ABOUT TREES

URBAN TREE & BUSHLAND MANAGEMENT

ADDITIONAL TREE REPORT

AT

PART 1 OF LOT 100 IN DP1135581

1A LEONAY PARADE

LEONAY

FOR

FAIRWAYS UNIT TRUST

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ABOUT TREES
URBAN TREE AND BUSHLAND MANAGEMENT

LAWRIE SMITH
ARBORICULTURAL &
ECOLOGICAL CONSULTANT

PO Box 300
Wentworth Falls 2782
PH 0439 758 658

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1.0 INTRODUCTION

A Development Application (DA) has been lodged with Penrith City Council for consent to construct a Proposed SEPP Housing for Seniors or People with a Disability (2004) on Part 1 of Lot 100 in DP1135581, 1A Leonay Parade, Leonay

A previous tree report addressed issues raised by Council in relation to trees along Leonay Parade. Council has requested that the report be revised to include an additional 85 trees throughout the site, as it wants to understand the number and type of trees being removed on the site.

1.1 Scope

This report has been commissioned by Mr. Stephen Vlangos and its purpose is to address the additional issue raised by Council

1.2 Summary of Report

The proposed site plan on Page 55 shows that tree No's 18 – 25, 27 – 29, 31 & 31A, 32 – 35, 37 – 48, 51 – 53, 55 & 56 are located within the footprint of the proposed development, and they have been scheduled to be removed.

These health and condition of this group of trees was assessed in April 2019. The majority of them were very sparsely foliage and appeared to be in advanced stages of decline. They were reviewed in June 2019 as new growth was being produced from axillary buds and epicormic growth, but four had completely died, and a few had considerable amounts of dieback in their canopies.

The soil in the vicinity of the worst effected trees is bare, poorly drained, very heavily compacted with no visible organic layer, and these are unsuitable growing conditions for *Eucalyptus microcorys* (see Plates 3 - 8)

Tree No's 15 – 17, 26, 30, 36, 49, 50, 54, 57, 58 & 60 – 79 have been scheduled for retention, and the majority are only retainable in the short term

1.2.1 Suitability of Trees being proposed for Retention

- Tree No's 15, 26, 30, 36, 50, 54, 57, 58, 60, 61, 62, 71, 72, 65, 67, 68, 69, 70, 73, 75, 76 & 79 are considered suitable for retention in the medium to long term
- Tree No's 16, 17, 63, 64, 65 & 68 are considered suitable for retention in the short term
- Tree No. 66 has a retention value of OLVP (0) – Likely to be removed immediately or retained in the Short Term

1.2.2 Encroachments into the Tree Protection Zones

- The proposed development encroaches into the Tree Protection Zones (TPZ's) of tree No's 15 & 16, 60 – 62 & 64 – 78 by less than 10%, and this is considered to be an insignificant impact on their safe life expectancies.
- It encroaches into the TPZ's of tree No's 36 & 63 by less than 20%, and this is considered to be a low impact on their safe life expectancies

- It encroaches into the TPZ's of tree No's 26 & 30 by less than 30%, and this is considered to be a high impact on their safe life expectancies

- It encroaches into the TPZ's of tree No's 50, 54, 57, 58 & 59 by more than 30%, and this is considered to be a significant impact on their safe life expectancies.

- Tree No. 58 is located within the footpath on the south-eastern side of Unit No. 1

1.2.3 Encroachments into the Structural Root Zones

- The footprint of Unit No. 1 encroaches into the Structural Root Zones of tree No's 54, 57 & 58

- The footprint of Unit No. 3 encroaches into the Structural Root Zones of tree No's 49 & 50

- The footprint of Unit No 5 encroaches into the Structural Root Zones of tree No's 30 & 36

- The footprint of Unit No 6 encroaches into the Structural Root Zones of tree No's 30

- The footprint of Unit No 6 encroaches into the Structural Root Zones of tree No's 26

- The footprint of Unit No 7 encroaches into the Structural Root Zones of tree No's 26

- The footprint of Unit No. 8 encroaches into the Structural Root Zones of tree No's 15 – 17 & 63

1.2.4 Minimising Arboricultural Impacts of the Development

- Impacts of the development of trees proposed for retention can be reduced to acceptable levels if the following recommendations are complied with

1.3 Recommendations

- Due to the restricted nature of the site and limited access within it for construction activities, the installation of protective fencing will not be feasible. Instead, it is proposed to use ground protection to minimise impacts of compaction and damage to roots in accordance with Clause 7.3 and Figure 7.3 of the Tree Management Plan (TMP) in Appendices 9.5 of this report.

- Trunk protection is to be installed around tree No's 15, 16, 17, 26, 30, 36, 49 & 50 and 57 in accordance with Clause 6 and Figure 7.3 of the TMP

- All other trees will be adequately protected by the standard construction site fencing along the western boundary

- The proposed decking on the western sides of the units and elsewhere on the perimeter of the Units encroach into the Tree Protection Zones and Structural Root Zones of a number of trees being retained. The pier holes for all decking within the Structural Root Zones of any trees should be located and installed in accordance with Clause 10 of the TMP

- Post holes for boundary fencing within the Structural Root Zones of any trees should also be located and installed in accordance with Clause 10 of the TMP

- No Stormwater Plan has been provided for review, but any Stormwater infrastructure should be located and installed in accordance with Clause 11of the TMP

- Footpaths within the Tree Protection Zones and Structural Root Zones should be installed in accordance with Clause 13 of the TMP

2.0 METHODOLOGY AND OTHER INFORMATION

This report has been presented in an accepted industry format and should easily be understood by any person with a reasonable understanding of arboriculture. An explanation of the terminology used within the report is provided in Section 8, and a list of commonly used abbreviations has been provided in Section 8.4 Addition information is provided in the Appendices which are referenced to recent industry research.

2.1 Methodology

- A visual assessment of these trees was undertaken from ground level in April 2019 in accordance with the Visual Tree Assessment (VTA method of Mattheck and Breloer (1994).
- The assessment took into account the biological state of the tree/s, as indicated by the health of their foliage, their structural form and growing environment.
- Unless otherwise stated, no underground sections were examined and no aerial inspection (climbing) was undertaken.
- Tree heights were obtained with a clinometer and canopy spreads were measured.
- Ecological and amenity values and visual prominence are based on Thyer (1996) Tree Valuation Method – (see Terminology in Section 8.0)
- Retention Values are based upon the Sustainable Retention Index Value (SRIV) – Refer to the SRIV Matrix in Appendices 9.2
- Safe Life Expectancies are based on Barrell (2006) 'TreeAZ', which provides the basis for deciding which trees are likely to be suitable for retention. 'A' category trees are suitable for retention for more than 10 years. 'Z' category trees are likely to be removed within 10 years – TreeA/Z Categories in Appendices 9.3
- The relevant information was recorded on a standard tree survey form and is summarised in the Tree Survey Table in Section 10. The terminology used in the survey is defined in Section 8.0
- A Tree Location Plan is included in Section 11, and shows the location of the subject trees.

2.2 Background

The author was provided with an updated A3 Site Plan at scale of 1: 500, which shows the locations of the subject trees, and requested to provide a report to address the issue raised by Council

2.3 Limitation of Liability

Trees are living organisms and do not remain static over time. Conditions are often hidden within trees and below ground. Unless it has been otherwise stated, observations have been made by eye and from ground level. Tree can be managed, but they cannot be controlled, and to live near a tree is to accept some degree of risk. The only way to eliminate all risks is to remove all trees.

Arborists cannot detect every condition that could possibly lead to the failure of a tree. They cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise remedial treatments, like any medicine, cannot be guaranteed.

Site changes, storms and ongoing growth can alter a tree over time; therefore, tree assessments must occur on a regular basis. Unless stated otherwise, this assessment cycle is based on an annual inspection. This is consistent with and the Land & Environment Courts definition of a tree that is 'likely to cause damage or injury in the near future' as 'likely to cause damage or injury within the next 12 months'.

It should also be noted that any opinions given by the Arborist in relation to the health, condition, desirability or significance of any tree will not necessarily coincide with the opinions of the relevant Council authority or their Tree Management Officers.

The author shall not be required to provide additional information, give testimony or attend Court by reason of this report unless subsequent contractual arrangements are made, including an additional fee for such services.

2.4 Uniform Civil Procedures Rules (2005)

In order to ensure the reliability of evidence provided by experts, the Courts have provided the Uniform Civil Procedures Rules 2005 (UCPR) and Land & Environment Court Rules 2007 (LECR).

The author of this report has read and understands the Expert Witness Code of Conduct in Schedule 7 to UCPR, and agrees to be bound by it in accordance with UCPR 31.23.

An expert is permitted to provide evidence before a Court in order to assist the Court draw inferences. The primary overriding duty of an expert is to assist the Court impartially on matters relevant to the expert witness's expertise. Any opinions expressed must be based on the persons training, study or expertise.

2.5 Curriculum Vitae of Author

The authors Curriculum Vitae is attached as Appendices 9.1 of this report which provides the qualifications, experience and additional training on which any stated opinions and conclusions are based.

2.6 Copyright

3.0 LEGISLATION

3.1 Penrith DCP 2014 – Vegetation Management

This section seeks to address vegetation management in a holistic manner by considering the requirements for vegetation preservation and enhancement in terms of a number of different and sometimes competing objectives.

This includes protecting threatened species and their habitats, protecting other significant native vegetation and bushland, preserving significant non-native or introduced vegetation; and considering the impact of bushfires on life and property where buildings and vegetation interface.

Any proposed development or activity should address the objectives and controls in this section in a holistic manner

General Objectives

a. To adopt the principles of ecologically sustainable development (ESD) in protecting and enhancing Penrith's native vegetation;
b. To preserve existing trees and vegetation for the benefits they provide;
c. To preserve existing trees and vegetation, where possible, during the design, development and construction process and justify any tree or vegetation removal to Council;
d. To protect and enhance native vegetation and biodiversity in the Penrith Local Government Area, including habitat for threatened species, populations and ecological communities and corridors for flora and fauna;
e. To retain native vegetation in parcels of a size and configuration which will enable existing plant and animal communities to survive in the long term;
f. To protect and enhance the landscape character and scenic qualities of the Penrith Local Government Area; and
g. To manage the conflict between protecting and removing vegetation to address natural hazards such as bushfires.

Preservation of Trees and Vegetation

There is a need to retain and protect trees and vegetation on both public and private land. However, conflicts between trees/vegetation and land uses/activities need to be managed. For this reason, this Plan provides controls for the preservation of trees and vegetation.

This section of the Plan seeks to reinforce and supplement the controls set out in Clause 5.9 Preservation of trees or vegetation of Penrith LEP 2010, which apply to the preservation of trees and vegetation in all areas of the City.

Note: The 'Development on natural resources sensitive land' clause in Penrith LEP 2010 and Section 2.2 Biodiversity Corridors and Areas of Remnant Indigenous Vegetation in Non-Urban Areas below contain additional provisions to protect and enhance biodiversity corridors and areas of remnant indigenous vegetation.

Objectives

a. To prescribe which species or kinds of trees or other vegetation are protected by Clause 5.9 Preservation of trees or vegetation of Penrith LEP 2010 and this section of the Plan;
b. To promote the benefits of trees and other vegetation;
c. To protect and enhance native vegetation, habitat for native fauna and biodiversity;
d. To protect and enhance native vegetation for its scenic values and to retain the unique visual identity of the landscape;
e. To manage non-native vegetation in accordance with its cultural and landscape significance;
f. To ensure that any new development takes into account existing vegetation in the site planning, design, development, construction and operation of the development; and
g. To ensure there are mechanisms for the long term protection, management and maintenance of trees and vegetation.

1. Development Consent

a. In accordance with Clause 5.9 of Penrith LEP 2010, a person must not ringbark, cut down, top, lop, remove, injure or wilfully destroy any tree or other vegetation which is prescribed by this Plan without development consent, or a permit granted by Council.

2. Prescribed Vegetation

a. The prescribed trees or other vegetation that are protected by Clause 5.9 of Penrith LEP 2010 and this section of the Plan include:
   (i) Any indigenous tree (both living and dead) or other vegetation that is on land zoned E2 Environmental Conservation in the Penrith LEP 2010 Land Zoning Map or natural resources sensitive land identified in the Penrith LEP 2010 Natural Resources Sensitivity Land Map.
   (ii) In residential areas, any tree or other vegetation having a height of 3m or more or a trunk diameter exceeding 100mm at 1400m above ground level.
   (iii) In business and industrial areas:
   - Any tree or other vegetation having a height of 3m or more or a trunk diameter exceeding 100mm at 1400mm above ground level.

   (iv) In rural areas:
   - Any tree or other vegetation, within 20m of a dwelling house, having a height of 3m or more or a trunk diameter exceeding 100mm at 1400mm above ground level.
   - Any indigenous tree or vegetation, not within 20m of a dwelling house. Note: clearing of vegetation will only be considered where it is proposed in conjunction with a use permissible on that land.
   - Any introduction vegetation, not within 20m of a dwelling house, having a height of 3m or more or a trunk diameter exceeding 100mm at 1400mm above ground level.

   (v) Any tree or other vegetation that is, or forms part of, a heritage item or is within a heritage conservation area.

b. Clause 5.9 of Penrith LEP 2010 and this section of the Plan do not apply to:
   (i) A tree or other vegetation that the Council is satisfied is dying or dead and is not required as the habitat for native fauna;
   (ii) Tree or other vegetation that the Council is satisfied is a risk or imminent threat to human life or property;
   (iii) A tree or other vegetation where the trunk is located within 2m of an existing dwelling, as measured from the main trunk of the tree or other vegetation to an external enclosing wall of the existing dwelling;
   (iv) The list of exempt trees and vegetation provided in Appendix F5 – Technical Information of this Plan;
   (v) A tree that is an edible fruit tree requiring annual pruning or is a tree within a timber plantation;
   (vi) the pruning or removal of trees and other vegetation on Council owned or managed land provided the work is undertaken by persons authorised by Council, and is in accordance with Council approved works, a Council policy or a Plan of Management, AS 4373-2007 (Australian Standard – Pruning of Amenity Trees) and statutory approvals;
   (vii) Action required or authorised to be done by or under the *Electricity Supply Act 1995*, the *Roads Act 1993* or the *Surveying and Spatial Information Act 2002*;
   (viii) Plants declared to be noxious weeds under the *Noxious Weeds Act 1993*. (See the Department of Primary Industries website);
   (ix) The removal of trees and other vegetation to control declared pests under the *Local Land Services Act 2013*. (Species currently declared pests in NSW are wild rabbits, wild dogs, feral pigs and a number of locust species); and
   (x) The removal of trees and other vegetation to maintain approved dams or asset protection zones.

c. Where vegetation works (including tree removal) are proposed as part of other works on the site for which consent is required, the works then must be assessed as part of the Development Application.

Submission Requirements

a. An application for development consent may require different levels of information, depending on:
   (i) The location and extent of the proposed works;
   (ii) Whether the site contains any threatened species, population, ecological community or its habitat.

   The level of information required to be submitted with the application will also depend on these factors.

b. Applicants should consult with Council's Development Services Department or Tree Management Officer for advice

   A species impact statement will be required if Council determines that the works are likely to have a significant effect on any threatened species, population or ecological community or its habitat. For some works, Council may require a report from a suitably qualified arborist.

   Note: A Flora and Fauna Assessment report will be required for any Development Application for works to any indigenous trees and vegetation comprising 5 or more native trees with understorey or when there is the potential for Threatened Species or Endangered Ecological Communities to be present.

c. A tree survey and assessment report should address the following matters:
   (i) The location and type of tree(s) or vegetation;
   (ii) Details of the proposed works and the reasons for the works;
   (iii) The health and condition of the tree(s) or vegetation, including its structural soundness and the condition of the root zone;
   (iv) The aesthetic, scientific and/or historic importance of the tree(s) or vegetation;
   (v) The impact of the proposed work on the appearance, health or stability of the tree(s) or vegetation and the general amenity of the surrounding area, including any effect on the streetscape;
   (vi) In the case of an application to remove a tree(s) or vegetation, whether pruning would be a more practicable and desirable alternative;
   (vii) The risk of personal injury;
   (viii) The risk of damage to buildings, structures or services;
   (ix) The extent of other trees and vegetation on the property;
   (x) Whether the tree(s) or vegetation is habitat, a source of food or shelter, or used by fauna; and
   (xi) Whether all alternatives to removing or pruning the tree or vegetation have been considered.

d. In most cases, where works are proposed to any indigenous vegetation and require a development application, a flora and fauna assessment will be required. The report must be undertaken by a suitably qualified and experienced and must be prepared in accordance with the Threatened Species Assessment Guidelines – The Assessment of Significance for the Threatened Species Conservation Act (DECCW (OEH) 2007), the Threatened Species Survey and Assessment: Guidelines for developments and activities (working draft) (DEC, 2004), and the Significant Impact Guidelines – Matters of National Environmental Significance for the EPBC Act (prepared by the Commonwealth Department of Environment, Water, Heritage and the Arts, 2013). This report must include the following as a minimum:
   (i) A written and mapped description of the plant and animal species present and their habitats;

   (ii) A clear site plan showing, as a minimum, the proposed development and any associated Asset Protection Zone and Effluent Management Area, location of all vegetation, important site features and location of any vegetation to be removed.
   (iii) A statement of whether any of the plant and animal species or their habitats are listed as threatened, endangered or vulnerable species or communities under the Threatened Species Conservation Act 1995 or the Fisheries Management Act 1994.
   (iv) A description of the proposed vegetation works and, if the works are to be undertaken as part of the proposed development, a description of the proposed development, including measures to mitigate adverse impacts;

(v) An objective assessment to determine whether the proposed works and development are likely to significantly affect any threatened species, populations or ecological communities or their habitats. This assessment is required under Section 5A Significant effect on threatened species, populations or ecological communities or their habitats, of *Environmental Planning and Assessment Act 1979*. Section 5A lists the factors that must be taken into account in making such a determination; and

(vi) Consideration of the likely impacts the proposed works or development may have on any potential use of the vegetation as a fauna movement corridor. Where relevant, consideration of the importance of any rural dams for fauna habitats. The location of any APZ or Effluent Management Area should also be considered by the assessment.

