

Edmondson Avenue, Fifth & Sixth Avenues, Austral

Arboricultural Impact Assessment

Prepared for Vantage Property

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Trees are living organisms. As such, their health and structure may alter, they will grow and their environmental circumstances may change from the time of the site inspection upon which this assessment is based. Trees, as with all living things, pose some level of risk.

This report is valid for a period of 12 months after the date of inspection, unless otherwise stated. Any significant change to the subject tree(s) or surrounding environment, including catastrophic storm/wind events will require the immediate re-inspection and assessment of the tree(s).

Trees fail in ways that the arboricultural community are yet to fully understand. There is no guarantee expressed or implied that failure or deficiencies may not arise of the subject trees in the future. No responsibility is accepted for damage to property or injury/death caused by the nominated trees.

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Abbreviations

Abbreviation	Description
AQF	Australian Qualifications Framework
AS	Australian Standards
DBH	Diameter at Breast Height
ELA	Eco Logical Australia
m	Metre
mm	Millimetre
NDE	Non-Destructive Excavation
NO	Number
NSW	New South Wales
SP	Species
SRZ	Structural Root Zone
TPZ	Tree Protection Zone
VTA	Visual Tree Assessment
J	Juvenile
SM	Semi mature
Μ	Mature

1 Background

1.1 Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by Vantage Property to prepare an arboricultural impact assessment for a proposed development located at Edmondson Avenue, Fifth and Sixth Avenue, Austral.

The development site has been bio-certified. This bio certification is outlined in The Growth Centres SEPP done by the order of the Minister for the Environment under s.126G of the TSC Act. The mechanism for achieving this is outlined in the Growth Centres Conservation Plan (Eco Logical Australia, 2007) and the conditions for the bio-certification are documented in the Minister's order for consent. The effect of the bio-certification is that any development undertaken on certified land is not likely to have a significant impact on threatened species, endangered populations and endangered ecological communities listed under the NSW *Threatened Species Conservation Act 1995*. It is considered that the bio-certification negates the requirement for any further ecological assessment, however an arboricultural impact assessment has been requested by the Joint Regional Planning Panel.

The purpose of this report is to:

- identify the trees within the site that are likely to be affected by the proposed works
- assess the current overall health and condition of the subject trees
- evaluate the significance of the subject trees and assess their suitability for retention.

1.2 The proposal

The key features of the proposed development are summarised as follows:

- demolition of existing dwellings and structures
- construction of new dwellings and associated subdivision
- road and landscaping works
- installation of associated services and infrastructure.

1.3 The study area

The study area is located within the City of Liverpool Local Government Area and is bounded by Sixth Avenue to the north, Edmondson Avenue to the east, and Fifth Avenue to the south. A map of the study area is in **Appendix A**.

1.4 The subject trees

The subject trees were inspected on 8 May 2017. A total of **102** trees were identified within the study area. Further information, observations and measurements specific to each of the subject trees can be found in **Chapter 3**.

1.5 Tree preservation

Trees that do not meet the criteria as a "tree" under the *Liverpool City Council* tree controls have not been included in this assessment. Liverpool City Council defines a tree as the following:

- height greater than 3.5 m; and/or
- canopy spread greater than 4 m; and/or
- primary trunk diameter greater than 400 mm when measured 1 m above existing ground level of the tree.

No trees identified on the site are listed as exempt (weed) species under Council's controls.

1.6 Documents and plans referenced

The conclusions and recommendations of this report are based on the *Australian Standard, AS 4970-2009, Protection of Trees on Development Sites*, the findings from the site inspections and analysis of the following documents/plans:

- Siteworks and Stormwater Management Plan prepared by Mott McDonald, dated 04/11/16
- Earthworks Depth Plan prepared by Mott MacDonald, dated 04/11/16
- Survey Plan prepared by Apex Surveying dated 30/8/16
- Order to confer biodiversity certification, Department of Climate Change, Environment and Water dated 11/12/2007
- Growth Centres Conservation Plan, Growth Centres Commission dated 02/2007

2 Method

2.1 Visual tree assessment

The subject trees were assessed in accordance with a stage one visual tree assessment (VTA) as formulated by Mattheck & Breloer (1994)¹, and practices consistent with contemporary arboriculture.

