Arboricultural Assessment Report

Prepared 10th March, 2009

Site Location

12-40 Bonar Street & 5 Loftus Street
Arncliffe 2205

Client

Meriton Apartments Pty Ltd

DISCLAIMER

The author and Tree & Landscape Consultants take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent modification/s to its growing environment either above or below ground contrary to our advice.

Peter Richards
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10th March, 2009

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Our reference: 1123-3-09

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INTRODUCTION

This report has been prepared by Tree & Landscape Consultants for Meriton Apartments Pty Ltd. The site was inspected and the subject trees and their general growing environment evaluated on the 6th March by the author. The land is located in the Rockdale City Council (the Council) Local Government Area (LGA) and a Tree Preservation Order applies.

This report assesses 15 trees the location of which is indicated in Appendix D & E and details their current health & condition and determines from the assessment, recommendations for removal or retention. The trees assessed are detailed in section 5. and consideration has been given to their Sustainable Retention Index Value (S.R.I.V.)© (Appendix A), condition, age class, vigour & species type.

1. OBJECTIVES

1.1 Assess the condition of the subject trees.

1.2 Provide recommendations for retention or removal of the subject trees.

2. METHODOLOGY

2.1 The method of assessment of tree/s is applied from the ongoing knowledge and development of the author and considers but is not confined to:

- Tree health and subsequent stability, both long and short term
- Sustainable Retention Index Value (S.R.I.V.)© IACA 2005)
- Amenity values
- Significance

2.2 This assessment is undertaken using a standard tree assessment criteria for each tree based on the values above and is implemented as a result of at least one comprehensive and detailed site inspection.

2.3 In this report the dimensions of the tree recorded by the author for the trunk *diameter at breast height* (DBH) measurement is calculated at 1.4m above ground from the base of the tree. Where a tree is trunkless or branches at or near ground such as a mallee formed tree, an average diameter is determined by recording the radial extent of the stem mass at its narrowest and widest dimensions, adding the two dimensions together and dividing them by 2 to record an average.

2.4 Crown spreads are expressed as length by breadth measurements to accurately record their dimensions. Where appropriate, *crown spread orientation* is described along the length of the crown spread e.g. North/South, or as *radial* if the crown is distributed at an approximately even radius from the trunk e.g. 6x6m.

2.5 In the absence of an Australian Standard, the British Standard BS 5837 Guide for "Trees in relation to construction", where applicable is applied to trees to be retained in this report as a point of reference and guide for the recommended minimum clearances from the centre of tree trunks to development works and is applied as a generalised benchmark and the distances may be increased or decreased by the author as a result of other factors providing mitigating circumstances or constraints as indicated by but not restricted to the following:

- *Tolerance of individual species to disturbance,*
- *Geology e.g. physical barriers in soil, floaters, bedrock to surface*
- *Topography e.g. slope, drainage,*
- *Soil e.g. depth, drainage, fertility, structure,*
- *Microclimate e.g. due to landform, exposure to dominant wind,*
- *Engineering e.g. techniques to ameliorate impact on trees such as structural soil, lateral boring,*
- *Construction e.g. techniques to ameliorate impact on trees such as pier and beam, bridge footings, suspended slabs*
- *Arboriculture e.g. exploration trenches to map location of roots,*
- *Physical limitations - existing modifications to the environment and any impact to tree/s by development e.g. property boundaries, road reserves, previous impact by excavation in other directions, soil level changes by cutting or filling, existing landscaping works within close proximity, modified drainage patterns.*

3. TREE PROTECTION GUIDELINES

3.1 GENERAL NOTES

3.1.1 The application of measures for the protection of trees on development sites is determined by the species characteristics, and the existing physical constraints of the growing environment on site both above and below ground.

3.1.2 This report considers where applicable, British Standard BS 5837 Guide for "Trees in relation to construction", as no Australian Standard currently exists for the protection of trees on development sites.

