ARBORICULTURAL IMPACT ASSESSMENT REPORT

68 BIRKLEY ROAD
MANLY NSW 2095

Prepared for Matthew and Georgi Bates

22 May 2017
Revision A

Author:

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1. INTRODUCTION

1.1 This report was commissioned by Matthew and Georgi Bates, the owners of 68 Birkley Road, Manly to provide an Arboricultural Impact Assessment report relating to the proposed alterations and additions on the site and the existing trees located on the property that are within close proximity to the proposed works.

1.2 As part of a development application with Northern Beaches Council (Manly) the owners are seeking permission to carry out alterations and additions to the existing garage located to the rear of the site (adjacent to Lawson Place), plus the construction of an in ground swimming pool in the rear yard and associated landscaping works. As part of the proposed works the existing single garage will be increased in width to form a double garage, which will necessitate the removal of the existing trees located in the rear yard of the site.

1.3 A total of three (3) trees are included in this assessment, all of which are located on the site and are protected trees in accordance with Northern Beaches (Manly) Council's *Local Environment Plan 2013 Part 5.9* whereby a tree is protected if it is over five (5) metres in height. In some cases a tree may meet the prescribed size criteria, however may not be protected for other reasons such as it being a species listed as exempt.

1.4 The purpose of this report is to undertake a visual assessment of the trees, determine the sustainability of the trees in the landscape and assess suitability for retention, and determine the impact of the proposed works on the trees and provide tree protection measures for those trees to be retained.

1.5 This report shall reflect the expert opinion of the Arborist. The Arborist is acting independently of and not as the advocate for the owner. The Arborist shall not receive any commission to prune or remove the tree/s which is the subject of this report.

1.6 This report has been prepared in accordance with the Australian Standard "*Protection of Trees on Development Sites*" (AS 4970:2009).

1.7 Details shown on the following plans were reviewed in this assessment:

Title	Author	Job No /Dwg No	Date
Architectural drawings (Issue B)	Arcouture	1510 / DA1, DA4-5DA14	15.5.15

1.8 Key Definitions and Abbreviations used in this report.

- TPZ = Tree Protection Zone. This is the area as defined by AS 4970 – "*Protection of trees on development sites*" and means the typical minimum area above and below ground at a given distance from the trunk to provide for protection of the tree. Most importantly it represents the root zone required to be kept uninjured to maintain a healthy and viable tree. Note, roots will usually extend well beyond this zone, so this represents the minimum remaining root zone required, assuming all others are lost or damaged due to construction. It is typically calculated as a circle centred on the trunk unless existing site conditions can be assessed and indicate otherwise. According to the Australian Standard, a minor encroachment of no greater than 10% of the TPZ is allowable, provided the 10% is compensated for elsewhere and contiguous to the TPZ. Any encroachment greater than 10% of the TPZ is considered to be major and may potentially result in an adverse impact upon the tree.
- SRZ = Structural Root Zone. This is the area as defined by AS 4970 – "*Protection of trees on development sites*" and means the area immediately around the base of the tree at a given distance from the trunk. The woody roots and soil cohesion in this area are considered vital to the structural stability of the tree. Damage or removal of soil and roots from this area will typically render the tree unstable and require its removal. It is typically calculated as a circle, centred on the trunk, unless existing site conditions can be assessed and indicate otherwise.

2. METHODOLOGY

2.1 Health and Condition Assessment

A site inspection was undertaken on 8 February 2017 at around 10am to visually assess the trees in view from the ground. This report is limited to the methods of assessment listed below (and outlined in **Appendix 1**), and does not include any internal probing, compaction testing, drilling, root mapping, aerial inspection or diagnostic testing.

- Tree Species (botanical and common name).
- Tree height and age was estimated.
- Canopy spread was estimated.
- Diameter at Breast Height (DBH) and Diameter at Ground Level (DGL) was measured or estimated if inaccessible.
- Health and vigour, including foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback, epicormic growth as indicators.
- Condition, using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location.
- The photographs included in this report were taken at the time of inspection.
- Assessment was carried out visually from ground level within the property.
- The comments and recommendations in this report are based on findings from the site inspection.