(vii) If Council determines that the proposed works and/or proposed development are likely to have a significant effect, then a *Species Impact Statement* will be required. The *Species Impact Statement* must be prepared in accordance with the requirements of the *Threatened Species Conservation Act 1995*. Before preparing a *Species Impact Statement*, the requirements of the Office of Environment and Heritage and Council must be sought. Similarly, a *Species Impact Statement* must be prepared if there is likely to be a significant impact on threatened fish or marine vegetation protected under the *Fisheries Management Act 1994*.

(viii) Where vegetation works are proposed on land that is a heritage item or within a heritage conservation area, a heritage impact statement may be required in accordance with Clause 5.10 Heritage conservation of Penrith LEP 2010. In this regard, applicants should consult with Council's Development Services Department.

Trees that are dying or dead

(a) Clause 5.9(5) of Penrith LEP 2010 states that it does not apply to a tree or other vegetation that the Council is satisfied is dying or dead and is not required as the habitat of native fauna. The terms 'dead', 'dying' and 'Council's satisfaction' are defined in Appendix F1 – Definitions.

(b) If the proposed works involve removing dead or dying trees or vegetation, Council's Development Services Department or Tree Management Officer must first be consulted.

Trees that are causing a Risk to Life or Property

(a) Clause 5.9(6) of Penrith LEP 2010 states that Clause 5.9 does not apply to a tree or other vegetation that the Council is satisfied is a risk to human life or property.

(b) If the proposed works involve undertaking work to a tree or other vegetation that is a risk or imminent threat to human life or property, Council's Development Services Department or Tree Management Officer must first be consulted.

(c) In relation to trees causing property damage, it must be demonstrated (e.g. by a report from a practising qualified structural engineer) that the tree, its trunk, or its root system is causing damage to a structure and the damage cannot be controlled by measures such as the installation of a root barricade.

Site Planning and Design

The following controls apply where the removal of trees and other vegetation is proposed as part of a development application for a proposed use permissible under the relevant zone of Penrith LEP 2010:

(a) The siting and layout of a development should consider, at the initial concept stage, the location of trees and other vegetation and favour their retention.

(b) Buildings, Asset Protection Zones and Effluent Management Areas are to be sited on existing cleared land, where possible.

(c) Where a stand of trees is to be retained, any associated native understorey should also be retained.

(d) Trees and vegetation should be retained on steeply sloping sites (slopes greater than 20%) or where there is unstable soil to minimise erosion or geo-technical instability. (See also the controls in the Land Management section of this Plan relating to Geotechnical Stability).

(e) Trees and vegetation must be retained along watercourses (See also the controls in the Water Management section of this Plan, relating to Riparian Corridors).

(f) An application is required to address the effect of the proposed development on existing vegetation, the landscape character and the scenic quality of the locality.

(g) Trees and vegetation must be retained where they shield existing or proposed buildings from views from public areas.

(h) Trees and vegetation must be retained where they form part of the landscape character of an area, including on or near ridgelines.

(i) Any proposed building should be setback a minimum of 3m from the trunk of any retained tree. Council may consider a variation to this setback depending on the type and size of the tree.

(j) Hard (or impervious) surfaces are not permitted under the drip line of any tree. The term ‘drip line’ is defined in Appendix F1 – Definitions.

(k) Services (and particularly pipes carrying water/moisture) must not be located in the drip line of an existing tree.

(l) Wherever trees or vegetation are removed (with consent) as a consequence of the development, an equal or greater number of replacement trees that grow to a similar or greater height or canopy should, where practical, be incorporated into the landscaping design of the new development.

(m) The siting and layout of a development should also consider, at the initial concept stage, bushfire risk. (See 2.3 ‘Bushfire Management’ below).

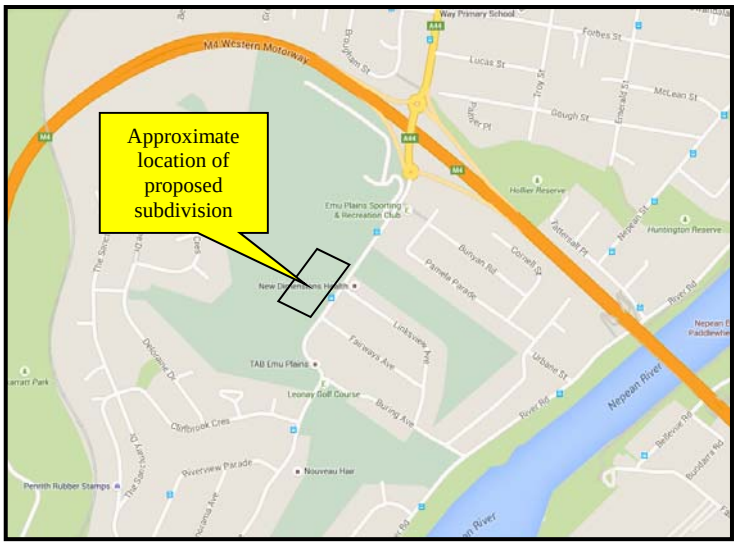
Protection of Trees during Construction

(a) During construction, an adequate fence or similar structure must be constructed around any trees or vegetation to be retained, at a distance at least equal to the drip line. This area must not be used by machinery, for stockpiling wastes or for storage of any building materials. This will help protect the tree or vegetation from soil compaction and contamination; root, trunk and limb damage; and changes in surface levels that affect the health of the tree or vegetation. (See the Landscape Design section of this Plan for further details).

(b) Tree protection must be in accordance with Australian Standard AS 4970-2009 Protection of trees on development sites.

4.0 OBSERVATIONS

4.1 The site is part of Lot 110 in DP1135581, Leonay and will be known as 1A Leonay Parade. It is to be bounded on the north, south, west Leonay Golf Course and on the southeast by Leonay Parade. The surrounding areas are mainly comprised of urban residential development



Map 1 – showing location of subject site (Google Maps 2018)

Map 2 – showing subject trees (Google Maps 2018)

4.2 The soil of the general has been described by Bannerman & Hazelton as 'Richmond' soil landscape, and occurs on the higher Quaternary terraces of the Hawkesbury, Nepean and Georges Rivers. It is a Quaternary alluvium consisting of sand, silt and gravels derived from sandstone and shales, forming poorly structured orange to red clay loams, clays and sands. The texture may increase with depth. Ironstone nodules and hardened iron rich layers may be present. (Bannerman 1990)

Topsoil: Up to 40cm of reddish brown loamy sand with apedal single-grained structure and porous sandy fabric (bt1) overlies 40 – 100cm of brown sandy clay loam with apedal massive structure and earthy fabric (bt2). The bt2 may occasionally be absent. Roots are common near the surface of bt1 but are rare at depth.

Subsoil; Brown mottled light clay with apedal massive structure (bt3) overlies brown mottled stiff medium – heavy clay (bt4). Small iron-indurated gravels may occur in concentrated bands or dispersed throughout bt3. The subsoil is stratified with alternating layers of bt3 & bt4.

4.3 Current Condition of the Trees

Tree 15 is a mature *Eucalyptus tereticornis* – Forest Red Gum is a medium-sized to tall forest tree with a straight trunk, ascending major branches and a large open crown. Extending from New Guinea to Victoria, it has the greatest latitudinal range of any Australian tree, occurring in open situations on well drained but moist alluviums often with clay subsoil, mostly on slopes and hillsides in the Sydney district (Fairley, A. & Moore, P. 1989

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 250mm (diameter at 1.4m above ground level), and forms a codominant canopy which is 20m in height, with a crown spread of 15x10m.
c. **Structural Condition:** Fair – Its lost its dominant leader and this has been replaced by two codominant ascending branches

Tree 16 is a mature *Eucalyptus tereticornis* – see description of tree No. 15

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 350mm and forms a codominant canopy which is <15m in height, with a crown spread of 13x12m.
c. **Structural Condition:** Poor – Its formed two codominant ascending branches with a weak junction and pointy nosed ribs at 4m high on the main trunk (see Plate 1)

Tree 17 is a mature *Eucalyptus tereticornis* – see description of tree No. 15

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 400mm and forms a codominant canopy which is 24m in height, with a crown spread of 13x14m.
c. **Structural Condition:** Poor – Its formed two codominant ascending branches with a weak junction and pointy nosed ribs at 4m high on the main trunk (see Plate 2)

Tree 26 is a mature *Eucalyptus microcorys* – 'Tallow-wood is a medium to very tall forest tree and is abundant along north coastal NSW and coastal south-eastern Qld from about Newcastle to Maryborough (Brooker & Kleinig 1993). 'It occurs in sheltered forests of the Eastern Slopes of the Great Dividing Range in high rainfall areas and forms a tall tree to 30-45 m, with a clean straight trunk to 1m or more in width, and an irregular open crown; but of smaller stature on open sites' (Rowell, R. 1980)

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 250mm and forms a codominant canopy which is 12m in height, with a crown spread of 12x9m.
c. **Structural Condition:** Fair – Its formed two codominant ascending branches with a weak junction at 4m high on the main trunk

Tree 30 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 350mm and forms a codominant canopy which is 22m in height, with a crown spread of 11x10m.
c. **Structural Condition:** Average

Tree 36 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 250 and forms a codominant canopy which is<15m in height, with a crown spread of 10x7m.
c. **Structural Condition:** Average

Tree 49 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Low – Its foliage density is considered to be sparse for the species, with minor symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 300mm and forms a codominant canopy which is <15m in height, with a crown spread of 10x9m.
c. **Structural Condition:** Fair – Its formed two codominant ascending branches with a weak junction at 3m high on the main trunk

Tree 50 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of three codominant stems; two with DBH of 200mm and one with a DBH of 250mm. These combine to form a codominant canopy which is <15m in height, with a crown spread of 12x11m.
c. **Structural Condition:** Fair – Its formed two codominant ascending branches with a weak junction at 1.5m high on the main trunk

Tree 54 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 350mm and forms a codominant canopy which is 16m in height, with a crown spread of 12x12m.
c. **Structural Condition:** Fair **–** Its formed three codominant ascending branches with a weak junction at 1m high on the main trunk

Tree 57 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 300mm and forms a codominant canopy which is <15m in height, with a crown spread of 12x12m.
c. **Structural Condition:** Average

Tree 58 is a mature *Eucalyptus microcorys* – see description of tree No. 26

a. **Health & Vitality:** Poor **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 300mm and forms a codominant canopy which is <15m in height, with a crown spread of 12x12m.
c. **Structural Condition:** Fair – Its formed two codominant ascending branches with a weak junction at 5m high on the main trunk

Tree 60 is a mature *Eucalyptus tereticornis* – see description of tree No. 15

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 500mm (diameter at 1.4m above ground level), and forms a dominant canopy which is 22m in height, with a crown spread of 19x18m.
c. **Structural Condition:** Fair **–** Numerous trunk cankers have formed along the main trunk

Tree 61 is a mature *Eucalyptus tereticornis* – see description of tree No. 15

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with DBH of 350mm, and forms a dominant canopy which is 20m in height, with a crown spread of 10x14m.
c. **Structural Condition:** Poor – This tree has formed two stems with a weak junction at 5m high on the main trunk (see Plate 10)

Tree 62 is a semi-mature *Allocasuarina torulosa* – 'Forest Oak occurs on the coastal ridges and slopes of the table lands of NSW and southern Qld. It forms an evergreen tree to 18 – 20m on the deep fertile soils of its native habitat, but on the Hawkesbury sandstones, then 8 – 12m tall' (Rowell, R.1980)

a. **Health & Vitality:** Normal **–** Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of two (2) codominant stems with a DBH of 250mm, and forms an asymmetrical canopy towards the west which is 17m in height, with a crown spread of 6x5m.
c. **Structural Condition:** Average

Tree 63 is an over-mature *Eucalyptus sideroxylon* – 'Mugga Mugga Ironbark: Small to medium sized woodland or forest tree widespread on the western slopes and plains of NSW, and west of Sydney towards the Blue Mountains' (Brooker & Kleinig 1993). 'It is a typical Ironbark, of erect form to 25m or so high when grown on better class soils, but shorter and denser to 10-12 m on dry ridges and poor, gravel soils, the branches and twigs pendulous. It is an attractive and useful species for parks, large gardens and roadside planting.

a. **Health & Vitality:** Low **–** the foliage is becoming sparse, with significant dieback in the eastern side of its canopy
a. **Tree Form & Habit:** Its structure is comprised of a single stem with a DBH of 500mm, and forms a significant asymmetrical canopy towards the west which is 20m in height, with a crown spread of 21x12m.
b. **Structural Condition:** Poor **–** Branch with a diameter of 300mm has failed on the main trunk (see Plates 11 & 12)

Tree 64 is a semi-mature *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** Its comprised of a two (2) codominant stems with DBH's of 250mm, and forms a dominant canopy which is m in height, with a crown spread of 5x10m
c. **Structural Condition:** Average

Tree 65 is a semi-mature *Eucalyptus microcorys* – 'Tallow-wood is a medium to very tall forest tree and is abundant along north coastal NSW and coastal south-eastern Qld from about Newcastle to Maryborough (Brooker & Kleinig 1993). 'It occurs in sheltered forests of the Eastern Slopes of the Great Dividing Range in high rainfall areas and forms a tall tree to 30-45 m, with a clean straight trunk to 1m or more in width, and an irregular open crown; but of smaller stature on open sites' (Rowell, R. 1980)

a. **Health & Vitality:** Normal **–** Its foliage density and colour appears to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with a DBH of 600mm, and forms an asymmetrical canopy towards the northwest which is 25m in height, with a crown spread of 22x22m.
c. **Structural Condition:** Poor – It has an asymmetrical canopy towards the northwest, with a natural trunk lean of 10°. In addition, it has a weak junction at 3m high on the main trunk (see Plates 13 & 14)

Tree 66 is an over--mature *Eucalyptus tereticornis* see description of tree No. 60

a. **Health & Vitality:** Low – Its foliage density is considered to be sparse for the species, with minor symptoms of decline
b. **Tree Form & Habit:** It's structure is comprised of a single stem with a DBH of 500mm, and forms a codominant canopy which is 25m in height, with a crown spread of 20x20m
c. **Structural Condition:** Poor – It has a history of four (4) branch failures throughout its canopy. These had average diameters of 150mm (see Plates 15 & 17)

Tree 67 is an *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's structure is comprised of a single stem with a DBH of 300mm and forms a codominant canopy which is 12m in height, with a crown spread of 7x3m
c. **Structural Condition:** Fair – Suppressed by No. 66 (see Plate 17)

Tree 68 is a semi-mature *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with a DBH of 150mm, and forms a heavily supressed canopy codominant canopy which is 8m in height, with a crown spread of 2x2m
d. **Structural Condition:** (see Plate 18)

Tree 69 is a suppressed *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with a DBH of 120mm, and forms a heavily supressed canopy which is 8m in height, with a crown spread of 2x2m.
c. **Structural Condition:** Fair – Suppressed by No. 66 (see Plate 18)

Tree 70 is a suppressed *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of a single stem with a DBH of 300mm, and forms a heavily supressed canopy which is 7m in height, with a crown spread of 8x8m.
c. **Structural Condition:** Fair – Suppressed by No. 66 (see Plates 18 & 21)

Tree 71 is a mature *Eucalyptus microcorys* – See description of tree No. 65

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's comprised of single stem with a DBH of 650mm, and forms a dominant canopy which is 23m in height, with a crown spread of 22x24m.
c. **Structural Condition:** Fair – Suppressed by No. 66 (see Plates 16, 19 & 20)

Tree 72 is a mature *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** Its comprised of a single stem with a DBH of 250mm, and forms a codominant canopy which is 17m in height, with a crown spread of 10x10m
c. (see Plates 18 & 23)

Tree 73 is a suppressed *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's of a single stem with a DBH of 400mm, and forms a codominant canopy which is 19m in height, with a crown spread of 10x11m
c. **Structural Condition:** Fair – codominant junction at 2.5m high on main trunk (see Plates 21 & 23)

Tree 74 is a dead *Allocasuarina torulosa* **–** see description of tree No. 62

a. This tree is dead and has been scheduled to be removed (see Plates 23 & 24)

