rain Tree consulting

Arboricultural Management

PO Box 326 AVALON NSW 2107

Mobile 0419 250 248

5 October 2019

27 - 29 NORTH AVALON ROAD

AVALON BEACH, NSW 2107

PROPOSED SENIORS LIVING FACILITY

ARBORICULTURAL IMPACT ASSESSMENT REPORT

Report Ref No- RTC-8619

Prepared for

Armada Avalon Pty Limited
C/- Environa Studio
224 Riley Street, SURRY HILLS, NSW
P: 9211 0000

Prepared by
Mark A. Kokot
AQF Level 5 Consulting arborist

CONTENTS **page**

INTRODUCTION

This report has been commissioned by Armada Avalon Pty Limited C/- Environa Studio. The reason this report has been commissioned is to assess the remaining Useful Life Expectancy (ULE) and potential impacts that may occur to significant trees in relation to a new development proposal. The new development proposal consists of constructing a Senior Living Facility within Lots 32 & 33 of DP8394 known as 27-29 North Avalon Road, AVALON BEACH NSW 2107.

Recommendations for retention or removal of trees is based on the trees condition, accorded ULE category, current design encroachments and potential impacts to trees under this development application. To retain specific trees and ensure their viability development must take into consideration protection of the Tree Protection Zone (TPZ) radius as identified within Appendix- B *Notes- of acceptable incursions*. As a guide to determining impacts the Structural Root Zone (SRZ) & Tree Protection Zone (TPZ) radial setbacks have been provided within Appendix- C the SRZ & TPZ distance column.

Development encroachments are referred to within this report as No impact (0%) incursion, Low impact (<10%) of minor consequence, Medium impact (<20%) incursion where the project arborist is to demonstrate the tree/s remain viable by tree sensitive construction techniques, and High level impact (>20%) where design changes or further information is required to manage tree vitality.

Each tree assessed has been accorded a temporary identification number and is referred to by number throughout this report. For additional trees not plotted on provided documentation their location has been estimated by taking offsets from existing trees and structures. The trees and their location may be referenced within the Tree Assessment Schedule and Tree Location Plan Appendices D & E.

Care has been taken to obtain information from reliable sources. All data has been verified as far as possible, however, I can neither guarantee nor be responsible for the accuracy of information provided by others.

METHODOLOGY

i In preparation for this report a limited site and ground level Visual Tree Assessment (VTA) was conducted on Friday 7th June 2019 by the author of this report. The principles of VTA were primarily adopted from components of Mattheck *& Breloer* 1994 '*The Body Language of Trees*' with risk values determined by criteria explained within the ISA TRAQ manual 2013. The inspection included assessment of the overall health and vigour of the trees, tree form, structure and structural condition commencing from near the lower trunk to the upper first order branch division as best as site conditions would allow. On completion of the VTA the retention value of the tree was summarised utilizing the tree assessment Checklist of Appendix- C.

ii The inspection was limited to a visual assessment from within the subject site where the retention value, condition and diameters of neighbouring trees was estimated. No aerial (climbing) inspections, woody tissue testing or tree root investigation was undertaken as part of this tree assessment. Tree height and canopy spread was estimated and expressed in metres with trunk diameters measured at approximately 1.4 metres above ground level, rounded off to the nearest 50mm and expressed as DBH (Diameter at Breast Height). Palm heights were estimated by the height of the palm trunk extending from ground level to the top of the crown shaft only.

iii This report acknowledges and utilizes the current Australian Standards 'Protection of Trees on Development Sites' AS 4970 – 2009 as explained within Notes of Appendix- B. Unless specified otherwise all distances and development offsets within this report are taken from the centre of the tree.

v Plans and/or documentation received to assist in preparation of this assessment include:

Environa Studio – project No 991 Senior Living, *design package specific to*

- Existing / Demolition Plan Dwg No. 040, rev L dated 30/9/2019
- Level 1 & 2 Plans Dwg No. 101 & 102, rev L dated 30/9/2019
- Section AA & BB Dwg No. 120, rev L dated 30/9/2019
- Elevations Dwg No. 130, 131 & 133, rev L dated 30/9/2019

John Lock & Associates –job No. 190247

- Landscape Plan Dwg No. 2604 LP-00 & 01, rev F dated 26/9/2019

NB Consulting Engineers –job No. 190247

- Stormwater Drainage Plan Dwg No. D03 issue E dated 17.9.19
- Redirection of existing drainage regime Plan & Detail, Job No.190866 Dwg No. D01 issue A dated Aug 2019
- Civil Access Plans, Sheet 2 Dwg No. C02 issue A dated 19/9/19

Hammond Smeallie & Co Pty Limited project No: 14535

- Survey Plan Sheet 1 rev C dated 7/3/2019

1. SUMMARY OF ASSESSMENT

1.1 General tree assessment

1.1.1 Fifty nine (59) trees have been assessed within this development proposal. Of the fifty nine trees eleven (11) trees are located within the front Council verge, twenty six (26) trees are non-prescribed exempt trees with seven (7) trees within the site and one (1) Council verge tree accorded low retention values due to poor structural condition.

Remaining trees are considered somewhat viable for retention without change in existing site conditions within their Tree Protection Zone (TPZ) radiuses, refer Appendix- C the SRZ & TPZ distance column.

1.1.2 *Low retention value trees* - are considered trees which should not restrict the development proposal due to average condition and estimated short remaining safe life expectancies.

Exempt non-prescribed trees - are trees permitted to be managed (pruned, removed or relocated) without Council consent. These trees are identified within Northern Beaches Council Exemption Species list or are located within 2m of a structural dwelling. Should an exempt species require retention further advice from an appointed project arborist is required prior to works commencing.

Table 1, Summary of tree retention values

	Dead or high risk trees	2	T46 & 48 – exempt trees of low habitat value
	Exempt tree species	24	T12, 13, 19, 22, 24, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 43, 44, 45, 47, 51, 57 & 59
	Low retention value trees	7	T17, 23, 25, 29, 40, 52 & 54
	Council verge low retention value trees	1	T1
	Council verge trees	11	T1 to 11
	Benefit from further investigations	1	T49 – significant tree with potential internal lower trunk structural fault

1.2 Prescribed tree removal to accommodate design

1.2.1 Those trees identified as prescribed Local Government Authority (LGA) protected trees requiring removal to accommodate design are identified as trees: 5, 7, 8, 9, 10, 14, 15, 16, 17, 18, 21, 23, 25, 26, 27, 29, 30, 40, 49, 52, 53, 54, 55, 56 & 58.

