



EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

**DEVELOPMENT
IMPACT ASSESSMENT REPORT
PROPOSED HOTEL
SITE 22, EDWIN FLACK AVENUE,
SYDNEY OLYMPIC PARK**

December 2008

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Member International Society of Arboriculture - Australian Chapter (ISAAC)
Member Local Government Tree Resources Association (LGTRA)*

1 INTRODUCTION:-

- 1.1.1 This report was commissioned by SOPROP Pty Ltd to assess the health and condition of fifty-eight (58) trees located within or immediately adjacent Site 22, Edwin Flack Avenue, Sydney Olympic Park (SOP). The report has been prepared to aid in the assessment of a development application for the construction of a new hotel within the property.
- 1.1.2 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

2 THE SITE:-

- 2.1.1 The subject property is a commercial allotment known as Site 22 (proposed Lot 160) Edwin Flack Avenue, Sydney Olympic Park. For the purposes of this report the subject allotment will be referred to as “the Site”. The site is currently vacant and contains a former bus and coach parking area forming part of the Public Domain of Sydney Olympic Park. The site is located on the eastern side of the Athletic Centre. The total area of the site is approx. 1531 m². The site is relatively level with a slight westerly gradient. The site is currently sealed with Asphaltic Concrete. A row of semi-mature Spotted Gums stand on the western side of the lot, flanking the western side of the coach park. A row of semi-mature Tallowwoods stand on the eastern side of the lot, forming part of the street planting in Edwin Flack Avenue. A row of immature Crow’s Foot Ash trees are located along the eastern side of the lot within the site and a random planting of Spotted Gums are located within the median in Edwin Flack Avenue, adjacent the site.
- 2.1.2 Soils within the site have been significantly disturbed by human activity. The original soils of this area are typical of the Blacktown Soil Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of shallow to moderately deep (less than 1000 mm) *Red & Brown Podzolic Soils* on crests, upper slopes and well drained areas. Soils on lower slopes and areas of poor drainage consist of deep (1500-3000 mm) *Yellow Podzolic Soils and Soloth Soils* derived Wianamatta Group & Hawkesbury Shales.¹ The landscape generally consists of undulating rises with slopes ranging usually less than 5% grade. The ground levels on the adjoining property to the west of the site have been lowered (excavated) by approx 800-1000mm below grade north of T11, exposing the B1/B2 horizon. The excavation is battered at 1:1 grade to the common boundary with SOP.
- 2.1.3 The original vegetation of this area consisted of Turpentine-Ironbark Forest, most of which was cleared for residential development in the mid-twentieth century.² Dominant locally-indigenous tree species formerly occurring in this area included *Syncarpia glomulifera* (Turpentine), *Eucalyptus fibrosa ssp. fibrosa* (Broad-leaved Ironbark), *Eucalyptus eugenioides* (Thin-leaved Stringybark), *Eucalyptus longifolia* (Woollybutt) and *Eucalyptus parramattensis* (Drooping Red Gum). Other species found in this association may include *Melaleuca decora* (White Feather Honey Myrtle) and *Melaleuca nodosa*.

3 SUBJECT TREES:-

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 12th December 2008. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 6**), based on the survey prepared by Project Surveyors, Dwg. Ref No. 19395-1 dated 3rd July 2008. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 4**). Trees 24a, 24b and 45a were not shown on the original survey and have been plotted on the drawing in their approximate positions by taking offsets from existing features.

4 HEALTH AND CONDITION ASSESSMENT:-

4.1 Methodology

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

4.1.2 The following information was collected for each tree:-

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

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

4.2 Remaining Life Expectancy

4.2.1 The estimated Remaining Life Expectancy of each tree is shown in **Appendix 4**. The remaining life expectancy is an estimate of the sustainability of the tree in the landscape, based on an estimate of the average age of the species in an urban area in Sydney, less its estimated current age. The longevity of each tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability.

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

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

4.2.3 The estimated Remaining Safe Useful Life Expectancy (SULE) of each tree is shown in **Appendix 4**. The remaining life expectancy is an estimate of the sustainability of the tree in the landscape, based on an estimate of the average age of the species in an urban area in Sydney, less its estimated current

4.3 General Observations

4.3.1 The row of *Corymbia maculata* (Spotted Gums) (T1-T21) located adjacent the western side of the site are semi-mature specimens, most of which are in good health and condition with moderate to long remaining lifespans. The trees have been planted between the western boundary of Sydney Olympic Park and the kerb and gutter of the former Coach Park in a narrow garden bed of approx. 2.2 metres in width. The trees range from 10-14 metres in height with a crown spread of 4-7 metres and trunk calliper of 200-350mm. Excavations of the adjacent site have probably resulted in loss of the majority of hydrotropic ('feeder') roots on the western side of T12 to T21.

- 4.3.2 The row of *Eucalyptus microcorys* (Tallowwood) (T22-35) located in Edwin Flack Avenue are in fair health and condition. All of the trees appear somewhat stunted due to limited soil volumes beneath the pavement and the pavement covering the majority of the root zone. These trees range from 4 to 11 metres in height with a crown spread of 4-7 metres and trunk calliper of 250-300mm, apart from some relatively new plantings. Most of the trees have been pruned to 3-4 metres from ground level on the eastern sides of the trees to clear the roadway, resulting in disfigurement of some of the trees.
- 4.3.3 The row of *Flindersia australis* (Crow's Foot Ash) (T36-T45a) are all immature specimens in fair to good health and condition. Most of these are structurally sound and range in height from 2-6 metres with a crown spread of 2-4 metres and trunk callipers of 50-150mm. A few of the trees exhibit slightly chlorotic foliage. All of the trees are surrounded by asphalt pavement with relatively small pavement openings
- 4.3.4 The median planting of *Corymbia maculata* (Spotted Gums) (T46-T55) within Edwin Flack Avenue are immature and semi-mature trees in good health and condition. All of these trees are structurally sound and stable with long SULE's.