The following limitations apply to this methodology:

- Trees were inspected from ground level, without the use of any invasive or diagnostic tools and testing.
- Trees within adjacent properties or restricted areas were not subject to a complete visual inspection (i.e. defects and abnormalities may be present but not recorded).
- No aerial inspections or root mapping was undertaken.
- Tree heights, canopy spread and diameter at breast height (DBH) was estimated, unless otherwise stated.
- Tree identification was based on broad taxonomical features present and visible from ground level at the time of inspection.

2.2 Retention value

The retention value of a tree or group of trees is determined using a combination of environmental, cultural, physical and social values.

- **Low:** These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
- **Medium:** These trees are moderately important for retention. Their removal should only be considered if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
- **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 *Australian Standard AS4970 Protection of trees on development sites*.

This tree retention assessment has been undertaken in accordance with the undertaken in accordance with the International Association of Consulting Arborists *Significance of a Tree, Assessment Rating System* (STARS). The subject trees have not been assessed for ecological or environmental value. Further details and assessment criteria are in **Appendix B**.

¹ VTA is an internationally recognised practice in the visual assessment of trees as *Field Guide for Visual Tree Assessment* by Mattheck, C., and Breloer, H. Arboricultural Journal 1, Vol 18 pp 1-23

2.3 Protection zones

- Tree protection zone (TPZ): The TPZ is the optimal combination of crown and root area (as defined by AS 4970-2009) that requires protection during the construction process so that the tree can remain viable. The TPZ is an area that is isolated from the work zone to insure no disturbance or encroachment occurs into this zone. Tree sensitive construction measures must be implemented if works are to proceed within the Tree Protection Zone.
- Structural root zone (SRZ): The SRZ is the area of the root system (as defined by AS 4970-2009) used for stability, mechanical support and anchorage of the tree. The SRZ only considers a tree's structural stability, not the area of root zone required for long term viability. Severance of structural roots (>50 mmØ) within the SRZ is generally not recommended as it may lead to the destabilisation and/or decline of the tree.
- Root investigation: When assessing the potential impacts of encroachment within the TPZ, consideration will need to be given to the location and distribution of the roots, including above or below ground restrictions affecting root growth. Location and distribution of roots may be determined through non-destructive excavation (NDE) methods such as hydro-vacuum excavation (sucker truck), air spade and manual excavation. Root investigation is used to determine the extent and location of roots within the zone of conflict. Root investigation does not guarantee the retention of the tree.



Figure 1: Indicative TPZ and SRZ

2.4 Encroachment within the TPZ

Encroachment includes, but is not limited to excavation, compacted fill, machine trenching, ground penetration, soil disturbance.

- No encroachment (0%): No likely or foreseeable encroachment within the TPZ.
- Minor encroachment (<10%): If the proposed encroachment is less than 10% (total area) of the TPZ, and outside of the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere, and be contiguous with the TPZ.
- Major encroachment (<20%): If the proposed encroachment is greater than 10% of the TPZ and outside of the SRZ, the project arborist must demonstrate that the tree(s) remain viable. The area lost to this encroachment should be compensated for elsewhere, and be contiguous with the TPZ. All work within the TPZ must be carried out under the supervision of the project arborist.
- Major encroachment (>20%): If the proposed encroachment is greater than 20% of the TPZ the SRZ may be impacted. Tree sensitive construction techniques may be used for minor works within this area providing no structural roots are likely to be impacted, and the project arborist can demonstrate that the tree(s) remain viable. Root investigation by nondestructive methods is essential for any proposed works within this area.



Figure 2: Indicative zones of encroachment within the TPZ

2.5 Mitigation measures

Encroachment within the TPZ must be offset with a range of mitigation measures to ensure that impacts to the subject tree(s) are reduced or restricted wherever possible. Mitigation must be increased relative to the level of encroachment within the TPZ to ensure the subject tree remains viable. **Table 1** outlines mitigation requirements under AS 4970-2009 within each category of encroachment.