Of these trees Palm T16 is viable for relocation and Council verge trees 5, 7, 8, 9 & 10 have been specified for removal to accommodate site and public footpath access requirements.

Provided within the following sections Table 2 discussions relate to tree retention, development impacts and/or removal by design.

1.3 Discussion of development impacts

1.3.1 Table 2 below identifies development encroachments and impacts occurring within both the Structural Root Zone (SRZ), *the area required for tree stability* and Tree Protection Zone (TPZ) radius of prescribed trees.

Table 2. Prescribed tree impacts and design requirements

T1	Likely low retention value. Potential removal with twin stems containing stem inclusion development likely to become problematic (fail) in age. No excavation cut within a designated 6m Tree Protection Area (TPA) without arborist advice. The SRZ to be considered a work exclusion zone.	Retain - refer to Council for advice
2	Should T1 be removed sudden exposure may affect trees safe retention value by sudden exposure. The stormwater drainage discharge location is unlikely to affect tree with no excavation cut within a designated 5m Tree Protection Area (TPA) without arborist advice. SRZ to be considered a work exclusion zone. Relocation of stormwater drainage [Plan D03'E'] is to ensure no excavation within the designated TPA, with impacts within No31 NTH Avalon Rd considered negligible as identified within Appendix-A.	Retain
3	Negligible encroachment & impact by design	Retain
4	Negligible encroachment & impact by design	Retain
5	Within proposed footpath footprint	Remove
6	3x trees, location not accurately plotted – may slightly be affected by footpath construction, requires arborist advice during works	Retain
7	Within proposed footpath footprint	Remove
8	Within footpath footprint + removal required to accommodate pathway entrance to dwellings 1 & 2	Remove
9	Within proposed footpath footprint	Remove
10	High level encroachment with works within SRZ & TPZ by pathway proposal. Tree contains extensive surface roots which may be problematic during excavation for footpath construction. SRZ severance may destabilize tree due to lean	Remove
11	High level encroachment with works within SRZ & TPZ by pathway access. Tree likely to contain shallow surface roots which may be problematic. Requires tree root investigation to determine risk of excavation impact on tree stability	Retain
14	Remove to accommodate design, where height & poor form of tree may become problematic after loss of adjacent trees 15, 17, 28 & 29	Remove
15	Remove to accommodate design & make space for new plantings in courtyard, where sudden exposure may become problematic to safe retention value by loss of adjacent trees 17, 28 & 29.	Remove
16	High level impact by driveway location, capable of relocation	Retain & relocate

17	Tree of low retention value. Located within driveway footprint	Remove
18	Located within pathway near waste collecting bay	Remove
20	Small sapling viable for retention – no works within TPZ	Retain
21	High level excavation impact by SW location	Remove
23	Low retention value in poor condition	Remove
25	Tree of somewhat low retention value. Located within building footprint	Remove
26	Located within building (deck) footprint	Remove
27	Located within building footprint	Remove
29	High level SRZ impact by building & infrastructure footprint	Remove
30	Located within building footprint	Remove
40	Tree of somewhat low retention value. Located within building footprint	Remove
49	Potential low retention value. Low bowing one sided canopy extension by 8+m towards building footprint where a high level of canopy impact is likely. Trees lower trunk may also be internally defective where pruning and site disturbance works are likely to reduce retention value. High level canopy impact indicates removal to make space for new plantings under the proposal	Remove
50	Negligible dwelling footprint encroachment at near 8.7m [Plan 101] with moderate encroachment by proposed decking & SW within TPZ. Existing ground level RL to remain beneath decking to dwelling at near 8m setback from tree with SW to be located directly against building 5 footprint to minimise excavation impacts. Section AA – Verandah floor level setback at 6.5m to be of suspended design with TPZ, with no landscape cut or fill within 8m of tree.	Retain
52	Low retention value tree. Heavily suppressed low bowing form towards building footprint with tree of average structural form. Canopy reduction to accommodate building resulting in high level canopy loss reducing retention value.	Remove
53	High level SRZ impact by building footprint	Remove
54	Low retention value tree. Located within building footprint	Remove
55	High level SRZ encroachment & SW impact with design locating tree within 2m of proposed building footprint	Remove
56	High level SRZ encroachment & SW impact with design locating tree within 2m of proposed building footprint	Remove
58	Tree of average structural condition. High level of SRZ & TPZ encroachment by design consisting of excavation, SW, retention tank, landscape retaining wall, building footprint and car park facility	Remove

Figure 1, Demolition plan Dwg No. 040

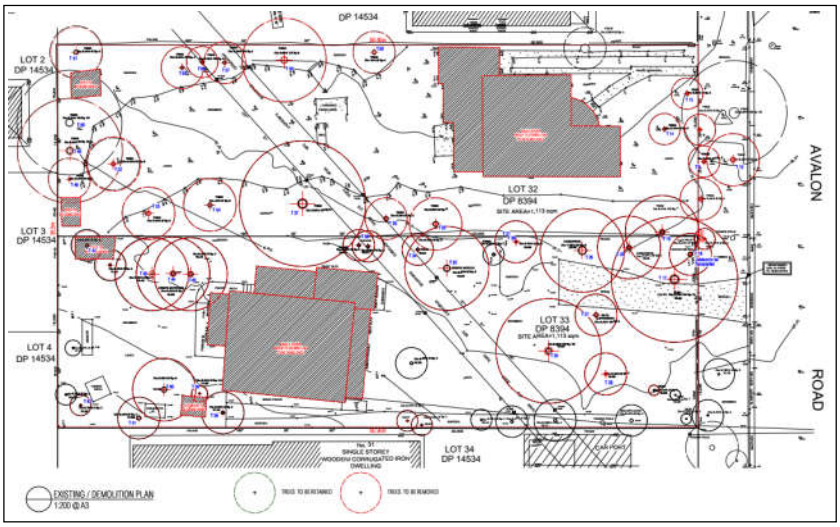


Figure 2, showing proposed development footprint, LP-01

2. CONCLUSIONS & RECOMMENDATION

2.1 Tree Removal

2.1.1 Under the current development proposal and with the consent of Council the removal of twenty five (25) prescribed trees are required or recommended to accommodate design. The twenty five trees are identified as trees:

- 5, 7, 8, 9, 10, 14, 15, 16, 17, 18, 21, 23, 25, 26, 27, 29, 30, 40, 49, 52, 53, 54, 55, 56 & 58. Of these trees palm 16 is capable of relocation.

Non-prescribed exempt trees permitted to be managed (retained, pruned, removed or relocated) without the consent of Council are identified as trees: T12, 13, 19, 22, 24, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 51, 57 & 59.

