2B McPherson Street, Moonee Ponds
Childcare Centre Adaptation

Moonee Valley City Council
Planning Permit Application
ITEM 9.1 - APPENDIX B

PROPOSED AERIAL VIEW

PROPOSED AERIAL VIEW
12 July 2017

Mr Lachlan Orr
Town Planner
City of Moonee Valley
PO Box 128
Moonee Ponds, VIC 3039
via: LOr@mvcc.vic.gov.au

Dear Mr Orr


Tract Consultants Pty Ltd continues to act on behalf of Mallard Property Investment, who represents Moonee Valley Racing Club in this matter.

Following a review of the outdoor play space, we are pleased to submit a revised Landscape Plan, with associated supporting documents, for your consideration. We provide these documents on a without prejudice basis for comment and in principle support.

Background

As you are aware, Planning Permit Application MV/597/2016 was lodged with Council on 29 July 2016. This application is currently in an ‘assessment’ phase having progressed through public notice and a public consultation meeting.

We further understand that no planning permit can be issued for the proposal until planning obligations for the broader Moonee Valley Racecourse redevelopment are settled (Section 173 Agreement and Integrated Transport Plan and Traffic Management Plan).

Notwithstanding this, we would like to resolve all outstanding items on this application so that a planning permit can be issued immediately following the resolution of broader Moonee Valley Racecourse redevelopment obligations.

Landscape Changes

We are pleased to present a revised landscape design for the open space area for comment. The proposed revisions include:

- The retention of one existing tree (Camellia japonica) adjacent the western boundary and the McPherson Street Gate (Element 4 in Figure 3 Elements of Significance of the Landscape Heritage Guidelines document: ‘Club Secretary’s House (Former) Moonee Valley Racecourse.’)
- The retention of five existing trees adjacent the eastern boundary, various species.
- An overhead shade sail in a beige colour directly adjacent the western boundary.
- Proposed replacement of existing Systinum floribundum with new tree of same species.
- Increase in the provision of trees and shrubs and update to planting schedule in-line with alterations to proposed planting.
- Alterations to the proposed landscaping elements of the childcare centre including decking and sandpits.

Project: 0315-0989
Enclosed Documentation

To assist your review, we are pleased to enclose the following documentation:

- Landscape Plan Marked 'without prejudice' prepared by John Patrick dated 10 July 2017 with changes bubbled.
- Heritage Architect written review: RBA Heritage Architects provided their approval of the new shade sail proposed to the front garden.

We look forward to your response. If you have any queries or would like to discuss further, please do not hesitate to contact me on 9429 8133.

Yours sincerely

[Signature]

Fabian Cullen
Town Planner
Tract Consultants Pty Ltd
Hi Vanessa

We have reviewed the attached landscape plan re the proposed shade sails.

The proposed beige colour would be appropriate as it would have limited impact by being of a similar colour to the existing painted walls.

The proposed shade sail to the north-west corner/courtyard would be mostly concealed by the boundary wall and would have limited visibility.

Whilst it would obscure the adjacent building fabric (former garage), this section is not visible from the public realm. Furthermore the former garage is considerably altered part of secondary heritage value.

As such, the introduction of a shade sail in this location would have limited heritage impact.

The proposed shade sail to the west, near the entrance to the building would have limited visibility.

At a height of 2100 – 2500mm it would be mostly hidden by the boundary wall and so have limited visibility from the public realm.

It is to be located such that it would be angled away from the entrance and would not obscure views of the adjacent part of the façade, which is the entry and focal point of the façade, through the front gate.

Although it would be adjacent to the façade, it would be sufficiently setback and recessive.

Furthermore, being set back in the proposed manner, views of the façade from within the front garden would be mostly unimpeded.

As such, the introduction of the proposed shade sail in this location would have limited heritage impact.

Best regards,

Hannah Shaw
Senior Architectural Graduate

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Tree Management Plan
2B McPherson Street, Moonee Ponds

Prepared for: Mollard P/L

Prepared by: Andrew Fox
26 May 2017

Tree Logic Reference: 8201
1.0 Introduction

The aim of this document is to provide guidelines for appropriate tree protection for four (4) mature trees growing within the property at 2B McPherson Street, Moonee Ponds. All construction and development works in the vicinity of the subject trees must abide by the protection and retention requirements outlined in this document.

The theme of the document is planning. Avoiding tree impacts is the best approach as it is almost impossible to rectify damage to trees that has occurred during construction activities. Tree protection cannot be achieved without a proactive approach. Similarly, a basic understanding of how trees grow and develop is needed. The planning and design stages of any construction project will determine the success of tree preservation.

The hierarchy of principles for tree protection are:

- Avoid damage to the subject trees
- Minimise damage to the subject trees
- Replace the subject trees and improve the landscape (as a last resort).

Plans to develop the site have been reviewed, which include the redevelopment of the existing dwelling into a childcare centre.

