BOTANICS
TREE WISE PEOPLE

Construction Impact Assessment

Lourdes Retirement Village
95 Stanhope Road, Killara

Compiled by
George Palmer
Botanics, Tree Wise People Pty Ltd

Dated
April 2011.

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1. Background

1.1 Introduction

1.1.1 This Construction Impact Assessment was commissioned by Aevum Living to address the general arboricultural requirements under the Planning and Assessment Guidelines and a number of specific issues raised by Ku-ring-gai Council, in particular Geoff Bird, the Landscape Officer at Ku-ring-gai Council.

1.1.2 The issues raised by Council include the impact on existing trees of the proposed infill development including; Councils Tree preservation Order; remnant vegetation, structurally significant tree roots and asset protection zones in relation to fire safety for existing and future residents.

1.1.3 Aevum Living have consulted closely with Council on numerous occasions, including an on site meeting between Mr Bird, Mr Grayson Landscape Architect consultant to Aevum Living, Mr Mads Toft of Mala GPR (Ground Penetrating Radar) Australia and myself (Arborist), to assess the site requirements and gain a better understanding of Councils specific concerns.

1.1.4 Previous Arboricultural Assessments have detailed the impacts of separate portions of the development proposal process as the project has evolved. This most recent version has identified an additional 42 trees with a trunk diameter of 150mm or more, located between the sites southern boundary and the southern most residences. This area has been seen as having the potential to contribute to a fire hazard and will require tree works to be completed in order to meet the Rural Fire Service requirement for the site to be treated as an Inner Protection Zone. There are additional requirements to ensure the proposed tree works consider Councils concern for soil erosion, remnant vegetation and native habitat.

1.1.5 This Construction Impact Assessment has recognised Ku-ring-gai Councils arboricultural objectives and has been written in accordance with the current Australian Standards for the Protection of Trees on Development Sites AS 4970-2009 with a particular focus on the removal of trees with poor health and/or form to reduce fuel loads on the escarpment adjacent to the site.

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1.2 The Subject Trees

1.2.1 The general findings and data collected for each of the subject trees is contained in the following Tree Assessment Schedule.

1.2.2 The southern boundary of the site has been defined by a series of marks on the top of a rock escarpment that separates this site from the adjoining urban bushland.

1.2.3 This area has developed a thick understorey of She Oaks, Melaleuca, Wattles and other colonising plant species. In addition there are a number of larger diameter stumps and dead trees that contribute fire fuel loads that will need to be cleared to address the issue raised in Bush Fire Protection regulations.

1.2.4 As noted the site survey documented an additional 42 trees over 150mm in diameter located between the sites lower southern boundary and the residences on the southern portion of the site. Those trees documented within the following schedule will require pruning or removal.

1.2.5 There are hundreds of additional smaller diameter trees and shrubs throughout this area that will also require removal to reduce fuel loads. These have not been surveyed but will be a Bush Fire Protection requirement as stipulated by Ecological (Bush Fire consultant). This includes an 80% reduction in Mid Storey vegetation between the southern boundary and the existing buildings.

1.3 The Proposed Works

1.3.1 The proposed work will involve the construction of a number of new independent senior's living units, being an extension of the existing facilities as documented.

1.3.2 The proposed works will therefore involve;

- The removal of those trees located within the proposed construction footprint as documented to allow for the construction process to occur.
- The protection of existing trees in accordance with Australian Standards for the Protection of Trees on Development Sites AS 4970-2009
- The removal and pruning of additional trees to satisfy the requirements under the RFS Inner Protection Area.

1.3.3 This is an important infill development that will allow for the additional housing and care of a large number of aged residents. This development will

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enhance the ability for Aevum Living to manage this private open space and continue to provide important facilities to the broader community.

1.3.4 The proposed work are aimed to reduced fire fuel loads, create canopy separation and to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with existing buildings and proposed buildings.

1.3.5 Tree Removal and Pruning works will include; the removal of dead wood from the ground and middle storey in designated areas, to create isolated tree clumps along the southern boundary, provide improved tree canopy separation and provide separation of minimum 2.0m between existing trees and buildings.

1.3.6 The preservation of the sites most arboriculturaly significant remnant plant material has been given a priority over exotic plant species. Wherever possible, tree removal recommendations have been kept to a minimum in favour of canopy modification pruning.

2. Methodology

2.1 Data Collection

2.1.1 An on site inspection and visual tree assessment (VTA) was undertaken on the 3rd and 5th October 2010 and on the 4th and 5th of April 2011. No aerial (climbing) inspections were done. Most of the site photos were taken by the author at the time of inspection with a digital camera.

2.1.2 The following Tree Removal and Protection Plans have been presented to Graphically represent Trees to be Removed, Transplanted and Pruned. Additional Pruning information has been provided as a photographic record detailing pruning works to be undertaken.

- Lourdes Village Tree Retention and Removal Plan # AEV02-DD-501, # AEV02-DD-502, # AEV02-DD-503 showing the locations of all surveyed trees in relation to the existing and proposed building footprints.

2.1.3 Norton Survey Partners tagged an additional 400 trees from the previously documented portion of the site. Botanics, Sym Studio and Ecological collaborated to identify, assess and make recommendations in an attempt to improve the Fire Hazard risk to existing residents and to meet the objectives outlined by the Rural Fire Service and Council.

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2.1.4 All trees surveyed have been tagged and numbered using a pink ribbon. Only those trees recommended for removal or pruning have been documented.

2.1.5 The areas where recommended Tree Protection Zones conflict with proposed construction impact zones have been marked out and assessed by ground penetrating radar to determine the size and significance of underlying roots. Appendix 1 is the Survey Report prepared by Cameron Young and Mads Tofts on behalf of Mala GPR Australia.

2.1.6 Whilst the location of trees, per the plans, appear to be accurate, measurements of their location in relation to the existing and proposed work has not been taken for the purpose of this report. All significant trees over 4 meters in height have been assessed from ground level and tabled within.

2.1.7 Tree heights and canopy spreads have been estimated and trunk diameters have been measured with a diameter tape where applicable.

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3. Discussion

3.1.1 As noted selected area where the proposed construction process conflicted with theoretical Tree Protection Zones of significant trees have been further assessed with the aid of 2D x 3M Ground Penetrating Radar (GPR). These areas have been assigned section numbers from 1 – 5.

3.1.2 Section 1 and 2 dealt with the Stanhope Road and the impacts associated with the installation of the piers to support the fence. The proposed pier holes were marked out and detailed.

3.1.3 The pruning and removal works proposed have been done to address those issues raised by the Rural Fire Service and concerned residences in light of the build up of dead wood on an escarpment that is located directly adjacent to a large parcel of urban bushland.

3.1.4 This area has become over loaded with fuel and has gone from an open forest into woodland.

Figure 1 Shows one of the storm water retention basins and some of the existing planting.

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Figure 2 Shows a section of the site heavily planted with She Oaks.

Figure 3 Shows Tree 227 and the decay at its base.

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3.1.5 As can be seen on pages 5 and 6 of Appendix 1, there are 5 proposed piers that will potentially impact on underlying tree roots. These tree roots have not come up as “major roots” and are likely to be less than 100mm in diameter.

3.1.6 The installation of these piers is within the Tree Protection Zone of the mature Liquidambar documented as Tree 32 as well as the stand of Turpentine’s documented as Trees 21 – 25. These are all well established and healthy trees that will have an extensive root system. The impacts associated with the installation of the proposed piers will affect less than 5% of their total root mass and have no significant or long term impact on the trees ability to absorb either soil moisture or nutrients from the soil system.

3.1.7 Section 3 deals with the impacts of the proposed development on the semi mature Araucaria, or Norfolk Island pine tree documented as Tree 17. Based a visual site assessment it is thought that the tree roots documented within the GPR assessment were from the adjacent Ash tree documented as Tree 13 and not from the Norfolk Island pine.

3.1.8 The proposed building footprint is approximately 4.5 meters from the base of this Pine and adjacent to the outer edge of the trees Tree Protection Zone. As such it will be impacting on less than 10% of the trees TPZ and should be classified as a “minor encroachment” in accordance with the Australian Standard.

3.1.9 The construction of the adjacent path is well within the TPZ but has been documented to be constructed above ground level and will not directly affect any of the trees underlying roots.

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Figure 4 Shows the trees on the Phoenix to be transplanted and the stand of Turpentine's to be retained with the exception of Tree 21.

3.1.8 Section 4 of the GPR assessment detailed the size and location of roots adjacent to the stand of Turpentine's documented as Trees 21 – 25. These are a significant stand of trees and are part of the remnant plant community.

3.1.9 an assessment of this stand noted that the tree closest the proposed development has been suppressed by the adjacent trees and has developed with a pronounced lean to the south and over the proposed building footprint. The tree has no hope of emerging from this suppression and will always be compromised by the remaining canopy. For this reason it has been recommended that this tree, documented as Tree 21 be removed to allow the adjacent stand of Turpentine's to develop without being compromised by this poorly formed specimen.

3.1.10 Section 5 of the GPR assessment dealt with the impacts of the construction process on the single Turpentine documented as Tree 1. As noted the remaining adjacent trees have significant structural faults that do not make them suitable for retention.