Tree 75 is a suppressed *Allocasuarina torulosa* **–** see description of tree No. 62

b. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
c. **Tree Form & Habit:** It's comprised of two (2) codominant stems with a DBH of 250 and 350mm, and forms a codominant canopy which is 14m in height, with a crown spread of 12x10m.
d. **Structural Condition:** Average (see Plates 23 & 24)

Tree 76 is a mature *Allocasuarina torulosa* **–** see description of tree No. 62

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** Its structure is comprised of a single stem with a DBH of 550mm, and forms a codominant canopy which is 21m in height, with a crown spread of 19x19m.
c. **Structural Condition:** Average (see Plate 25)

Tree 77 is semi mature *Pinus* sp

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's structure is comprised of two (2) codominant stems with a DBH of 220 and 180mm, and forms a codominant canopy which is 11m in height, with a crown spread 9x7
c. **Structural Condition:** Average (see Plate 26)

Tree 78 is a mature *Eucalyptus microcorys* – See description of tree No. 65

a. **Health & Vitality:** Normal – Its foliage density, size and colour appear to be generally healthy and growing vigorously, with no significant visible symptoms of decline
b. **Tree Form & Habit:** It's structure is comprised of a single stem with a DBH of 400mm, and forms a codominant canopy which is 15m in height, with a crown spread of 15x12m
c. **Structural Condition:** Average (see Plate 26)

Tree 79 is a mature *Eucalyptus microcorys* – See description of tree No. 65

a. **Health & Vitality:** Poor – Its foliage density is sparse with a significant amount of deadwood through its canopy
b. **Tree Form & Habit:** It's structure is comprised of a single stem with a DBH of 450mm, and forms a codominant canopy which is 16m in height, with a crown spread of 13x13m
c. **Structural Condition:** Fair – Codominant junction at 2.5m high on the main trunk (see Plate 27)

Plate 1 – showing tree No. 16

Plate 2 – showing tree No. 17

Plate 3 – showing tree No. 28 (dead)

Plate 4 – showing tree No. 29 (twig dieback)

Plate 5 – showing tree No. 32 (dead)

Plate 6 – showing tree No. 41 (dead)

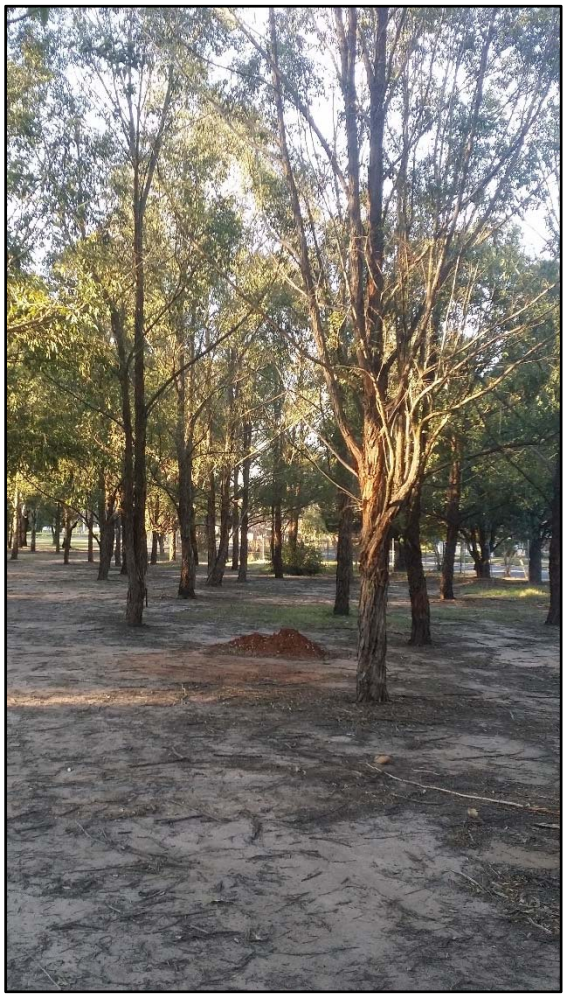


Plate 7 – showing tree No. 47 (dieback)

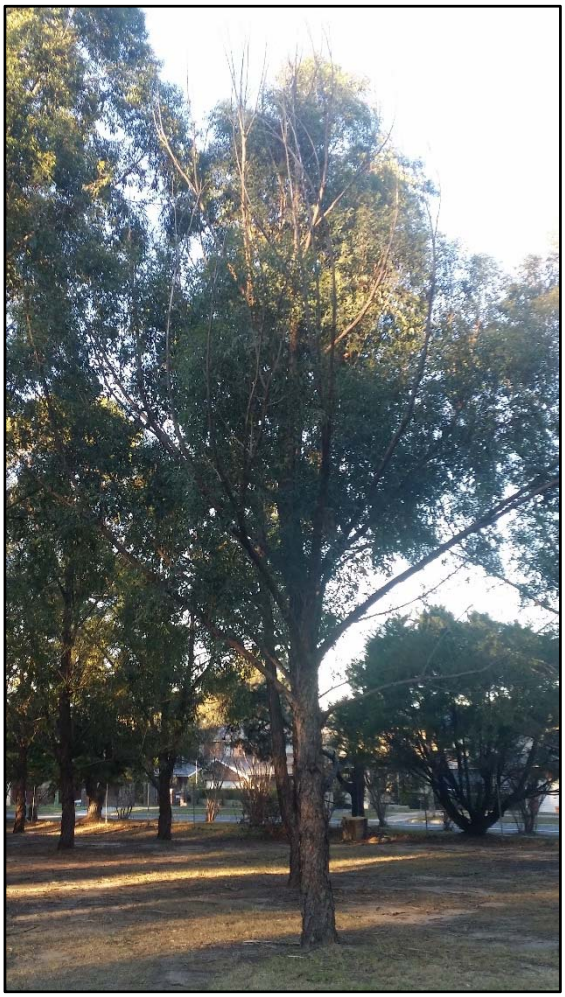


Plate 8 – showing tree No. 59 (dieback)

Plate 9 – showing tree No. 60

Plate 10– showing tree No. 61

Plate 11 – showing canopy of tree No. 63

Plate 12 – showing failed branch on tree No. 63

Plate 13 – showing canopy of tree No. 65

Plate 14 – showing weak junction on tree No. 65

Plate 15 – showing tree No. 66

Plate 16 – showing tree No. 71

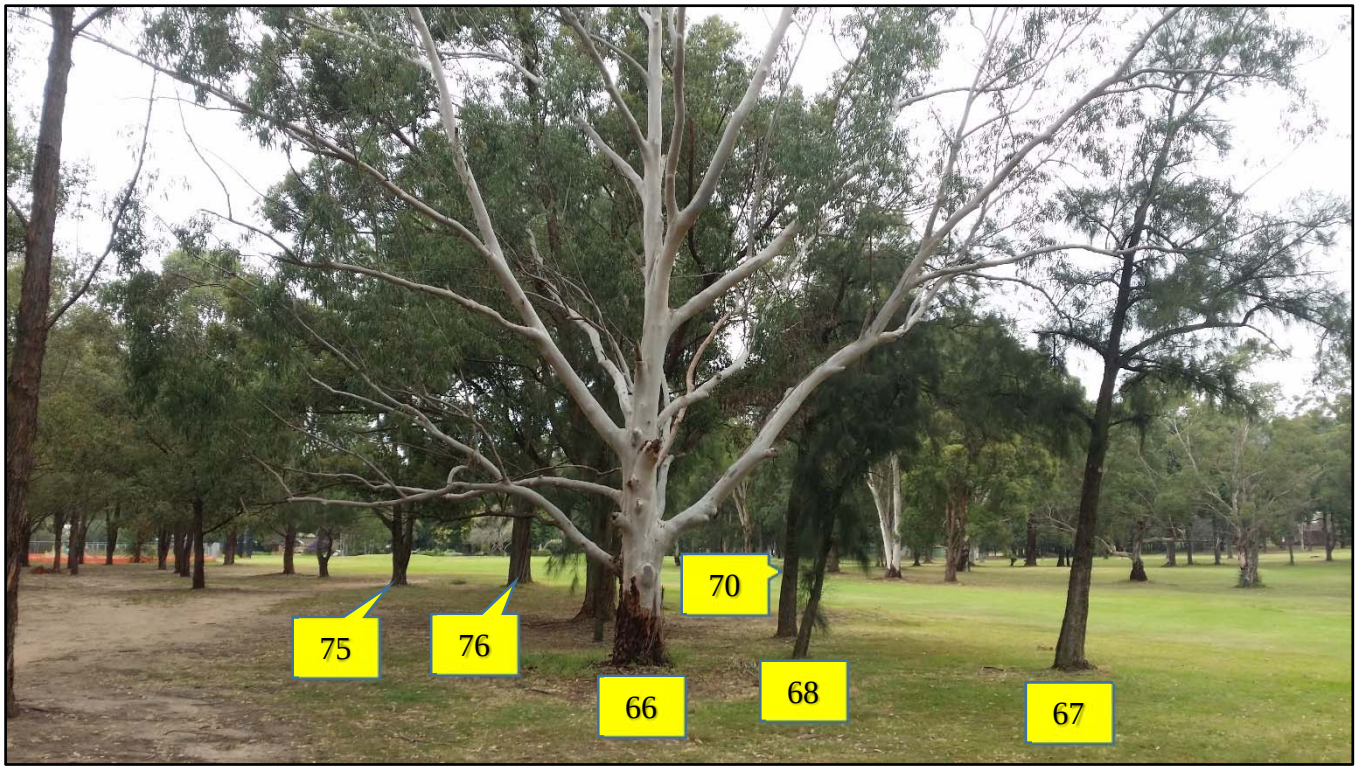


Plate 17 – showing tree No's 66 – 70, 75 & 76

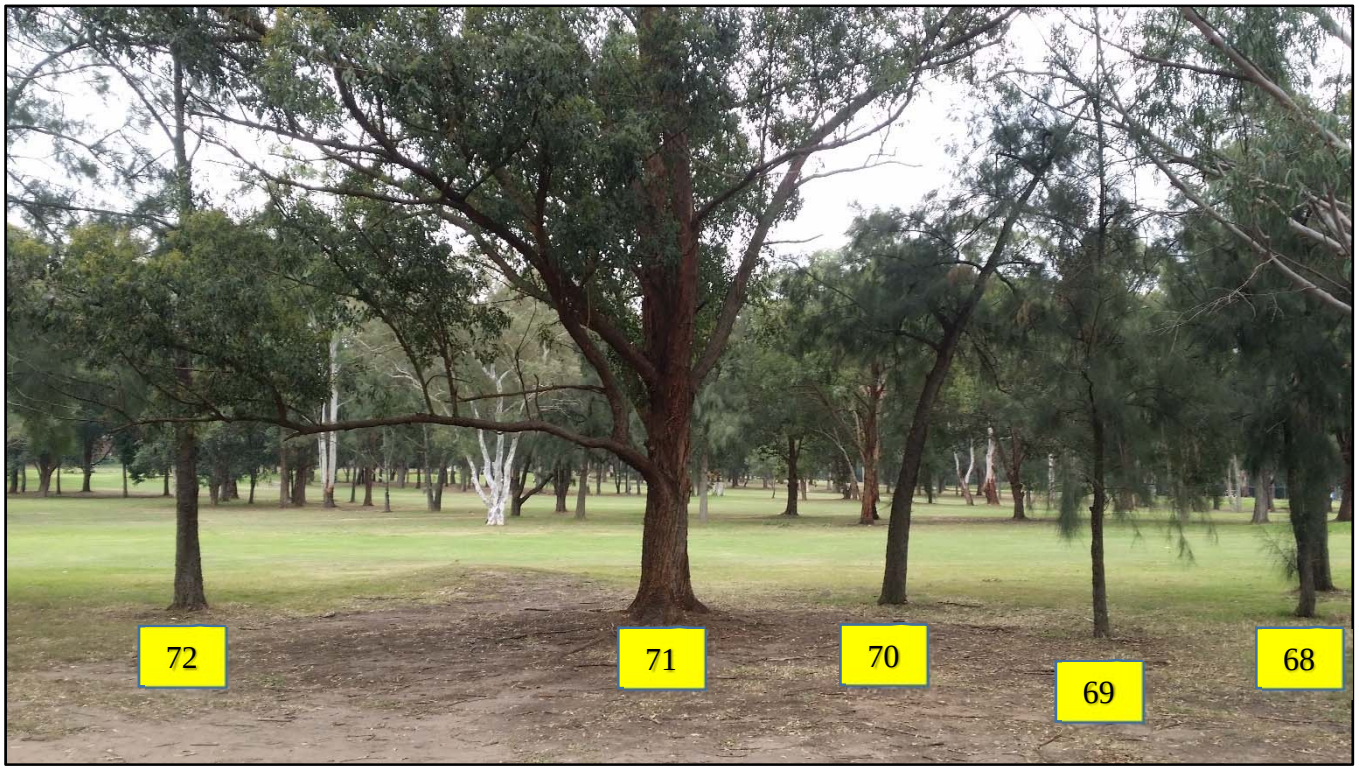


Plate 18 – showing tree No's 68 – 72


Plates 19 & 20– showing lightning earth strip on tree No. 71

Plate 21 – showing tree No. 71

Plate 22 – showing tree No. 73

Plate 23 – showing tree No. 72 - 76

Plates 24 & 25 – showing tree No's 73 - 76

Plate 26 – showing tree No's 77 & 78

4.5 Retention Vales of the Subject Tree/s

Sustainable Retention Index Value (SRIV©) considers its age class, condition class, vigour class and its sustainable retention with regard to the safety of people or damage to property. The ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement is also considered (See Matrix in Appendices 9.2).

Unfortunately, like all methodologies used to assess trees, not all trees fit neatly into a category. For example, SRIV doesn't give consider the negative attributes that an individual tree may have, or of its suitability for the location.

- Tree No's 15, 26, 30, 36, 60, 62, 71, 72, 75, 76 & 77 have retention values of a MGVG (10) – Mature tree in good health and condition with a retention value index of 10 – Retainable in the medium to long term

- Tree No's 50, 54, 57, 58, 61, 65, 67, 68, 69, 70, 73 & 79 have retention values of MGVF (9) – Mature tree in good vitality and fair condition; 'Suitable for retention in the medium term, potential for longer with improved growing conditions

- Tree No's 16, 17 have retention values of MGVP (6) – Mature tree in good vitality and poor condition; 'Retainable in the short term

- Tree No. 64 & 66 have retention values of MLVF (4) – Mature tree in low vigour and fair condition; 'Retainable in the short term

- Tree No. 63 & 68 have a retention values of OLVF (2) – Over-mature tree in low vigour and fair condition: 'Retainable in the short term

- Tree No. 65 has a retention value of OLVP (0) – Likely to be removed immediately or retained in the Short Term

4.6 Safe Life Expectancy of the Tree (TreeA/Z)

'TreeAZ' is a systematic method of assessing whether individual trees are important, and how much consideration should be given to them in management decisions. It views each tree as being worthy of 'consideration' in the planning process, not automatically as a 'constraint' on development. Each tree is considered against a standard list of thirteen (13) negative attributes. If a tree fails any of these tests, it is categorised as 'Z' and further analysis stops. If it passes all attributes, it is categorised as 'A', and is then viewed as a constraint on the development.

Tree No's 15, 60, 62, 64, 71, 72, 75, 76, 77 & 78 are categorised as A1

- Explanation of A1 'No significant defects and could be retained with minimal remedial care for at least 10 years

Tree No. 74 is categorised as Z4 as it is dead.

- Explanation of Z4 – 'Dead, dying, diseased or declining – unsuitable for retention'

'Trees that are unlikely to recover from a serious health problem. The condition must be terminal with no obvious potential to recover; e.g. severe crown dieback related to excavation damage or root decay to the extent that the structural branch framework is compromised. Trees that are likely to recover or improve should not be placed in this category, e.g. trees suffering from a foliar problem that has little impact on the branch framework, and may vary from year to year' (Barrell (2006).

Tree No's 16, 17, 61, 63, 65 are categorised as Z5

- Explanation of Z8 – Severe damage or structural defects that cannot be properly addressed by remedial care including cavities, decay, weak junctions, wounds and excessively unbalanced

'*Severe means that there is no realistic chance of the tree achieving its full potential with an acceptable level of risk. In many cases, acceptable levels of risk can be achieved by dramatic reduction in tree size, but this has severe health, maintenance cost and amenity implications, so it would not be considered to be a sustainable management option'* (Barrell (2006).

Tree No's 67, 68, 69, 70, 73 & 79 are categorised as Z8

- Explanation of Z8 – Poor trees with no potential to improve;

'*It is common to find trees that are obviously unsuitable for long term retention for many reasons, including poor health, sever imbalance, tall, thin forms, or they have no realistic potential to improve. However, the problems are not so severe that they represent an immediate risk, and they shouldn't be discounted for this reason. The Z8 category is for these trees and relies on the principle of sustained amenity to justify the allocation. The short term retention of a tree that is obviously not going to improve and poses an ongoing level of risk is not good tree management and is just delaying its inevitable removal*' (Barrell (2006).