Should an exempt species require retention further advice from an appointed project arborist is required prior to works commencing.

2.2 Recommended tree management & protection principles

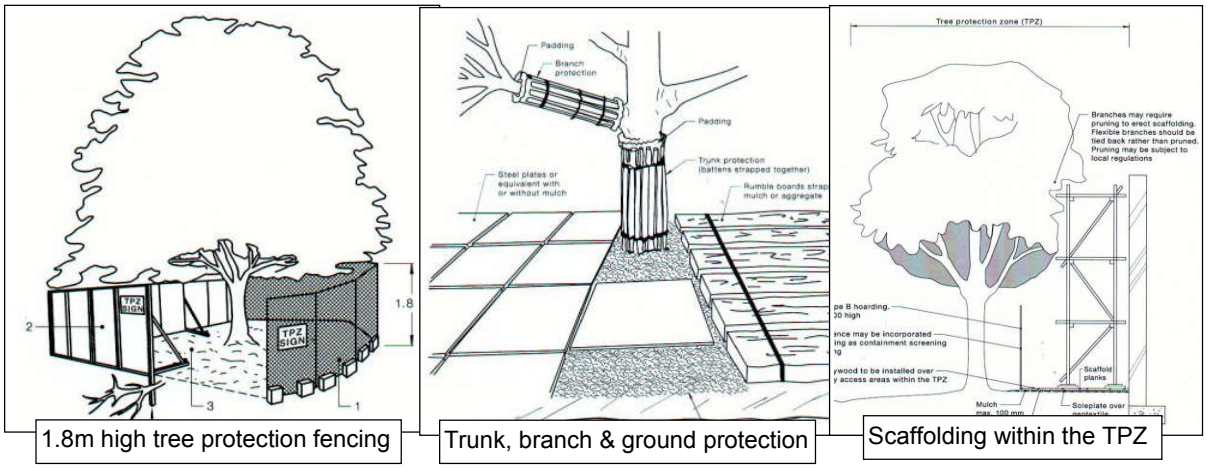
2.2.1 In addition to the recommendations provided within Australian Standard AS4970 – 2009 Protection of Trees on Development Sites and within this report the following summary and/or additional recommendations are provided as a guide to tree protection during works:

1. *Specific management & protection requirements*
   - *Council verge trees.*
     Tree 1 - Having a low retain value will likely fail (split apart) in age due to included bark being a weak stem attachment. The retention of the tree requires to be closely considered by Council as removal and sudden exposure may affect the retention value of T2. The stormwater discharge location as shown within Plan D03 'G' is to be positioned outside of a proposed 6m Tree Protection Area (TPA).
   - Tree 2 - The stormwater discharge location as shown within Plan D03 'G' is to be positioned outside of a proposed 5m Tree Protection Area (TPA). Within stormwater (SW) Plan D01'B' and as referenced within Appendix A the discharge service line assessment area is located outside of the trees structural root zone.
   - The proposed stormwater drainage discharge located within No 31 North Avalon Road and as shown in Plan D01'B' and as referenced within Raintree Consulting report No RTC-12919 will have a negligible impact to the additional Council verge tree and neighbouring tree being located outside of structural root zones.
   - Tree 11 requires further information to determine root zone impacts. The proposed public footpath has been situated specifically along the boundary to minimise root zone conflicts however, given the Council verge width the footpath falls within the SRZ of the tree. Exploratory tree root investigations are required to provide more information on construction impacts, and the likely effect of root severance on tree vitality and primarily tree stability.
   - Given the high concentration of surface roots within the Council verge ground and timber beam trunk protection will be required on all trees to be retained to mitigate tree and root damages during construction activities.
2. *General* - Trees to be retained tree protection fencing and/or zones are to be installed prior to construction works occurring and constructed under the guidance and certification of an appointed project arborist. Where design constraints exists and excluding *specific management requirements* other tree protection measure such as ground and timber beam trunk protection are to be provided forming part of tree protection methodology, see Figure 3 p10.
3. Unless specified otherwise within this report in accordance with AS4970 - 2009 (1.4.4) a project arborist is to be engaged to monitor, supervise excavation within TPZ setbacks, and provide certification of protection works conducted. The project arborist is recommended to be suitably qualified having a minimum Australian Qualification Framework (AQF) Level 4 certification and be competent in methodology of protecting trees on development sites. The project arborist is to provide final

certification outlining tree protection measures with photographic evidence of ongoing works retained for certification purposes (AS4970 S/5.5.2 *Final certification*).

4. The selected arborist is to be familiar with protection measures specific to Australian Standard AS4970 'Protection of Trees on Development Sites' – 2009 requirements with any modification in Tree Protection Fencing (TPF) or Zones (Z) to be compliant with AS4970 Section 4.5 *Other Tree Protection Measures.*

Figure 3: tree protection fencing, ground and trunk protection detail



All tree protection fencing requires appropriate signage clearly stating *a TPZ restriction area* being a designated Tree Protection Zone.

Table 3, certification requirements & hold points

1	Pre-construction works	Prior to demolition clearly mark all prescribed trees approved for retention
		Install tree protection fencing & zones around trees to be retained
2	During construction	Schedule project arborist for supervision during excavation & activities within TPZ setbacks
		Obtain arborist advice where modification in existing site conditions are required within TPZ areas
3	Post construction	Prior to handover project arborist to provide final inspection & certification of tree health & vitality

5. ***Hold points***: Hold points specific to *no works are to commence without arborist advice, inspections & certifications*. It is the responsibility of the principle contractor to complete each task identified within Table 3 and hold point items for Principal Certifying Authority (PCA) compliance purposes.

5a ***Hold point 1 specific***. No construction works are to commence without tree protection fencing and/or zones being in place and certified by the project arborist. Note - the TPZ is to be considered an exclusion zone where the storage of material & fill within the TPZ is to be avoided.

5b ***Hold point 2***. There is to be no access, excavation or soil disturbance within SRZ setbacks (the area required for tree stability AS4970) without prior project arborist advice, refer SRZ & TPZ setback distance column Appendix- D.

5c ***Hold point 3***. No open trench excavation for in ground services are to occur within Tree Protection Zones (TPZ) without prior arborist advice and/or site supervision.

