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ARBORICULTURAL IMPACT REPORT

Site Address: 1-23 Lenore Drive, Erskine Park 2759

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1 Introduction

This report has been prepared for the client, Mr Frank Nicholas, in response to a request for an Arboricultural Impact Report regarding 7 x trees surveyed to the south western corner of the site that may be affected by the proposed industrial development at 1-23 Lenore Avenue, Erskine Park.

It has been noted that within the same stand of 7 trees surveyed, there are a further 7 x trees that are protected by Council's Development Control Plan (DCP). Locations for these trees have been approximated and the trees have been included in the report. There are also a number of trees located toward the north eastern site boundary, however the Architect has advised that Council determined at the Pre-DA Meeting that these trees were not required to be included within the report.

2 Aim

The intent of the report is to provide an independent assessment of tree health, condition and retention value and review the potential impact of the proposed development upon the tree/s, making recommendations for removal or retention and protection including design changes as required.

3 Methodology

3.1 General

The site was attended on 18 February 2019 and an assessment of the trees and their growing environment was undertaken. Inspection of the trees has been carried out from the ground only. No aerial inspections, woody tissue testing, or root mapping has been undertaken at the time of inspection, however these may be recommended.

3.2 Visual Tree Assessment (VTA)

A Visual Tree Assessment for each tree has been carried out using standard industry practice. This includes research of the tree species origin and optimal growing conditions, visual assessment of the tree's roots, trunk, branches and canopy undertaken from the ground and research of the tree's growing environment including soil, topography and site history. Site measurements have been calculated as follows:

- Height and canopy spread have been approximated
- Diameter at Breast height (DBH) has been measured using a diameter tape at 1.4 metres above ground level
- Diameter at Base (DAB) has been measured using a diameter tape just above the root flare

3.3 Useful Life Expectancy Assessment (ULE)

An assessment of ULE has been carried out for each tree. A ULE is the life expectancy of the tree, modified by its age, health, condition, location, economics, effects on better trees and sustained amenity (Barrell). Please see Appendix A for further information.

3.4 Significance Assessment

An assessment of significance for each tree has been carried out using the Institute of Australian Consulting Arborists (IACA) Significance of a Tree, Assessment Rating System (STARS). Please see Appendix B for further information.

3.5 Tree Protection and Structural Root Zones

Tree Protection Zones (TPZ's) and Structural Root Zones (SRZ's) have been calculated for each tree by measuring the circumference of the tree at 1.4 metres above ground level and just above the root flare using the calculation formula as specified in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

Incursion of the development into the tree protection zone may impact upon the viability of the tree. Although incursion should be avoided wherever possible, an incursion of 10% or less is considered minor. Any incursion more than 10% of the tree protection zone area will require further Arborist investigation and may include root mapping and recommendations for construction methodologies to reduce impacts upon the tree.

3.6 Documentation

Documentation reviewed as part of the investigation for this report includes:

1. SEPP Vegetation in Non-Rural Areas 2017
2. Penrith Local Environment Plan (LEP) 2010
Clause 5.9 – Preservation of Trees or Vegetation
3. Penrith Development Control Plan (DCP) 2014
Part C2 – Vegetation Management
4. Architectural Drawings by ArkExpress, Project No. 17221:
A0002, Issue B, dated 20.04.2018 – Proposed Site & Roof Plan
A1002, Issue 3, dated 12.02.2019 – Proposed Ground Master Plan

4 Discussion of Trees and Proposed Development

4.1 Site and Trees - General

The site is currently vacant and appears to have been disturbed in the past. The ground area immediately to the north of the trees is currently occupied by a somewhat degraded bitumen and gravel road. The soil area over the northern portion of the root plates is likely to be compacted.

All trees are showing signs of varying degrees of stress likely due in the first instance to soil compaction, disturbance and poor growing conditions over an extended period, with secondary infestations of mistletoe and termite as well as extensive branch dieback, branch failure and poor wound wood development evident.