4.7 Recommended Setbacks Required Under AS 4970 (2009)

Australian Standard (4970) '*Protection of Trees on development Sites*' (2009) provides the recommended setback that a tree requires from development activities (See Appendices 9.5).

The following table provides a summary of the setbacks required by the subject tree/s in order to minimise impacts on their health and stability.

- Column 2 provided the diameter of the trunk at 1.4m above ground level (DBH)
- Column 3 provides the radius of its Tree Protection Zone (TPZ). It is measured from the centre of the trunk (COT), and is based upon the recommendations in AS 4970 (2009).
- Column 4 provides its Root Crown Diameter (RCD)
- Column 5 provides the radius of its Structural Root Zone (SRZ) and is based on AS 4970 (2009). It represents the mechanical functions of a structural root plate, regardless of species, and the minimum setback between a tree and infrastructure to reduce impacts on its stability.
- Column 6 provides the recommended setbacks of a tree from infrastructure to minimise damage from interactions with main woody transport roots (Cutler, D. 1995).

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Tree No.	DBH (mm)	**TPZ (m)**	RCD (mm)	**SRZ (m)**	Radius of Primary Woody Root Zone	Encroachment into TPZ
15	250	**3.0**	400	**2.3**	6.09	<10%
16	350	**4.2**	400	**2.3**	6.09	<10%
17	400	**4.8**	500	**2.5**	7.6	<15%
26	250	**3.0**	300	**2.0**	4.57	<30%
30	350	**4.2**	450	**2.4**	7.01	<30%
36	250	**3.0**	300	**2.0**	4.57	<20%
49	300	**3.6**	350	**2.1**	5.48	<30%
50	650	**6.5**	450	**2.4**	7.01	>30%
54	350	**4.2**	450	**2.4**	7.01	>30%
57	300	**3.6**	350	**2.1**	5.48	>30%
58	300	**3.6**	400	**2.3**	6.09	>30%
60	500	**6.0**	700	**2.8**	10.36	0%
61	350	**4.2**	450	**2.4**	7.01	0%
62	2x 250	**6.0**	400	**2.3**	6.09	0%
63	500	**6.0**	700	**2.8**	10.36	<20%
64	2x 250	**5.0**	400	**2.3**	6.09	0%
65	600	**7.2**	700	**2.8**	10.36	<10%
66	500	**6.0**	750	**2.9**	11.58	0%
67	300	**3.6**	400	**2.3**	6.09	0%
68	150	**1.8**	250	**1.8**	3.39	0%
69	120	**1.4**	200	**1.7**	3.04	0%
70	300	**2.3**	400	**2.3**	6.09	0%
71	650	**7.8**	800	**3.0**	12.19	<10
72	250	**3.0**	400	**2.3**	6.09	0%

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Tree No.	DBH (mm)	**TPZ (m)**	RCD (mm)	**SRZ (m)**	Radius of Primary Woody Root Zone	Encroachment into TPZ
73	400	**2.4**	450	**2.4**	7.01	0%
74	250	**3.0**	350	**2.1**	5.48	0%
75	250/350	**6.0**	500	**2.5**	7.6	<10%
76	550	**6.6**	700	**2.8**	10.36	0%
77	220/180	**4.0**	400	**2.3**	7.01	<10%
78	400	**6.0**	500	**2.5**	7.6	<10%
79	450	**5.4**	550	**2.6**	8.5	>30%

Table 1 – showing recommended Tree Protection Zones in accordance with AS 4970 (2009)

5.0 DISCUSSION

The proposed site plan on Page shows that tree No's 18 – 25, 27 – 29, 31 & 31A, 32 – 35, 37 – 48, 51 – 53, 55 & 56 are located within the footprint of the proposed development, and they have been scheduled to be removed.

Tree No's 15 – 17, 26, 30, 36, 49, 50, 54, 57, 58 & 60 – 79 have been scheduled for retention

5.1 Arboricultural Impacts of the Proposed Development

The recommended Tree Protection Zones (TPZ's) of the trees being proposed for retention were calculated in Table No. 1 and drawn to scale on the proposed Site Plan on Page 54. Potential impacts on the trees have been calculated by using Table 2

Impacts of Encroachment into a TPZ	
0 – 10% encroachment	No significant impact
10 – 20% encroachment	Low impact
20 – 25% encroachment	Moderate impact
25 – 30% encroachment	High impact
>30%	Significant impact (see SRZ)

Table 2 – Potential Impacts on Subject Trees

5.1.1 Encroachments into the Tree Protection Zones

- The proposed development encroaches into the Tree Protection Zones (TPZ's) of tree No's 15 & 16, 60 – 62 & 64 – 78 by less than 10%, and this is considered to be an insignificant impact on their safe life expectancies.

- It encroaches into the TPZ's of tree No's 36 & 63 by less than 20%, and this is considered to be a low impact on their safe life expectancies

- It encroaches into the TPZ's of tree No's 26 & 30 by less than 30%, and this is considered to be a high impact on their safe life expectancies

- It encroaches into the TPZ's of tree No's 50, 54, 57, 58 & 59 by more than 30%, and this is considered to be a significant impact on their safe life expectancies.

5.1.2 Encroachments into the Structural Root Zones

- The footprint of Unit No. 1
- The footprint of Unit No. 3
- The footprint of Unit No 5 36
- The footprint of Unit No 6 30
- The footprint of Unit No 6 30
- The footprint of Unit No 7 26
- The footprint of Unit No. 8 encroaches into the Structural Root Zones of tee No's 15 – 17 & 63

5.2 Suitability of Trees for Retention

- Tree No's 15, 26, 30, 36, 50, 54, 57, 58, 60, 61, 62, 71, 72, 65, 67, 68, 69, 70, 73, 75, 76 & 79 are considered suitable for retention in the medium to long term

- Tree No's 16, 17, 63, 64, 66 & 68 are considered suitable for retention in the short term

- Tree No. 65 has a retention value of OLVP (0) – Likely to be removed immediately or retained in the Short Term

6.0 CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusions

The proposed site plan on Page 55 shows that tree No's 18 – 25, 27 – 29, 31 & 31A, 32 – 35, 37 – 48, 51 – 53, 55 & 56 are located within the footprint of the proposed development, and they have been scheduled to be removed.

These health and condition of this group of trees was assessed in April 2019. The majority of them were very sparsely foliage and appeared to be in advanced stages of decline. They were reviewed in June 2019 as new growth was being produced from axillary buds and epicormic growth, but four had completely died, and a few had considerable amounts of dieback in their canopies.

The soil in the vicinity of the worst effected trees is bare, poorly drained, very heavily compacted with no visible organic layer, and these are unsuitable growing conditions for *Eucalyptus microcorys* (see Plates 3 - 8)

Tree No's 15 – 17, 26, 30, 36, 49, 50, 54, 57, 58 & 60 – 79

6.1.1 Suitability of Trees being proposed for Retention

- Tree No's 15, 26, 30, 36, 50, 54, 57, 58, 60, 61, 62, 71, 72, 65, 67, 68, 69, 70, 73, 75, 76 & 79 are considered suitable for retention in the medium to long term
- Tree No's 16, 17, 63, 64, 66 & 68 are considered suitable for retention in the short term
- Tree No. 65 has a retention value of OLVP (0) – Likely to be removed immediately or retained in the Short Term

6.1.2 Encroachments into the Tree Protection Zones

- The proposed development encroaches into the Tree Protection Zones (TPZ's) of tree No's 15 & 16, 60 – 62 & 64 – 78 by less than 10%, and this is considered to be an insignificant impact on their safe life expectancies.
- It encroaches into the TPZ's of tree No's 36 & 63 by less than 20%, and this is considered to be a low impact on their safe life expectancies
- It encroaches into the TPZ's of tree No's 26 & 30 by less than 30%, and this is considered to be a high impact on their safe life expectancies
- It encroaches into the TPZ's of tree No's 50, 54, 57, 58 & 59 by more than 30%, and this is considered to be a significant impact on their safe life expectancies.
- Tree No. 58 is located within the footpath on the south-eastern side of Unit No. 1

6.1.3 Encroachments into the Structural Root Zones

- The footprint of Unit No. 1 encroaches into the Structural Root Zones of tree No's 54, 57 & 58
- The footprint of Unit No. 3 encroaches into the Structural Root Zones of tree No's 49 & 50
- The footprint of Unit No 5 encroaches into the Structural Root Zones of tree No's 30 & 36
- The footprint of Unit No 6 encroaches into the Structural Root Zones of tree No's 30
- The footprint of Unit No 6 encroaches into the Structural Root Zones of tree No's 26

- The footprint of Unit No 7 encroaches into the Structural Root Zones of tree No's 26

- The footprint of Unit No. 8 encroaches into the Structural Root Zones of tree No's 15 – 17 & 63

6.1.4 Minimising Arboricultural Impacts of the Development

- Impacts of the development of trees proposed for retention can be reduced to acceptable levels if the following recommendations are complied with

6.2 Recommendations

- Due to the restricted nature of the site and limited access within it for construction activities, the installation of protective fencing will not be feasible. Instead, it is proposed to use ground protection to minimise impacts of compaction and damage to roots in accordance with Clause 7.3 and Figure 7.3 of the Tree Management Plan (TMP) in Appendices 9.5 of this report.

- Trunk protection is to be installed around tree No's 15, 16, 17, 26, 30, 36, 49 & 50 and 57 in accordance with Clause 6 and Figure 7.3 of the TMP

- All other trees will be adequately protected by the standard construction site fencing along the western boundary

- The proposed decking on the western sides of the units and elsewhere on the perimeter of the Units encroach into the Tree Protection Zones and Structural Root Zones of a number of trees being retained. The pier holes for all decking within the Structural Root Zones of any trees should be located and installed in accordance with Clause 10 of the TMP

- Post holes for boundary fencing within the Structural Root Zones of any trees should also be located and installed in accordance with Clause 10 of the TMP

- No Stormwater Plan has been provided for review, but any Stormwater infrastructure should be located and installed in accordance with Clause 11of the TMP

- Footpaths within the Tree Protection Zones and Structural Root Zones should be installed in accordance with Clause 13 of the TMP

If you require any further information, please feel free to contact me on 0439 758 658.

Lawrie Smith,
Arboricultural Consultant

7.0 REFERENCES

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8.0 TERMINOLOGY

8.1 AGE – Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as Young, Mature and Over-mature.

- **Young** Tree aged less 20% of life expectancy, in situ
- **Mature** Tree aged 20-80% of life expectancy, in situ.
- **Over-mature** Tree aged greater than >80% of life expectancy, in situ, or senescent with or without reduced vigour, and declining gradually or rapidly but irreversibly to death.

8.2 VIGOUR – The ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g. dormant, deciduous or semi-deciduous trees. Vigour can be categorized as High Vigour, Average Vigour, Low Vigour and Dormant Tree Vigour.

- **High Vigour –** Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

- **Average Vigour –** Normal ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.

- **Low Vigour –** Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the structural condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.

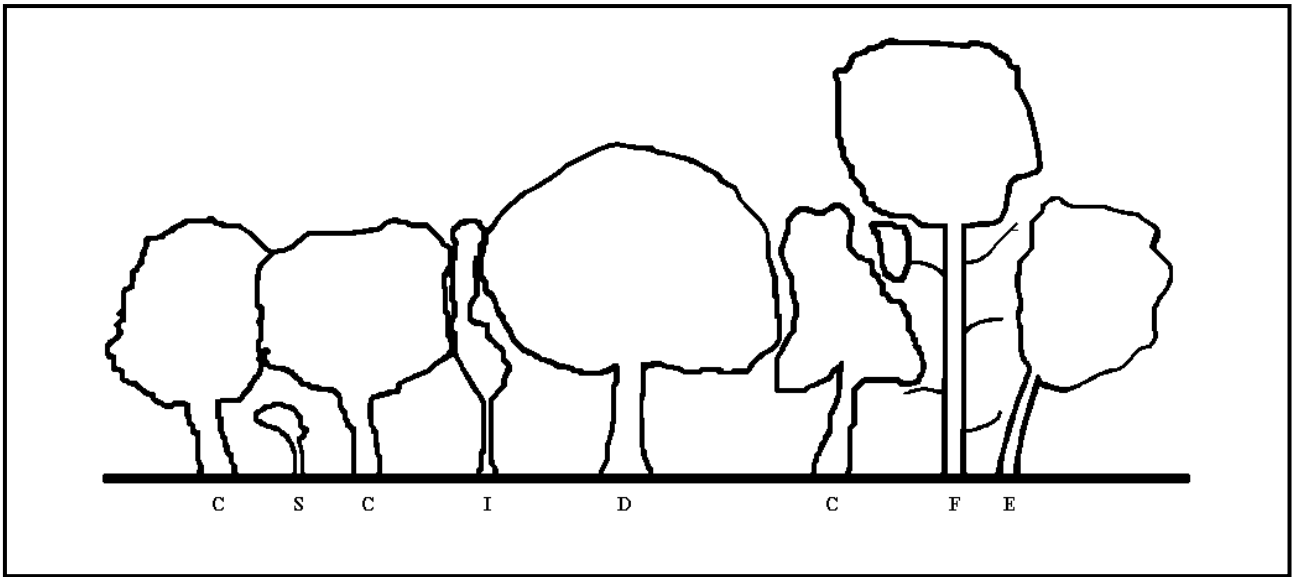
- **Dormant Tree Vigour –** Determined by existing turgidity in lowest order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.

8.3 TREE FORM

This refers to the growth habit of a tree, including its trunk and main structural branches, and their potential for failure.

- **Growth Habit** (Modified from Matheny, N. & Clarke, J. 1998)

Co-dominant	Trees that define the general upper edge of the canopy, receiving light primarily from above.
Dominant	Trees with crowns above the upper layer of the canopy and generally receiving light from above and the sides.
Edge-Type	Trees located on the edge of a more dominant canopy, and frequently possessing asymmetrical canopy (heavier on the open side) and trunks that bow out of the stand
Forest-type	Trees that have grown in a forest setting and only have about 1/3 of their canopy located on tall straight trunks
Intermediate	Trees that have been largely overtopped, but may receive some light from above.
Suppressed	Trees that have been overtopped, and become part of the understorey canopy
Understorey	Small trees and shrubs that form the understorey canopy.



D – Dominant I – Intermediate C – Co-dominant F – Forest
S – Suppressed E – Edge U – Forms part of the understorey canopy

8.4 FAILURE POTENTIAL – This refers to the growth habit of a tree, including its trunk and main structural branches, and their potential for failure.

- **Good –** Trees with a single dominant trunk along which evenly spaced branches are spread. Branches have properly formed collars which provide strong attachment to the trunk, and are about 25% of the trunk diameter. Minor structural defects may be present with low failure potentials.

- **Average –** Trees with structural defects with low failure potential

- **Fair –** Trees with structural defects with medium failure potentials and require monitoring on an annual basis.

- **Poor –**Trees with defects which have failed, or have a high risk of failing soon, and corrective action must be taken as soon as possible.

8.5 STRUCTURAL CONDITION – A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils), the stability and viability of the root plate, trunk and the 1st & 2nd order structural branches, including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorized as Good Condition, Fair Condition, Poor Condition and Dead.

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

- **Fair Condition** Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival.

  Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.

Poor Condition Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage

9.0 APPENDICES

9.1 QUALIFICATIONS & EXPERIENCE OF AUTHOR

QUALIFICATIONS

- Graduate Certificate in Bushfire Design, University of Western Sydney (2012 – Completed)
- Diploma in Conservation & Land Management (AQF 5), Hortus Australia (2005)
- Advanced Diploma of Horticulture (Arboriculture – AQF 6), Hortus Australia (2002).
- Small Business Enterprise Certificate, Blue Mountains TAFE (1996).
- Certificate in Tree Care, Lynnfield West (1995).
- Tree Surgery Certificate, Ryde School of Horticulture (1990).
- Certificate in Horticulture, Wollongong TAFE (1987).

WORK HISTORY

- 1998 – Present Self-*employed as an Arboricultural Consultant.*
- 2000 – 2002. *Tree Management Officer,* Blue Mountains City Council.
- 1984 – 1998. *Self employed as a Practicing Arborist.*
- 1977 – 1978. *Tree pruning and removal,* SEC Victoria.
- 1975 – 1976. *Tree maintenance*, Queensland Forestry Commission.

FURTHER TRAINING

- Attendance of the following seminars or conferences;
    1. ISA Tree Risk Assessment Qualification (Renewal) Parramatta (2018)
    2. ICAA Concept to Construction, Parramatta (2017)
    3. Introduction to Risk Management –AS/NZS ISO 31000: 2009 (SAI Global 2014)
    4. ISA Tree Risk Assessment Qualification (TRAQ) Melbourne (2013)
    5. EIANZ Environmental Expert Professional Development Course (Sydney 2013)
    6. HEDRA Workshop (Sydney 2012)
    7. ISA National Conference Newcastle (2009)
    8. Tree Roots in the Built Environment, J. Urban (2008)
    9. *Phytophthora cinnamomi* – Workshop (2008)
    10. Trees on Construction Sites Workshop by J. Barrell (2006)
    11. ISA National Conference, Parramatta (2004)
    12. 5 Day Scientific Workshop on Tree Pathology and Wood Decay by F. Schwarze (2004)
    13. Safe Trees Seminar by Ed Hayes (2002)
    14. ISA National Conference, Melbourne (2002)
    15. Advanced Lecture on Visual Tree Assessment by Dr Claus Mattheck (2001)
    16. Trees for Urban Landscapes (2000)
    17. Assessing Hazardous Trees & their Safe Useful Life Expectancy (1997)

PROFESSIONAL ASSOCIATIONS

- International Society of Arboriculture (#152238)
- Fire Protection Association Australia (#26890)

9.2 SUSTAINABLE RETENTION INDEX VALUE (SRIV) ©

SRIV © provides a dual method of objectively rating the viability of urban trees for development sites based on general tree and landscape assessment criteria, and a numeric index for each tree as a tree management tool.

