ABOUT TREES

URBAN TREE & BUSHLAND MANAGEMENT

TREE REPORT

AT

143 - 145 STAFFORD STREET

PENRITH

FOR

GWGPH P/L

TABLE OF CONTENT

ABOUT TREES
URBAN TREE AND BUSHLAND MANAGEMENT

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1.0 INTRODUCTION

A Development Application (DA) is to be lodged with Penrith City Council for consent to construct a townhouse development at No's 143 - 145 Stafford Street Penrith

1.1 Scope

This report has been commissioned by Mr. Frank Catani and its purpose is to assess the health and condition of the subject tree/s, provide an estimate of their safe life expectancies, and their necessary setback from development in accordance with AS 4970 (2009) 'Protection of trees on construction sites.'

1.2 Summary of Report

- Tree 1 is becoming colonised by mistletoe which is an early symptom of decline in this species. In addition, the lower branches are becoming sparsely foliaged with dieback of the terminal growth.
    - The previous removal of a codominant tree and the failure of a structural branch on its northern side has left an exposed asymmetrical canopy with a bias towards the south.
    - The removal of the mistletoe and declining branches will leave an asymmetrical canopy with tall, narrow form, and this will reduce the amenity value of the tree in the medium term.

- Tree No's 2 & 4 are not considered suitable for retention as they are in advanced stages of decline and pose a high risk of causing injury to persons and/or damage to property.

- Tree No. 3 forms a large codominant canopy with No. 3. After the latter is removed, the inner branches of its asymmetrical canopy will be exposed to unaccustomed wind loading, and this will increase their failure potentials.

- Tree No. 5 is within the dripline of tree No. 4 and its form has been suppressed by the more dominant form of the larger tree. It has a 1m setback from the footings of a Unit on No. 141. It poses a significant risk of causing significant damage to property and has been scheduled to be removed.

1.3 Conclusions

- The subject trees have been scheduled to be removed.

- There is a large area on the northern part of the property that would be of a suitable size for replacement landscape planting of the same species (*Eucalyptus moluccana* and *Eucalyptus tereticornis*). In addition, these new plantings would be expected to provide a long term ecological and amenity benefit to the local area.

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

Lawrie Smith,
Arboricultural Consultant

2.0 METHODOLOGY AND OTHER INFORMATION

This report provides Arboricultural s opinion of the subject trees/ based upon 45 years of practical experience and the qualifications of the author. It has been presented in an accepted industry format and should easily be understood by any person with a reasonable understanding of the subject.

The author is acting independently of and not as the advocate for the owner of the subject tree/s, and is not to receive a commission to prune or remove the subject tree/s. 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.

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.

2.1 Methodology & Assessment Criteria

- A visual assessment of these trees was undertaken from ground level on the 17 June 2021 in accordance with the Visual Tree Assessment (VTA method of Mattheck and Breloer (1994).
- The assessment took into account the biological state of the trees, as indicated by the health of their foliage, their structural form and their growing environment.
- The terminology used in the assessment is defined in Section 8, with more detailed information provided in the Appendices, which are referenced to recent industry research.
- 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.
- 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) – Refer to TreeA/Z Categories in Appendices 9.3
- Significance Values are based on numerous concepts used within the Arboricultural Industry – Refer to the Significance Values in Appendices 9.4
- A copy of the tree assessment is include in Section 10
- A Tree Location Plan is included in Section 11, and shows the location of the subject tree/s.

2.2 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.'

2.3 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.

2.4 Copyright

3.0 TREE LEGISLATION

3.1 State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

Aims of this Policy

1. to protect the biodiversity values of trees and other vegetation in non-rural areas of the State, and
2. to preserve the amenity of non-rural areas of the State through the preservation of trees and other vegetation

Land to which Policy applies

This Policy applies to the following areas of the State (the non-rural areas of the State)

1. land in the following local government areas

- Bayside, City of Blacktown, Burwood, Camden, City of Campbelltown, Canterbury, Bankstown, Canada Bay, Cumberland, City of Fairfield, Georges River, City of Hawkesbury, Hornsby, Hunter's Hill, Georges River, Inner West, Ku-ring-gai, Lane Cove, City of Liverpool, Mosman, Newcastle, North Sydney, Northern Beaches, City of Parramatta, City of Penrith, City of Randwick, Rockdale, City of Ryde, Strathfield, Sutherland Shire, City of Sydney, The Hills Shire, Waverley, City of Willoughby, Woollahra.

2. land within the following zones under an environmental planning instrument

- Zone RU5 Village, Zone R1 General Residential, Zone R2 Low Density Residential, Zone R3 Medium Density Residential, Zone R4 High Density Residential, Zone R5 Large Lot Residential, Zone B1 Neighbourhood Centre, Zone B2 Local Centre, Zone B3 Commercial Core, Zone B4 Mixed Use, Zone B5 Business Development, Zone B6 Enterprise Corridor, Zone B7 Business Park, Zone B8 Metropolitan Centre, Zone IN1 General Industrial, Zone IN2 Light Industrial, Zone IN3 Heavy Industrial, Zone IN4 Working Waterfront, Zone SP1 Special Activities, Zone SP2 Infrastructure, Zone SP3 Tourist, Zone RE1 Public Recreation, Zone RE2 Private Recreation, Zone E2 Environmental Conservation, Zone E3 Environmental Management, Zone E4 Environmental Living or Zone W3 Working Waterways.

Clearing of vegetation in non-rural areas that requires authority under this Policy

A person must not clear vegetation in any non-rural area of the State to which Part 3 applies without the authority conferred by a permit granted by the council under that Part.

1. A person must not clear native vegetation in any non-rural area of the State that exceeds the biodiversity offsets scheme threshold without the authority conferred by an approval of the Native Vegetation Panel.
2. Clearing of vegetation is not authorised as referred to in this clause unless the conditions to which the authorisation is subject are complied with.
3. This subclause extends to conditions that impose obligations on the person who clears the vegetation that are required to be complied with before or after the clearing is carried out.