3.1.3 This report applies the ***Tree Protection Zone - Standard Procedure*** as developed and continually improved by the Consultant Arboriculturist for the effective protection of trees on development sites over time. (See section 4.0) Additional or alternative conditions are applied where it is deemed appropriate by the author for the protection of trees. Such additional or alternative conditions may be founded upon professional judgement based on:

- the experience of the Consulting Arboriculturist
- scientific research
- new technology
- industry best practice
- consideration of the individual tree species and its relative tolerance to development impacts
- the individual or cumulative factors present or proposed to impact upon the growing environment essential for the trees' survival

3.2 PRECAUTIONS TO PROTECT TREES

3.2.1 ***Demolition of landscape structures***

The demolition of walls, driveways, paths etc. near trees to be retained should be undertaken manually using hand tools. Use of light machinery can occur by utilising the driveway or a paved area as a stable platform to prevent soil compaction. The volume of space previously occupied by the driveway or paved area must be replaced with local top soil from the site or otherwise a loamy sand, to replace the mass on the root plate which may be critical to the ballast and centre of mass for the stability of the tree. If the tree becomes unstable immediately contact the Consultant Arboriculturist.

3.2.2 ***Structural Soil to accommodate compacted subgrade and root growth***

To further protect woody roots with a diameter of 40mm or greater outside the area of the tree protection zone (see table 2), structural soil as a fill material or a subgrade should be used where appropriate and as detailed in the report recommendations. Structural soil addresses the issue of how to increase soil rooting volume whilst maintaining structural support for pavement. Structural soil maximises rock to rock contact utilising durable rock. Pore spaces are on average 8mm in size of which approximately 60% is taken up by the filler soil - the horticultural component, depending on the product utilised. The product is used for new tree planting in pavements, courtyards, carparks and kerbsides,planter boxes and raising levels around existing trees providing increased available soil volume to trees in pavements, structural properties for pavement support, increased root depth and high permeability for both air and water. (Benedict Sand & Gravel P.O. Box 875 St Ives NSW 2075 Ph: 02 9986 3500 Fax:0299863555 Contact Murray Fraser bsc(ag) for technical inquiries.)

3.2.3 ***Root location and protection where structures are to be positioned near a retained tree***

A:If walls, driveways or other structures are to be constructed near a protected tree or within a tree protection zone (see table 2 column G), careful excavation is to be undertaken manually by using hand tools or light machinery to determine the location of structural woody roots with a diameter of 40mm or greater, without damaging them. These roots are to be protected from physical damage by utilising pier & beam type footings to reduce excessive disturbance of existing soil profile supporting tree roots. Placement of piers are to be positioned so as to clear any structural root by at least 100mm to allow for future radial expansion of the tree root within the soil profile. Any roots 40mm or less may be clean cut with final cuts to undamaged woody tissue.

B: Where structural woody roots outside of the Tree Protection Zone or as otherwise indicated are to be pruned they are to be excavated manually first by using hand tools to adequately expose the root. Once located those roots to be severed are to be cut cleanly with a final cut to undamaged woody tissue. This will prevent tearing damage to the roots from excavation equipment which can extend beyond the point of excavation back towards the tree. Severed roots are to be treated with a root growth hormone stimulant.

3.3.4 ***Pruning/Removal Guidelines***

- Any pruning recommended in this report is to be to the Australian Standard® AS4373 'Pruning of amenity trees', and conducted in accordance with the NSW Work Cover Authority Code of Practice for the Amenity Tree Industry, 1998
- All pruning or removal works are to be in accordance with the appropriate Tree Management Policy where applicable, or Tree Management Order (TMO), or Tree Preservation Order (TPO), or applicable consent conditions.
- Tree maintenance work is specialised and in order to be undertaken safely and to ensure the works carried out are not detrimental to the survival of the tree or surrounding vegetation, all works should be undertaken by a qualified Arboriculturist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of 5 years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.
- Any pruning near electricity wires should be undertaken in accordance with relative Electrical Safety Rules and be performed by persons individually authorised by Energy Australia

4. TREE PROTECTION ZONE STANDARD PROCEDURE

4.1 Each tree to be retained is to have its dripline fenced off, except where otherwise indicated, to create a ***Tree Protection Zone***, and this may include one enclosure to protect a single or multiple tree/s, or multiple enclosures separated over the site. The area contained is the ***Tree Protection Zone***, and is to exclude any activity, except where otherwise stated. The ***Tree Protection Zone*** is to exclude: modification of existing soil levels, storage of materials, site sheds and machinery; preparation of building materials e.g. concrete, or chemical treatments; the movement of pedestrian or vehicular traffic; or the temporary or permanent location of services, or the works required for their installation, e.g. trenches, holes or canals. The above list is not meant to be exhaustive, and is intended as a guide to

the types of activities that are excluded from within the ***Tree Protection Zone***, except where otherwise stated.

