CARDINAL FREEMAN VILLAGE

Supporting Documentation

Appendix BH

Tree Impact Assessment

Prepared by **Earthscape Arborist**

aevum LIMITED

EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

DEVELOPMENT IMPACT ASSESSMENT REPORT

CARDINAL FREEMAN VILLAGE
137 VICTORIA STREET, ASHFIELD

STAGE 2 – CARE PRECINCT

March 2010

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Member Local Government Tree Resources Association (LGTRA)

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1 INTRODUCTION

1.1.1 This report was commissioned by EPM Projects Pty Ltd on behalf of Aevum Limited to assess the health and condition of approximately sixty-three (63) trees located within or immediately adjacent to the Care Precinct (Stage 2) of Cardinal Freeman Village, 137 Victoria Street, Ashfield. The report has been prepared to aid in the assessment of a development application for the re-development of the facilities within the property.

1.1.2 This report follows an Arboricultural Assessment Report for the proposed Concept Plan Development prepared by Earthscape dated March 2010.

1.1.3 The purpose of this report is to assess the potential impact of the proposed development on the subject trees within the Care Precinct, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

2 THE SITE

2.1.1 The subject property is a Retirement Village known as Lot 101 in DP 702245, Lot 4 in DP 717062, Lots 6 & 7 in DP 717644 and Lot 1 in DP 1126717, being Cardinal Freeman Retirement Village, 137 Victoria Street, Ashfield. For the purposes of this report the subject allotments will be referred to as “the Site”. The site contains a number of multi-unit residential dwellings together with other services and amenity buildings and a chapel. The total area of the site is approximately 40,851 m². The site has a moderate north-easterly gradient. The site contains established lawns and gardens, with a mixture of mature exotic and native trees, shrubs and palms. The Care Precinct (Stage 2) is located within the north-west corner of the property as shown in **Figure 1**.

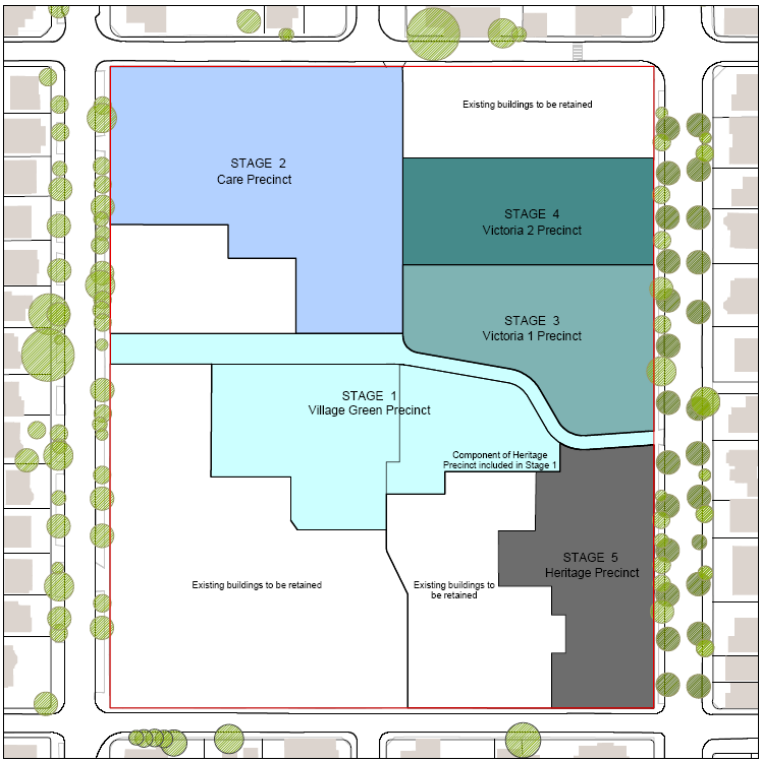

Figure 1 – Cardinal Freeman Village – Plan Showing Future Development Precincts.

2.1.2 Soils of this area are typical of the Blacktown Soil Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of shallow to moderately deep (less than 1000 mm) *Red & Brown Podzolic Soils* on crests, upper slopes and well drained areas. Soils on lower slopes and areas of poor drainage consist of deep (1500-3000 mm) *Yellow Podzolic Soils and Soloth Soils* derived Wianamatta Group & Hawkesbury Shales.[1] The landscape generally consists of undulating rises with slopes ranging usually less than 5% grade.

2.1.3 The original vegetation of this area consisted of Turpentine-Ironbark Forest, most of which was cleared for residential development in the mid-twentieth century.[2] Dominant locally-indigenous tree species formerly occurring in this area included *Syncarpia glomulifera* (Turpentine), *Eucalyptus fibrosa ssp. fibrosa* (Broad-leaved Ironbark), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *Eucalyptus longifolia* (Woollybutt) and *Eucalyptus parramattensis* (Drooping Red Gum). Other species found in this association may include *Melaleuca decora* (White Feather Honey Myrtle) and *Melaleuca nodosa*. There are no remaining locally-indigenous species within the site.

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 11th March 2008. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (Appendix 6), based on the survey prepared by Lockley Land Title Solutions, Dwg. Ref No. 29838DT-D dated 18th February 2010. The numbers used on this plan correlate with the Tree Assessment Schedule (Appendix 4).

4 HEALTH AND CONDITION ASSESSMENT:-

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure. [3] All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

- Tree Species (Botanical & Common Name);
- Approximate height;
- Canopy spread; measured using a metric tape and an average taken.
- Trunk Diameter measured at Breast Height (DBH) (1.4 metres from ground level);
- Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres).
- Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators,
- Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

This information is presented in a tabulated form in **Appendix 4.**

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy [4] of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area in Sydney, less its estimated current age. The life expectancy of the tree has been further

modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 4.**

4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)
- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its amenity, environmental and heritage values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure in a consistent approach, the assessment criterion shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

5.2 Environmental Significance

5.2.1 A Tree Preservation Order (TPO) exists within the Municipality of Ashfield, made under the Ashfield Local Environment Plan 1985 (as amended 2007). The TPO generally protects all trees with a height of five metres or greater. Some exemptions apply. The following trees are exempt (not protected) under the provisions of Ashfield Council's Tree Preservation Order:-

Tree No.	Species	Exemption
127	*Morus nigra* (Mulberry)	Environmental Weed Species
119	*Liquidambar styraciflua* (Liquidamber)	Environmental Weed Species (less than 10 metres in height)
131	*Plumeria acutifolia* (Frangipani)	Less than 5 metres in height
130	*Callistemon viminalis* (Weeping Bottlebrush)	Less than 5 metres in height
143	*Cupressocyparis x leylandii* (Leyland Cypress) (Row of 11 trees)	Nuisance Species

5.2.2 The remainder of the trees are protected under Council's TPO.

5.2.3 All of the trees assessed are exotic or non-local native species that would be of some benefit to native wildlife (shelter, food sources etc). However, none of the trees contain cavities suitable as nesting hollows for arboreal mammals or birds or other visible signs of wildlife habitation. All of the trees assessed have either been planted or are self-sown. There are no remaining locally indigenous species within the site.

5.2.4 None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993. Tree 121, [an *Acer negundo* (Box Elder)] whilst protected under Council's TPO is considered an Environmental Weed Species in many Local Government Areas.

5.2.5 None of the trees assessed are listed as Threatened or Vulnerable Species or form part of Endangered Ecological Communities under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.

5.3 Heritage Significance

5.3.1 The Chapel within the site (constructed in 1942) is listed as a Heritage Item under Schedule 7 of the Ashfield Local Environment Plan (1985) and formerly formed part of the "Convent of the Good Shepherd" (founded about 1913). 'Glentworth House' is also listed as a heritage item under the LEP. Glentworth House is a Victorian Italianate mansion thought to have been constructed between 1876 and 1900.

5.3.2 All of the trees within the Care Precinct are relatively recent plantings, most of which appear to have been planted post-1980. None of the subject trees within the Care Precinct have any known or suspected Heritage Significance.

5.4 Amenity Value

5.4.1 Criteria for the assessment of amenity values are incorporated into Appendix 1. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 TREE PROTECTION ZONES

6.1.1 Tree Protection Zones and Minimum Set-back Distances to construction for each tree are shown in **Appendix 4**. These have been determined using the methodology shown in **Appendix 3**.