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

- 5.1.1 The significance of a tree in the landscape is a combination of its amenity, environmental and heritage values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure in a consistent approach, the assessment criterion shown in **Appendix 1** have been used in this assessment.
- 5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-
1. **Significant**
 2. **Very High**
 3. **High**
 4. **Moderate**
 5. **Low**
 6. **Very Low**
 7. **Insignificant**

5.2 Environmental Significance

- 5.2.1 Auburn Council's Tree Preservation Order (TPO) does not apply within Sydney Olympic Park as the *Sydney Regional Environmental Plan No. 24 – Homebush Bay Area* (SREP24) takes precedence. All development within the site is undertaken in accordance with the approved Sydney Olympic Park Master Plan (2002). Under Section 13 of SREP24 SOPA must consider the potential impact of any proposed development on the natural environment (including existing trees). Site 22 is located within the Southern Events Precinct covered by the Master Plan. There are no specific requirements listed for Site 22 within regard to the preservation of the existing trees within or adjoining the site.
- 5.2.2 All of the trees are non local native species that were planted within the site during the late 1990's. None of the trees contain cavities suitable as nesting hollows for arboreal mammals or birds or other visible signs of wildlife habitation.
- 5.2.3 None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993.

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

5.3 Heritage Significance

- 5.3.1 None of the trees within the site are listed as Heritage Items. All of the trees are relatively recent plantings forming part of the development of Sydney Olympic Park for the Sydney 2000 Olympic Games.

5.4 Amenity Value

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

6 TREE PROTECTION ZONES

- 6.1.1 Tree Protection Zones and Minimum Set-back Distances to construction for each tree are shown in **Appendix 5**. These have been determined using the methodology shown in **Appendix 3**.

7 PROPOSED DEVELOPMENT

- 7.1.1 The proposed development includes the construction of a new hotel within the site, together with basement car parking facilities. Two new pedestrian crossings will extend from the site across Edwin Flack Avenue.

8 IMPACT ASSESSMENT

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

Title	Author	Dwg No.	Date
<i>Landscape Plan</i>	Aspect Studios	28049 SK02	August 2008
<i>Section A</i>	Fenton Design Group	QUE-032 SK19	19/08/08
<i>Section B</i>	Fenton Design Group	QUE-032 SK20	19/08/08

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

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

- 8.1.3 The proposed development will necessitate the removal of four (4) trees of low and very low retention value. These include T24 & T33 (Tallowoods) and T37 & T38 (Crow's Foot Ash). None of these trees are considered significant or worthy of special measures to ensure their preservation.

- 8.1.4 The proposed development will necessitate the removal of a further sixteen (16) trees of moderate retention value. These include T39-T45 & T45a (row of Crows Foot Ash) and T47-T50 and T52-T55 (Spotted Gums). These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties. There is no space available within or adjacent the site to undertake replacement planting. The Crows foot Ash are all relatively small trees. Their removal will not have a significant impact on the amenity of the site or streetscape. The spotted Gums form part of the median planting in Edwin Flack Avenue. Some additional planting elsewhere within the median may be feasible to compensate for any loss of amenity.
- 8.1.5 The proposed development should not result in any adverse impact on the row of Spotted Gums adjacent the south-west boundary of the site. Excavations for the basement are beyond the Tree Protection Zones of all of the trees and temporary scaffolding should not necessitate any canopy pruning. In order to protect these trees during construction, a temporary Tree Protection Fence should be erected on the north-eastern side of the existing kerb and gutter (i.e. outside the existing planting strip/garden bed) in accordance with Section 12.2.
- 8.1.6 Excavations for the basement are located within the TPZ of T25, T26, T27, T28, T29 & T32 (all Tallowwoods on the nature strip). The extent of incursion to the root zone of these trees is less than 20% of the TPZ, which is considered within acceptable limits. However, temporary scaffolding erected around the building during construction may necessitate some canopy pruning of T27, T28 & T32 and significant canopy pruning of T25, T26 & T29. Given the pruning that has already been undertaken on the North-east side of the trees to clear the roadway, the pruning of T25, T26 & T29 is expected to result in severe disfigurement, leading to a significant adverse impact. Pruning of T27, T28 & T32 is less severe due to the lesser crown spread and smaller size of these trees. It may be feasible to avoid some pruning of these trees during construction by temporarily tying back the crown away from the scaffold.
- 8.1.7 It should be noted that Tallowwoods are ultimately tall forest trees, capable of obtaining mature dimensions of more than 25 metres in height and 15 metres crown spread. Whilst their ultimate height may not be achieved under these conditions (due to restricted soil volumes) the trees still have significant growth potential. Due to the extent of pruning necessary, and the space available for future growth and development following construction of the Hotel, the removal and replacement of these trees should be considered with a more appropriate species.
- 8.1.8 No other trees will be adversely affected by the proposed development.

9 REPLACEMENT PLANTING

- 9.1.1 In order to compensate for any loss of amenity, consideration should be given to replanting new trees within the site or adjoining the site in consultation with SOPAs Place Management team. Replacement trees should preferably include some locally indigenous species. These will be most appropriate to the site conditions and be most valuable in terms of preserving the landscape character and wildlife habitat of the area.

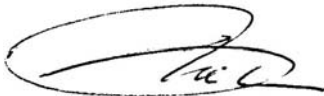
10 CONCLUSIONS:-

- 10.1.1 A total of fifty-eight (58) trees stand within the site and in close proximity to the boundaries on adjoining properties. These are all non-local native species in fair to good health and condition. The trees consist of four main groups; a row of Spotted Gums on the south-west side of the site, a row of young Crow's Foot Ash along the north-east boundary, a row of semi-mature Tallowwoods adjacent the north-east boundary on the nature strip in Edwin Flack Avenue, and a random planting within the median in Edwin Flack Avenue adjacent the site.