4.2 The Tree Protection Fence that defines the ***Tree Protection Zone*** is to be 1.8m high steel chain link with galvanised steel pipes, or in situations where the tree is well clear of proposed works star pickets and parra-webbing, located around the dripline of the tree except where otherwise stated, as a minimum distance from the tree for its protection and should be made larger where possible. The perimeter of the ***Tree Protection Zone*** to be further delineated by the attachment of shade cloth material to the outside surface area of the fence facing the inside of the site to reduce the movement of dust and other air borne residue from building activities that may be phytotoxic to plants or plant parts. The fence is to be installed prior to the commencement of any works on site, (except weed removal and tree maintenance, e.g. pruning, irrigation and mulching), and is to be maintained for the duration of the project. The fence must have a lockable opening for access to, and the security of the enclosed area.

4.3 Tree Protection signage is to be attached to each ***Tree Protection Zone*** and displayed in a prominent position and the sign repeated at 10m intervals or closer where the fence changes direction. The signs to be a minimum size of 600mm x 500mm. Example details, as following:

1. (Title)**Tree Protection Zone**
2. (TEXT) **Name, Address** and **Telephone number** of the *developer* (to enable enquiries concerning the trees to be directed to the developer).

4.4 Where a tree is to be retained and a ***Tree Protection Zone*** can not be adequately established due to restricted access e.g. tree located along side an access way, the trunk will be protected by wrapping 2 layers of hessian or carpet underfelt around the trunk for a minimum of 2m or as lower branches permit, then wire or rope secures 75x50x2000mm hardwood lengths to the trunk (do not nail to the trunk). The number of planks to be used is as required to encircle the trunk and the planks are to extend to the base of the tree.

4.5 If a tree is growing down slope from an excavation, a silt fence located along the contours of the site in the area immediately above the ***Tree Protection Zone*** fencing may need to be installed and regularly maintained to prevent burial and asphyxiation of the roots of the tree. To allow for the maintenance of both fences, the silt fence must be constructed separately to the tree protection fence and the 2 fences must be constructed independently of each other and standalone. To reduce competition with the tree the area within the ***Tree Protection Zone*** is to be kept free of weeds. These are best removed by the application of foliar herbicide with Glyphosate as the active constituent. This is the preferred method rather than removal by cultivation of the soil within the dripline, to minimise root disturbance to the tree. The removal of woody weeds such as Privet should use the cut and paint method of herbicide application. Weeds to be controlled within the ***Tree Protection Zone***, for the duration of the project.

4.6 The area of the ***Tree Protection Zone*** to be mulched to a depth of 100 millimetres with organic material being 75% leaf litter and 25% wood, and this being composted material preferably from the same genus and species of tree as that to where the mulch is to be applied, i.e. species specific mulch. The depth of mulch and type as indicated, to be maintained for the duration of the project.

4.7 No services either temporary or permanent are to be located within the ***Tree Protection Zone***. If services are to be located within the ***Tree Protection Zone***, special details will need to be provided by a qualified Consulting Arboriculturist for the protection of the tree regarding the location of the service/s.

4.8 A tree will not be fertilised during its protection within the ***Tree Protection Zone***, as this may hasten its decline if it were to decline. If a tree is to be fertilised this should be in consultation with a qualified Consulting Arboriculturist.

4.9 In the event of prolonged dry periods, or where a tree has been transplanted, or where excavation nearby, especially up slope, leads to drying out of soil profiles closest to the tree/s, the tree/s is to be deep root watered thoroughly at least twice a week. The need for such watering is determined readily by observing the dryness of the soil surface within the dripline of the tree by scraping back some mulch. Mulch to be reinstated afterwards. In the event of disrupted ground or surface water flows to the tree due to excavation, filling or construction, an irrigation system may be required to be installed within the ***Tree Protection Zone***. If an irrigation system is to be installed, consideration must be given to volume, frequency, and drainage of water delivered, and this should be in consultation with a qualified Consulting Arboriculturist.

