

**TREE MANAGEMENT    CONSULTING ARBORICULTURISTS**

**ARBORICULTURAL ASSESSMENT  
and  
DEVELOPMENT IMPACT REPORT**

for

St Vincents and Mater Health Sydney  
C/O Savills  
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## 1 INTRODUCTION

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- 1.1 This Arboricultural report was commissioned by Savills Strategic Project Delivery, on behalf of the St Vincent's and Mater Health Sydney Limited. The site is currently owned by Catholic Healthcare Services Limited. It is in the process of being purchased by St Vincents and Mater Health Sydney Limited who is scheduled to take ownership by 31 December 2007.
- 1.2 The subject site is identified as 30 Rocklands Road, Crows Nest, New South Wales, and known as Justinian House.
- 1.2 This report is to accompany a development application to the Department of Planning for a proposed medical facility on the subject site.
- 1.3 This report assesses the *health* and *condition* of several trees in the subject site, and, where applicable, trees on adjoining sites. The report also assesses any identified or potential impacts that the proposed development may have on the subject trees.
- 1.4 This report also provides guidelines for tree protection during the course of the proposed development.
- 1.5 Information contained in this Arboricultural Assessment covers only the trees that were examined, and reflects the condition of those trees at the time of inspection. 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.
- 1.6 This Arboricultural report is not intended as an assessment of any impacts on trees by any proposed future development of the site, other than the current development application.
- 1.7 This report is not intended to be a comprehensive *hazard* assessment; however the report may make recommendations, where appropriate, for further assessment or testing of trees where potential structural problems have been identified, or where below ground investigation may be required.

## 2 METHODOLOGY

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**2.1** In preparation for this report, limited ground level *visual tree assessments* (Mattheck 1994) were undertaken by the author of this report on 17<sup>th</sup> July and 11<sup>th</sup> October, 2007.

**2.2** Tree height and canopy spread was estimated. Trunk diameter of trees within the subject site was measured at 1.4 metres above ground level (DBH), using a standard metal tape. The DBH of trees on adjoining site was visually estimated where possible.

**2.3** Field observations were written down.

**2.4** No *aerial inspections* or woody tissue testing were undertaken as part of this tree assessment. Information contained in this tree report covers only the trees that were examined and reflects the condition of the trees at the time of inspection.

**2.5** Plans and documents referenced for the preparation of this report include:

- Details and Levels Survey, Dwg. No. 112265001, dated 25/06/07, prepared by Hard & Forester;
- Plans, Elevations and Sections, Dwg. No's DA 1001 - 1006, Rev. P3, Dwg's DA 2001/A, 2002 /P2, DA 2501 – 2504/P2, prepared by Daryl Jackson Robin Dyke Architects;
- Bulk Excavation plans Dwg. No's B1 and B2, prepared by SCP Consulting Pty Ltd;
- North Sydney Council Tree Preservation Order 2006.

**2.6** The trees are shown on a marked up copies of the site plans. The plans are attached as Appendix D – Tree Retention / Removal Plans Plan.

### 3 OBSERVATIONS AND DISCUSSION

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#### 3.1 Brief Description of Existing Vegetation

- 3.1.1 The majority of existing site vegetation is present in the perimeter garden areas facing Sinclair Street and Rocklands Road. For the most part these gardens are higher and separate from the ground floor level of the existing main building, and retained by brick walls. The garden at the southeast corner of the site is generally level with the ground floor.
- 3.1.2 The plantings in the bed facing Sinclair Street consist of a large, mature Eucalypt, several small native trees (most of which do not meet the height where they are protected by the Tree Preservation Order), planted and self sown exotic palms, or understorey perennials. Many plants are *overmature*, competing for space, and generally of low vigour and visual amenity.
- 3.1.3 The garden areas facing Rocklands Road include several small, suppressed and 'tired' tree specimens within the small front courtyard. Most of these exotic species do not meet the height where they are protected by the Tree Preservation Order. A group of three (3) Camphor Laurels at the site frontage have developed a vertical branch arrangement due to suppressed lateral branch growth. This is as a result of competition for light with the larger, broader street trees opposite.
- 3.1.4 There are four small garden courtyards within the site that are entirely surrounded by the existing linked buildings. The majority of plantings in these areas consist of tree ferns, small palms, exotic perennials and potted shrubs. No palms or trees are visible from outside these courtyards.
- 3.1.5 A Washington Palm, approximately 10 metres high, is growing in an extremely confined courtyard space which may have restricted development of a well structured root mass. Whilst this species is readily

transplanted with success, this individual might not be a candidate for transplanting if it is found to lack a supportive root ball. Further, give the proximity of walls and footings around all sides of the palm, it may not be possible to avoid significant root loss or damage.