Clearing that does not require authority under this Policy

An authority to clear vegetation is not required under this Policy if it is clearing of a kind that is authorised under section 60O of the Local Land Services Act

1. An authority is not required under this Policy for the removal of vegetation that the council or Native Vegetation Panel is satisfied is dying or dead and is not required as the habitat of native animals.
2. An authority is not required under this Policy for the removal of vegetation that the council is satisfied is a risk to human life or property.

Part 3 Council permits for clearing of vegetation in non-rural areas

Council may issue permit for clearing of vegetation

1. A council may issue a permit to a landholder to clear vegetation to which this Part applies in any non-rural area of the State.
2. A permit cannot be granted to clear native vegetation in any non-rural area of the State that exceeds the biodiversity offsets scheme threshold.
3. A permit under this Part cannot allow the clearing of vegetation

a. that is or forms part of a heritage item or that is within a heritage conservation area, or

b. that is or forms part of an Aboriginal object or that is within an Aboriginal place of heritage significance, unless the council is satisfied that the proposed activity
c. is of a minor nature or is for the maintenance of the heritage item, Aboriginal object, Aboriginal place of heritage significance or heritage conservation area, and
d. would not adversely affect the heritage significance of the heritage item, Aboriginal object, Aboriginal place of heritage significance or heritage conservation area.

(4) A permit may be granted under this Part subject to any conditions specified in the permit.

Miscellaneous provisions relating to permits
An application for a permit
1. is to be made in the form and manner required by the council, and
2. is to be accompanied by the application fee (if any) determined by the council.

The council may request an applicant for a permit to provide the council with such further information about the proposed clearing as the council considers necessary for its proper consideration of the application (including information about previous clearing of vegetation in the area or surrounding area).

The council may deal with the application if the applicant notifies the council that the information will not be provided or if the information has not been provided within the period specified by the council or within such further period as the council may allow.

The council is to determine an application for a permit within 28 days after the date on which the application was duly made.

Any period after the applicant is requested by the council to provide further information to enable the application to be dealt with and until the information is provided (or the applicant notifies the council the information will not be provided) is not to be counted in calculating that 28-day period.
An application for a permit that has not been determined is taken to have been refused after the expiration of that 28-day period.

The council may grant or refuse to grant a permit even if the application is taken to have been refused under this clause.

Appeal to Land and Environment Court
1. An applicant for a permit may appeal to the Land and Environment Court against the refusal by a council to grant the permit.
2. Any such appeal is to be made within 3 months after the date on which the applicant is notified of the decision or within 3 months after the council is taken to have refused the application (whichever is the later).

3.2 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 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.

3.2.1 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.

3.2.2 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 1400mm 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 1.4mm 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 1.4m 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.

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

c. Exemptions
   (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) You can also carry out the following works without permission:
   - Remove or prune edible fruit trees (excluding Australian natives), eg. Citrus, Apple, Mulberry, etc. Note: Ornamental fruit trees are not exempt.
   - Remove fruit and dead leaves (fronds) from palm trees.
   - Prune branches up to 50mm diameter.
   - Prune to remove deadwood and mistletoe.
   - Remove or prune any exempt species (see below)

African Olive (*Olea europaea* subsp.africana)	Cassia (*Senna pendula*)
Cocos palm (*Syagrus romanzoffianum*)	Cotoneaster (*Cotoneaster* spp)
Norfolk Island Hibiscus (*Lagunaria patersonia*)	Hackberry (*Celtis sinensis*)
Oleander (*Nerium oleander*)	Privet (*Ligustrum* spp.)
Tree of Heaven (*Ailanthus altissima*)	Rubber Tree (*Ficus elastica*)
Umbrella Tree (*Schefflera actinophylla*)	

   (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.

(vii) 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.

(viii) 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*.

(ix) Controlled weeds under the NSW Biosecurity Act 2015 and identified in the Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022.

(x) 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

(xi) The removal of trees and other vegetation to maintain approved dams or asset protection zones.

d. 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.

3.2.3 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.

e. 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.

3.2.4 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.

3.2.5 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.

3.2.6 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).

3.2.7 Protection of Trees during Construction

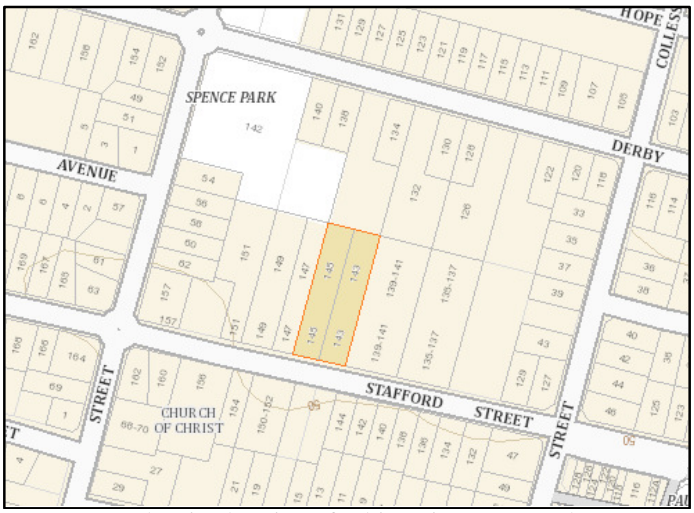
(a) During construction, an adequate fence or similar structure must be constructed around any trees or vegetation to be retained, at a distance at least equal to the drip line.

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

4.0 OBSERVATIONS

4.1 Site Description

The site is known as 143 - 145 Stafford Street Penrith and is bordered on the north, east and west privately owned multi-unit residential development, and on the south by Stafford Street. The surrounding areas are mainly comprised of urban residential development



Map 1 – showing location of subject site (Dept Lands 2021)


Map 2 – showing subject trees (Dept Lands 2021)

4.2 Soil Landscape

The soil of the general area has been described by Bannerman & Hazelton (1990), as 'Luddenham Soil Landscape'. The topsoil is usually 10cm of friable brownish dark brown loam which becomes hard setting when dry or compacted (lu1), and overlies 40cm of hard setting brown clay loam, especially when exposed at the surface (lu2).

Where subsoil exits, >50cm of medium to heavy clay (lu3) over overlies <90cm of grey mottled clay (lu4). Soil is generally shallow on crests (<100cm), moderately deep on upper slopes (70 – 150cm) and moderately deep on lower slopes and drainage lines (<150cm). Subsoils have high clay content and are moderately reactive.