No hollows were observed and the only habitat identified is provided by a bird box which could be readily relocated to a semi-mature tree within the neighbouring allotment that appears to support an indigenous flora and wetland regeneration project.

4.2 Trees to be Removed

All 14 x trees assessed as part of this report are proposed to be removed as part of the proposed development. For detailed observations and calculations regarding each tree, impact of the proposed development and recommendations, please refer to Appendix C – Tree Impact and Assessment Table.

12 of the trees are *Eucalyptus moluccana* (Grey Box) at various stages of maturity. These trees show signs of stress with secondary infestations of mistletoe and termite as well as extensive branch dieback, branch failure and poor wound wood development evident and have been assessed as low or medium retention value.

The remaining 2 x trees are *Syagrus romanzoffianum* (Cocos Palm) and *Lagunaria patersonia* (Norfolk Island Hibiscus) which are exempt species under Council's DCP.

The proposed development represents major incursions into the TPZ areas for all 12 x *Eucalyptus moluccana* and also incurs into the SRZ for these trees. Given the current fair to poor health and condition of the trees, it is highly likely that any further disturbance would increase stress and contribute to a further decline in health and condition.

The trees have been assessed as low to medium retention value and the cost associated with nursing some of the trees back to optimum health along with the design changes and/or specialised construction techniques that would be required to retain them in the long term would be substantial. Given that there is more than adequate opportunity to establish a dense, healthy replacement tree canopy within the embankment areas to the north east and north west site boundaries, it is considered more appropriate to allow for the removal and replacement of these trees. Planting of locally indigenous trees, understory shrubs and grasses will also assist in the management of soil, improve biodiversity and provide food source and habitat for indigenous fauna.

5 Conclusion

The proposed industrial development requires the removal of 2 x exempt tree specimens and 12 x *Eucalyptus moluccana* (Grey Box) at various stages of maturity and in fair to poor health and condition with low to medium retention value. No hollows were observed and a habitat box could be easily relocated to a tree within the adjoining property that appears to support an indigenous flora and wetland regeneration project.

The cost associated with nursing the trees back to optimum health along with the design changes and/or specialised construction techniques that would be required to retain them in the long term would be substantial and as such it is considered more appropriate to remove and replace the trees within the proposed dense embankment planting areas to the north east and north west site boundaries.

6 Recommendations

6.1 Tree Removal and Replacement

All 14 x trees assessed as part of this report are recommended to be removed and replaced.

The habitat box attached to tree number 4 will be required to be carefully removed by an appropriately qualified professional and re-attached at a similar height to a semi-mature tree within the adjoining property. Note that permission from the property owner will be required.

Replacement tree planting proposed within the embankment areas to the north east and north west property boundaries should include a minimum of 14 x *Eucalyptus moluccana* (Grey Box).

7 Limitations of Liability & Validity

This report has been prepared by TREECAS on the understanding that its contents may not be disclosed to any other party except for the Local Government Authority for the site without prior written approval from TREECAS. This report must be read in its entirety. At no time, shall part of the written assessment be referred to unless taken in full context of the whole written report. If this written report is to be presented in a court of law or any legal situation TREECAS must be advised in writing prior to the event.

Care has been taken to ensure that all information is accurate, however TREECAS will not be held responsible for the accuracy of information provided by others.

This assessment and findings of this report are valid for a period of 12 months from the date of site inspection under normal conditions. The report is no longer valid in the following circumstances:

- The site is substantially altered by clearing, demolition, excavation or construction works
- Intense weather events that may include any of the following; heavy rain (40mm/hour or more), soil erosion, strong winds (50km/hour or more), lightning activity
- Tree works being undertaken on the trees including branch or root pruning, pest treatment and/or tree removal

8 References & Bibliography

Trees and Development

Matheny and Clark 1998

Evaluation of Hazard Trees in Urban Areas

Matheny and Clark 1994

Institute of Australian Consulting Arborists

www.iaca.org.au

International Society of Arboriculture

www.isa-arbor.com

Penrith Council

www.penrithcity.nsw.gov.au

Tree Risk Assessment Manual

International Society of Arboriculture 2013

Australian Standard for Protection of Trees on Development Sites AS4970-2009

(Incorporating Amendment 1)

9 Glossary of Terms

Age Class

Immature (IM) refers to a well-established but juvenile tree

Semi Mature (SM) refers to a tree at growth stages between immaturity and full size. A tree that has reached first adult form i.e. displays adult characteristics.