- 3.1.6 The street trees along the Sinclair and Gillies Street frontages are all small specimens. The exotic species in Gillies Street are all *mature* individuals, whereas the Brush Boxes in Sinclair Street are young, but have been routinely kept low by pruning to clear overhead lines.
- 3.1.7 The four (4) street trees along the Rocklands Road frontage are *late-mature* Camphor Laurels that have been poorly pruned to maintain clearance for power lines. Together with their counterparts on the opposite side of Rocklands Road, these Camphors present a visually significantly landscape element. Fortunately, the trees at each end of the row are in better health than the central trees, where the thinning crowns and lower vigour of the poorer specimens do not obviously detract from the linking canopy cover over the street.

## 3.2 Proposed Tree Removal

- 3.2.1 Of the eighteen (18) trees or tree groups assessed, it is noted that Tree 2, Tree Group 11, (consisting of three (3) Camphor Laurels), and Trees 12, 13, 15, 16 and 17 are subject of a previous development application (DA348/2007), and have been approved for removal.
- 3.2.2 This major project application proposes to remove one (1) tree to facilitate a strong focal point and entry to the new medical facility.  
This tree (Tree 14 - *Eucalyptus nicholii* Small leaved Peppermint) was included in the August 2007 arborist report for the demolition DA. However; it was noted in that report the retention of the tree was subject of further detailed assessment. This further assessment was carried out on 11<sup>th</sup> October 2007, and the result of that assessment is that it should be removed.

Tree 14 is a late-mature *Eucalyptus nicholii*, growing in the northeast corner of the garden bed facing Sinclair Street. The tree has large, *co-dominant* stems at 1.5 metres above ground. The tree is in fair health, but exhibits typical signs of decline which identify this as a tree about to enter an over-mature phase, where continued vigour and growth is unlikely. This species is short-lived. Generally, a decline in health and structure rarely allows retention of these trees beyond 35 – 45 years. Based on the size and condition of this specimen, I estimate its age to be approximately 30 to 35 years.

3.2.3 An examination of the tree has revealed the northern co-dominant stem growing over the footpath has a defect and associated problems that considerably lower the trees *Safe Useful Life Expectancy* (SULE). A wound to the upper side of the stem has prevented the formation of *tension wood*, which is the manner in which broad-leaved trees prevent leaning or subsidence of stems and large branches (Mattheck & Breloar 1994).

In an effort to stabilise the heavy stem the tree has formed *compression wood*, on the underside of the stem. The underside of the stem has wide bark 'plates' or section which are lighter in colour than the surrounding bark. This indicates the wood is loaded in compression, and the stem is slowly sinking.



**Plate 1**

An old wound on the upper side of the stem has decayed and formed a cavity, reducing the strength of the stem at this point. The tree is also unable to form tension wood to 'pull' the stem up.

**Plate 2**

The photograph shows the co-dominant stems of the tree. The arrows points to an old wound on the upper side of the stem, near the union of both stems. The wound has decayed and formed a cavity, preventing the formation of tension wood on the upper side of the stem. Note the increase in stem diameter in the region of the upper and lower points of attachment to the stem on the right.

### 3.2.4 "By definition, co-dominant stems are a structural defect. The severity of this defect is increased by included bark, large crowns and strong wind."<sup>1</sup>

Matheny & Clark (1994) cite this as a major cause of stem failure, giving:

"Trunks also fail due to poor attachments, between either co-dominant stems.....Key indicators for this type of failure are included bark, co-dominant stems....and poor holding wood....."<sup>2</sup>

The inherent failure of this type of defect is corroborated by Lonsdale<sup>3</sup>, Shigo<sup>4</sup>, and Harris<sup>5</sup>.

<sup>1</sup> Matheny, NP & Clark, JR (1994) *Evaluation of Hazard Trees in Urban Areas* p 9, International Society of Arboriculture, Urbana, Illinois.