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Figure 5 Shows a portion of the Turpentine, documented as Tree 1 to be pruned to allow for suitable building line clearance.

3.1.11 This tree (Tree 1) is again part of the remnant plant community but is significant being a single tree rather than part of a stand. The tree has however been considered for retention. The GPR information was inconclusive. A visual assessment of the area noted that there is a large concrete sewer access pit has previously been constructed to the east of this tree. It is understood that this pit is at least 700mm bellow the soil surface and is more likely to be anywhere up to 3 meters bellow ground.

3.1.12 The construction of such a significant structure adjacent to the base of this tree will have altered the development of the trees root system and will have limited the development of its roots in this easterly direction.

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3.1.13 The development of the trees upper canopy however will impact on the proposed building line and require some canopy modification pruning that will affect up to 30% of the trees total canopy mass as documented in Figure 2.

3.1.4 This proposed pruning will open up 2 pruning wounds, the largest of which will be 200 mm in diameter. Given the relatively young age and good health of the tree, as well as its biological potential it can be assumed that these will compartmentalize these wounds in the medium term and cope with the impacts of the construction process.

3.1.5 The other 2 trees located adjacent to the proposed construction footprint that have been documented for retention are the 2 Lophostemon confertus, or Brush Box trees documented as Trees 67 and 68. These trees are located on the southern edge of the development and will require some small scale building line clearance work. The largest limb required for removal is approximately 120mm is diameter and represent less than 5% of the trees total canopy mass.

3.1.5 This section deals with trees located adjacent to the construction site and form part of the construction process since they are located within the broader development site. These trees have been assessed against the Rural Fire Services criteria for Internal Road Access. As such the trees identified are required to be either pruned or removed as illustrated.

Figure 6 Shows a portion of the Blackbutt, documented as Tree 54 to be pruned to increase tree life expectancy, improve safety and allow for RFS access.

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3.1.6 This proposed pruning will open up 2 pruning wounds, the largest of which will be 175 mm in diameter. This mature specimen has a pronounced lean on a 60 degree angle overhanging the internal road and main pedestrian access way. The impacts of pruning of approximately 25% of the canopy should alleviate overturning forces and therefore increase its length of survival and minimise the safety risk of branch failure.

Figure 7 Shows a portion of the Syzgium, documented as Tree 91 to be pruned (remove: 1x 125mm, 1x75mm branches as shown) to allow for RFS access

Figure 8 Shows a portion of the Alder, documented as Tree 92 to be pruned (remove: 1x 100mm as shown) to allow for RFS access

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Figure 9 Shows a portion of the Tee Tree, documented as Tree 93 to be removed to allow for RFS access

Figure 10 Shows the Plum, documented as Tree 94 to be removed to allow for RFS access

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Figure 11 Shows a portion of the Red Bloodwood, documented as Tree 95 to be pruned (remove: 1x 125mm branch as shown) to allow for RFS access

Figure 12 Shows a portion of the Pittosporum, documented as Tree 96 to be pruned (remove: 2x 75mm branches as shown) to allow for RFS access

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Figure 13 Shows a portion of the Watergum, documented as Tree 97 to be pruned (remove: 1x 75mm branch as shown) to allow for RFS access

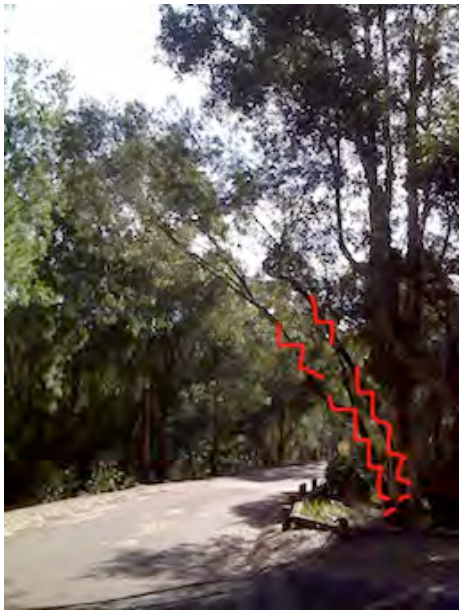

Figure 14 Shows the 2 Swamp Oaks, documented as Tree 98 & 99 to be removed to allow for RFS access

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Figure 15 Shows a portion of the Paperbark, documented as Tree 100 to be pruned (remove: 4x75mm branches as shown) to allow for RFS access

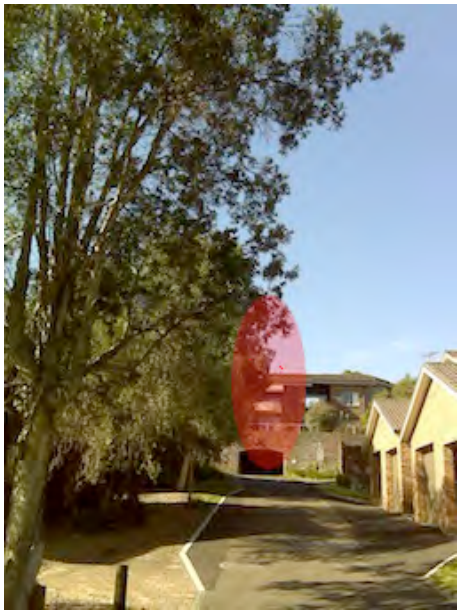

Figure 16 Shows a portion of the Paperbark, documented as Tree 101 to be pruned (remove: 4x 50mm, branches as shown) to allow for RFS access

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Figure 17 Shows a portion of the Pittosporum, documented as Tree 102 to be pruned (remove: 4x 50mm, branches as shown) to allow for RFS access

Figure 18 Shows a portion of the Jacaranda, documented as Tree 103 to be removed to allow for RFS access

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Figure 19 Shows a portion of the Bottlebrush, documented as Tree 104 to be removed to allow for RFS access

Figure 20 Shows a portion of the Plum, documented as Tree 105 to be pruned (remove: 2x75mm branches as shown) to allow for RFS access

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Figure 21 Shows a portion of the Wattle, documented as Tree 106 to be removed to allow for RFS access

Figure 22 Shows a portion of the Tallow, documented as Tree 107 to be pruned (remove: 2x 75 branches as shown) to allow for RFS access

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Figure 23 Shows a portion of the Grey gum, documented as Tree 108 to be pruned (remove: 2x 150mm, branches as shown) to allow for RFS access

Figure 24 Shows a portion of the Smooth Bark Apple, documented as Tree 109 to be pruned (remove: 1x 125mm, branch as shown) to allow for RFS access

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Figure 25 Shows a portion of the Pittosporum, documented as Tree 110 to be pruned (remove: 1x75mm branch as shown) to allow for RFS access

Figure 26 Shows a portion of the Silky Oak, documented as Tree 119 to be pruned (remove: 1x75mm branch on eastern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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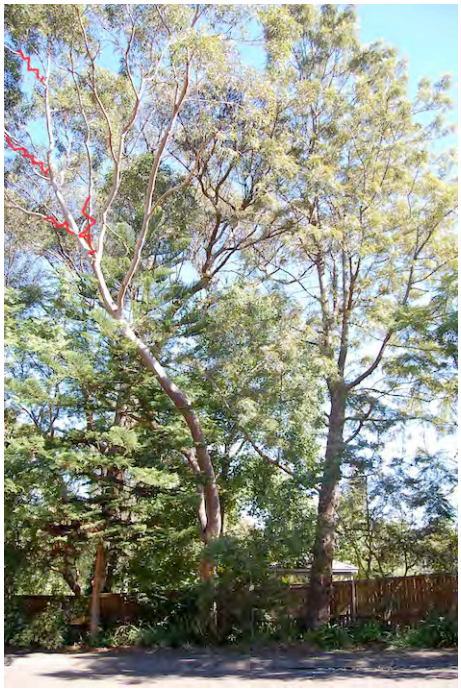

Figure 27 Shows a portion of the Smooth Barked Apple, documented as Tree 120 to be pruned (remove: 4x75mm branch on eastern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

Figure 28 Shows a portion of the Sydney Peppermint, documented as Tree 134 to be pruned (remove: 2x225mm branch on northern and western side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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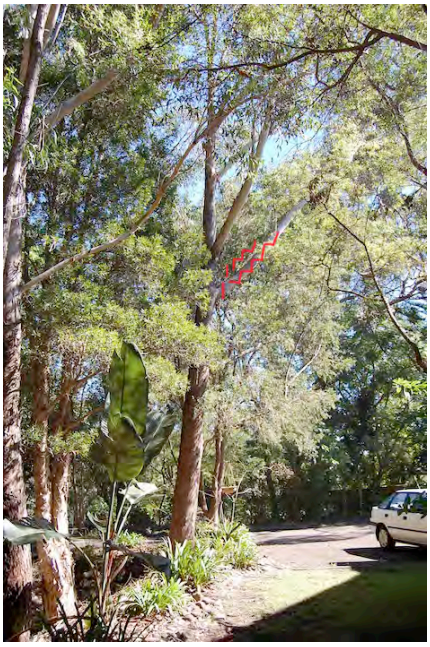

Figure 29 Shows a portion of the Sydney Peppermint, documented as Tree 152 to be pruned (remove: 2x250mm branches on northern and north-eastern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