2.2 Landscape Significance

The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. A criteria for the assessment of landscape significance as devised by Andrew Morton (2003) and shown in **Appendix 2** have been applied. Whilst it may be somewhat subjective to assess these values consistently, it is appropriate to assign some measure to assist in determining the overall retention value of a tree.

The rating system which has been applied to the tree and to assist in determining a priority for retention, includes the following categories:

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

2.3 Tree Retention Value

The retention value shown in the Tree Assessment Schedule in **Appendix 4** have been determined on the basis of the estimated longevity of the tree and its landscape significance rating, in accordance with Table 1 that follows. These retention values will help determine the most appropriate position of any future building footprints and/or structures within the site, to minimise the impact on trees considered worthy of preservation. Note, when a tree is located on a neighbouring property or public land, typically a higher retention value has been allocated given that the tree is not owned by the client and the client is therefore obligated to ensure the neighbouring or Council owned trees are not negatively impacted upon by proposed works.

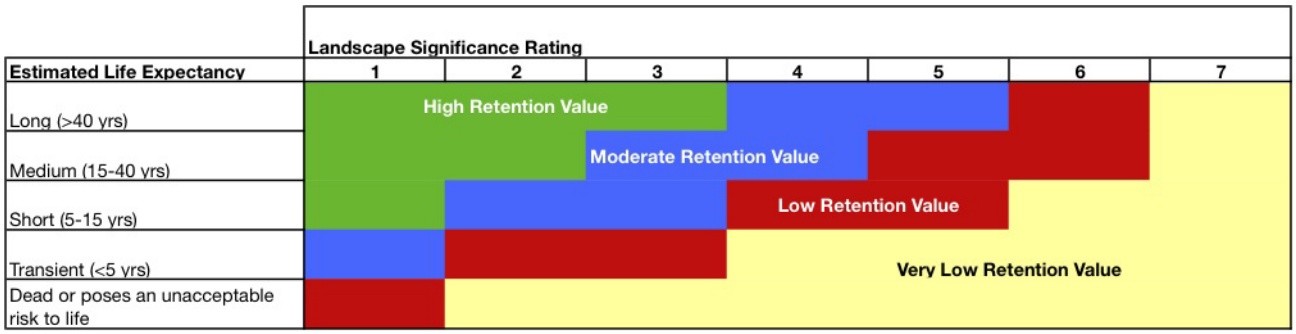


Table 1: Tree Retention Values - assessment methodology (Ref:- Morton, Andrew 2006 modified from Couston, Mark & Howden, Melanie (2001) Footprint Green Pty Ltd, Sydney, Australia)

3. OBSERVATIONS

3.1 The Site

The site is a relatively narrow allotment located on the eastern side of Birkley Road. A lane way adjoins the rear eastern boundaries known as Lawson Place. Residential properties adjoin the north and southern boundaries. Rectangular in shape, the site has a total area of 341.8 square metres. The natural terrain on the site is relatively flat, with a gentle slope up to the rear boundary.

On the site is an existing multiple storey dwelling located towards the front of the site. A single garage structure is located to the rear of the site, providing vehicular access onto the property via Lawson Place (refer to **Figure 1**).

3.2 The Trees

The three (3) trees included in this assessment are located adjacent to the northern boundary towards the rear of the site. Each tree has been provided with an identification number for reference purposes which is denoted on the Site Plan (refer to **Appendix 3**), and based on the proposed ground floor plan prepared by Arcouture. The numbers on this plan correlate with the Tree Assessment Schedule (**Appendix 4**). Site context photographs of the trees are found in **Appendix 5**.

Figure 1: An aerial image of the site with boundary lines highlighted in red (accessed from http://maps.six.nsw.gov.au/ on 16/02/17).