It is designed as an objective system based on set criteria to replace previous subjective systems, and is based on the principle of sustaining trees in the urban environment including remnant forest trees, but does not cover social aspects of trees, or hedges. Dead trees and environmental or noxious weed species are not considered as removal of these trees is generally encouraged.

The Glossary details the definitions for terms to be used with the SRIV© system are provided in Section 8, and are taken from the Institute of Australian Consulting Arboriculturists (IACA) © Dictionary for Managing Trees in Urban Environments[1].

9.2.1 SRIV Matrix

Good Vigour & Good Condition	**Good Vigour & Fair Condition**	**Good Vigour & Poor Condition**	**Low Vigour & Good Condition**	**Low Vigour & Fair Condition**	**Low Vigour & Poor Condition**
(GVG)	**(GVF)**	**(GVP)**	**(LVG)**	**(LVF)**	**(LVP)**
Able to be retained if sufficient space available above and below ground for future growth.	Able to be retained if sufficient space available above and below ground for future growth.	Able to be retained if sufficient space available above and below ground for future growth.	May be able to be retained if sufficient space available above and below ground for future growth.	May be able to be retained if sufficient space available above and below ground for future growth.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth.
No remedial work or improvement to growing environment required. May be subject to high vigour.	Remedial work may be required or improvement to growing environment may assist.	Remedial work unlikely to assist condition, improvement to growing environment may assist.	No remedial work required, but improvement to growing environment may assist vigour.	Remedial work or improvement to growing environment may assist condition and vigour.	Remedial work or improvement to growing environment unlikely to assist condition or vigour.
Medium to Long Term Retention	**Medium Term Retention**	**Short Term Retention**	**Short Term Retention**	**Short Term Retention**	**Short Term Retention**
	Potential for longer with remediation or favourable environmental conditions.	Potential for longer with remediation work, or favourable environmental conditions.	Potential for longer with remediation work, or favourable environmental conditions.	Potential for longer with remediation work, or favourable environmental conditions.	Potential for longer with remediation work, or favourable environmental conditions.

YGVG - 9	YGVF - 8	YGVP - 5	YLVG - 4	YLVF - 3	YLVP - 1
	Index Value 8	Index Value 5	Index Value 4	Index Value 3	Index Value 1
Long Term Retention Potential	Short - Medium Term Retention Potential	Short Term Retention Potential	Short Term Retention Potential	Short Term Retention Potential	Likely to be removed immediately or retained for Short Term.
Likely to provide minimal contribution to local amenity if height <5m.	Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m.	Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m.	Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m.	Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m.	Likely to provide minimal contribution to local amenity if height <5m.
Retain, move or replace.	Medium-high potential for future growth and adaptability. Retain, move or replace.	Low-medium potential for future growth and adaptability. Retain, move or replace.	Medium potential for future growth and adaptability. Retain, move or replace.	Low-medium potential for future growth and adaptability. Retain, move or replace.	Low potential for future growth and adaptability. Retain, move or replace.

MGVG - 10	MGVF - 9	MGVP - 6	MLVG - 5	MLVF - 4	MLVP - 2
Index Value 10	Index Value 9	Index Value 6	Index Value 5	Index Value 4	Index Value 2
	Medium Term.	Short Term.	Short Term.	Short Term.	Zero to Short
Medium - Long Term.	Potential for longer with improved growing conditions.	Potential for longer with improved growing conditions.	Potential for longer with improved growing conditions.	Potential for longer with improved growing conditions.	Likely to be removed immediately or retained for Short term

OGVF - 6	OGVF - 5	OGVP - 4	OLVG - 3	OLVF - 2	OLVP
Index Value 6	Index Value 5	Index Value 4	Index Value 3	Index Value 2	Index Value 0
Retention potential	Retention potential	Retention potential	Retention potential	Retention potential	Retention potential
Medium - Long Term.	Medium Term	Short Term	Short Term Potential for longer with improved growing conditions.	Short Term	Likely to be removed immediately or retained for Short Term.

9.3 SULE CATEGORIES (Safe useful life expectancy)

TreeAZ' is a systematic method of assessing whether individual trees are important, and how much consideration should be given to them in management decisions. Each tree is considered against a standard list of tree removal tests. If a tree fails any of these tests, it is categorised as 'Z' and further analysis stops. If it passes all the tests, it is categorised as 'A'.

'Z' Tree are not suitable for retention for more than 10 years and not considered important or worthy of consideration in management decisions.

Exempt Species: Trees that could be removed under TPO policies
Z1 Exempt species (invasive or noxious species)

Small Trees: Plants that could realistically be easily replaced in the short term
Z2 Less than 5m tall

Z3 Formal hedges or trees regularly pruned to restrict size

High Risk: Trees that would be removed within 10 years because of declining health or poor structural damage

Z4 **Dead, dying, diseased or declining**

Explanation: '*Trees that should be removed despite statutory protection because they are in poor health, poor structural condition or otherwise unstable. The condition must be terminal with no obvious potential to recover, i.e. severe crown dieback related to excavation damage or root decay to the extent that the structural branch framework is compromised. This would also apply to diseases with no practical cure'* (Barrell (2006).

Z5 **Severe damage or structural defects that cannot be properly addressed by remedial care including cavities, decay, weak junctions, wounds and excessively unbalanced**

Explanation: *Severe means that there is no realistic chance of the tree achieving its full potential with an acceptable level of risk. In many cases, acceptable levels of risk can be achieved by dramatic reduction in tree size, but this has severe health, maintenance cost and amenity implications, so it would not be considered to be a sustainable management option*

Z6 **Present or future instability because of poor anchorage or increased exposure**

Explanation: *Alterations to tree exposure to the wind occurs because of changes in the shelter provided by adjacent objects such as buildings or other trees. This primarily applies to maturing and mature trees that have greater sail areas to catch the wind and established root systems that are less able to adapt to changes than younger trees. This often applies to groups of trees where one large dominant tree will be lost because of poor health or a structural problem, dramatically exposing the remaining trees in the group'* (Barrell (2006).

Good Management: Trees that would be probably pruned or removed within 10 years through responsible management

Z7 **Severe damage or structural defects that can be temporarily addressed by remedial care including cavities, decay, weak junctions, wounds and excessively unbalanced**

Z8 **Poor trees with no potential to improve** –

Explanation: It is common to find trees that are obviously unsuitable for long term retention for many reasons, including poor health, sever imbalance, tall, thin forms, or they have no realistic potential to improve. However, the problems are not so severe that they represent an immediate risk, but their removals should not be discounted for this reason.

This subcategory is for these trees and relies on the principle of sustained amenity to justify the allocation. The short term retention of a tree that is obviously not going to improve and will pose an ongoing risk is not good tree management and is just delaying its inevitable removal.

Z9 Adversely interfering with adjacent trees

Z10 Overgrown hedge or row of trees vulnerable to adverse weather events

Z11 Causing unreasonable inconvenience to existing properties (light, dominance, debris, interference)

Explanation: *In its broadest sense inconvenience is the interference with the authorised use of land. In relation to trees, it can be in the form of root disrupting landscaping and hard surfaces, parts of trees physically preventing land use, tree debris such as leaves and fruit falling and tree crowns causing excessive shade. The principles for establishing what are acceptable levels of inconvenience are the same, irrespective of the cause.*

In a community context, it is reasonable for individuals to tolerate some level of inconvenience from their presence. However, the precise location or value of these thresholds is not always obvious and is often a subjective interpretation rather than a definitive point. There will always have to be a balancing of the benefit to the community weighed against the inconvenience suffered by the individual. What is an acceptable, tolerable or reasonable level of inconvenience is often a matter of judgement for each specific situation, tempered by experience and common sense. This in turn should be guided by court, tribunal and planning decisions that have been made informed judgements on these issues.

Lack of sunlight is a common example, especially in regard to solar panels. People generally expect to be able to use a patio for sitting in the sun and if trees shade is to the extent that irt cannot be used as intended, then that is excessive interference. However, if the garden is large and there are other places to do the same thing, then the case for tree removal might be weakened

On an international level, very large trees near existing occupies buildings can dominate to the extent that the dis-benefit from the anxiety of the occupants outweigh the benefit of the tree. Similarly, regular and sever staining caused by fallen debris to a swimming pool surround may be unacceptable because the stark contrast in colours creates a dirty impression whereas the same staining on a path or driveway surface may be more acceptable. In contrast, falling leaves blocking gutters causing them to be cleaned one a year is not that much of a local inconvenience in the extent of the wider benefits that the trees impart.

Assessing inconvenience is almost entirely a subjective judgement, based on experience and understanding of what is perceived as being reasonable and unreasonable for a normal person. As with all these judgements, a simple test is to imagine a TPO appeal situation where an inspector has to decide if the levels of inconvenience are intolerable. If they are, then the tree is a Z11; if they are not that bad, then the tree belongs in another subcategory (Barrel 2006).

Z12 Causing or likely to cause damage to existing structures

Explanation: Damage as opposed to inconvenience – *Where more serious damage occurs to property from root action, then court judgements on liability help to focus on what level of damage is deemed acceptable by society.*

The most common example is direct damage from roots, trunks, and branches to structures and surfacing. Repairs to walls may vary require such extensive excavations and cutting of roots that the tree cannot be retained. However, the use of innovative techniques may reduce root damage but still provide a viable boundary, allowing the tree to be retained.

As a general rule, there would need to be good evidence of or potential for ongoing damage with little scope for remedial works before a tree could reliably allocated to this category (Barrel 2006)

Council tree inspectors are not legal experts, but are often required to follow council policies that tend to put more emphasis on protect trees more than their rate payers and residents when assessing trees under their Tree Preservation Orders. For example, many Councils in the Sydney area do not consider root damage to privately owned fences and paved surfaces as being a valid reason to remove a tree.

A recent court decision in NSW indicates that this is not always consistent with the legal torte of nuisance and negligence. This case sets a president and Councils could now easily find themselves liable for future claims for damages. Refer to Dimitrios Michos & Another v Council of the City of Botany Bay [2012] NSWSC 625 (8 June 2012)

Z13 **Unacceptably expensive to retain**

Explanation: Degree of Cost **–** *This is a matter of judgement and may vary widely. It primarily applies to existing trees that are not suited to their location but there is resistance to their replacement. As a general principle, all trees will incur some management costs and these would normally not be a valid reason for removal. However, as these costs increase, their acceptability decreases to the point where it will be more cost effective to plant a new tree more suited to the location, rather than incur the burden of repeated and excessive costs indefinitely. Typical examples include topped trees with excessive decay, pollarded trees, to reduce subsidence risk, tree beneath powerlines, and trees close to buildings, roads and pathways. All these examples will require high levels of maintenance that may not be financially viable unless the benefits that arise from remaining trees are particularly high*

'A' Trees are suitable for retention for more than 10 years and considered important and worthy of consideration in management decisions.

A1 **No significant defects and could be retained with minimal remedial care**

A2 **Minor defects that could be addressed by limited remedial care or work to adjacent trees**

A3 **Special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years**

A4 **Trees that may have legal protection for ecological reasons**

9.4 IMPORTANCE OF THE ROOT SYSTEM

The most vulnerable part of a tree is its root system. As it is not visible and is poorly understood, it is frequently ignored, but damage or death of the root system will affect the health stability of the entire tree. When either a cut or fill occurs near trees, the root system is immediately reduced and the soil available for root growth is reduced.

9.4.1 Tree Protection Zone (TPZ)

The Tree Protection Zone (TPZ) is the principle means of protecting trees on development sites. The TPZ is a combination of the root area and crown area that requires protection. It is an area isolated from construction disturbance, so that the tree remains viable (AS – 4970)

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

TPZ = DBH x 12 (DBH = trunk diameter measured at 1.4m above ground level)

The radius of the TPZ is measured from COT (Centre of the trunk).

A sturdy protective fence is required around each tree to prevent damage occurring in the TPZ.

Variations to a TPZ
While TPZ's usually form a circular area under AS 4970, British Standard 5837 allows the area of a TPZ in m² to be converted into a square. This slightly reduces the extent of the TPZ while protecting the same amount of area in m²'s. BS 5837 also allows a 20% variation in the location of the centre of the TPZ, while AS 4970 allows a minor variation of 10%, with any further variation subject to advice from the project Arborist.

9.4.2 Structural Root Zone (SRZ)

The Structural Root Zone (SRZ) is the area around the base of a tree required for its stability. The woody root growth and soil cohesion in this area are necessary to hold the tree upright; therefore there are no variations to its size. The SRZ is normally circular with the trunk at its centre and is expressed by its radius in metres (AS – 4970). Due to the potential of causing instability of a tree, it is highly recommended that no roots within its SRZ are pruned or removed.

9.4 References to Appendices 9.4

- AS 4970 (2009) 'Protection of trees on construction sites' Standards Australia, Sydney, Australia

9.5 TREE MANAGEMENT PLAN

The following specifications are for the specific guidance of projects which must preserve existing trees within or adjacent to a given site. These may be supplemented with additional requirements through the design review process.

DESIGN STAGE

1.0 PROJECT DESIGN

1.1 Planning should include consideration of all levels near the trees that are to be retained so that their root systems can be adequately protected.

1.2 Footings and service trenches should be located no closer than the TPZ, which will be determined for each tree individually

1.3 All service trenches should be included in the approved electrical, stormwater and sewer diagrams, and these should include the locations and TPZ's of all trees being retained, and those within 5m of any boundary.

1.4 All contractors & sub-contractors whose work will be in close proximity to trees which are to be retained should be given a copy of this Tree Management Plan.

PRE CONTRUCTION STAGE

2.0 TREE REMOVALS

2.1 Any approved tree removals should be undertaken by a suitably qualified and experienced arborist, and this work should conform to the 'Workcover Code of Practice for the Tree Industry.

2.2 It is usually more convenient to remove trees before the erection of protective fencing, but the contractor should be instructed not to cause damage to trees that are to be retained. All vehicles should be excluded from the vicinity of these trees.

3.3 To avoid damage to adjacent trees, it may be necessary for trees to be dismantled in sections rather than free felling.

3.0 STUMP REMOVAL

3.1 Stumps of removed trees in protected areas should be ground out and not pulled out by machine.

3.2 The stumps of all trees the in areas designated for construction activities should also be removed.

3.3 Trees to be retained should not be used as anchorages for equipment used in stump removal.

4.0 PRUNING

4.1 Any approved pruning work should be undertaken by a suitably qualified and experienced arborist. This work should conform to the 'Workcover Code of Practice for the Tree Industry', and the Australian Standard 'Pruning of Amenity Trees' (AS 1996)

4.2 The low branches of trees to be retained should not be pruned prior to grading or the mobilization of any equipment on the site. These should be within a TPZ (Tree Protection Zone) and therefore protected in accordance with Clause 6

4.3 Limbs that must be removed will require prior consent by the Council.

5.0 SIGNAGE

5.1 Appropriate warning signs should be placed on the protective fencing advising that there will be no oils, gas, chemicals, liquid waste, solid waste, construction machinery or construction materials stored or allowed to stand for any period within the dripline of the tree. No one should enter the TPZ for any reason other than monitoring the health of the trees.

6.0 TRUNK PROTECTION

6.1 Trunk protection will require the placement of 2m lengths of 100mm x 50mm hardwood battens arranged vertically at 150mm intervals around the circumference of the trunk. Battens are to be secured in place by metal strap bindings or ten gauge fencing wire at 300mm apart. Prior to placing battens, a soft protective padding must be installed to the ends of the timbers to prevent damage to the bark and conductive tissue. Under no circumstances are the battens to be secured to the tree by a method that involves the trunk being penetrated by nail, screw, rod or the like. Trunk protection must remain in place for the duration of the works.

7.0 TREE PROTECTION ZONES

7.1 Before any construction or site activities begin, trees that are to be retained should have their TPZ clearly defined and protected by a sturdy, 1.8m high mesh fence, which is supported by on a vertical and horizontal framework.

7.2 Tree protection measures must remain in place through all stages of development and construction activities.

7.3 If a reduced TPZ has been specified to allow access for construction purposes in close proximity to a tree, the following protection methods must be adhered to.