Figure 30 Shows a portion of the Sydney Peppermint, documented as Tree 154 to be pruned (remove: 1x150,1x200mm branches on northern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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Figure 31 Shows a portion of the Spotted Gum, documented as Tree 164 to be pruned (remove: 2x150mm branches on north and south side as shown) + remove deadwood to allow for RFS Inner Protection Zone

Figure 32 Shows a portion of the Sydney Peppermint, documented as Tree 165 to be pruned (remove: 1x150mm branches on south side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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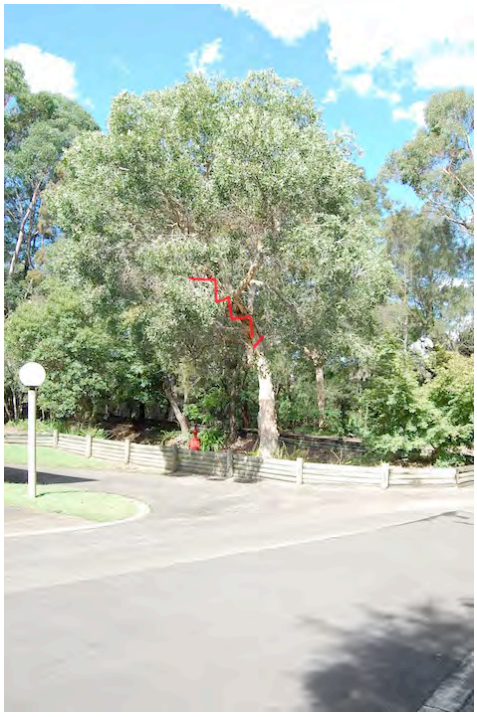

Figure 33 Shows a Paper Bark, documented as Tree 172 to be pruned (remove: 1x250mm branches on north side as shown) + remove deadwood to allow for RFS Inner Protection Zone

Figure 34 Shows a portion of the Smooth Barked Apple, documented as Tree 199 to be pruned (remove: 2x150mm branches on northern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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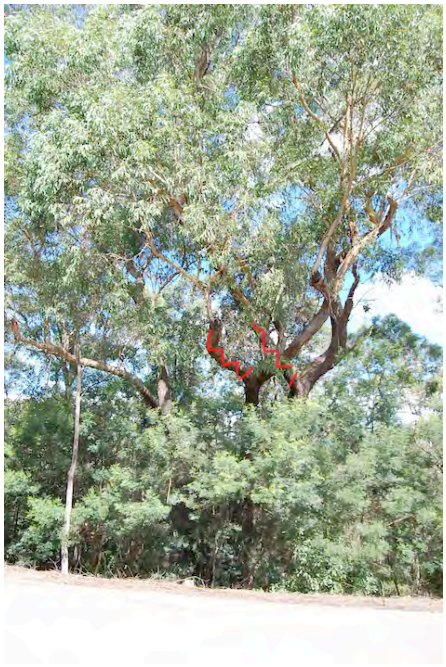

Figure 35 Shows a portion of the Sydney Peppermint, documented as Tree 209 to be pruned (remove: 2x300mm branches on northern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

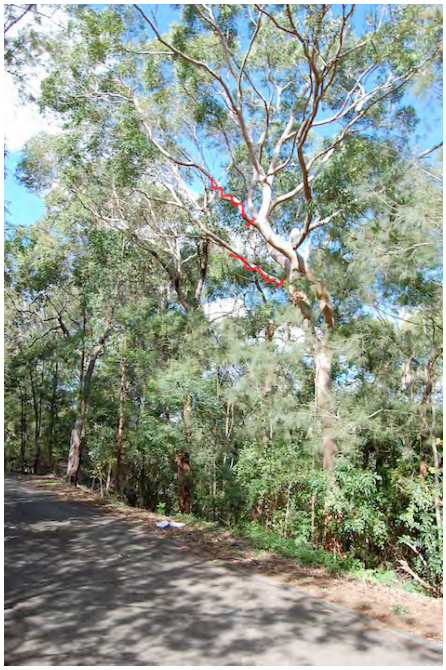

Figure 36 Shows a portion of the Smooth Barked Apple, documented as Tree 222 to be pruned (remove: 2x200mm branches on northern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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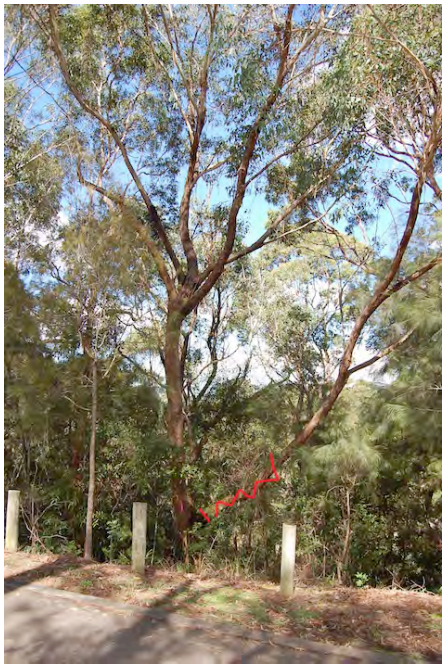

Figure 37 Shows a portion of the Sydney Peppermint, documented as Tree 234 to be pruned (remove: 1x300mm branches on western side as shown) + remove deadwood to allow for RFS Inner Protection Zone

Figure 38 Shows a portion of the Bloodwood, documented as Tree 350 to be pruned (remove: 2x150mm branches on northern side as shown) + remove deadwood to allow for RFS Inner Protection Zone

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4. Recommendations

4.1 Site Specific

4.1.1. The following trees have been recommended for removal and will be required for removal to allow the proposed development to occur. There are Trees;
2,3,4,5,6,7,8,9,10,11,12,13,15,16,19,20,21,26,27,28,31,33,59,60,61,62,63,64, 65, 69,70,72,73,74,75,76,77,81,82,83,84,85,93,94,98,99,103,104,106,111, 112,113,118,123,144,150,151,157,166,171,179,180,202,193,206,215,226,227,228,244,252,262,273,331,340,349,351,352.

4.1.2. The following tree schedule details those trees recommended for removal as well as those trees recommended canopy pruning.

4.1.3 The remainder of the trees documented within this report are located outside the construction impact zone and can and should be retained throughout the construction process with the implementation of the following tree preservation recommendations.

4.1.4 There are a large number of additional trees <150mm dia. located between the southern boundary and the existing residences that will be removed as part the mid storey hazard reduction. These are predominantly She Oaks, Melaleuca and Wattles.

4.1.5 All vegetation should be mulched on site and this native mulch put back on the escarpment to stabilize this area and to limit the colonisation and spread of weeds.

4.1.6 It is recommended that all trees to be removed be cut to ground level and left with root stock interact. This will aid in the stabilization of the embankments and limit the impacts of the proposed works on the adjacent bush land.

4.1.7 It is recommended that the embankment then be planted out with a range of mesic native ground cover species to further aid in the stabilization process.

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4.2.1 Tree Protection Requirements Generic

The following is a list of tree protection recommendations that should be implemented to limit the impact of the construction process on those trees documented for preservation. These recommendations should be implemented for the duration of the construction process if no site specific recommendations have been detailed.

4.2.2 Arborists Involvement

A suitable qualified arborist should be employed prior to the commencement of the construction process. The Arborists scope of work should include the monitoring and documentation of all trees on and adjacent to the site. Consequently ensuring the impact of the construction process is minimised.

The Arborist should be present to supervise any excavation, trenching or tunnelling within the Primary Root Zone (PRZ) of any tree documented for preservation.

The Schedule of Work must acknowledge the role of the Site Arborist and the need to preserve and protect retained trees. Adequate notice should be given to allow access to site during critical stages of the construction process.

4.2.3 Tree Protective Fencing

Trees to be retained throughout the construction process should be protected with fencing or have trunk protection installed, thereby enclosing a sufficient area to prevent any additional construction impact to the critical root zones and trunks.

Fencing should be erected before any materials are brought on to site or before any site work and construction is to occur and are to remain for the duration of the building work. The fencing should be installed to enclose the critical root zone, where applicable.

The location of the fencing should be determined at a site meeting between the Superintendent and the site arborist to prevent the need to move the fencing during construction.

The enclosed area should be mulched and irrigated and kept free from building materials and/or contaminants. If scaffolding is required within a Tree Protection Zone the area must be mulched.

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4.2.4 Tree Pruning and Removal

All tree and tree root pruning shall be carried out by a suitable qualified and experienced arborist to Australian Standards AS4373-2007, “Pruning of Amenity Trees” and to the WorkCover Code of Practice for the Amenity Tree Industry, 1998.

Stump grinding shall be done for stumps that are within the PRZ or trees documented for retention to limit the disturbance to the adjacent tree. The poisoning of stumps should be limited to minimise the chance of poisoning adjacent trees with fussed root systems.

4.2.5 Mulching

If construction is documented within the PRZ of a retained tree, mulching is required. Mulch and maintain to a depth of 75-100mm with composted green waste mulch for the duration of the construction process.

4.2.7 Soil Compaction

The affects of soil compaction are often the most arboriculturaly significant impact of the construction process. Reducing traffic volumes and limiting the access to specific tracks will reduce the affect on adjacent trees.