Mature (M) refers to a full-size tree with some capacity for further growth

Over Mature (OM) refers to a tree approaching decline or already declining

Crown Class

Dominant (D) refers to trees whose crowns are above the upper layer of the canopy and generally receiving some light from above and sides

Co-dominant (CO) refers to trees whose crowns form the upper edge of the canopy, touching the canopies of similar size trees or built structures and generally only receiving light from above.

Intermediate (IN) refers to trees whose crowns have been reduced or affected by surrounding trees or built structures, however they are still receiving some light from above.

Suppressed (SU) refers to trees whose crowns have been overtopped by other trees or built structures and occupy an understorey position in the canopy.

Deadwood dead branches or limbs throughout the canopy

Diameter at Breast Height (DBH) expressed in millimetres refers to the trunk diameter at 1.4m above ground level.

Dieback death of foliage and upper branchlets in the canopy

Epicormic Growth stems or branches formed from dormant buds beneath the bark of a tree, usually activated into growth in response to some form of stress, injury or severe environmental condition

Height expressed in metres refers to the estimated overall height of the tree

Included Bark a weak branch union formed when bark becomes entrapped in the crotch/branch junction during subsequent growth

Spread expressed in metres refers to the estimated spread of the crown at the dripline

ULE a systematic pre-development tree assessment procedure. It gives the length of time that the Arborist feels a particular tree can be retained with an acceptable level of risk based on the information available at the time of inspection

Tree a perennial plant with a single woody trunk and more or less distinct and elevated head

Vigour Ability of tree to sustain its life processes. This is independent of the condition of the tree but may have an impact upon it. Vigour can appear to alter rapidly with change of seasons e.g. dormancy or deciduous and semi-deciduous trees

Appendix A - Useful Life Expectancy (ULE) Assessment Process

	1.LONG ULE Trees that appeared to be retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance.	2.MEDIUM ULE Trees that appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	3.SHORT ULE Trees that appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	4.REMOVALS Trees which should be removed within the next 5 years.	5.MOVED OR REPLACED Trees which can be reliably moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 40 more years.	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small trees less than 5 metres (m) in height.
B	Trees that could be made suitable for long-term retention by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety and nuisance reasons.	Dangerous trees through damage, structural defect, instability or recent loss of adjacent trees.	Young trees less than 15 years old but over 5 m 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 damage, structural defects including cavities, decay, included bark, wounds and poor form.	Trees that have been regularly pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	
F				Trees that are damaging or may cause damage to existing structure within 5 years.	
G				Trees that will become dangerous after removal of other trees for the reasons given in A) to F).	
H				Trees in categories A) to G) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.	

Appendix B - Tree Retention Value – Priority Matrix

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest/Noxious Weed Species	Hazardous /Irreversible Decline
Estimated Life Expectancy	1. Long > 40 years					
	2. Medium 15-40 years					
	3. Short <1-15 years					
	4. Dead					
Legend for Matrix Assessment						
	Priority for Retention (High) – These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 Protection of Trees on development sites. Tree sensitive construction measures must be implemented e.g. pier and beam etc. if works are to proceed within the tree Protection Zone.					
	Consider for Retention (Medium) – These trees may be retained and protected. These are less critical; however, their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.					
	Consider for Removal (Low) – These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.					
	Priority for Removal – These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.					

IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES

Australia ICOMOS Inc. 1999, The Burra Charter - The Australian ICOMOS Charter for Places of Cultural Significance, International Council of Monuments and Sites, www.icomos.org/australia

Draper BD and Richards PA 2009, Dictionary for Managing Trees in Urban Environments, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

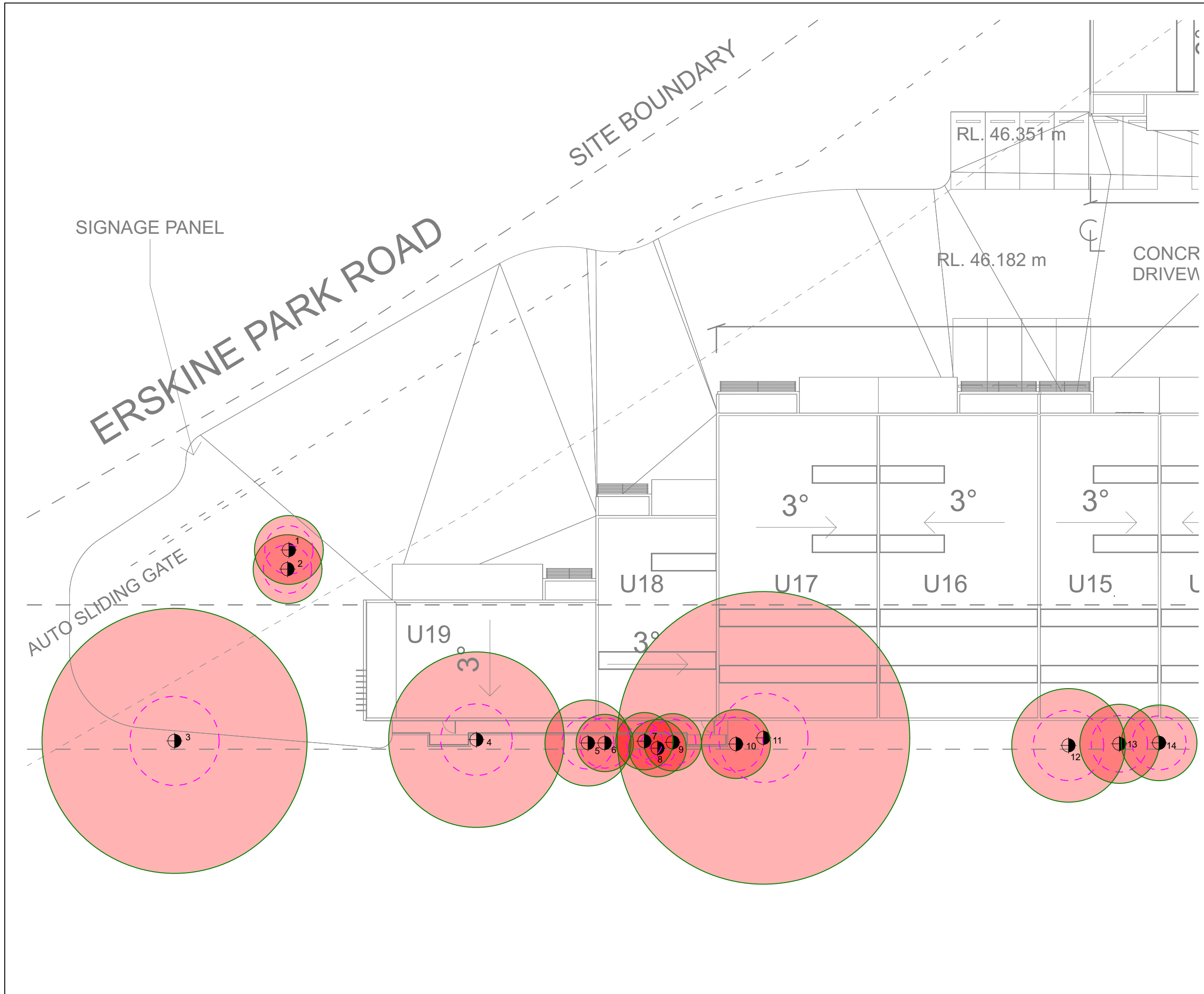
Footprint Green Pty Ltd 2001, Footprint Green Tree Significance & Retention Value Matrix, Avalon, NSW Australia, www.footprintgreen.com.au