Table 1: Mitigation measures

AS 4970-2009	Requirements Under AS 4970-2009	Encroachment	Mitigation Measures
No encroachment (0%)	• N/A	No encroachment (0%)	• N/A
Minor encroachment (<10%)	 The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. Detailed root investigations should not be required. 	Minor encroachment (<10%)	 The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. Tree protection must be installed.
Major	 The project arborist must demonstrate the tree(s) would remain viable. Root investigation by non-destructive methods may be required. Consideration of relevant factors including: Root location and 	Major encroachment (<20%)	 The project arborist must demonstrate the tree(s) would remain viable. The project arborist will be required to supervise any works within the TPZ. Tree protection must be installed.
encroachment (>10%)	 distribution, tree species, condition, site constraints and design factors. The area lost to this encroachment should be compensated for elsewhere, contiguous with the TPZ. 	Major encroachment (>20%)	 The project arborist must demonstrate the tree(s) would remain viable. Non-destructive root investigation will be required for any trees proposed for retention. The project arborist will be required to supervise any works within the TPZ. Tree protection must be installed.

3 Discussion

Table 2 shows the results of the arboricultural assessment. Key points are:

- Major encroachment (>20%): 102 trees will be subject to a major encroachment (>20%) within the TPZ. Under the current proposal, none of these subject trees will be retained. Trees proposed for removal have the following retention values:
 - **74** trees with a low retention value.
 - **28** trees with a medium retention value.

The approximate total volume of fill proposed for the site has been calculated at +28,606 m³. The fill will be distributed at a varying level across the site, at an average approximately 1.5 m higher than the current ground surface. This has been requested by Council for flood mitigation purposes.

Trees within the subject site will be negatively impacted by this fill due of the loss of gaseous exchange and water infiltration. This results in suffocation of the trees' root system and the trees will gradually decline.

The trees considered most worthy of retention (group of 12 x *Eucalyptus tereticornis* deemed to be of medium significance) are located within the site on the corner of Edmondson Avenue and Sixth Avenue. Substantial modification of the design proposal would be required to retain these trees.

The trees are in varying states of health and vigour, but the *Eucalyptus moluccana* observed and outlined in **Table 2** have been substantially defoliated by the Grey Box Psyllid (*Cardiaspina sp.*). Substantial effort would be required to rehabilitate these defoliated trees.

There will also be a level of excavation required for the installation of services to the site to occur within the Council verge. This will require the excavation within the SRZ of these trees, an area required for tree stability.

Table 2: Results of the arboricultural assessment

No.	Botanical Name	Trees in Group	Age	Height (m)	Spread (m)	Health	Structure	Retention	DBH (mm)	SRZ (mm)	TPZ (mm)	Encroachment	Proposal
1	Pinus radiata	13	SM-M	11	6	Fair	Fair	Low	550	2575	6600	Major >100%	Remove
2	Eucalyptus tereticornis	1	М	20	10	Fair	Poor	Low	750	2933	9000	Major >100%	Remove
3	Eucalyptus crebra	1	М	20	10	Fair	Fair	Low	850	3091	10200	Major >100%	Remove
4	Eucalyptus crebra	1	М	20	10	Fair	Fair	Low	700	2849	8400	Major >100%	Remove
5	Eucalyptus tereticornis	1	М	18	10	Fair	Fair	Low	750	2933	9000	Major >100%	Remove
6	Eucalyptus tereticornis	2	М	15	10	Fair	Fair	Low	550	2575	6600	Major >100%	Remove
7	Eucalyptus moluccana	1	М	15	10	Fair	Fair	Low	900	3166	10800	Major >100%	Remove
8	Eucalyptus moluccana	1	SM	15	10	Fair	Fair	Low	700	2849	8400	Major >100%	Remove
9	Eucalyptus tereticornis	1	М	25	15	Fair	Fair	Low	900	3166	10800	Major >100%	Remove
10	Eucalyptus tereticornis	1	М	15	10	Fair	Fair	Low	800	3013	9600	Major >100%	Remove
11	Eucalyptus moluccana	1	SM	15	10	Fair	Fair	Low	700	2849	8400	Major >100%	Remove