Should heavy and regular vehicular access be required within the PRZ of a retained tree be required an access track should be formed using large diameter railway ballast (100mm) over a geofabric or a corduroy of heavy timbers.

4.2.8 Soil Inversion

Care should be taken to avoid the inversion of soil layers and particularly within the PRZ of trees documented for preservation. If a clay soil is placed over a course textured soil water infiltration will be altered often creating a perched water table. This can result in the decline and death of underlying tree roots due to moisture stress.

4.2.9 Services

Trenching for services must be regarded as construction. Trenching within the PRZ should be avoided wherever possible. Directional “trenchless” boring or suspending services above a root plate should be used wherever possible.

Where trenching is required within the PRZ of a retained tree the excavation is to be done by hand to ensure that no roots greater than 30mm are to be cut.

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4.2.10 Site Access and Site Establishment

Site access, site sheds and construction access paths shall be placed clear of the dripline of all retained trees. Stockpiling and storage of materials shall not occur within the dripline of retained trees

George Palmer
Diploma Horticulture- Arboriculture (Level 5)
Associate Diploma Horticulture- Landscape.

LIMITATIONS ON THE USE OF THIS REPORT

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 of the original report (or a copy) is referenced in, and directly attached.

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Tree Location – Overall Tree Key Diagram

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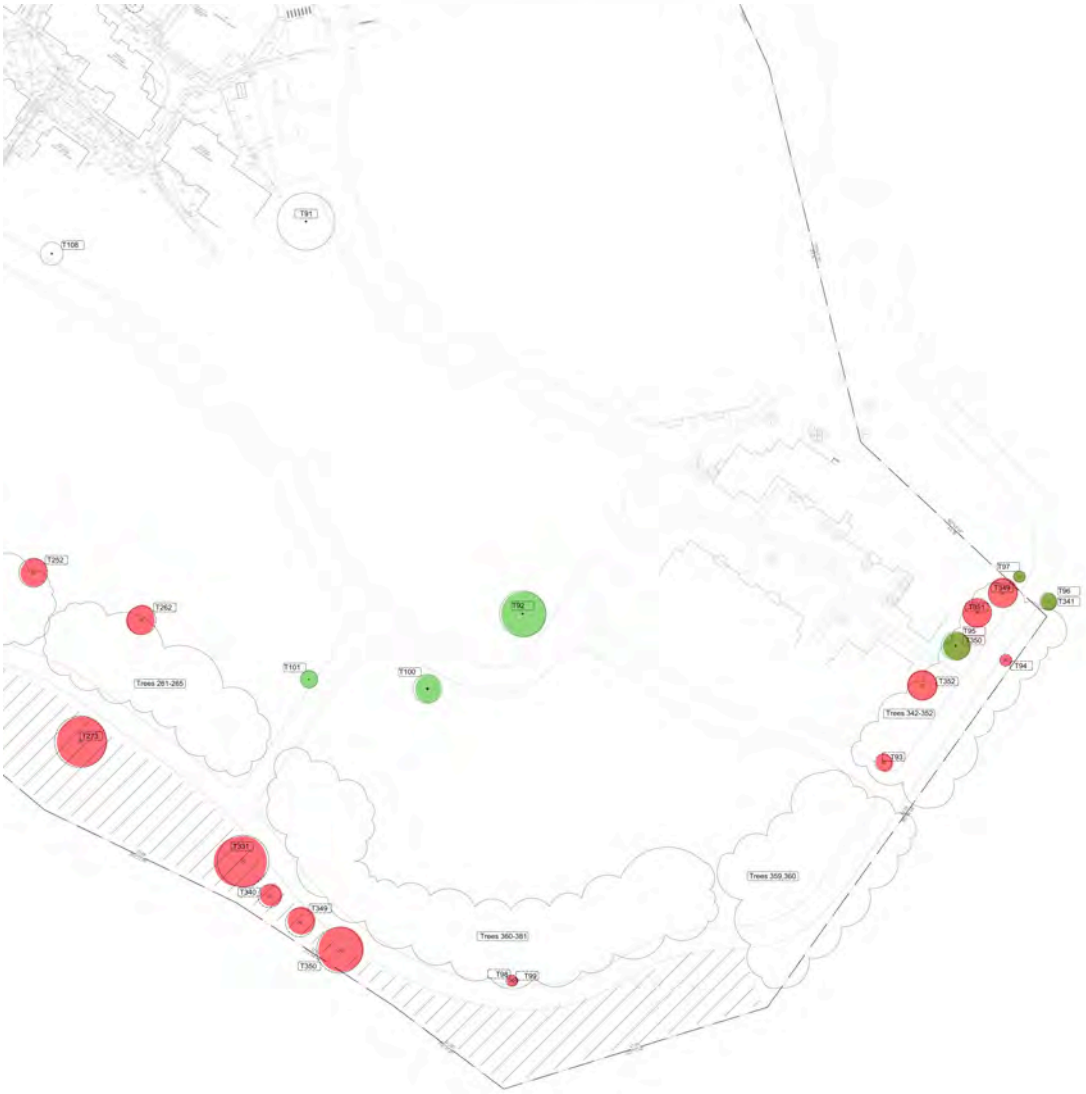

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Tree No	Genus and Species	Common name	Height (m)	Spread (m)	Trunk Dia. (cm)	Tree protection Zone	Retention valiue	Recommendation	S.U.L.E	Observations and Comments
1	Syncarpia glomulifera	Turpentine	8	4	30cm	3	B	Retain	Long B	A semi mature example of the species. Good health and condition.
2	Syncarpia glomulifera	Turpentine	6	5	48	4	C	Remove	Remove C	A semi mature example of the species that has been "lopped" at 4 meters and has formed a new canopy of epicormic growth.
3	Syncarpia glomulifera	Turpentine	6	5	51cm	5	C	Remove	Remove C	Located adjacent to and in similar condition.
4	Eucalyptus robusta	Mahogany	7	4	27cm	3	C	Remove	Medium C	A poor quality tree with little chance of improvement. Dead wood through canopy.
5	Melaleuca bracteata	Black Tea Tree	6	4	30cm	3	C	Remove	Medium C	A semi mature example of the species that has developed with a co dominant trunk that is included.
6	Syagrus comosa	Cocos Palm	6	3	20	NA	C	Remove	Short C	One of 3 Palms located on the southern edge of the site. Recommended for removal irrespective of the proposed development.
7	Casuarina glauca	She Oak	6	4	26cm	3	D	Remove	Medium C	Co dominant trunk with inclusion at ground level. Remove irrespective of the proposed development.
8	Melaleuca bracteata	Black Tea Tree	6	4	25cm	3	D	Remove	Medium C	A semi mature example of the species that has developed with a lean to the north.
9	Melaleuca bracteata	Black Tea Tree	6	4	25cm	3	D	Remove	Medium C	A semi mature example of the species that has developed with a lean to the north.
10	Eucalyptus robusta	Mahogany	7	4	27cm	3	C	Remove	Medium C	A poor quality tree with little chance of improvement. Dead wood through canopy.

11	Eucalyptus robusta	Mahogany	6	3	27cm	3	D	Remove	Remove B	Dead tree.
12	Eucalyptus robusta	Mahogany	7	4	27cm	3	C	Remove	Remove B	A poor quality tree with little chance of improvement. Dead wood through canopy.
13	Ash	Ash	8	5	34cm	4	C	Remove	Remove B	A larger tree located predominantly within the space. Appears to be in poor health with decay at base.
14	Acer palmatum	Japanese Maple	6	5	38cm	4	A	Retain	Long A	A mature and healthy tree located within the neighbouring property.
15	Olea africana	African Olive	8	6	40cm	NA	D	Remove	Short C	A self seeded weed species that should be removed irrespective of the proposed development.
16	Erythrina sykesii	Coral tree	6	5	38cm	NA	D	Remove	Short C	A small tree with a series of undesirable characteristics. Recommend removal irrespective of the proposed development.
17	Araucaria hetrophylla	Norfolk Island Pine	18	8	54cm	6m	A	Retain	Long A	A semi mature and significant tree. Healthy and structurally sound.
18	Phoenix canariensis	Canary Island Date palm	8	6	65cm	4m	A	Transplant	Long C	A semi mature health and significant tree. Recommend for transplantation to maintain arboricultural amenity.
19	Melaleuca bracteata	Black Tea Tree	7	4	45cm	3	D	Remove	Medium C	A semi mature example of the species that has an included co dominate trunk at 1.8 meters.
20	Cupressus spp		17	9	1m +	8m	B	Remove	Short C	The sites largest and most significant tree. Located on the boundary with Stanhope Street.
21	Syncarpia glomulifera	Turpentine	6	5	38	3	B	Remove	Medium C	A semi mature example of the species that has been suppressed by the adjacent Turpentines and has no realistic prospect for improvement.
22	Syncarpia glomulifera	Turpentine	6	5	51	5	B	Retain	Long A	A semi mature to mature example of the species forming an important arboricultural component to the site.