4. IMPACT ASSESSMENT

4.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the trees. The Site Plan (refer to **Appendix 3**) shows the tree locations and the impact (if applicable) of the proposed development on each tree to be retained is shown. The impact (if applicable) is also noted in the Tree Assessment Schedule (**Appendix 4**). The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (RL)
- Tree Protection Zone (TPZ)
- Structural Root Zone (SRZ)
- Footprint of the proposed development and any temporary structures (such as scaffolding)
- Incursions to the TPZ & SRZ, including excavation, filling, and potential above ground impacts to tree canopy; and
- Assessment of the likely impact of the works on the existing trees.

4.2 The proposed double garage structure will necessitate the removal of the two (2) Eucalypts, identified as T1 and T2. Both trees are mature specimens that exhibit normal to low signs of vigour and are considered to be in fair to poor condition. T1 has some twig dieback and some persistent deadwood in the canopy. Decay is also evident at a branch junction approximately 5.5m above ground level with bracket fungi visible at an old pruning cut. T2 exhibits signs of a thinning crown with major deadwood and twig dieback in the canopy with a reduced live crown of approximately 60%. Both T1 and T2 are estimated to have a short life expectancy of 5 to 15 years. With consideration to the current health, condition and longevity of T1 and T2 overall the trees are considered to hold a moderate to low retention value.
Note: The existing single garage structure is located in the SRZ of T1 and T2, representing a major encroachment in the respective TPZ of the trees. It is in the author's opinion the northern wall should not extend any closer to the north if the trees are to be retained, as the increased encroachment in the SRZ would inevitably result the severance of structural woody roots which may lead to tree decline and/or tree failure. As such, any extension of the existing northern garage wall closer to T1 and T2 is considered to necessitate the removal of T1 and T2.

4.3 The proposed double garage and timber decking areas are located in the TPZ of T3 (Kentia Palm) representing an encroachment of approximately 33% which is considered to potentially result in a high level of impact upon the palm. As such, it is considered that the proposed works will necessitate the removal or T3. The palm is suppressed by the canopy of T2 (Wallangarra White Gum) and is a fair representation for the species with a moderate retention value. It may be possible to consider transplanting T3 to an alternative location in the rear yard of the site.

5. CONCLUSION | RECOMMENDATIONS

5.1 The proposed double garage structure will necessitate the removal of T1 (Eucalypt) and T2 (Wallangarra White Gum). Both trees are relatively poor specimens with an estimated short life expectancy of 5 to 15 years. Overall both T1 and T2 are considered to have a moderate to low retention value. Due to the positioning of the existing single garage structure already located in the SRZ of T1 and T2, it is in the author's opinion the northern wall should not extend any closer to the trees if they are to be retained, so as to avoid any compromise to the stability of the trees due to root severance in the SRZ. As such, any extension of the existing garage towards the north is considered to necessitate the removal of T1 and T2.

5.2 The proposed double garage and timber decking areas represents a major encroachment of approximately 33% in the TPZ of T3 (Kentia Palm) which may well result in a high level of impact upon the palm. As such, it is considered that the proposed works will necessitate the removal or T3. Consideration may be given to transplanting the palm to another location on site.

5.3 The three (3) trees proposed for removal are considered to be moderate to low retention value trees. Whilst none of the trees are considered to hold high landscape or heritage significance, T1 and T2 are native trees, and overall the combined canopy makes a contribution to canopy coverage and amenity of the site. Tree planting should be carried out on the site in accordance with Table 6 of Manly Council's Development Control Plan 2007. The tree planting should comprise a minimum of one (1) endemic tree species which can reach a minimum mature height of ten (10) metres with a minimum container size of 25-litres at time of planting.

If you have any questions regarding this report please do not hesitate to contact the undersigned.