7 PROPOSED DEVELOPMENT

7.1.1 The proposed development includes the demolition of the existing buildings within the Care Precinct (Stage 2) and construction of new buildings and aged care facilities within the Precinct.

8 IMPACT ASSESSMENT

8.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	**Author**	**Dwg No.**	**Date**
Site Plan & Basement Plan	Hills Thalis		
Landscape Plan	Terras Landscape Architects	8190 GA L01-L09 Rev G	March 2010

8.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 5**. The following criteria have been examined as part of this assessment:-

- Relative Level (R.L.) at base of tree;
- Optimum Tree Protection Zone (TPZ);
- Critical Root Zone (CRZ);
- Incursions to the TPZ, CRZ and tree canopy, including estimated cut & fill and offset from the tree;
- Assessment of the likely impact of the works;
- Recommendations for retention or removal.

8.1.3 The proposed development will necessitate the removal of twenty-four (24) trees of low and very low retention value These include T103, T106, T107, T108, T108a, T115a, T115b, T115c, T115d, T115e & T130 (all Weeping Bottlebrush), T109 & T143a (Golden Elm), T116a (Pittosporum), T119 (Liquidambar), T120 (Willow-leaved Hakea), T121 (Box Elder), T124 (Lillypilly), T126 (Chinese Hawthorn), T127 (Mulberry), T128 (Kaffir Plum), T144 (Jacaranda), T143 (row of eleven Leyland Cypress) and T145a (Ornamental Plum). None of these trees are considered significant or worthy of special measures to ensure their preservation. It should be noted that T127, T119, T130 & T143 are all exempt from Council's Tree Preservation Order.

8.1.4 The proposed development will necessitate the removal of a further twenty-four (24) trees of moderate retention value. These include T101, T102, T104, T110, T111, T113, T114, T132, T133, T134, T137 & T142 (all Broad-leaved Paperbarks), T103a (Murraya), T105 (Golden Elm), T112 & T122 (Jacaranda), T115 (Peppercorn Tree), T116 & T125 (Liquidambars), T118 (Cook's Pine), T123 (Monterey Pine), T129 & T131a (Weeping Bottlebrush) and T23 (Spotted Gum) These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties.

8.1.5 The proposed development will also necessitate the removal of a one (1) tree of high retention value [Tree 117 (a Tallowwood)]. This tree is in good health and condition and makes a positive contribution to the amenity of the site. It should be noted that the subject tree has no known or suspected heritage or ecological significance and is likely to have been planted within the site in the early 1980's.

8.1.6 The proposed basement is located within a quadrant of the TPZ of T100 (a Melaleuca). The extent of incursion to the root zone of the tree is less than 20% of the TPZ, which is considered within acceptable limits and should not result in any adverse impact on this tree. Some canopy pruning may be required to clear the building envelope and temporary scaffold. In order to minimise any adverse impact associated with pruning, all pruning works should be undertaken in accordance with Section 12.10

8.1.7 Ground level changes and over-excavations for a proposed retaining wall and associated pathway are located within the TPZ's of T138 (Melaleuca) and T139, T140 and T141 (Spotted Gums). The extent and proximity of the excavation is likely to necessitate the severance of woody roots of these trees, resulting in a significant adverse impact. It is understood that these trees are intended to be retained. In order to ensure the long term viability of the trees, the existing ground levels within the TPZ's need be maintained intact. Minor incursions to the root zone would be acceptable (refer to Appendix 3). In order to preserve these trees, consideration should be given to amending the design (layout and position of the retaining wall, pathway and associated level changes) within the TPZ's of these trees.

8.1.8 The remaining nine (9) trees are proposed to be retained and will not be adversely affected by the proposed works.

9 REPLACEMENT PLANTING

9.1.1 The Landscape Plan prepared by Terras Landscape Architects indicates approximately 37 new trees to be planted within the Care Precinct. These will provide some compensation for loss of amenity resulting from the removal of trees to accommodate the proposed development.

10 CONCLUSIONS:-

10.1.1 A total of sixty-three (63) trees stand within or immediately adjacent the Care Precinct (Stage 2). These are a mix of non-local native and exotic species in fair to good health and condition. Most of the trees within the site are relatively recent plantings, planted post-1970. None of the trees have any known or suspected heritage or ecological significance.

10.1.2 The proposed development will necessitate the removal of twenty-four (24) trees of low and very low retention value These include T103, T106, T107, T108, T108a, T109, T115a, T115b, T115c, T115d, T115e, T116a, T119, T120, T121, T124, T126, T127, T128, T130, T143, T143a, T144 and T145a. None of these trees are considered significant or worthy of special measures to ensure their preservation. It should be noted that T127, T119, T130, & T143 are all exempt from Council's Tree Preservation Order.

10.1.3 The proposed development will necessitate the removal of a further twenty-four (24) trees of moderate retention value. These include T23, T101, T102, T103a, T104, T105, T110, T111, T112, T113, T114, T115, T116, T118, T122, T123, T125, T129, T131a, T132, T133, T134, T137 and T142. These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties.

10.1.4 The proposed development will also necessitate the removal of one tree of high retention value [Tree 117]. This tree has no special heritage or ecological significance, but is in good health and condition and makes a positive contribution to the amenity of the site.

10.1.5 The proposed basement is located within a quadrant of the TPZ of T100 (a Melaleuca). The extent of incursion to the root zone of the tree is less than 20% of the TPZ, which is considered within acceptable limits and should not result in any adverse impact on this tree. Some canopy pruning may be required to clear the building envelope and temporary scaffold

10.1.6 Ground level changes and over-excavations for a proposed retaining wall and associated pathway are likely to result in a significant adverse impact on trees T138, T139, T140 and T141. It is understood that these trees are intended to be retained. In order to maintain the long term viability of the trees, the existing ground levels within the TPZ's need be maintained. Minor incursions to the root zone would be acceptable (refer to Appendix 3).

10.1.7 No other trees will be adversely affected by the proposed works.

11 RECOMMENDATIONS:-

1. The following Tree Protection Measures (Appendix 2) should be implemented to ensure the long term survival of all trees within the site to be retained as part of the development

2. In order to minimise any adverse impact on T100, excavations for the proposed basement within the TPZ should be undertaken in accordance with Section 12.6.

3. In order to minimise any adverse impact on T100 associated with pruning to clear the building envelope or temporary scaffolding, all pruning works should be undertaken in accordance with Section 12.10

4. In order to preserve trees T138, T139, T140 and T141 as intended, consideration should be given to amending the design (position of proposed retaining wall and associated pathway) to ensure that the existing ground levels within the TPZ's of these trees are maintained. Minor incursions to the TPZ may be acceptable (as outlined in Appendix 3). However, any incursion to the CRZ is likely to compromise the stability of the trees and should be avoided.

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
11th March 2010

REFERENCES:-

[1] GA Chapman & CL Murphy (1989)
Soil Landscapes of the Sydney 1:100,000 Sheet
Soil Conservation Service of NSW. Sydney

[2] Benson, Doug & Howell, Jocelyn (1990)
Taken for Granted: the Bushland of Sydney and its Suburbs.
Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW

[3] Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)
The Body Language of Trees – A Handbook for Failure Analysis
The Stationery Office, London, England

[4] Barrell, Jeremy (1996)
Pre-development Tree Assessment
Proceedings of the International Conference on Trees and Building Sites (Chicago)
International Society of arboriculture, Illinois, USA

APPENDIX 1
CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

The level of landscape significance has been determined using the following key criteria as a guide:

1. SIGNIFICANT

- The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance; or
- The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item; or
- The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event; or
- The subject tree is scheduled as a Threatened Species as defined under the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999; or
- The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species; or
- The subject tree is a Remnant Tree, being a tree in existence prior to development of the area; or
- The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent in the landscape, exhibits very good form and habit typical of the species and makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity; or
- The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
- The species, cultivated variety or form is rare in cultivation within the region.