23	Syncarpia glomulifera	Turpentine	6	5	48	5	B	Retain	Medium A	A semi mature example of the species that has been "lopped" at 4 meters and has formed a new canopy of epicormic growth.
24	Syncarpia glomulifera	Turpentine	6	5	48	5	B	Retain	Long A	A semi mature to mature example of the species forming an important arboricultural component to the site.
25	Syncarpia glomulifera	Turpentine	3	0	48	0	D	Retain	Medium C	A dead Syncarpia with interconnected structural root zone.
26	Syagrus comosa	Cocos Palm	6	3	20	NA	C	Remove	Short C	One of 3 Palms located on the southern edge of the site. Recommended for removal irrespective of the proposed development.
27	Syagrus comosa	Cocos Palm	6	3	20	NA	C	Remove	Short C	One of 3 Palms located on the southern edge of the site. Recommended for removal irrespective of the proposed development.
28	Acacia elata	Wattle	8	4	34cm	NA	D	Remove	Short C	A fast growing tree that has developed over the rear of the kitchen area. Remove to allow suitable long term replacement.
29	Magnolia grandiflora	Bull Bay Magnolia	8	8	82cm	10m	AA	Retain	Long A	One of the sites most significant trees located in a prominent location.
30	Araucaria hetrophylla	Norfolk Island Pine	15	7	84	10m	AA	Retain	Long A	The sites other highly significant tree located adjacent to Tree 29 and in a similarly prominent location.
31	Fraxinus excelsior	Common Ash	5	4	20cm	NA	D	Remove	Short C	A small tree with limited amenity value located within the CRZ of Tree 32.
32	Liquidambar styraciflua	Liquidambar	14	9	1.2m+	12m	AA	Retain	Long A	A mature and significant example of the species located prominently on the street verge. Lifting adjacent paving that will need to be upgraded.

33	Liquidambar styraciflua	Liquidambar	5	4	42cm	5	C	Remove	Med. C	A semi mature example of the species located on the street verge. The tree has been "lopped" at approximately 4 meters and is structurally poor.
34	Araucaria hetrophylla	Norfolk Island Pine	8	4	30cm	NA	C	Retain	Med. C	A semi mature example of the species located adjacent to the existing entrance way.
35	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
36	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
37	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
38	Araucaria hetrophylla	Norfolk Island Pine	8	4	30cm	NA	C	Retain	Med. C	A mature example of the species located prominently adjacent to the existing entranceway.
39	Melaleuca quinquinervia	Paper bark	7	4	22cm	3m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
40	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
41	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
42	Araucaria hetrophylla	Norfolk Island Pine	9	4	22cm	NA	D	Retain	Short B	A semi mature example of the species that is structurally compromised due to surface decay at 4m/

43	Phoenix canariencis	Canary Island Date Palm	9	6	68cm	5	A	Retain	Long C	One of a number of mature Date Palms that will have an historical significance and should be retained throughout the construction process.
44	Phoenix canariencis	Canary Island Date Palm	9	6	68cm	5	A	Retain	Long C	One of a number of mature Date Palms that will have an historical significance and should be retained throughout the construction process.
45	Melaleuca quinquinervia	Paper bark	7	4	26cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
46	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
47	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 3 semi mature examples of the species located outside the construction impact zone.
48	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 4 semi mature examples of the species located outside the construction impact zone.
49	Melaleuca quinquinervia	Paper bark	7	5	32cm	3.5m	B	Retain	Long A	1 of 4 semi mature examples of the species located outside the construction impact zone.
50	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 4 semi mature examples of the species located outside the construction impact zone.
51	Melaleuca quinquinervia	Paper bark	7	4	28cm	3.5m	B	Retain	Long A	1 of 4 semi mature examples of the species located outside the construction impact zone.
52	Phoenix canariencis	Canary Island Date Palm	9	6	68cm	5	A	Retain	Long C	One of a number of mature Date Palms that will have an historical significance and should be retained throughout the construction process.

53	Phoenix canariencis	Canary Island Date Palm	9	6	68cm	5	A	Retain	Long C	One of a number of mature Date Palms that will have an historical significance and should be retained throughout the construction process.
54	Eucalyptus pilularis	Blackbutt	14	8	62cm	8m	AA	Retain	Long A	A mature and significant tree located within the upper embankment adjacent to the underground carport entrance.
55	Syzgium austral	Lillie Pillie	4	2	15cm	3m	C	Retain	Med. C	One of several similar trees that have developed within a planter adjacent to the crochet courts.
56	Syzgium austral	Lillie Pillie	4	2	15cm	3m	C	Retain	Med. C	One of several similar trees that have developed within a planter adjacent to the crochet courts.
57	Syzgium austral	Lillie Pillie	4	2	15cm	3m	C	Retain	Med. C	One of several similar trees that have developed within a planter adjacent to the crochet courts.
58	Syzgium austral	Lillie Pillie	4	2	15cm	3m	C	Retain	Med. C	One of several similar trees that have developed within a planter adjacent to the crochet courts.
59	Melaleuca linarifolia	Snow in Summer	5	3	20cm	NA	C	Remove	Med C	A small tree located within the CIZ and required for removal.
60	Pittosporum undulatum	Sweet Pittosporum	6	4	25cm	NA	C	Remove	Med. C	A semi mature example of the species located within the CIZ and required for removal to allow the construction to occur.
61	Lophostemon confertus	Brush Box	6	3	25cm	NA	C	Remove	Med. C	1 of 2 semi mature examples of this species located on the rock escarpment adjacent to the carport entrance.
62	Lophostemon confertus	Brush Box	6	3	25cm	NA	C	Remove	Med. C	1 of 2 semi mature examples of this species located on the rock escarpment adjacent to the carport entrance.

63	Angophora costata	Smooth Barked Apple	6	4	20cm	NA	B	Remove	Med B	A semi mature example of the species located on the embankment adjacent to the entrance of the underground carport.
64	Angophora costata	Smooth Barked Apple	7	4	2 x 20cm	NA	B	Remove	Med B	A co dominant and semi mature example of the species located on the embankment adjacent to the entrance of the underground carport.
65	Eucalyptus gummifera	Bloodwood	6	4	20cm	NA	D	Remove	Rem. B	A small tree that has failed to properly establish.
66	Pittosporum undulatum	Sweet Pittosporum	6	4	25cm	NA	C	Retain	Med. B	A semi mature example of the species.
67	Lophostemon confertus	Brush Box	10	5	44cm	5m	A	Retain	Long.A	A mature and significant tree located adjacent to the proposed development.
68	Lophostemon confertus	Brush Box	12	6	56cm	5m	A	Retain	Long.A	A mature and significant tree located adjacent to the proposed development Will require pruning to allow adequate building line clearance.
69	Cupressus macrocarpa	Monterey Cypress	14	6	1.5m+	NA	C	Remove	Short.C	An over mature example of the species that should be removed irrespective of the proposed development to limit the hazard associated with its failure.
70	Phoenix canariencis	Canary Island Date Palm	5	5	50cm	NA	C	Remove	Short C	A self seeded example of the species that should be removed irrespective of the proposed development.
71	Cedrus atlantica	Cedar	9	8	52cm	6m	B	Retain	Med. B	A mature example of the species located in a predominant location. Some minor level changes proposed for adjacent to its base.
72	Melaleuca quinquinervia	Paperbark	6	4	20cm	NA	C	Remove	Med. C	A semi mature example of the species located within the CIZ and required for removal.

73	Callistemon viminalis	Bottle Brush	4	3	15cm	NA	C	Remove	Med.C	A semi mature example of the species located within the CIZ.
74	Acer negundo	Maple	6	4	25cm	NA	C	Remove	Med. C	A semi mature example of the species located within the proposed construction footprint.
75	Melaleuca quinquinervia	Paperbark	6	4	30cm	NA	C	Remove	Med. C	A semi mature example of the species located within the construction footprint.
76	Pittosporum undulatum	Sweet Pittosporum	5	5	30cm	NA	C	Remove	Med. C	A semi mature example of the species located within the proposed construction footprint.
77	Jacaranda mimosifolia	Jacaranda	7	5	30cm	NA	C	Remove	Medium C	A semi mature example of the species that has developed with a distinctive lean onto the proposed building footprint.
78	Grevillia robusta	Silky Oak	10	4	35cm	5m	B	Retain	Med. A	A semi mature example of the species located within the neighbouring residence and outside the construction impact zone.
79	Jacaranda mimosifolia	Jacaranda	9	8	38cm	5m	B	Retain	Med. B	A semi mature example of the species located on the western boundary.
80	Jacaranda mimosifolia	Jacaranda	6	5	35cm	5m	C	Retain	Med. B	A semi mature example of the species located directly adjacent to the proposed development and may require some pruning to allow for its retention.
81	Melaleuca quinquinervia	Paperbark	6	4	30cm	NA	C	Remove	Med. C	A semi mature example of the species located within the construction footprint.
82	Melaleuca quinquinervia	Paperbark	6	4	30cm	NA	C	Remove	Med. C	A semi mature example of the species located within the construction footprint.