<sup>2</sup> *Ibidem*, p 53

<sup>3</sup> Harris R.W. (1999, 3<sup>rd</sup> edition), *Arboriculture: Integrated management of landscape trees, shrubs and vines*, Prentice-Hall, New Jersey.

<sup>4</sup> Shigo, A.L. (1986, 2<sup>nd</sup> edition) *A New Tree Biology*, Shigo and Trees, Associates, Durham, New Hampshire.

<sup>5</sup> Lonsdale, D (1999) *Principles of Tree Hazard Assessment and Management*, p 31, DETR, London.

3.2.5 The affected stem has a higher risk than normal of failure, due to its weakened structure (i.e. decayed wood in the upper side), and the inability of the tree to support the weight of the stem.

As this stem is growing over a public footpath and road, it presents a degree of risk to the public which must be addressed.

3.2.6 Given the age of the tree it would not be acceptable to remove the weak stem as it would remove 50% of the tree, seriously affecting the tree's health, and altering the balance of the whole tree. Complete failure of the remaining stem could result.

Cabling and bracing the tree is not an option for the following:

- Site usage beneath the tree would have to be limited (which in this case is not an option);
- it is only a short term solution;
- it is not a guarantee against tree failure; and
- set-up and ongoing maintenance costs are very expensive.

3.2.7 Under the Safe Useful Life Expectancy method of pre-development tree classification, such a tree would receive a classification of 4C (removal).

A. which states "*Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.*"<sup>6</sup>

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<sup>6</sup>Barrell, J (1995) *Pre-development Tree Assessment* from *Trees and Building Sites* pp 132 - 142, Eds. Watson & Neely, International Society of Arboriculture, Illinois.

### 3.3 Potential Impacts on Trees to be Retained

- 3.3.1 Tree 1 is outside the subject site, and separated from the development footprint by a boundary retaining wall that is to remain. The crown of the tree is well clear of the site, and will not be affected by the works.
- 3.3.2 Trees 3, 4 and 5 are located within the grassed areas of the Gillies Street footpath, adjacent to the site. Whilst these trees do not have any significant branch extension into the site, they will require ground protection to discourage any activity such as stockpiling of debris, or parking of vehicles over the grass. Provided the trees are given appropriate protection they are not expected to suffer any impacts on their health or condition as a result of the proposed development.
- 3.3.3 Trees 6, 7, 8 and 9 are large Camphor Laurels, growing in the nature strip of Rocklands Road.  
It is noted these street trees, particularly the two middle trees (T7 and T8), have been damaged by pruning works to clear power lines. The pruning has been poorly done, leaving stubs, branch tears and poorly formed regrowth. The trees have been subject to removal of large, laterally spreading branches in the past.  
All trees will require protection from site activities during development.
- 3.3.4 Tree 6 A new or rebuilt wall is located within approximately 4.5 metres of the tree. As the existing wall occupies the same line or footprint as the new wall it is unlikely a new wall will require cutting of roots at this point. However, the possibility that woody roots have grown alongside the wall must be considered during construction. This may dictate the width any type of footings adopted to support the new wall.

3.3.5 Tree 7 The new driveway crossover appears to be approximately 2 metres from this tree. The crossover will be 1 metre wider on the east side of the existing driveway footprint. This setback will be inside the tree's CRZ. In terms of levels it envisaged to follow the existing surface levels, however it may be possible to raise the finished levels by 100m, effectively avoiding or at least reducing the potential for any changes to the soil levels beneath the existing driveway.

An investigation into the locations of woody roots at the edge of the proposed new driveway will help to determine the final levels and methods of construction most suitable for this tree.

The edge of the proposed excavation batter to the tree is in the vicinity of 7.5 metres, which is an acceptable setback.

The tree is not expected to require any pruning, as crown development into the site has been discouraged by the crowns of the Camphors (Tree 11) within the subject site.

3.3.6 Tree 8 The edge of the proposed batter is also in the vicinity of 7 – 8 metres from the tree, which is acceptable.

This tree may require the removal of two (2) stubbed branches, approximately 150mm diameter, to accommodate steps and ramp entry from Rocklands road. A smaller, 50mm diameter branch over the site would also be removed. The total loss of live material is less than 5% of the overall foliage cover. It is noted the removal of the stubbed branches will improve the tree's branch structure.