1.1 Summary of key requirements to protect the subject trees

Trees 1, 3 and 4 stand to incur varying degrees of TPZ encroachment under the current design. Tree 1 currently stands to incur up to 16% TPZ encroachment from the construction of the Children’s Room 2. The proposed Children’s Room 2 is to be constructed at the existing grade, using isolated screw piles. Based on the proposed construction methodology and on the site observations the tree is expected to tolerate and adapt to any changes in its growing environment from the proposed redevelopment. Trees 3 and 4 stand to incur TPZ encroachments of less than 10% and provided appropriate tree protection management is implemented, no further construction controls should be required in order to see their successful retention.

Tree 4 was a maturing Weeping Lilli Pilli (Waterhousea floribunda) that contained an active split at a union of two of its primary limbs. The tree is recommended for removal and replacement on account of its structural condition, in combination with the intended future site usage. Regardless of the tree’s condition, it is protected under Schedule 376 of the Heritage Overlay (HO379) and would trigger permit requirements prior to any works being undertaken.

The proposed parking areas surrounding the site extended into the recommended TPZs of Trees 1 – 3. An established brick perimeter wall existed between the trees and the proposed parking areas. It is expected the wall will have restricted root growth extending out of the subject site. No construction related impact is expected to occur to Trees 1 – 3 as a result of the installation of the proposed parking areas.

The proposed L-shaped steps to the east of Tree 3 must be constructed above the existing grade within the tree’s 11.3 m radius TPZ. The deck must be constructed utilizing isolated footings within the TPZ that are minimised in size and number, as far as practical with the footings manually dug for the initial 450 mm, avoiding any significant roots >70 mm in diameter.

Pruning works are recommended for Trees 1 and 3. The works are intended provide adequate clearance to facilitate the design and to lessen potential for impact wounds occurring as a result of access and operation of machinery within close proximity to the trees. All pruning must be carried out by a qualified arborist, with the
removal of no more than 20% of live foliage, and must be in accordance with the AS 4373 -2007 Pruning of amenity trees. Refer to Section 4.2.3 for further information regarding recommended canopy pruning.

1.2 Background for the tree management plan

The primary purpose of the tree management plan is to meet the requirements of the City of Moonee Valley to afford adequate protection for canopy trees.

Australian Standards relating to tree protection have been reviewed in preparing this document:

- AS 4970 – 2009 Protection of trees on development sites.
- AS 4373 – 2007 Pruning of amenity trees.
- AS 4687 – 2007 Temporary fencing and hoardings.

2.0 The subject trees

The four (4) trees were located within the grounds of the former Moonee Valley Racecourse Club Secretary’s House. With the exception of Tree 4, the assessed specimens were of Moderate arboricultural value, having the potential to be a medium to long term components of the landscape if managed appropriately.

Tree 4 was a maturing Weeping Lilli Pilli (Waterhousea floribunda) that contained an active split at a union of two of its primary limbs. The tree should be considered for removal and replacement on account of its structural condition, in combination with the intended future site usage. Regardless of the tree’s condition, it is protected under Schedule 379 of the Heritage Overlay (HO379) and would trigger permit requirements prior to any works being undertaken.

Refer to Figure 1 for an aerial image of the site, indicating the approximate locations of the assessed vegetation.

Figure 1: A Nearmap aerial image of the site (07.02.2017) indicating the approximate tree locations.
<table>
<thead>
<tr>
<th>No</th>
<th>Tree data sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Common Name</td>
</tr>
<tr>
<td></td>
<td>Species</td>
</tr>
<tr>
<td></td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td>DBH (cm)</td>
</tr>
<tr>
<td></td>
<td>Basal (cm)</td>
</tr>
<tr>
<td></td>
<td>Height x Width (m)</td>
</tr>
<tr>
<td></td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td>Health</td>
</tr>
<tr>
<td></td>
<td>Structure</td>
</tr>
<tr>
<td></td>
<td>Comment</td>
</tr>
<tr>
<td></td>
<td>Arb Rating</td>
</tr>
<tr>
<td></td>
<td>TPZ (m radius)</td>
</tr>
<tr>
<td></td>
<td>SRZ (m radius)</td>
</tr>
</tbody>
</table>

2B McPherson Street, Moonee Ponds
3.0 Permit requirements

The site falls within the Moonee Valley Planning Scheme and is covered by Schedule 2 to the Environmental Significance Overlay (ESO2) and Schedule to the Heritage Overlay (HO379).

Any proposed removal of the four (4) trees would trigger permit requirements under the ESO2 and HO379.

4.0 Tree management plan

4.1 Determining the Tree Protection Zone (TPZ)

The Australian Standard AS 4970-2009 Protection of trees on development sites has been used as a guide in the allocation of a TPZ for the subject trees. The TPZ is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the tree's DBH by 12. The method provides a TPZ that addresses both the stability and growing requirements of a tree.

TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level.

Refer to Figure 2 for examples of minor encroachment.
Encroachment into the TPZ is permissible under certain circumstances and is dependent on both site conditions and tree characteristics. Minor encroachment, up to 10% of the TPZ area, is generally permissible and should be compensated for by recruitment of an equal area contiguous with the TPZ. The 10% encroachment on one side only equates to approximately 1/3 radial distance.