4.3 Current Condition of the Trees

4.3.1 Tree 1 is a mature *Eucalyptus moluccana:* Grey Box has a straight trunk, to half the height of the tree and the canopy is usually 'V' shaped. It is the most common of the boxes in the Sydney district, and is associated with *Eucalyptus tereticornis, Eucalyptus maculata* and the Ironbarks on clay soils in Western Sydney. It occurs in Open Forest and Woodland in moist, but well drained, moderately fertile undulating country with a clay soil or subsoil, and is common on the Cumberland Plain west of Parramatta (Leonard, G. 1993. Fairley, A. Moore, P. 1989)

a. **Tree Form:** This tree has formed a single trunk with a diameter at 1.4m above ground level (DBH) of 800mm which supports an asymmetrical canopy with a bias towards the south that is m in height with a crown spread of 14x21m (see Plates 1 & 2)

b. **Health & Vigour: Low** (60 – 90% canopy density) **–** Reduced ability of a tree to sustain its life processes. This may be evident by minor twig dieback and the formation of epicormic growth throughout the upper canopy, reduced foliage density and a reduced resistance to predation.

c. **Structural Condition: Fair –** The removal of a codominant tree on its northern side has left an asymmetrical canopy with a bias towards the south. In addition, the failure of a first order branch has caused a longitudinal cambium wound on its northern side of the trunk. Mistletoes have formed on the lower branches and dieback of their terminal foliage are symptoms of decline in this species (see Plates 1 & 2).

4.3.2 Tree 2 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. **Tree Form:** This tree has formed two codominant trunks with DBH's of 700mm and these combine to form an asymmetrical canopy with a bias towards the east that is 22m in height with a crown spread of 14x19m (see Plate 3)

b. **Health & Vigour: Poor** (20 – 60% canopy density) – Reduced ability of a tree to sustain its life processes. This may be evident by twig and branch dieback and the formation of epicormic growth along the main structural branches, reduced crown cover and reduced crown density and a reduced resistance to predation.

c. **Structural Condition: Poor –** This tree is in advanced stages of decline. This is evident by dieback of the lower branches on the eastern trunk and significant dieback of the canopy of the western trunk. In addition, the upper canopy of the eastern trunk is sparse, with epicormic growth being produced on the structural branches (see Plate 3). There are large cambium cankers on the lower sections of their main stems, with significant amount of decay in the codominant junction (see Plates 4 – 6).

4.3.3 **Tree 3 is a mature *Eucalyptus tereticornis*** (See description of tree No. 2)

a. **Tree Form:** This tree has formed a single trunk with a diameter a DBH of 800mm which supports an asymmetrical canopy with a bias towards the west that is 26m in height with a crown spread of 18x21m (see Plates 7 & 8)

b. **Health & Vigour: Average** (90 – 100% canopy density) – Normal ability of a tree to maintain and sustain its life processes. This may be evident by little or no twig dieback throughout the upper canopy, the typical growth of leaves, crown cover and crown density, and a resistance to predation.

c. **Structural Condition: Fair –** This tree combines with No. 2 to form a large codominant canopy. The removal of No. 2 will leave the canopy of this tree to unaccustomed wind loading, and this may increase the failure potential of branches within it (see Plate 8).

4.3.4 **Tree 4 is a mature *Eucalyptus tereticornis*** (See description of tree No. 2)

a. **Tree Form:** This tree has formed a single trunk with a DBH of 900mm which supports an asymmetrical canopy with a bias towards the northeast that is 28m in height with a crown spread of 24x28m (Plate 9)

b. **Health & Vigour: Poor** (20 – 60% canopy density) – Reduced ability of a tree to sustain its life processes. This may be evident by twig and branch dieback and the formation of epicormic growth along the main structural branches, reduced crown cover and reduced crown density and a reduced resistance to predation.

c. **Structural Condition: Poor –** This tree is in advanced stages of decline. This is evident by dieback of the main structural branches on the eastern side of the canopy and sparse foliage and twig dieback on the west. In addition, the upper canopy of the eastern trunk is sparse, with epicormic growth being produced on the structural branches (See Plates 9 & 11). There is a large cambium canker along the main trunk, and this has been colonised by a wood decaying organism (see Plate 10).

4.3.5 **Tree 5 is a mature *Eucalyptus moluccana*** (See description of tree No. 1)

a. **Tree Form:** This tree has formed a single trunk with a DBH of 450mm which supports a supressed canopy that is 19m in height with a crown spread of 12x9m (see Plate 12)

b. **Health & Vigour: Average** (90 – 100% canopy density) – Normal ability of a tree to maintain and sustain its life processes. This may be evident by little or no twig dieback throughout the upper canopy, the typical growth of leaves, crown cover and crown density, and a resistance to predation.

c. **Structural Condition: Poor –** Tree is of good habit or misshapen, with a form that may be severely restricted for space and light and may exhibit symptoms of irreversible decline.

4.4 Site Photographs

Plates 1 & 2 – showing tree 1, viewed from the N/W.

Plate 3 – showing tree 2 viewed from the N/E

Plate 4 – showing trunk of tree 2, viewed from the S/E

Plates 5 & 6 – showing cankers and decay in trunk of tree 2, viewed from the N/E

Plate 7 – showing tree No. 3, viewed from the west

Plate 8 – asymmetrical canopy tree No. 3, viewed from the north.

Plate 9 – showing tree No. 4, viewed from the east.

Plate 10 – showing cambium canker on trunk of tree No. 4.

Plate 11 – showing deadwood in canopy of No. 4.

Plate 12 – showing tree No. 5 within 1m of Unit on No. 141

4.5 Retention Values

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. 1 (*Eucalyptus moluccana*) has a retention value of MLVF (4) – Mature tree with Low Vitality and in Fair Condition, and retainable in the medium term.

Tree No. 2 (*Eucalyptus tereticornis*) has a retention value of MLVP (2) – Mature tree with Low Vitality and in Poor Condition, likely to be removed immediately or retained in the short term.

Tree No. 3 (*Eucalyptus tereticornis*) has a retention value of MGVG (10) – Mature tree with Good Vitality and in Good Condition, and retainable in the long term.