2. VERY HIGH

- The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site; or
- The subject tree is listed on Council's Significant Tree Register; or
- The tree is a locally-indigenous species, representative of the original vegetation of the area and forms part of the assemblage of species of an Endangered Ecological Community;
- The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% Crown Cover (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
- The species, cultivated variety or form is uncommon in cultivation (few examples in cultivation within the region)

3. HIGH

- The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence; or
- The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value;
- The subject tree has a large live crown size exceeding 100m²; and
- The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (eg crown distortion/suppression) with a crown density of at least 70% Crown Cover (normal); and
- The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.

4. MODERATE

- The subject tree has a medium live crown size exceeding 40m²; and
- The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% Crown Cover (thinning to normal); and
- The tree makes a fair contribution to the visual character and amenity of the area; and
- The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms.
- The tree has no known or suspected historical association

5. LOW

- The subject tree has a small live crown size of less than 40m² and can be replaced within the short term with new tree planting; or
- The subject tree is not visible from surrounding properties (visibility obscured) and makes little contribution the amenity and visual character of the area.

6. VERY LOW

- The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species; or
- The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% Crown Cover (sparse) or has a negative impact on visual amenity; or
- The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. INSIGNIFICANT

- The tree is a declared Noxious Weed under the *Noxious Weeds Act* (NSW) 1993

APPENDIX 2
12 TREE PROTECTION MEASURES

12.1 Tree Protection Zones

12.1.1 The Tree Protection Zones are recommended for all trees within the site to be retained shall be equivalent to the Tree Protection Zone as specified in Appendix 5. This is a radial distance measured from the centre of the trunk of the subject tree.

12.1.2 The following activities should be avoided within specified Tree Protection Zones:-

- Excavations and trenching (with exception of the approved foundations and underground services);
- Ripping or cultivation of soil;
- Mechanical removal of vegetation;
- Soil disturbance or movement of natural rock;
- Soil level changes including the placement of fill material (excluding any suspended floor or slab);
- Movement and storage of plant, equipment & vehicles;
- Erection of site sheds;
- Affixing of signage or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

12.2 Tree Protection Fencing

12.2.1 All trees within the site to be retained shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence beneath the canopy to the full extent of the Tree Protection Zone (excluding the footprint of the proposed works and areas within adjoining properties). As a minimum the fence should consist temporary chain wire panels 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate.

12.2.2 Appropriate signage shall be installed on the fencing to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone.

12.2.3 A 50mm layer of woodchip mulch shall be installed to the full extent of the Tree Protection Zone of all trees to be retained. Mulch shall be installed and spread by hand to avoid soil disturbance and compaction within the root zone.

12.3 Trunk Protection

12.3.1 Where provision of tree protection fencing is in impractical due to its proximity to the proposed building envelope, trunk protection shall be erected around the tree to avoid accidental damage. As a minimum, the trunk protection shall consist of two metre lengths of hardwood timbers (100 x 50mm) spaced at 100-150mm centres secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in any way) to avoid mechanical injury or damage. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period.

12.4 Tree Damage

12.4.1 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

12.5 Demolition Works within Tree Protection Zones

12.5.1 Demolition of pathways and paved areas within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The pavement surface and sub-base shall be stripped-off in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and minimise soil disturbance. The machine shall work within the footprint of the existing pathway to avoid compaction of the adjacent soil. The final layer of sub-base material shall be

removed using hand tools were required to avoid compaction of the underlying soil profile and damage to woody roots.

12.5.2 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels. Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile.

12.5.3 Demolition of low masonry walls within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The walls shall be demolished using equipment on the street side of the wall. Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the existing walls.

12.6 Excavations within Tree Protection Zones

12.6.1 Excavations within the Tree Protection Zone of any tree to be retained shall be avoided wherever possible.

12.6.2 Excavations for foundations and pavement sub-grade within the Tree Protection Zone of any tree to be retained shall be undertaken by hand or using an Air-spade® device to locate and expose roots along the perimeter of the foundation or pavement prior to any mechanical excavation. All care shall be undertaken to preserve root systems intact and undamaged. Any roots less than 50mm in diameter shall be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise stress on the tree.

12.6.3 Where large woody roots (greater than 50mm diameter) are encountered during excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor on piers, cantilevered slab, etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the CRZ.

12.6.4 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (eg steel or timber pickets, lattice etc) fixed to pillars.

12.6.5 For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation.

12.7 Underground Services

12.7.1 All proposed stormwater lines and other underground services should be located as far away as practicable, or suspended beneath the floor of the building where possible, to avoid excavation within the Tree Protection Zone of trees to be retained.

12.7.2 For underground services, where the incursion to the Root Zone is less than 20% of the total TPZ (i.e. beyond the Minimum Setback Distance), a chain trenching device may be used. A backhoe or skid steer loader is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact wherever possible (eg by sub-surface boring beneath roots or re-routing the service etc).

12.7.3 Excavations required for underground services within the Critical Root Zone of any tree to be retained should only be undertaken by sub-surface boring. The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. This will depend on the soil conditions at the site. Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by the arborist to determine continued health and stability of the subject tree.

12.7.4 If trees show signs of stress or deterioration, remedial action shall be taken to improve the health and vigour of the subject tree (s) in accordance with best practice arboricultural principles

12.8 Pavements

12.8.1 Pavements should be avoided within the Tree Protection Zone of trees to be retained where possible. Proposed paved areas within the Tree Protection Zone of trees to be retained should be placed above grade to minimise excavations within the root zone and avoid root severance and damage. Pavement sub-base material should be as per Section 12.8.

12.9 Fill Material

12.9.1 Placement of fill material within the Tree Protection Zone of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal) or equivalent to provide some aeration to the root zone. Note that Roadbase or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material should be placed in direct contact with the trunk.

12.10 Canopy & Root Pruning

12.10.1 All pruning work required shall be carried out in accordance with Australian Standard No 4373-2007 – Pruning of Amenity Trees. Written approval from Council may be required under the Tree Preservation Order prior to undertaking this work. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).

12.10.2 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.

12.10.3 Where root pruning is required, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

12.11 Tree Removal

12.11.1 The approval of Ashfield Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.

12.11.2 Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.

12.11.3 Stumps shall be grubbed-out where required using a mechanical stump grinder without damage to the root system of other trees. Where trees to be removed are in close proximity to trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained should **not** be removed using excavation equipment or similar.

APPENDIX 3
13 METHODOLOGY FOR DETERMINING TREE PROTECTION ZONES

13.1.1 In order to provide adequate protection for trees nominated as suitable for preservation, Tree Protection Zones (TPZ) are required to provide adequate setbacks from buildings and other infrastructure to minimise adverse impact. The Tree Protection Zone is a radial distance measured from the centre of the trunk of the tree as specified in Appendix 5 (refer also Figure 4). The intention of the Tree Protection Zone is to minimise incursions to the root system and canopy to ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile.

13.1.2 A commonly used delineation for the Tree Protection Zone is the drip-line (extent of the crown spread projected to the ground plane). However, this may not provide adequate protection for trees that have prominent leans or distorted, imbalanced or narrow crowns. A more appropriate guideline is the trunk diameter.[5]

13.1.3 The TPZ has been determined from Table 3, based on guidelines prepared by the British Standards Institute (1991) using the following parameters:-

- The trunk diameter;
- The sensitivity/tolerance of the species to construction impacts;
- The level of maturity;
- The health, vigour and structural integrity of the tree (refer to Section 4); and
- The trees root and crown formation.

13.2 Trunk Diameter

13.2.1 The trunk diameter of each tree was measured at 1.4 metres from ground level using a metric diameter tape. For the purpose of calculating the tree protection zone, the diameter of twin-trunked trees has been added then multiplied by 75%. For multi-trunked trees, the diameter of each trunk has been added then multiplied by 60%. This gives a more realistic measurement for an equivalent sized single-trunked tree.

13.3 Construction Tolerance

13.3.1 The Construction Tolerance of each tree has been divided into the following categories:-

- **G** **Good –** good tolerance to construction impacts
- **M** **Moderate –** moderate tolerance to construction impacts
- **P** **Poor –** poor tolerance to construction impacts

13.3.2 As there is very little documentary record of the construction tolerance of species under Australian conditions, the trees have been categorized according to our field observation and experience. The above classifications are also used as criteria to determine appropriate setback distances to trenching (together with Maturity Class).