A structural root zone (SRZ) has also been allocated for the subject trees. The SRZ comprises the area around the base of a tree where structural roots required to maintain the tree’s stability in the ground are typically located. The SRZ is calculated using the formula provided in AS4970-2009. The SRZ must be considered the minimum tree protection distance. Excavation must not occur within the SRZ area as any severance of structural roots could compromise tree stability.

4.2 Design considerations

4.2.1 Perceived TPZ encroachments

**Tree 1**

Tree 1 stands to incur up to 16% TPZ encroachment from the construction of the Children’s Room 2 to the north of the tree. It is understood that the proposed Children’s Room 2 is to be constructed at the existing grade and by using isolated screw piles. This method of construction will cause minimal disturbance to the existing surface area and will reduce the likelihood of damage occurring to the tree’s underlying root system.

The Liquidambar existed in a relatively large grassed garden area, which is going to remain relatively undisturbed. Given the proposed construction methodology for the Children’s Room 2 and based on site observations, the tree is expected to tolerate and adapt to the perceived changes in its growing environment under the current design. Any potential root loss within the proposed footprint of the Children’s Room 2 will be recruited within the garden area to the south and west of the tree.

**Tree 3**

Several construction and landscaping elements are proposed within the TPZ of Tree 3. The tree stands to incur up to 8% TPZ encroachment from the installation of an underground water tank and the proposed extension to the south of the Children’s Room 3. L-shaped steps are also proposed within the tree’s 11.3 m radius TPZ.

Given their proximity to the tree, the L-shaped steps must be constructed sympathetic to the tree’s root requirements to minimise loss of significant roots. Isolated footings must be utilized within the TPZ and they must be minimised in size and number, with the footings manually dug for the initial 450 mm, avoiding any significant roots >70 mm in diameter.

**Tree 4**

Tree 4 stands to incur a minor TPZ encroachment of up to 1% under the current design from the installation of the proposed water tank. Under AS 4970 the recommended TPZ may be reduced by 10% (approx. 1/3 of the radial distance on one side only) of the total TPZ area. Therefore, provided appropriate tree protection management is implemented, no further construction controls should be required in order to successfully retain Tree 4.

As discussed in Section 2, Tree 4 was a maturing Weeping Lilli Pilli that contained an active split at a union of two of its primary limbs (Figure 3). The tree should be considered for removal and replacement on account of its structural condition in combination with the intended future site usage.

![Figure 3](image-url)
Regardless of the condition of Tree 4, it is protected under Schedule 379 of the Heritage Overlay (HO379). Any proposed removal would trigger permit requirements under the schedule.

4.2.2 Landscaping elements within the subject trees’ TPZs

With the exception of the proposed L-shaped steps to the south west of the site, the existing landscaping elements within the site are intended to be retained under the current design. The retention of existing landscaping within the trees’ allocated TPZs will greatly reduce the potential for impacts to occurring to the trees during the proposed redevelopment.

4.2.3 Canopy pruning

The northern canopy of Tree 1 and the eastern canopy of Tree 3 partly extended into the proposed construction areas.

Pruning works are recommended for Tree 1 to reduce the section of its northern canopy extending into the proposed construction area. Shown in Figure 4, Tree 3 contained a relatively low hanging canopy. A crown lift of the tree’s eastern canopy is recommended.

The pruning works are intended provide adequate clearance to facilitate the design and to lessen potential for impact wounds occurring as a result of access and operation of machinery within close proximity to the trees during the proposed redevelopment.

All pruning must be undertaken by a suitably qualified arborist in accordance with AS 4373-2007 - Pruning of amenity trees. Pruning wounds should be less than approximately 75 mm Ø with the removal of no more than 20% of live foliage.

4.3 Tree protection fencing

Appropriate TPZ fencing or ground buffering is required to protect the subject trees’ TPZs. The fencing must be erected before any machinery or materials are brought on site and before the commencement of any works. Once erected the protection fencing must not be removed or altered without approval from the project arborist. An alignment of the required TPZ fence is indicated in Appendix 1.

The tree protection fencing should consider the confined nature of the site. The full extent of tree protection fencing, as set out in AS 4970, will be impractical as access through the TPZs areas will be required throughout the duration of the works.

Appropriate tree protection management should be established 1 metre back from the proposed building footprints of the proposed Children’s Room 2 and the proposed extension to Children’s Room 3, with ground buffering installed between the construction footprint and the TPZ fence. Works within the fenced off TPZ area, for the purpose of installing the L-shaped seating or repairing the existing landscaping features, must first be brought to the attention of the project arborist. A determination must then be made on whether or not arborist supervision will be required for that particular phase.
4.4 General tree protection requirements

The following are guidelines that must be implemented to minimise the impact of the proposed construction works on the subject trees.

