PLATEAUTREES
Safety. Quality. Progress.

Arboricultural Impact Assessment

Prepared for: **Mr George Opadchy**

Site Address: 7 Clifford Ave
Fairlight
NSW 2094

Date: 7/7/18

Prepared by: Nick Nelson
Consulting Arborist
Plateau Tree Service

Diploma in Horticulture (Arboriculture)

Reference: 94912

Plateau Tree Service Pty Ltd
PO BOX 1522, DEE WHY NSW 2099 Australia
P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

Contents

Summary 3

1.0 Introduction 4

1.1 Background 4
1.2 The Site 5

2.0 Inspection Methodology 6

3.0 The Trees 7

4.0 Impacts of the Proposed Works 8

5.0 Conclusions and Recommendations 9

Attachments

Attachment 1: Tree assessment schedule 11
Attachment 2: Photographs 12
Attachment 3: Tree assessment criteria 13
Attachment 4: Safe Useful Life Expectancy description and categories 15
Attachment 5: Significance of a Tree Assessment Rating System (STARS) 16
Attachment 6: General guidance notes for protecting trees on development sites 18
Attachment 7: Site Plan 22

Summary

Plateau Tree Service have been engaged by Mr. George Opadchy to provide this Arboricultural Impact Assessment (AIA) report for the proposed works within the above address. The works involve the renovation of the dwelling through alterations and additions to the existing structure.

On the 7th of July 2018 an on-site inspection of the site was undertaken by the author. Tree data and information was collected at this time.

Summary of results/observations/findings.

The following table surmises trees that can and cannot be retained under the current design:

Trees that cannot be retained under the current design	Trees that can be retained
Tree 2 *Jacaranda mimosifolia* (Jacaranda)	Tree 1 *Persea americana* (Avocado) although this tree is in fact exempt from the Northern Beaches Council Tree Preservation Order

Tree protection measures have been recommended and are to be implemented in accordance with Attachment 6 of this report and AS4970-2009 Protection of Trees on Development Sites with some modifications due to the physical limitations of the site.

1.0 Introduction

1.1 Background

1.1.1 This Arboricultural Impact Assessment (AIA) was prepared for Mr. George Opadachy in relation to the proposed alterations and additions at 7 Clifford Ave Fairlight NSW 2094 (the site). It concerns trees located within the site that may have a potential to be impacted upon by the works.

1.1.2 The purpose of this report is to record the information gathered from an onsite Visual Tree Assessment (VTA) and determine the impacts of the proposed works on the subject trees. Recommendations based on the onsite observations, information provided and data collected shall be given regarding tree retention and protection measures.

1.1.3 This report has been prepared in accordance with the Australian Standard AS4970-2009 Protection of Trees on Development Sites and the guidelines for the

1.1.4 The following documentation was provided to assist with the onsite assessment trees and the preparation of this report:

- True North Surveys 23/11/17 Details and Levels Plan
- Arborist Plan Trees 1 & 2 Provided by Du Plessis and Du Plessis Architects

1.1.6 General guidance notes regarding the protection of trees on development sites have been given as Attachment 6 of this report. These notes contain basic requirements and procedures to ensure that the impacts of construction works on site trees are minimised. Advice from the project arborist is to be sought prior to undertaking works within a tree protection zone.

1.1.7 This report is to be used in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report may only be used where the whole original report (or a copy) is referenced to and directly attached to that submission, report or presentation. Information contained in the report covers only the trees that were inspected and reflects the trees condition at the time of the inspection. There is no guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.

1.2 The Site

1.2.1 The subject site identified as Lot B DP315261 this being 7 Clifford Ave, Fairlight NSW 2094, is a rectangular shaped block located on the southern side of Clifford Ave, Fairlight NSW 2094. The site steps down in incremental levels from the front of the property level on Clifford Ave. The site is currently occupied by a multi storey residence located in the front center of the property.