Tree No. 4 (*Eucalyptus tereticornis*) has a retention value of MLVP (2) – Mature tree with Low Vitality and in Poor Condition, likely to be removed immediately or retained in the short term.

Tree No. 5 (*Eucalyptus moluccana*) has a retention value of MLVF (4) – Mature tree with Low Vitality and in Fair Condition, 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 (See Tree A/Z Categories in Appendices 9.3).

Tree No. 1 (*Eucalyptus moluccana*) has a SULE Rating of 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.*

Tree No. 2 (*Eucalyptus tereticornis*) has a SULE Rating of 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.*

Tree No. 3 (*Eucalyptus tereticornis*) has a SULE Rating of A1 – No significant defects and could be retained with minimal remedial care.

Tree No. 4 (*Eucalyptus tereticornis*) has a SULE Rating of 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.*

Tree No. 5 (*Eucalyptus moluccana*) has a SULE Rating of 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)

4.7 Significance Value

This methodology is based on numerous concepts used in the Arboricultural Industry, i.e. IACA (2009) & Thyer (2006).

Five parameters of a tree are assessed, with each providing a numerical value. Each high significance parameter has a value of 20%, each medium parameter has a value of 14%, each low parameter has a value of 7% and each very low parameter has a value of 0% (Refer to Appendices 9.4)

Only one parameter can selected for each tree, and they are added together to obtain its Significance Value. The highest Significance Value would be 100%, and the lowest would be 0.

Tree No.	Health & Vitality	Structural Condition	Ecological Value	Amenity Value	Visual Prominence	Significance Value
1	14	14	14	7	7	56%
2	7	7	14	7	7	42%
3	14	14	14	14	7	63%
4	7	7	14	7	7	42%
5	14	14	14	14	7	63%

Table 1 – showing calculated Significance Value

4.8 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	Area of TPZ m²
1	800	9.6m	850	3.1m		289.53m²
2	2x 700	14.0m	1400	3.8m		615.75m²
3	800	9.6m	900	3.2m		289.53m²
4	900	10.80m	1000	3.3m		366.44m²
5	450	5.4m	550	2.6m		91.61m²

Table 2 – showing recommended Tree Protection Zones in accordance with AS 4970 (2009)

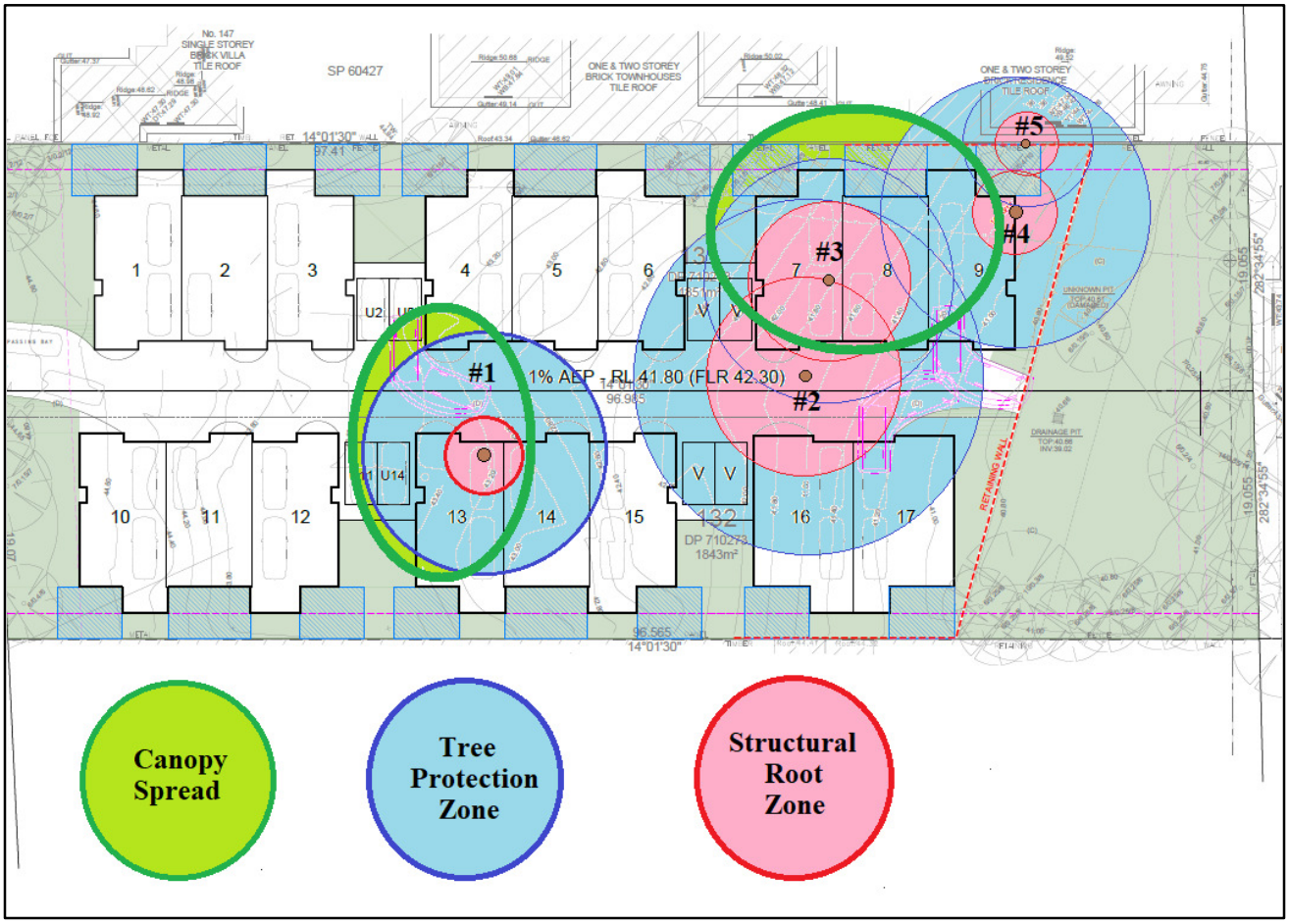


Diagram 1 – showing recommended Tree Protection Zones

5.0 DISCUSSION

5.1 Arboricultural Impacts of the Proposed Development

The Tree Protection Zones were calculated in Table No. 1 and drawn to scale in Diagram 1. 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 – 30% encroachment	Moderate impact
>30%	Significant impact (see SRZ)

Table 2 – Potential Impacts on Subject Trees

Tree No. 1 (*Eucalyptus moluccana*)

- According to AS 4970, it will require a Tree Protection Zone (TPZ) with a radius of 9.6m, measured from the centre of its trunk (COT), to reduce impacts of construction on its health and vitality to an acceptable level (see Appendices 9.5). This represents an area of 289.53m².
- It has a Structural Root Zone (SRZ) with a radius of 3.1m COT.
- This tree is located within the footprint of Unit No. 13 and has been scheduled to be removed.