83	Melaleuca quinquinervia	Paperbark	6	4	30cm	NA	C	Remove	Med. C	A semi mature example of the species located within the construction footprint.
84	Jacaranda mimosifolia	Jacaranda	9	8	38cm	5m	B	Remove	Medium C	A mature example of the species located on the western boundary.
85	Araucaria hetrophylla	Norfolk Island Pine	8	4	42cm	NA	C	Remove	Med. C	A semi mature example of the species located directly adjacent to the proposed construction footprint and has a significant structural fault.
86	Jacaranda mimosifolia	Jacaranda	5	4	15cm	2m	C	Retain	Med. B	A semi mature example of the species located on the sites front verge. Has a pronounced lean over the street.
87	Acacia baileana	Wattle	5	4	20cm	3m	C	Retain	Med. C	A small tree in decline. Located on the front verge and outside the CIZ.
88	Eucalyptus robusta	Swamp mahogany	6	5	20cm	4m	C	Retain	Med. C	A semi mature example of the species located on the front verge and under the overhead power lines.
89	Eucalyptus sideroxylon	Scribble Gum	8	8	40cm	6m	C	Retain	Med B	An over mature tree located within the neighbouring property that is in decline and will need to be removed in the short to medium terms irrespective of the proposed development.
90	Syncarpia glomulifera	Turpentine	11	5	32cm	4	B	Retain	Med. C	A semi mature example of the species located within the neighbouring property and outside the CIZ.
91	Syzgium austral	Lillie pillie	9	5	35cm	4	B	Retain	Med B	A semi-mature example of the species with limbs overhanging RFS Access zone.
92	Alnus acuminata	Evergreen Alder	9	8	35cm	5	C	Retain	Med. C	A semi-mature example of the species with limbs overhanging RFS Access zone.
93	Leptospurmum petersonii	Tee Tree	3	2	15cm	2	B	Remove	Med. B	A semi-mature example of the species within RFS Access zone.

94	Prunus x bilireana	Flowering Plum	2	2	7.5cm	2	C	Remove	Med. C	A semi-mature example of the species within RFS Access zone.
95	Corymbia gummifera	Red Bloodwood	11	5	30cm	5	A	Retain	Long B	A semi-mature example of the species with limbs overhanging RFS Access zone.
96	Pittosporum undulatum	Sweet Pittosporum	5	3	15cm	3	C	Retain	Med. C	A semi-mature example of the species with limbs overhanging RFS Access zone.
97	Tristaniopsis laurina	Watergum	6	2	10cm	2	B	Retain	Long B	A semi-mature example of the species with limbs overhanging RFS Access zone.
98	Casuarina glauca	Swamp Oak	4	2	10cm	1	C	Remove	Remove B	A juvenile example of the species, heavily suppressed by other trees and within RFS Access zone.
99	Casuarina glauca	Swamp Oak	3	1	7.5cm	1	C	Remove	Remove B	A juvenile example of the species, heavily suppressed by other trees and within RFS Access zone.
100	Melaleuca quinquinervia	Paperbark	10	5	40cm	4	C	Retain	Med. C	A semi mature example of the species with limbs overhanging RFS Access zone.
101	Melaleuca quinquinervia	Paperbark	9	4	45cm	4	C	Retain	Med. C	A semi mature example of the species with limbs overhanging RFS Access zone.
102	Pittosporum undulatum	Sweet Pittosporum	5	3	10cm	3	C	Retain	Med. C	A semi-mature example of the species with limbs overhanging RFS Access zone.
103	Jacaranda mimosifolia	Jacaranda	2	3	10cm	1	C	Remove	Remove B	A juvenile example of the species, heavily suppressed by other trees and within RFS Access zone.
104	Callistemon viminalis	Bottlebrush	3	3	8cm	2	B	Remove	Med. B	A semi-mature example of the species within RFS Access zone.

105	Prunus x bilireana	Flowering Plum	5	3	10cm	2	C	Retain	Med. C	A semi-mature example of the species with limbs overhanging RFS Access zone.
106	Acacia mearnsii	Black Wattle	3	2	7.5cm	1	C	Remove	Med. C	A semi-mature example of the species within RFS Access zone.
107	Sapium sebiferum	Chinese Tallowood	5	6	35cm	5	B	Retain	Long C	A semi-mature example of the species with limbs overhanging RFS Access zone.
108	Eucalyptus punctata	Grey Gum	6	4	30cm	5	A	Retain	Med. B	A semi-mature example of the species with limbs overhanging RFS Access zone.
109	Angophora costata	Smooth Bark Apple	7	6	30cm	4	B	Retain	Med. B	A semi-mature example of the species with limbs overhanging RFS Access zone.
110	Pittosporum undulatum	Sweet Pittosporum	3	2	15cm	3	C	Retain	Med. C	A semi-mature example of the species with limbs overhanging RFS Access zone.

Tree No	Botanical Name (common name)	Height and spread	TPZ	L/Sign	Recommendation	Observations and comments
111	Callistemon viminalis (Bottle Brush)	6 x 4	12	Low	Remove	A small co dominant tree located directly adjacent to the building within RFS Inner Protection Zone.
112	Leptospermum petersonii (Lemon Scented Tea Tree)	6 x 2	NA	Low	Remove	A small tree in decline. Remove to in accordance with RFS Inner Protection fuel loads.
113	Leptospermum petersonii (Lemon Scented Tea Tree)	7 x 3	NA	Low	Remove	A small tree in decline. Remove to reduce RFS Inner Protection fuel loads.
115	Grevillia robusta (Silky Oak)	15 x 5	NA	Moderate	Prune	A semi mature to mature example of the species located within the neighbouring property. Prune back to seperate canopies and to reduce RFS Inner Protection fuel loads.
118	Jacaranda mimosifolia (Jacaranda)	8 x 5	NA	Moderate	Remove	A semi mature example of this exotic tree species. Developing over the road way, suppressing adjacent native vegetation and will over hang RFS Internal Access Zone in the medium term.
119	Grevillia robusta (Silky Oak)	14 x 4	NA	Moderate	Prune	Remove the lower limb over the fenceline, remove dead wood throughout lower and mid canopy. Prune to create RFS Inner Protection Canopy Seperation.
120	Angophora costata (Smooth Barked Apple)	16 x 9	NA	High	Prune	Part of the remnant plant community that provides a significant arboricultural amenity. Prune back to clear canopies and remove dead wood in accordance with RFS Inner Protection Canopy Seperation.
123	Olea europa (Olive)	6 x 4		Low	Remove	An exotic weed species recommended for removal.
134	Eucalyptus piperita (Sydney Peppermint)	12 x 6		Moderate	Prune	A mature and significant tree. Remove the lowest limb over the roadway to clear canopies and remove dead wood in accordance with RFS inner Protection Canopy Seperation.
144	Casuarina glauca (She Oak)	8 x 4		Low	Remove	Dead. Remove dead wood in accordance with RFS Inner Protection Canopy Seperation.

150	Casuarina glauca (She Oak)	7 x 4		Low	Remove	In final stages of decline. Remove to in accordance with RFS Inner Protection fuel loads.
151	Callistemon viminalis (Bottle Brush)	5 x 4		Low	Remove	A small tree included at the base. Remove to reduce RFS Inner Protection fuel loads.
152	Eucalyptus piperita (Sydney Peppermint)	9 x 5		Moderate	Prune	Remove the 2 x lowest limbs over the building line. Prune back to remove deadwood and to seperate canopies and to to reduce RFS Inner Protection fuel loads.
154	Eucalyptus piperita (Sydney Peppermint)	9 x 5		Moderate	Prune	Remove the 2 x lowest limbs over the building line. Prune back to remove deadwood and to seperate canopies and to to reduce RFS Inner Protection fuel loads.
157	Corymbia maculata (Spotted Gum)	9 x 5		Moderate	Remove	A mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
164	Corymbia maculata (Spotted Gum)	12 x 6		Moderate	Prune	A mature example of the species. Prune to remove deadwood and to create RFS Inner Protection Canopy Seperation.
165	Eucalyptus piperita (Sydney Peppermint)	12 x 8		Moderate	Prune	A mature and significant tree. Remove the lowest limb over the roadway on southern side and Prune to remove dead wood and to create RFS Inner Protection Canopy Seperation.
166	Melaleuca quinquinervia (Paper bark)	9 x 5		Moderate	Remove	A mature example of the species. Remove in accordance with RFS Inner Protection Canopy Seperation.
171	Chamaecyparis lawsoniana (Lawson Cypress)	10 x 5		Moderate	Remove	A mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
172	Melaleuca quinquinervia (Paper bark)	10 x 5		Moderate	Prune	A mature example of the specie. Prune lowest limbs over the building to increase offset from building in accordance with RFS Inner Protection Seperation.
179	Melaleuca quinquinervia (Paper Bark)	10 x 5		Moderate	Remove	A mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.