6. Landscape and minor works are to comply with SRZ access restrictions with proposed works within the TPZ to be compliant to tree protection measures. Boundary fences and/or structures within the SRZ & TPZ are to be suspended above ground level supported by pier and beam construction to avoid disturbance to underlying tree roots.
7. During approved manual excavation activities within TPZ setbacks the pruning of roots at or <30mm(Ø) is to be conducted by the appointed arborist in accordance with AS4970 – 2009 Section 4.5.4 *Root protection during works within the TPZ*, such that tree roots are not damaged or ripped beyond the point of excavation. Where larger roots have been encountered they are to be referred to a Level 5 project arborist for further advice. Exposed roots at the excavated cut face are to be protected with jute mesh, geotextile fabric or similar being secured in place to avoid drying of roots and face of the soil profile.
8. *Canopy pruning / tree removal:* where required tree removal and canopy reductions are to be approved by the Local Government Authority. Works are to be conducted by a suitably qualified AQF Level 3 arborist in accordance with AS4373 Pruning Standards, and specifically be conducted in accordance with Safe Work Australia – Guide to managing risks of tree trimming and removal works 2016 (www.swa.gov.au).
9. *Additional inground services within TPZ's* which may include sewer, stormwater, water and electrical services, final design and impact to trees shall be reviewed and endorsed by the project arborist prior to their installment.
10. To ensure trees are appropriately protected the development site superintendent is recommended to be familiar with all tree protection requirements as outlined within this report. The superintendent is responsible for informing all subcontractors of the responsibilities and requirements of tree protection prior to their engagement.
11. Should there be any uncertainty in tree protection requirements the appointed arborist is to be consulted prior to work activities commencing.

Yours sincerely

Mark A Kokot

AQF Level 5 consulting arborist

Diploma of Hort/Arboriculture (AQF5), Associate Diploma Parks Management (AQF4)
Certified Arborist / Tree Surgeon (AQF3), ISA Tree Risk Assessment Qualified 6/2014
Member: IACA, Arboriculture Australia (AA) & ISA, Working With Children No: WWC01446

APPENDICES

APPENDIX- A: No. 31 North Avalon Road SW discharge report

rain Tree consulting
Arboricultural Management
PO Box 326 AVALON NSW 2107
Mobile 0419 250 248

Armada Avalon Pty Limited
C/- Nick Dunnet
P: 9906 7775

14 September 2019

27 – 29 NORTH AVALON ROAD – AVALON BEACH
STORMWATER REDIRECTION THROUGH 31 NORTH AVALON ROAD
ARBORICULTURAL ASSESSMENT REPORT
File No: RTC-12919

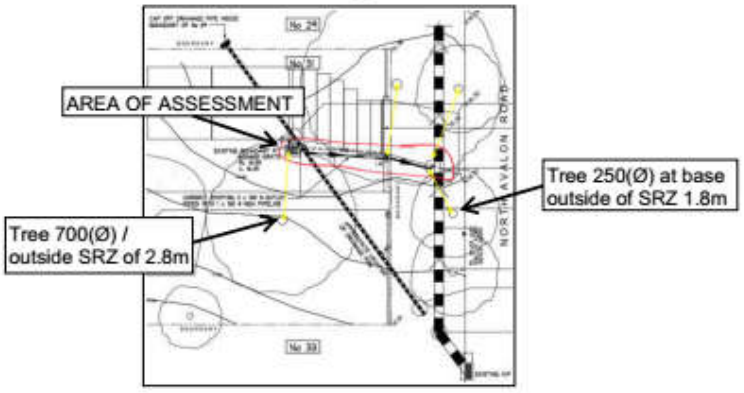
INTRODUCTION & METHODOLOGY

Dear Nick Dunnet

I refer to your request to comment on proposed stormwater (SW) redirection and potential impacts that may occur to trees located within or adjacent to No. 31 North Avalon Road. In preparation for this report a site inspection was conducted by the author on Tuesday 10th September 2019 from the adjacent Council verge. The scope of area assessed is detailed below referencing NB Consulting Engineers Discharge Regime Plan Dwg No. D01 issue A, dated August 2019.

SUMMARY OF CONCLUSION

The location of the 150mm(Ø) discharge service pipe is unlikely to have a significant impact on adjacent private and Council verge trees. To ensure minimal root damage occurs careful manual hand excavation is to be conducted retaining tree roots at or >30mm(Ø). Tree roots are to be protected in accordance with Australian Standard AS 4970 – 2009 Protection of Trees on Development Sites, where the SW pipe is to tunnel beneath larger woody tree roots. Should root pruning be required prior advice from an appointed project arborist is recommended. Photographic evidence of the exposed trench and final certification of work methodology should also be obtained.



Yours sincerely

Mark A Kokot
AQF Level 5 consulting arborist
Diploma of Hort/Arboriculture (AQF5), Associate Diploma Parks Management (AQF4)
Member: Arboriculture Australia & IACA, Working With Children No: WWC0144637E

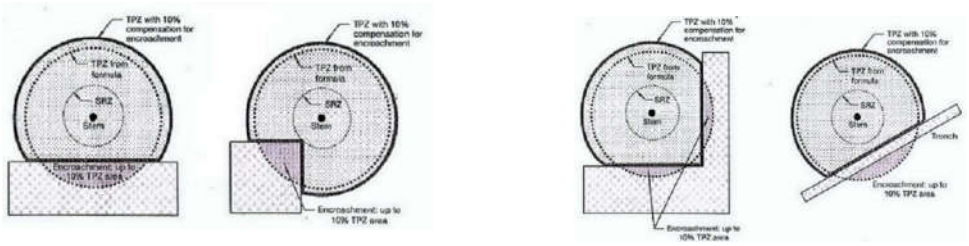
APPENDIX- B: Terminology, notes & references

Acceptable Risk: Exposure to or reject risk of varying degrees. The acceptable risk is defined as '*The person who accepts some degree of risk in return for a benefit being exposed to some risk of varying degree*.
Age classes: (I) Immature refers to a well established but juvenile tree. (ESM) refers to an early semi mature tree not of juvenile appearance. (SM) Semi-mature refers to a tree at growth stages advancing into maturity and full size. (LSM) Late Semi- Mature, refers to a tree between semi-mature and close to mature. (EM) refers to a tree at the first stages of maturity. (M) Mature refers to a full size tree with some capacity for future growth. (LM) Late mature refers to a tree entering into over maturity (OM) and likely first stages of senescence. **Health:** Refers to a trees vigor exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion and the degree of dieback.
Condition: Refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) and the state of the scaffold (i.e. Trunk and major branches), including structural defects such as cavities, crooked trunks or week trunk / branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition. **Decay:** (*N*) – an area of wood that is undergoing decomposition. (*V*) – decomposition of an area of wood by fungi or bacteria. **Decline:** Is the response of a tree to a reduction of energy levels resulting from stress. Recovery from decline is difficult and slow; is usually irreversible. **Defect:** A identifiable fault in a tree. **Epicormic Shoots**: Shoots that arise from latent or adventitious buds that occur on stems and branches and on suckers produced from the base of the tree. A symptom / result of stress related factors. **Footprint:** The area occupied by site structures, including the dwelling driveways and hard surfaces. **Included Bark**: (Inclusion) a genetic weak fault, pattern of development at branch junctions where the bark is turned inwards rather than pushed out, can pose a potential hazard. **Order of branches:** First order being those that are the first to extend from the main trunk or codominant limbs, second order branches extend from the first order and third order branches extend from the second order. **Probability:** The likelihood of some event happening. **Risk:** Is the probability of something adverse happening. **Suppression:** Restrained growth pattern from competition of other trees or structures. **Wound:** Damage inflicted upon a tree through injury to its living cells, may continue to develop further weakening of the structure compromising structural integrity.

