i> Flooded Gum	7	18	35/29 60	5.4 2.7	Immature, moderate condition, with twin stems, a canker to the west at 1m height, and dead wood.	2d	2b	Mod.	RETAIN & PROTECT Prune dead wood west at 3m.
520	-33.798033 151.161057	<i>Eucalyptus grandis</i> Flooded Gum	5	24	30 68	3.6 2.8	Immature, moderate condition, dehydrated, tall due to competition.	2d	2b	Low	REMOVE & REPLENISH
521	-33.790951 151.160858	<i>Eucalyptus grandis</i> Flooded Gum	7	26	33 41	4.0 2.3	Immature, moderate condition, with exposed roots, a lean and an unbalanced canopy to the north-west, and uplift to the south.	3d	2b	Low	REMOVE & REPLENISH
522	-33.791046 151.160568	<i>Eucalyptus grandis</i> Flooded Gum	5	27	27 27	3.2 1.9	Immature, moderate condition, with an unbalanced canopy to the east.	2d	2d	Low-Mod.	RETAIN & PROTECT
523	-33.791023 151.160492	<i>Eucalyptus grandis</i> Flooded Gum	4	21	22 30	2.6 2.0	Immature, moderate condition, with an unbalanced canopy to the east.	2d	2d	Low-Mod.	RETAIN & PROTECT
524	-33.791012 151.160416	<i>Eucalyptus grandis</i> Flooded Gum	7	22	37 43	4.4 2.3	Immature, good condition, with a significant amount of dead wood, and some epicormics.	2d	2b	Low-Mod.	RETAIN & PROTECT Prune dead wood north at 9m.
525	-33.790985 151.160004	<i>Species unknown</i> (Stag)	-	5	40 -	4.8 -	Dead, with hollows. Stump hollow is (20x20cm)	4a	2a	Low	REMOVE Poor Condition
526	-33.791214 151.160812	<i>Angophora costata</i> Rough-Barked Apple	6	16	17 20	2.0 1.7	Immature, growing on rocks, with physical damage to the west at 6m height, a split trunk, and minor dead wood.	2d	2c	Mod.	RETAIN & PROTECT Prune dead wood.
526a	-33.790890 151.159836	<i>Casuarina glauca</i> Swamp Oak	4	7	17 20	2.0 1.7	Immature, good condition.	2d	2d	Low-Mod.	RETAIN & PROTECT
527	-33.791058 151.160095	<i>Angophora floribunda</i> Smooth-Barked Apple	2	11	22 26	2.6 1.9	Immature, good condition but poorly developed, dehydrated, with a sparse foliage crown.	2d	2d	Low-Mod.	RETAIN & PROTECT

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
530	-33.791351 151.160736	<i>Corymbia gummifera</i> Red Bloodwood	4	14	25 28	3.0 1.9	Immature, good condition but poorly developed, with epicormics and some fire damage.	2d	2c	Mod.	RETAIN & PROTECT Prune dead wood.
531	-33.791353 151.160736	<i>Corymbia gummifera</i> Red Bloodwood	6	16	29/26 50	4.7 2.5	Immature, with twin stems, an unbalanced canopy to the east and some fire damage.	2d	2c	Mod.	RETAIN & PROTECT Prune dead wood.
532	-33.791351 151.160736	<i>Species unknown</i> (Stag)	-	8	12 -	2.0 -	Dead.	4a	2a	Low	REMOVE Poor Condition
536	-33.790791 151.159729	<i>Allocasuarina littoralis</i> Black She-Oak	5	10	25/25 44	4.2 2.3	Immature, good condition, with twin stems.	2d	2d	Mod.	RETAIN & PROTECT
537	-33.790665 151.159714	<i>Casuarina glauca</i> Swamp Oak	4	12	18 21	2.2 1.7	Immature, good condition but poorly developed.	2a	2d	Mod.	RETAIN & PROTECT
538	-33.790665 151.159714	<i>Species unknown</i> (Stag)	-	3	40/10 -	4.9 -	Dead, with hollow (25x25cm)	4a	2a	Low	REMOVE Poor Condition
539	-33.790665 151.159714	<i>Casuarina glauca</i> Swamp Oak	3	7	18 20	2.2 1.7	Immature, good condition.	2a	2d	Low-Mod.	RETAIN & PROTECT
540 (x 2)	-33.790707 151.159439	<i>Species unknown</i> (Stag)	-	4	30 -	3.6 -	Dead	4a	2a	Low	REMOVE Poor Condition
541	-33.790695 151.159485	<i>Corymbia gummifera</i> Red Bloodwood	4	13	24/20 36	3.7 2.1	Immature, good condition but poorly developed, with twin stems and dead leaders.	2d	2b	Low-Mod.	RETAIN & PROTECT Prune dead wood.
542	-33.790501 151.159531	<i>Eucalyptus racemosa</i> Scribbly Gum	7	14	29/20/ 26 75	5.3 2.9	Immature, good condition, previously pruned.	2d	2d	Mod.	RETAIN & PROTECT
543	-33.790550 151.159332	<i>Casuarina glauca</i> Swamp Oak	3	7	16 20	2.0 1.7	Immature, good condition but poorly developed, with a lean to the east.	2d	2d	Low	RETAIN & PROTECT Prune hanging branch.
544	-33.790617 151.159363	<i>Eucalyptus obliqua</i> Messmate	4	9	17 19	2.0 1.7	Immature, good condition but poorly developed, with an inclusion at 2m height.	2d	2c	Low-Mod.	RETAIN & PROTECT Prune dead wood.
544A	-33.790617 151.159363	<i>Casuarina glauca</i> Swamp Oak	3	6	22 26	2.6 1.9	Immature, good condition.	2a	2d	Low-Mod.	RETAIN & PROTECT
545	-33.790684 151.159302	<i>Eucalyptus piperita</i> Sydney Peppermint	7	8	20/18/ 17 -	3.8 -	Immature, good condition but poorly developed, with three main stems, and a sparse foliage crown.	2d	2d	Mod.	RETAIN & PROTECT
570	-33.789490 151.159515	<i>Eucalyptus resinifera</i> Red Mahogany	8	18	33 32	4.0 2.1	Immature, dehydrated, with mistletoe in the canopy, and an inclusion at 9m height.	2d	2d	Mod.	RETAIN & PROTECT Prune dead wood north at 1m.
571	-33.789661 151.159424	<i>Eucalyptus obliqua</i> Messmate	5	17	23 26	2.8 1.9	Immature, good condition but poorly developed, with a sparse foliage crown.	2d	2d	Low-Mod.	RETAIN & PROTECT Prune dead wood.

Tree No.	GPS co-ord. (Long/Lat)	Common & Scientific Name	Crown spread (m)	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure Potential (Health & Structure) (Defects & Measurements)	TULE AZ	TRA	RV	Works
572	-33.790138 151.159225	<u>Casuarina glauca</u> Swamp Oak	5	15	27 33	3.2 2.1	Immature, good condition but poorly developed, heavily pruned at the base, with an inclusion at 5m height, an unbalanced canopy, and physical damage to the west at the base.	2d	2c	Low-Mod.	RETAIN & PROTECT
573	-33.790936 151.159363	<u>Casuarina glauca</u> Swamp Oak	5	8	26 28	3.1 1.9	Immature, with an inclusion at 2m height.	2d	2c	Low-Mod.	RETAIN & PROTECT
574	-33.78998 151.159384	<i>Species unknown</i> (Stag)	-	5	35 -	4.2 -	Dead, with hollow (10x15cm)	4a	2a	Low	REMOVE Poor Condition
575	-33.790517 151.156158	<u>Casuarina glauca</u> Swamp Oak	3	12	13 18	2.0 1.6	Immature, good condition but poorly developed, with an inclusion at 7m height.	2d	2d	Low	RETAIN & PROTECT Prune minor dead wood.
578	-33.792881 151.161301	<u>Corymbia maculata</u> Spotted Gum	5	22	33 42	4.0 2.3	Immature, good condition but poorly developed, previously impacted, with an unbalanced canopy to the east.	2d	2d	Mod.	RETAIN & PROTECT
579	-33.791424 151.160034	<u>Melaleuca spp.</u> Paperbark	3	7	20 24	2.4 1.8	Immature, with an inclusion at 1m height, and an unbalanced canopy to the south-west from the neighbouring tree.	2d	2d	Mod.	RETAIN & PROTECT
581	-33.792717 151.160701	<u>Eucalyptus saligna</u> Sydney Blue Gum	5	19	36 43	4.3 2.3	Immature, previously impacted, with an unbalanced canopy to the north and a very sparse foliage crown.	2d	2b	Mod.-High	RETAIN & PROTECT Prune dead wood north.
583	-33.790592 151.160095	<u>Eucalyptus racemosa</u> Scribbly Gum	12	15	68 77	8.2 3.0	Semi-mature, with dead wood, a build-up of soil at the base, and a hollow branch at 3m height.	2d	2b	High	RETAIN & PROTECT Further investigation
584	-33.798630 151.16455	<u>Corymbia gummifera</u> Red Bloodwood	6	17	44 50	5.3 2.5	Immature, good condition but poorly developed, with an unbalanced canopy to the west, and dead wood.	2d	2b	Mod.	RETAIN & PROTECT Prune dead wood north side.
585	-33.792770 151.161621	<u>Angophora floribunda</u> Smooth-Barked Apple	4	7	20/10/ 8 35	2.9 2.1	Immature, multi-stemmed, with a lean to the north-east.	2d	2d	Low	REMOVE & REPLENISH

9.0 FINDINGS



Plate 1:

Tree 138, an *Angophora costata* (Smooth-Barked Apple) tree of high value to be retained.



Plate 2:

Surrounding bushland south of the proposed works. Species include *Eucalyptus botryoides* (Bangalay), *Eucalyptus piperita* (Sydney Peppermint), *Eucalyptus haemastoma* (Scribbly Gum) & *Angophora costata* (Smooth-Barked Apple).



Plate 3:

Tree 71, a *Eucalyptus haemastoma* (Scribbly Gum) to be removed.



Plate 4:

Tree 70, a *Eucalyptus botryoides* (Bangalay) tree of high value to be pruned of dead wood by an AQF Level 3 arborist.



Plate 5:

Tree 583, a *Eucalyptus racemosa* (Scribbly Gum) tree of high value to be retained and protected.