Appendix C – Tree Impact and Assessment Table

Tree Number	Species	Age Class	Height (m)	Spread (m)	DBH (m)	Crown	Health & Condition	Comment	ULE	Retention Value	TPZ (m)	SRZ (m)	Incursion	Likely Impact	Action Required
1	<i>Syagrus romanzoffianum</i> (Cocos Palm)	SM	7	3	N/A	CO SYM	Good	The tree is an exempt species within the Penrith LGA.	4e	Low	N/A	N/A	N/A	N/A	REMOVE
2	<i>Lagunaria patersonia</i> (Norfolk Island Hibiscus)	M	8	4	N/A	CO ASYM	Fair	The tree is an exempt species within the Penrith LGA.	4e	Low	N/A	N/A	N/A	N/A	REMOVE
3	<i>Eucalyptus moluccana</i> (Grey Box)	M	17	7	0.77	D ASYM	Poor	A wound occurs to the lower trunk from the root crown to 0.8 metres above ground level and extends 30% circumference with fair wound wood development and termite damage evident. Multiple large branches to approximately 300mm diameter have failed within the canopy with termite damage evident at wound sites. An included branch junction with reaction wood development occurs at 2.5 metres above ground level. The canopy is sparse with multiple deadwood to approximately 80mm diameter, epicormic growth and mistletoe infestations.	3c	Low	9.24	3.11	MAJOR – 41.4%	Disruption of absorbing and structural root systems for the construction of the proposed entrance road within approximately 0.3 metres of the base of the tree trunk.	REMOVE
4	<i>Eucalyptus moluccana</i> (Grey Box)	SM	16	4	0.51	CO SYM	Fair	A habitat box is attached to the tree at approximately 5 metres above ground level with suspected bird inhabitants (bird calls heard in the immediate vicinity whilst on site). Multiple deadwood to 80mm diameter, a deadwood hanger, epicormic growth and mistletoe infestations occur within the canopy. Small branches to approximately 40mm diameter have previously failed within the canopy with termite damage evident at wound sites.	2d	Medium	6.12	2.49	MAJOR – 48.7%	Disruption of absorbing and structural root systems for the construction of the proposed unit 19 hard up against the tree trunk.	REMOVE
5	<i>Eucalyptus moluccana</i> (Grey Box)	SM	6	2	0.25 @1m	SU SYM	Poor	Location on plan is approximate only. The tree has been previously topped at 1.4 metres above ground level and the wound has not fully occluded.	3c	Low	3.00	1.82	MAJOR – 37.7% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed unit 19 hard up against the tree trunk.	REMOVE
6	<i>Eucalyptus moluccana</i> (Grey Box)	SM	8	2	0.15	SU SYM	Poor	Location on plan is approximate only. Mistletoe infestation and foliar damage by chewing insect occurs within the canopy.	2d	Medium	2.00	1.75	MAJOR- 31.5% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed unit 18 hard up against the tree trunk.	REMOVE