No.	Botanical Name	Trees in Group	Age	Height (m)	Spread (m)	Health	Structure	Retention	DBH (mm)	SRZ (mm)	TPZ (mm)	Encroachment	Proposal
12	Eucalyptus crebra	2	Μ	15	10	Fair	Fair	Low	600	2670	7200	Major >100%	Remove
13	Eucalyptus tereticornis	3	SM	15	10	Fair	Fair	Low	500	2474	6000	Major >100%	Remove
14	Eucalyptus tereticornis	2	SM	15	10	Fair	Fair	Low	800	3013	9600	Major >100%	Remove
15	Eucalyptus tereticornis	7	М	20	5	Fair	Fair	Low	600	2670	7200	Major >100%	Remove
16	Eucalyptus tereticornis	1	М	20	10	Fair	Fair	Low	700	2849	8400	Major >100%	Remove
17	Eucalyptus tereticornis	1	Μ	20	10	Fair	Fair	Low	800	3013	9600	Major >100%	Remove
18	Eucalyptus tereticornis	12	Μ	20	10	Fair	Good	Medium	750	2933	9000	Major >100%	Remove
19	Eucalyptus crebra	1	Μ	20	10	Fair	Poor	Low	600	2670	7200	Major >100%	Remove
20	Eucalyptus moluccana	4	М	15	7	Fair	Fair	Low	550	2575	6600	Major >100%	Remove
21	Eucalyptus moluccana	1	М	30	15	Poor	Fair	Low	900	3166	10800	Major >25%	Remove
22	Eucalyptus crebra	2	Μ	15	10	Fair	Fair	Low	600	2762	7800	Major >25%	Remove
23	Eucalyptus tereticornis	3	М	15	10	Fair	Fair	Low	500	3166	10800	Major >100%	Remove

No.	Botanical Name	Trees in Group	Age	Height (m)	Spread (m)	Health	Structure	Retention	DBH (mm)	SRZ (mm)	TPZ (mm)	Encroachment	Proposal
24	Eucalyptus tereticornis	1	SM	15	10	Fair	Fair	Low	600	2670	7200	Major >100%	Remove
25	Eucalyptus tereticornis	1	SM	15	10	Fair	Fair	Low	550	2575	6600	Major >100%	Remove
26	Eucalyptus tereticornis	4	SM	12	7	Fair	Fair	Low	500	2474	6000	Major >100%	Remove
27	Eucalyptus tereticornis	1	Μ	25	10	Fair	Fair	Low	600	2670	7200	Major >100%	Remove
28	Eucalyptus tereticornis	1	Μ	25	10	Fair	Fair	Medium	600	2670	7200	Major >100%	Remove
29	Eucalyptus tereticornis	1	Μ	30	10	Fair	Fair	Medium	600	2670	7200	Major >100%	Remove
30	Eucalyptus moluccana	1	SM	20	10	Fair	Fair	Low	700	2849	8400	Major >100%	Remove
31	Eucalyptus moluccana	4	J-SM	10	6	Fair	Fair	Low	500	2474	6000	Major >25%	Remove
32	Jacaranda mimosifolia	1	Μ	12	11	Fair	Fair	Low	550	2575	6600	Major >100%	Remove
33	Eucalyptus moluccana	1	SM	15	10	Poor	Fair	Low	650	2762	7800	Major >25%	Remove
34	Eucalyptus moluccana	3	SM	17	10	Poor	Fair	Low	650	2762	7800	Major >100%	Remove
35	Eucalyptus sp.	1	М	15	10	Poor	Poor	Low	500	2474	6000	Major >100%	Remove

No.	Botanical Name	Trees in Group	Age	Height (m)	Spread (m)	Health	Structure	Retention	DBH (mm)	SRZ (mm)	TPZ (mm)	Encroachment	Proposal
36	Eucalyptus tereticornis	2	SM	20	10	Fair	Fair	Low	600	2670	7200	Major>100%	Remove
37	Eucalyptus tereticornis	12	SM	20	10	Fair	Fair	Medium	600	2670	7200	Major>100%	Remove
38	Eucalyptus tereticornis	1	SM	15	10	Fair	Fair	Low	600	2670	7200	Major>100%	Remove
39	Eucalyptus tereticornis	1	Μ	25	10	Fair	Fair	Medium	900	3166	10800	Major>100%	Remove
40	Eucalyptus tereticornis	1	Μ	20	10	Fair	Fair	Medium	750	2933	9000	Major>100%	Remove
41	Eucalyptus tereticornis	1	Μ	20	15	Fair	Fair	Medium	900	3166	10800	Major>100%	Remove
42	Eucalyptus tereticornis	1	Μ	20	10	Fair	Fair	Medium	800	3013	9600	Major>100%	Remove

4 Recommendations

4.1 Trees proposed for removal

- **Low retention value:** A total of **74** trees with a low retention value are recommended for removal.
- **Medium retention value:** A total of **28** trees with a medium retention value should be retained wherever possible, but should not be seen as a constraint on the development.
- High retention value: There are no trees on the site of high retention value.
- **Offsetting:** any loss of trees should be offset with replacement planting in accordance with the relevant offset policy.