Plate 6:

Trees 63, *Eucalyptus pilularis* (Blackbutt), 72 *Eucalyptus piperita* (Sydney Peppermint), 583 *Eucalyptus racemosa* (Scribbly Gum), 584 *Corymbia gummifera* (Red Bloodwood) adjacent to the proposed COLA building.

10.0 DISCUSSION

10.1 One hundred and thirteen (113) trees were assessed by an AQF level 5 arborist on site at LLV-Lindfield Learning Village, within the mapped area presented in Appendix F.

10.2 The retention value of one hundred and thirteen (113) trees/tree groups on site were assessed as follows for the proposal:

- three (3) trees are of HIGH retention value.
- eight (8) trees are of MODERATE to HIGH retention value.
- thirty-seven (37) trees are of MODERATE retention value.
- twenty-nine (29) trees are of LOW to MODERATE retention value.
- thirty-six (36) trees/tree groups are of LOW retention value.

10.3 The impacts of trees have been assessed on the site by the current proposal and are listed in the Impacts Table 2. Seventy-one (71) trees are impacted by the proposed works.

10.4 Ten (ten) trees are impacted by the proposed works greater than the standards allow and cannot be retained having impacts that are numbered 66, 68, 71, 72, 75, 97, 119, 128, 139, 159, 162, 578 and 579. Twenty-two (22) trees are in poor condition and are to be removed numbered 81, 86, 97, 103, 104, 106, 108, 114, 123, 124, 133, 194, 513, 518, 520, 521, 525, 532, 538, 540, 574 and 585.

10.5 Eighty one (81) trees are to be retained and protected numbered 63, 69, 70, 73, 78, 82, 83, 87, 88, 89, 90, 91, 92, 92a, 93, 96, 99, 100, 102, 105, 107, 109, 110, 111, 112, 113, 115, 116, 117, 118, 120, 121, 122, 126, 127, 130, 131, 132, 134, 135, 136, 137, 138, 140, 160, 161, 192, 195, 196, 512, 514, 515, 516, 519, 522, 523, 524, 526, 526a, 527, 530, 531, 536, 537, 539, 541, 542, 543, 544, 544a, 545, 570, 571, 572, 573, 575, 578, 579, 581, 583 and 584.

10.6 Thirty (30) trees numbered 63, 78, 82, 92, 93, 91, 96, 99, 100, 105, 111, 112, 115, 118, 120, 122, 130, 131, 135, 136, 137, 160, 514, 519, 524, 539, 541, 542, 581 and 583 require sensitive construction for all work within the TPZ which must be under the supervision of an AQF level 5 arborist. Seventeen (17) trees numbered 63, 91, 93, 96, 105, 111, 112, 118, 122, 131, 135, 514, 519, 539, 542, 581 and 583 have an impact on their SRZ and require supervision by an AQF level 5 arborist to ensure no roots are cut within the SRZ. A majority of these impacts would be small pier holes for a stirrup to be implanted and bear the weight of an above ground boardwalk.

10.7 Thirty-nine (39) trees numbered 63, 69, 70, 73, 78, 82, 83, 87, 88, 90, 91, 92, 93, 96, 99, 105, 110, 111, 112, 115, 118, 120, 122, 130, 131, 135, 137, 138, 160, 514, 519, 524, 536, 539, 541, 542, 581, 583 and 584 require Tree Trunk Protection and all remaining trees require Tree Protection Fencing over the TPZ. Twenty-six (26) trees numbered 63, 70, 91, 93, 96, 105, 110, 111, 112, 115, 118, 120, 122, 130, 131, 135, 160, 192, 515, 519, 536, 539, 541, 542, 583 and 584 require increased ground protection in the form of 100mm of inert basalt of 120mm diameter within the TPZ. Increased ground protection is required within the TPZ of these trees as they are within areas that require major work and continuous access. The inert gravel will help to minimise the compaction of the soil within the TPZ of the trees. The inert DECO Granite™ will have minimal leaching of nutrients that would contribute to toxicity if other limestone gravels or products are used to resist compaction.

10.8 Specifications for all work within the TPZ of retained trees:

- Trees impacted by the sandstone blocks numbered 78, 89, 91, 92, 99, 105, 115, 110, 116, 117, 118, 192, 536, 539, 541, 542, 530, 531, 578, 579 require sensitive construction for the installation. The blocks are to be placed on 100mm of inert gravel, (DECO Granite™) of which could be basalt gravel of 20mm diameter.
- The 'indicative land fill area' as specified on the 'Landscape Plans' must use low impact materials that are inert (non-reactive) such as sandstone or basalt and must allow for drainage.
- The boardwalk between Tree 138 to Tree 120 must be constructed using sensitive construction. All piers are to be hand excavated under the supervision of an AQF level 5 arborist.
- All pathways within the SRZ of trees 63, 91, 93, 96, 105, 111, 112, 118, 122, 131, 135, 514, 519, 539, 542, 578, 579, 581 and 583 are to be boardwalks. The installation of the boardwalks are to use pier and beam and require supervision by an AQF Level 5 arborist to ensure no roots are cut within the SRZ.
- Tree 63 is impacted 25% and Tree 583 is impacted by 30% by the proposed works. The pathway within the TPZ of the two trees must be a board walk to minimise the impacts. It is to be constructed using pier and beam with steel stirrups used within the SRZ of both trees. The clearance of the board walk must be a minimum of 200mm and no roots are to be cut within the SRZ. Any roots to be cut within the TPZ must be wrapped immediately with geo-fabric.
- The concrete pathway from trees 105 and 107 must be placed on geofabric and adequate drainage is required which must be installed agricultural line under the pavement with drainage holes of 50mm every two metres perpendicular to the path.
- The pathways within the TPZ of trees are to use DECO Granite™ which is consolidated crushed rock.
- Hard surfaces within the TPZ of Tree 107 are to use Deco Granite to reduce the impacts on the tree. No roots greater than 40mm are to be cut within the TPZ of Tree 107.
- Any excavations required for the installation of the landscape sleepers within the TPZ of trees 536, 539 and 192 must be excavated by hand and no roots greater than 40mm are to be cut. The sleepers are to be made of inert material which must not leach unwanted elements.
- The 'snakes and ladders' impact on trees 82, 105 and 110 are considered minimal and can be managed by ensuring no roots greater than 40mm are cut within the TPZ.
- The 'low cargo net' within the TPZ of Tree 73 will not significantly impact the tree as it is to be fixed to an existing rock outcrop and is therefore of low impact.

- Tree 118 has an impact from the play area, referred to as Item 1 on the Landscape Plan. The area within the TPZ is to use minimal impact materials such as consolidated crushed rock-DECO Granite™.
- The proposed vegetable garden within the TPZ of trees 584 and 583 is to be elevated and in a contained system to ensure no phosphate fertilisers leaked into the TPZ of the trees. Vegetables that grow well in acidic soils are preferred and remediation of the soil is recommended by adding sulphate potash.
- Items 4 and 5 within the Landscape Plan are to be installed using sensitive construction. All excavations required must be carried out by hand and no roots are to be cut greater than 40mm.
- The swales are to be constructed under the supervision of an AQF level 5 arborist when within the TPZ of retained trees numbered 63, 78, 82, 83, 105, 110, 111, 112, 118, 120, 160, 526a, 536, 581, 583. The swale impacting tree 118 must be located outside the SRZ of the tree. The machine must not exceed more than 2 tonnes to minimise the pressure on the root systems and must have tracked rubber pads to prevent further damage. Machinery operators require an induction to inform them of the restrictions.
- Tree 160 is impacted by the proposed road by 20%. The road within the TPZ must be constructed under the supervision of an AQF level 5 arborist and no roots greater than 40mm are to be cut within the TPZ.
- The installation of the fence must use sensitive construction within the TPZ of retained trees. There are to be no impacts on the SRZ of retained trees and any roots to be cut within the TPZ for the installation of the fence must not exceed 40mm in diameter.

10.9 Pruning is required for trees numbered 70, 93, 96, 105, 110, 111, 118, 121, 122, 126, 130, 131, 132, 138, 160, 196, 512, 519, 524, 526, 530, 531, 541, 543, 570, 571, 575, 581 and 584 and all pruning must be carried out by an AQF level 3 arborist, as specified in the Tree Survey Table and must be in accordance with *Australian Standards AS/4743-2007 Pruning of Amenity Trees*

10.10 To assist in competent removal and pruning of trees, contractors must be AQF level 3 licensed arborists and must work in accordance with *Australian Standards AS/4743-2007 Pruning of Amenity Trees* and *SafeWork NSW Guide to Managing Risks Tree Trimming Removal*. A registered current member of Tree Contractors Association Australia (TCAA) or Arboriculture Australia (AA) must complete the works.

10.11 Replenishment is required for ten (10) trees being removed due to impacts. The replenishment is to be of three (3) 30-litre *Eucalyptus resinifera* (Red Mahogany), three (3) 30-litre *Eucalyptus saligna* (Sydney Blue Gum), two (2) 30-litre *Casuarina glauca* (She Oak) and two (2) 30-litre *Elaeocarpus reticulatus* (Blueberry Ash).

10.12 Five (5) trees with potential hollows, numbered 81, 518, 525, 538 and 574, are to be removed and will have nesting boxes made and installed prior to removal of these trees. These trees must be

supervised by an AQF Level 5 arborist or ecologist (including a competent person), ensuring no habitat is damaged or killed with the processing of trees. Cutting of the trees and allowing one hour to pass while checking for habitat would be a suitable ameliorative choice. Nesting boxes to RMS standards to allow for relocation prior or during the process of clearing these trees. The stump of dead trees that are not within the foot print of proposed pathways are to be retained and the stump can be either cut at the desired level or can be ground down to ground level in order to retain the root system to prevent erosion of soil.

10.13 An induction process with education on the sited area is required for general workers to ensure that tree protection measures and guidelines are described. General workers are to be inducted by the AQF Level 5 arborist, with visits to site during the construction period to be logged. Foot baths are encouraged to protect the soil rhizosphere from infection, ensuring biosecurity is maintained during works. This is to be logged and reported on to the consenting authority.

PROJECT ARBORIST

10.14 Tree Trunk Protection is to utilise timber lengths of 1.8-2metresx 50mmx100mm and stand vertically on wrapped geofabric on the trunk. With airgaps of 150mm. The timber is to be secure with framing steel and screws are to be drilled into the hardwood, not the tree (see Section 4.2, Appendix D). Tree Protection Fencing must be utilised where stated in the Tree Retention and Management Plan. It is to be interlocking 1.8m steel mesh fencing.