13.4 Maturity Class.

13.4.1 The Maturity Classification of each tree has been divided into the following categories:-

- **OM** **Overmature –** greater than 80% of the life expectancy for the species
- **M** **Mature –** 50-80% of the life expectancy for the species
- **SM** **Semi-mature –** 20-50% of the life expectancy for the species
- **I** **Immature –** less than 20% of the life expectancy for the species

13.5 Root and Crown Formation

13.5.1 The distribution of the canopy and branches of each tree was recorded in the field from visual observation and is shown in **Appendix 4**. This is also reflected in the tree location plans in **Appendix 6**. Based on the information available, it has been assumed that the soil conditions are fairly uniform and therefore a uniform radial root system has also been assumed. Existing incursions (due to existing underground services, adjacent structures or grade differences) to the root zone were also noted in the field. Where appropriate the Tree Protection Zones take account of existing incursions and canopy distribution.

TABLE THREE – GUIDELINES FOR OPTIMUM TREE PROTECTION ZONES

Species Tolerance	Tree Maturity Class	Distance from Trunk (m) per Unit Trunk Diameter (cm)
Good	Young	0.06
	Mature	0.09
	Overmature	0.12
Moderate	Young	0.09
	Mature	0.12
	Overmature	0.15
Poor	Young	0.12
	Mature	0.15
	Overmature	0.18

KEY (Maturity Class)
Young (<20% Life Expectancy)
Mature (20-80% Life Expectancy)
Overmature (>80% Life Expectancy)

Modified from the British Standards Institute (1991)
Guidelines are for trees of average to excellent vigour

REF:- Harris, R.W., Clark, J.R. & Matheny, NP (1999)
Arboriculture - Integrated Management of Landscape Trees, Shrubs & Vines (Third Edition)
Prentice Hall, New Jersey, USA

13.6 Minimum Set-back Distance.

13.6.1 Where construction work within the TPZ is unavoidable, the proposed incursion should be limited to a radial offset equivalent to no greater than 20% of the TPZ, on one side only (refer to **Figure 4**). It is generally accepted that healthy, vigorous trees can withstand incursions of this amount without any significant adverse impact on their health and long-term preservation. Incursions of greater amounts are likely to result in an adverse impact and significant incursions may lead to the demise or destabilization of the tree. Minimum Setback Distances to construction have been specified in **Appendix 5**.

13.7 Critical Root Zone.

13.7.1 The diameter of the root plate, which provides the bulk of mechanical support and anchorage for a tree, is related to the distance from the trunk at which rapid taper of tree roots ceases. [6] This has been defined as the tree's "Critical Root Zone". Based on field studies of root plate sizes of windthrown (overturned) trees, it has been established that there is a relationship between the Critical Root Zone (Root Plate Diameter) and the trunk diameter.[10] The Critical Root Zone for each tree has been shown in **Appendix 5**. Incursions within the Critical Root Zone are not recommended as they are likely to result in the severance of woody roots which may lead to the destabilisation and/or demise of the tree.

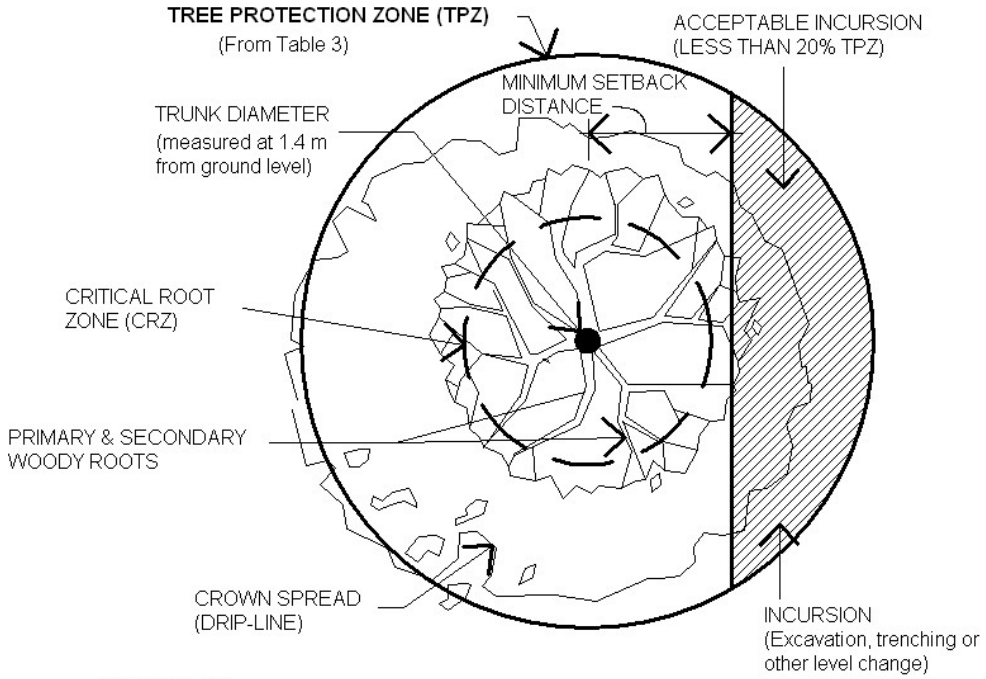

FIGURE 4

METHODOLOGY TO CALCULATE MINIMUM SETBACK DISTANCE

13.8 Acceptable Incursions to the Root Zone.

13.8.1 Incursions within the TPZ and CRZ may be acceptable only where special construction methods are adopted to avoid any adverse impact on the trees root system. Fully elevated construction methods incorporating suspended flooring, isolated piers or pier and beam type footing construction are generally acceptable within the TPZ / CRZ, provided all excavations are undertaken by hand and roots are adequately protected.

REFERENCES

[5] Harris, R.W., Clark, J.R. & Matheny, N.P. (2004)
Arboriculture – Integrated Management of Landscape Trees, Shrubs and Vines (4th Edition)
Prentice Hall, New Jersey, USA

[6] Culter, David F. (1995)
Interactions between Tree Roots and Buildings
Proceedings of and International Workshop on Trees and Buildings
International Society of Arboriculture, Illinois, USA

