

cat mackenzie landscape by design
Arboricultural Consulting and Landscape Design
PO Box 151 Newport Beach NSW 2106
Phone (02) 9918 9833 - Mobile 0414 997 417 - Fax (02) 9918 9844
Email cmackenzie1@bigpond.com

ARBORICULTURAL REPORT

**An assessment of tree health and condition
and development impacts on trees to be retained**

at

3 Boundary Road
WARRIEWOOD, NSW

for:

Mr Scott Avery

DECEMBER 5, 2003

Report prepared by
Catriona Mackenzie
Certificate of Horticulture,
Associate Diploma of Applied Science (Landscape), MAIH MIACA



1 INTRODUCTION

1.1 This report was commissioned by Mr Scott Avery to assess the health and condition of several trees on the site known as 3 Boundary Road, Warriewood. The report relates to a proposed single dwelling on the site.

1.2 The purpose of this report is to assess the potential retention of trees and to identify probable hazards presented by the condition of the subject trees.

The report also provides recommendations for preservation or removal of trees. Where reasonable I have given recommendations for design changes that would allow the retention of trees considered desirable and in good health and condition.

On Wednesday, December 3, 2003 I carried out an inspection of the trees on the site.

1.3 Plans analysed for the preparation of this report include:

- o Site and Floor plans, Dwg No's 03 AVERY 01 – 05, dated 20/10/03, prepared by W & B Consulting Pty Ltd;
- o Elevations and Sections, Dwg No's 03 AVERY 06 – 10, dated 20/10/03, prepared by W & B Consulting Pty Ltd;and
- o Shadow diagrams (with contours and levels shown), Dwg No's 03 AVERY 12 – 13, dated 20/10/03, prepared by W & B Consulting Pty Ltd.

1.4 Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of inspection. The inspection was limited to visual examination of the subject trees without dissection, excavation, probing or coring. No aerial (climbing) inspections, woody tissue testing or tree root investigation was undertaken as part of this tree assessment.

Care has been taken to obtain all 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.

2 METHODOLOGY

2.1 In preparation for this report, a ground level visual tree assessment (Mattheck 1994) was undertaken by the author of this report on Wednesday, December 3, 2003.

2.2 Tree height and canopy spread of the subject tree was estimated and expressed in metres. Trunk diameter was measured at 1.4 metres above ground level (*DBH*), using a standard metal tape.

- 2.3** 10 trees were considered to be within a setback from the proposal where potential impacts on those trees could occur.

3 DISCUSSION

- 3.1** Of the ten (10) trees assessed, five (5) are recommended for removal based on their decline in health, poor form, or have identifiable defects and are considered hazardous.

These are trees 1, 4, 5, 7 and 9.

- 3.2** Of the remaining five (5) trees the following was noted:

- Trees 2, 8 and 10 have potential problems and require ongoing yearly monitoring of their condition; and
- Trees 3 and 6 do not appear to have any significant health problems or significant defects.

- 3.3** At an initial site meeting with Mr Avery, I expressed some concern about the proximity of the proposed excavation to Trees 2 and 3.

Of most concern was the setback for excavation from Tree 3. This tree, in terms of its size, health and condition is considered to be the best specimen of all 10 trees, and most worthy of design changes to retain it.

The excavation was to be at 3.0 metres from the tree and at the edge of the tree's Critical Root Zone (CRZ).

An old existing cut for the driveway had exposed significant roots belonging to Tree 3. These roots were growing in a southeasterly direction and had been severed at approximately 4.2 and 5.2 metres from the center of the tree trunk.

Relocating the setback to 5.0 metres east from the tree (1.0 metres inside the Primary Root Zone (PRZ)) would reduce the likelihood of significant roots being encountered and severed.

This setback would also prevent further damage and cutting of the exposed roots noted above and increase the setback of excavation from Tree 2.

- 3.4** The setback of the proposed dwelling is well away from Tree 6. No impacts are expected to this tree.

- 3.5** Relocating the dwelling 2.0 metres east will increase the setback from 1.5 to 3.0 metres for the posts and footings near Tree 8. This area is predominantly sandstone outcrops and floaters with thin layers and pockets of soil between the rock. Footings are most likely to be placed directly into rock, however the possibility of tree roots growing between rocks, etc should not be discounted.

- 3.6** The relocating of the dwelling footprint reduces the setback from Tree 10, however, the excavation would be at a distance of 6.0 metres from the tree, and outside its PRZ.

