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Re Arboricultural Impact Assessment (AIA) supporting the DA at 10 Capua
Place, Avalon Beach

Prepared by

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1. Introduction

This AIA has been commissioned by Felicity Benbrook the owner of 10 Capua Place, Avalon Beach to support the DA application to demolish the existing garage and build a new one as well as installing a roof over the level three deck.

The AIA will comply with AS 4970-2009, Protection of trees on development sites.

The following plans that have assisted in preparing this AIA

- I) Garage and Level 1 prepared by Jo Willmore Designs, DA-02
- II) Level 3 and Deck Plan prepared by Jo Willmore Designs, DA-04
- III) Site Survey, YSCO Geomatics, 12001/4

Site visits was undertaken on 18/12/2019 and on 10/08/2020 when visual tree assessments (VTAs¹) were carried out from the level 3 deck on the eight retained trees within 5m of the development. They are two *Angophora costatas* (T1 and T3), one *Elaeocarpus reticulatus* (T2) two *Ficus benjamins* (T4) and three *Syagrus romanzoffianas* (T5). One *Pittosporum undulatum* (T6), being the only tree within 5m of the proposal for the level 1 garage, was also assessed by VTA.

¹ VTA:

Visual Tree Assessment – a systematic inspection usually conducted from ground level looking for defects in a tree. Further investigation would be carried out if necessary by aerial inspection or with specialised equipment to test the extent of a defect and the implications for the tree. A VTA is the accepted starting point and often the end point for assessing trees for defects. (C. Mattheck, 2015)

2. Findings

Table 1, Tree data²

| # | DBH approx. m | Spread approx. m | Height approx. m ³ | Age | Health Condition | Comments |
|----|---------------|------------------|-------------------------------|-----|------------------|---|
| T1 | 0.2 | 6 | 8 | M | P-G | Sparse canopy, dead branches, suppressed, fig 1 |
| T2 | 0.15 | 6 | 8 | M | VP | Top half of the blue berry ash is dead, fig 2 |
| T3 | 0.6 | 16 | 20 | M | G-VG | 95% of canopy is in northern hemisphere, fig 3 |
| T4 | 0.4 | 6 | 3 | M | VG | 2x weeping figs, exempt species, fig 4 |
| T5 | 0.3 | 4 | 6 | M | VG | 3x cocos palms, exempt species, fig 5 |
| T6 | 0.25 | 5 | 12 | M | VG | Pittosporum south side of the garage, fig 6 |

The new roof proposed for the level 3 deck area will be approximately 0.6m away from the trunk of T1, approximately 0.9m away from the trunk of T3 and will be partly supported by two posts set in the ground at the edge of the deck on one side and by the existing house on its other side.

At the edge of the level 3 deck are 2x weeping figs (T4) which are valued by the residents as a privacy screen and 3x cocos palms (T5) all considered exempt species under the Northern Beaches Tree Preservation Order and they would not need Council consent for their removal.

One new post will be placed at the edge of the level 3 deck among the weeping figs, the cocos palms and approximately 2.7m from the angophora T3. It will be set in a post hole or on a pier approximately 200 - 300mm in diameter.

T3 has a DAB⁴ of approximately 0.65m and an SRZ⁵ with radius of approximately 2.8m⁶ putting the post at the edge of the SRZ.

The base and lower trunk of T3 is protected from mechanical damage by the deck, fig 7.

² Appendix 1, Terminology

³ From deck level T1 – T5 inclusive

⁴ Diameter above the buttress, Appendix 1, Terminology

⁵ Structural Root Zone, Appendix 1, Terminology

⁶ https://www.treetec.net.au/tpz_srz_dbh_calculator-2/

The existing garage at level 1 will be demolished and a new garage with a new concrete slab will be built with a slightly larger footprint but one that does not exceed the area currently under concrete and sandstone. T6 at 4m downhill from the proposed works is the only tree within 5m.

3. Tree Protection Measures

The trees within the level 3 deck of the DA would be protected from mechanical damage by trunk protection.⁷ T1, T2 and T3 will not have to be protected from heavy machinery working on the level 3 deck but it is conceivable that a crane could be used to lift materials to this position or that building activities at deck level around the stems of these trees could result in accidental damage to their cambium.