- 10.1.2 The proposed development will necessitate the removal of four (4) trees of low and very low retention value. These include T24, T33, T37 & T38. None of these trees are considered significant or worthy of special measures to ensure their preservation.
- 10.1.3 The proposed development will necessitate the removal of a further sixteen (16) trees of moderate retention value. These include T39-T45, T45a, T47-T50 and T52-T55. These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties.
- 10.1.4 The proposed development should not result in any adverse impact on the row of Spotted Gums adjacent the south-west boundary of the site.
- 10.1.5 Excavations for the basement should not result in any adverse impact on T25, T26, T27, T28, T29 & T32. However, temporary scaffolding erected around the building during construction may necessitate some canopy pruning of T27, T28 & T32 and significant canopy pruning of T25, T26 & T29. The pruning of T25, T26 & T29 is expected to result in severe disfigurement, leading to a significant adverse impact on these trees. Pruning of T27 T28 & T32 should not result in any adverse impact on these trees.
- 10.1.6 No other trees will be adversely affected by the proposed development.

11 RECOMMENDATIONS:-

1. The following Tree Protection Measures (Appendix 2) should be implemented to ensure the long term survival of all trees within the site to be retained as part of the development.
2. In order to protect T1-T21 during construction, a temporary Tree Protection Fence should be erected on the north-eastern side of the existing kerb and gutter (i.e. outside the existing planting strip/garden bed) in accordance with Section 12.2.
3. In order to protect T27 T28 & T32 during construction, all branches projecting through temporary scaffolding should be temporarily tied back away from the scaffold to minimise pruning. Any required pruning should be undertaken in accordance with Section 12.9. Trunk protection should be erected around these trees prior to commencement in accordance with Section 12.4
4. Due to the extent of pruning of T 25, T26 & 27 necessary to clear the scaffold, and the space available for future growth and development of this species following construction of the Hotel, the removal and replacement of these trees should be considered with a more appropriate species.



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19th December 2008

REFERENCES:-

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- ¹ GA Chapman & CL Murphy (1989)
Soil Landscapes of the Sydney 1:100,000 Sheet
Soil Conservation Service of NSW. Sydney
- ² Benson, Doug & Howell, Jocelyn (1990)
Taken for Granted: the Bushland of Sydney and its Suburbs.
Kangaroo Press & The Royal Botanic Gardens, Sydney, NSW
- ³ Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)
The Body Language of Trees – A Handbook for Failure Analysis
The Stationery Office, London, England

APPENDIX ONE

CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

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

1. SIGNIFICANT

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

2. VERY HIGH

- The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site; or
- The subject tree is listed on Council's Significant Tree Register; or
- The tree is a locally indigenous species, being an associated canopy species of a Threatened or Endangered Ecological Community.
- The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value;
- The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% Crown Cover (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.

3. HIGH

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

4. MODERATE

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

5. LOW

- The subject tree has a small live crown size of less than 40m² and can be replaced within the short term with new tree planting; or
- The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% Crown Cover (sparse); and
- The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area.

6. VERY LOW

- The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.
- The subject tree is scheduled as exempt (not protected) under the provisions of the local Council's Tree Preservation Order due to its species, nuisance or position relative to buildings or other structures.

7. INSIGNIFICANT

- The tree is a declared Noxious Weed under the *Noxious Weeds Act* (NSW) 1993 or completely dead with no habitat value.

APPENDIX TWO

12 TREE PROTECTION MEASURES

12.1 Tree Protection Zones

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

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

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

12.2 Tree Protection Fencing

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

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

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

12.3 Trunk Protection

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

12.4 Tree Damage

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

12.5 Demolition Works within Tree Protection Zones

Demolition of Pathways and Pavements

12.5.1 Demolition of pathways and paved areas within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The pavement surface and sub-base shall be stripped-

off in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and minimise soil disturbance. The machine shall work within the footprint of the existing pathway to avoid compaction of the adjacent soil. The final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and damage to woody roots.

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

Demolition of Retaining Walls or other Structures

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

12.6 Excavations within Tree Protection Zones

- 12.6.1 Excavations within the Tree Protection Zone of any tree to be retained shall be avoided wherever possible.
- 12.6.2 Excavations for foundations and pavement sub-grade within the Tree Protection Zone of any tree to be retained shall be undertaken by hand or using an Air-spade[®] device to locate and expose roots along the perimeter of the foundation or pavement prior to any mechanical excavation. All care shall be undertaken to preserve root systems intact and undamaged. Any roots less than 50mm in diameter shall be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise stress on the tree.
- 12.6.3 Where large woody roots (greater than 50mm diameter) are encountered during excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor on piers, cantilevered slab, etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the CRZ.
- 12.6.4 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (eg steel or timber pickets, lattice etc) fixed to pillars.
- 12.6.5 For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation.

12.7 Underground Services

- 12.7.1 All proposed stormwater lines and other underground services should be located as far away as practicable, or suspended beneath the floor of the building where possible, to avoid excavation within the Tree Protection Zone of trees to be retained.
- 12.7.2 For underground services, where the incursion to the Root Zone is less than 20% of the total TPZ (i.e. beyond the Minimum Setback Distance), a chain trenching device may be used. A backhoe or skid steer loader is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact wherever possible (eg by sub-surface boring beneath roots or re-routing the service etc).
- 12.7.3 Excavations required for underground services within the Critical Root Zone of any tree to be retained should only be undertaken by sub-surface boring. The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. This will depend on the soil conditions at the site. Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by the arborist to determine continued health and stability of the subject tree.
- 12.7.4 If trees show signs of stress or deterioration, remedial action shall be taken to improve the health and vigour of the subject tree (s) in accordance with best practice arboricultural principles

12.8 Pavements

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

12.9 Fill Material

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

12.10 Canopy & Root Pruning

- 12.10.1 All pruning work required shall be carried out in accordance with Australian Standard No 4373-2007 – Pruning of Amenity Trees. Written approval from Council may be required under the Tree Preservation Order prior to undertaking this work. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998).
- 12.10.2 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.
- 12.10.3 Where root pruning is required, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

12.11 Tree Removal

- 12.11.1 The approval of SOPA shall be obtained prior to the removal or pruning of any tree.
- 12.11.2 Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.
- 12.11.3 Stumps shall be grubbed-out where required using a mechanical stump grinder without damage to the root system of other trees. Where trees to be removed are in close proximity to trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained should **not** be removed using excavation equipment or similar.