5. TREE ASSESSMENTS

Table 1

Tree No.	Genus & species Common Name	Age S-Sapling Y-Young M-Mature O-Overmature	Condition D-Dead P-Poor F-Fair G-Good	Pest & Diseases N = No or Y = Yes (If yes see comments)	Branch Bark Included N = No or Y = Yes (If yes see comments)	Canopy Orientation A-Asymmetrical Sy-Symmetrical N,S,E,W-Orientation	DBH (mm) @ 1.4 metres from ground	Height / Spread (M)	Vigour L-Low N-Normal D- Dormant A- Abnormal	Trunk Lean X-Straight or Slightly Leaning A-Acaulescent M-Moderate S-Severe C-Critical	SRIV Age,Vigour,Condition/ Index Rating (See Appendix A)
27	**Eucalyptus botryoides** *Bangalay*	M	G	N	N	Sy	400	14 7x7	N	X	MNVG10
28	**Eucalyptus botryoides** *Bangalay*	Y	F	N	N	Sy	120	6 3x3	N	X	YNVF8
29	**Agonis flexuosa** *Willow Myrtle*	M	F	N	N	Sy	340	7 6x6	N	X	MNVF9
30	**Corymbia maculata** *Spotted Gum*	M	G	N	N	Sy	360	14 4x4	N	M	MNVG10
31	**Corymbia maculata** *Spotted Gum*	M	G	N	N	Sy	400	14 4x4	N	M	MNVG10
32	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	13 8x8	N	X	MNVP6
33	**Corymbia citriodora** *Lemon Scented Gum*	Y	F	N	N	Sy	150	8 3x3	N	X	YNVF8
34	**Schinus areira** *Peppercorn Tree*	O	P	N	N	Sy	300	13 3x3	N	X	ONVP4
35	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	13 8x8	N	X	MNVP6
36	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	13 8x8	N	X	MNVP6
37	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	13 8x8	N	X	MNVP6
38	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	13 8x8	N	X	MNVP6
39	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	13 8x8	N	X	MNVP6
40	**Erythrina x sykesii** *Coral Tree*	M	P	N	N	Sy	500	16 8x8	N	X	MNVP6
43	**Jacaranda mimosifolia** *Jacaranda*	M	F	N	N	Sy	400	10 7x7	N	X	MNVF9

Table 2 Setbacks for tree protection zones

This table only applies to trees being retained and potentially impacted upon by the proposed works to be included within a Tree Protection Zone. Tree Protection Zone fencing locations where required as measured from the centre of each tree and the recommended distances for the side closest to the building construction works e.g. excavation. (see explanatory notes below).

A	B	C	D	E	F	G
Tree No.	**Trunk Diameter** in millimetres at 1.4m above ground, or mm or m above ground where indicated.	**Age of tree** **Y** = Young **S** = Semi-mature **M** = Mature **O** = Over-mature (senescent)	**Tree Vigour Normal Vigour=** NV Or **Low Vigour=** LV	**British Standard BS 5837:1991'Guide for trees in relation to construction.** Recommended distance per DBH in metresl)	**Distance of fence reduced by one third on one side of tree only, in metres**. As per BS 5837:1991section 7.5.5	**Recommended distance of tree protection fence /zone on the side closest to building /construction in metres.** (See explanatory notes below & report recommendations)
27	400	M	NV	6	4	4(1)
28	120	Y	NV	2	1.33	1.33(1)
29	340	M	NV	4	2.66	2.66(1)
30	360	M	NV	6	4	4(1)
31	400	M	NV	6	4	4(1)
32	500	M	NV	6	4	4(1)
33	150	Y	NV	2	1.33	1.33(1)
34	300	O	NV	6	4	4(1)
35	500	M	NV	6	4	4(1)
36	500	M	NV	6	4	4(1)
37	500	M	NV	6	4	4(1)
38	500	M	NV	6	4	4(1)
39	500	M	NV	6	4	4(1)
40	500	M	NV	6	4	4(1)
43	400	M	NV	6	4	4(1)

Explanatory notes for Table 2.0.

This table is based upon British Standard BS 5837 : 1991 Guide for "Trees in relation to construction." Table 1. Protection of trees: minimum distances for protective fencing around trees' (see Appendix C), where the approved building works should be no closer, including excavation, than the dimensions stated above when the age and vigour of each tree is considered.
If this set back cannot be met the dripline (the lateral extent of the branch and foliage crown) of the tree is considered the appropriate location for the tree protection fence. However, if the prescribed setback from the trunk of the tree for the location of the Tree Protection Zone, is unable to accommodate the location of building works nearby in accordance with British Standard BS 5837 : 1991 Guide for "Trees in relation to construction. 7.5 Prevention of damage to roots", of that Standard provides the following:

"7.5.5 If it is deemed acceptable for construction works to occur closer than the minimum distance, the distance can be reduced by up to one - third on one side only. If distances are reduced in this way, a corresponding increase in distances should be made in other directions"