Tree No. 2 (*Eucalyptus tereticornis*)

- This tree will require a TPZ with a radius of 14.0m COT and this represents an area of 615.75m².
- It has a SRZ with a radius of 3.8m COT.
- This tree is located within the footprint of the proposed driveway and has been scheduled to be removed.

Tree No. 3 (*Eucalyptus tereticornis*)

- According to AS 4970, it will require a TPZ with a radius of 9.6m and this represents an area of m².
- It has a SRZ with a radius of m COT.
- This tree is located within the footprint of Unit No. 7 and has been scheduled to be removed.

Tree No. 4 (*Eucalyptus tereticornis*)

- This tree will require a TPZ with a radius of 10.80m COT and this represents an area of 366.61m².
- It has a SRZ with a radius of m COT.
- This tree is located within the footprint of Unit No. 9 and has been scheduled to be removed.

Tree No. 5 (*Eucalyptus moluccana*) is located on common boundary on No's 141 & 143.

- This tree will require a TPZ with a radius of 5.4m COT and this represents an area of 91.61m².
- It has a SRZ with a radius of m COT.
- This tree has a setback of 1m from the footings of a Unit on No. 141. It poses a significant risk of causing significant damage to property and has been scheduled to be removed.

6.0 CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusions

- Tree 1 is becoming colonised by mistletoe which is an early symptom of decline in this species. In addition, the lower branches are becoming sparsely foliaged with dieback of the terminal growth.
    - The previous removal of a codominant tree and the failure of a structural branch on its northern side has left an exposed asymmetrical canopy with a bias towards the south.
    - The removal of the mistletoe and declining branches will leave an asymmetrical canopy with tall, narrow form, and this will reduce the amenity value of the tree in the medium term.

- Tree No's 2 & 4 are not considered suitable for retention as they are in advanced stages of decline and pose a high risk of causing injury to persons and/or damage to property.

- Tree No. 3 forms a large codominant canopy with No. 3. After the latter is removed, the inner branches of its asymmetrical canopy will be exposed to unaccustomed wind loading, and this will increase their failure potentials.

- Tree No. 5 is within the dripline of tree No. 4 and its form has been suppressed by the more dominant form of the larger tree. It has a 1m setback from the footings of a Unit on No. 141. It poses a significant risk of causing significant damage to property and has been scheduled to be removed.

6.2 Recommendations

- The subject trees have been scheduled to be removed.

- There is a large area on the northern part of the property that would be of a suitable size for replacement landscape planting of the same species (*Eucalyptus moluccana* and *Eucalyptus tereticornis*). In addition, these new plantings would be expected to provide a long term ecological and amenity benefit to the local area.

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

Lawrie Smith,
Arboricultural Consultant

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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 Good, Average, Low, Poor, Dormant, Advanced Decline and Dormant

- **Good** (100% canopy density) – Normal ability of a tree to maintain and sustain its life processes. This may be the typical growth of leaves, crown cover and crown density, and a resistance to predation.

- **Average** (90 – 100% canopy density) – Normal ability of a tree to maintain and sustain its life processes. This may be evident by little or no twig dieback throughout the upper canopy, the typical growth of leaves, crown cover and crown density, and a resistance to predation.

- **Low** (60 – 90% canopy density) **–** Reduced ability of a tree to sustain its life processes. This may be evident by minor twig dieback and the formation of epicormic growth throughout the upper canopy, reduced foliage density and a reduced resistance to predation.

- **Poor** (20 – 60% canopy density) – Reduced ability of a tree to sustain its life processes. This may be evident by twig and branch dieback and the formation of epicormic growth along the main structural branches, reduced crown cover and reduced crown density and a reduced resistance to predation.

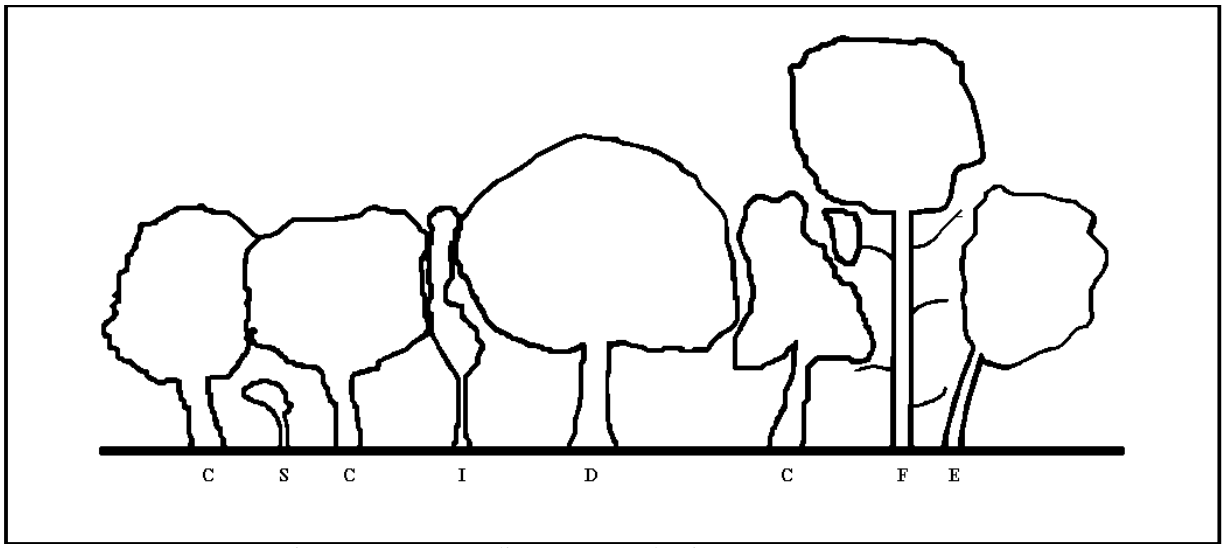
- **Advanced Decline** (0 – 20% canopy density) – Reduced ability of a tree to sustain its life processes. This may be evident by dieback of large scaffold branches and epicormic growth throughout the canopy, reduced crown density and a reduced resistance to predation.