4 CONCLUSIONS

- 4.1 Several trees have been storm and/or fire damaged. Their retention within the proximity of a dwelling is not desirable.
- 4.2 Relocating the proposed building footprint 2.0 metres east will significantly reduce possible impacts on at least three trees.
- 4.3 The new dwelling can be constructed with little, if any, impact on other remaining trees.

5 RECOMMENDATIONS

- 5.1 Remove the nominated trees 1, 4, 5, 7 and 9.
- 5.2 Trees 2, 8 and 10 should be inspected yearly, or after a major storm event by a qualified arborist.
- 5.3 The east stem of Tree 2 should be reduced or removed to minimize branch weight over the dwelling.
- 5.4 Remove northern branch from Tree 8 to accommodate proposed dwelling.
- 5.5 All deadwood of 30mm diameter or greater should be removed from the trees to remain within the vicinity of the dwelling.
- 5.6 Remove epicormic growth from lower trunk (west side) of Tree 10 to keep foliage clear of dwelling.
- 5.7 Excavation of the northwest corner in the proximity of Trees 2 and 3 must be carried out by hand to avoid possible damage to tree roots. If any roots greater than 50mm diameter are encountered an arborist is to be retained to advise on the impacts of removal of these roots.
- 5.8 To comply with recommendations of *Planning for Bushfire Protection 2001* an arborist should be retained at post construction to selectively remove tree parts which may overhang or touch the dwelling.
- 5.9 Provide Tree Protection fencing to all trees to be retained.
 - 5.9.1 **Tree Protection Fencing (TPF)**
 - TPF must be provided before any site works are carried out including any clearing or grading.

- Provide TPF as far as practicable from the trunk of the trees preferably outside the canopy dripline of the tree.
- For trees 2 and 3 this fencing should be no closer than 4.0 metres from the tree.
- The fencing should be placed to encircle the whole tree.
- The most appropriate fencing for TPF is 1.8m chainlink with 50mm metal pole supports. During installation care must be taken to avoid damage to significant roots.
- Nothing should occur inside the TPF, so therefore all access to personnel and machinery, and storage of fuel, chemicals, cement or site sheds is prohibited.
- Signage should explain exclusion from the TPF and carry a contact name for access or advice.

5.10 The following general comments apply to trees nominated for retention.

- Service trenches should not pass through a fenced area, although if this cannot be avoided, a qualified arborist should be present to supervise excavation, cut torn roots cleanly or redesign around roots.
- No stock-piling should take place around the root zone.
- The inclusion of a mulch layer of composted leaf and woodchip to a depth of 75mm will help retain soil moisture and protect soil from contaminants.
- A qualified arborist should be retained to carry out and/or supervise works within the Primary Root Zone (PRZ) of the trees 2 and 3.
- Any roots that must be severed must be cut cleanly with a sharp handsaw. Tearing of roots is not acceptable.
- Any excavation within 5.0 metres of T2, 3 and 10 should be carried out by hand i.e. a trench along the line of cut adjacent to the tree should be carefully dug by hand to expose any roots. After cutting of roots, machinery may complete the excavation.
- Do not allow excavation vehicles or equipment to rip at, or remove the roots along the face of the excavation adjacent to the tree. In the event the vehicles 'grab' at roots during works, the machine operator must stop work immediately and allow the roots to be cut before continuing.
- Locations for any piers within 5.0 metres of the tree must be determined by careful hand exploration to avoid tree roots. Where significant tree roots are encountered which coincide with the desired location for a pier, the location should be moved so as to avoid the root/s. In the event this is not possible to achieve, an arborist should be consulted to assess the impacts of the removal of further significant roots on the trees health and stability.
- Providing a regular supply of water to the trees during the period of works is recommended.
- During this period it also recommended that the trees be given fortnightly applications of a rooting hormone such as Hormone 20® to encourage the development of new roots.
- Any landscaping within the canopy dripline of trees should consist only of tubestock container size at time of planting. Extreme care must be taken to avoid further disturbance or damage to tree roots.
- Removal of mulch is advised after construction to remove any contaminants.

- Regular monitoring of the tree during development works for unforeseen changes or decline, will help maintain the tree in a healthy state.