NOTE 1: This report acknowledges the current **Australian Standards 'Protection of Trees on Development Sites'** AS 4970 – 2009 with reference to the Tree Protection Zone (TPZ): being a combination of the root and crown area requiring protection. The TPZ takes into consideration the Structural Root Zone (SRZ): The area required for tree stability. Determined by AS4970 - 2009 Figure 1, Table of determining the SRZ, section 3.3.5 of the standards. The standard states where a greater than 10% encroachment occurs the arborist is to take into consideration the schedule of determining impacts as set within AS4970 s. 3.3.4. Encroachments are referred to within this report as major or minor encroachments (AS4970 s. 3.3.2 & 3.3.3). Below is the terminology used for estimated percentage of development incursion used within this report. To retain specific trees and ensure their viability development must take into consideration protection of the TPZ radius.

NOTE 2: The extent of inclusion within the TPZ radius has been categorised as follows:
Development encroachments are referred to as No impact (0%) incursion, Low impact (<10%) of minor consequence, Medium impact (<20%) incursion where the project arborist is to demonstrate the tree/s remain viable by tree sensitive construction techniques, and High level impact (>20%) where design changes or further information is required to manage tree vitality.

Showing acceptable incursion within the TPZ (AS4970)



SELECTED REFERENCES:
Barrell J. 1993, 'Preplanning Tree Surveys: Safe useful Life expectancy (SULE) is the Natural Progression", Arboricultural Journal 17: 1, February 1993, pp. 33-46.
International Society of Arboriculture (ISA) 2013, Tree Risk Assessment Manual, Martin Graphics, Champaign Illinois U.S.
Mattheck, C. & Breloer, H.(1994) *The Body Language of Trees.* Research for Amenity Trees No.4 the Stationary Office, London.
Matheny N. & Clark J. 1998, Trees & Development *'A Technical Guide to Preservation of Trees During Land Development'* International Society of Arboriculture, Champaign USA.
Standards Australia 2009, *Australian Standards 4970 Protection of Trees on Development Sites* - Standards Australia, Sydney, Australia.
The Hills Shire Council, Tree Management Fact Sheet, Environment & Planning Services.
www.thehills.nsw.gov.au

APPENDIX- C: Tree Retention Value *Checklist* ©rainTree consulting

VTA i) Landscape Significance (LS): The significance of a tree in the landscape is a combination of its amenity, environmental and heritage values.

Values may be subjective however, are based after IACA Sustainable Retention Index Value (SRVI) which offer a visual understanding of the relative importance of the tree to the environment. The Landscape Significance for this assessment is described in seven categories to assist in determining the retention value of trees.

1	Significant	2	Very High	3	High	4	Moderate	5	Low	6	Very Low	7	Insignificant

ii) Visual Tree Assessment (VTA)

0	If appropriate to VTA - **exempt* trees from Local Government Authority (LGA) Tree Management or Preservation Orders (TPO)	2E	Trees location likely to be affected by infrastructure restricting root growth potential, or tree has potential to cause infrastructure damage where risk mitigation or rectification works may likely compromise tree
0A	Noxious or invasive species located within heritage conservation area		
1	Trees that are dead, significantly declining >75% volume or obviously hazardous	3	This rating incorporates trees that may require further investigation of defects such as cavities or symptoms indicating internal decay to an extent that cannot be quantified under visual examination. Further inspections may be in the way of arborist climbing inspection within the canopy, root crown investigation and/or drill penetrating or Picus Sonic Tomograph ultrasound testing procedures to determine percentage of internal decay.
2	Trees that are structurally damaged. Have poor structure or weak & detrimental large stem inclusions capable or failure opposed to 2B. Tree also may be affected by extensive borer damage, fungal pathogens (wood rot) or viruses. Some symptoms may be reversible, remediated or controlled give appropriate management.		
2A	Tree damage specific to basal and/or root plate damage, very shallow soils or steep topography resulting in poor anchorage where condition may become problematic in near future / may include trees with included bark splits to ground level	4	Trees which appear specifically environmentally stressed by drought, poor soil or site conditions. Symptoms may be reversible given appropriate management
2B	Defect specific to stem inclusions development (weak branch attachments) where the condition may not be immediately detrimental however, require annual to biannual monitoring with control to prevent stem failure by installing slings, cable or bracing. Tree may also contain multi stems or codominant twin stems	5	Trees that would benefit from crown maintenance pruning as identified within the Australian Standards AS 4373 – 2007 Pruning of Amenity Trees
		5A	Trees that require little or no maintenance at time of inspection other than close monitoring
2C	Tree may contain minor wounds, pest or minor pathogen activity, altered from storm damaged to an extent that is not considered immediately detrimental - may also display average form. Likely to require close annual monitoring or minor corrective pruning	6	Trees may be typical for species type, of good form and visual condition for age class May have suppressed one sided canopies or are low risk trees
2D	Trees significantly altered by recent storm or over pruning events which may reduce retention values due to average form- or tree extensively pruned for power line clearance	7	VTA restricted by canopy or plant material vine or ivy covering tree parts, or site conditions which do not allow access- e.g. fences to neighbouring sites

iii) Retention Value (RV): y [1] High, tree viable for retention, [2] Medium, viable for retention with minor faults which may reduce ULE, [3] Low, trees which should not restrict development applications containing faults that are likely to become problematic in the short term, [4] Remove, trees to be considered for removal due to average condition.

1	High retention	2	Medium retention	3	Low retention	4	Consider removal

iv) U.L.E. categories Useful Life Expectancy (after *Barrell* 1996, modified by the author). A trees U.L.E. category is the life expectancy of the tree modified first by its age, health, condition, safety and location. U.L.E. assessments are not static but may be modified as dictated by changes in trees health and environment.