The subject trees’ allocated TPZs and Structural Root Zones should be clearly indicated on all construction drawings.

Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The site induction, for all contractors and workers, should include a segment on tree preservation. The site induction is a perfect opportunity to educate workers and contractors about the restrictions regarding the tree protection zones. Plans that indicate the main areas and specific locations of trees to be protected should be distributed to relevant supervisors and operators.

The project arborist is to be consulted where the TPZ will be encroached. An on-site presence may be required to supervise works within the subject trees’ TPZs.

There is no immediate requirement for supplemental irrigation within the recommended TPZ areas during the construction phase. Monitoring of the trees in-line with prevailing weather conditions will indicate if supplemental irrigation will be required.

The TPZ needs to be considered when planning for construction storage. No storage of material or equipment should take place within the TPZ of the subject trees, unless investigations have been undertaken or protection strategies have been agreed to by the site manager in conjunction with the municipal arborist.

No fuel, oil dumps or chemicals shall be allowed in or stored in any allocated TPZ and the servicing and refuelling of equipment and vehicles should be carried out away from the recognised root zones.

Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing device.

4.5 Determining when an arborist will be required on site during the project

The requirement for an arborist to attend the site will depend on a number of factors. A suitably qualified and experienced arborist should be commissioned to be on call when issues arise. An initial site visit prior to commencement may assist in conveying the tree protection requirements to contractors.

Refer to the table below for a supervision schedule covering both the construction and post construction phases of the project.

<table>
<thead>
<tr>
<th>Inspection No.</th>
<th>Stage of project</th>
<th>Reason</th>
<th>Signed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction Phase</td>
<td>Inspection 4 weeks after commencement to ensure maintenance of TPZs. Inspect tree and ground conditions and make recommendation regarding any supplementary irrigation or other measures if required to minimise construction impacts to trees being retained.</td>
<td>Project Arborist</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Additional inspections at 12 week intervals for duration of construction period and when notified by Builder or Project Manager if any unforeseen tree-related issues arise.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Contact project arborist anytime works are conducted within the TPZ.</td>
<td></td>
</tr>
</tbody>
</table>
4.6 Potential treatments after construction phase

Tree protection measures can be removed at practical completion (assuming all building works are finished). The trees’ condition is to be assessed by an arborist at this point. Remedial works on the subject trees could be recommended including the application of any fertiliser, soil amendment and supplemental irrigation.

Irrigation is the most important post-construction maintenance activity, particularly if minor impacts to the root system have occurred. Supplemental irrigation may be prescribed post-construction or during prolonged drought conditions during construction.

5.0 Conclusion

Implementation of the tree protection measures listed in the tree management plan of this report will provide the most appropriate response in maintaining the health and safety of the assessed vegetation, both during and after the proposed redevelopment of 2B McPherson Street, Moonee Ponds.

In summary:

- The proposed Children’s Room 2 must be constructed at or above the existing grade, using isolated screw piles within the tree’s 7.7 metre TPZ.

- The proposed L-shaped steps, to the east of Tree 3 must be constructed sympathetic to the tree’s root requirements. Isolated footings must be utilized within the TPZ and they must be minimised in size and number, with the footings manually dug for the initial 450 mm, avoiding any significant roots >70 mm in diameter.

- Tree 4 contained an active split at a union of two of its primary limbs. The tree should be considered for removal and replacement on account of its poor structural condition, in combination with the intended future site usage.

Regardless of the tree’s condition, it is protected under Schedule 379 of the Heritage Overlay (HO379). Any proposed removal would trigger permit requirements under the schedule.

- The northern canopy of Tree 1 and the eastern canopy of Tree 3 have been recommended for pruning. Refer to Section 4.2.3 for the specific recommendations.

All pruning must be undertaken by a suitably qualified arborist in accordance with AS 4373-2007 - Pruning of amenity trees. Pruning wounds should be less than approximately 75 mm Ø with the removal of no more than 20% of live foliage.

- Appropriate tree protection fencing must be installed before any machinery or materials are brought on site and before the commencement of any works. Information regarding the installation of tree protection fencing is discussed in Section 4.3.
Under no circumstance shall this report be reproduced unless in full.

Signed

Andrew Fox
Consulting Arborist- TreeLogic P/L
M 0417 113 516
E andrew.fox@treelogic.com.au

References and bibliography:
Australian Standard (4373-2007) Pruning of Amenity trees, Standards Australia, Homebush, NSW.
City of Auckland (1999), Annexure 5 – Guidelines for works within the vicinity of trees, City of Auckland – District plan
development. ISA , Champaign, Illinois.
Appendix 1: Illustration of the proposed works within the subject site
Appendix 2: Arboricultural Descriptors (April 2015)

Note that not all of the described tree descriptors may be used in a tree assessment and report. The assessment is undertaken with regard to contemporary arboricultural practices and consists of a visual inspection of external and above-ground tree parts.