10.15 Prohibitions in Appendix D state that no washouts or chemicals are to be released into the TPZ of preserved trees unless the project arborist has given consent. All rubbish and waste is to be kept within the hoardings and waste designated areas on site. The sited areas for waste are located to the east of the site within the road access area.

10.16 Remedial reports may be required if yellowing of tree leaves, chlorosis or browsing is greater than 20% of the canopy. Where physical damage has been maintained the project arborist will ensure that the tree is undergoing a plan and construction staff and the management are inducted into the care of the specimen. Further reporting may be required during the course of the remedial works and the construction process. By an AQF Level 5 project arborist.

10.17 Contact details must be presented on site with indelible ink and state the project arborist name and contact number on tree protection areas. Tree Protection areas must be labelled clearly.

10.18 Small machines may only be used where suitable ground protection is in place, under close supervision of the project arborist and only where the project arborist deems it safe for the tree to do so.

10.19 Exposed roots shall be wrapped or covered over with carpet or hessian and moistened until such time as the pathway materials are installed. Roots greater than 50mm diameters are to be protected with dense SBR rubber to avoid the risk of direct contact/abrasion from materials and access usage. No roots are to be cut within the SRZ of retained trees.

10.20 Irrigation is to be undertaken for a period of 12 months following completion of works. The Project Arborist is to ensure the soil moisture is adequate during inspections.

10.21 Ensure trees are removed by a qualified Arborist AQF 3 or AQF 5. An ecologist shall be on site during clearing works to ensure any fauna are relocated. Prior to the approval of removal for hollow bearing trees the manager is to carry out the following actions to prevent the harm to native wildlife.

- a) An AQF Level 5 arborist to ensure that the trees are removed in sections prior to dusk when roosting animals would be alert and likely to disperse from the site. Ensure the trees are knocked several times to alert any roosting animals. Ensure all hollow in trees are examined prior to and immediately after their removal to ensure roosting animals are free from danger.
- b) A WIRES contact volunteer can be contacted on (02) 89773333 or An AQF Level 5 arborist who is competent.
- c) Nesting boxes (5) are constructed to RMS standards¹ utilising 19mm marine ply with design of holes and attached with glue and screw. These can be nominally located above five metres to the north east of the allocated tree and secured with non-abrasion type plastic tubing on wire. An AQF level 5 arborist who is competent at installing these boxes must be engaged.
- d) Footbath is to be utilised of disinfectant and sodium solution 1% to water. A signed log and induction in to the use of this footbath during the construction process is necessary for biosecurity. This could be further determined by an ecologist.
- e) A logged induction into the sited area for construction will ensure that the trees are protected by workers entering the landscaping and construction area.

¹ https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/biodiversity_guidelines.pdf

11.0 IMPACTS TABLE 2

Tree No.	Impact	Works Required
69, 70, 83, 87, 90, 92a, 102, 109, 113, 127, 132, 140, 161, 195, 512, 523, 526, 527, 530, 543, 544, 575	0%	Retain & Protect Tree Protection & Mulch 75mm depth over TPZ.
73, 88, 89, 107, 110, 116, 117, 121, 126, 134, 138, 192, 196, 515, 516, 522, 526a, 531, 536, 537, 544a, 545, 570, 571, 572, 573, 578, 579 & 584.	<10%	Retain & Protect Tree Protection & Mulch 75mm depth over TPZ.
78, 82, 92, 93, 99, 100, 115, 120, 122, 130, 136, 137, 524, 581.	10-15%	Retain & Protect Sensitive Construction All work within the TPZ must be supervised by an AQF Level 5 Arborist. Tree Trunk Protection & Mulch 75mm depth over TPZ.
91, 96, 105, 111, 112, 118, 131, 135, 160, 514, 519, 541, 542.	20%	Retain & Protect Sensitive Construction All work within the TPZ must be supervised by an AQF Level 5 Arborist. Tree Trunk Protection & Mulch 75mm depth over TPZ.
63.	25%	Retain & Protect Sensitive Construction All work within the TPZ must be supervised by an AQF Level 5 Arborist. Tree Trunk Protection & Mulch 75mm depth over TPZ.
539, 583.	30%	Retain & Protect Sensitive Construction All work within the TPZ must be supervised by an AQF Level 5 Arborist. Tree Trunk Protection & Mulch 75mm depth over TPZ.
162.	>30%	Remove & Replenish Impacts greater than the standards allow to retain the tree.
66, 68, 71, 72, 75, 119, 128, 139 & 159.	>40%	Remove & Replenish Impacts greater than the standards allow to retain the tree.
81, 86, 97, 103, 104, 106, 108, 114, 123, 124, 133, 194, 513, 518, 520, 521, 525, 532, 538, 540, 574 & 585.	-	Remove & Replenish Poor Condition.

12.0 HOLDING POINTS – RETENTION AND PROTECTION OF TREES.

12.1 Pruning is required for twenty-nine (29) trees on site as specified in tree survey table. Any pruning greater than 40mm within TPZ of preserved trees will need to be cut cleanly under supervision of an AQF Level 5 certified Arborist in accordance to *Australian Standards AS4373 2007 Pruning of Amenity Trees*.

12.2 Retention and protection of seventy-nine (79) trees using Tree Protection and 100mm of clean certified *Eucalyptus spp* mulch within the TPZ. (See the Tree Management Plan)

12.3 Sensitive construction is required within the TPZ of thirty (30) trees and all work must be installed as specified in the discussion and must be under the supervision of an AQF level 5 arborist.

12.4 Removal and replenishment is required for ten (10) trees due to the impacts proposed. The replenishment is to be of three (3) 30 litre *Eucalyptus resinifera* Red Mahogany, three (3) 30 litre *Eucalyptus saligna* Sydney Blue Gum, two (2) 30 litre *Casuarina glauca* She Oak and two (2) 30 litre *Elaeocarpus reticulatus* Blueberry Ash.

12.5 An AQF level 5 Arborist must install or supervise Tree Trunk Protection. The installation found in the Tree Management Plan is to be installed prior to any demolition, construction or re-landscaping.

12.6 The TPZ of all trees on site adjacent the development must be maintained with a 75mm depth of clean certified Eucalyptus species, mulch for the duration of the proposed development. Twenty six (26) trees listed in the discussion will require 100mm of inert basalt gravel within their TPZ for increased access on geofabric as part of the ground protection.

12.7 No changes in soil level within the TPZ of retained trees unless the consent authority has agreed and is supervised by the project arborist. Soil must not be stockpiled into the TPZ of preserved trees.

12.8 Any roots to be cut must be carried out using a clean, sharp hand tool and must be given consent by an AQF level 5 arborist. No roots are to be cut within the SRZ of retained trees.

12.9 Trees with potential hollows to be removed will have nesting boxes made and installed prior to removal of these trees. These trees must be supervised by an AQF level 5 arborist or ecologist (including a competent person) ensuring no habitat is damaged or killed with the processing of trees. Cutting of the trees and allowing one hour to pass while checking for habitat would be a suitable ameliorative choice. Nesting boxes to RMS standards to allow for relocation prior or during the process of clearing these trees.

12.10 Monthly inspections by an AQF level 5 arborist are required for this site and need to be complied with for the duration of the development. Certification of tree protection as per Tree Protection Plan by AQF level 5 Arborist prior to any demolition, construction or re-landscaping.

12.11 Prohibitions are listed Appendix D, to be complied with and certified by an AQF level 5 Arborist.

12.12 Inductions-Small machines are to be less than 2 tonne and supervised within the TPZ by an inducted and competent person. 10.21abcd must be logged by an AQF level 5 arborist.

13.0 RECOMMENDATIONS AND CONCLUSION

13.1 Eighty one (81) trees are to be retained and protected.

13.2 Pruning required is to be carried out by an AQF level 3 arborist ensuring pruning is done in accordance to *Australian Standards AS4373 2007 Pruning of Amenity Trees*.

13.3 Retained trees will require either Tree Protection Fencing or Tree Trunk Protection with no work within the TPZ of retained trees unless under supervision of the AQF level 5 certified arborist.

13.4 Sensitive construction is required within the TPZ of thirty (30) trees as specified in the discussion and all work must be under the supervision of an AQF level 5 arborist. No roots are to be cut within the SRZ of retained trees.

13.5 Removal and replenishment is required for ten (10) trees due to the impacts proposed. The replenishment is to be of three (3) 30 litre *Eucalyptus resinifera* Red Mahogany, three (3) 30 litre *Eucalyptus saligna* Sydney Blue Gum, two (2) 30 litre *Casuarina glauca* She Oak and two (2) 30 litre *Elaeocarpus reticulatus* Blueberry Ash.

13.6 To assist in competent removal and pruning of trees, contractors must be AQF level 3 licensed arborists and must work in accordance with *Australian Standards AS4790-2009 Protection of Trees in Development Sites* and *Australian Standards AS/4743-2007 Pruning of Amenity Trees* and *SafeWork NSW Guide to Managing Risks Tree Trimming Removal*. A registered current member of Tree Contractors Association Australia (TCAA) or Arborists Australia (AA) must complete the works.

13.7 Holding points 12.1-12.12 will be compliant by an AQF level 5 arborist.

13.8 To reduce the compaction of the soil around the retained trees, it is recommended the addition of clean *Eucalyptus sp.* mulch at 75mm depth over the TPZ of each tree. Twenty-six (26) trees listed in the discussion will require 100mm depth of inert basalt gravel with 20mm diameter within their TPZ for increased ground protection.

13.9 Trees with potential hollows to be removed will have nesting boxes made and installed prior to removal of these trees. These trees must be supervised by an AQF level 5 arborist or ecologist (including a competent person) ensuring no habitat is damaged or killed with the processing of trees. Cutting of the trees and allowing one hour to pass while checking for habitat would be a suitable ameliorative choice. Nesting boxes to RMS standards to allow for relocation prior or during the process of clearing these trees.

14.0 GLOSSARY

Aerial Inspection: Where a tree is climbed by an arborist to inspect upper stem and crown for signs or symptoms of defects and disease etc.

Borer: larvae beetles, moths or wasps that cause damage within the phloem/cambium, sapwood and heartwood of the tree. Borers generally attack weakened trees or stressed trees.