There is no requirement for tree protection fences at ground level to prevent damage from activities to do with the placement of the new post as the base of T3 is already shielded by the deck, fig 7.

Trunk protection would also be applied to T6 at the level 1 garage site.

4. Conclusions/Recommendations

The proposed development will be of low impact to the existing trees because it consists of

- I) One post hole at the edge of the SRZ of T3 with negligible encroachment of the TPZ⁸
- II) Work taking place within an existing concreted footprint, T6

The trees other than T3 close to where the new post is planned are exempt species and hardy to the extent that digging a post hole nearby will have a minimal impact on their health and condition.

If one of these trees (weeping figs or cocos palms) blocked the placement of the new post one option would be for the tree or palm to be pruned⁹ or removed.

⁷ Appendix 2, Tree Protection Measures and Fig 8

⁸ Tree Protection Zone, Appendix 1 Terminology

⁹ Complying with AS 4373-2007, Pruning of amenity trees

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Nigel Dean', on a light-colored background.

Nigel Dean

Standfast Tree Services Pty Ltd

Bibliography

Australia, S. (2009). AS 4970-2009 Protection of trees on development sites.

C. Mattheck, K. B. (2015). *The Body Language of trees*. Karlsruhe Institute of Technology.

Richard W. Harris. James R. Clark, N. P. (2004). *Arboriculture, Integrated Management of Landscape Trees, Shrubs, and Vines, Fourth Edition*. Pearson Education Inc.