*	Average diameter.
1	Special conditions apply to protect the roots of trees generally, see recommendations
2	Additional protective fencing and works as detailed in section 3 & 4.
3	Acceptable due to the good relative tolerance of the species to development impacts
4	Range of set backs for the trees at each end of a linear stand.
5	Acceptable as fence located at a substantial distance beyond dripline, or may also include the location of a smaller tree in proximity to a larger tree to be retained and the smaller tree being protected well within the protective fencing for that larger tree.
6	Acceptable due to additional special protection works, see section 4.0 & recommendations for this tree.
7	Acceptable as pre-existing site conditions were conducive to having restricted the development of root growth in this direction.
8	Street tree with protective fencing of minimal width to allow for pedestrian access along road reserve.
9	Acceptable as tree transplanted reducing the area of the root zone.
10	Acceptable as not effected by development.
11	Palm species or young tree not expected to have established a substantially expansive root system and able to re-establish or modify growth to be sustainable due to age and normal vigour.
12	Set back prescribed by the consent authority.
13	Acceptable as tree growing on a lean and encroachment on compression wood side where root growth is of reduced structural importance.
14	Acceptable as root mapping has indicated extent of structural woody roots with a diameter of 40mm or more.
15	Acceptable as pre-existing conditions would have aided in the deflection of roots away from the proposed development site.

6. Discussion

This report finds that of the 15 trees assessed, numbers 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, & 43 can be adequately retained without dramatically impacting upon the root systems of the trees. Soil levels will be maintained or marginally decreased to cater for the area set aside for the overland flow path. Ground disturbance will mostly occur next to the most N/E area of the site adjacent to trees 27-33 where potential excavation will be required to demolish the existing workshop. The trees in this area are mostly of smaller dimension and the footings of the existing workshop would have aided in the deflection of any roots that may be present away from the development site. Generally all works along this boundary within setbacks identified within table 2 should be monitored to ensure protection of the trees present within the adjoining school boundaries and to undertake any remedial works that may be required.

The retention of these trees contributes to: securing local amenity, preservation of existing amenity, providing for a balance to the scale of the proposed development works, maintaining elements of a continuous landscape, providing a more harmonious integration and transition of the use of the land.

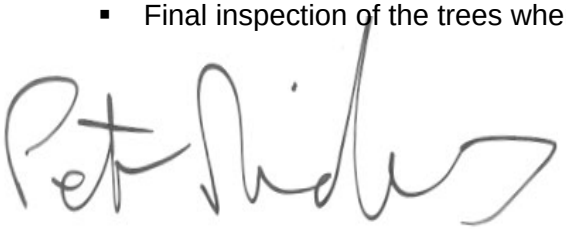
7. RECOMMENDATIONS

a. That trees 27,28,29,30,31,32,33,34,35,36,37,38,39,40, & 43 be retained and protected. Tree protection zones are to be established within the development site boundaries only at setbacks identified in table 2 column G in accordance with section 4 following demolition of the existing buildings and other site features.

b. That minimal level changes occur adjacent to these trees. Any soil excavation at or within setbacks identified in table 2 column G from these trees is to be undertaken by hand or use of light machinery. Any roots encountered are to be treated in accordance with 3.2.3 or as otherwise directed on site by the consulting Arboriculturist.

c. That an inspection schedule and certification reporting be introduced as part of construction works to be provided to the certifying authority at key points as follows:

- Initial certification of the establishment of Tree Protection Zones.
- Attend the site and supervise any excavation works near to the trees to be retained.
- Final inspection of the trees when all site works are completed.



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Appendix A
Matrix - Sustainable Retention Index Value (S.R.I.V.)©

Developed by IACA – Institute of Australian Consulting Arboriculturists www.iaca.org.au (2005)

" A visual method of rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria. To be used with the values defined in Appendix B. Index values as indicated where (10) ten is the highest value."