5.11 Tree preservation requires a long-term commitment to monitoring and rectifying problems associated with trees.

Recommendations for care of these trees after construction are:

- Mulching – removal of mulch after construction to remove any contaminants. Replacement with a good quality mulch and addition of 10% organic matter will improve beneficial soil micro-organisms, retain moisture and improve aeration and water infiltration.
- Pruning - Removal of any deadwood from the trees is recommended for hazard abatement when the TPF is removed at the end of the project. A minimum amount of live material should be removed from trees so they have maximum photosynthetic ability to develop new roots to adapt to new conditions.
All pruning work should be carried out by a qualified arborist and be to Australian Standard for Pruning of Amenity Trees, AS4373 1996.
- Irrigation – An arborist should determine whether irrigation should be carried out during extended periods of drought.
- Pest management – Monitoring as trees under stress are more open to insect attack.
- Hazard Management – monitoring of the trees and re-assessment by a qualified arborist is required for adequate long-term safety of residents. These trees are not part of a natural system and will require observation and treatment if they are to remain an asset to the development and the community.

BIBLIOGRAPHY

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Matheny, N.P. and Clark, J.R. 1991, *A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas*, Second Edition. International Society of Arboriculture, Savoy, Illinois.

Mattheck, C. & Breloer, H.(1999) *The Body Language of Trees*. Research for Amenity Trees No.4 the Stationary Office, London.

APPENDIX A - TERMS AND DEFINITIONS



TERMS AND DEFINITIONS

The following relates to terms or abbreviations that may have been used in this report and provides the reader with a detailed explanation of those terms.

Age classes

- ? (I) = immature and refers to a well established but juvenile tree.
- ? (S) = semi-mature and refers to a tree at growth stages between immaturity and full size.
- ? (M) = mature and refers to a full sized tree with some capacity for further growth.
- ? (O) = over-mature and refers to a tree about to enter decline or already declining.
- ?

Basal flare The rapid increase in diameter that occurs at the confluence of trunk and root crown, associated with both stem and root tissue.

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 (ie trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition.

Critical Root Zone (CRZ) refers to a radial offset of five (5) times the trunk DBH measured from the center of the trunk. Distance rounded off to the nearest 0.5 metre. Excavation within this area may seriously destabilize the tree. Fully elevated construction within this area is possible with specific root zone assessment.

Diameter at Breast Height (DBH) refers to the tree trunk diameter at breast height (1.4 metres above ground level)

Footprint refers to the area occupied by structures including dwellings driveways and paths.

Hazard refers to anything with the potential to harm health, life or property.

Health refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

Primary Root Zone (PRZ) refers to a radial offset of ten (10) times the trunk DBH measured from the center of the trunk. Distance rounded off to the nearest 0.5 metre. Excavation is possible within one offset only with this area and subject to specific rootzone assessment.

Scaffold branch A primary structural branch of the crown

Stem/bark inclusion, a genetic fault and potentially a weak point of attachment.

SAFE USEFUL LIFE EXPECTANCY (SULE)

In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. SULE is a system designed to classify trees into a number of categories so that information regarding tree retention can be concisely communicated in a non-technical manner.

SULE categories are easily verifiable by experienced personnel without great disparity.

A tree's SULE category is the life expectancy of the tree modified first by its age, health, condition, safety and location (to give safe life expectancy), then by economics (ie cost of maintenance: retaining trees at an excessive management cost is not normally acceptable), effects on better trees, and sustained amenity (ie establishing a range of age classes in a local population).

SULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with a short SULE may be at present be making a contribution to the landscape but their value to the local amenity will decrease rapidly towards the end of this period, prior to their being removed for safety or aesthetic reasons.

For details of SULE categories see Appendix B, adapted from Barrell 1996.

Taper Relative change in diameter with length; reflects the ability of the stem or branch to evenly distribute stress along its length.

Topping or heading is a pruning practice that results in removal of terminal growth leaving a cut stub end. Topping causes serious damage to the tree.

Tree Protection Zone (TPZ), generally the minimum distance from the center of the tree trunk where protective fencing or barriers are to be installed to create an exclusion zone.