- All surface areas within the recommended TPZ should be mulched with 100mm woodchip to reduce soil compaction, and be maintained at this depth throughout the project.
- Compaction from pedestrian traffic within a reduced TPZ is to be managed by placing rumble boards or 2.4m x 200mm x 50mm landscape timbers on the wood chip mulch (refer to Diagram 2)
- Timbers are to be fastened in accordance with Diagram 2 of this TMP

7.4 The Tree Survey sheet will indicate the recommended Tree Protection Zone (TPZ) for each tree, and is to be installed in accordance with Clause 5 of this TMP

7.5 No grading or trenching equipment is permitted within the TPZ.

7.6 Machinery movements, site sheds etc, stockpiling of materials and site soils are not permitted in the TPZ.

7.7 Care should be taken when using cranes or other machinery to prevent damage occurring to the canopy of trees.

7.8 Should heavy vehicle movement be required within a TPZ, a track should be formed using 100mm x 75mm lengths of hardwood timber fastened at 150mm centers. Alternatively, a 150mm deep layer of wood chip mulch or a 50mm deep layer of coarse gravel beneath rumble boards could be used as a load-spreading surface.

7.9 Any work performed within the TPZ is to be done by hand and under the supervision of a consulting arborist.

7.10 No one should enter the TPZ for any reason other than monitoring the health of the trees.

7.11 Concrete mixing should not be carried out within the TPZ. Consideration of the slope should be taken in to account to prevent caustic or other materials flowing towards the trees.

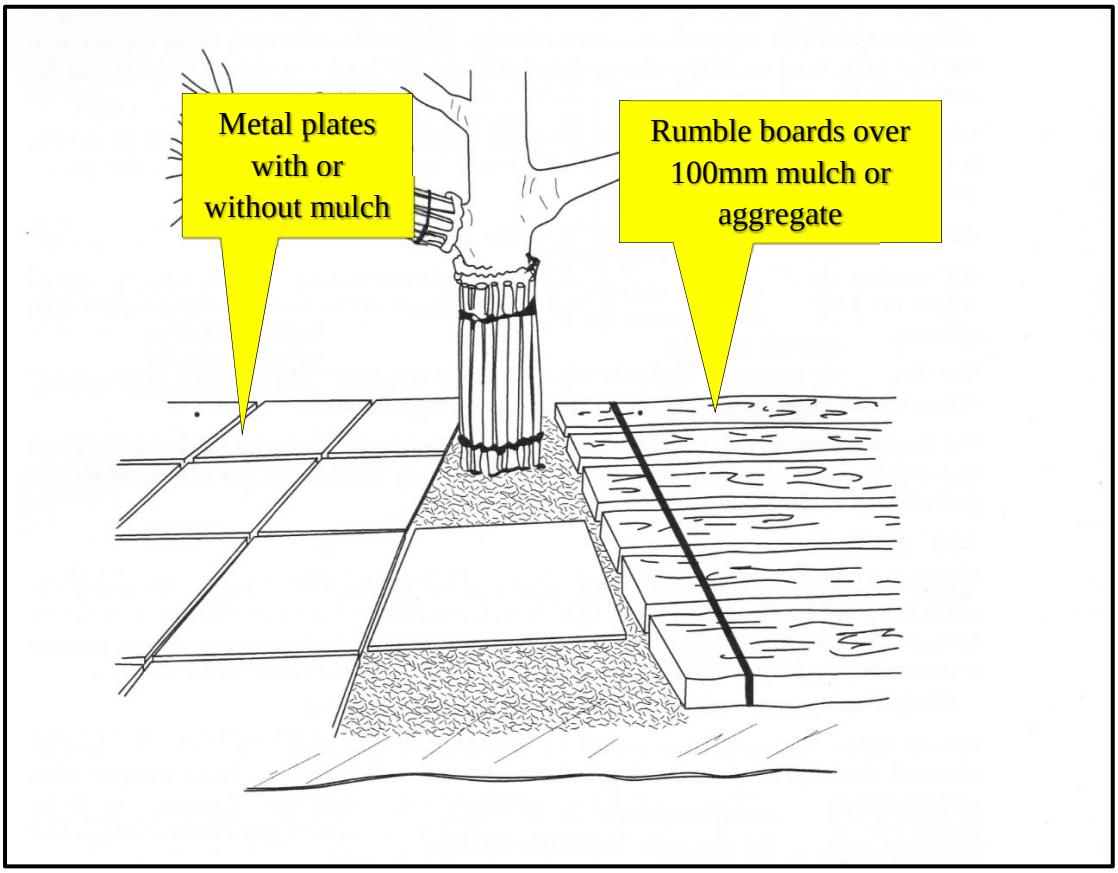


Figure 7.3 – Showing ground protection methods that comply with Clause 7.3

CONTRUCTION STAGE

8.0 CHANGING SOIL LEVELS

8.1 Raising soil levels around tree trunks should not be permitted as this can cause decay of the trunk, serious damage to the trees health, or even their death.

8.2 Finished grades should slope away from the trunks to avoid directing runoff water towards the base of trees.

8.3 During grading, roots over 25mm in diameter should be cut off cleanly with a handsaw about 300mm behind the line of excavation. Any exposed roots should be kept moist by covering with backfill soil. This should apply even if the roots are outside the dripline of the tree

9.0 EXCAVATIONS FOR STRIP FOOTINGS

9.1 These should be located no closer than the TPZ, which will be determined for each tree individually.

9.2 A test trench should be dug to check for the occurrence of roots at the distance where foundations will be.

9.3 If roots over 25mm in diameter are excavated, they should be cut off cleanly with a handsaw about 300mm behind the line of excavation. Any exposed roots should be kept moist by covering with backfill soil. This should apply even if the roots are outside the dripline of the tree.

9.4 If larger diameter roots (50mm or greater) are encountered within the zone of excavation, the root should not be cut. The job should be stopped in this area and the Consultant Arborist called in for a site inspection. If the root is located where a footing is to be placed, an alternative footing should be used which bridges the root with pilings and grade beams.

9.5 Areas of root zones beneath concrete should be protected during slab forming and pouring, with a layer of geotextile or similar fabric.

10.0 EXCAVATIONS FOR PIER FOOTINGS

10.1 Where pier type footings with suspended beams or slabs are proposed, a void is required between natural ground level and the suspended beams or slabs to minimize impacts on the health and stability of the tree/s.

10.2 Any work performed within the TPZ is to be done by hand and under the supervision of a consulting arborist.

10.3 Where possible, piers should not be located within the SRZ of any tree. Any pier holes located within the SRZ should be hand dug to minimize potential damage to woody roots.

10.4 If such roots are encountered, the site arborist is required to assess their significance before they are removed or the hole should be relocated to avoid compromising the stability of the tree.

10.5 Should heavy vehicle movement be required within a TPZ, a track should be formed using 100mm x 75mm lengths of hardwood timber fastened at 150mm centers. Alternatively, a 100mm deep layer of wood chip mulch or a 50mm deep layer of coarse gravel beneath rumble boards could be used as a load-spreading surface.

11.0 SERVICE TRENCHES

11.1 All service trenches should be included in the approved electrical, stormwater and sewer diagram, and these should include the locations and TPZ's of all trees being retained, and those within 5m of any boundary.

11.2 Service trenches should be located no closer than the TPZ, which will be determined for each tree individually. If underground services must be routed within the TPZ, they should be installed by direct drilling or in manually excavated trenches

11.3 Consideration should be given to underground boring as an alternative. Tunneling should be done under large diameter roots to prevent root damage. It is the responsibility of the developer to coordinate and make appropriate arrangements with utility companies when trenching near trees to be retained (see Clause 12).

11.4 Manually excavated for any service trenches within the TPZ should be supervised by an appropriately qualified arborist

11.5 If roots over 25mm in diameter are excavated, they should be cut off cleanly with a handsaw about 300mm behind the line of excavation. Any exposed roots should be kept moist by covering with backfill soil. This should apply even if the roots are outside the dripline of the tree.

11.6 If larger diameter roots (50mm or greater) are encountered within the zone of excavation, the root should not be cut. The job should be stopped in this area and the Consultant Arborist called in for a site inspection. If the root is located where a footing is to be placed, an alternative footing should be used which bridges the root with pilings and grade beams.

11.7 Areas of root zones beneath concrete should be protected during slab forming and pouring, with a layer of geotextile or similar fabric.

12.0 UNDERGROUND BORING

12.1 If an underground service must pass through the dripline of a tree, an alternative to open trenching is underground boring. An appropriately qualified consulting arborist should be on site to supervise any boring activities beneath trees.

12.2 Boring under root systems can greatly reduce both damage to the tree and the cost to repair landscape and other features destroyed in the trenching process.

12.3 If underground boring has been approved within the TPZ, an open trench is to be excavated on opposite sides of the tree relative to the location of the service. Where possible, the open trench should be located at a 90° angle to the tree trunk to reduce the likelihood of severing of roots. This can be done by hand or with a backhoe until roots of 25mm diameter are encountered. Backhoes and other machinery must not be located within the TPZ.

12.4 When roots greater than 25mm are encountered, excavation is then performed by hand to the start of the Tree Protection Zone.

12.5 Boring should commence at the start of the TPZ and be located at least 1m deep to reduce impacts with roots

13.0 PAVING & OTHER HARD SURFACES

13.1 As the majority of feeder roots occur in the uppermost 600mm of soil, changes in level should be minimal.

13.2 Any vegetation on the existing soil surface should be killed using a herbicide which will not leach through the soil (e.g. Glyphosate)

13.3 Lowering the soil surface can be particularly damaging, as this will sever surface roots. For the same reason, the soil surface should not be skimmed to establish the new paving at the former ground level

13.5 New paving should be established not more than 100mm above the former ground level, using a granular fill

13.6 Raising the soil surface can be accommodated more easily provided a permeable material is used which will not impede gaseous diffusion.

13.7 Paving slabs or flags, including those with perforations, should be laid dry-jointed on a sharp sand foundation.

13.8 The practice of laying brick pavers on concrete containing fines should be avoided in the vicinity of trees because of insufficient permeability.

13.9 Bricks or blocks, when laid directly upon sand or another open foundation material, provide enough moisture accessibility and movement of air around the base of a tree.

13.10 In the case of bricks and brick pavers, the long sides should be mortared or grouted, but with the end of only each third paver being mortared.

13.11 Installation of edge support for paving should be carefully considered. Excavation for curbing and edging may sever roots. Consideration could be given to using an alternative method of edge support, such as steel framed sections.

13.12 Temporary bitumen or road base pathways can be installed in close proximity to the TPZ's if they are laid on the existing grade on a geotextile or similar fabric.

14.0 LANDSCAPING

14.1 A friable garden soil can be spread to a depth of 150mm to top dress the existing grade for new plantings within a TPZ. However, the existing grade should not be modified by digging or rotary-hoe

14.2 Backfilling of any retaining walls within driplines of trees should consist of washed river sand or similar well drained soil medium

14.3 Raising soil levels around tree trunks should not be permitted as this can cause decay of the trunk, serious damage to the trees health, or even their death.

14.4 Finished grades should slope away from the trunks to avoid directing runoff water towards the base of trees.

14.5 Landscape plantings of 150mm pot sizes are permitted within the Tree Protection Zone, but only tube stock is permitted for plantings within the Structural Root Zone to minimise root damage for larger pot sizes

14.6 Excavations for holes for larger sized landscape plantings within the TPZ should comply with Clause 10.0 of this TMP - Excavations for Pier Footings

14.7 The landscape plan should attempt to replace any trees being removed with trees species considered suitable for the size and scale of the development.

14.8 Only drip irrigation should be permitted within 2.5 - 3m of the trunks, unless specified by the Consultant Arborist

10.0 TREE SURVEY

Tree No		15	16	17	18	19	20	21	22	23	24
Species		*Eucalyptus tereticornis*	*Eucalyptus tereticornis*	*Eucalyptus tereticornis*	*Eucalyptus microcorys*	*Melaleuca* sp.	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*
DBH (mm)		250	350	400	250	X	400	400	400	250	300
RCD (mm)		400	400	500	300	X	450	450	450	350	400
Height (m)		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Canopy Spread (m)	N	5	9	7	5	X	7	6	5	6	5
	S	10	4	4	5	X	5	4	4	4	2
	E	10	9	7	5	X	6	5	6	4	6
	W	0	3	7	5	X	6	5	4	4	4
Age Class		M	M	M	M	O/M	M	M	M	M	M
Canopy Type Direction		C	C	I	C/E	X	C	C	C	C	C
Health		A	A	A	A	X	A	F	A	A	A
Condition		A/F	F/P	F/P	F	X	F	F	A	A	A
Amenity						X					
Prominence						X					
Ecological						X					
Crown Symmetry						X					
Trunk Lean						X					
SULE		**A**	**Z5**	**Z5**		**Z**	**Z**				
TPZ (m)		3.0	4.2	4.8	3.0	X	4.8	4.8	4.8	0.0	3.6
SRZ (m)		2.3	2.3	2.5	2.0	X	2.4	2.4	2.4	2.1	2.3
Additional Comments		Loss of codominant leader	Included bark junction with significant rib formation			Dead tree	Codominant junction with included bark	Codominant trunks			

Tree No		25	26	27	28	29	30	31	31A	32	33	34
Species		*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*
DBH (mm)		200	250	250	350	2x 200	350	300	300	350	100/250	250
RCD (mm)		250	300	350	400	400	450	400	400	450	350	300
Height (m)		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Canopy Spread (m)	N	4	6	6	X	5	6	6	6	X	4	5
	S	4	6	3	X	4	5	3	6	X	3	4
	E	3	6	4	X	5	5	6	5	X	6	5
	W	4	3	4	X	4	5	4	3	X	5	3
Age Class		S/M	S/M	S/M	X	S/M	S/M	S/M	S/M	X	S/M	S/M
Canopy Type Direction		C	C	C	C	C	C	C	C	X	C	C
Health		A	A	A	X	A/F	A/F	A	A	X	F	A
Condition		A	A/F	A	X	A/F	A	F	A	X	F	F
Amenity												
Prominence												
Ecological												
Crown Symmetry												
Trunk Lean												
SULE			**Z8**									
TPZ (m)		2.4	3.0	3.0	4.2	4.0	4.2	3.6	3.6	4.2	3.5	3.0
SRZ (m)		1.8	2.0	2.1	2.3	2.3	2.4	2.3	2.3	2.4	2.1	2.0
Additional Comments			Canopy density is becoming sparse		Dead	Sparse foliage and dieback in outer canopy		Codominant junction with included bark at 5m high on main trunk		Dead	Codominant on root crown	Codominant junction at 2m above ground level

Tree No		35	36	37	38	39	40	41	42	43	44
Species		*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*
DBH (mm)		250	250	200/250	250	2x 200	200/250	250	250	150/200	2x 150 200
RCD (mm)		300	300	450	350	400	400	300	300	300	350
Height (m)		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Canopy Spread (m)	N	5	5	6	5	5	5	X	6	4	5
	S	4	5	4	4	5	4	X	4	4	4
	E	5	3	6	4	5	3	X	5	4	4
	W	4	4	5	3	5	6	X	4	5	5
Age Class		S/M	S/M	S/M	S/M	S/M	S/M	X	S/M	S/M	S/M
Canopy Type Direction		C	C	C	C	C	C	X	C	C	C
Health		A	A	A	A	F	A	X	F	F	A
Condition		F	A	A	F	F	F	X	A	F	F
Amenity											
Prominence											
Ecological											
Crown Symmetry											
Trunk Lean											
SULE			**A1**								**Z5**
TPZ (m)		3.0	3.0	4.5	3.0	4.0	4.5	X	3.0	3.5	10.0
SRZ (m)		2.0	2.0	2.4	2.1	2.3	2.3	X	2.0	2.0	2.1
Additional Comments		Codominant junction at 4m above ground level			Codominant junction at 2m above ground level	Sparse foliage with terminal dieback		Dead tree	Declining health and vitality	Declining health and vitality, codominant branches at 1m high on main trunk	Three codominant branches at 3m high on main trunk