3.3.7 Tree 9 The proposed batter is approximately 6 metres from this tree. This is just outside the tree's CRZ. The potential for woody roots in this area is low, considering the presence of a brick wall on the boundary which has likely deflected woody roots from entering the site.

Arboricultural supervision of the work in this area would be prudent.

Tree 9 would require the complete removal of one (1) large, 250mm diameter lateral branch that extends into the site (i.e. cutting back to the branch collar, at the junction of the branch and trunk of the tree). Reducing the length of this branch back to a smaller branch or growth point is not recommended as resulting epicormic shoots, which are prone to failure, would be present over the footpath.

This would result in a canopy loss of less than 10% of the overall crown foliage which, in itself, is unlikely to lead to significant loss of vigour or tree health. However the large wound resulting from branch removal will increase the risk of disease or insect invasion.

3.3.8 Tree 10 is within the site. The proposed excavation is approximately 5.5 metres, which is acceptable as the existing building is already within this footprint. The excavation will be shored at the line of cut to prevent any batter (i.e. changes to existing grade) towards this tree. The MSB room located within 4 metres north of the tree is also within the existing building footprint, and is unlikely to affect the tree. The proposed driveway is approximately 2.74 metres from the tree (measured from the centre of the tree stem), and well inside the CRZ where woody roots are likely to be present. An investigation into the locations of woody roots at the edge of the proposed new driveway will help to determine the final levels and methods of construction most suitable for this tree. Although the proposed building is no higher than the existing structure, this tree may require the removal of around 30% of the live crown extending to the north into the site, to accommodate temporary scaffolding. The amount of pruning can be reduced to around 15 -20% if careful tying and restraining of branches is carried out prior to erecting scaffolding.

3.3.9 Tree 18 is a group of five (5) Brush Boxes growing in the road reserve of Sinclair Street. These trees are small and well set back from the site, and would only require normal protection devices, such as fencing, to protect them from any stockpiling of materials or vehicle parking during site works.

## 4 CONCLUSIONS

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**4.1** The site vegetation primarily consists of small landscape trees and shrubs, which are generally of low vigour and amenity value.

The proposed development requires the removal of one mature tree, which is identified as at high risk of major stem failure. The removal of this tree will be compensated for the provision of replacement landscape specimens capable of achieving a similar height and visual amenity.

Whilst the degree of pruning and development that would affect the Camphor Laurels in Rocklands road is generally low, Tree 7 and Tree 10 (Camphor Laurels) may also be affected by the proposed driveway. The extent of disturbance may only be estimated after investigation into the location of tree roots is performed for both trees 7 and 10.

Some modification of the driveway design may be required to ensure the trees can be retained.

Some of the remaining trees and vegetation, both within and outside the site, will need to be protected from development activities, however these trees are not expected to suffer any impacts from the proposed works.

## 5 RECOMMENDATIONS

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### 5.1 Tree Removal

5.1.1 Remove Tree 14.

5.1.2 *Tree Protection Zones (TPZ)* must be in place to protect other trees from damage. See 5.2 and 5.3 below.

5.1.3 The following recommendations for the removal of trees are:

- All tree parts are to be disposed of in an approved waste disposal area or recycled after chipping, or disposed of as firewood;
- Any damage caused to retained trees during the removal of nominated trees must be reported to the site supervisor;
- No unauthorized persons are allowed on the site during works unless authorized by the works supervisor;
- No work is to be carried out without a supervisor present; and
- The site is to be left in a clean and safe condition. No hazards, pruned materials, offcuts etc., are to be left on the site.

### 5.2 Specific Recommendations

5.2.1 Tree 1 – Protected by default. No specific protection measures required.

5.2.2 Trees 3, 4 and 5 – Provide fencing over exposed ground in street. Fencing to enclose all three trees as a group. Refer to 5.3 for details of appropriate fencing.

5.2.3 Trees 7 and 10 – An investigation of root locations is to be carried out prior to finalising driveway design and construction methods. The investigation is to map the size, number, location and depth of roots located within the proposed driveway and crossover footprint. The investigation is to be performed by, or under the supervision of an Australian Qualification Framework Level 5 arboriculturist.

This would be practically performed after site demolition, when existing structures and walls will not impede investigation.

The arboriculturist is to assess the impacts of disturbance or removal of roots on the retention on Trees 7 and 10, and provide advice on the final design levels and methods of driveway construction adjacent to the trees.