APPENDIX THREE

13 METHODOLOGY FOR DETERMINING TREE PROTECTION ZONES

- 13.1.1 In order to provide adequate protection for trees nominated as suitable for preservation, Tree Protection Zones (TPZ) are required to provide adequate setbacks from buildings and other infrastructure to minimise adverse impact. The Tree Protection Zone is a radial distance measured from the centre of the trunk of the tree as specified in Appendix 5 (refer also Figure 4). The intention of the Tree Protection Zone is to minimise incursions to the root system and canopy to ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to changes in ground levels, (either lowering or raising the grade), trenching or other forms of soil disturbance such as ripping, grading or inverting the soil profile.
- 13.1.2 A commonly used delineation for the Tree Protection Zone is the drip-line (extent of the crown spread projected to the ground plane). However, this may not provide adequate protection for trees that have prominent leans or distorted, imbalanced or narrow crowns. A more appropriate guideline is the trunk diameter.⁴
- 13.1.3 The TPZ has been determined from Table 3, based on guidelines prepared by the British Standards Institute (1991) using the following parameters:-
- The trunk diameter;
 - The sensitivity/tolerance of the species to construction impacts;
 - The level of maturity;
 - The health, vigour and structural integrity of the tree (refer to Section 4); and
 - The trees root and crown formation.

13.2 Trunk Diameter

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

13.3 Construction Tolerance

- 13.3.1 The Construction Tolerance of each tree has been divided into the following categories:-
- **G** **Good** – good tolerance to construction impacts
 - **M** **Moderate** – moderate tolerance to construction impacts
 - **P** **Poor** – poor tolerance to construction impacts
- 13.3.2 As there is very little documentary record of the construction tolerance of species under Australian conditions, the trees have been categorized according to our field observation and experience. The above classifications are also used as criteria to determine appropriate setback distances to trenching (together with Maturity Class).

13.4 Maturity Class.

- 13.4.1 The Maturity Classification of each tree has been divided into the following categories:-
- **OM** **Overmature** – greater than 80% of the life expectancy for the species
 - **M** **Mature** – 50-80% of the life expectancy for the species
 - **SM** **Semi-mature** – 20-50% of the life expectancy for the species
 - **I** **Immature** – less than 20% of the life expectancy for the species

13.5 Root and Crown Formation

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

TABLE THREE – GUIDELINES FOR OPTIMUM TREE PROTECTION ZONES

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

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

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

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

13.6 Minimum Set-back Distance.

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

13.7 Critical Root Zone.

- 13.7.1 The diameter of the root plate, which provides the bulk of mechanical support and anchorage for a tree, is related to the distance from the trunk at which rapid taper of tree roots ceases.⁵ This has been defined as the tree's "Critical Root Zone". Based on field studies of root plate sizes of windthrown (overturned) trees, it has been established that there is a relationship between the Critical Root Zone (Root Plate Diameter) and the trunk diameter.⁹ The Critical Root Zone for each tree has been shown in **Appendix 5**. Incursions within the Critical Root Zone are not recommended as they are likely to result in the severance of woody roots which may lead to the destabilisation and/or demise of the tree.