1. Long U.L.E. - Appear retainable at the time of assessment for over 40 years with an acceptable degree of risk assuming reasonable maintenance.
2. Medium U.L.E. - Appear to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk assuming reasonable maintenance.
3. Short U.L.E. - Trees appear to be retainable at the time of assessment for 5 to15 years with an acceptable degree of risk assuming reasonable maintenance.
4. Very short - Removal- Trees which should be scheduled for removal within the very short term or as specified within this report.
5. Small, young or regularly pruned – Trees under 5m in height that can be easily moved or replaced, includes screen plantings or hedge lines.

APPENDIX- D: Tree Assessment Schedule

	Trees requiring removal due to hazardous or dead condition - subject to Local Government Authority notification		Trees with low retention values: senescence, developing defects or being *exempt trees from the LGA Tree Preservation Order (TPO)

Tree No	*Botanical Name* COMMON NAME	Height x spread (m)	DBH (mm)	SRZ / TPZ	Age	Health	Condition	Signifi-cance	VTA	RV	U. L.E.	Comments CV = Council verge tree NT= Neighbouring tree
1 CV	*Casuarina glauca* She Oak	16 x 11	650	2.8m / 7.8	SM	Good	Fair / Poor	3	2	3	<3	Twin stems at 1.4m with stem inclusion development capable of failure
2 CV	*Casuarina glauca* She Oak	20 x 13	550	2.7 / 6.6	SM	Good	Good	3	6/7	1	2	Tree with no significant defects noted
3 CV	*Casuarina glauca* She Oak	6 x 2	100	1.5 / 2	I	Good	Good	3	6	1	2	Tree with no significant defects noted
4 CV	*Jacaranda mimosifolia* Jacaranda	9 x 7	300at base	2 / 3.6	ESM	Good	Good	4	2C	2	2	Minor lower trunk wounds – appear not immediately detrimental
5 CV	*Eucalyptus Botryoides* Southern Mahogany	6 x 4	200	1.8 / 2.4	ESM	Good	Fair / Good	3	6	1	2	Suppressed canopy form biomass NE – no significant visual faults
6 x3 CV	*Casuarina glauca* She Oak	av 5 x 3	av 100	1.5 / 2	ESM	Good	Fair	3	2C	2	2	Three small trees of average form
7 CV	*Bauhinia sp* Bauhinia	9 x 11	450at base	2.4 / 5.4	SM	Good	Fair / Good	4	2C	2	2	Minor wounds at multi stems 0.5m + stub end cuts N sides
8 CV	*Hibiscus sp* Hibiscus	3 x 6	150at base	1.5 / 2	ESM	Good	Fair / Good	4	2B	2	3	Multi stemmed at base, typical for species type
9 CV	*Casuarina glauca* She Oak	23 x 14	550, 350	3.1 / 10.8	ESM	Good	Fair / Good	3	2A	2	3	Twin stems at ground level, NW stem with stem inclusion development at ground level = likely to become problematic in the future
10 CV	*Eucalyptus robusta* Swamp Mahogany	16 x 11	350	2.3 / 4.2	ESM	Fair / Good	Fair	3	2E	2	3	Shallow root plate with surface roots, slight lean N + suppressed canopy form biomass - N
11 CV	*Corymbia citriodora* Lemon Scented Gum	23 x 18	700	2.8 / 8.4	ESM	Good	Good	4/3	2C	2	2	Minor lower trunk wound W side – appears not immediately detrimental
*12	*Phoenix canariensis* Phoenix Palm	4 x 8	1000	- / 5	ESM	Good	Good	4	0/6	1	2	Exempt palm species
*13	*Cupressus leylandii* Leyland Green Cypress	7 x 4	150, 200	2.1 / 4.2	ESM	Fair / Good	Fair	4	0/2B	2	2	Exempt tree species, twin at ground level with minor stem inclusion development

	Trees requiring removal due to hazardous or dead condition - subject to Local Government Authority notification		Trees with low retention values: senescence, developing defects or being *exempt trees from the LGA Tree Preservation Order (TPO)

Tree No	*Botanical Name* COMMON NAME	Height x spread (m)	DBH (mm)	SRZ / TPZ	Age	Health	Condition	Signifi-cance	VTA	RV	U. L.E.	Comments CV = Council verge tree NT= Neighbouring tree
14	*Casuarina glauca* She Oak	15 x 5	300	2.1m / 3.6	ESM	Good	Fair / Good	3	2C	2	2	Skewed trunk, of tall forest form, slight lean W, suppressed canopy = likely to become problematic if exposed
15	*Casuarina glauca* She Oak	24 x 11	350	2.3 / 4.2	SM	Good	Good	3	6	1	2	Tree with no significant defects noted SRZ & TPZ likely to be greater
16	*Livistona australis* Cabbage Palm	4 x 5	400	- / 3.5	ESM	Fair / Good	Good	3	2C/6	1	2/5	Slight pest / pathogen affected foliage – appears not immediately detrimental
17	*Corymbia maculata* Spotted Gum	20 x 22	750	2.8 / 9	SM	Fair / Good	Fair / Poor	2	2	3	3	Structurally defective tree, large wound S side ground level to 5m – wound wood face sound, wound margins increasing with decline in canopy = likely pathogen affected = low retention value
18	*Melaleuca quinquenervia* Paperbark	5 x 3	100, 100	1.6 / 2.4	ESM	Good	Fair / Good	4/3	2B	2	2	Twin stems at ground level with minor stem inclusion development
*19	*Melaleuca quinquenervia* Paperbark	4 x 2.5	100	1.5 / 2	ESM	Good	Good	4/3	6	1	2/5	Exempt tree species height class <5m
20	*Angophora costata* Angophora	6 x 5	150	1.6 / 2	I	Good	Good	3	6	1	1	Tree with no significant defects noted
21	*Eucalyptus sp* Eucalypt	6 x 4	150at base	1.5 / 2	I	Good	Good	4/3	6/7	1	1	Small juvenile tree, requires flower & fruit for ID – no significant visual faults noted
*22	*Gordonia axillaris* Gordonia	4 x 6	300at base	2 / 3.6	SM	Fair	Fair / Good	4/5	4/2C	2	2	Exempt tree species height class <5m, Environmentally stressed with reduction pruning evident
23	*Leptospermun petersonii* Lemon Scented Tea Tree	5 x 4	250at base	1.8 / 3	SM	Good	Fair	4	2C/4	2	<3	Very Slight decline in canopy, of average form by lopping / reduction pruning = low retention value
*24	*Grevillea sp* Grevillea Moonlight	4 x 5	300at base	2 / 3.6	M	Fair / Poor	Fair / Poor	5	0/4	3	<3	Exempt tree species height class <5m, with significant decline throughout