Tree Number	Species	Age Class	Height (m)	Spread (m)	DBH (m)	Crown	Health & Condition	Comment	ULE	Retention Value	TPZ (m)	SRZ (m)	Incursion	Likely Impact	Action Required
7	<i>Eucalyptus moluccana</i> (Grey Box)	SM	6	2	0.15	SU SYM	Fair	Location on plan is approximate only.	1b	Medium	2.00	1.50	MAJOR – 36.5% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed unit 18 hard up against the tree trunk.	REMOVE
8	<i>Eucalyptus moluccana</i> (Grey Box)	SM	8	3	0.12	SU SYM	Fair	Location on plan is approximate only. Mistletoe infestation occurs within the canopy.	2d	Medium	2.00	1.61	MAJOR – 21.7% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed unit 18 within approximately 0.5 metres of the base of the tree trunk.	REMOVE
9	<i>Eucalyptus moluccana</i> (Grey Box)	J	4	2	0.08	SU SYM	Fair	Location on plan is approximate only. A small wound occurs to the lower trunk and epicormic growth occurs within the canopy.	2d	Medium	2.00	1.50	MAJOR – 41% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed unit 18 hard up against the tree trunk.	REMOVE
10	<i>Eucalyptus moluccana</i> (Grey Box)	SM	6	2	0.20 @1m	SU SYM	Poor	Location on plan is approximate only. The tree has been previously topped at 1.4 metres. A small wound occurs to the trunk. Epicormic growth and fused branches occur within the canopy.	3c	Low	2.40	1.88	MAJOR – 23.9% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed unit 18 hard up against the tree trunk.	REMOVE
11	<i>Eucalyptus moluccana</i> (Grey Box)	OM	13	6	0.85	CO ASYM	Poor	The tree has three co-dominant leaders from the base. 1 x eastern leader has completely died back to the root crown. The remaining eastern leader has 90% of its foliage comprising of mistletoe infestation and multiple previous branch failures to approximately 80mm diameter. The western leader has died back to 4 metres above ground level with multiple previous large branch failures, epicormic growth and termite damage evident.	4a	Low	10.2	3.11	MAJOR – 45%	Disruption of absorbing and structural root systems for the construction of the proposed units 16, 17 & 18 hard up against the tree trunk.	REMOVE
12	<i>Eucalyptus moluccana</i> (Grey Box)	SM	13	4	0.33	CO SYM	Poor	Multiple previous branch failures to approximately 100mm diameter and branch die back occur within the canopy. An included junction occurs at 4 metres above ground level. 40% of the foliage is mistletoe infestation and epicormic growth occurs within the canopy.	4a	Low	3.96	2.45	MAJOR – 20.5%	Disruption of absorbing and structural root systems for the construction of the proposed units 15 & 16 within approximately 1.2 metres of the base of the tree trunk.	REMOVE

Tree Number	Species	Age Class	Height (m)	Spread (m)	DBH (m)	Crown	Health & Condition	Comment	ULE	Retention Value	TPZ (m)	SRZ (m)	Incursion	Likely Impact	Action Required
13	<i>Eucalyptus moluccana</i> (Grey Box)	SM	13	3	0.23	CO SYM	Poor	Location on plan is approximate only. An included junction with reaction wood development occurs at 3 metres above ground level. Small mechanical wounds with kino seepage occur to the lower trunk. The canopy is asymmetrical and heavily biased to the north.	3c	Low	2.76	1.97	MAJOR – 11.6% (Approximately)	Disruption of absorbing and structural root systems for the construction of the proposed units 15 & 16 within approximately 1.2 metres of the base of the tree trunk.	REMOVE
14	<i>Eucalyptus moluccana</i> (Grey Box)	SM	12	2	0.22	CO SYM	Fair	A small mechanical wound occurs at 2 metres above ground level. Mistletoe infestation occurs within the canopy.	2d	Medium	2.64	1.88	MAJOR – 11%	Disruption of absorbing and structural root systems for the construction of the proposed units 14 & 15 within approximately 1.2 metres of the base of the tree trunk.	REMOVE



LEGEND

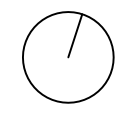
- TREE FOR REMOVAL - TPZ
- TREE FOR REMOVAL - SRZ



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NORTH POINT 	SCALE 1:250@A3
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DRAWN BY KM	DATE 27.02.2019
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NUMBER ARB01	ISSUE DA
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PLAN TITLE
 APPENDIX D
 TREE IMPACT PLAN