1. Tree Condition

The assessment of tree condition evaluates factors of health and structure. The descriptors of health and structure attributed to a tree evaluate the individual specimen to what could be considered typical for that species growing in its location under current climatic conditions. For example, some species can display inherently poor branching architecture, such as multiple acute branch attachments with included bark. Whilst these structural defects may technically be considered arboriculturally poor, they are typical for the species and increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the assessor.

Diagram 1, provides an indicative distribution curve for tree condition to illustrate that within a normal tree population the majority of specimens are centrally located within the condition range (normal distribution curve). Furthermore, that those individual trees with an assessed condition approaching the outer ends of the spectrum occur less often.

2. Tree Name

Provides botanical name, (genus, species, variety and cultivar) according to accepted international code of taxonomic classification, and common name.

3. Tree Type

Describes the general geographic origin of the species and its type e.g. deciduous or evergreen.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous</td>
<td>Occurs naturally in the area or region of the subject site. Remnant.</td>
</tr>
<tr>
<td>Victorian native</td>
<td>Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous (component of EVG benchmark). Could be planted Indigenous trees.</td>
</tr>
<tr>
<td>Australian native</td>
<td>Occurs naturally within Australia but is not a Victorian native or Indigenous</td>
</tr>
<tr>
<td>Exotic deciduous</td>
<td>Occurs outside of Australia and typically sheds its leaves during winter</td>
</tr>
<tr>
<td>Exotic evergreen</td>
<td>Occurs outside of Australia and typically holds its leaves all year round</td>
</tr>
<tr>
<td>Exotic conifer</td>
<td>Occurs outside of Australia and is classified as a gymnosperm</td>
</tr>
<tr>
<td>Native conifer</td>
<td>Occurs naturally within Australia and is classified as a gymnosperm</td>
</tr>
<tr>
<td>Native Palm</td>
<td>Occurs naturally within Australia. Woody monocotyledon</td>
</tr>
<tr>
<td>Exotic Palm</td>
<td>Occurs outside of Australia. Woody monocotyledon</td>
</tr>
</tbody>
</table>

4. Height and Width

Indicates height and width of the individual tree; dimensions are expressed in metres. Crown heights are measured with a height meter where possible. Due to the topography of some sites and/or the density of vegetation it may not be possible to do this for every tree. Tree heights may be estimated in line with
previous height meter readings in conjunction with assessor’s experience. Crown widths are generally
grounded (estimated) at the widest axis or can be measured on two axes and averaged. In some instances
the crown width can be measured on the four cardinal direction points (North, South, East and West).

Crown height, crown spread are generally recorded to the nearest half metre (crown spread would be
rounded up) for dimensions up to 10 m and the nearest whole metre for dimensions over 10 m. Estimated
dimensions (e.g. for off-site or otherwise inaccessible trees where accurate data cannot be recovered)
shall be clearly identified in the assessment data.

5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific
assessment and an individual trees specific characteristics. DBH is the typical trunk diameter captured as
it relates to the allocation of tree protection distances. The basal trunk diameter assists in the allocation of
a structural root zone. Some municipalities require trunk diameters be captured at different heights, with
1.0 m above grade being a common requirement. The specific planning schemes will be checked to
certify requirements.

Stem diameters shall be recorded in centimetres, rounded to the nearest 1 cm (0.01 m).

_Diameter at Breast Height (DBH)_

Indicates the trunk diameter (expressed in centimetres) of an individual tree measured at 1.4m
above the existing ground level or where otherwise indicated, multiple leaders are measured
individually. Plants with multiple leader habit may be measured at the base. The range of methods
to suit particular trunk shapes, configurations and site conditions can be seen in Appendix A of
Australian Standard AS 4970-2009 Protection of trees on development sites. Measurements
undertaken using foresters tape or builders tape.

_Basal trunk diameter_

The basal dimension is the trunk diameter measured at the base of the trunk or main stem(s)
immediately above the root buttress. Used to ascertain the Structural Root Zone (SRZ) as outlined
in AS4970.

6. Health

Assesses various attributes to describe the overall health and vigour of the tree.

<table>
<thead>
<tr>
<th>Category</th>
<th>Vigour, Extension growth</th>
<th>Decline symptoms, Deadwood, Dieback</th>
<th>Foliage density, colour, size, intactness</th>
<th>Pests and or disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Above typical. Excellent. Full canopy density</td>
<td>Negligible</td>
<td>Better than typical</td>
<td>Negligible</td>
</tr>
<tr>
<td>Fair</td>
<td>Typical. 90-100% canopy density</td>
<td>Minor or expected. Little or no dead wood</td>
<td>Typical. Minor deficiences or defects could be present.</td>
<td>Minor, within damage thresholds</td>
</tr>
<tr>
<td>Fair to Poor</td>
<td>Below typical - low vigour</td>
<td>More than typical. Small sub-branch dieback</td>
<td>Exhibiting deficiencies. Could be thinning, or smaller</td>
<td>Exceeds damage thresholds</td>
</tr>
<tr>
<td>Poor</td>
<td>Minimal - declining</td>
<td>Excessive, large and/or prominent amount &amp; size of dead wood</td>
<td>Exhibiting severe deficiences. Thinning foliage, generally smaller or deformed</td>
<td>Extreme and contributing to decline</td>
</tr>
</tbody>
</table>

http://tmp.2b.mopherson.street.moorne.ponds.docx  treelogic.com.au
7. Structure

Assesses principal components of tree structure (Diagram 2).