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
23	***Corymbia maculata*** (Spotted Gum)	16	12	460	156	M	Appears stable with sound branching structure. Exhibits a large wound in lower trunk due to borer damage	No Evidence	Fair	Moderate borer infestation (Longicorn Beetle)	Medium 15-40 Years	3	**moderate**	On-site
100	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	13	11	820	88	M	Appears stable with fair branching structure. Exhibits a multiple low bark inclusions at 1.5 metres.	Lower limbs selectively pruned	Good	No Evidence	Long - more than 40 years	3	**high**	On-site
101	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	7	6	270	30	SM	Appears stable with sound branching structure. Crown suppressed on west side due to building	No Evidence	Good	No Evidence	Medium 15-40 Years	4	**moderate**	On-site
102	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	9	5	320	25	SM	Appears stable with sound branching structure. Crown suppressed on west side due to building	No Evidence	Fair	No Evidence	Medium 15-40 Years	5	**moderate**	On-site
103	***Callistemon viminalis*** (Weeping Bottlebrush)	7	3	120	18	SM	Stability suspect with sound branching structure. Located immediately adjacent building.	No Evidence	Fair	No Evidence	Short 5-15 Years	5	**low**	On-site
103a	***Murraya paniculata*** (Murraya)	7	6	240	30	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	5	**moderate**	On-site
104	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	10	6	400	36	M	Appears stable with fair branching structure. Exhibits a multiple low bark inclusions at 1.2 metres.	Lower limbs selectively pruned	Good	No Evidence	Medium 15-40 Years	4	**moderate**	On-site
105	***Ulmus glabra*** **'Lutescens'** (Golden Elm)	7	8	220	40	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	4	**moderate**	On-site
106	***Callistemon viminalis*** (Weeping Bottlebrush)	6	5	220	22.5	M	Appears stable with sound branching structure. Located close to existing building.	Lower limbs selectively pruned	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
107	***Callistemon viminalis*** (Weeping Bottlebrush)	7	6	200	30	M	Appears stable with sound branching structure. Exhibits a prominent lean to the NE. Suppressed on south side due to crowding	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
108	***Callistemon viminalis*** (Weeping Bottlebrush)	7	4	170	14	M	Appears stable with sound branching structure. Located close to existing building.	Lower limbs selectively pruned	Fair	No Evidence	Short 5-15 Years	5	**low**	On-site
108a	***Callistemon viminalis*** (Weeping Bottlebrush)	5	4	140 + 120	12	SM	Appears stable with fair branching structure. Exhibits A moderate bark inclusion at ground level	Crown lifted to 1.5 metres	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
109	***Ulmus glabra*** **'Lutescens'** (Golden Elm)	7	8	300	40	M	Appears stable with fair branching structure. Exhibits a low bark inclusion at 1.2 metres	No Evidence	Good	No Evidence	Short 5-15 Years	5	**low**	On-site
110	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	5	5	200	20	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**moderate**	On-site
111	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	8	6	320	36	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
112	***Jacaranda mimosifolia*** (Jacaranda)	11	8	330	72	M	Appears stable with sound branching structure. Exhibits moderate wound in secondary limb to the north with suspected fracture.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
113	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	8	5	400	32.5	M	Appears stable with fair branching structure. Exhibits a moderate wound at ground level due to branch loss. Multiple moderate bark inclusions at 1 metre	No Evidence	Fair	No Evidence	Medium 15-40 Years	4	**moderate**	On-site
114	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	7	7	450	35	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 1.2 metres.	No Evidence	Fair	No Evidence	Medium 15-40 Years	4	**moderate**	On-site
115	***Schinus areira*** (Peppercorn Tree)	9	8	310 + 230	72	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
115a	***Callistemon viminalis*** (Weeping Bottlebrush)	6	6	150 + 100x2	24	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Fair with thinning crown	No Evidence	Short 5-15 Years	5	**low**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
115b	***Callistemon viminalis*** (Weeping Bottlebrush)	6	6	150x2	24	M	Appears stable with poor branching structure. Crown suppressed on south side due to branch loss (storm damage)	No Evidence	Fair with thinning crown	No Evidence	Transient (less than 5 years)	5	**very low**	On-site
115c	***Callistemon viminalis*** (Weeping Bottlebrush)	6	6	200	24	M	Appears stable with fair branching structure. Crown suppressed on west side due to crowding.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	5	**low**	On-site
115d	***Callistemon viminalis*** (Weeping Bottlebrush)	6	8	180x2	32	M	Appears stable with poor branching structure. Exhibits a severe bark inclusion at GL with fracture.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	5	**low**	On-site
115e	***Callistemon viminalis*** (Weeping Bottlebrush)	5	6	150x2	24	SM	Appears stable with fair branching structure. Crown suppressed on east side due to overshadowing. Very prominent lean to the west.	No Evidence	Good	No Evidence	Short 5-15 Years	5	**low**	On-site
116	***Liquidambar styraciflua*** (Liquidamber)	12	9	370	90	SM	Appears stable with sound branching structure. Suppressed on north-east side due to crowding. Exhibits slight thinning in upper crown.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
116a	***Pittosporum undulatum*** (Native Daphne)	6	6	200	27	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
117	***Eucalyptus microcorys*** (Tallowwood)	16	14	700	196	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	3	**high**	On-site
118	***Araucaria columnaris*** (Cook's Pine)	8	3	200	22.5	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	**moderate**	On-site
119	***Liquidambar styraciflua*** (Liquidamber)	7	5	200	35	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	6	**low**	On-site
120	***Hakea salicifolia*** (Willow leaved Hakea)	5.5	4	220	18	M	Appears stable with sound branching structure.	No Evidence	Fair with thinning crown	Moderate borer infestation	Short 5-15 Years	5	**low**	On-site
121	***Acer negundo*** (Box Elder)	5	4	180	14	SM	Appears stable with sound branching structure. Exhibits a small wound at 0.5 metres due to mechanical injury.	No Evidence	Good	No Evidence	Long - more than 40 years	6	**low**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
122	***Jacaranda mimosifolia*** (Jacaranda)	12	11	250x2 + 300	99	M	Appears stable with fair branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	3	**moderate**	On-site
123	***Pinus radiata*** (Monterey Pine)	13	12	670	138	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	3	**moderate**	On-site
124	***Acmena sp.*** (Lillypilly)	4.5	6	200	21	I	Appears stable with sound branching structure. Suppressed on north side due to crowding.	No Evidence	Fair	Moderate vine infestation	Short 5-15 Years	5	**low**	On-site
125	***Liquidambar styraciflua*** (Liquidamber)	10	9	360	76.5	SM	Appears stable with sound branching structure.	Crown-lifted to 1.5 metres	Very Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
126	***Photinia x fraseri* 'Robusta'** (Chinese Hawthorn)	5	6	170 + 150x3	21	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
127	***Morus nigra*** (Mulberry)	6	10	300	45	M	Appears stable with poor branching structure. Exhibits a large wound at 0.5 to 1.3 metres due to sunscald. Severe bark inclusion at 0.5 metres with fracture.	No Evidence	Fair	No Evidence	Short 5-15 Years	6	**very low**	On-site
128	***Harpephyllum caffrum*** (Kaffir Plum)	8	7	470	42	M	Appears stable with poor branching structure. Exhibits multiple high bark inclusions at 1 metre.	No Evidence	Fair	No Evidence	Short 5-15 Years	4	**low**	On-site
129	***Callistemon viminalis*** (Weeping Bottlebrush)	8	7	430	45.5	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at 0.5 metres	Selectively pruned	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
130	***Callistemon viminalis*** (Weeping Bottlebrush)	4	6	230	12	M	Appears stable with sound branching structure. Exhibits a low bark inclusion at 0.8 metres	Crown-lifted to 1.5 metres	Very Good	No Evidence	Medium 15-40 Years	6	**low**	On-site
131	***Plumeria acutifolia*** (Frangipani)	4	4	200	10	SM	Appears stable with sound branching structure. Exhibits a prominent lean to the south-east	Crown-lifted to 1.5 metres	Good	No Evidence	Medium 15-40 Years	6	**low**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
131a	***Callistemon viminalis*** (Weeping Bottlebrush)	5	4	170	20	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	**moderate**	On-site
132	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	8	5	300	30	SM	Appears stable with sound branching structure. Exhibits a small wound at 1.5 metres.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**moderate**	On-site
133	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	9	6	440	42	M	Appears stable with fair branching structure. Exhibits a low bark inclusion at 1.3 metres. Suppressed on western side due to crowding.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
134	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	10	6	420	42	M	Appears stable with sound branching structure. Exhibits a low bark inclusion at 1.2 metres. Suppressed on eastern side due to crowding.	Lower limbs selectively pruned	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
137	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	8	12	550	78	M	Appears stable with fair branching structure.	Selectively pruned to clear powerlines	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
138	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	10	8	400+500	56	M	Appears stable with fair branching structure.	Selectively pruned to clear powerlines	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
139	***Corymbia maculata*** (Spotted Gum)	10	4	200	32	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
140	***Corymbia maculata*** (Spotted Gum)	16	5	300	70	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	3	**high**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
141	***Corymbia maculata*** (Spotted Gum)	18	6	300	96	SM	Appears stable with poor branching structure. Twin trunked at 4 metres with adaptive growth due internal stress.	No Evidence	Good	No Evidence	Short 5-15 Years	3	**low**	On-site
142	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	10	7	360	56	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**moderate**	On-site
143	***Cupressocyparis x leylandii*** (Leyland Cypress) (Row of 8 trees)	6 to 8	3 to 4	250	20	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	**low**	On-site
143a	***Ulmus glabra*** **'Lutescens'** (Golden Elm)	7	6	100x2	36	SM	Appears stable with fair branching structure. Crown suppressed on east side due to crowding.	Crown lifted to 1.5 metres	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
144	***Jacaranda mimosifolia*** (Jacaranda)	6	5	180 + 120	25	I	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at ground level.	No Evidence	Good	No Evidence	Long - more than 40 years	5	**low**	On-site
145	***Tibouchina granulosa*** (Lasiandra)	6	6	200	24	M	Appears stable with sound branching structure. Crown suppressed on west side due to building	Crown lifted to 2 metres	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
145a	***Prunus cerasifera*** **'Nigra'** (Ornamental Plum)	7	6	160	30	M	Appears stable with sound branching structure. Exhibits some basal epicormic sprouts.	Crown lifted to 3 metres	Fair with thinning crown	Moderate borer infestation	Short 5-15 Years	5	**low**	On-site
146	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	11	8	450	72	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at 1.5-2 metres. Roots lifting path.	No Evidence	Good	No Evidence	Medium 15-40 Years	4	**moderate**	On-site
146a	***Callistemon citrinus*** (Bottlebrush)	5.5	5	100x10	17.5	SM	Appears stable with sound branching structure.	Crown lifted to 2 metres	Very Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
147	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	8	4	200	24	SM	Appears stable with sound branching structure. Located close to existing retaining wall.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
148	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	6	6	200	24	SM	Appears stable with sound branching structure. Located close to existing retaining wall.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
149	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	6	4	200	16	SM	Appears stable with sound branching structure. Located close to existing retaining wall.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
150	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	8	5	200x2	30	SM	Appears stable with sound branching structure. Located close to existing retaining wall.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site
151	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	7	3	200	15	SM	Appears stable with sound branching structure. Located close to existing retaining wall.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**low**	On-site