	Trees requiring removal due to hazardous or dead condition - subject to Local Government Authority notification		Trees with low retention values: senescence, developing defects or being *exempt trees from the LGA Tree Preservation Order (TPO)

Tree No	*Botanical Name* COMMON NAME	Height x spread (m)	DBH (mm)	SRZ / TPZ	Age	Health	Condition	Signifi-cance	VTA	RV	U. L.E.	Comments CV = Council verge tree NT= Neighbouring tree
25	*Eucalyptus robusta* Swamp Mahogany	17 x 15	650	2.8 / 7.8	SM	Good	Fair / Poor	2	2/3	2	3?	Large open lower trunk wound at 1m W side with decay evident, wound wood seam increasing to 2.4m = low retention value - benefit from further investigations with very shallow surface roots evident
26	*Macadamia integrifolia* Macadamia	6 x 5	250at base	1.8 / 3	ESM	Good	Good	4	6	1	2	Tree with no significant defects noted
27	*Melaleuca quinquenervia* Paperbark	13 x 3	250	2 / 3	ESM	Fair / Good	Fair / Good	4/3	2B	2	2	Minor stem inclusion development at 7m twin stem bifurcation – likely to become problematic if exposed
*28	*Grevillea robusta* Silky Oak	24 x 8	400	2.4 / 4.8	ESM	Good	Good	4/3	6	1	2	Exempt tree species, tall forest form – likely to become problematic if exposed
29	*Casuarina glauca* She Oak	22 x 15	450, 450	3.1 / 10.8	SM	Good	Fair	3	2A	3	3	Main twin stems at ground level with stem inclusion development – likely to become problematic in the future, shallow and extensive root plate = low retention value
30	*Syzygium* smithii Lilly pilly	5 x 7	200	1.8 / 2.4	ESM	Good	Good	3	6	1	2	Suppressed canopy form biomass E with no significant defects noted
*31	*Nerium oleander* Oleander	11 x 11	multi 1200at base	3.6 / 14.4	M	Fair / Good	Fair / Good	5	0	2	2	Exempt tree species
*32	*Lagerstromia indica* Crepe Myrtle	9 x 10	multi 850at base	3 / 10.2	M	Good	Fair / Good	4/3	0/2B	2	2	Exempt tree species
*33	*Schefflera actinophylla* Umbrella Tree	12 x 10	multi 700at base	2.8 / 7.8	M	Good	Fair / Good	5	0/2B	2	2	Exempt tree species
*34 x5	*Howea forsteriana* Kentia Palm (clump)	2 x 1.5	100	- / 2	ESM	Good	Good	5	0/6	1	3/5	Exempt palm species
*35	*Olea europaea susp cuspidate* African Olive	7 x 5	200	1.8 / 2.4	ESM	Good	Good	5	0/6	1	2	Exempt tree species

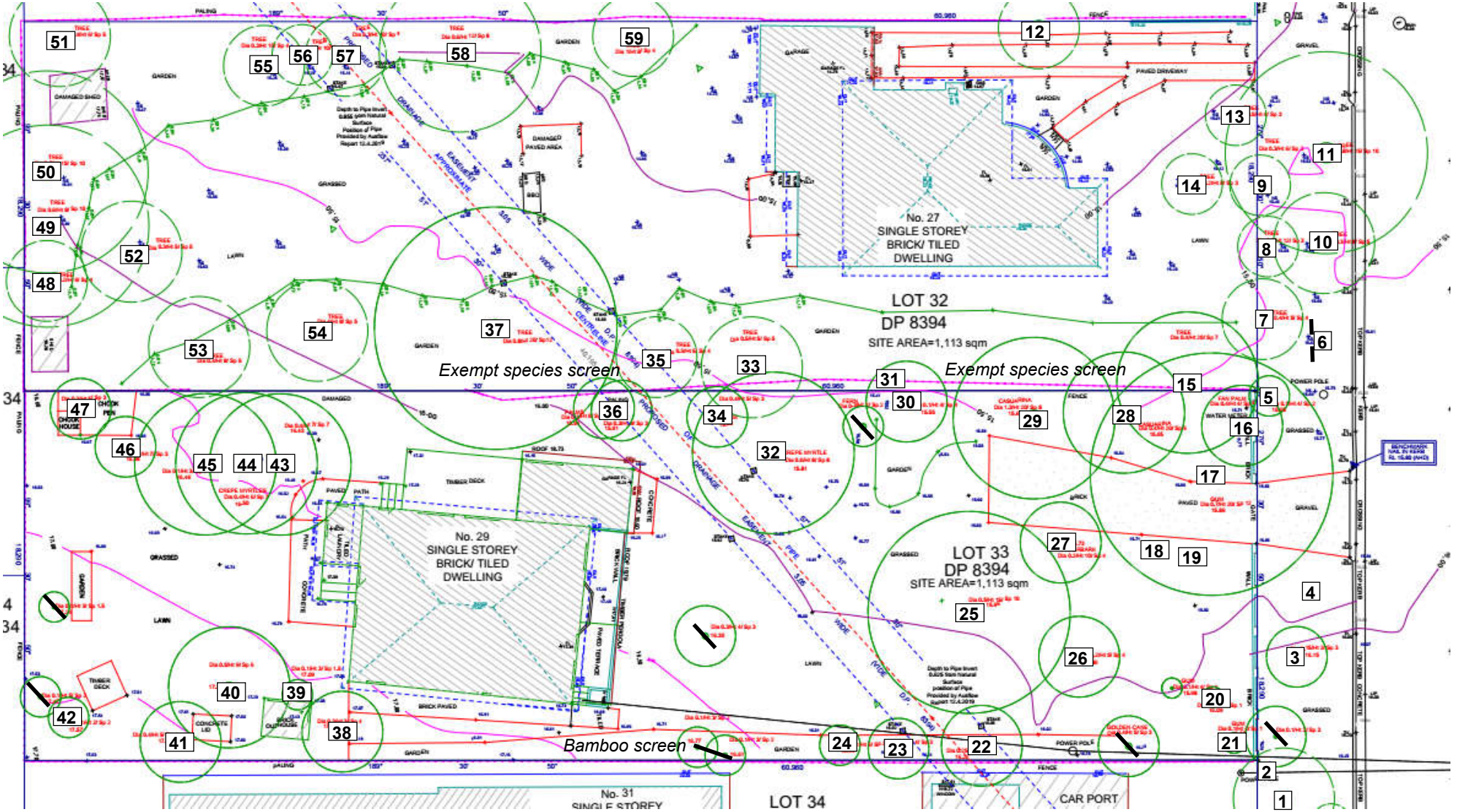
	Trees requiring removal due to hazardous or dead condition - subject to Local Government Authority notification		Trees with low retention values: senescence, developing defects or being *exempt trees from the LGA Tree Preservation Order (TPO)