Pruning of the trees is to be carried out in accordance with Australian Standard 4373-2007 Pruning of Amenity Trees, and under the supervision of an Australian Qualification Framework Level 5 arboriculturist.

5.2.4 Trees 6 7, 8 and 9 – Fencing these trees is probably not appropriate given locations for parking spaces and pedestrian access. Site induction for contractors must include identification of the Rocklands Road reserve as an exclusion zone for any related site demolition activities. The exclusion zone can be identified by placing high visibility markers, plastic mesh fencing or similar barriers, and appropriate signage to ensure it is clearly defined as a ‘no go’ area.

Pruning of the trees is to be carried out in accordance with Australian Standard 4373-2007 Pruning of Amenity Trees, and under the supervision of an Australian Qualification Framework Level 5 arboriculturist.

5.2.5 Tree 10 – Prior to erecting fencing, any paving within 7 metres of the tree is to be removed by hand. Fencing is to be placed as far as practicable from the tree, and may need to be set further back as demolition of structures progresses. Coarse grade mulch to a thickness of 100mm is to be placed over the root zone, no less than 4 metres from the tree, and over newly exposed ground within 7 metres of the tree.

The project arboriculturist is to advise on any changes to the protection measures adopted for this tree.

Any structures, such as retaining walls, within 7 metres of the tree must be dismantled by hand. If this is not possible the project arboriculturist must be present to supervise machinery operators during the work.

Removal of branches and foliage to accommodate scaffolding and building clearance is to be limited to 20% live material loss. To achieve this, the temporary tying back of branches is to be carried out in general accordance with the following:

Tying back of woody branches.

- The material used for tying back of branches should be a minimum 75mm wide, soft (polyester) slings, tensioned via a ratchet strap winch.
- The treeworker is to ensure the branch is not bent to a point where tension causes bark or wood cracking or splitting. The branch is to be pulled in and anchored to at least two or three locations along the holding branch or stem to reduce localised loading/tension.
- Where possible the anchor points should be located towards the distal ends of the branches where flexibility will be greatest.
- All effort is to be made to tie branches back to large branches or stems of double the diameter of the branch to be tied back.

Tying back of small branches, branchtips and foliage.

- The ends of branches, where the foliage will be within the construction zone (i.e. where building scaffolding is to be erected), are to be gathered up in wide sections of hessian, and swept back for tying to larger woody parts of the tree.

5.2.6 Tree Group 18 – These street trees are unlikely to be affected, however, during construction the trees are to have fencing placed at the outer perimeter of the surrounding grassed areas.

### 5.3 Tree Protection Zones (TPZ) and Installation

- 5.3.1 Trees to be retained must be provided with appropriate protection devices before tree removals, or any approved works are begun.
- 5.3.2 The arboriculturist is to inspect the installed TPZ devices, and provide written confirmation that the TPZ's are in accordance with the recommendations of this report and industry standards.

#### 5.3.3 Methods of Protection

The following additional measures may need to be adopted for trees to be protected. These requirements need to be confirmed by the arboriculturist prior to installing the TPZ's.

Tree Guard – Tree guards may be required during some stages of works where fencing may need to be removed to allow work access.

Root/ground Protection Area – Trees may need to be provided with coarse grade mulch to a thickness of 100mm over the existing ground. If the area is to be used for foot traffic, wide timber planks, or similar sturdy, inflexible material is to be placed over the mulch.

For vehicle access over tree root zones, the inclusion of rumble boards or similar sturdy device is to be placed over the mulched areas.

Tree Protection Fencing – The trees, or group of trees are to be protected by sturdy fencing in accordance with the advice of the project arboriculturist.

- 5.3.4 The Tree Protection Zones (TPZ) are to be in accordance with the following:
  - o The most appropriate fencing for TPZ is 1.8m chainlink with 50mm metal pole supports. During installation care must be taken to avoid damage to significant roots.
  - o Locate any large primary roots by careful removal of soil within the fencing area. ***Do not drive any posts or pickets into tree roots.*** Replace soil back over tree roots.
  - o Protection devices may include mulching, tree guards and other devices other than, or in addition to, fencing.
  - o TPZ must be in place prior to any site works commencing, including clearing, demolition or grading.