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
23	***Corymbia maculata*** (Spotted Gum)	P	6.9	2.5	4.7	Proposed new roadway offset 0.4 metres west. Excavations and compaction for pavement subgrade within CRZ	Will result in severance of woody roots, resulting in a significant adverse impact. Proposed works will necessitate removal.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
100	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	7.0	3.15	4.8	Proposed basement offset 5.4 metres NW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits - no adverse impact. Some canopy pruning may be required to clear scaffolding.	Retain in accordance with recommended Tree Protection Measures. Install Tree protection fence in accordance with Section 12.2. Undertake any required canopy pruning in accordance with Section 12.10.
101	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.2	1.9	2.2	Proposed building (first floor) offset 0.9 metres NW.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
102	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.8	1.9	2.6	Proposed building (first floor) offset 0.9 metres west.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
103	***Callistemon viminalis*** (Weeping Bottlebrush)	M	1.8	1.3	1.2	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
103a	***Murraya paniculata*** (Murraya)	M	3.6	5.8	2.4	Located within footprint of proposed building	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
104	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.8	2.4	3.3	Located within footprint of proposed basement.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
105	***Ulmus glabra*** **'Lutescens'** (Golden Elm)	M	3.3	1.85	2.2	Located within footprint of proposed building	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
106	***Callistemon viminalis*** (Weeping Bottlebrush)	M	2.6	1.85	1.8	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
107	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.0	1.6	2.0	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
108	***Callistemon viminalis*** (Weeping Bottlebrush)	M	2.6	1.3	1.7	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
108a	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.0	2.8	2.0	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
109	***Ulmus glabra*** **'Lutescens'** (Golden Elm)	M	4.5	2.1	3.1	Proposed basement offset 0.6 metres east. Excavations for basement within CRZ	Will result in severance of woody roots, resulting in a significant adverse impact.	Remove tree
110	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.0	1.6	2.0	Proposed basement offset 4.1 metres east & 3.8 metres west. No incursion to TPZ. Proposed driveway/turning circle offset 0.7 metres NE. Excavations for pavement sub-grade & kerb within CRZ.	Will result in severance of woody roots, resulting in a significant adverse impact.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
111	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.8	2.25	2.6	Proposed basement offset 0.5 metres east. Excavations for basement within CRZ	Will result in severance of woody roots, resulting in a significant adverse impact.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
112	***Jacaranda mimosifolia*** (Jacaranda)	M	5.0	2.25	3.4	Located within footprint of proposed basement.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
113	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.8	2.4	3.3	Proposed basement offset 0.8 metres west. Excavations for basement within CRZ	Will result in severance of woody roots, resulting in a significant adverse impact.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
114	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	5.4	2.5	3.7	Proposed basement offset 4 metres west & new roadway 4 metres east. Excavations for basement within TPZ & roadway within TPZ. Proposed curved wall offset 0.5 metres south.	Will result in severance of woody roots, resulting in a significant adverse impact.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
115	***Schinus areira*** (Peppercorn Tree)	M	4.9	2.5	3.3	Located within footprint of proposed basement.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
115a	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.8	28.8	2.6	Located within footprint of proposed planter box	Proposed works will necessitate removal	Remove tree

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
115b	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.4	29.8	2.3	Located within footprint of proposed planter box	Proposed works will necessitate removal	Remove tree
115c	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.0	30.8	2.0	Located within footprint of proposed planter box	Proposed works will necessitate removal	Remove tree
115d	***Callistemon viminalis*** (Weeping Bottlebrush)	M	4.1	23.8	2.8	Located within footprint of proposed planter box	Proposed works will necessitate removal	Remove tree
115e	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.4	24.8	2.3	Located within footprint of proposed planter box	Proposed works will necessitate removal	Remove tree
116	***Liquidambar styraciflua*** (Liquidamber)	M	5.6	2.4	3.8	Located within footprint of proposed basement.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
116a	***Pittosporum undulatum*** (Native Daphne)	M	3.0	3.8	2.0	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
117	***Eucalyptus microcorys*** (Tallowwood)	P	8.4	2.9	5.7	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal - High Retention Value
118	***Araucaria columnaris*** (Cook's Pine)	M	3.0	1.6	2.0	Located within footprint of proposed building	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
119	***Liquidambar styraciflua*** (Liquidamber)	M	3.0	1.6	2.0	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
120	***Hakea salicifolia*** (Willow leaved Hakea)	M	3.3	1.85	2.2	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
121	***Acer negundo*** (Box Elder)	M	2.7	1.6	1.8	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
122	***Jacaranda mimosifolia*** (Jacaranda)	M	7.2	2.6	4.9	Located within footprint of proposed building	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
123	***Pinus radiata*** (Monterey Pine)	M	8.0	2.9	5.5	Located within footprint of proposed courtyard/pergola.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
124	***Acmena sp.*** (Lillypilly)	M	3.0	1.6	2.0	Located within footprint of proposed courtyard/pergola.	Proposed works will necessitate removal	Remove tree
125	***Liquidambar styraciflua*** (Liquidamber)	M	5.4	2.25	3.7	Located within footprint of proposed pathway	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
126	***Photinia x fraseri*** **'Robusta'** (Chinese Hawthorn)	M	4.4	2.4	3.0	Located within footprint of proposed pathway	Proposed works will necessitate removal	Remove tree
127	***Morus nigra*** (Mulberry)	M	4.5	2.1	3.1	Located within footprint of proposed pathway	Proposed works will necessitate removal	Remove tree
128	***Harpephyllum caffrum*** (Kaffir Plum)	M	5.6	2.6	3.8	Proposed pathway offset 1.8 metres south. Excavations for pavement sub-grade within CRZ.	May result in soil disturbance and root damage leading to an adverse impact. Proposed to be removed to accommodate new landscape works.	Remove tree
129	***Callistemon viminalis*** (Weeping Bottlebrush)	M	5.2	2.5	3.5	Proposed pathway offset 1.7 metres south. Excavations for pavement sub-grade within CRZ.	May result in soil disturbance and root damage leading to an adverse impact.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
130	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.5	1.85	2.3	Proposed basement offset 3.8 metres south. Excavations for basement within TPZ. Proposed pathway offset 0.3 metres souith. Excavations for pavement sub-grade within CRZ.	Extent of incursion to root zone from basement is less than 20% of the TPZ, which is considered within acceptable limits - no adverse impact. Some canopy pruning may be required to clear scaffolding. Excavations for pathway sub-grade may result in root damage leading to a significant adverse impact.	Remove tree
131	***Plumeria acutifolia*** (Frangipani)	M	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact. Dead tree	To be retained - no special protection measures required.