Within Building Footprint (WBF) refers to those trees within the footprint of the proposed development

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APPENDIX B - SULE CATAGORIES



SULE CATAGORIES (after Barrell 1996, Updated 01/04/01)

The five categories and their sub-groups are as follows:

1. **Long SULE** - tree appeared retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance:
 - A. structurally sound trees located in positions that can accommodate future growth
 - B. trees which could be made suitable for long term retention by remedial care
 - C. trees of special significance which would warrant extraordinary efforts to secure their long term retention
2. **Medium SULE** - tree appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance:
 - A. trees which may only live from 15 to 40 years
 - B. trees which may live for more than 40 years but would be removed for safety or nuisance reasons
 - C. trees which may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
 - D. trees which could be made suitable for retention in the medium term by remedial care
3. **Short SULE** - tree appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance:
 - A. trees which may only live from 5 to 15 years
 - B. trees which may live for more than 15 years but would be removed for safety or nuisance reasons
 - C. trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting
 - D. trees which require substantial remediation and are only suitable for retention in the short term
4. **Removal** - trees which should be removed within the next 5 years
 - A. dead, dying, suppressed or declining trees
 - B. dangerous trees through instability or recent loss of adjacent trees
 - C. dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
 - D. damaged trees that are clearly not safe to retain.
 - E. trees which may live for more than 5 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.
 - F. trees which are damaging or may cause damage to existing structures within the next 5 years.
 - G. trees that will become dangerous after removal of other trees for the reasons given in (a) to (f).
 - H. trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
5. **Small, young or regularly pruned** - Trees that can be reliably moved or replaced.
 - A. small trees less than 5m in height.
 - B. young trees less than 15 years old but over 5m in height.
 - C. formal hedges and trees intended for regular pruning to artificially control growth.

APPENDIX C – SCHEDULE OF SURVEYED TREES



SCHEDULE OF SURVEYED TREES

Tree No.	Species	R.L.	Height (M)	Canopy spread (M) N S E W	DBH (mm)	CRZ PRZ (M)	Age	Health	Condition	SULE	Comments
	<i>Eucalyptus botryoides</i> Bangalay	46.86	16	3 2 1 1	430	2.5 4.5	M	Fair	Fair to Poor	4C	Locally indigenous species. Leaning- has self corrected. High % epicormic growth along stem. Poorly anchored root system. Decay of roots to North. Hazard tree.
	<i>Eucalyptus umbra</i> Broad-leaved White Mahogany	46.33	17	4 6 6 6	710	4.0 8.0	OM	Good	Fair	Short 3D	Locally indigenous species. Three large, dead scaffold branches to North - possible decay column. Old storm and bushfire damage. Old branch failures. Many old trunk wounds. Large diameter deadwood in crown. Included Co-dominant stems @ 5m, possible compression fracture. Epicormic growth low on trunk.
3	<i>Angophora costata</i> Sydney Red Gum	44.67	18	2 8 4 8	600	3.0 6.0	M	Good	Good	Medium 2A	Locally indigenous species. Suppressed to North by tree 2. Large roots exposed and severed @ 4 - 5 metres southeast of tree. Small pocket of decay in east root.
	<i>Allocasuarina torulosa</i> Forest Oak	40.70	14	1.5 all directions	200	1.0 2.0	OM	Fair	Very Poor	4C	Locally indigenous species. Severe trunk wounds.
	<i>Allocasuarina torulosa</i> Forest Oak	38.08	14	2 all directions	250	1.5 2.5	OM	Fair	Very Poor	4C	Locally indigenous species. Old storm damage, branch failures. Fruiting bracket fungus in stem.
6	<i>Angophora costata</i> Sydney Red Gum	36.51	16	1 7 3 4	480	2.5 5.0	M	Good	Fair to Good	Long 1	Locally indigenous species. Minor tip dieback. Large % deadwood in canopy.
	<i>Allocasuarina torulosa</i> Forest Oak	40.06	14	2 0 0 2	320	2.0 3.5	OM	Fair	Poor	4C	Locally indigenous species. Old storm and fire damage. Dieback of top, epicormic growth to trunk. Severe trunk wounds. Included co-dominant stems @ 6m, compression fracture.
	<i>Angophora costata</i> Sydney Red Gum	40.66	17	6 7 1 6	480	2.5 5.0	M	Fair	Fair	Medium 2A	Scaffold branch to North has old damage and decay.
	<i>Allocasuarina torulosa</i> Forest Oak	41.28	13	1 2 1 1.5	350	2.0 3.5	OM	Good	Poor	4C	Locally indigenous species. Old trunk wounds, branch failures, cavity at base.
	<i>Eucalyptus botryoides</i> Bangalay	42.92	17	3 2 5 5	500	2.5 5.0	M	Fair	Fair	Medium 2A	Locally indigenous species. Termites active in pruned, damaged branches. Large diameter deadwood present. Minor dieback and epicormic growth in canopy. Epicormic growth to lower trunk.

APPENDIX D – TREE LOCATION PLAN