- **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 understory canopy
Understorey	Small trees and shrubs that form the understory 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. This may be independent from, or contributed to by vigour. Condition can be categorized as Good, Fair, Poor, Advanced Decline and Dead.

- **Good –** 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 –** Tree is of good habit or misshapen, with a form not severely restricted for space and light, and may exhibit early symptoms of decline due to effects of foliage pests and diseases, or modifications to its growing environment. This may include twig dieback in outer canopy and a history of failure of small branches. Cankers and/or decay in branch junctions or pruning wounds may also be present
- **Poor –** Tree is of good habit or misshapen, with a form that may be severely restricted for space and light, and may exhibit symptoms of irreversible decline. This may include twig and branch of terminal branches and the failure of a scaffold branch. Large cankers, fungal fruiting and small cavities may also be present

  Additional symptoms may include structural defects, termite infestation, ring-barking from borer activity, root damage and/or instability of the tree caused by excavations or altered local environmental conditions

- **Advanced Decline** – Tree is of good habit or misshapen, with a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline. This may include major die-back of the canopy and the failure of numerous scaffold branches. Large cankers, fungal fruiting bodies and cavities may also be present.

  Additional symptoms may include significant structural defects, termite infestation, ring-barking from borer activity, root damage and/or instability of the tree caused by excavations or altered local environmental conditions.

- **Dead** – The tree is no longer capable of performing any of the following processes, or is exhibiting any of the following symptoms;
  - **Processes**
    - Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);
    - Osmosis (the ability of the roots system to take up water)
    - Turgidity (the ability of the plant to sustain moisture pressure in its cells);
    - Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber);

  - **Symptoms**
    - Permanent leaf loss;
    - Permanent wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots);
    - Shedding of the epidermis (bark desiccates and peels off to the beginning of the sapwood).

8.6 SAFE LIFE EXPECTANCY – The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as Immediate, Short Term, Medium Term and Long Term.

- **Short Term** Period of time less than 15 years.
- **Medium Term** Period of time 15 - 40 years.
- **Long Term** Period of time greater than >40 years.

9.0 APPENDICES

9.1 QUALIFICATIONS & EXPERIENCE OF AUTHOR

QUALIFICATIONS

- Graduate Certificate in Bushfire Design, University of Western Sydney (2012)
- 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)

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**

Explanation: *This is similar to Z5, but where the defect is not so severe that remedial works have to be extensive and immediate. Quite often, there is are less sever defects that are so bad that there is no realistic potential for the tree to improve, but it could be retained in the short term with some significant remedial works. A typical example would be a tree with a structural defect that will clearly prevent it from ever improving its condition or safe life expectancy. However, target pruning and/or crown thinning may sufficiently reduce the weight of the defective part and its failure potential.*

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**

Explanation: *This applies to trees in groups where one individual is destructively interfering with another. The judgement of which is the better tree is subjective and would be informed by which tree had the best potential for sustainable retention.*

An obvious example is one tree growing up through another and directly rubbing, and causing damage. Retaining both would probably result in the loss of each, whereas removing one may allow the other to achieve its full potential. Another example would be one tree shading and preventing the sustainable development of a neighbour, to the extent that both trees would be prematurely removed if left unmanaged. The removal of one tree may be justified if it allowed the remaining tree to reach its full potential. If both trees can be retained as a group and achieve their full potential, then they should not be included in the subcategory.

Z10 **Overgrown or over mature hedge or row of trees vulnerable to adverse weather events**
Explanation: *Where a hedge has not been actively managed or a screen has become over mature, individuals often attain the height of isolated trees, although they have no realistic hope of being sustainably retained as such because of their form.*

This subcategory is intended to be applies to rows of trees that may have been originally planted as a hedge or screen, but their close spacing and the inevitable tall thin form has made them vulnerable to adverse weather events. Rows of trees fall into this subcategory if there is some doubt whether they could be defined as a hedge or screen, but they are clearly unsuitable for long term retention

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 SIGNIFICANCE ASSESSMENT

The significance of any tree in the landscape is usually based on the personal opinion of the assessor, and can therefore be very subjective. A major drawback of methodologies based on subjective criteria is the difficulty in consistently arriving at the same answer with different assessors. This problem can never be fully addressed, but if a methodology is going to be effective, it must provide the basis to allow an independent person to arrive at the same conclusion.

This methodology is based on numerous concepts used in the Arboricultural Industry (IACA 2009 & Thyer 2006). Five parameters of a tree are assessed, with each providing a numerical value. Each high significance parameter has a value of 20, each medium parameter has a value of 14, each low parameter has a value of 7 and each very low parameter has a value of 0

Only one parameter can selected for each tree, and they are added together to provide its Significance Value. The highest Significance Value would be 100, and the lowest would be 0.