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>Zone 1 - Root plate &amp; lower stem</th>
<th>Zone 2 - Trunk</th>
<th>Zone 3 - Primary branch support</th>
<th>Zone 4 - Outer crown and roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>No obvious damage, disease or decay; obvious basal flare / stable in ground</td>
<td>No obvious damage, disease or decay; well tapered</td>
<td>Well formed, attached, spaced and tapered. No history of failure.</td>
<td>No obvious damage, disease, decay or structural defect. No history of failure.</td>
</tr>
<tr>
<td>Fair</td>
<td>Minor damage or decay. Basal flare present.</td>
<td>Minor damage or decay.</td>
<td>Generally well attached, spaced and tapered branches. Minor structural deficiencies may be present or developing. No history of branch failure.</td>
<td>Minor damage, disease or decay; minor branch end-weight or over-extension. No history of branch failure.</td>
</tr>
<tr>
<td>Fair to Poor</td>
<td>Moderate damage or decay; minimal basal flare.</td>
<td>Moderate damage or decay; approaching recognised thresholds.</td>
<td>Weak, decayed or with acute branch attachments; previous branch failure evidence.</td>
<td>Moderate damage, disease or decay; moderate branch end-weight or over-extension. Minor branch failure evident.</td>
</tr>
<tr>
<td>Poor</td>
<td>Major damage, disease or decay; fungal fruiting bodies present. Excessive lean; placing pressure on root plate</td>
<td>Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump re-sprout</td>
<td>Decayed, cavities or branch attachments with included bark; excessive compression flaring; failure likely. Evidence of major branch failure.</td>
<td>Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension. Branch failure evident.</td>
</tr>
<tr>
<td>Very Poor</td>
<td>Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable</td>
<td>Excessive damage, disease or decay; cavities. Excessive lean. Stump re-sprout</td>
<td>Decayed, cavities or branch attachments with active split; failure imminent. History of major branch failure.</td>
<td>Excessive damage, disease or decay; excessive branch end-weight or over-extension. History of branch failure.</td>
</tr>
</tbody>
</table>

Diagram 2: Tree structure zones

Structure ratings will also take into account general branching architecture, stem taper, live crown ratio, crown symmetry (bias or lean) and crown position such as tree being suppressed amongst more dominant trees.

The lowest or worst descriptor assigned to the tree in any column could generally be the overall rating assigned to the tree. The assessment for structure is limited to observations of external and above ground...
tree parts. It does not include any exploratory assessment of underground or internal tree parts unless this is requested as part of the investigation. Trees are assessed and then given a rating for a point in time. Generally, trees with a poor or very poor structure are beyond the benefit of practical arboricultural treatments.

The management of trees in the urban environment requires appropriate arboricultural input and consideration of risk. Risk potential will take into account the combination of likelihood of failure and impact, including the perceived importance of the target(s).

8. Age class

Relates to the physiological stage of the tree’s life cycle.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
<td>Sapling tree and/or recently planted. Approximately 5 or less years in location.</td>
</tr>
<tr>
<td>Semi-mature</td>
<td>Tree increasing in size and yet to achieve expected size in situation. Primary developmental stage.</td>
</tr>
<tr>
<td>Early-mature</td>
<td>Tree established, generally growing vigorously. 50% of attainable age size.</td>
</tr>
<tr>
<td>Mature</td>
<td>Specimen approaching expected size in situation, with reduced incremental growth.</td>
</tr>
<tr>
<td>Over-mature</td>
<td>Mature full size with a retrenching crown. Tree is senescent and in decline. Significant decay generally present.</td>
</tr>
</tbody>
</table>

9. Arboricultural Rating

Relates to the combination of tree condition factors, including health and structure (arboricultural merit), and also conveys an amenity value. Amenity relates to the trees biological, functional and aesthetic characteristics (Hitchmough 1994) within an urban landscape context. The presence of any serious disease or tree-related hazards that would impact risk potential are taken into account.