4.2 Tree work

- All tree work is to be carried out by an arborist with a minimum AQF Level 3 qualification in Arboriculture.
- All tree work must be in accordance with Australian Standard AS 4373-2007, Pruning of Amenity Trees and the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).
- Permission must be granted from the relevant consent authority, prior to removing or pruning of any of the subject trees.
- If trees are to be retained within the site due to design modifications, further advice should be sought regarding tree management to comply with AS 4970-2009 Protection of trees on development sites.

References

Australian Standard, AS 4373-2007, Pruning of Amenity Trees SAI Global

Australian Standard, AS 4970-2009, Protection of Trees on Development Sites SAI Global

Harris, R., Clark, J., Matheny, N. and Harris, V. 2004. *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*, Upper Saddle River, N.J.: Prentice Hall, London

Mattheck, C. 2007. Updated field guide for visual tree assessment. Karlsruhe: Forschungszentrum Karlsruhe.

WorkCover NSW. 1998. Code of Practice: Amenity Tree Industry

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

University of Western Sydney – Hawkesbury Campus URL https://www.westernsydney.edu.au/hie/research/research_projects/the_psyllid_outbreaks_on_cumber https://www.westernsydney.edu.au/hie/research/research_projects/the_psyllid_outbreaks_on_cumber https://www.seternsydney.edu.au/hie/research/research_projects/the_psyllid_outbreaks_on_cumber https://www.seternsydney.edu https://www.seternsydney.edu <a href="

Liverpool City Council's Tree Management Policy October 2016

Appendix A - Tree locations



Appendix B - Tree retention assessment method

LowMediumHighThe tree is in fair-poor condition and good or low vigour.The tree is in fair to good condition and good or low vigour.The tree is in fair to good condition and good or low vigour.The tree is in fair to good condition agood rolw vigour.The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildingsThe tree is a planted locally indigenous or a common species with its taxa commonly planted in the local areaThe tree is a form typical for the species.The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local areaThe tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation obstructed by other vegetation or mechanisms and can erached dimensions to be protection mechanisms and can easily be replaced with a suitable specimeThe tree is provides a fair contribution to the visual character and amenity of the local area The tree's growth is moderably ground influences, reducing its altily to reach dimensions typical for the taxa in situThe tree is listed as a heritage titem.The tree is listed as exempt under the provisions of the jocal Council The tree is a newnitor of defect that has the potential to become structurally unsound.The tree's growth is unrestricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ - tree is an environmental pest species due to its invasioness protection mechanismsThe tree is a declared noxious section with in the landscape due to its invasiones protection within the landscape due to i	Tree Significance - Assessment Criteria - STARS [©]									
 The tree is in fair-poor condition and good or low vigour. The tree has form atypical of the species The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree reprovides a rain amenity of the local area The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree reprovides a fair contribution to the visual phranetal ad amenity of the local area The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms The tree is listed as exempt under the provisions of the local Council Tree Preservation or defact that has the potential to become structurally unsound. The tree is a environmental pest species (and the species or port or similar protection mechanisms to be provides at a situ - Tree is a appropriate to the site conditions The tree is a newironmental pest species (and the total is the species due to its invasibleness or poisonous/allergenic properties. The tree is a declared noxious 	Low	Medium	High							
	 The tree is in fair-poor condition and good or low vigour. The tree has form atypical of the species The tree is not visible or is partly visible from the surrounding properties or obstructed by other vegetation or buildings The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms The tree has a wound or defect that has the potential to become structurally unsound. The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties. The tree is a declared noxious weed by legislation 	The tree is in fair to good condition The tree has form typical or atypical of the species The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street The tree provides a fair contribution to the visual character and amenity of the local area The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ	The tree is in good condition and good vigour The tree has a form typical for the species The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age. The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on councils significant tree register The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity. The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values. The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions.							



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 if works are to proceed within the Tree Protection Zone.
Consider for retention (Medium): These trees may be retained and protected. These are considered less critical; however their retention should remain priority with the 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.
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.









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