Joanne Leigh
Consultant Arboriculturalist (AQF 5)
Member of I.A.C.A. (Institute of Australian Consulting Arborists)
Member of I.S.A (International Society of Arboriculture)

Assumptions
Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible. However Joanne Leigh – Consulting Arborist can neither guarantee nor be responsible for the accuracy of information provided by others.
Unless stated otherwise:
- Information contained in this report covers only the tree that was examined and reflects the condition of the tree at the time of inspection: and
- The inspection was limited to visual examination of the subject tree without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

6. REFERENCES

- Draper, Danny B. and Richards, Peter A (2009) "Dictionary for Managing Trees in Urban Environments". CSIRO Publishing, Collingwood, VIC Australia
- Harris, R.W; Clark, J.R; & Matheny, N.P (2004) Arboriculture; Integrated Management of Landscape Trees, Shrubs & Vines 4th Edition, Prentice Hall, New Jersey.
- Mattheck, Claus (2007) "Updated Field Guide for Visual Tree Assessment". Karlsruhe Research Centre, Germany.
- Standards Australia (2009) AS2970-2009 "Protection of Trees on Development Sites", Sydney.
- Council's relevant tree planning documents.

APPENDIX 1: TREE INSPECTION INVENTORY NOTES

The values for terminology provided below are sourced from SRIV© Sustainable Retention Index Value © From Draper BD and Richards PA 2009, Dictionary for Managing Trees in Urban Environments, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Age: Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as Young, Mature and Over-mature.
Young - Tree aged less 20% of life expectancy, in situ.
Mature - Tree aged 20-80% of life expectancy, in situ.
Over-mature - Tree aged greater than >80% of life expectancy, in situ, or senescent with or without reduced vigour, and declining gradually or rapidly but irreversibly to death.

Height: In metres (estimated)

Spread: Average diameter of canopy in metres (estimated)

Crown class:
(D) Dominant (crown extends above general canopy; not restricted by other trees)
(C) Co-dominant (crown forms the bulk of the general canopy but crowded by other trees)
(I) Intermediate (crown extends into dominant/codominant canopy but quite crowded on all sides)
(S) Supressed (crown development restricted from overgrowing trees)

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g. dormant, deciduous or semi-deciduous trees. Vigour can be categorized as:
Normal Vigour Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
High Vigour Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard; a tree subject to a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.
Low Vigour Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
Dormant Tree Vigour Determined by existing turgidity in lowest order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.

Useful Life Expectancy: The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as Immediate, Short Term, Medium Term and Long Term.
Short Term - Period of time less than 15 years.
Medium Term - Period of time 15 - 40 years.
Long Term - Period of time greater than >40 years.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils), the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly second (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorized as:
Good Condition - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.
Fair Condition - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
Poor Condition - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.

APPENDIX 2: CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

The level of landscape significance has been determined using the following key criteria as a guide:

1. SIGNIFICANT
• The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance; or
• The subject tree forms part of the curtilage of a Heritage Item (building /structure /artifact as defined under the LEP) and has a known or documented association with that item; or
• The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event;
• The subject tree is scheduled as a Threatened Species or is a key indicator species of an Endangered Ecological Community as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999; or
• The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species; or
• The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
• The subject tree has a very large live crown size exceeding 300m2 with normal to dense foliage cover, is located in a visually prominent in the landscape, exhibits very good form and habit typical of the species and makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity; or
• The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.

2. VERY HIGH
• The tree has a strong historical association with a heritage item (building/structure/artifact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site; or
• The subject tree is listed on Council's Significant Tree Register; or
• The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value;
• The subject tree has a very large live crown size exceeding 200m2; a crown density exceeding 70% Crown Cover (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.

3. HIGH
• The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence; or
• The tree is a locally-indigenous species and representative of the original vegetation of the area; or
• The subject tree has a large live crown size exceeding 100m2; and
• The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (eg crown distortion/suppression) with a crown density of at least 70% Crown Cover (normal); and
• The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.