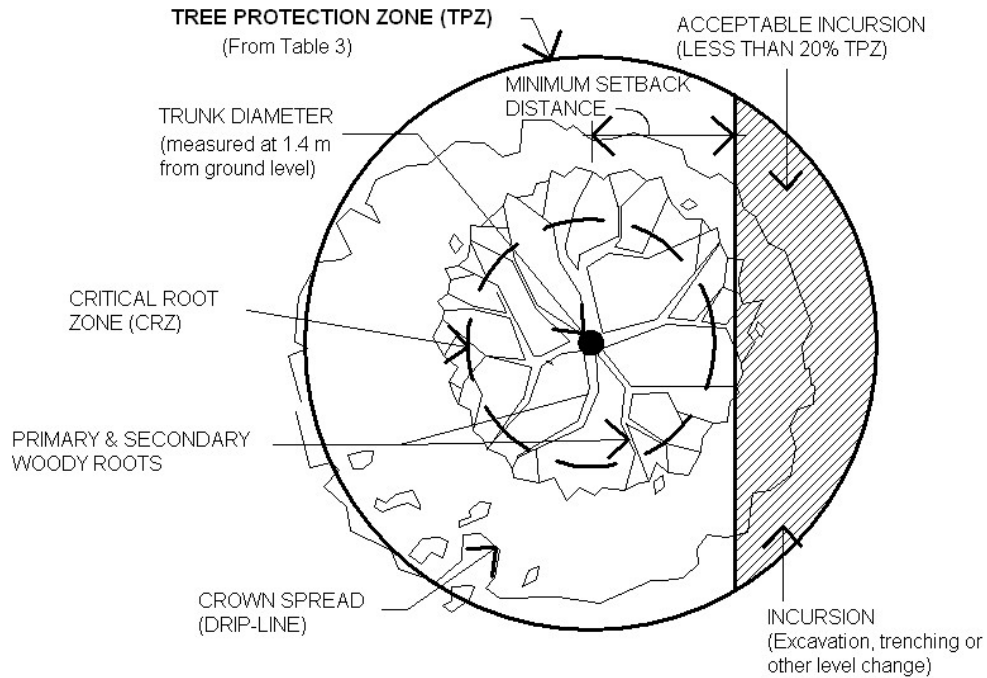


FIGURE 4
METHODOLOGY TO CALCULATE MINIMUM SETBACK DISTANCE

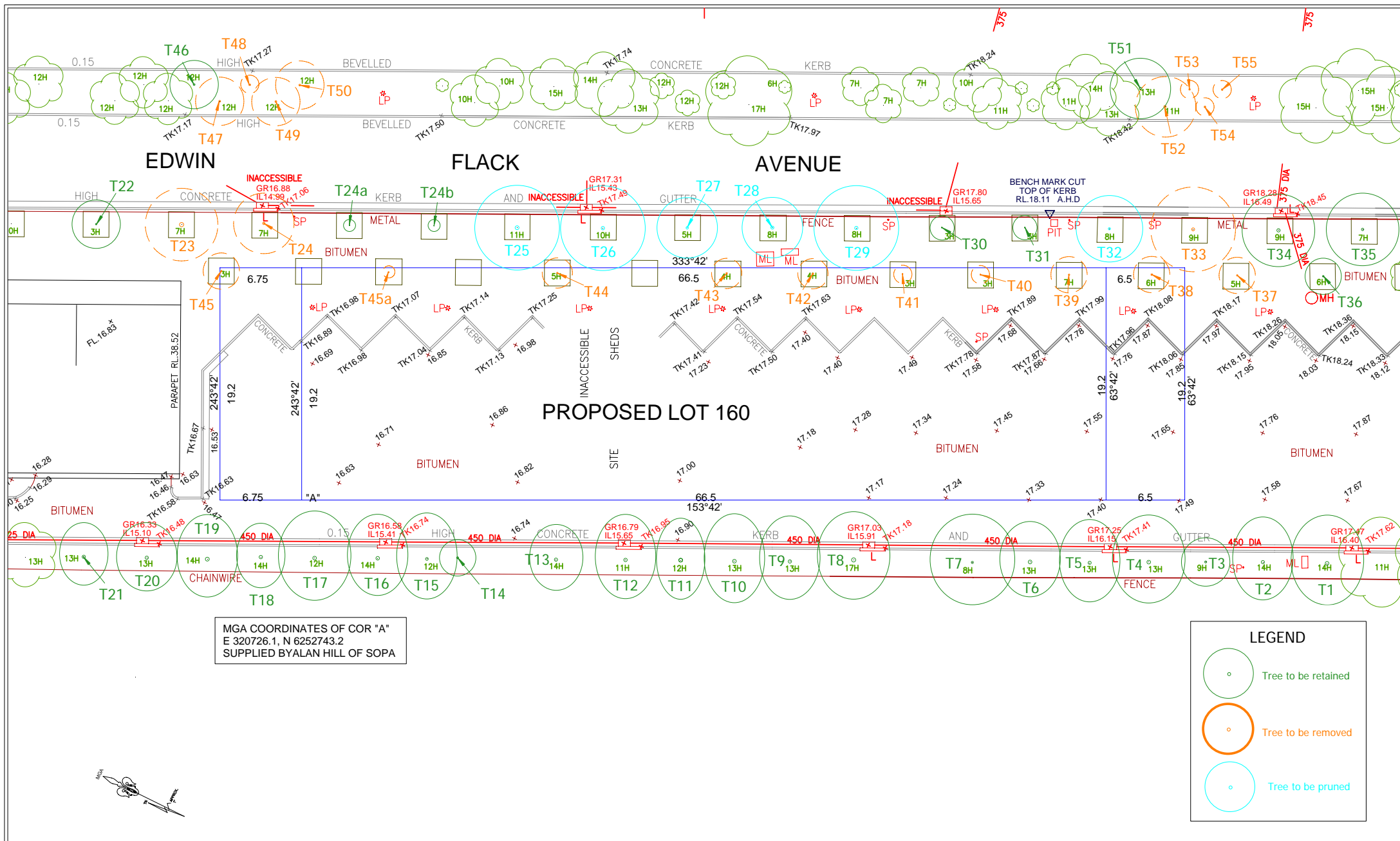
13.8 Acceptable Incursions to the Root Zone.

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

REFERENCES

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

⁵ Culter, David F. (1995)
Interactions between Tree Roots and Buildings
Proceedings of and International Workshop on Trees and Buildings
International Society of Arboriculture, Illinois, USA



**APPENDIX 6
 TREE LOCATION PLAN**

Site 22 - Edwin Flack Avenue
 SYDNEY OLYMPIC PARK



Earthscape Horticultural Services
 Arboricultural and Horticultural Consultants
 PO Box 364
 BEROWRA NSW 2081
 Ph: 02 9456 4787
 Fax: 02 9456 5757 e: earthscape@inet.net.au