Age Class	Vigour Class and Condition Class					
	Normal Vigour & Good Condition (NVG)	Normal Vigour & Fair Condition (NVF)	Normal Vigour & Poor Condition (NVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to abnormal vigour. Retention potential - Medium – Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed or retained for Immediate – Short Term. Potential for longer with remediation or favourable environmental conditions.
Young (Y)	Index Value 9 Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height <5m. High potential for future growth and adaptability. Retain, move or replace.	Index Value 8 Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. High-moderate potential for future growth and adaptability. Retain, move or replace.	Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Moderate-low potential for future growth and adaptability. Retain, move or replace.	Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Moderate potential for future growth and adaptability. Retain, move or replace.	Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Moderate-low potential for future growth and adaptability. Retain, move or replace.	Index Value 1 Retention potential - Likely to be removed or retained for Immediate – Short Term. Likely to provide minimal contribution to local amenity if height <5m. Low potential for future growth and adaptability.
Mature (M)	Index Value 10 Retention potential - Medium - Long Term.	Index Value 9 Retention potential - Medium Term. Potential for longer with improved growing conditions.	Index Value 6 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 2 Retention potential - Likely to be removed or retained for Immediate – Short Term.
Over-mature (O)	Index Value 6 Retention potential - Medium - Long Term.	Index Value 5 Retention potential - Medium Term.	Index Value 4 Retention potential - Short Term.	Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions.	Index Value 2 Retention potential - Short Term.	Index Value 0 Retention potential - Likely to be removed or retained for Immediate – Short Term.

Appendix B

Definitions & Terminology

Condition of trees

Condition A 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 first and possibly second order branches), including structural defects such as cavities, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These are not directly connected with health/vigour and it is possible for a tree to be healthy or of normal vigour but in poor condition.

Good Condition Tree is of good habit, a form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Fair Condition Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.

Poor Condition Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in *good* to *fair* condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;
Processes
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 or epicormic meristem strands in Eucalypts (Burrows 2002, Pp.111-131) (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a *lignotuber*);
Symptoms
Permanent leaf loss;
Permanent wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots);
Shedding of the epidermis (bark desiccates and peels off to the beginning of the sapwood).

Sustainable Retention Index Value (SRIV) A visual method of rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria. SRIV© is for the professional manager of urban trees to consider the tree in situ with an assumed knowledge of the taxa and its growing environment and is based on the physical attributes of the tree and its response to its environment considering its age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property and the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. (IACA 2005)

Description of Tree Dimensions

Height The distance measured vertically between the horizontal plane at the lowest point at the base of a tree, which is immediately above ground, and the horizontal plane immediately above the uppermost point of a tree.
Spread The furthest expanse of the crown when measured horizontally from one side of the tree to the other, generally through the centre of the trunk. Where the crown is not circular a measurement should be an average of the narrowest and widest diameters and this is dependent upon crown form and to a lesser extent its symmetry.
Crown Cover Percent of the homogenous distribution of foliage across the entire crown based upon that expected for a specimen of that species in good condition and of normal vigour, depending on form in situ, e.g. this may be influenced by crown die-back, proximity to other trees or structures, moisture stress, or overshadowing.
Crown Density Percent of foliage present in the overall cover of the crown based upon that expected for a specimen of that species in good condition and of normal vigour, depending on form in situ, e.g. and may be influenced by seasonal grazing of insects; or leaf shedding or growth flushes due to seasonal availability of moisture. May also be influenced by epicormic shoots where a tree with a low percentage of crown cover may have a high percentage of crown density due to the vigorous crowding of the shoots of such reactive growth.
Acutely Divergent A branch growing in a direction away from its point of attachment where the angle in the crotch is less than 90^{O}.

Vigour

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. dormancy of deciduous or semi-deciduous trees.
Health A tree's *vigour* as exhibited by the crown density, leaf colour, presence of epicormic shoots ability to withstand predation by pests and diseases and the degree of dieback.
Normal Vigour Ability of a tree to maintain and sustain its life processes. This may be evident by the growth of leaves, branches, roots and trunk. 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.
Low Vigour Reduced ability of a tree to sustain its life processes. This may be evident as a decline in the growth of leaves, branches, roots and trunk, and a deterioration of their functions. 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.

Age of Trees

Age of Trees Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown. These increments are Young, Mature and Overmature.
Young Tree aged less than 20% of life expectancy.
Mature Tree aged 20-80% of life expectancy.

Over-mature Tree aged greater than 80% of life expectancy tending to senescent with or without reduced vigour, and declining gradually or rapidly but irreversibly to death.
Sapling A young tree, early in its development with small dimensions.
Senescent Advanced old age, over-mature.

General

Acaulescent Tree grows forming a very short trunk, or tree is *trunkless*.
Caulescent Tree grows forming a trunk.