Cambium: The layer of cells between the exterior bark and the inner wood which control cell division, hence stem, branch and shoot expansion.

Cavity: A void, initiated by a wound within the trunk, branches or roots. These voids are referred to as hollows.

Co-dominant: Stems or branches equal in size and relative importance.

Crown: The width of the foliage in the upper canopy of the assessed tree to the four cardinal points.

Crown lifting: The removal of the lower branches of the tree.

Crown thinning: The portion of the tree consisting of branches and leaves and any part of the stem from which branches arise.

Drip line: Where the canopy releases water shed from the foliage during precipitation.

DBH/Diameter: Diameter of trunk at 14meters in height of assessed tree.

Dead wooding: The removal dead branches from a tree.

Dieback: Tree deterioration where the branches and leaves die.

Flush cut: A cut that damages or removes the branch collar or removes the branch and stem tissue and is inconsistent with the branch attachment as indicated by the bark branch ridge.

Genus/ Species: Identified using its scientific name. Where the species name is not known, species is used. The common name for trees may vary considerably in each area of geographical differences and so will not be used in the field survey.

Height: Height has been estimated to + / - 2 meters.

Maturity: Tree age, Assessed as over mature (last 1/3 of life expectancy), mature (1/3 to 2/3 life expectancy) and semi mature (less than 1/3 life expectancy).

Remedial (restorative) pruning: includes: Removing damaged, deadwood; trimming diseased or infested branches. Trimming branches back to undamaged tissue in order to induce the production of shoots from latent or adventitious buds, from which a new crown will be established.

SRZ- Structural Root Zone: An area within the trees root zone in which roots stabilize the tree. Roots cut in this zone can cause instability and lead to anchorage loss.

Structural Integrity: Describes the internal supporting timber. (Substantial to frail)

Target: risk targets are people, property or activities that could injure, damage or disrupted.

Tree Numbering: All trees listed in the tree survey have been numbered and plotted.

TULE- Tree Useful Life Expectancy: An estimation of the trees useful life expectancy using appropriate industry methods with an inspection regime.

Vigour: This is an indication of the tree health. Trees have either been assessed as Good Vigour, Normal Vigour or Low Vigour.

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APPENDIX A TREE USEFUL LIFE EXPECTANCY - TULE

Adapted from Jeremy Barrell (SULE) 2014 for TCAA Consultant Arborists						
	1 Long TULE Trees that appeared to be retainable at the time of assessment for more than 40 years with low level of risk	2 Medium TULE Trees that appeared to be retainable at the time of assessment for 15 to 40 years with and with low to medium level risk	3 Short TULE Trees that appeared to be retainable at the time of assessment for 5 to 15 years with medium to high level of risk	4 Remove Trees that should be removed within the next 5 years High to Very high level of risk	5. No Potential for Retention REMOVE IMMEDIATELY Trees that must be removed immediately. Very high to Extreme level of risk	6 Small, Young or Regularly clipped Trees that can be easily transplanted or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live for between 15 and 40 more years.	Trees that may only live for between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Dead, dying or declining trees diseased or inhospitable conditions.	Small trees less than 5 meters in height.
B	Trees that could be made suitable for retention in the long term by Intervention Works.	Trees that may live for more than 40 years, but would need to be removed for safety or nuisance reasons.	Trees that may live for more than 15 years, but would need to be removed for safety or nuisance reasons.	Dangerous trees through instability or recent loss of adjacent trees.	Dangerous trees through instability or recent loss of adjacent trees.	Young trees less than 15 years old but over 5 meters in height.
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.	Trees that may live for more than 40 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been regularly pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by Intervention Works.	Trees that require substantial Intervention Works, and are only suitable for retention in the short-term.	Damaged trees that are clearly not safe to retain.	Damaged trees that are clearly not safe to retain and must be removed immediately.	
E				Trees that may live for more than 5 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	High Toxicity Allegan trees, asthmatic and poisonous trees and must be removed immediately.	
F				Trees that may cause damage to existing structures within 5 years.	OTHER, with legitimate explanation to be removed immediately.	
G				Trees that will become dangerous after removal of other trees for reasons given in 1A-1F.		
INSPECTION FREQUENCY	Inspection frequency 1-5 Years by competent inspector unless event monitored.	Inspection frequency 1-5 Years by competent inspector unless event monitored.	Inspection frequency 1-3 years by competent inspector unless event monitored.	Inspection frequency to 1 year by competent inspector unless event monitored.	1-7 days by competent inspector and event monitored	Inspection frequency Biannually by competent inspector.

APPENDIX B HEALTH & STRUCTURAL CONDITION OF TREE-VISUAL

KEY	Health & Structural Condition of Tree
1.	Maturity: J - Juvenile; IM - Immature; SM - Semi-Mature; M - Mature
2.	Excellent condition
3.	Good condition but poor development 3b Moderate
4.	Dieback is more than 20%. 4b Epicormics
5.	Sparse foliage crown 5b Unbalanced Canopy
6.	Physical damage
7.	Insect damage 7b Borers
8.	Fungal attack
9.	Cavity
10.	Termite damage inclusions
11.	Lean
12.	Heavily pruned 12b Dying
13.	Damage to roots 13b Encroachment
14.	Parasitic vine present
15.	Damage by climbing plant
16.	Inclusions
17.	Habitat tree
18.	Endangered species

Mattheck The Body Language of Trees 1994 adapted; Hornsby Shire Council

APPENDIX C RETENTION VALUES

DETERMINING LANDSCAPE SIGNIFICANCE RATING			MORTON, A 2006
RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register.	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999.	The subject tree has a very large live crown size exceeding 300m ² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species.
	The subject tree forms part of the curtilage of a Heritage Item (building/structure/artefact as defined under the LEP) and has a known or documented association with that item.	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species.	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity.
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event.	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area.	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc.) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m ² , a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence.	The tree is a locally indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link/Wildlife Corridor or has known wildlife habitat value.	The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. Crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	<p>The subject tree has a medium live crown size exceeding 40m²; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc.) with a crown density of more than 50% (thinning to normal); and</p> <p>The tree is visible from surrounding properties, but is not visually prominent - view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.</p>
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item.	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to building or other structures.	The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5-10 years) with new tree planting.
6. VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value.	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

APPENDIX C Continued

RETENTION VALUES: MORTON, A 2006 Determining landscape significance ratings.	
RETENTION VALUE	RECOMMENDED ACTION
High	<ul style="list-style-type: none"> • These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. • Proposed site design and placement of buildings and infrastructure should consider the Tree Protection Zones as discussed in the following section to minimise any adverse impact. • In addition to Tree Protection Zones, the extent of the canopy (canopy dripline) should also be considered, particularly in relation to a high-rise development. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
Moderate	<ul style="list-style-type: none"> • The retention of these trees is desirable. • These trees should be retained as part of any proposed development if possible, however these trees are considered less critical for retention. • If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.
Low	<ul style="list-style-type: none"> • These trees are not considered to be worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. • These trees should not be considered as a constraint to the future development of the site.
Very Low	<ul style="list-style-type: none"> • These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. • The removal of these trees is therefore recommended regardless of the implications of any proposed development.

APPENDIX C1 TREE RISK ASSESSMENT MATRIX

McArdle Arboricultural Consultancy Pty Ltd *Redrafted 14.4.14*

Categories and Sub-Categories

Failure Potential		1. Occasional use	2. Intermittent use	3. Frequent use	4. Constant use	5. Continual use
	A. Very Likely Almost certainly likely to occur in most circumstances	Medium	High	High	Very High	Extreme
	B. Likely May occur frequently	Medium	Medium	High	Very High	Very High
	C. Somewhat likely Possible and likely to occur at some time	*ALARP	Medium	High	High	Very High
	D. Unlikely Not likely to occur but could happen	ALARP	ALARP	Medium	Medium	High
	E. Highly Unlikely May occur in rare and exceptional circumstances	ALARP	ALARP	ALARP	Medium	High

The risk rating score is determined after assessing the Failure Potential and Target Rating of an identified hazard tree. The determination of these calculations will indicate a priority and course of action when implementing the risk reduction measures. *ALARP as low as reasonably practical.

Legend Failure Potential	Failure Potential x Target Rating = Risk Assessment		
A. Very Likely	Partial or whole tree failure is imminent e.g. cavity in excess of 70% of the trunk. Major bark inclusions, dead limbs, leaning tree with lifting root plate, roots/trunk decayed or damaged, Toxins, HOSTING BEES (other).		
B. Likely	Defects that could cause structural failure of the tree within the next 6 months.		
C. Somewhat likely	Defects present that could cause portions of the tree to fail.		
D. Unlikely	Defects are minor and not likely to cause significant harm.		
E. Highly unlikely	Tree is healthy with no obvious defects. Poses no immediate threat.		
TARGET RATING	<i>Adapted from B. Sullivan for TCAA CLIMBING CONSULTANT ARBORISTS</i>		
1. Occasional use	Out of bounds area, Restricted and inducted areas.		
2. Intermittent use	Parking lot, Ovals		
3. Frequent use	Busy street adjacent, schoolyard, childcare center.		
4. Constant use	Occupied classrooms and buildings, residences, offices, canteen and sit down lunch areas.		
5. Continual use	Access paths and gateways, where students congregate in numbers, assembly areas.		

APPENDIX D TREE PROTECTION

Extract from *Australian Standard AS4970 2009 – Protection of Trees on Development Sites*.

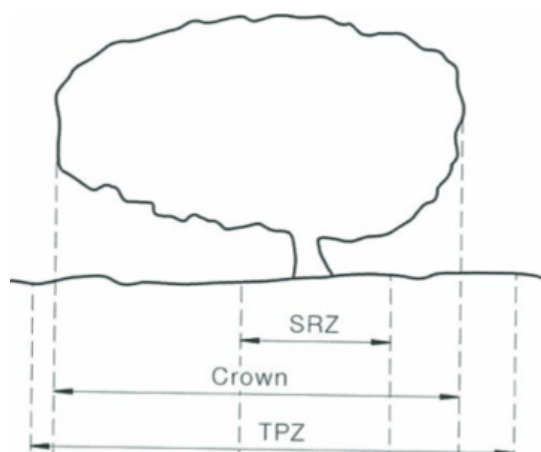


Figure 8. The TPZ, SRZ and Crown protection zones.