Based on the Survey Drawing
 prepared by Project Surveyors

Dwg Ref No. 19395-1

Dated 3rd July 2008

DWG No. TLP 1075

DATE: 17/12/2008

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	<i>Corymbia maculata</i> (Spotted Gum)	13	6	300	60	SM	Appears stable with sound branching structure.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
2	<i>Corymbia maculata</i> (Spotted Gum)	12	5	260	45	SM	Appears stable with sound branching structure.	Crown lifted to 2 metres	Good with slightly thinning crown	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
3	<i>Corymbia maculata</i> (Spotted Gum)	7	4	170	16	I	Appears stable with fair branching structure. Exhibits two co-dominant leaders at 1.6 metres	Crown lifted to 2 metres	Fair with thinning crown	No Evidence	Medium 15-40 Years	5	low	Adjoining property
4	<i>Corymbia maculata</i> (Spotted Gum)	12	6	300	54	SM	Appears stable with sound branching structure.	Crown lifted to 3 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
5	<i>Corymbia maculata</i> (Spotted Gum)	11	5	260	35	SM	Appears stable with sound branching structure.	Crown lifted to 3 metres	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
6	<i>Corymbia maculata</i> (Spotted Gum)	12	3	300	27	SM	Appears stable with sound branching structure.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
7	<i>Corymbia maculata</i> (Spotted Gum)	7	5	180	25	SM	Appears stable with fair branching structure. Rounded form with atypical branching habit. Exhibits some dieback with 5-10% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	5	low	Adjoining property
8	<i>Corymbia maculata</i> (Spotted Gum)	13	6	340	60	SM	Appears stable with sound branching structure.	Crown lifted to 3 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
9	<i>Corymbia maculata</i> (Spotted Gum)	11	5	270	35	SM	Appears stable with sound branching structure.	Crown lifted to 3 metres	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
10	<i>Corymbia maculata</i> (Spotted Gum)	11	5	300	35	SM	Appears stable with sound branching structure.	Crown lifted to 4 metres	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
11	<i>Corymbia maculata</i> (Spotted Gum)	10	4	300	28	SM	Appears stable with sound branching structure.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
12	<i>Corymbia maculata</i> (Spotted Gum)	8	5	280	25	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
13	<i>Corymbia maculata</i> (Spotted Gum)	10	4	260	28	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
14	<i>Acacia melanoxylon</i> (Blackwood)	2	3	160	6	SM	Appears stable with poor branching structure. Exhibits multiple wounds due to borer infestation with evidence of decay.	No Evidence	Poor	Severe borer infestation	Transient (less than 5 years)	5	very low	Adjoining property
15	<i>Corymbia maculata</i> (Spotted Gum)	8	5	230	30	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
16	<i>Corymbia maculata</i> (Spotted Gum)	10	5	290	40	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	Crown lifted to 1 metre	Very Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
17	<i>Corymbia maculata</i> (Spotted Gum)	7	5	140 +100 +220	25	SM	Appears stable with poor branching structure. Exhibits multiple high bark inclusions close to Ground Level with three main leaders.	Crown lifted to 1 metre	Very Good	No Evidence	Short 5-15 Years	5	low	Adjoining property
18	<i>Corymbia maculata</i> (Spotted Gum)	11	4	280	28	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	No Evidence	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
19	<i>Corymbia maculata</i> (Spotted Gum)	12	4	320	32	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	No Evidence	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
20	<i>Corymbia maculata</i> (Spotted Gum)	11	5	270	45	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	No Evidence	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
21	<i>Corymbia maculata</i> (Spotted Gum)	10	4	270	28	SM	Appears stable with sound branching structure. Adjacent site excavated 1 metre below grade battered 1:1 to boundary.	No Evidence	Good	No Evidence	Long - more than 40 years	4	moderate	Adjoining property
22	<i>Eucalyptus microcorys</i> (Tallowwood)	4	4	120	12	I	Appears stable with fair branching structure. Multiple primary limbs at 1.5 metres with decurrent habit.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	Nature Strip
23	<i>Eucalyptus microcorys</i> (Tallowwood)	11	6	350	48	SM	Appears stable with fair branching structure. Exhibits a moderate axial wound at 1-3 metres and moderate wound due mech. Injury at 1.8 metres.	Lower limbs selectively removed	Fair with slight thinning crown	No Evidence	Medium 15-40 Years	4	moderate	Nature Strip
24	<i>Eucalyptus microcorys</i> (Tallowwood)	7	5	200	22.5	SM	Appears stable with sound branching structure.	Crown lifted to 3 metres	Very Good	No Evidence	Long - more than 40 years	4	moderate	Nature Strip
24a	<i>Eucalyptus microcorys</i> (Tallowwood)	2	1	30	2	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	Nature Strip
24b	<i>Eucalyptus microcorys</i> (Tallowwood)	2	1	30	2	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	Nature Strip
25	<i>Eucalyptus microcorys</i> (Tallowwood)	11	6.5	320	52	SM	Appears stable with sound branching structure.	Secondary leader removed at 3 metres	Good	No Evidence	Long - more than 40 years	4	moderate	Nature Strip

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
26	<i>Eucalyptus microcorys</i> (Tallowwood)	10	6.5	280	45.5	SM	Appears stable with fair branching structure.	Lower limbs selectively removed	Fair	No Evidence	Medium 15-40 Years	4	moderate	Nature Strip
27	<i>Eucalyptus microcorys</i> (Tallowwood)	5.5	5	200	12.5	SM	Appears stable with fair branching structure.	Selectively pruned to clear roadway	Fair with thinning crown	No Evidence	Medium 15-40 Years	5	low	Nature Strip
28	<i>Eucalyptus microcorys</i> (Tallowwood)	9	5	250	32.5	SM	Appears stable with fair branching structure. Enlarged lower trunk - suspected internal cavity.	Selectively pruned to clear roadway	Good	No Evidence	Medium 15-40 Years	4	moderate	Nature Strip
29	<i>Eucalyptus microcorys</i> (Tallowwood)	8	7	270	42	SM	Appears stable with fair branching structure. 10% epicormic growth due previous pruning.	Selectively pruned to clear roadway	Very Good	No Evidence	Long - more than 40 years	4	moderate	Nature Strip
30	<i>Eucalyptus microcorys</i> (Tallowwood)	2	2	50	4	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	Nature Strip
31	<i>Eucalyptus microcorys</i> (Tallowwood)	2	1	50	2	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	Nature Strip