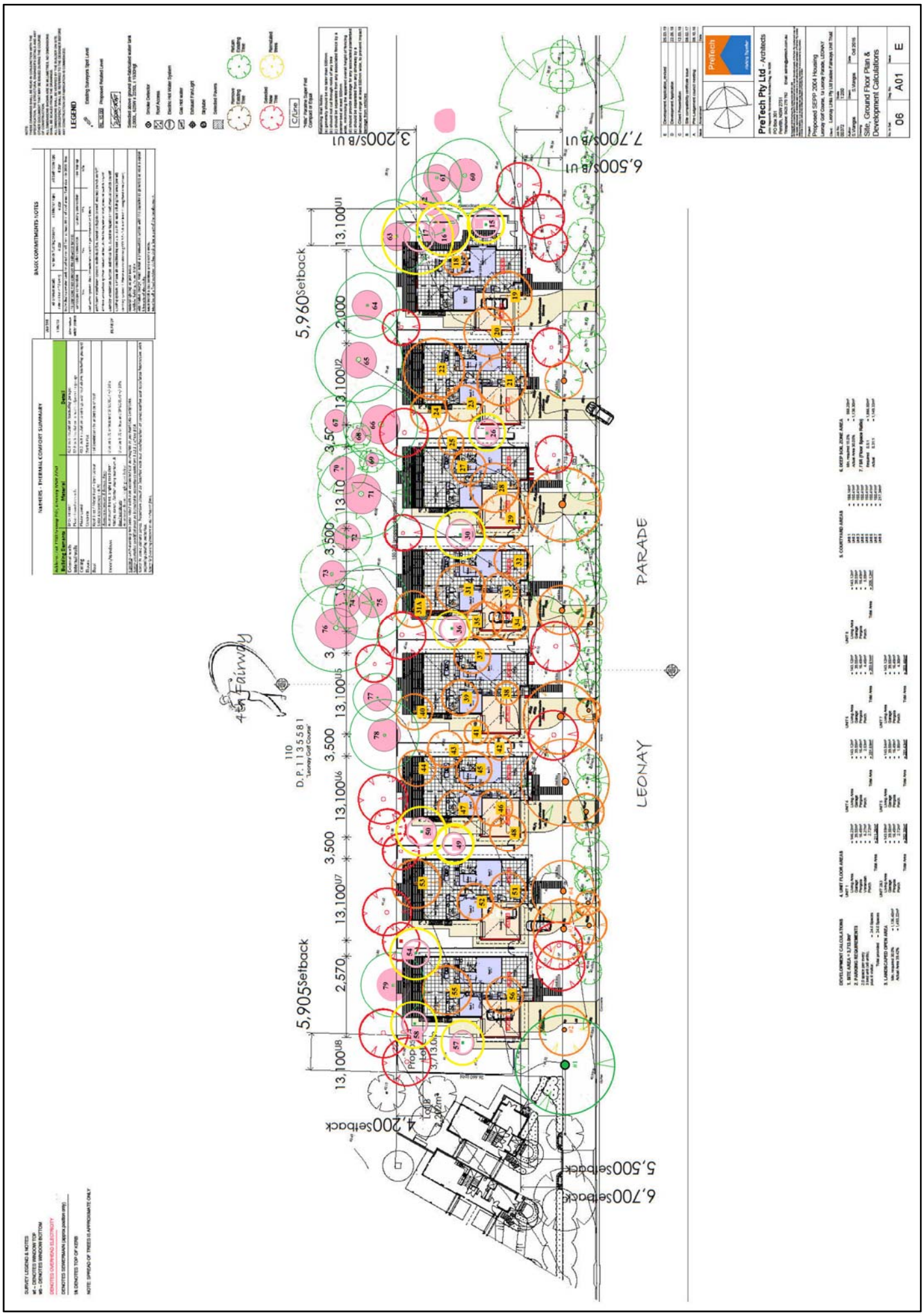
Tree No		45	46	47	48	49	50	51	52	53	54
Species		*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*
DBH (mm)		250	350	250	300	300	2x 200 250	200/350	300	350	350
RCD (mm)		300	400	300	400	350	450	450	400	450	450
Height (m)		<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Canopy Spread (m)	N	4	5	5	6	6	7	6	6	5	7
	S	4	4	4	5	4	5	7	5	5	5
	E	4	5	4	5	5	6	5	3	7	6
	W	4	4	4	5	4	5	4	6	6	6
Age Class		S/M	S/M	S/M	S/M	S/M	S/M	S/M	S/M	S/M	S/M
Canopy Type Direction		C	C	C	C	C	C	C	C	C	C
Health		A	A	F	A	F	A	A	F	A	A
Condition		F	F	F	F	F	F	F	F	F	A
Amenity											
Prominence											
Ecological											
Crown Symmetry											
Trunk Lean											
SULE						**Z5**	**Z5**				
TPZ (m)		3	4.2	3	3.6	3.6	6.5	5.5	3.6	4.2	4.2
SRZ (m)		2.0	2.3	2.0	2.3	2.1	2.4	2.4	2.3	2.4	2.4
Additional Comments				Codominant branches at 4m high on main trunk	Codominant branches at 5m high on main trunk	Codominant branches at 3m high on main trunk	Codominant branches at 1m high on main trunk	Codominant branches at 3m high on main trunk	Codominant branches at 4m high on main trunk	Codominant branches at 4m high on main trunk	

Tree No		55	56	57	58						
Species		*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*	*Eucalyptus microcorys*						
DBH (mm)		250/300	300	300	300						
RCD (mm)		500	450	350	400						
Height (m)				22	20						
Canopy Spread (m)	N	5	5	5	6						
	S	5	5	6	6						
	E	6	6	6	6						
	W	6	6	6	5						
Age Class		S/M	S/M	S/M	S/M						
Canopy Type Direction		C	C	C	C						
Health		A	A	F	F						
Condition		A	A	F	F						
Amenity											
Prominence											
Ecological											
Crown Symmetry											
Trunk Lean											
SULE											
TPZ (m)		5.5	3.6	3.6	3.6	0.0	0.0	0.0	0.0	0.0	0.0
SRZ (m)		2.5	2.4	2.1	2.3	0.0	0.0	0.0	0.0	0.0	0.0
Additional Comments											

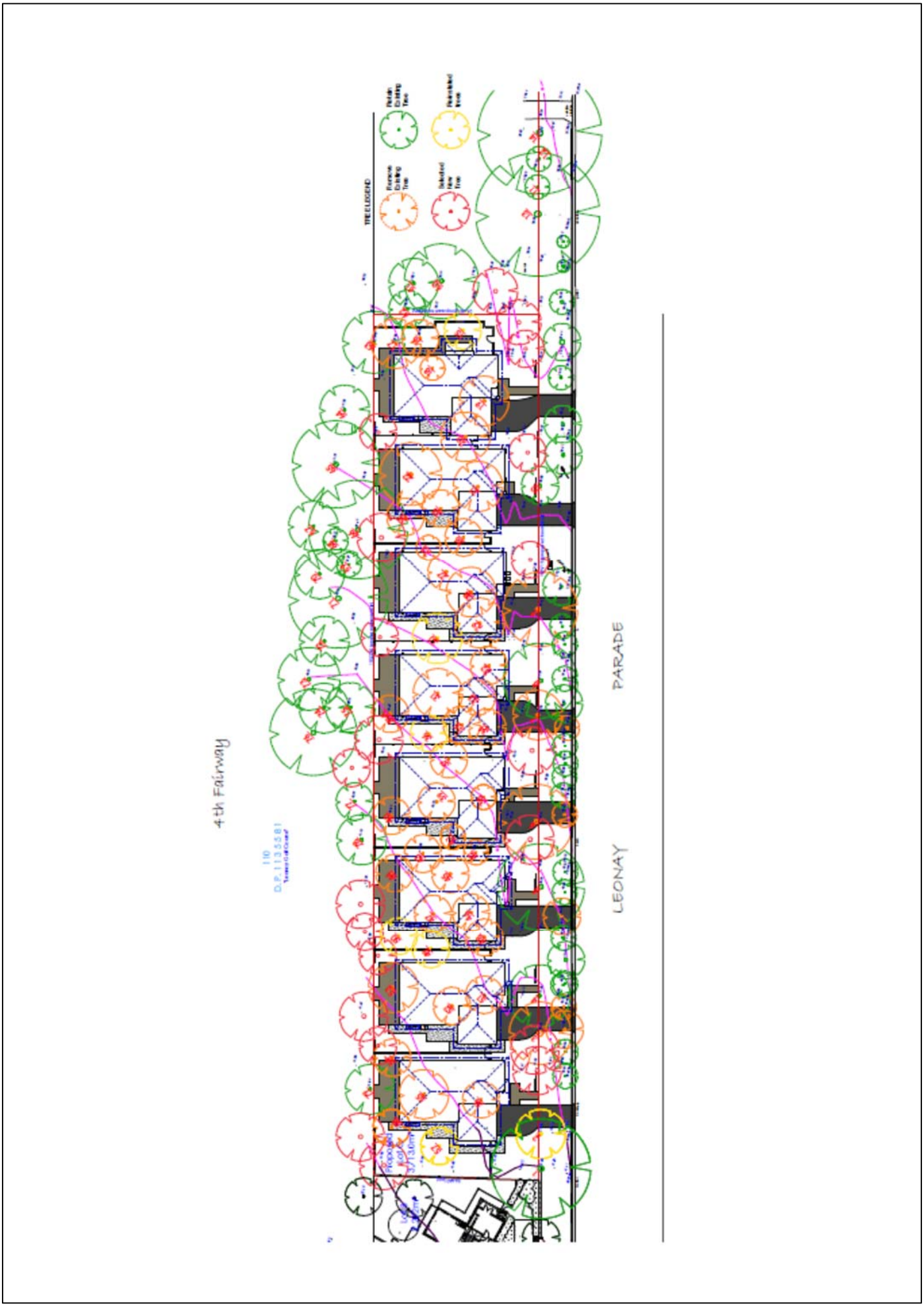
Tree No		60	61	62	63	64	65	66	67	68	69
Species		*Eucalyptus tereticornis*	*Eucalyptus tereticornis*	*Allocasuarina torulosa*	*Eucalyptus sideroxylon*	*Allocasuarina torulosa*	*Eucalyptus microcorys*	*Eucalyptus tereticornis*	*Allocasuarina torulosa*	*Allocasuarina torulosa*	*Allocasuarina torulosa*
DBH (mm)		500	350	2x 250	500	2x 250	600	500	300	150	120
RCD (mm)		700	450	400	700	400	700	750	400	250	200
Height (m)		22	20	17	20	20	25	22	12	8	8
Canopy Spread (m)	N	10	5	4	10	3	12	10	4	<1	<1
	S	9	5	2	11	2	10	10	3	<1	<1
	E	12	4	1	4	5	8	10	0	<1	<1
	W	6	10	4	8	5	4	10	3	<1	<1
Age Class		M	M	S/M	O/M	M	M	M	M	M	M
Canopy Type Direction		C	C	C	C/E	S	S	D	S	S	S
Health		A	A	A	F	A	A	A	A	A	A
Condition		A	F	A	F-P	A	A	F-P	F	F	F
Amenity											
Prominence											
Ecological											
Crown Symmetry											
Trunk Lean											
SULE		**A1**	**Z5**	**Z5**	**Z5**	**A1**	**A1**	**Z5**	**Z8**	**Z8**	**Z8**
TPZ (m)		6.0	4.2	6.0	6.0	5.0	7.2	6.0	3.6	1.8	1.4
SRZ (m)		2.8	2.4	2.3	2.8	2.3	2.8	2.9	2.3	1.8	1.7
Additional Comments			Codominant branches with a weak junction	Codominant branches with a weak junction	Wide spreading branch with weak junction, leaning across fairway			History of four branch failures	Heavily suppressed by No. 66	Heavily suppressed by No. 66	Heavily suppressed by No. 66

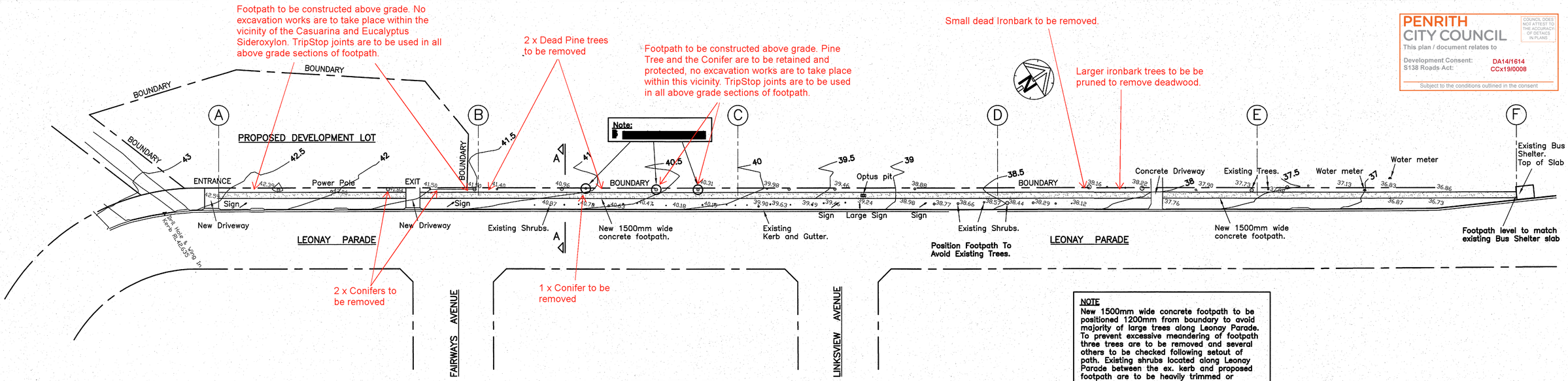
Tree No		70	71	72	73	74	75	76	77	78	79
Species		*Allocasuarina torulosa*	*Eucalyptus moluccana*	*Allocasuarina torulosa*	*Allocasuarina torulosa*	*Allocasuarina torulosa*	*Allocasuarina torulosa*	*Allocasuarina torulosa*	*Pinus*	*Eucalyptus moluccana*	*Eucalyptus moluccana*
DBH (mm)		300	650	250	400	250	250/350	550	220/180	400	450
RCD (mm)		400	800	400	450	350	500	700	400	500	550
Height (m)		7	23	17	19	15	14	21	11	15	16
Canopy Spread (m)	N	6	9	4	5	X	6	9	5	7	6
	S	2	13	6	5	X	6	10	4	8	7
	E	2	12	4	6	X	6	9	4	6	6
	W	6	12	6	5	X	4	10	3	6	7
Age Class			M	S/M	M	O/M	M	M	S/M	M	M
Canopy Type Direction			D	C	C	X	C	D	C/E	C	C
Health			A	A	A	X	A	A	F	A	A
Condition			F	A	A/F	X	A	A	A	A	A/F
Amenity											
Prominence											
Ecological											
Crown Symmetry											
Trunk Lean											
SULE		**Z8**	**A1**	**A1**	**Z8**	**Z4**	**A1**	**A1**	**A1**	**A1**	**Z8**
TPZ (m)		3.6	7.8	3.0	6.0	3.0	6.0	6.6	4.0	6.0	5.4
SRZ (m)		2.3	3.0	2.3	2.4	2.1	2.5	2.8	2.3	2.5	2.6
Additional Comments			Earth strip along main trunk caused by lightning strike		Codominant junction at 2.5m high on main trunk	Dead Tree					Codominant junction at 2.5m high on main trunk

11.0 TREE LOCATION PLAN



12.0 PROPOSED SITE PLAN

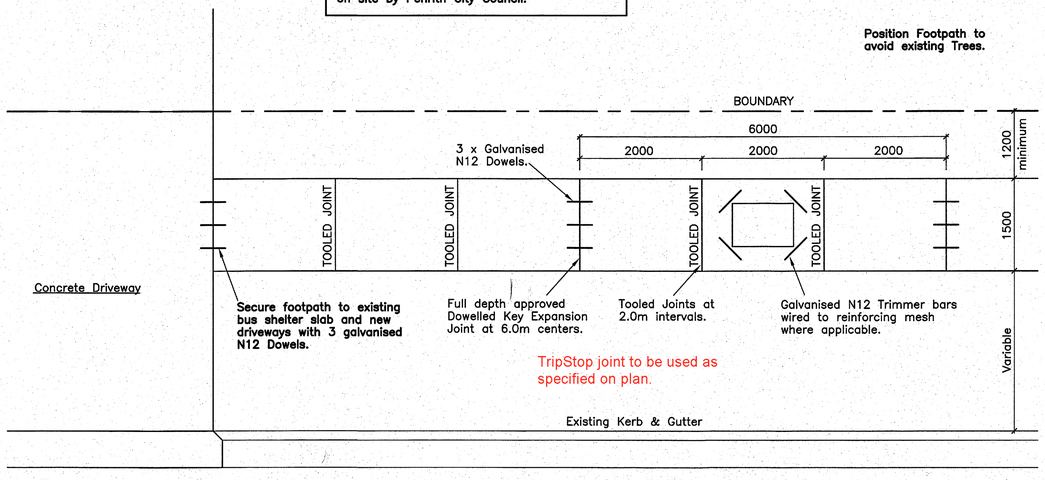




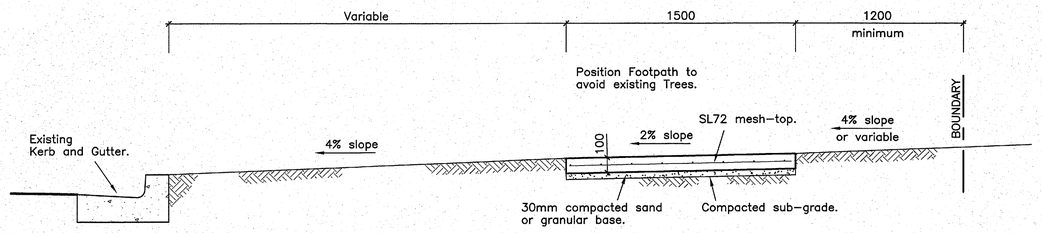
PENRITH CITY COUNCIL
This plan / document relates to
Development Consent: DA14/1614
S138 Roads Act: CCx19/0008
Subject to the conditions outlined in the consent
COUNCIL DOES NOT ATTEST TO THE ACCURACY OF DETAILS IN PLANS

PLAN – FOOTPATH 1:500

NOTE
New 1500mm wide concrete footpath to be positioned 1200mm from boundary to avoid majority of large trees along Leonay Parade. To prevent excessive meandering of footpath three trees are to be removed and several others to be checked following setout of path. Existing shrubs located along Leonay Parade between the ex. kerb and proposed footpath are to be heavily trimmed or removed, as determined by Penrith City Council.
Exact alignment of footpath to be confirmed on site by Penrith City Council.