180	Melaleuca quinquinervia (Paper Bark)	11 x 4		Moderate	Remove	A semi-mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
202	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A mature and significant tree with a co dominant trunk and decay at the base. Remove in accordance with RFS Inner Protection Canopy Seperation.
193	Casuarina glauca (She Oak)	7 x 3		Low	Remove	A semi mature example of this species located within one of the retention basins. Recommended for removal to allow appropriate canopy separation.
206	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A mature and significant tree with a co dominant trunk and decay at the base. Remove in accordance with RFS Inner Protection fuel loads.
209	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Prune	A mature and significant tree. Remove the lowest limbs over the roadway and Prune to remove dead wood and to create RFS Inner Protection Canopy Seperation.
215	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A mature example of the species. Remove in accordance with RFS Inner Protection Canopy Seperation.
222	Angophora costata (Smooth Barked Apple)	14 x 12		High	Prune	Part of the remnant plant community that provides a significant arboricultural amenity. Prune back to clear canopies and remove dead wood in accordance with RFS Inner Protection Canopy Seperation.
226	Casuarina glauca (She Oak)	7 x 3		Low	Remove	A semi mature example of this species located within one of the retention basins. Remove in accordance with RFS Inner Protection Canopy Seperation.
227	Eucalyptus gummifera (Bloodwood)	11 x 8		Moderate	Remove	Located adjacent to the roadway and is in decline with decay at the base. Remove in accordance with RFS Inner Protection Canopy Seperation.
228	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A semi-mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.

234	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Prune	A semi mature example of the species required to have lowest limb pruned back from road way to allow canopy separation.
244	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A mature and significant tree with a co dominant trunk and decay at the base. Remove in accordance with RFS Inner Protection Canopy Seperation.
252	quinquinervia (Paper Bark)	10 x 5		Moderate	Remove	A mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
262	quinquinervia (Paper Bark)	10 x 5		Moderate	Remove	A mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
273	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A mature and significant tree with a co dominant trunk and decay at the base. Remove in accordance with RFS Inner Protection Zone Canopy Seperation.
331	Eucalyptus piperita (Sydney Peppermint)	12 x 9		Moderate	Remove	A mature and significant tree with a co dominant trunk and decay at the base. Remove in accordance with RFS Inner Protection Zone Canopy Seperation.
340	Acacia decurrens (Wattle)	9 x 4		Low	Remove	A mature example of the species. Remove in accordance with RFS Inner Protection Zone Canopy Seperation.
349	Lophostemon confertus (Brush Box)	7 x 5		Moderate	Remove	A mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
350	Eucalyptus gummifera (Bloodwood)	11 x 8		Moderate	Prune	A semi mature example of the species. Prune back to clear canopies and remove dead wood in accordance with RFS Inner Protection Canopy Seperation.
351	Lophostemon confertus (Brush Box)	7 x 5		Moderate	Remove	A semi-mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.
352	Lophostemon confertus (Brush Box)	7 x 5		Moderate	Remove	A semi-mature example of the species located directly adjacent to the building within RFS Inner Protection Zone.

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-KILLARA TREE ROOT MAPPING-
X3M SURVEY REPORT

CLIENT	BOTANICS - Tree Wise People		
ADDRESS	PO Box 500 Potts Point, NSW, 1335 AUSTRALIA		
CLIENT CONTACT	George Palmer	**TELEPHONE**	0411 193 366
EMAIL	botanics@bigpond.net.au		
JOB SITE	Lourdes Village - Killara	**CLIENT REF.**	GNX10128
RT PROJECT ID #	GNX10128		
SURVEY DATE	13th October 2010	**METHODS**	[x] GPR [ ] Concrete Radar [ ] Radio Location

COMPILED BY

_____
Cameron Young/ Geophysicist

REPORT DATE 13th October 2010

SPECIFICATIONS The undertaking of a geophysical survey to map the tree roots in client specified locations around the Lourdes Village in Killara

The scanning technology used was the 2D X3M Ground Penetrating Radar (GPR) system, as specified as by the client.

The initial area to be surveyed was stated as being approximately 30 line meters. The survey area was later extended to complete the survey accurately.

SURVEY AREA The surveyed areas are approximately outlined in yellow on the image below (Image 1).

IMAGE 1: Outline of initial and extended survey area.

The area is generally relatively open and accessible, stones and trenching made smooth data collection challenging in some sections

Section 1: Data was collected from east to west, the X axis running approximately north to south (Photo 1 in appendix)

Section 2: Data was collected from east to west, the X axis running approximately north to south (Photo 2 in appendix)

Section 3: Data was collected from east to west, the X axis running approximately north to south (Photo 3 in appendix)

Section 4: Data was collected from east to west, the X axis running approximately north to south (Photo 4 in appendix)

Section 5: Data was collected from north west to south east, the X axis runnning approximately north east to south west (Photo 5)

INSTRUMENT

The described area was surveyed using the MALA X3M radar. The system represents a high level of GPR acquisitioning and provides for a 2D image of the sub surface.

The GPR data was collected by in a grid fashion using a rough terrain cart. Positioning was assisted by Object Mapper software.

DATA ACQUISITIONING

The following parameters were used for the X3M GPR acquisitioning.

MIRA SURVEY PARAMETERS	
Antenna Frequency	800MHz Shielded Antenna
Data Channels	1
Line spacing	0.10 to 0.5m

STAFFING

The data acquistioning was performed by Mads Toft and Cameron Young.

RESULT OF SURVEY

The results of the survey are of graphs created from processed 2D images (See appendix):

Feaures identified are assumed to be tree roots. The depth of penetration is 0cm to 70 cm.

An example of a processed 2D image can be viewed in Image 2 below.

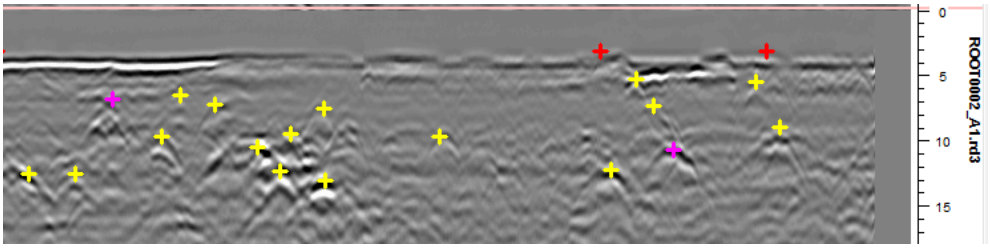


IMAGE 2: Example of a processed 2D image with features marked.
Red Cross: Client specified pier hole positions
Yellow Cross: Assumed tree root
Pink Cross: Assumed main tree root

DISCLAIMER

It should be noted that the final soil depth profile is the result of an interpretation of the collected GPR data. Whilst state-of-the-art instrumentation and qualified personnel has been utilised for this survey there are circumstances under which the interpreted result can differ from the actual sub-surface conditions.

The author accepts no responsibility for actions or decisions mads on the basis of the presented result. The results are presented for the clients' review only and should not form the sole basis of any decision or action made in relation to this project.

This report has been prepared for the use of the client as listed on page 1 in accordance with general accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report.

This report was prepared on completion of the fieldwork/processing and is based on conditions encountered and reviewed at the time of preparation. MALA GPR Australia disclaims responsibility for any changes that might have occurred after this time.
This report should be read in full, No responsibility for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Only qualified legal practitioners can give legal advice.

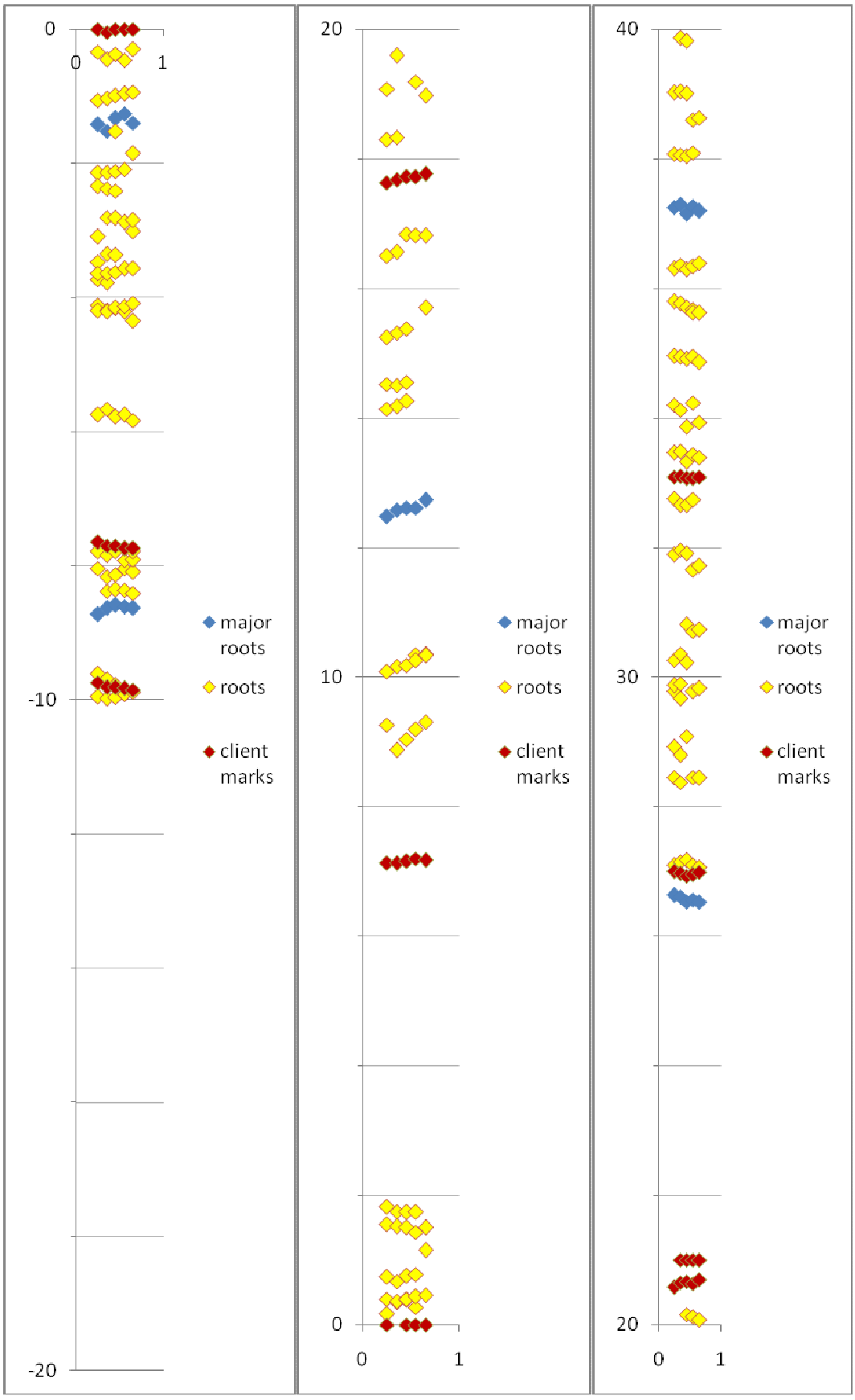
Whilst to the best of our Knowledge, information contained in this report is accurate at the date of issue; conditions on the site can change in a limited time. This should be borne in mind if the report is used after a protracted delay. As with any form of non-destructive resting, our opinions of results do not apply, we rely solely on date collection and criteria conformance.
If it is found that the actual locations differ from the interpreted result the author should be contacted immediately.