D.1 STRUCTURAL ROOT ZONE (SRZ)

"The SRZ is the area considered essential for tree stability. Temporary tree protection fencing shall be erected around the perimeter of all tree protection zones.

D.2 OTHER TREE PROTECTION MEASURES

When tree protection fencing cannot be installed due to restricted access e.g. tree located along side an access way/cliff or requires temporary removal, other tree protection measures should be used, including those set out below.

D.3 PROTECTIVE FENCING

It shall be installed prior to any demolition, or clearing and consists of a chain wire mesh panel, 1.8m-height cyclone fencing or star pickets at 2m intervals, connected by a continuous highly-visible barrier/hazard mesh at the height of 1.8 m. An alternative is plywood or wooden paling fence panels. This fencing material also prevents building material and soil from entering the TPZ. Mulch is to be applied across the surface of TPZ within the fencing. Bracing is permissible within the TPZ. Avoid damaging roots. This fencing will remain in place until all the construction work has been completed.

D.4 TREE PROTECTION ZONES

Signage shall be attached to the fence at regular intervals. Signage shall read "TREE PROTECTION ZONE. NO ENTRY EXCEPT TO AUTHORISED PERSONNEL *with induction*. FINES APPLY. "With contact details of Project Arborist J.E.McArdle Contac

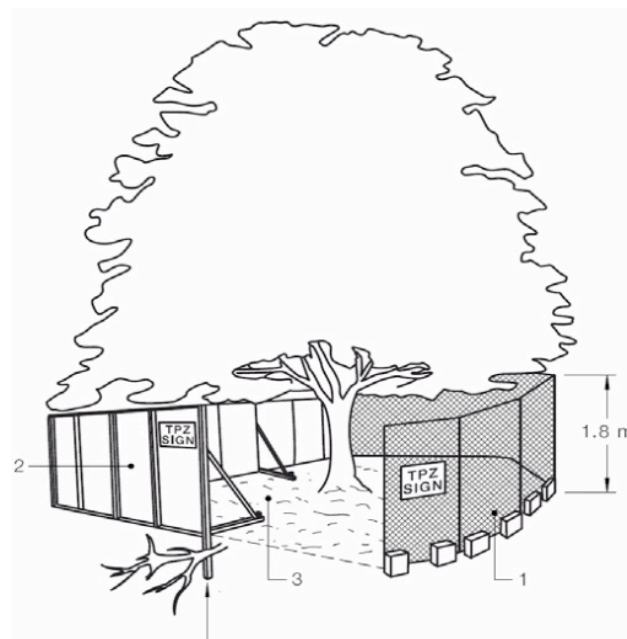


Figure 9. Tree Protection Fencing over the TPZ.

D.5 GROUND PROTECTION

If temporary access for machinery is required within the TPZ, ground protection measures will be required to prevent compaction in the root zone. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch 100mm maximum and 50mm minimum or crushed granite or sandstone rock below rumble boards.

D.6 INSTALLING UNDERGROUND SERVICES&LANDSCAPING WITHIN TPZ

All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by hand excavation under supervision of the AQF level 5 arborist(in manually-excavated trenches). The project arborist should assess the likely impacts of swale excavations and landscaping on retained trees. For landscaping and manual excavation trenches, the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

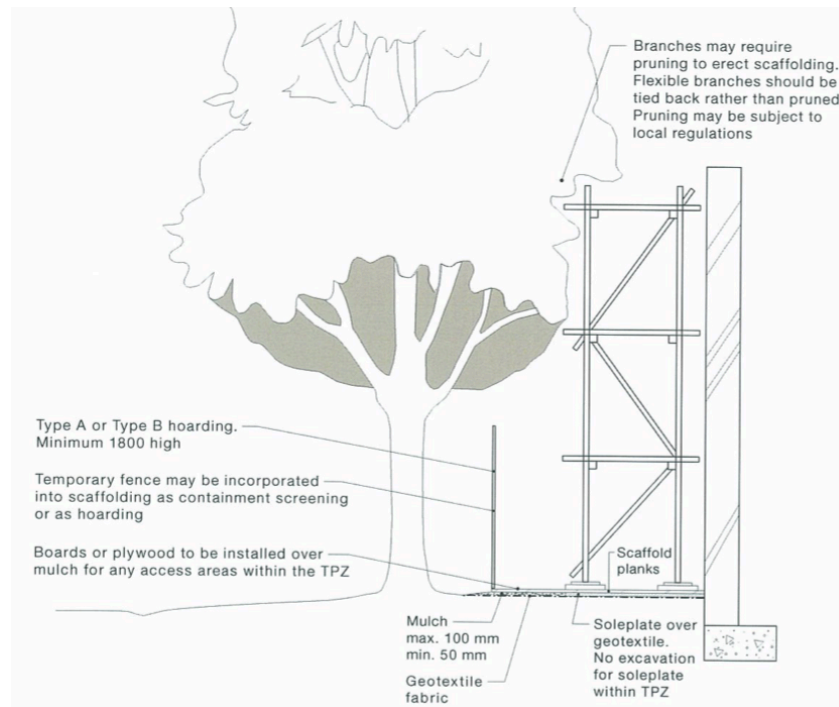


Figure 10. Ground Protection adjacent the Cola area

D.7 TRUNK AND BRANCH PROTECTION

For trunk and branch protection, use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed. Rumble boards should be a suitable thickness to prevent soil compaction and root damage. SBR matting is also to be utilised to assist in reduction of any compaction within TPZ access areas or=f the LLV site.

D.8 EXCAVATION

Excavation required for the insertion of support posts for boardwalks and tree protection fencing should not involve the severance of any roots greater than 20mm in diameter, without the prior approval of the project arborist. No roots to be cut within theSRZ(see Table 1 for setbacks)

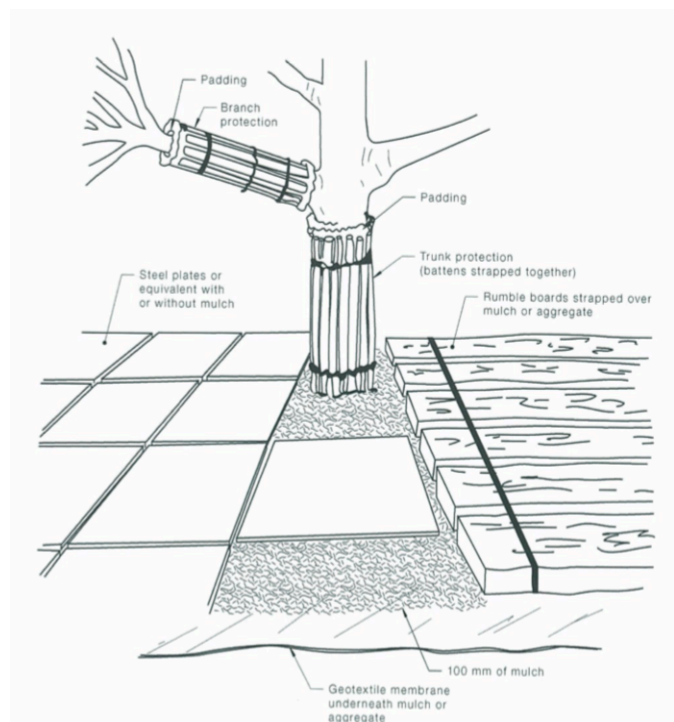


Figure 11. Tree Trunk and Branch Protection.

APPENDIX D Continued

D.9 INDUCTIONS

Inductions for footbaths and the use and access into tree protection zones TPZ of retained trees would be utilised in this site. See Appendix G.

D.10 NESTING BOXES

Installed and built according to RMS standards with locations presented by the ecologist. Nesting boxes are to be installed with low friction surfaces so that with current wind elements and movement the trees will not be damaged from bark fracture or wear at the sites of the nesting box installations.

D.11 PROHIBITIONS

- I The following activities shall not be carried out within any Tree Protection Zone:
 - a. Disposal of chemicals and liquids (including concrete and mortar slurry, solvents, paint, fuel or oil);
 - b. Stockpiling, storage or mixing of materials;
 - c. Refuelling, parking, storing, washing and repairing tools, equipment, machinery and vehicles;
 - d. Disposal of building materials and waste;

- II The following activities shall not be carried out within any Tree Protection Zone unless under the supervision of the Project Arborist:
 - a. Increasing or decreasing soil levels (including cut and fill);
 - b. Soil cultivation, excavation or trenching;
 - c. Placing offices or sheds;
 - d. Erection of scaffolding or hoardings; and/or
 - e. Any other act that may adversely affect the vitality or structural condition of the tree.

- III All work undertaken within or above a Tree Protection Zone shall be supervised by the Project Arborist. This includes landscaping and drainage installation.

- IV Excavation within the Tree Protection Zone of any tree to be retained shall:
 - a. Be undertaken using non-destructive methods (e.g. an Air-spade or by hand) to ensure no roots greater than 40mm in diameter are damaged, pruned or removed. No roots within the SRZ are to be pruned at the LLV site.
 - b. All care shall be taken to preserve and avoid damaging roots; excavation should not occur within the Structural Root Zone.

APPENDIX E TREE PLANTING SPECIFICATIONS AND MAINTENANCE

Australian Standards AS 2303 2015 – Tree Stock for Landscape Use.

E.1 Careful consideration should be given to the location of trees and shrubs to minimise future problems. A basic guide for planting follows:

E.2 Don't plant too close to buildings or swales or plant large trees too close together: Determine the height and canopy of trees when fully grown. Allow room for root growth (at least twice the height of the tree). Large trees should be planted at least three meters from buildings or hard surface infrastructure.

Check with the AQF level 5 project arborist when planting under wires or over drainage lines including swales: Determine the mature size of the tree and the size and nature of its root system.

E.3 Consider your neighbours when choosing plants: Consider the effect on neighbouring properties (i.e. shading, loss of views, impact on foundations, fences and services).

E.4 Use trees to provide your home with summer shade and/or winter sun: Plant deciduous trees (suitable to the climate and soils of this Shire). Consider the summer and winter shadows of evergreen trees.

E.5 Don't grow climbers on trees: Climbers can strangle trees, leading to the tree's eventual death. Retain and protect as many trees as possible when building or extending your home. (This will be a Council requirement).