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Tree of high quality in good to fair condition. Generally a prominent arboricultural/landscape feature. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is highly desirable.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Tree of moderate quality, in fair or better condition. Tree may have a condition, and or structural problem that will respond to arboricultural treatment. These trees have the potential to be a medium- to long-term component of the landscape if managed appropriately. Retention of these trees is generally desirable.</td>
</tr>
<tr>
<td>Low</td>
<td>Unremarkable tree of low quality or little amenity value. Tree in either poor health or with poor structure or a combination. Tree is not significant because of either its size or age, such as young trees with a stem diameter below 15 cm. These trees are easily replaceable. Tree (species) is functionally inappropriate to specific location and would be expected to be problematic if retained. Retention of such trees may be considered if not requiring a disproportionate...</td>
</tr>
</tbody>
</table>
### Category | Description
--- | ---

**None**

- Trees of low quality with an estimated remaining life expectancy of less than 5 years.
- Tree has either a severe structural defect or health problem or combination that cannot be sustained with practical arboricultural techniques and the loss of the tree would be expected in the short term.
- Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline. Tree infected with pathogens of significance to either the health or safety of the tree or other adjacent trees.
- Tree whose retention would not be viable after the removal of adjacent trees (includes trees that have developed in close spaced groups and would not be expected to acclimatise to severe alterations to surrounding environment – removal of adjacent shelter trees).
- Tree has a detrimental effect on the environment, for example, the tree is a recognised environmental woody weed with potential to spread into waterways or natural areas.
- Unremarkable tree of no material landscape, conservation or other cultural value.

Trees have many values, not all of which are considered when an arboricultural assessment is undertaken. However, individual trees or tree group features may be considered important community resources because of unique or noteworthy characteristics or values other than their age, dimensions, health or structural condition. Recognition of one or more of the following criterion is designed to highlight other considerations that may influence the future management of such trees.

<table>
<thead>
<tr>
<th>Significance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horticultural Value/ Rarity</td>
<td>Outstanding horticultural or genetic value; could be an important source of propagating stock, including specimens that are particularly resistant to disease or exposure. Any tree of a species or variety that is rare.</td>
</tr>
<tr>
<td>Historic, Aboriginal Cultural or Heritage Value</td>
<td>Tree could have value as a remnant of a particular important historical period or a remnant of a site or activity no longer in action. Tree has a recognised association with historic aboriginal activities, including scar trees. TREE commemorates a particular occasion, including plantings by notable people, or having associations with an important event in local history.</td>
</tr>
<tr>
<td>Ecological Value</td>
<td>Tree could have value as habitat for indigenous wildlife, including providing breeding, foraging or roosting habitat, or is a component of a wildlife reserve. Remnant indigenous vegetation that contribute to biological diversity</td>
</tr>
</tbody>
</table>

**Useful life expectancy**

Assessment of useful life expectancy provides an indication of health and tree appropriateness and involves an estimate of how long a tree is likely to remain in the landscape based on species, stage of life...
(cycle), health, amenity, environmental services contribution, conflicts with adjacent infrastructure and risk to the community. It would enable tree managers to develop long-term plans for the eventual removal and replacement of existing trees in the public realm. It is not a measure of the biological life of the tree within the natural range of the species. It is more a measure of the health status and the trees positive contribution to the urban landscape.

Within an urban landscape context, particularly in relation to street trees, it could be considered a point where the costs to maintain the asset (tree) outweigh the benefits the tree is returning.

The assessment is based on the site conditions not being significantly altered and that any prescribed maintenance works are carried out (site conditions are presumed to remain relatively constant and the tree would be maintained under scheduled maintenance programs).

<table>
<thead>
<tr>
<th>Useful Life Expectancy</th>
<th>Typical characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year (No remaining ULE)</td>
<td>Tree may be dead or mostly dead. Tree may exhibit major structural faults. Tree may be an imminent failure hazard. Excessive infrastructure damage with high risk potential that cannot be remedied.</td>
</tr>
<tr>
<td>1-5 years (Transitory, Brief)</td>
<td>Tree is exhibiting severe chronic decline. Crown is likely to be less than 50% typical density. Crown may be mostly epicormic growth. Dieback of large limbs is common (large deadwood may have been pruned out). Over-mature and senescing. Infrastructure conflicts with heightened risk potential. Tree has outgrown site constraints.</td>
</tr>
<tr>
<td>6-10 years (Short)</td>
<td>Tree is exhibiting chronic decline. Crown density will be less than typical and epicormic growth is likely to present. The crown may still be mostly entire, but some dieback is likely to be evident. Dieback may include large limbs. Over-mature and senescing or early decline symptoms in short-lived species. Early infrastructure conflicts with potential to increase regardless of management inputs.</td>
</tr>
<tr>
<td>11-20 years (Moderate)</td>
<td>Tree not showing symptoms of chronic decline, but growth characteristics are likely to be reduced (bud development, extension growth etc.). Tree may be over-mature and senescing.</td>
</tr>
<tr>
<td>21-30 years (Moderate)</td>
<td>Trees displaying normal growth characteristics. Tree may be growing in restricted environment (e.g. Streetscapes) or may be in late maturity.</td>
</tr>
<tr>
<td>31-60 years (Moderately long)</td>
<td>Semi-mature and mature trees exhibiting normal growth characteristics. Juvenile trees in streetscapes.</td>
</tr>
<tr>
<td>60+ years (Long)</td>
<td>Generally juvenile and semi-mature trees exhibiting normal growth characteristics in parks or open space. Could also be maturing, long-lived trees. Tree well suited to the site with negligible potential for infrastructure conflicts.</td>
</tr>
</tbody>
</table>

Note that ULE may change for a tree dependent on the prevailing climatic conditions, which can either increase or decrease, or sudden changes to a tree’s growing environment creating an acute stress.