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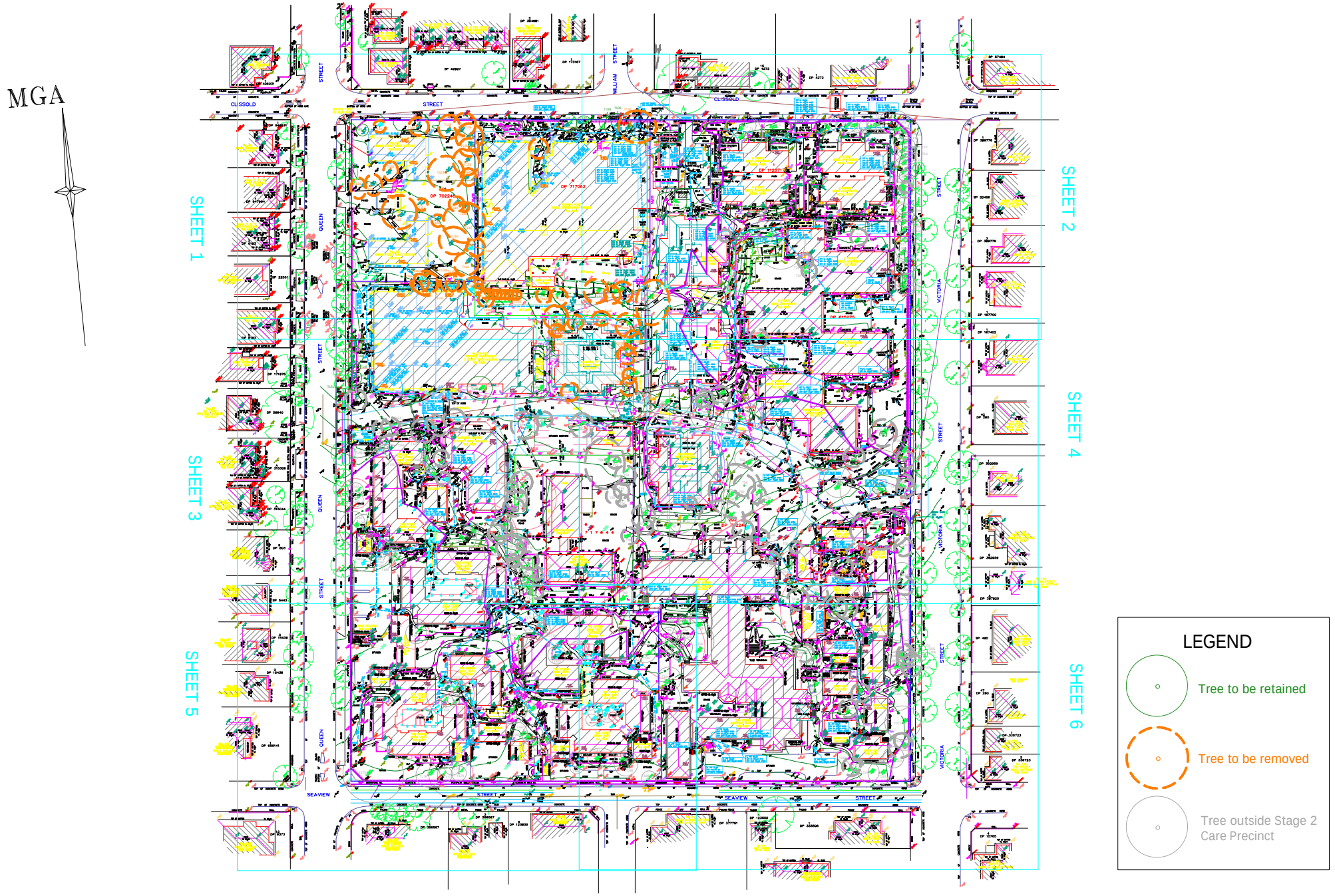
Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
131a	***Callistemon viminalis*** (Weeping Bottlebrush)	M	2.6	25.8	1.7	Located within footprint of proposed pathway	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
132	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.6	2.1	2.4	Located within footprint of proposed building	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
133	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	5.3	2.5	3.6	Proposed basement offset 1.4 metres east at RL 39.07. Excavations for basement within CRZ. Within footprint of pathway.	Will result in severance of woody roots, resulting in a significant adverse impact.	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
134	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	5.0	2.5	3.4	Proposed basement offset 4.3 metres east Excavations for basement within CRZ. Located within footprint of paved area & curved wall.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
137	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	6.6	2.7	4.5	Located with footprint of proposed footpath & roadway.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
138	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	6.0	2.9	4.1	Proposed new retaining wall offset 5 metres SW & pathway beyond at RL38.20 (1.1 metres below grade). Area around trunk lowered to 38.80 (0.5 metres below grade). Building offset 7.5 metres south	Ground level changes within the SRZ and over-excavations for the retaining wall foundations are likely to necessitate the severance of woody roots resulting in a significant adverse impact on this tree.	Consider amending the position of the retaining wall and associated ground level changes to ensure the preservation of this tree. Maintain the exsting ground levels within the TPZ.
139	***Corymbia maculata*** (Spotted Gum)	M	3.0	2.1	2.0	Proposed new retaining wall offset 2.5 metres south & pathway beyond at RL38.20 (1.1 metres below grade). Area around trunk lowered to 38.80 (0.5 metres below grade).	Ground level changes within the SRZ and over-excavations for the retaining wall foundations are likely to necessitate the severance of woody roots resulting in a significant adverse impact on this tree.	Consider amending the position of the retaining wall and associated ground level changes to ensure the preservation of this tree. Maintain the exsting ground levels within the TPZ.
140	***Corymbia maculata*** (Spotted Gum)	M	4.5	2.1	3.1	Proposed new retaining wall offset 2.5 metres south & pathway beyond at RL38.20 (1.1 metres below grade). Area around trunk lowered to 38.80 (0.5 metres below grade).	Ground level changes within the SRZ and over-excavations for the retaining wall foundations are likely to necessitate the severance of woody roots resulting in a significant adverse impact on this tree.	Consider amending the position of the retaining wall and associated ground level changes to ensure the preservation of this tree. Maintain the exsting ground levels within the TPZ.

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
141	***Corymbia maculata*** (Spotted Gum)	M	4.5	2.1	3.1	Proposed new retaining wall offset 2.5 metres south & pathway beyond at RL38.20 (1.1 metres below grade). Area around trunk lowered to 38.80 (0.5 metres below grade).	Ground level changes within the SRZ and over-excavations for the retaining wall foundations are likely to necessitate the severance of woody roots resulting in a significant adverse impact on this tree.	Consider amending the position of the retaining wall and associated ground level changes to ensure the preservation of this tree. Maintain the exsting ground levels within the TPZ.
142	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.3	2.25	2.9	Located within footprint of proposed basement driveway.	Proposed works will necessitate removal	Undertake replacement planting elsewhere within the site order to compensate for loss of amenity.
143	***Cupressocyparis x leylandii*** (Leyland Cypress) (Row of 8 trees)	M	3.8	1.85	2.6	Located within footprint of proposed basement.	Proposed works will necessitate removal	Remove tree
143a	***Ulmus glabra*** **'Lutescens'** (Golden Elm)	M	2.3	27.8	1.5	Located within footprint of proposed basement.	Proposed works will necessitate removal	Remove tree
144	***Jacaranda mimosifolia*** (Jacaranda)	M	3.4	1.85	2.3	Located within proposed paved courtyard/pathway	Proposed works will necessitate removal	Remove tree
145	***Tibouchina granulosa*** (Lasiandra)	M	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
145a	***Prunus cerasifera*** **'Nigra'** (Ornamental Plum)	M	2.4	4.8	1.6	Located within footprint of proposed buillding	Proposed works will necessitate removal	Remove tree
146	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	5.4	2.5	3.7	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
146a	***Callistemon citrinus*** (Bottlebrush)	M	3.6	40.8	2.4	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
147	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
148	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
149	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
150	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	4.5	2.1	3.1	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.
151	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact	To be retained - no special protection measures required.