Your Faithfully

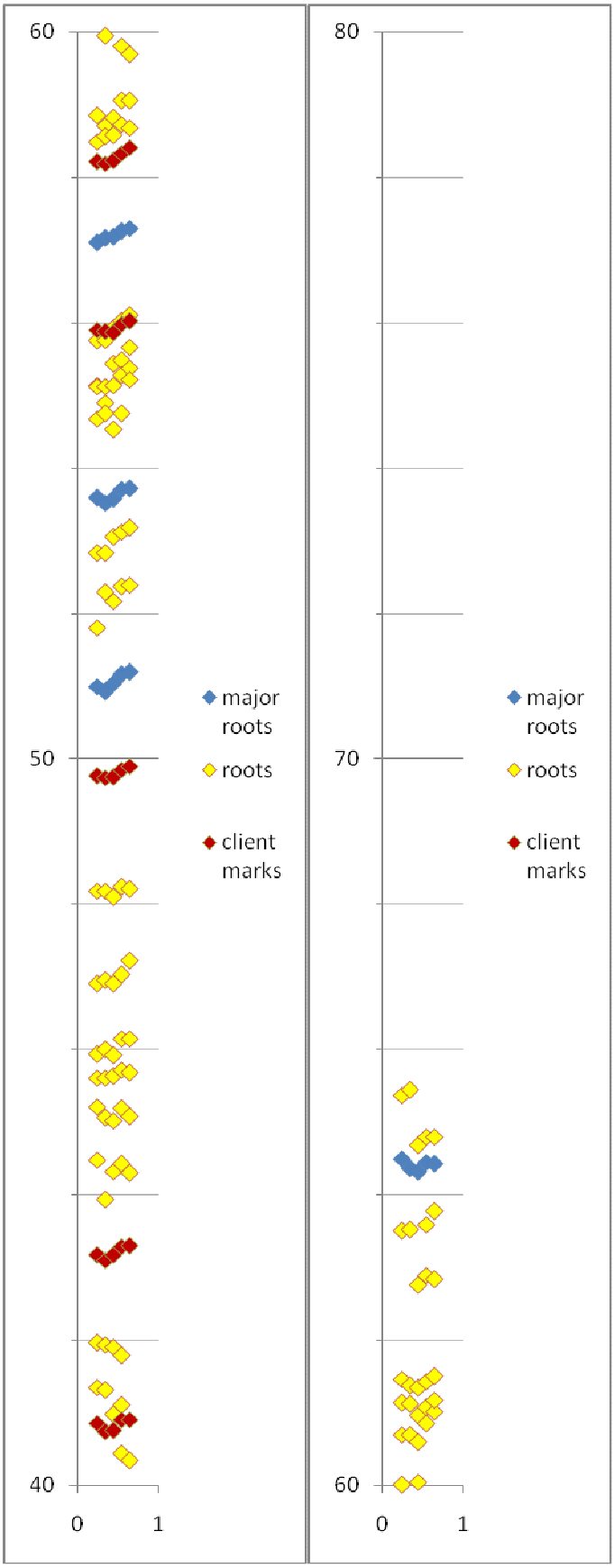
Mads Toft / Cameron Young

APPENDIX

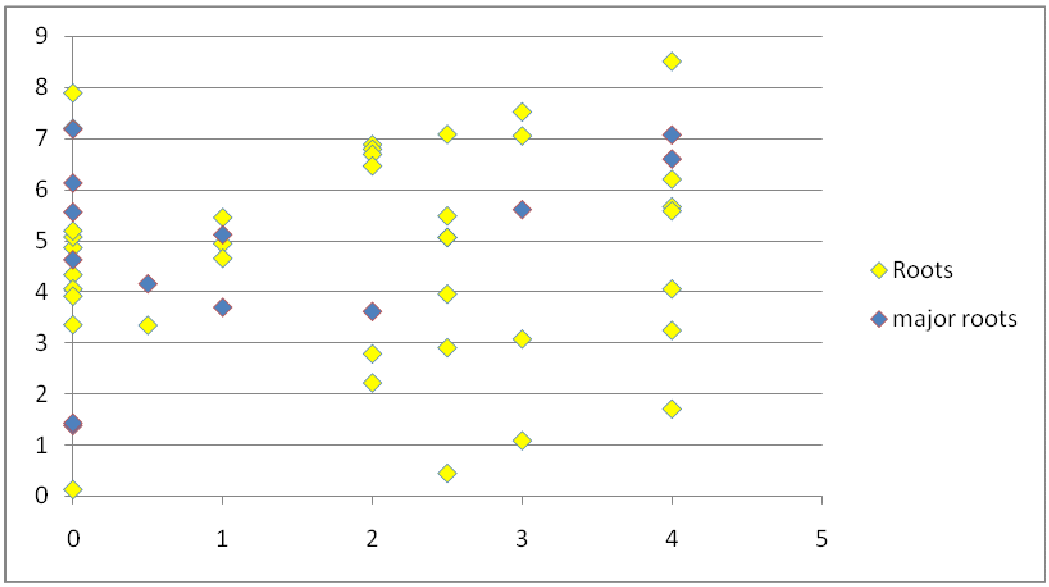
SECTION ONE AND TWO



X - Axis

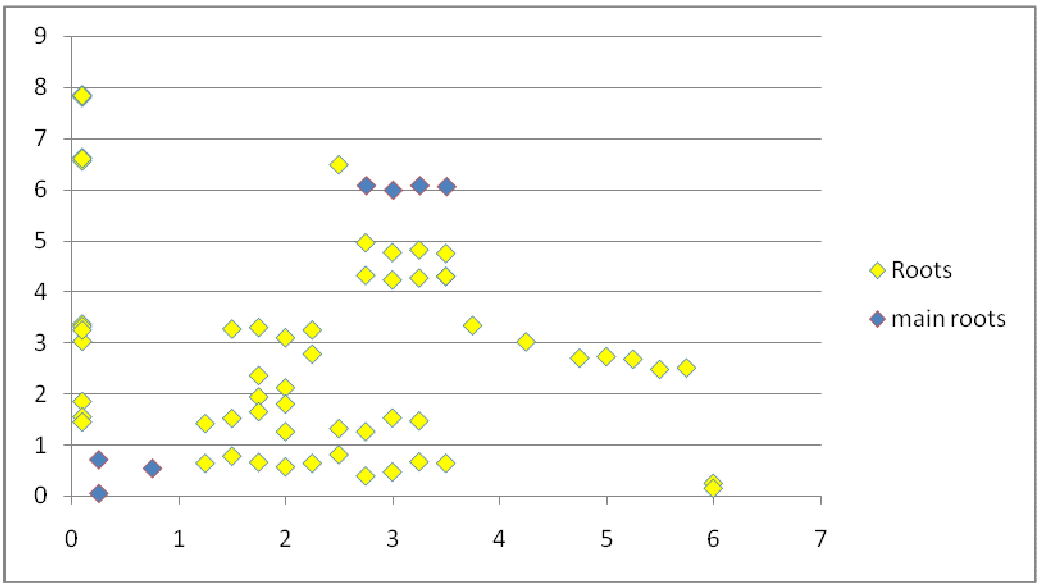

60
50
40
0
1
major roots
roots
client marks
80
70
60
0
1
major roots
roots
client marks

SECTION 3



X axis

SECTION 4



X - axis

SECTION 5

Section 5 returned negative results and unfortunatly the creation of a graph was not possible.

Picture 1: Section One

Picture 2 : Section 2

Picture 3: Section 3

Picture 4: Section 4

Picture 5 : Section 5