Appendix C

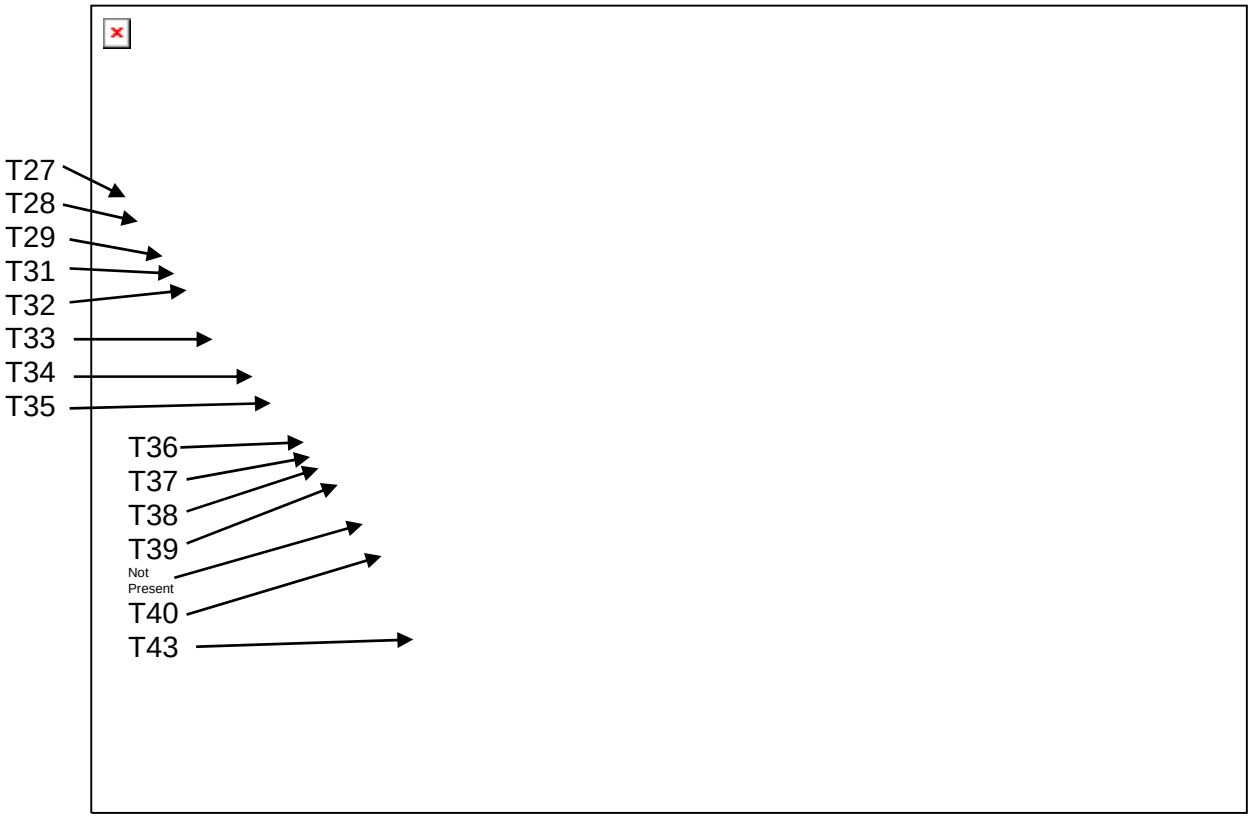
Extract from British Standard BS 5837 : 1991

Guide for "Trees in relation to construction."
Protection of Trees

Table 1. Protection of trees: minimum distances for protective fencing around trees			
Tree age	**Tree vigour**	**Trunk diameter**	**Minimum distance**
		mm	m
Young trees (age less than 1/3 life expectancy	Normal vigour	< 200 200 to 400 > 400	2.0 3.0 4.0
Young trees	Low vigour	< 200 200 to 400 > 400	3.0 4.5 6.0
Middle age trees (Semi-mature) (1/3 to 2/3 life expectancy)	Normal vigour	< 250 250 to 500 > 500	3.0 4.5 6.0
Middle age trees (Semi-mature)	Low vigour	< 250 250 to 500 > 500	5.0 7.5 10.0
Mature trees	Normal vigour	< 350 350 to 750 > 750	4.0 6.0 8.0
Mature trees and over mature trees	Low vigour	< 350 350 to 750 > 750	6.0 9.0 12.0
Note 1. It should be emphasized that this table relates to distances from centre of tree to protective fencing. Other considerations particularly the need to provide adequate space around the tree including allowances for future growth (see 6.3), and also working space (see 6.7), will usually indicate that structures should be further away. Note 2. With appropriate precautions, temporary site works can occur within the protected area, e.g. for access or scaffolding (see 8.3).			