- Any areas of the *Critical Root Zone* (CRZ) and/or the *Primary Root Zone* (PRZ) outside the TPZ must, where practicable, be covered in thick, coarse mulch to a depth of 100mm to reduce soil compaction and soil moisture losses.
- Nothing should occur inside the TPZ, so therefore all access to personnel and machinery, storage of fuel, chemicals, cement or site sheds is prohibited.
- No washing or rinsing of tools is to be carried out upslope of any trees, or within 8 metres of the trees.
- Signage should explain exclusion from the area defined by TPZ and carry a contact name for access or advice.
- ***The TPZ cannot be removed, altered, or relocated without the project arboriculturist's prior assessment and approval.***

## 5.4 General Measures to Reduce Impacts on Trees

### 5.4.1 The following general comments apply:

- A qualified arboriculturist must be retained to carry out and/or supervise works within the CRZ and PRZ of the trees.
- Any excavation within the CRZ 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 trees. 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.
- Any root pruning works and/or crown pruning must be carried out by a suitably competent, qualified arboriculturist, and to the Australian Standard for Pruning of Amenity Trees AS 4373-2007.
- The arboriculturist is to supervise works where machinery used within the site may contact overhanging branches from nearby trees. Where necessary, the arboriculturist is to advise on appropriate measures to be adopted to avoid any pruning to clear site works.
- Any proposed planting locations within the PRZ of trees must remain flexible so as to avoid damage to existing roots.  
In some cases, tubestock container size may be the only suitable size for planting within the root zone of a tree.  
Mattocks and similar digging instruments must not be used within the dripline of trees to be retained. Planting holes should be dug by hand with a garden trowel, bulb planter or similar small tool.

Should you require further assistance with this matter, or require my liaison with Council officers, please do not hesitate to contact me.

Yours faithfully,



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Consulting arboriculturist, horticulturist and landscape designer.

Certificate of Horticulture *Honours*

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Associate Diploma of Applied Science (Landscape) *Distinction*

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## **APPENDIX A**

### **TERMS AND DEFINITIONS**



## TERMS AND DEFINITIONS

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

**Aerial inspection** Where the subject tree is climbed by a professional tree worker or arborist specifically to inspect and assess the upper stem and crown of the tree for signs or symptoms of defects, disease, etc.

**Age classes**

I	<i>Immature</i> refers to a refers to a well-established but juvenile tree
SM	<i>Semi-mature</i> refers to a tree at growth stages between immaturity and full size
M	<i>Mature</i> refers to a full sized tree with some capacity for further growth
LM	<i>Late Mature</i> refers to a full sized tree with little capacity for growth that is not yet about to enter decline
OM	<i>Over-mature</i> refers to a tree about to enter decline or already declining

**Co-dominant** refers to stems or branches equal in size and relative importance.

**Compression wood** Type of reaction wood produced by conifers on the underside of branches and leaning trunks.

**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 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. This zone is often the location of the tree's structural support roots. Excavation within this area may seriously destabilize the tree. Fully elevated construction within this area is possible with specific root zone assessment. CRZ distances are always rounded up to the closest 0.5 metre. The minimum CRZ given will never be less than 1.5 metres for a tree with a stem diameter less than 300mm.

**Dead wood** refers to any whole limb that no longer contains living tissues (e.g. live leaves and/or bark). Some dead wood is common in a number of tree species.

**Decay** Process of degradation of woody tissues by fungi or bacteria through decomposition of cellulose and lignin. There are numerous types of decay that affect different types of tissues, spread at different rates and have different affect on both the tree's health and structural integrity.

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

**Dieback** Death of growth tips/shoots and partial limbs, generally from tip to base. Die back is often an indicator of stress and tree health

**Epicormic** Shoots which arise from adventitious or latent buds. These shoots often have a weak point of attachment. They are often a response to stress in the tree.

Epicormic growth/shoots are generally a survival mechanism, often indicating the presence of a current, or past stress event such as fire, pruning, drought, etc.

**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.

**Inclusion - stem/bark**, the pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet. This is normally a genetic fault and potentially a weak point of attachment as the bark obstructs healthy tissue from joining together to strengthen the joint.

**Increment strips** where 'light' strips appear between the outer bark layer as a result of wood formation in response to localised stress.