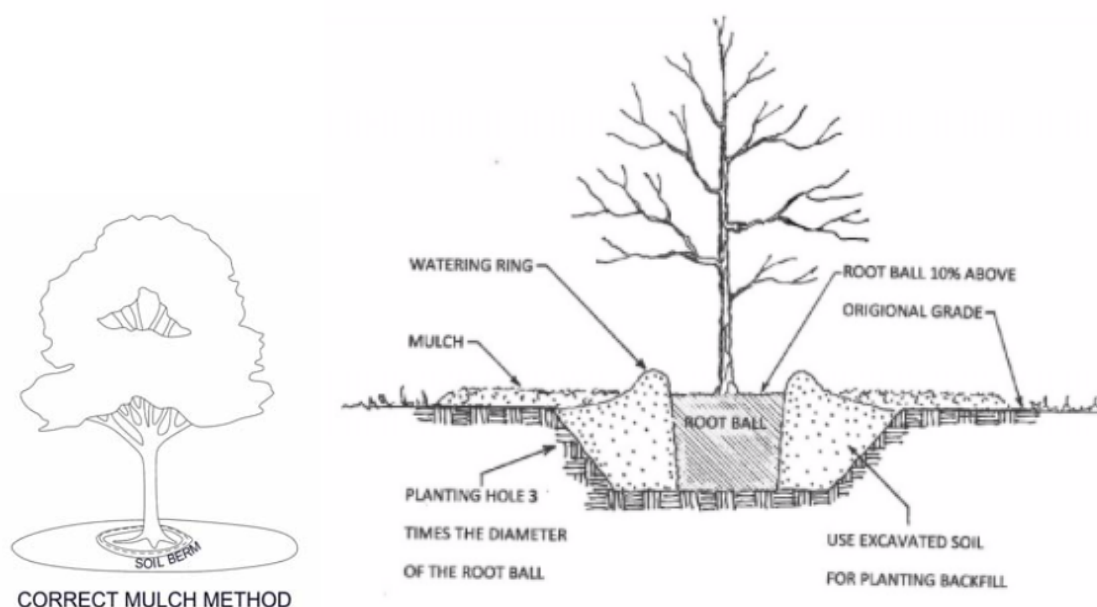
E.6 Use locally native and non-invasive species in your garden: Increase the success rate of your garden. Attract native fauna to your garden. Reduce the amount of watering required.

E.7 Don't excavate or alter the ground level around trees: Can cause root damage or starving of the roots. Can cause limb drop, instability or tree death. Substantially altering soil level within three meters of the trunk is in breach of the Tree Preservation Order.

E.8 When buying plants, check their characteristics: Check on mature size, shade characteristics, potential for roots to cause damage, flowers, fruits and pollen, to determine their suitability.

E.9 Mature trees do need maintenance: Remove or trim misshapen branches. Check for fungal rots or other diseases. If in doubt, contact Council for a tree inspection or contact an experienced Arborist. Indiscriminate lopping can be dangerous to your safety and the health of the tree.

Staking of trees and mulch should be carried out similar to the diagrams.



APPENDIX F TREE RETENTION AND MANAGEMENT PLAN

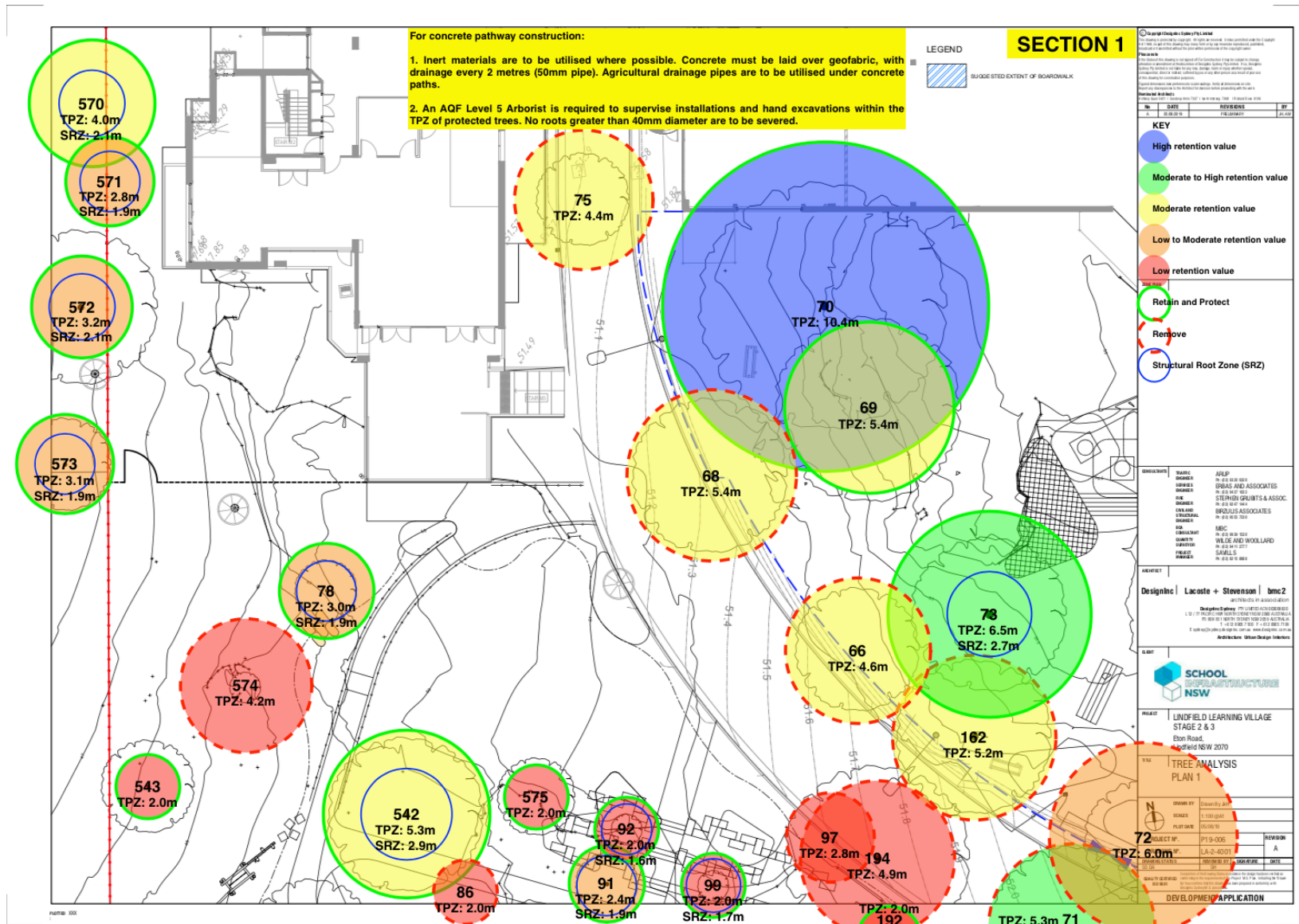


Figure 12: Tree Retention and Management Plan – Section 1

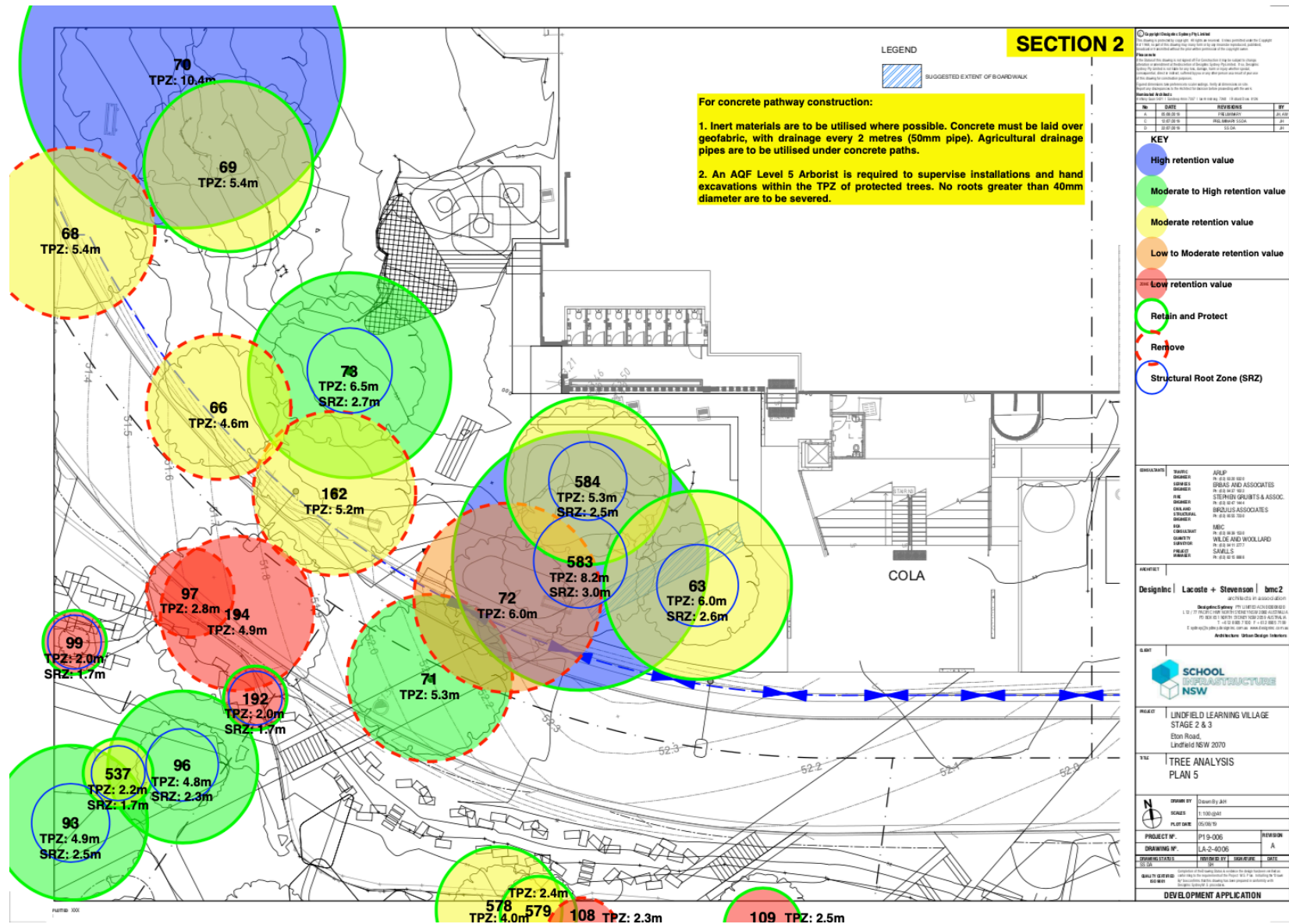


Figure 13: Tree Retention and Management Plan – Section 2.