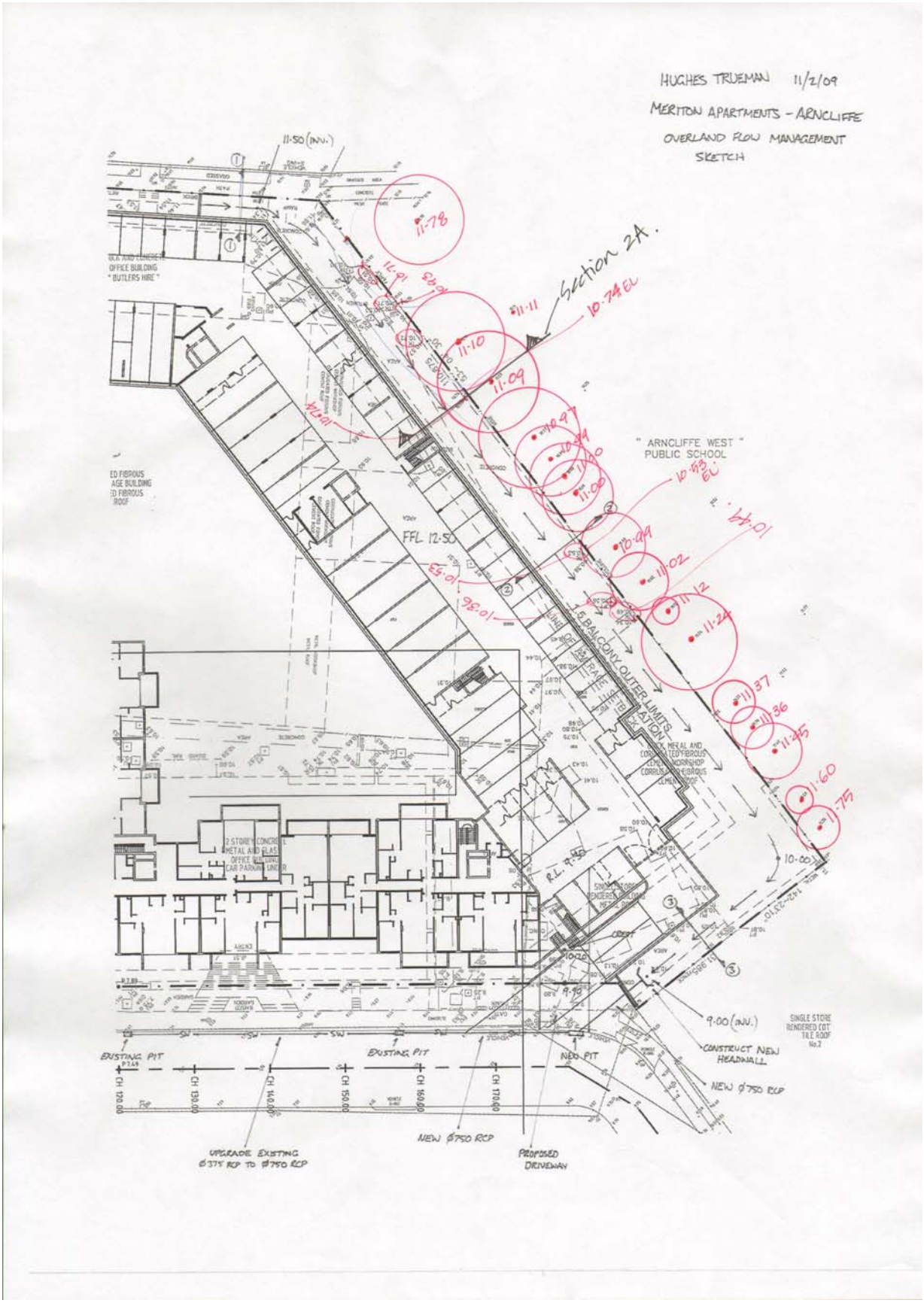
Appendix D

Tree Locations/Survey Plan



. Appendix E

Tree Locations/ Overland Water flow Plan



Appendix F
References

REFERENCES

1. IACA (2005), Sustainable Retention Index Value, Institute of Australian Consulting Arboriculturists, www.iaca.org.au .

2. British Standard® BS 5837: 1991 guide for 'Trees in relation to construction.'

3. Australian Standard® AS 4373 – 2007 Pruning of amenity Trees.