1.2.2 The site is dominated by exotic tree species and has a sparse population of trees in its current form.

1.2.3 The image below shows the subject site.

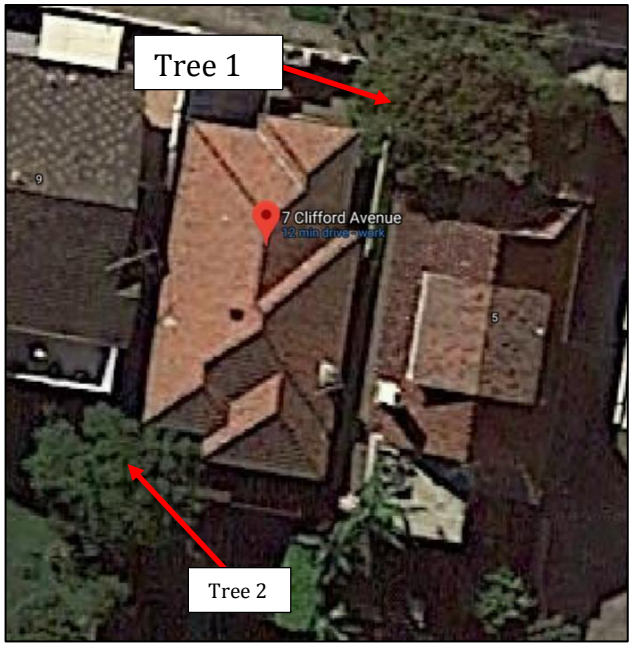

Fig 1: Aerial image (Google Maps 2018) showing site.

1.2.4 The only trees/vegetation that are impacted by the works are located within the site and this arboricultural impact assessment deals with these trees in accordance with the requirements of the Manly Local Environment Plan (LEP) 2013 and the Manly Development Control Plan (DCP) 2013.

2.0 Inspection Methodology

2.1 On the 7th of July 2018 Nick Nelson attended the site to undertake the tree assessment and collect data.

2.2 The tree(s) were assessed using the principles of a ground based Visual Tree Assessment (VTA)[1] and methods consistent with modern arboriculture. No aerial (climbing) inspection, tissue sampling or diagnostic testing was undertaken as part of the inspection process unless otherwise stated. Weather conditions at the time of the inspection were fine and mild.

2.3 The physical dimensions of the tree(s) including height, radial canopy spread and trunk diameter have been estimated or measured. Refer Tree Assessment Criteria. Tree data collected at the time of the inspection can be found within the Tree Assessment Schedule, Attachment 1.

2.4 Methodology for determining vigour, structure and age class can be found as Attachment 3.

2.5 The trees have been given Safe Useful Life Expectancy (SULE) rating. Methodology used to calculate these ratings can be found as Attachment 4.

2.6 Each tree has been assessed against the Institute of Australian Consulting Arborists (IACA) Significance of a Tree Assessment Rating System (STARS). This provides a dual method of objectively rating the viability and retention value of urban trees on development sites. The STARS assessment criteria and retention matrix table can be found as Attachment .

2.7 The tree protection zone (TPZ) has been calculated to assist with this report. Calculations have been made in accordance with the Australian Standard *AS4970-2009 Protection of Trees on Development Sites* and can be found within the Tree Assessment Schedule Attachment 1.

2.8 Photographs were taken using an Apple Iphone 6S+ on the day of the inspection and can be found as Attachment 2.

2.9 A general guidance note for protecting trees on development sites has been given and can be found as Attachment 6.

[1] Mattheck, C. and Breloer, H (2006), *The Body Language of Trees – A Handbook for Failure Analysis*, The Stationary Office. Pages 118-122.

3.0 The Trees

3.1 Two trees were surveyed as part of this assessment. In general they were found to be in fair to good overall health and fair condition, consistent with their species, age class and growing environment.

3.2 Tree 1 is a mature specimen of *Persea Americana* (Avocado) and was noted as having a heavy lean towards the neighboring property at No.5 Clifford Ave, Fairlight NSW 2094. Tree 1 is exempt from the provisions of the Northern Beaches Council Tree Management Guidelines "All non-native fruit producing trees (Loquat, Paw Paw, Citrus, Kumquat, Apple, Mulberry, Avocado, Apricot, Almond, Cherry, Plum, Peach, Mango)" and its management in the context of the development is at the discretion of the property owners as no consent it required to prune or remove the subject tree.