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
32	<i>Eucalyptus microcorys</i> (Tallowwood)	7	5.5	180	22	SM	Appears stable with fair branching structure.	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	4	moderate	Nature Strip
33	<i>Eucalyptus microcorys</i> (Tallowwood)	9	7	250	35	SM	Appears stable with fair branching structure. Extended lateral primary limbs.	Selectively pruned to clear roadway	Fair with thinning crown	No Evidence	Short 5-15 Years	4	low	Nature Strip
34	<i>Eucalyptus microcorys</i> (Tallowwood)	9	7	270	42	SM	Appears stable with fair branching structure. Prominent lean to the west.	Selectively pruned to clear roadway	Good	No Evidence	Long - more than 40 years	4	moderate	Nature Strip
35	<i>Eucalyptus microcorys</i> (Tallowwood)	7	6	200	24	SM	Appears stable with fair branching structure.	Selectively pruned to clear roadway	Good	No Evidence	Medium 15-40 Years	4	moderate	Nature Strip
36	<i>Flindersia australis</i> (Crows Foot Ash)	6.5	3	130	13.5	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	moderate	On-site
37	<i>Flindersia australis</i> (Crows Foot Ash)	6	3	120	10.5	I	Appears stable with sound branching structure. Slightly chlorotic foliage	No Evidence	Fair	No Evidence	Medium 15-40 Years	5	low	On-site
38	<i>Flindersia australis</i> (Crows Foot Ash)	7	3	100	13.5	I	Appears stable with sound branching structure. Exhibits a moderate wound at 1.7 metres due previous branch loss. Slightly chlorotic foliage	No Evidence	Fair	No Evidence	Medium 15-40 Years	5	low	On-site
39	<i>Flindersia australis</i> (Crows Foot Ash)	7	3	120	15	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
40	<i>Flindersia australis</i> (Crows Foot Ash)	3	1.5	60	3	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site
41	<i>Flindersia australis</i> (Crows Foot Ash)	2	1.5	60	1.5	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site
42	<i>Flindersia australis</i> (Crows Foot Ash)	4	2.5	100	3.75	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site
43	<i>Flindersia australis</i> (Crows Foot Ash)	4	2.5	100	5	I	Appears stable with sound branching structure. Exhibits multiple small wounds (broken stubs) due to broken branches.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site
44	<i>Flindersia australis</i> (Crows Foot Ash)	6	2.5	110	8.75	I	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site
45	<i>Flindersia australis</i> (Crows Foot Ash)	4.5	3	50	10.5	I	Appears stable with sound branching structure. Small wound on lower trunk due prev branch loss.	No Evidence	Good	No Evidence	Long - more than 40 years	5	moderate	On-site
45a	<i>Flindersia australis</i> (Crows Foot Ash)	3	1	60	2	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	moderate	On-site
46	<i>Corymbia maculata</i> (Spotted Gum)	12	4	180	40	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	moderate	Median Strip
47	<i>Corymbia maculata</i> (Spotted Gum)	12	4	180	40	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	moderate	Median Strip

APPENDIX 4 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Id. No.	Species	Height	Spread	DBH (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Life Expectancy	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
48	<i>Corymbia maculata</i> (Spotted Gum)	5	1.5	100	6	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	moderate	Median Strip
49	<i>Corymbia maculata</i> (Spotted Gum)	12	4	180	40	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	moderate	Median Strip
50	<i>Corymbia maculata</i> (Spotted Gum)	12	4	180	40	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	moderate	Median Strip
51	<i>Corymbia maculata</i> (Spotted Gum)	13	5	200	55	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	moderate	Median Strip
52	<i>Corymbia maculata</i> (Spotted Gum)	11	5	180	45	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	moderate	Median Strip
53	<i>Corymbia maculata</i> (Spotted Gum)	5	1.5	100	6	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	moderate	Median Strip
54	<i>Corymbia maculata</i> (Spotted Gum)	5	1.5	100	6	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	moderate	Median Strip
55	<i>Corymbia maculata</i> (Spotted Gum)	5	1.5	100	6	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	moderate	Median Strip

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	<i>Corymbia maculata</i> (Spotted Gum)	P	4.5	2.1	3.1	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
2	<i>Corymbia maculata</i> (Spotted Gum)	P	3.9	1.9	2.7	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
3	<i>Corymbia maculata</i> (Spotted Gum)	P	2.6	1.6	1.7	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
4	<i>Corymbia maculata</i> (Spotted Gum)	P	4.5	2.1	3.1	Proposed building & basement offset 6.5 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
5	<i>Corymbia maculata</i> (Spotted Gum)	P	3.9	1.9	2.7	Proposed building & basement offset 6.2 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
6	<i>Corymbia maculata</i> (Spotted Gum)	P	4.5	2.1	3.1	Proposed building & basement offset 6.0 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
7	<i>Corymbia maculata</i> (Spotted Gum)	P	2.7	1.6	1.8	Proposed building & basement offset 6.0 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
8	<i>Corymbia maculata</i> (Spotted Gum)	P	5.1	2.25	3.5	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
9	<i>Corymbia maculata</i> (Spotted Gum)	P	4.1	2	2.8	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
10	<i>Corymbia maculata</i> (Spotted Gum)	P	4.5	2.1	3.1	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
11	<i>Corymbia maculata</i> (Spotted Gum)	P	4.5	2.1	3.1	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
12	<i>Corymbia maculata</i> (Spotted Gum)	P	4.2	2	2.9	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
13	<i>Corymbia maculata</i> (Spotted Gum)	P	3.9	1.9	2.7	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
14	<i>Acacia melanoxylon</i> (Blackwood)	P	2.4	1.4	1.6	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact.	Consider removal - poor specimen
15	<i>Corymbia maculata</i> (Spotted Gum)	P	3.5	1.8	2.3	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
16	<i>Corymbia maculata</i> (Spotted Gum)	P	4.4	2.1	3.0	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
17	<i>Corymbia maculata</i> (Spotted Gum)	P	4.5	2.1	3.1	Proposed building & basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact. Temporary scaffolding should be clear of the crown.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
18	<i>Corymbia maculata</i> (Spotted Gum)	P	4.2	2	2.9	Proposed basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
19	<i>Corymbia maculata</i> (Spotted Gum)	P	4.8	2.2	3.3	Proposed basement offset 5.8 metres NE. No incursion to root zone or canopy	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
20	<i>Corymbia maculata</i> (Spotted Gum)	P	4.1	1.9	2.8	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
21	<i>Corymbia maculata</i> (Spotted Gum)	P	4.1	1.9	2.8	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
22	<i>Eucalyptus microcorys</i> (Tallowwood)	P	2.0	1.3	1.4	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
23	<i>Eucalyptus microcorys</i> (Tallowwood)	P	5.3	2.25	3.6	Proposed new pedestrian kerb ramp offset 3.4 metres east. Excavation for foundations of kerb ramp within TPZ.	Unlikely to result in any adverse impact - proposed to be removed.	Consider retention
24	<i>Eucalyptus microcorys</i> (Tallowwood)	P	3.0	1.6	2.0	Located within footprint of proposed kerb ramp.	Proposed works will necessitate removal	Remove tree
24a	<i>Eucalyptus microcorys</i> (Tallowwood)	P	1.0	0.6	0.7	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures
24b	<i>Eucalyptus microcorys</i> (Tallowwood)	P	1.0	0.6	0.7	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures
25	<i>Eucalyptus microcorys</i> (Tallowwood)	P	4.8	2.2	3.3	Proposed hotel building & basement offset 3.3 metres SW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits. Crown reduction required to clear temporary scaffolding will result in a significant adverse impact.	Consider removal & replacement