4. MODERATE
• The subject tree has a medium live crown size exceeding 40m2; and
• The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% Crown Cover (thinning to normal); and
• The tree makes a fair contribution to the visual character and amenity of the area; and
• The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms.
• The tree has no known or suspected historical association

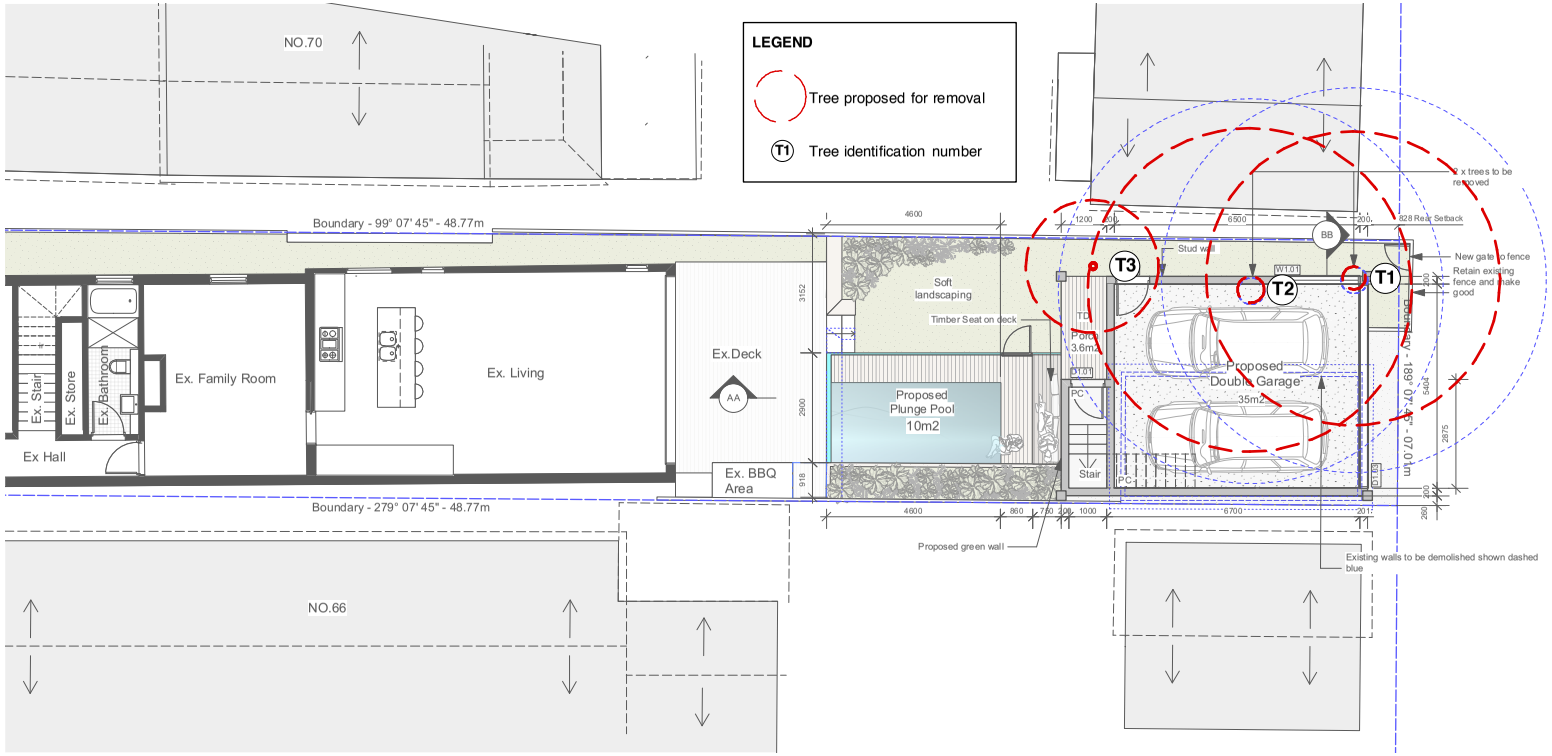
5. LOW
• The subject tree has a small live crown size of less than 40m2 and can be replaced within the short term with new tree planting; or
• The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% Crown Cover (sparse); and
• The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area.