3.3 Tree 2 is a poorly structured specimen of *Jacaranda mimosifolia* (Jacaranda) that is located on the boundary between No.7 and No.9 Clifford Ave, Fairlight, NSW 2094. The subject tree has a co-dominant crown with evidence of previous pruning and water sprouts that have developed as a result of poor pruning practices. Vigorous upright water sprouts often develop in response to damage or pruning. The structure of water-sprout regrowth is not as strong as natural tree growth and the shoots are more subject to diseases and pests.

Co-dominant trees:

The subject trees crown is made up of four roughly equally sized main leaders, co-dominant trees are often associated with an increased risk of failure. Some of the issues that are caused by trees with co-dominant leaders are highlighted below.

Narrow branch angles are weak. Typically branches with good structure have at least several layers of overlapping wood at their junction point. The trunk of the tree produces some of this wood, while the branch produces the rest; the result of this growth is a very strong point of attachment. Due to the fact that co-dominant stems are not proper branches, they often lack these important overlapping layers of wood, and therefore the strength of proper branch junctions. This may lead to an increased risk of failure.

Co-Dominant stems are often associated with bark inclusions. Co-dominant stems grow and develop as they would if they were single leaders, meaning that they produce not only xylem (wood), but also phloem, cambium and – most importantly – bark. As the two or more stems grow wider, some of this bark can become trapped inside the union or junction. The bark further compromises the integrity of the joint, increasing the chances of failure. In the case of the subject tree no bark inclusions were noted, this does not mean that included unions may not develop over time as the subject tree continues to grow.

4.0 Impacts of the Proposed Works

4.1 The proposed construction works will have only minor effects in relation to Tree 1 but will require the removal of Tree 2 in order to undertake the required construction works.

4.2 Development and construction works can impact trees in several ways. Any damage caused to a tree may be seen as detrimental to its health. Root disturbance is the most common cause of damage to trees on development/construction sites.

4.3 The main functions of roots include the uptake of water and nutrients, anchorage, storage of sugar reserves and the production of some plant hormones. The root system of trees consists of several types of roots found in different parts of the soil and is generally much more extensive than commonly thought.

4.4 The effect of root damage on trees include,

- A reduction in the uptake of water and nutrients
- Loss of stability if structural woody roots are cut
- An eventual loss of leaves, reduced photosynthesis and sugar production
- Decay as a result of wounding
- Predisposition to soil borne pathogens

4.5 These effects, on a tree as a whole, may range from a fairly rapid death to a permanent or merely temporary reduction in vigour and vitality. The impacts of construction works near trees can be cumulative and very difficult to remediate after completed.

5.0 Conclusions and Recommendations

5.1 The construction of the proposed alterations and additions to the existing dwelling will have little or no encroachment into the tree protection zone of Tree 1 which is in any case exempt from the provisions of the LEP and DCP. However Tree 2 will need to be removed in order to undertake the required construction actions.

5.2 It is further recommended that the property owner should engage a suitably qualified and experienced arborist (Minimum AQF Level III Arb) to undertake remedial pruning on Tree 1 to help with the general weight distribution of the crown.

5.3 Any excavation undertaken within the protection zone of trees retained on the site is to be undertaken using methods that do not damage roots and under the supervision of a project arborist.

5.4 Trees retained on the site should to be protected against the impacts of development works in accordance with Attachment 6 of this report and AS4970-2009 Protection of Trees on Development Sites.