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
26	<i>Eucalyptus microcorys</i> (Tallowwood)	P	4.2	2.1	2.9	Proposed hotel building & basement offset 3.3 metres SW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits. Crown reduction required to clear temporary scaffolding will result in a significant adverse impact.	Consider removal & replacement
27	<i>Eucalyptus microcorys</i> (Tallowwood)	P	3.0	1.6	2.0	Proposed hotel building & basement offset 3.3 metres SW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits. Some pruning required to clear temporary scaffolding will result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures. Temporarily tie back branches where possible to minimise pruning. Undertake pruning in accordance with Section 12.9. Install trunk protection in accordance with Section 12.4
28	<i>Eucalyptus microcorys</i> (Tallowwood)	P	3.8	1.85	2.6	Proposed hotel building & basement offset 3.3 metres SW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits. Some pruning required to clear temporary scaffolding will result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures. Temporarily tie back branches where possible to minimise pruning. Undertake pruning in accordance with Section 12.9. Install trunk protection in accordance with Section 12.4
29	<i>Eucalyptus microcorys</i> (Tallowwood)	P	4.1	1.9	2.8	Proposed hotel building & basement offset 3.3 metres SW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits. Crown reduction required to clear temporary scaffolding will result in a significant adverse impact.	Consider removal & replacement
30	<i>Eucalyptus microcorys</i> (Tallowwood)	P	1.0	0.6	0.7	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)
31	<i>Eucalyptus microcorys</i> (Tallowwood)	P	1.0	0.6	0.7	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1)

APPENDIX 5 - IMPACT ASSESSMENT SCHEDULE

Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
32	<i>Eucalyptus microcorys</i> (Tallowwood)	P	2.7	1.6	1.8	Proposed hotel building & basement offset 3.3 metres SW. Excavations for basement within TPZ.	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits. Some pruning required to clear temporary scaffolding will result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures. Temporarily tie back branches where possible to minimise pruning. Undertake pruning in accordance with Section 12.9. Install trunk protection in accordance with Section 12.4
33	<i>Eucalyptus microcorys</i> (Tallowwood)	P	3.8	1.85	2.6	Located within footprint of proposed kerb ramp.	Proposed works will necessitate removal	Remove tree
34	<i>Eucalyptus microcorys</i> (Tallowwood)	P	4.1	1.9	2.8	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1). Install trunk protection in accordance with Section 12.4
35	<i>Eucalyptus microcorys</i> (Tallowwood)	P	3.0	1.6	2.0	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1).
36	<i>Flindersia australis</i> (Crows Foot Ash)	M	2.0	1.3	1.3	No proposed works within TPZ	No adverse impact	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1).
37	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.8	1.3	1.2	Located within footprint of proposed new paved area	Proposed works will necessitate removal	Remove tree
38	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.5	1	1.0	Located within footprint of proposed building	Proposed works will necessitate removal	Remove tree
39	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.8	1.3	1.2	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)

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Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
40	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.0	0.6	0.7	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
41	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.0	0.6	0.7	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
42	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.5	1	1.0	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
43	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.5	1	1.0	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
44	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.7	1	1.1	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
45	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.5	0.6	1.0	Located within footprint of proposed new paved area	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
45a	<i>Flindersia australis</i> (Crows Foot Ash)	M	1.0	0.6	0.7	Located within footprint of proposed building	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
46	<i>Corymbia maculata</i> (Spotted Gum)	P	2.7	1.6	1.8	Proposed pedestrian crossing offset 2.1 metres SE at RL x ((approx 200mm below grade of median (level with road pavement)).	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1). Excavated pavement sub-grade in accordance with Section 12.6.
47	<i>Corymbia maculata</i> (Spotted Gum)	P	2.7	1.6	1.8	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)

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Id. No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Critical Root Zone (m R)	Minimum Setback Distance (tangent to root plate)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
48	<i>Corymbia maculata</i> (Spotted Gum)	P	1.5	1	1.0	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
49	<i>Corymbia maculata</i> (Spotted Gum)	P	2.7	1.6	1.8	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
50	<i>Corymbia maculata</i> (Spotted Gum)	P	2.7	1.6	1.8	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
51	<i>Corymbia maculata</i> (Spotted Gum)	P	3.0	1.6	2.0	Proposed pedestrian crossing offset 2.3 metres SE at RL x (approx 200mm below grade of median - level with road pavement).	Extent of incursion to root zone is less than 20% of the TPZ, which is considered within acceptable limits.	Retain in accordance with recommended Tree Protection Measures (refer Section 12.1). Excavated pavement sub-grade in accordance with Section 12.6.
52	<i>Corymbia maculata</i> (Spotted Gum)	P	2.7	1.6	1.8	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
53	<i>Corymbia maculata</i> (Spotted Gum)	P	1.5	1	1.0	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
54	<i>Corymbia maculata</i> (Spotted Gum)	P	1.5	1	1.0	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)
55	<i>Corymbia maculata</i> (Spotted Gum)	P	1.5	1	1.0	Located within footprint of proposed pedestrian crossing	Proposed works will necessitate removal	Proposed works will necessitate removal (moderate retention value)