Tree No	*Botanical Name* COMMON NAME	Height x spread (m)	DBH (mm)	SRZ / TPZ	Age	Health	Condition	Signifi-cance	VTA	RV	U. L.E.	Comments CV = Council verge tree NT= Neighbouring tree
*36 x4	*Archontophoenix cunninghamiana* Bangalow Palm	av 7 x 3	av 200	- / 2.5m	ESM	Good	Good	4	0/6	1	2	Exempt palm species
*37	*Liquidambar styraciflua* Liquidambar	21 x 23	1000	3.3 / 12	M	Good	Fair / Poor	4/3	0/2B/ D	2	3	Exempt tree species, large past structural failure evident within upper branch scaffolds
*38	*Ficus lyrata* Cabbage / Fiddle Leaf Fig	6 x 4	200	1.8 / 2.4	ESM	Good	Fair / Good	4	0/2C	2	2	Exempt tree species, past pruned for building line clearance
*39	*Callistemon viminalis* Bottle Brush	3 x 2	100at base	1.5 / 2	ESM	Good	Fair / Good	4	0/2C	2	3/5	Exempt tree species height class <5m, past pruning resulting in average form
40	*Eucalyptus Botryoides* Southern Mahogany	14 x 12	450	2.5 / 5.4	ESM	Good	Fair	3	2D	3	3	Large stem failure NW side modifying tree form – may become problematic in the future = low retention value
*41	*Musa sp.* Banana Trees	av 4 x 3	av 150	- / 2	ESM	Good	Good	5	0/6	1	2/5	Exempt tree / palm species
*42	*Hibiscus sp* Hibiscus	5 x 5	multi 550at base	2.6 / 6.6	ESM	Fair / Good	Fair / Good	5	0/2B	2	2/5	Exempt tree species height class <5m
*43	*Lagerstromia indica* Crepe Myrtle	8 x 6	multi 550at base	2.6 / 6.6	SM	Good	Fair / Good	4	2C	2	2	Exempt tree species, past reduction pruning & stub end cuts evident
*44	*Lagerstromia indica* Crepe Myrtle	8 x 6	multi 550at base	2.6 / 6.6	SM	Good	Fair / Good	4	2C	2	2	Exempt tree species, past reduction pruning & stub end cuts evident
*45	*Lagerstromia indica* Crepe Myrtle	7 x 7	multi 550at base	2.6 / 6.6	SM	Good	Fair / Good	4	2C	2	2	Exempt tree species, past reduction pruning & stub end cuts evident
*46	DEAD TREE	9 x 2	200	1.6 / -	-	-	-	6	1	4	4	Dead tree
*47	*Morus sp* Mulberry	7 x 7	400	2.4 / 4.8	ESM	Fair	Fair / Poor	4	0/2	3	<3	Exempt tree species, decay at base N side
*48	DEAD TREE	5 x 0	200	1.6 / -	-	-	-	6	1	4	4	Dead tree

	Trees requiring removal due to hazardous or dead condition - subject to Local Government Authority notification		Trees with low retention values: senescence, developing defects or being *exempt trees from the LGA Tree Preservation Order (TPO)

Tree No	*Botanical Name* COMMON NAME	Height x spread (m)	DBH (mm)	SRZ / TPZ	Age	Health	Condition	Signifi-cance	VTA	RV	U. L.E.	Comments CV = Council verge tree NT= Neighbouring tree
49	*Glochidion ferdinandi* Cheese Tree	14 x 14	800	3m 9.6	OM	Fair / Good	Fair	2	2/3	3	3?	Likely remnant tree, aging specimen, one sided canopy biomass NTH by 8+m, torsion twisted lower trunk with trunk folds and evidenced of potential internal fault – benefit from further investigations
50	*Eucalyptus robusta* Swamp Mahogany	23 x 17	750	3 9	SM	Good	Fair	2	2B	2	2	Twin stems at 5m with stem inclusion development – likely to become problematic in the future
51	*Glochidion ferdinandi* Cheese Tree	6 x 5	150, 200	2.1 4.2	ESM	Good	Fair	2	2B	3	3	Twin stems at near ground level with stem inclusion development – likely to become problematic in the future due to one sided weight loaded canopy lean = low retention value
*52	*Morus sp* Mulberry	8 x 11	550at base	2.6 6.6	SM	Fair / Good	Fair	5	0/2	3	<3	Exempt tree species with decay on lower trunk S side
53	*Eucalyptus robusta* Swamp Mahogany	12 x 11	350	2.3 4.2	ESM	Good	Good	2	6	1	2	Average anchoring root development STH side with minor suppressed canopy form biomass W
54	*Corymbia maculata* Spotted Gum	9 x 8	450	2.5 5.4	ESM	Fair / Poor	Fair / Poor	2	2	3	3	Lower trunk wounds NW at 1m - appears pathogen affected resulting in decline in canopy = low retention value
55	*Eucalyptus Botryoides* Southern Mahogany	15 x 11	350	2.3 4.2	ESM	Good	Fair / Good	2	2C	2	2	Bowing lower trunk, upper branch scaffolds with no significant visual faults
56	*Lophostemon confertus* Qld Brush Box	16 x 8	300	2.1 3.6	ESM	Good	Good	4/3	2C	2	2	Minor past stem failure at 9m modifying form – appears not immediately detrimental
*57	*Brachychiton acerifolius* Illawarra Flame Tree	8 x 6	350	2.3 4.2	ESM	Good	Good	4/3	0/6	1	2	Exempt tree species – no significant visual faults
58	*Eucalyptus microcorys* Tallowwood	18 x 16	600	2.7 7.2	ESM	Fair / Good	Fair	4/3	2B	2	2	Multi stemmed at 4m, minor stem inclusion development at lower junction(s) – condition may become problematic in the future
*59	*Schefflera actinophylla* Umbrella Tree	10 x 9	multi 550	2.6 6.6	SM	Good	Fair / Good	5	0/2B	2	2	Exempt tree species, multi stemmed at base

APPENDIX- E: Tree Location Plan



APPENDIX- F: Tree Protection Plan