9.4.1 High Significance in the Landscape

- **Health & Vigour**: Tree with average vigour and typical of the species, considering its age, without noticeable decline, and expected to continue to remain so provided conditions around the tree required for its survival do not change.
- **Structural Condition:** Trees with good form; i.e. 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.
- **Ecological Value:** Indigenous species being an integral part of a natural ecosystem, and may be protected by Threatened Biodiversity Legislation
- **Amenity Value:** Superb, appealing specimen, attractive or interesting in all seasons.
- **Prominence:** Tree is known widely, of local historical importance, and/or listed as, or part of a Heritage Item

9.4.2 Medium Significance in the Landscape

- **Health & Vigour:** Tree is generally vigorous but shows some indications of decline due to pests and diseases or changes to its growing environment
- **Structural Condition:** Trees with structural defects with low failure potential
- **Ecological Value:** Remnant species of native vegetation
- **Amenity Value:** Attractive or interesting for part of the year
- **Prominence:** Tree is known locally or seen by many passers by

9.4.3 Low Significance in the Landscape

- **Health & Vigour:** Tree is in low vigour and in decline
- **Structural Condition:** Trees with structural defects with medium failure potentials and may require monitoring on an annual basis.
- **Ecological Value:** Native or introduced ornamental species - beneficial to fauna, food resource and/or shelter.
- **Amenity Value:** Ordinary or plain
- **Prominence:** Tree is only seen by neighbourhood residents and passers by

9.4.4 Very Low Significance in the Landscape

- **Health & Vigour:** Tree exhibits symptoms of advanced and irreversible decline due to fungal decay, major dieback of branch and crown canopy, predation of pests, storm or lightning damage, root damage, instability of the tree and alterations to its growing environment
- **Structural Condition:** Trees with defects which have failed, or have a high risk of failing soon, and corrective action must be taken as soon as possible.
- **Ecological Value:** Listed as a Priority Weed, Environmental Weed or an exempt species by the Local Council
- **Amenity Value:** Misshapen and/or unattractive, with little or no benefit to the local amenity
- **Prominence:** Tree is only seen by private owners or adjacent residents

9.5 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.

9.5.1 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.

9.5.2 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.

9.5.2 References to Appendices 9.5

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

9.6 EXTENT OF THE ROOT SYSTEM

The shape of the main structural root system develops in response to the need to support the tree. Beyond this zone, root growth and development is influenced by the availability of water and nutrients. Unless conditions are uniform around the tree (which would be unusual) the extent of the root-systems can be irregular and difficult to predict. As roots are very opportunistic, they will not generally show the symmetry seen in the aerial parts. The majority is located in the surface 600mm of soil, and it is quite common for it to extend from 1.5 and 2.5 times the spread of the crown (Lonsdale 1999).

9.6.1 Types of Roots

Structural Root Plate: This is referred to in AS 4790 (2009) as the Structural Root Zone (SRZ) and represents the main structural woody root system that provides most of the trees anchorage. It is the central part of the root-system which rotates, and becomes visible, when a tree is wind thrown.

'Between four and eleven major woody roots (primary roots) originate from the base of the stem of most trees, the majority growing horizontally through the soil. Their points of attachment to the trunk are close to ground level and are associated with a marked swelling (root buttress) (Perry 1982). These rapidly subdivide to about 100mm in diameter (zone of rapid taper) and become the main woody, transport roots.

The size of tree's structural root plate varies in accordance to its dimensions, and growing environment. However, the diameter of its root crown can be used to calculate the recommended setback between it and the surrounding infrastructure.

Woody Transport Roots: Beyond the structural root plate the primary roots subdivide into approximately 100mm diameter woody roots. These continue to branch and subdivide into smaller diameter roots which transport water and nutrients from the non-woody roots. Their general direction of growth is radial from the structural root plate and horizontal to the soil surface. In typical clay-loam soils, they are usually located less than 20 to 30cm below the surface and it is not uncommon for them to extend from between 2.5 and 3 times the height of the tree (Stout 1956, Lyford & Wilson 1964)

Little is known about the dimensions and depth of transport roots from about 4m from the trunk outwards to their growing extremities. It can be inferred that for many species, they probably remain at the same depth as where they were recorded near the root plate (Cutler, D. 1995).
Woody transport roots can also be responsible for damage to infrastructure. Column 3 of Table 1 calculates the minimum radius measured from the stem that identifies the area containing the main transport roots. Ideally, this area should not be encroached upon to provide adequate moisture and nutrients needs of a healthy tree, and to minimise the potential of damage to infrastructure (Coder, K. 1996).

Non-Woody Roots:
Feeder Roots; Beyond the woody transport roots, a complex system of smaller non-woody lateral roots develop and these branch 3 to 4 times to form fans or mats of thousands of fine, short non-woody roots. They tend to be 1mm or less in diameter, at least 20cm long and grow predominantly upwards into the top 150mm of soil and leaf litter (Perry 1982 & Craul 1992).
Fine non-woody roots form the major part of a trees surface root system and are often called 'feeder roots' because they are the primary sites of absorption of water and minerals. The combined number of fine root tips of an individual tree has been estimated from 70 to 500 million (Craul 1992).

Root Hairs; The majority of the moisture requirements of a tree is absorbed from the soil into the non-woody roots through root hairs. The number of root hairs on a single plant has been estimated at more than 14 billion, and this can increase at a rate of more than 100 million per day (Robbins & others 1950).

Mycorrhizal Associations; Many trees die soon after planting because certain fungi are not present to form mycorrhizae associations with their roots. Mycorrhizae (*myco* means fungus and *rhiza* means root) are root structures formed when the non-woody roots are invaded by specific fungi that form a symbiotic relationship beneficial to both organisms (Harris 1983). The fine threads (hyphae) that mycorrhizal fungi send into the soil around roots can increase the effective surface area of the root system by up to 60 times (CSIRO 1979)

9.6.2 References to Appendices 9.6

- Coder, K. (1996) Construction damage assessments: 'Tree and Sites'. University of Georgia Cooperative Extension Service Publication, FOR 96-39 18pp
- Coder, K. (1998) Root Growth Control: Managing Perceptions and Realities in 'The Landscape Below the Ground 2, Proceedings of a Second International Workshop on Tree Root Development in Urban Soils Ed by Neely & Watson
- Craul, P.J. (1992) 'Urban Soils in Landscape Design' John Wiley & Sons New York
- Cutler, D. (1995) Interactions between tree roots and buildings, pp 78 -87 In Watson & Neely (Eds.) Trees and Building Sites: Proceedings of an International Workshop on Trees and Building, Chicago, IL. International Society of Arboriculture
- Gilman, E. (1997 b) 'Trees for Urban and Suburban Landscapes', Delmar Publishers
- Harris (1983)
- Lyford & Wilson (1964) 'Development of the root system of *Acer rubrum*', Harvard Forest Paper No. 10 Harvard University, Petersham Mass
- Lonsdale, D. (1999) 'Principles of Tree Hazard Assessment and Management' Dept of Environment, Transport and the Regions. London.
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- Stout, B.A. (1956) 'Studies of the root systems of deciduous trees' Black Rock Forest Bulletin #15. Harvard Black Rock Forest. Cornwall-on-the-Hudson, New York. In cooperation with the Maria Moors Cabot Foundation, Harvard University, Cambridge, Mass