**Primary Root Zone (PRZ)** refers to a radial offset of ten (10) times the trunk DBH measured from the center of the trunk. This zone often contains a significant amount of (but by no means all of a tree's) fine, non-woody roots required for uptake of nutrients, oxygen and water. Excavation is possible within one offset only with this area and subject to specific rootzone assessment. PRZ distances are always rounded up to the closest 0.5 metre.

**Scaffold branch/root** A primary structural branch of the crown or primary structural root of the tree.

#### **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 i.e. 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 (i.e. cost of maintenance - retaining trees at an excessive management cost is not normally acceptable); and finally, effects on better trees, and sustained amenity (i.e. 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 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 them being removed for safety or aesthetic reasons.

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

**Suppressed** In crown class, trees which have been overtapped and whose crown development is restricted from above.

**Tension wood** Type of reaction wood produced by broad-leaved tree species which forms on the upperside of branches, stems and leaning trunks.

**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. The TPZ surrounding a tree aids the tree's ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death and the possible damage to structural stability of the tree from root damage.

To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the Tree Protection Zone (TPZ).

Using the *British Standard for Trees on Construction Sites* (BS5837), a TPZ is based on the age of the tree, young, middle aged or mature, the trunk diameter at D.B.H. and the tree's vigour. A TPZ is required for each tree or group of trees within five metres of building envelopes.

**Visual Tree Assessment (VTA)** a procedure of defect analysis developed by Mattheck and Breloer (1994), that uses the growth response and form of trees to detect defects.

## **APPENDIX B**

### **SULE CATEGORIES**

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**Safe Useful Life Expectancy (SULE) CATEGORIES** (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

- B. dead, dying, suppressed or declining trees
- C. dangerous trees through instability or recent loss of adjacent trees
- D. dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form.
- E. damaged trees that are clearly not safe to retain.
- F. 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.
- G. trees which are damaging or may cause damage to existing structures within the next 5 years.
- H. trees that will become dangerous after removal of other trees for the reasons given in (a) to (f).
- I. 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 ASSESSED TREES**



**Schedule of Assessed Trees – 17th July & 11<sup>th</sup> October, 2007**

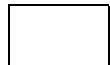
Justinian House, Rocklands Road, Crows Nest

Tree No.	Species and Common Name	Height (m)	Crown spread (m)	DBH (mm)	Age	Health	Condition	SULE	CRZ (m)	PRZ (m)	Landscape Significance Rating*	Comments
1	<i>Pittosporum undulatum</i> Sweet Pittosporum	7	6	4 stems 150 – 250	M	Good	Good	3A	3.5	6.5	Low	Locally indigenous species. Outside property boundary – inspection limited.
2	<i>Prunus cerasifera 'Nigra'</i> Plum Cherry	3	2	150	M	Good	Fair	3A	1	1.5	Low	Small street tree. Approved for removal under DA 348/07. Replace with suitable species at later stage.
3	<i>Callistemon viminalis</i> Weeping Bottlebrush	4.5	6	2 x 200 / 100	M	Fair	Fair to Poor	3D	2	4	Low	Introduced native species. Topped for power lines. Inclusion near base.
4	<i>Prunus</i> sp.	4	6	180 / 200	M	Good	Good	3A	1.5	3	Low	Introduced exotic species. Topped for power lines. Damaged surface roots.
5	<i>Gordonia axillaris</i> Gordonia	4	5	2 x 180	I	Good	Fair	3A	1.5	3	Low	Introduced exotic species. Included stems near base. Pruned for power lines.
6	<i>Cinnamomum camphora</i> Camphor Laurel	14	12	800	M	Good	Fair	2D	4	8	High	Introduced exotic species. Street tree, @ south end of row. Very recently 'pruned' @ 4m to path side for line clearance. Low branching over path 1.8 – 2m. Small decay pockets at old branch sites.
7	<i>Cinnamomum camphora</i> Camphor Laurel	11	12	700	M	Fair to Good	Fair	2D	3.5	7	Moderate	Introduced exotic species. Street tree. Poorly pruned. Small Ø deadwood in crown.