Attachments

Attachment 1: Tree assessment schedule
Attachment 2: Photographs
Attachment 3: Tree assessment criteria
Attachment 4: Safe Useful Life Expectancy description and categories
Attachment 5: Significance of a Tree Assessment Rating System (STARS)
Attachment 6: General guidance notes for protecting trees on development sites
Attachment 7: Site Plan

Attachment 1: Tree assessment schedule

Tree number	Tree Name		Tree Dimensions			Age Class	Vigour	Condition	TPZ (m)	SULE	Retention Value	Comments
	Botanical Name	Common Name	Height (m)	Canopy Spread (m)	D.B.H (mm)							
1	*Persea americana*	Avocado	10	6	500	Mature	N V	F	6m	M(a)	H	Tree on heavy lean, remedial pruning is recommended should the tree be retained.
2	*Jacaranda mimosifolia*	Jacaranda	8	5	400	Semi-Mature	N V	F	4.8m	M(a)	L	Tree will be negatively impacted by development and will need to be removed

Attachment 2: Site Photographs

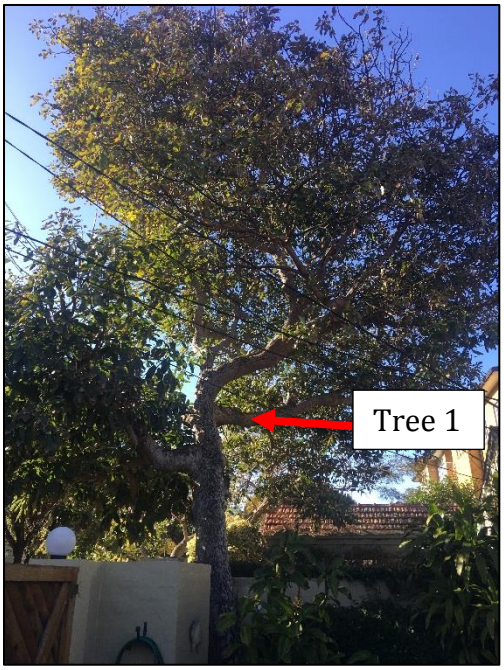

Photo 1: Tree 1 *Persea Americana* (Avocado)

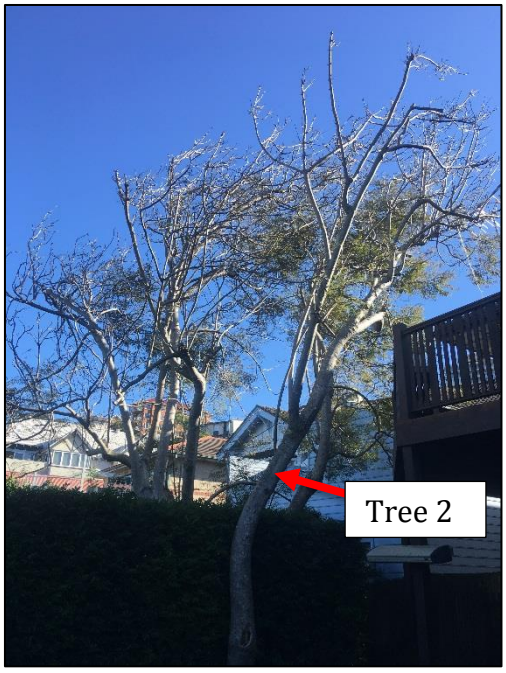

Photo 2: Tree 2 *Jacaranda mimosifolia*

Attachment 3: Tree assessment criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- Height: Estimated or measured height of tree in meters.
- Spread: Estimated or measured radial canopy spread of tree in meters.
- Diameter at Breast Height (DBH): The diameter of trunk in given in millimetres measured at 1.4m from ground. The D.B.H of trees/shrubs with multiple or groups of stems are given as a range or defined by the amount of stems defined by the preceding smaller text. DBH is estimated where full access to the tree is restricted.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

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 categorised as Dormant, Low, Normal and High.

Dormant Vigour – Determined by the existing turgidity in the lower order branches in the outer extremity of the crow, 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.

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.

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 stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

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 (1^{st}) and possibly (2^{nd}) 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 categorised as Dead, Poor, Fair and Good.

Dead Condition – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).

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.

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.

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.