10.0 TREE SURVEY

No.	Species Name	DBH (mm)	RCD (mm)	Height	Crown Spread	Age Class	Crown		
1	*Eucalyptus moluccana*	800	850	23	N4 S10 E11 W10	M	Type D	Form	Lean
Health and Vitality		Structural Condition		Eco	Amenity	Prom	SULE	TPZ	SRZ
								9.6	3.1
Other Information									

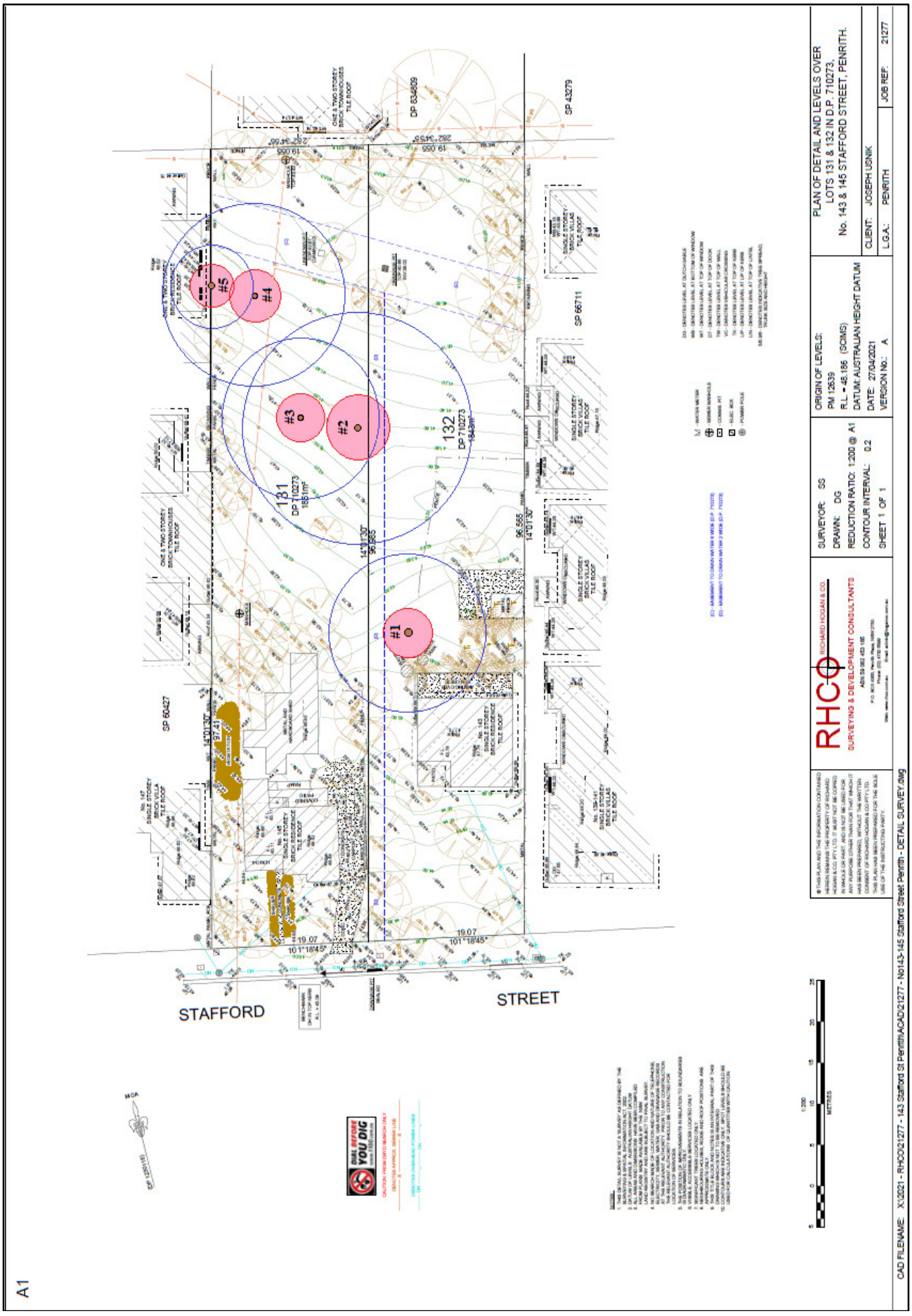
No.	Species Name	DBH (mm)	RCD (mm)	Height	Crown Spread	Age Class	Crown		
2	*Eucalyptus tereticornis*	2x700	1400	22	N9 S10 E10 W4	OM	Type CD	Form	Lean
Health and Vitality		Structural Condition		Eco	Amenity	Prom	SULE	TPZ	SRZ
								14.0	3.8
Other Information									

No.	Species Name	DBH (mm)	RCD (mm)	Height	Crown Spread	Age Class	Crown		
3	*Eucalyptus tereticornis*	800	900	26	N14 S9 E12 W12	M	Type CD	Form	Lean
Health and Vitality		Structural Condition		Eco	Amenity	Prom	SULE	TPZ	SRZ
								9.6	3.2
Other Information									

No.	Species Name	DBH (mm)	RCD (mm)	Height	Crown Spread	Age Class	Crown		
4	*Eucalyptus tereticornis*	900	1000	28	N18 S10 E14 W10	OM	Type D	Form	Lean
Health and Vitality		Structural Condition		Eco	Amenity	Prom	SULE	TPZ	SRZ
								10.8	3.3
Other Information									

No.	Species Name	DBH (mm)	RCD (mm)	Height	Crown Spread	Age Class	Crown		
5	*Eucalyptus moluccana*	450	550	19	N7 S5 E4 W5	M	Type S	Form	Lean
Health and Vitality		Structural Condition		Eco	Amenity	Prom	SULE	TPZ	SRZ
								5.4	2.6
Other Information									

11.0 TREE LOCATION PLAN



12.0 PROPOSED SITE PLAN