APPENDIX 6 TREE LOCATION PLAN

STAGE 2 - CARE PRECINCT

CARDINAL FREEMAN VILLAGE

137 Victoria Street, ASHFIELD

Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
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Based on the Survey Drawing

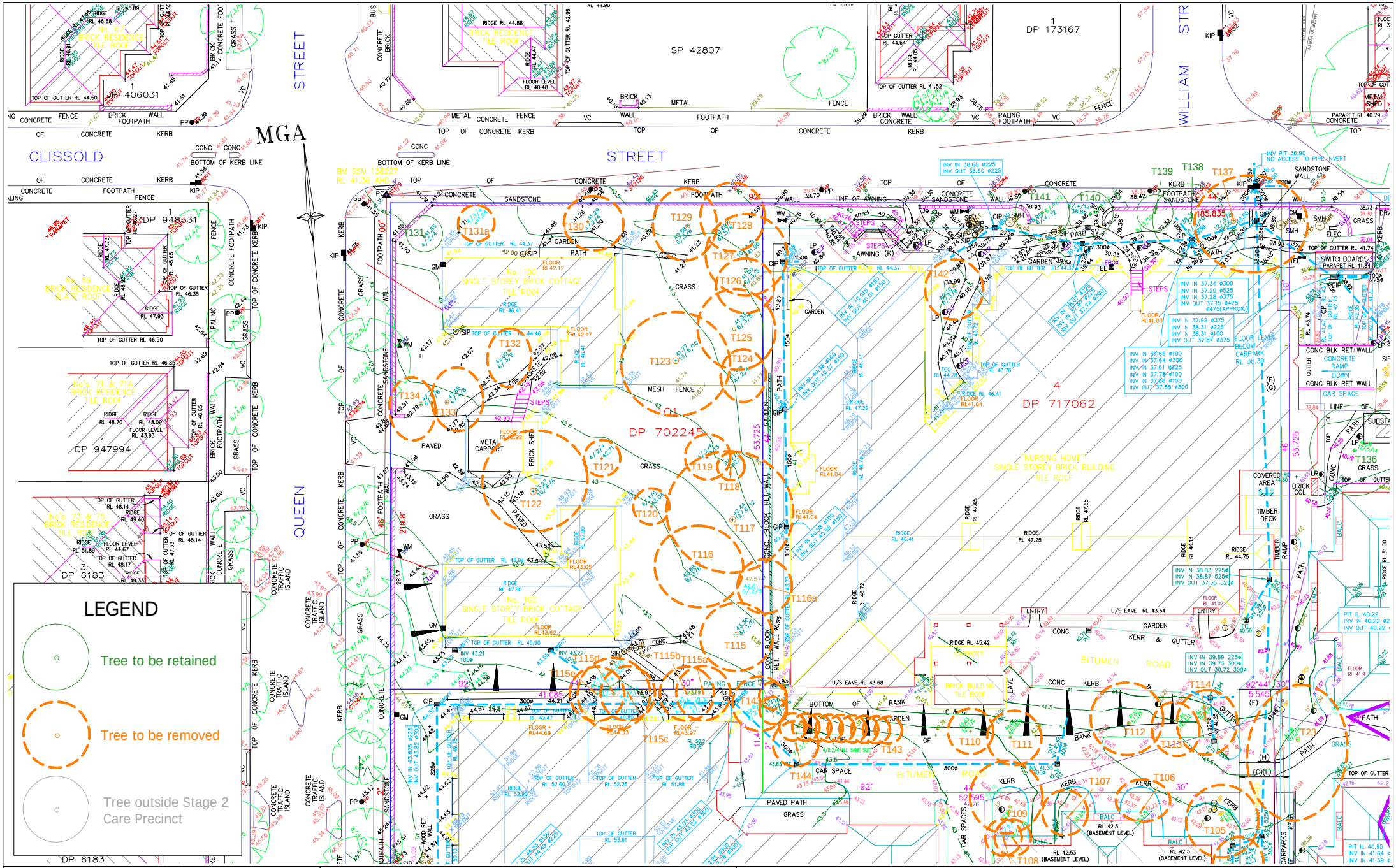
prepared by Lockley Land Title Solutions

Dwg Ref No. 29838DT-D

Dated 18/02/2010

DWG No. TLP 4285 KEY PLAN

DATE: 11/03/2010



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STAGE 2 - CARE PRECINCT
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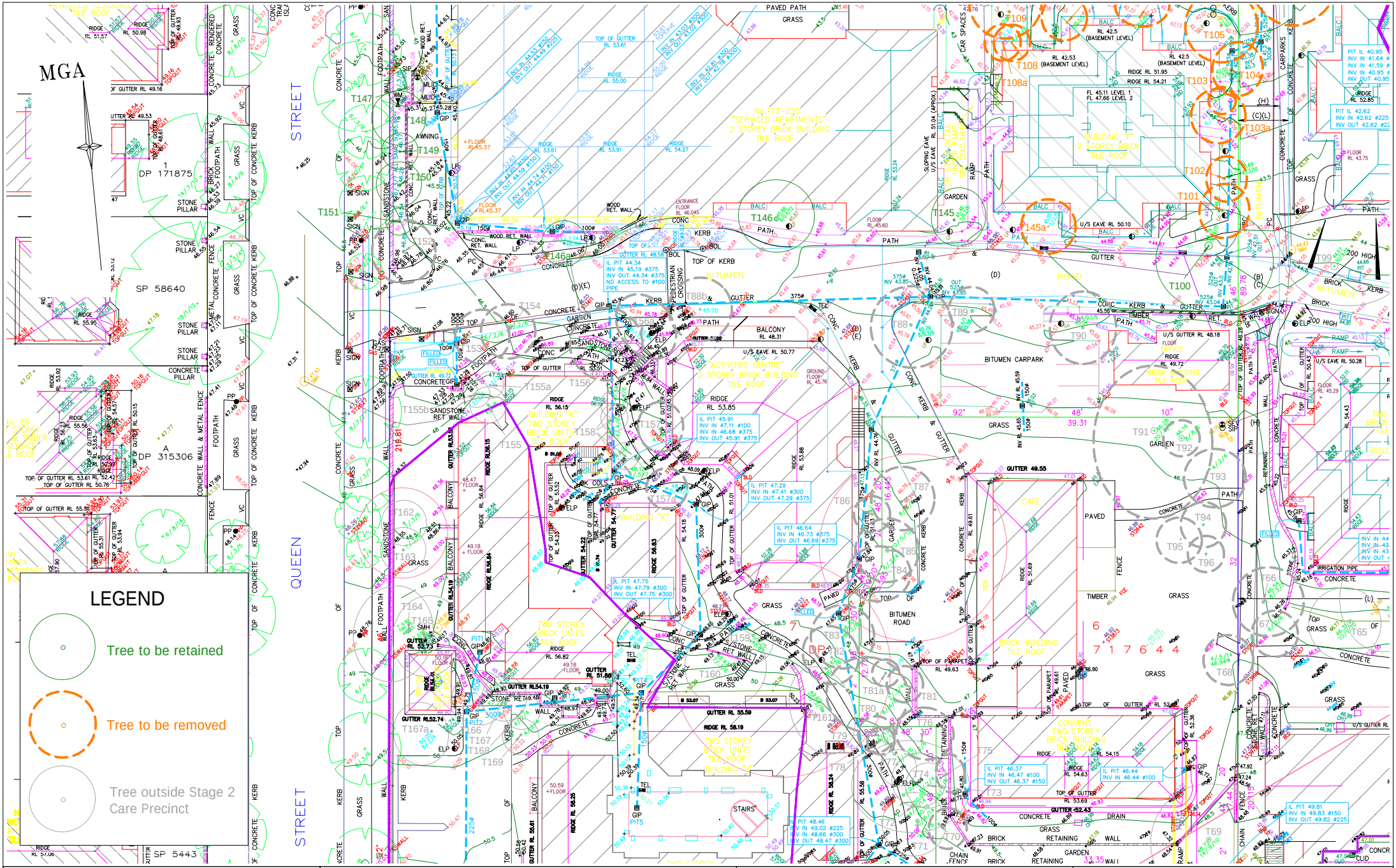
Dwg Ref No. 29838DT-D
Dated 18/02/2010

DWG No. TLP 4285 SHEET 1

DATE: 11/03/2010



APPENDIX 6 TREE LOCATION PLAN

STAGE 2 - CARE PRECINCT

CARDINAL FREEMAN VILLAGE

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Based on the Survey Drawing

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Dwg Ref No. 29838DT-D

Dated 18/02/2010

DWG No. TLP 4285 SHEET 3

DATE: 11/03/2010