6. VERY LOW
• The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or a nuisance species.
• The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. INSIGNIFICANT
• The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993

Ref:- Morton, Andrew (2003) Criteria for Assessment of Landscape Significance Earthscape Horticultural Services. Sydney, Australia

APPENDIX 3: SITE PLAN (not to scale)



Drawn By:
Alice Cutcliffe

email: alice.e.cutcliffe@gmail.com
mobile: 0424 561 309

Notes
1.This drawing and design are copyright and no portion may be reproduced without the written permission of the Architect.
2.Use written dimensions or grid lines in preference to scaled dimensions. Measurements to existing work are to be checked on site.
3.This drawing is to be read in conjunction with the Architect's Specification and Conditions of Contract.
4.Electronic data transfer should be scanned for viruses before use and any loss or damage (incl. consequential damage) caused to the recepient of electronic data, by its direct or indirect use, is not the liability of the designer.
5. All work to relevant BCA & Australian Standards
6. NOT FOR CONSTRUCTION, development application purposes only.

Issue	Description	Date
A	Schematic Design - Sketch Options	19/05/15
B	PRE-DA Meeting	13/05/17

Developement Application

for Matthew & Georgi Bates
lot A DP 334786
at No. 68 Birkley Road, Manly
prepared by **Arcouture**

Title
Prop. Ground Floor Plan

Date 15.05.2017
Scale 1:100 @ A3
Drawn AC
Job No. 0001

Dwg {DA04}
Issue B

APPENDIX 4: TREE ASSESSMENT SCHEDULE

Tree No.	Plant Name (Species/Common Name)	Age	Tree Height (m)	Average Canopy spread (m)	DBH (m)	DGL (m)	Crown class D/C/I/S	Vigour	Condition	Useful Life Expectancy	Landscape Significance	Tree Retention Value	Observations/comments	Tree Protection Zone (TPZ) radius in metres	Structural Root Zone (SRZ) radius in metres	Proposed to remove or retain?	Impact / Incursion
1	*Eucalyptus spp.* (Eucalypt)	M	12.0	7.0 (bias to north and east)	0.54	0.58	C	normal	fair - poor	short (5-15yrs)	moderate	moderate - low	Tree has a canopy bias to the north and east. Twig dieback/deadwood - minor. Decay considered major at localised branch junction 5.5m above ground level with bracket fungi evident at old pruning cut.	6.5	2.6	remove	Tree is located in footprint of proposed double garage envelope.
2	*Eucalyptus scoparia* (Wallangarra White Gum)	M	12.5	9.5 (bias to west)	0.56	0.71	C	low	fair - poor	short (5-15yrs)	moderate	moderate - low	Deadwood - major Twig dieback - major Evident of branch failures Thinning canopy with reduced crown cover estimated to be approximately 60% Raised canopy through past pruning cuts.	6.7	2.9	remove	Tree is located in footprint of proposed double garage envelope.
3	*Howea forsteriana (Kentia Palm)*	M	6.0	4.0	0.175	n/a	S	normal	good	long (>40yrs)	low	moderate - low	Typical representation for the species Canopy suppressed by Tree No. 2	3.0	n/a	remove	New structures form an encroachment of approximately 33% in the TPZ of the palm. Proposed works will potentially result in a high level of impact upon the palm.

APPENDIX 5: SITE PHOTOGRAPHS

Photograph 1: Viewing east to the existing single garage with T3 (Kentia Palm) and T2 (Wallangarra White Gum) visible to the left hand side.

Photograph 2: Viewing south along Lawson Place, with the trunk of T1 (Eucalypt) visible (centre).

Photograph 3: A closer view of the bracket fungi visible at T1 (Eucalypt) - see red arrow.