PLAN – FOOTPATH 1:50



SECTION A–A 1:20

NOTE:
1. **Footpath construction to be in accordance with Penrith City Council requirements and approval.**
2. **Longitudinal edging to be provided along footpath and at all expansion joints.**
3. **The footpath is to be finished with a Broom finish perpendicular to direction of travel.**

CONCRETE NOTES

1. Workmanship and materials to comply with AS3600 and associated Australian Standards and Penrith City Council's Engineering Construction specification for Civil Works.
2. Concrete properties:

	SLABS
Characteristic Strength	25MPa
Slump	90mm
Maximum Aggregate Size	20mm

3. Concrete to be mechanically vibrated during placing.
5. Cure and protect concrete as required by Penrith City Council.
6. Reinforcement to be supported on bar chairs spaced at every 5th wire in both directions.

NOTE:
Location of Sydney Water's sewer main, sewer connection lines, water pipes, stormwater drains, underground electricity lines and other services must be obtained prior to commencement of any work on site.
DIAL BEFORE YOU DIG 1100

Issue	Date	App'd	DESCRIPTION
			REVISIONS
B	11.7.18		Amended for Longitudinal Section.
A	25.6.18		Note regarding tree removal added

KB GROUP
KNEEBONE, BERETTA & HALL PTY LTD
CONSULTING STRUCTURAL & CIVIL ENGINEERS
4 MACQUARIE AVENUE, PENRITH NSW 2750
PHONE: (02) 4731 3833 FACSIMILE: (02) 4721 5442
WEBSITE: kbgconsulting.com
E-MAIL ADDRESS: kbhallengineers@gmail.com
A.C.N 002 419 757
A.B.N 36 822 442 203
Directors: Trevor B. HALL, B.Sc (Eng), F.I.E. Aust., C.P. Eng.
Peter R. ANDRESEN, B.E. M.I.E. Aust, C.P. Eng.
Member of: CONSULT AUSTRALIA

SCALE	1:500,1:50,1:20
DATE	11–4–18
DRAWN	P.Martin.
DESIGNED	P.Andresen.
APPROVED	

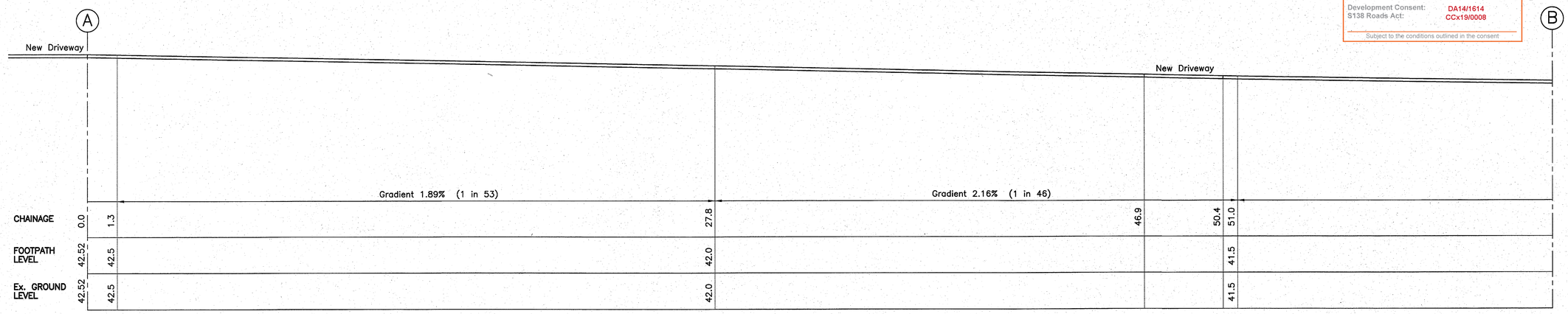
CLIENT: CORATZA CONSTRUCTIONS

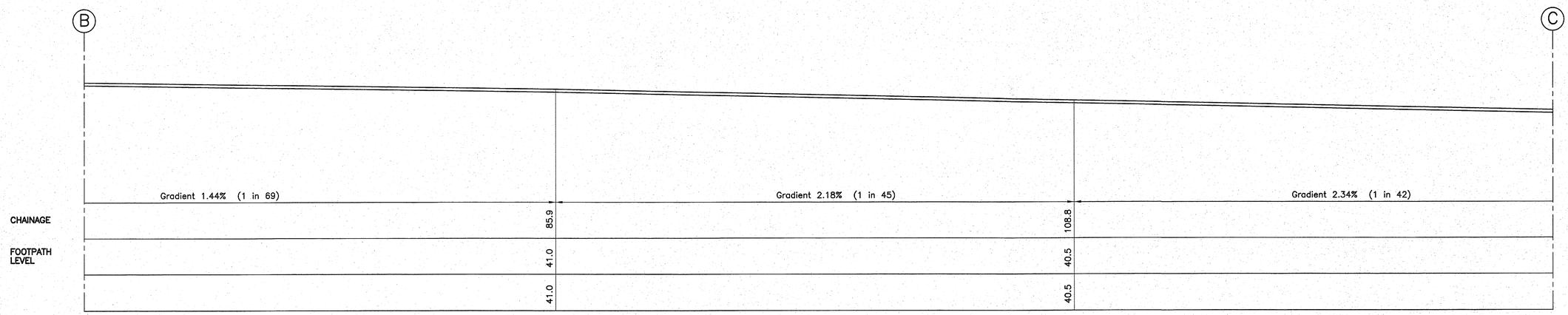
PROPOSED MULTI UNIT HOUSING AT 1A LEONAY PARADE, LEONAY.

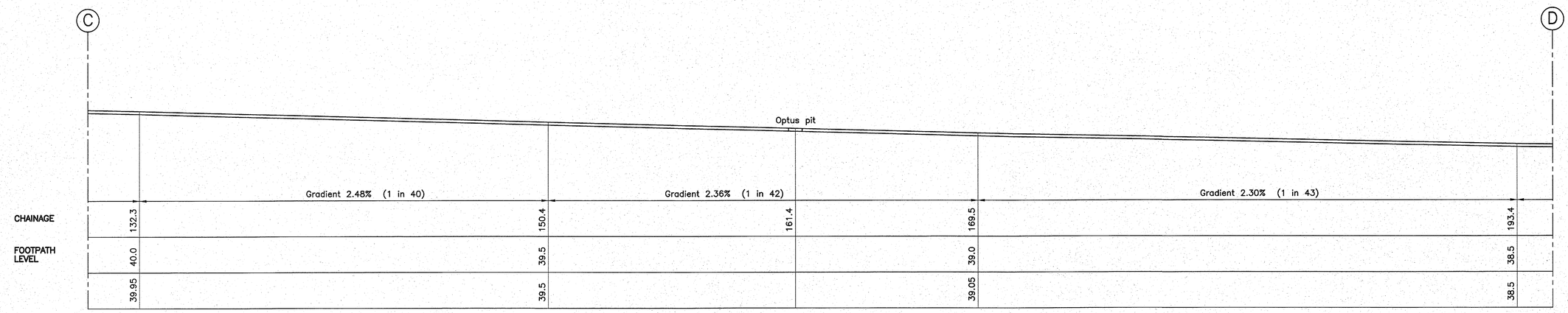
DRAWING NUMBER 104157–3

FOOTPATH DETAILS

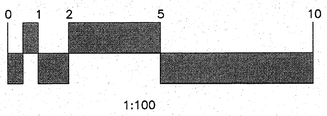
ISSUE B







LONGITUDINAL SECTION 1:100



Issue	Date	App'd	DESCRIPTION
B	11.7.18		Amended for Longitudinal Section.

REVISIONS

KNEEBONE, BERETTA & HALL PTY LTD
CONSULTING STRUCTURAL & CIVIL ENGINEERS
4 MACQUARIE AVENUE, PENRITH NSW 2750
PHONE: (02) 4731 3833 FACSIMILE: (02) 4721 5442
WEBSITE: kbgconsulting.com
E-MAIL ADDRESS: kbhallengineers@gmail.com
A.C.N 002 419 767
A.B.N 36 822 442 203
Directors: Trevor B. HALL, B.Sc (Eng), F.I.E. Aust., C.P. Eng.
Peter R. ANDRESEN, B.E. M.I.E. Aust, C.P. Eng.
Member of: CONSULT AUSTRALIA
KB GROUP

SCALE	1:100
DATE	11-7-18
DRAWN	P.Martin.
DESIGNED	P.Andresen.
APPROVED	

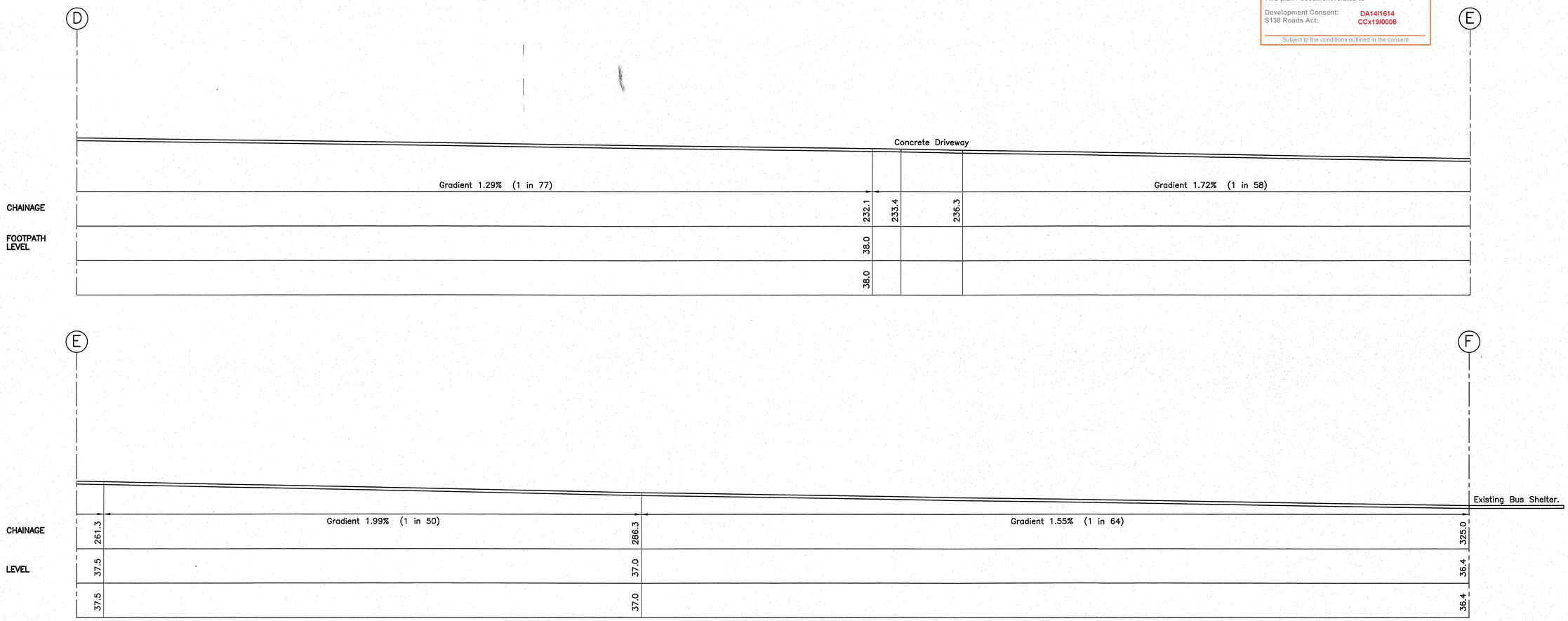
CLIENT: CORATZA CONSTRUCTIONS

PROPOSED MULTI UNIT HOUSING AT 1A LEONAY PARADE, LEONAY.

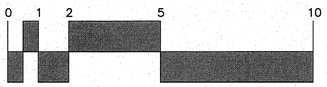
FOOTPATH DETAILS

DRAWING NUMBER 104157-4

ISSUE B



LONGITUDINAL SECTION 1:100



Issue	Date	App'd	DESCRIPTION
B	11.7.18		Amended for Longitudinal Section.

REVISIONS

KNEEBONE, BERETTA & HALL PTY LTD
CONSULTING STRUCTURAL & CIVIL ENGINEERS
4 MACQUARIE AVENUE, PENRITH NSW 2750
PHONE: (02) 4731 3833 FACSIMILE: (02) 4721 5442
WEBSITE: kbgconsulting.com
E-MAIL ADDRESS: kbhallengineers@gmail.com
A.C.N 002 419 767
A.B.N 38 822 442 203
Directors: Trevor B. HALL, B.Sc (Eng), F.I.E. Aust., C.P. Eng.
Peter R. ANDRESEN, B.E. M.I.E. Aust, C.P. Eng.
Member of: CONSULT AUSTRALIA

SCALE	1:100
DATE	11-7-18
DRAWN	P.Martin.
DESIGNED	P.Andresen.
APPROVED	

CLIENT: CORATZA CONSTRUCTIONS

PROPOSED MULTI UNIT HOUSING AT 1A LEONAY PARADE, LEONAY.

FOOTPATH DETAILS

DRAWING NUMBER 104157-5

ISSUE B

PENRITH

Our reference: DA14/1614
Contact: Caleb O'Reilly
Telephone: 4732 7928

26 March 2019

Mr Robert Coratza
53 Jones Street
KINGSWOOD NSW 2747

Dear Mr Coratza

Re: CCX19/0008 Roads Act Approval for 1A Leonay Parade Leonay

Please find included Roads Act Approval No. CCX19/0008 for works at 1A Leonay Parade Leonay, together with an electronic copy of the stamped plans.

Prior to the commencement of works, a pre-construction meeting is to be held between the applicant, the appointed contractor and Council. Please contact the person below to arrange a suitable date.

All works for the development are to be constructed in accordance with Penrith City Council's Engineering Construction Specification for Civil Works. During the construction stage, your contractors are required to arrange inspections in accordance with this guideline and as required by Council's inspector.

Your contact person for inspections will be Garry Fletcher He can be contacted on his mobile 0409 986 392.

You will need to keep one set of stamped plans plus the Roads Act Approval on site at all times.

Yours sincerely

Caleb O'Reilly
Trainee Engineer – Major Developments

Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

PENRITH

Our reference: DA14/1614
Contact: Caleb O'Reilly
Telephone: 4732 7928

26 March 2019

Mr Robert Coratza
53 Jones Street
KINGSWOOD NSW 2747

Dear Mr Coratza

Re: CCX19/0008 Roads Act Approval for 1A Leonay Parade Leonay

Under Section 138 of the Roads Act 1993, approval is granted for works in the road reserve of 1A Leonay Parade Lenonay as detailed by Condition No. 32 of DA14/1614 and in accordance with the stamped approved plans by Kneebone, Beretta & Hall listed in the following schedule and as amended in red by Council.

Plan No.	Revision No.	Date	Sheet Title
104157 - 3	B	11/07/2018	Longitudinal Section Foot Path Detail
104157 - 4	B	11/07/2018	Longitudinal Section Foot Path Detail
104157 - 5	B	11/07/2019	Longitudinal Section Foot Path Detail

Approval is subject to the following conditions:

1. All works shall be undertaken in accordance with the approved plans, Penrith City Council's Engineering Construction Specification for Civil Works and at the direction of Penrith City Council.

2. The applicant is to provide Penrith City Council with written notice of intention to commence works a minimum of two days before any construction activity on site.

3. The notice of commencement shall be accompanied by the following documentation:

    a) Traffic control plan certified by a Roads & Maritime Services accredited Traffic Controller.
    b) Sediment & Erosion Control Plan.
    c) Contractor's license and details of public liability insurance with a limit of not less than $20,000,000.00 (twenty million dollars) indemnifying Penrith City Council from all claims arising from the execution of works.

Penrith City Council
PO Box 60, Penrith
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F 4732 7958
penrithcity.nsw.gov.au

4. Prior to the commencement of works, a dilapidation report shall be undertaken over the full extent of works including road pavement, kerb and gutter, footpaths, street trees and private vehicular crossings. Any damage shall be rectified at the applicant's cost prior to the issue of Council's final signoff of the works.

5. The contractor is to notify all affected residents in writing two (2) days prior to the commencement of construction. Vehicular access to all properties is to be maintained throughout the construction. The contractor's contact details are to be included in the letter.

6. Inspections are to be undertaken in accordance with the requirements of Penrith City Council's Engineering Construction Specification for Civil Works and at the direction of Penrith City Council Officers.

7. A final inspection will not be undertaken until full Works-As-Executed plans and compliance documentation have been submitted to Penrith City Council for review.

8. A letter of completion for works under this approval will not be issued by Penrith City Council until all defects identified in the final inspection have been completed and a maintenance bond has been lodged with Penrith City Council.

9. The Principal Certifying Authority shall not issue an Occupation Certificate for the building development until such times as a Compliance Certificate for works under this approval has been issued by Penrith City Council.

For further information in respect of this approval, please contact Caleb O'Reilly Trainee Engineer - Major Developments on 4732 7928.

Yours sincerely

Caleb O'Reilly
Trainee Engineer – Major Developments

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