Estimated Age – The estimated age of each tree has been assessed based on its species, size, location, health and condition. Age ranges are given as less than fifteen years (<15), fifteen to forty years (15-40), forty to eighty (40-80) and eighty plus (80+). Where possible historical imagery has been used to classify tree age.

Safe Useful Life Expectancy – Refer Attachment 4.

Comments: Any noteworthy or significant points regarding the tree.

Attachment 4: Safe Useful Life Expectancy description and categories

Safe Useful Life Expectancy (SULE)

SULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. SULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the SULE assessment. Consequently, the reliability all SULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

SULE Assessment Categories

Long SULE (L): Trees that appear to be retainable at the time of the assessment for more than 40 years with an acceptable level of risk.
(a) Structurally sound trees located in positions that can accommodate future growth.
(b) Trees that could be made suitable for retention in the long term by remedial tree care.
(c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.

Medium SULE **(M)**: Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
(a) Trees that may only live between 15 and 40 more years.
(b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons.
(c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(d) Trees that could be made suitable for retention in the medium term by remedial tree care.

Short SULE **(S)**: Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
(a) Trees that may only live between 5 and 15 more years.
(b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
(c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(d) Trees that could be made suitable for retention in the medium term by remedial tree care.

Remove (R): Trees that should be removed within the next 5 years.
(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions.
(b) Dangerous trees because of 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 that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting.
(f) Trees that are damaging or may cause damage to existing structures within 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 high wildlife habitat value and with appropriate treatment could be retained subject to regular review.

Young or Small Trees (Y): Trees that can be reliably moved or replaced.
(a) Small trees less than 5 meters in height.
(b) Young trees less than 15 years old but over 5 meters in height.
(c) Formal hedges and trees intended for regular pruning to artificially control growth

Attachment 5:

Tree Significance Assessment Criteria and Retention Value Matrix

IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010)©

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured quantative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree significance – Assessment Criteria* and *Tree Retention Value – Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of High, Medium and Low significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined.

Tree Significance – Assessment Criteria

1. High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on councils significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

2. Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

3. Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound

Environmental Pest / Noxious Weed Species

- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation

Hazardous / Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monoculture stand in its entirety e.g. hedge.

Table 1.0 Tree Retention Value – Priority Matrix

		Tree Significance				
		1. High	**2. Medium**	**3. Low**		
		Significance in Landscape	Significance in Landscape	Significance in Landscape		
Useful Life Expectancy					Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
	Long >40 years					
	Medium 15-40 years					
	Short <1-15 years					
	Dead or Young & Small					

Legend for Matrix Assessment

	Priority for retention (High): These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 *Protection of trees on development sites*. Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for retention (Medium): These trees may be retained and protected. These are considered less critical; however their retention should remain priority with the removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for removal (Low): These tree are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Remove (R): These trees are considered hazardous, in irreversible decline or weeds and should be removed irrespective of development.

References

Australia ICOMOS Inc. 1999, The Burra Charter – The Australian OCOMOS Charter for Places of Cultural Significance, International Council of Monuments and Sites, www.icomos.org/australia
Draper BD and Richards PA 2009, Dictionary For Managing Trees in Urban Environments, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood Victoria, Australia.
Footprint Green Pty Ltd 2001, Footprint Green Tree Significance & Retention Value Matrix, Avalon, NSW Australia, www.footprintgreen.com.au

Attachment 6:

General guidance notes for protecting trees on development sites

1.0 Purpose of this guidance note

1.1 This guidance note details the basic general requirements that must be followed when trees are retained on and in some cases adjacent to development sites. The tree protection requirements are determined by the tree species, the existing physical constraints of the growing environment both above and below ground and the development proposal itself.

1.2 This guidance note should always be used in conjunction with the tree assessment information specific for the particular site.

1.3 The aim of this guidance note is to provide site personnel with a basic understanding of the requirements needed to successfully protect and maintain trees whilst development works are undertaken. All personnel working adjacent to or within tree protection zones must be properly briefed about their responsibilities towards the trees and their retention.