Figure 1, T1 *Angophora costata*, suppressed



Figure 2, T2 *Elaeocarpus reticulatus*, dead top



Figure 3, T3 *Angophora costata*, poor form



Figure 4, T4, Ficus benjamins x2, privacy screen



Figure 5, T5, 3x Syagrus romanzoffianas

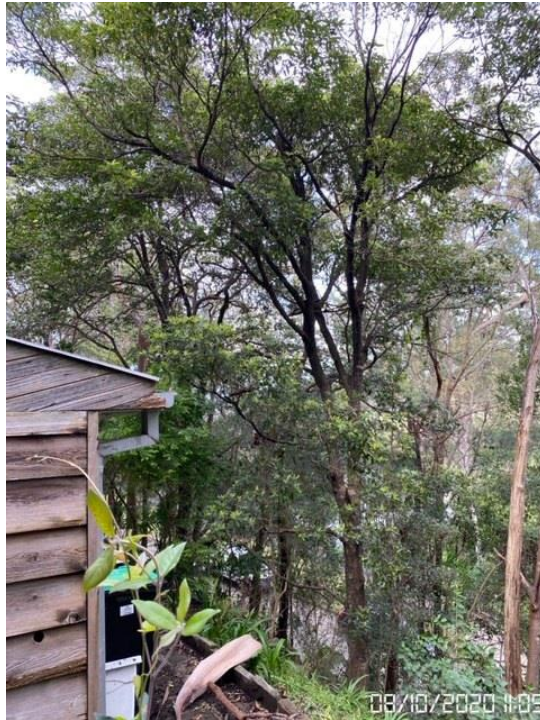


Figure 6, T6 Pittosporum undulatum 4m from proposed garage development, level 1



Figure 7, Base of T3 protected from mechanical damage by the level 3 deck

4.5.2 Trunk and branch protection

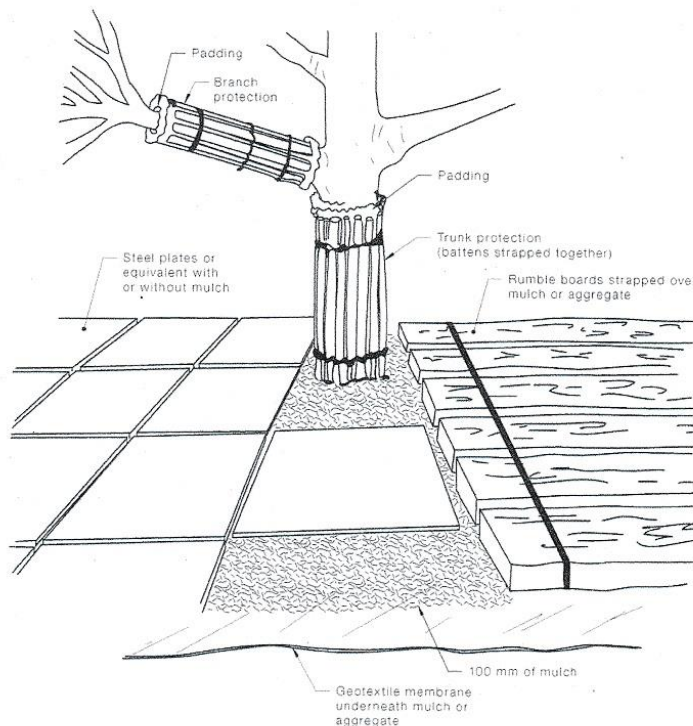
Where necessary, install protection to the trunk and branches of trees as shown in Figure 4. The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2 m is recommended.

Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

4.5.3 Ground protection

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards as per Figure 4.

These measures may be applied to root zones beyond the TPZ.



NOTES:

- 1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
- 2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION

Appendix 1, Terminology

Age Classes:

Juvenile refers to a well-established but young tree (J).

Semi Mature refers to a tree at growth stages between juvenile and full size (SM).

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

Over Mature refers to a tree about to enter decline or already declining (OM).

Health:

Refers to a tree's vigour and is assessed by looking at crown density, leaf colour, presence of epicormic shoots and degree of dieback. Classes are Very Good (VG) Good (G) Poor (P) Very Poor, declining (VP).

Condition:

The state of the scaffold (trunk and major branches) is assessed. Defects such as cavities, included branches and trunk unions and the fruiting body of a fungus would be indicative of compromised condition. Classes are Very Good (VG) Good (G) Poor (P) Very Poor (VP).

Note: Trees may be found to be in VG health but in VP condition and vice versa

DBH:

Diameter at Breast Height refers to the tree trunk diameter measured at breast height or 1.4 metres above ground level.

DAB:

Diameter Above the Buttress refers to the tree trunk diameter measured above the root buttress and is used to calculate the radius of the SRZ.

Defect:

Tree defects are injuries, growth patterns, decay, or other conditions that reduce a tree's structural strength. While a defect identifies the point at which a tree may fail or why it may fail it does not mean the tree will fail. Defects should be tested until their full extent is established.

Hazard:

Something that has the potential to cause harm or loss; this does not mean that it will cause harm or is likely to cause harm.

Note: all trees are hazardous.

Risk:

The likelihood of a particular harm or loss occurring (Likelihood x Consequence). Often risk associated with trees is small enough to be ignored or small enough that no reasonable practicable solution exists to reduce risk. Consequence refers to the target that would be affected by tree or branch failure.

*TPZ:*¹⁰

Tree Protection Zone The radius of the TPZ is calculated for each tree by multiplying the DBH x 12. To establish the TPZ this radius is measured from the centre of the stem at ground level and it is an area that is to be isolated from construction disturbance. Any encroachment into the TPZ of more than 10% is considered to be a major encroachment.

*SRZ:*¹¹

Structural Root Zone The radius of the SRZ is calculated using the following formula:

$r \text{ (SRZ)} = (D \times 50)^{0.42} \times 0.64$ where D is the DAB measured in metres. It is the area around a tree that is required for tree stability and is usually applied on construction sites after there has been a major encroachment of the TPZ.

*t/R < 0.30*¹²

t = width of sound wood, R = radius of the trunk. Regarded as the threshold for action when the ratio of the width of sound wood to the radius of the trunk is less than 0.3 for a cavity or decay in the stem of a tree.

Canker:

A localised area of exposed wood on the trunk or a branch with no bark or cambium caused by invading decay fungi. The bark and cambium does not grow back and the wood can become brittle and the point at which a stem or branch fails⁴.

Crown maintenance:

'Pruning according to the growth habit of the tree. It includes deadwooding, crown thinning, selective pruning and formative pruning....It does not reduce the volume of the crown and retains the structure and size of the tree.' AS 4373-2007, Pruning amenity trees.