Tree No.	Species and Common Name	Height (m)	Crown spread (m)	DBH (mm)	Age	Health	Condition	SULE	CRZ (m)	PRZ (m)	Landscape Significance Rating*	Comments
8	<i>Cinnamomum camphora</i> Camphor Laurel	14	14	800	M	Fair to Poor	Fair	2D	4	8	Moderate	Introduced exotic species. Street tree. Thinning upper crown. Tip and small branch dieback. Very poorly pruned for line clearance.
9	<i>Cinnamomum camphora</i> Camphor Laurel	14	18	1100	M	Fair to Good	Fair	2D	5.5	11	High	Introduced exotic species. Street tree @ north end of row. Poorly pruned – stubs remain. Mechanical wounding to road side of stem. Deadwood to 80mmØ. Some thinning of upper crown. Very long lateral branch into subject site.
10	<i>Cinnamomum camphora</i> Camphor Laurel	14	12	2 x 500	M	Good	Fair to Good	2D	4	7.5	High	Introduced exotic species. Co-dominant stems. Opposite southern street tree. Poorly pruned. Cracking of wall to street side. Some small Ø deadwood and minor tip dieback.
11	<i>Cinnamomum camphora</i> (row of 3) Camphor Laurel	13	6	400 – 1000	M	Fair	Fair to Poor	2B	2 – 5	4 – 10	Moderate	Introduced exotic species. Previously topped @ 2, 3 and 4m. Very vertical branching habit due to lopping, line clearance and canopy competition. Decay pockets, tip and small branch dieback. Epicormic shoots. Shared root zone. Thinning crowns. Deadwood to 100mmØ. Approved for removal under DA 348/07.
12	<i>Radermachera sinica</i> Asian Bell	14	6	250 / 320	M	Good	Fair	3B	2	4	Low	Introduced exotic species. Approved for removal under DA 348/07.

Tree No.	Species and Common Name	Height (m)	Crown spread (m)	DBH (mm)	Age	Health	Condition	SULE	CRZ (m)	PRZ (m)	Landscape Significance Rating*	Comments
13	<i>Betula pendula</i> Silver Birch	9	3	3 x 100	SM	Fair	Fair	3A	2	3.5	Low	Exempt from protection under Tree Preservation Order 2006. Approved for removal under DA 348/07.
14	<i>Eucalyptus nicholii</i> Small leaved Peppermint	13	12	2 x 500	LM	Fair	Fair	4C	3.5	7	Moderate	Introduced native species. Tip dieback noted to upper crown. Discolouration of upper foliage in crown. Co-dominant stems @ 1.5m. Small, damaged area near stem union, upper side of stem over path. Epicormic shoots arising. Lower side of stem heavily loaded in compression, with wide increment strips to bark. Dieback and epicormic shoots over paths, building.
15	<i>Phoenix canariensis</i> Canary Island Date Palm (2 palms)	5 – 6	2 – 3	700-1000	I	Good	Fair	5A	1.5	2.5	Low	Self sown specimens, crowded, below crown of T14. Exempt from protection under Tree Preservation Order 2006. Approved for removal under DA 348/07.
16	<i>Washingtonia robusta</i> Cotton Palm	10	4	400	SM	Good	Fair	2D	1	2	Moderate	Root ball and stem highly restricted by structures on all sides.
17	<i>Callistemon salignus</i> Willow Bottlebrush ( x 2)	5 – 7.5	3 – 4	110 / 210 +250	LM	Fair to Poor	Fair	4A	2.5	5	Low	Exempt from protection under Tree Preservation Order 2006. Approved for removal under DA 348/07.
18	<i>Lophostemon confertus</i> Brush Box ( x 5)	5 -6	4	350 – 450	SM	Good	Fair	2D	2 – 3	3.5 – 4.5	Moderate	Introduced native species. Routinely topped for line clearance. The easternmost tree is a recent planting of less than 100mm stemØ.

## LEGEND



Trees to be retained.



Trees approved for removal for demolition, under DA 348/07.



Trees to be removed in the short term due to poor health or condition or, would restrict reasonable development or, can be readily replaced with more appropriate or desirable species.

### **\*Landscape Significance Rating.**

The importance of the tree as a result of its prominence in the landscape and its amenity value, from the point of public benefit.

- Exceptional – Tree/s of crucial importance as a principal feature of a public place, or are so visually prominent as to be a landmark feature.
- High – prominent tree/s in private gardens or well-frequented public places.
- Moderate – Contributes some amenity to the immediate garden/landscape areas, or to the streetscape.
- Low – Poor, declining or small examples; noxious or undesirable species; little or no visual amenity to public view.

**APPENDIX D**  
**TREE RETENTION / REMOVAL PLANS**