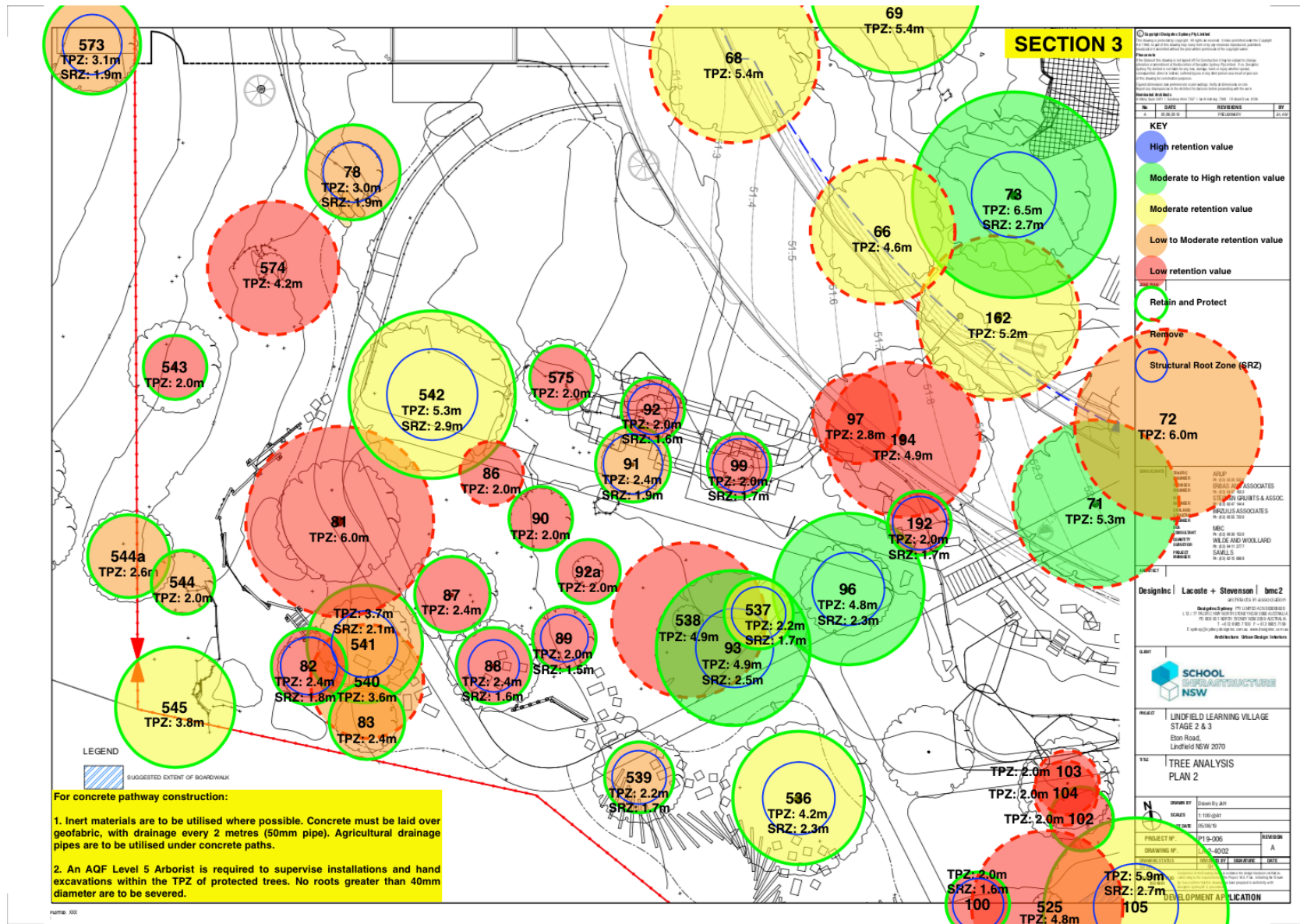


Figure 14: Tree Retention and Management Plan – Section 3.

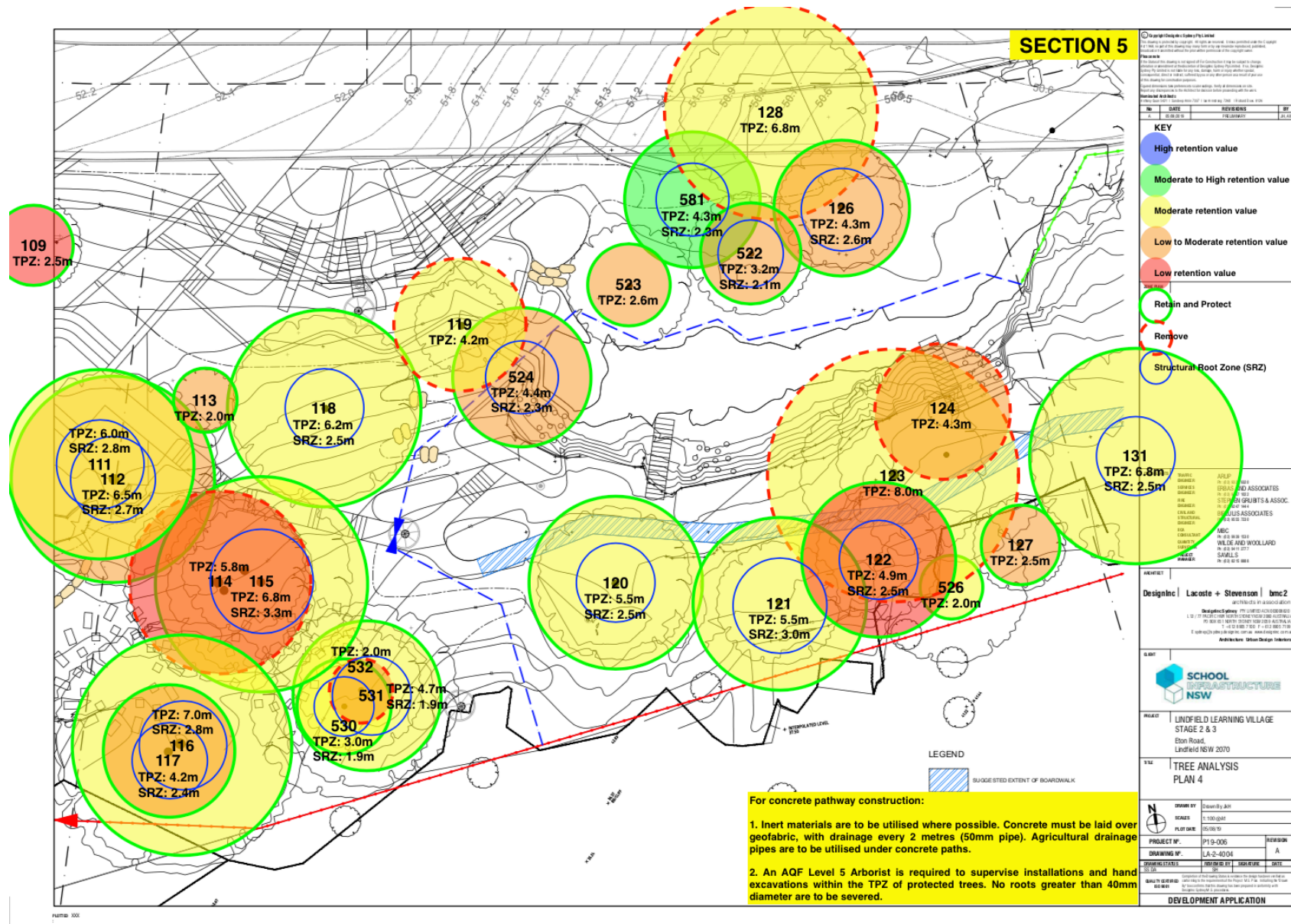


Figure 16: Tree Retention and Management Plan – Section 5.