¹⁰ AS 4970-2009, Protection of trees on development sites

¹¹ AS 4970-2009, Protection of trees on development sites

¹² Australia, S. (2009). AS 4970-2009 Protection of trees on development sites.

C. Mattheck, K. B. (2015). *The Body Language of trees*. Karlsruhe Institute of Technology.

Richard W. Harris. James R. Clark, N. P. (2004). *Arboriculture, Integrated Management of Landscape Trees, Shrubs, and Vines, Fourth Edition*. Pearson Education Inc.

Crown modification:

'Pruning that changes the form and habit of the tree. It includes reduction pruning, crown lifting, pollarding and remedial (restorative) pruning.' AS 4373-2007, Pruning amenity trees.

Appendix 2, Tree Protection Measures

Tree Protection Fence (TPF)

The TPZ should be isolated from construction disturbance by a Tree Protection Fence (TPF) around the tree or groups of trees to be retained. Existing structures such as fences or walls can be part of the TPF.

The TPF should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition.

A TPF complying with AS 4687 would:

- Be constructed of chain wire mesh panels with shade cloth attached (if required) to reduce the transport of dust, other particulate matter and liquids into the protected area.
- Have fence posts and supports with a diameter greater than 20mm.
- Be held in place with concrete feet.
- Be 1.8m high.
- Have signs that are visible from within the development site identifying the TPZ placed around its edge. The lettering on the signs should comply with AS 1319.

Trunk and branch protection

The purpose of trunk and branch protection is to prevent physical damage being done to the tree from plant and machinery and other construction activities.

Trunk and branch protection should consist of boards and padding that will not damage the bark.

Boards should be strapped to trees and not nailed or screwed.

A minimum height of 2m is recommended.

Ground protection

If temporary access for machinery is required within the TPZ ground protection measures will be required.

The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Ground protection measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards.

Root protection during works within the TPZ and SRZ

Some approved works within the TPZ and SRZ have the potential to damage roots. These activities include:

- Regrading
- Installation of piers
- Landscaping

If the grade is to be raised the material should be coarser or more porous than the underlying material. Depth and compaction should be minimised.

Manual excavation should be carried out under the supervision of the project arborist to identify roots critical to tree stability. Relocation or redesign of works may be required.

Roots pruned within the outer edge of the TPZ and SRZ should:

- Have the final cut made to undamaged wood.
- Be pruned with sharp tools such as secateurs, pruners, handsaws or chainsaws.
- Should not be treated with dressings or paint.
- Should not be 'pruned' with machinery such as a backhoe or an excavator.

When roots within the TPZ and SRZ are exposed by excavation temporary root protection should be installed to prevent them from drying out. This may include jute mesh or hessian sheeting as multiple layers over the exposed roots and the excavated soil profile extending to the full depth of the root zone. Root protection sheeting should be pegged in place and kept moist during the period that the root zone is exposed

Other excavation works in proximity to trees, including landscape works such as paving, irrigation and planting can adversely affect root systems.

Installing underground services within the TPZ

All services should be routed outside the TPZ.

If underground services must be routed within the TPZ they should be installed by directional drilling or in manually excavated trenches.

The directional drilling bore should be at least 600mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

For manual excavation of trenches the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

Scaffolding

Scaffolding should be erected outside the TPZ.

Where it is essential for scaffolding to be erected within the TPZ branch removal should be minimised. When pruning is unavoidable it must be specified by the project arborist and comply with AS 4373.

The ground below the scaffolding should be protected with boarding, eg scaffold board or plywood sheeting. Where access is required a board walk or other surface material should be used to minimise soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed.

Activities restricted within the TPZ

1. machine excavation including trenching
2. excavation for silt fencing
3. cultivation
4. storage
5. preparation of chemicals, including preparation of cement products
6. parking of vehicles and plant
7. refuelling
8. dumping of waste
9. wash down and cleaning of equipment
10. placement of fill
11. lighting of fires
12. soil level changes
13. temporary or permanent installation of utilities and signs
14. causing physical damage to the tree.