1.4 This guidance note is based on the Australian Standard AS4970 – *2009 Protection of Trees on Development Sites* and AS 4373 – 2007 *Pruning of Amenity Trees*.

2.0 Site Personnel

2.1 All site personnel including contractors are to be made aware of the relevant tree protection requirements and the role of tree protection zones on the site.

3.0 The project arborist

3.1 A project arborist shall be engaged prior to any works commencing on the site. The project arborist shall have a minimum qualification of the Australian Qualifications Framework (AQF) level 5 in Arboriculture.

3.2 The project arborist is to advise on, monitor, inspect and ensure compliance where trees are retained within and where required adjacent to the development site.

3.3 Any work within a designated tree protection zone requires authorisation from the project arborist.

4.0 Tree and vegetation removal and pruning

4.1 Trees and vegetation approved for removal by the relevant consent authority shall be undertaken prior to any other works commencing on site, including the establishment of tree protection zones.

4.2 All tree removal works are to be undertaken by suitably qualified tree workers (minimum AQF level 2) and in accordance with the NSW Workcover Code of Practice for the Amenity Tree Industry 1998.

4.3 In addition, all tree pruning works (including roots) are to be undertaken in accordance with the Australian Standard AS4373-2007 *Pruning of Amenity Trees*.

4.4 All care shall be taken to avoid damaging trees identified for retention during removal and pruning works.

5.0 Tree Protection Zone (TPZ)

5.1 The tree protection zone is the designated area around a tree to protect the trunk, roots and crown during development works.

5.2 Tree protection fencing is to be installed in compliance with Section 4 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites*.

5.3 The following activities unless otherwise authorised by the project arborist are restricted within the tree protection zone:

- Machine excavation including trenching
- Excavation for silt/sediment fencing
- Cultivation
- Storage
- Preparation of chemicals, including preparation of cement products
- The parking of vehicle and/or plant
- Refuelling
- Dumping of waste
- Washing down and cleaning of equipment
- Placement of fill
- Lighting of fires
- Soil level changes
- Temporary or permanent installation of utilities and signs
- Physical damage to the trees

5.4 Any work within a designated tree protection zone requires authorisation from the project arborist.

6.0 Signage

6.1 Signs identifying the TPZ shall be attached to the tree protection fencing and clearly visible from within the development site. The contact details of either the site manager or project arborist shall be displayed on the sign.

6.2 Further reference to the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made regarding signage.

7.0 Tree protection fencing

7.1 Tree protection fencing is to be installed at the limits of the TPZ or as determined by the project arborist. Fencing shall consist of 1.8m high interlocking chain link or plywood fencing panels. The fencing shall be erected in such a way as to prevent building materials, soil and unauthorised personnel entering the TPZ.

8.0 Trunk and branch protection

8.1 Where necessary trunk protection may be required. Trunk protection is installed by first wrapping the stem of the tree in hessian or like material then strapping timber battens over the top. It is recommended that timber battens with the dimensions of length 2000mm, width 75mm and depth 50mm are used. The battens are not to be directly screwed or nailed into the tree.

8.2 Where necessary branch protection may be required. Branch protection is installed in the same fashion as the trunk protection mentioned above but cut to suit the shape of the branch.

8.3 Reference to Section 4.5.2 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made for further details.

9.0 Ground protection

9.1 Where temporary access or encroachment into the TPZ is required ground protection measures are to be implemented. The purpose of ground protection measures is to avoid damage to tree roots and compaction of the soils within the TPZ.

9.2 Ground protection generally consists of 100mm deep layer of mulch overlaid with rumble boards or road plates (light traffic). Where heavy traffic through or over the TPZ is required the existing ground is be protected by a geo-textile fabric covered with a 300mm layer of compacted road base or railway ballast.