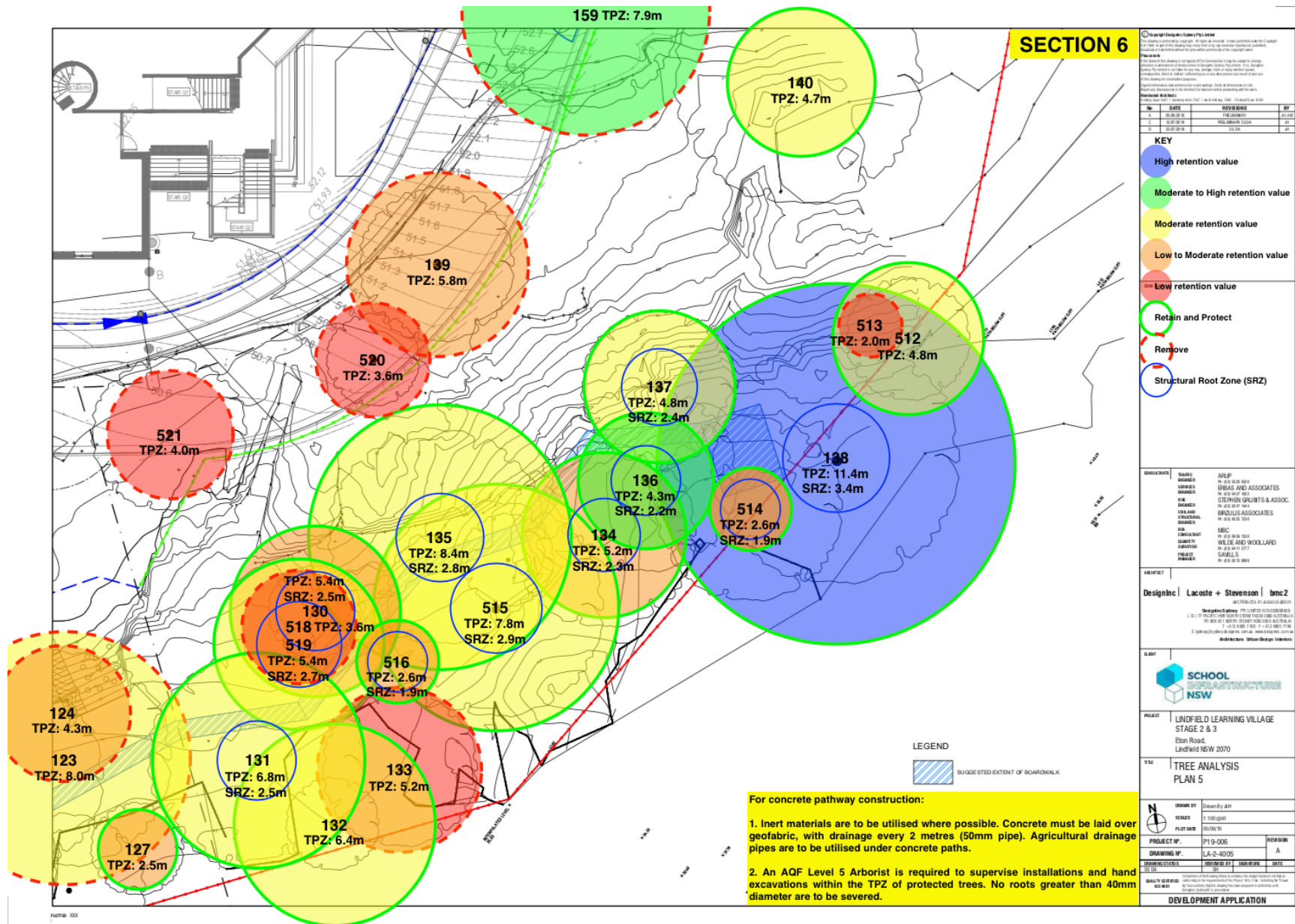


Figure 17: Tree Retention and Management Plan – Section 6.

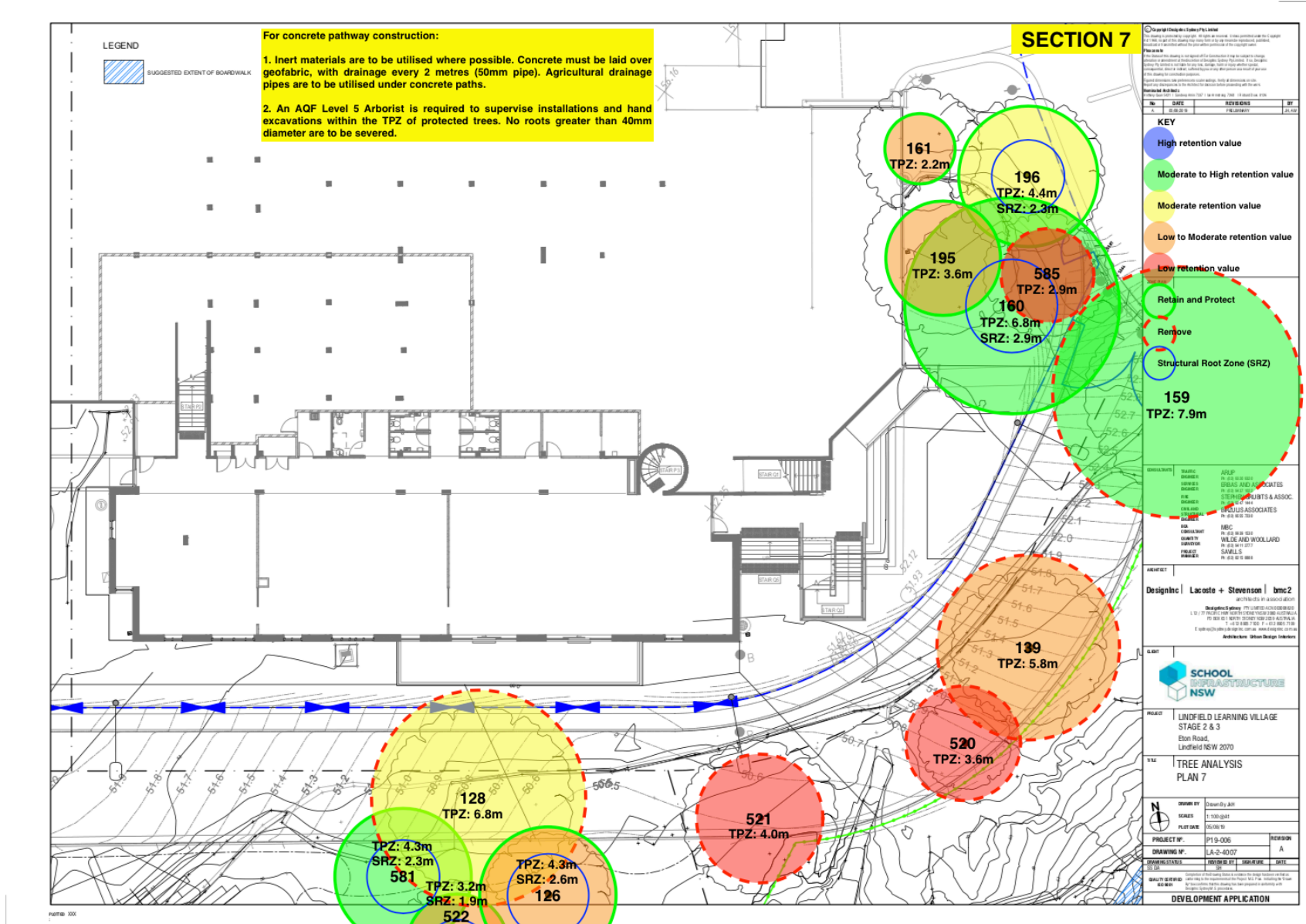
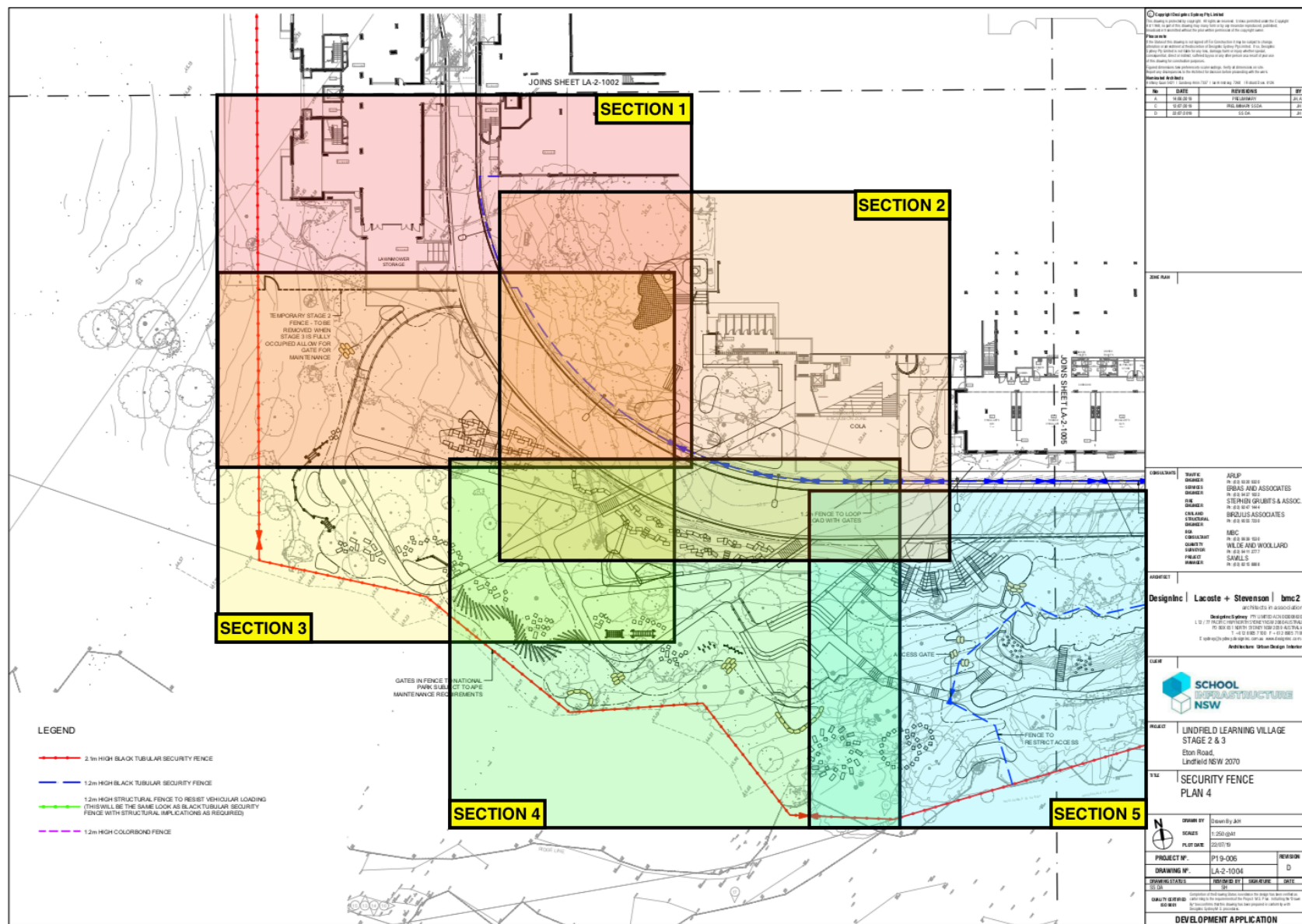


Figure 18: Tree Retention and Management Plan – Section 7.



McArdle Arboricultural Consultancy Pty Ltd



DISCLAIMER

McArdle Arboricultural Consultancy Pty Ltd does not assume responsibility for liability associated with the tree on or adjacent to this project site, their future demise and/or any damage, which may result therefrom.

McArdle Arboricultural Consultancy Pty Ltd takes care to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

McArdle Arboricultural Consultancy Pty Ltd cannot be held responsible for any consequences as a result of work carried out outside specifications, not in compliance with Australian Standards or by inappropriately qualified staff.

Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale.

LIMITS OF OBSERVATION

McArdle Arboricultural Consultancy Pty Ltd makes every effort to accurately identify current tree health and safety issues. Results may or may not correlate to actual tree structural integrity. There are many factors that may contribute to limb or total tree failure. Not all these symptoms are visible. There can be hidden defects that may result in a failure even though it would seem that other, more obvious defects would be the likely cause of failure. All standing trees have an element of unpredictable risk.



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