9.3 Reference to Section 4.5.3 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made for further details.

10.0 Excavation within the TPZ

10.1 Excavations within the TPZ may only be undertaken under the supervision and authorisation of the site arborist.

10.2 All excavation within the tree protection zone must be carried out carefully using spades, forks, and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air may be an appropriate alternative to hand digging, if available. All soil removal must be undertaken with care to minimise disturbance of roots beyond the immediate area of the excavation. Where possible, flexible clumps of smaller roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage. If digging by hand, a fork should be used to loosen the soil and help located any substantial roots. Once roots have been located, the trowel should be used to clear the soil away from them without damaging the bark.

10.3 Roots temporarily exposed must be protected from direct sunlight, drying out and extremes of temperature by appropriate covering.

11.0 Fill within the TPZ

11.1 Where possible soil levels are not to be raised within the TPZ. Retaining walls and alternate engineering solutions are to be considered to avoid over battering and encroachment into the TPZ.

11.2 Where fill is required within the TPZ it is to be of an approved courser material than the existing site soil and allow for free gaseous and water exchange into the natural soil profile.

12.0 Pier and beam footings within the TPZ

12.1 Where footings are required within the TPZ they are to be of pier and beam type construction. Excavation shall be restricted to pier/post holes only. All other footing and foundation parts shall be constructed and installed above the existing ground level.

12.2 Pier locations within the TPZ are to be excavated using non-destructive techniques and where possible to their full extent. Where this is not achievable a minimum depth of 600mm shall be excavated. Any further excavation that is then to be undertaken mechanically is to be of a diameter less than that excavated by hand whilst avoiding compaction of the soils within the TPZ.

12.3 A degree of flexibility should be built into the design to allow for the pier locations to be moved if structural or significant roots are found. A minimum clearance distance of 100mm shall be allowed around significant roots.

13.0 Scaffolding

13.1 Where possible scaffolding shall not be erected or installed within the TPZ nor come into contact with any part of a tree scheduled for retention and protection.

13.2 Where scaffolding is required within the TPZ suitable ground protection measures are to be implemented. Flexible branches shall be temporarily tied back to avoid the need for unnecessary pruning or potential tree damage.

13.3 Further reference to section 4.5.6 of the Australian Standard AS4970-2009 *Protection of Trees on Development Sites* should be made for further details.

14.0 Damage to Trees

14.1 Damage to any part of the tree including roots, bark, trunk, branches and leaf material shall be avoided.

14.2 Damage to trees may also be incurred by contamination of the TPZ through chemical, paint or cement wash out.

14.3 The ripping and tearing of roots by excavators or shovels will cause damage and potentially impact tree health. Where roots are accidentally damaged during the works they are to be exposed back to intact woody tissue and pruned in accordance with the arborists recommendations.

14.4 Any damage to any part of a retained tree is to be reported to the project arborist immediately.

15.0 Demolition of structures and surfaces within the TPZ

15.1 The demolition of existing structures and surfaces within the TPZ is to be supervised by the project arborist.

15.2 Where possible existing structures are to be dismantled manually using hand tools. Demolition works should start closest to the tree and work backwards moving out of the TPZ avoiding damage or compaction to the soil. Heavy machinery such as excavators should not be used within the TPZ unless they can be positioned on and work from existing hard surfaces such as concrete slabs.

15.3 Tree roots exposed by the demolition of existing site structures are to be kept in place and advice sought from the project arborist.

16.0 Soft landscaping within the TPZ

16.1 Soft landscaping works are regarded as the installation of plants or organic ground covers (mulch). New tree plantings requiring excavation should refer to section 10.0 *Excavation within the TPZ*. Hard landscaping features such as retaining walls, edging and footpaths are regarded as construction works.

16.2 Where possible trees to be retained shall be incorporated into the landscape design.

16.3 Where fill is required for planting it is to be of an approved courser grade than the site soils and comply with section 11.2.

17.0 Utilities and services within the TPZ

17.1 Where possible the installation of utilities and services are to be kept out of the TPZ.

17.2 Where this is not deemed possible trenchless or underground boring techniques are to be employed. Underground boring should be no less than 600mm below the existing soil level.

17.3 Suspension of service wires through the TPZ should be kept clear of the trees canopy and regulatory safety clearances observed

Attachment 7: Site Plan