Bibliography:
Cofer, K.D. (1996) Construction damage assessments: trees and sites, University of Georgia, USA
Hitchmough, J.D. (1994) Urban landscape management, Inkata Press, Australia

Appendix 3: Tree protection zones.

Introduction

In order to sustain trees on a development site consideration must be given to the establishment of tree protection zones.

The physical dimensions of tree protection zones can sometimes be difficult to define. The projection of a tree's crown can provide a guide but is by no means the definitive measure. The unpredictable nature of roots and their growth, differences between species and their tolerances, and observable and hidden changes to the trees growing environment, as a result of development, are variables that must be considered.

Most vigorous, broad canopied trees survive well if the area within the drip-line of the canopy is protected. Fine root density is usually greater beneath the canopy than beyond (Gilman, 1997). If few to no roots over 3cm in diameter are encountered and severed during excavation the tree will probably tolerate the impact and root loss. A healthy tree can sustain a loss of between 30% and 50% of absorbing roots (Harris, Clark, Matheny, 1999), however encroachment into the structural root system of a tree may be problematic.

The structural root system of a tree is responsible for ensuring the stability of the entire tree structure in the ground. A tree could not sustain loss of structural root system and be expected to survive let alone stand up to average annual wind loads upon the crown.

Allocation of tree protection zone (TPZ)

The method of allocating a TPZ to a particular tree will be influenced by site factors, the tree species, its age and developed form.

Once it has been established, through an arboricultural assessment, which trees and tree groups are to be retained, the next step will require careful management through the development process to minimise any impacts on the designated trees. The successful retention of trees on any particular site will require the commitment and understanding of all parties involved in the development process. The most important activity, after determining the trees that will be retained is the implementation of a TPZ.

The intention of tree protection zones is to:

- mitigate tree hazards;
- provide adequate root space to sustain the health and aesthetics of the tree into the future;
- minimise changes to the trees growing environment, which is particularly important for mature specimens;
- minimise physical damage to the root system, canopy and trunk; and
- define the physical alignment of the tree protection fencing

Tree protection

The most important consideration for the successful retention of trees is to allow appropriate above and below ground space for the trees to continue to grow. This requires the allocation of tree protection zones for retained trees.

The Australian Standard AS 4970-2009 Protection of trees on development sites has been used as a guide in the allocation of TPZs for the assessed trees. The TPZ for individual trees is calculated based on trunk (stem) diameter (DBH), measured at 1.4 metres up from ground level. The radius of the TPZ is calculated by multiplying the trees DBH by 12. The method provides a TPZ that addresses both the
stability and growing requirements of a tree. TPZ distances are measured as a radius from the centre of the trunk at (or near) ground level. The minimum TPZ should be no less than 2m and the maximum no more than 15m radius. The TPZ of palms should be not less than 1.0m outside the crown projection.

Encroachment into the TPZ is permissible under certain circumstances though is dependent on both site conditions and tree characteristics. Minor encroachment, up to 10% of the TPZ, is generally permissible provided encroachment is compensated for by recruitment of an equal area contiguous with the TPZ. Examples are provided in Diagram 1. Encroachment greater than 10% is considered major encroachment under AS4970-2009 and is only permissible if it can be demonstrated that after such encroachment the tree would remain viable.

Diagram 1A

Diagram 1B

*Diagram 1: Examples of minor encroachment into a TPZ.*

(Extract from: AS4970-2009, Appendix D, p30 of 32)

The 10% encroachment on one side equates to approximately ⅓ radial distance. Tree root growth is opportunistic and occurs where the essentials to life (primarily air and water) are present. Heterogeneous soil conditions, existing barriers, hard surfaces and buildings may have inhibited the development of a symmetrically radiating root system.

Existing infrastructure around some trees may be within the TPZ or root plate radius. The roots of some trees may have grown in response to the site conditions and therefore if existing hard surfaces and building alignments are utilised in new designs the impacts on the trees should be minimal. The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1986). Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build.

The TPZ should also give consideration to the canopy and overall form of the tree. If the canopy requires severe pruning in order to accommodate a building and in the process the form of the tree is diminished it may be worthwhile considering altering the design or removing the tree.

**General tree protection guidelines**

The most important factors are:

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood. Pruning works may also identify other tree hazards that require remedial works.
- Installation of tree protection fencing. Once the tree protection zones have been determined the next step is to mulch the zone with woodchip and erect tree protection fencing. This must be completed prior to any materials being brought on-site, erection of temporary site facilities or demolition/earth works. The protection fencing must be sturdy and withstand winds and construction impacts. The protection fence should only be moved with approval of the site
supervisor. Other root zone protection methods can be incorporated if the TPZ area needs to be traversed.

- Appropriate signage is to be fixed to the fencing to alert people as to importance of the tree protection zone.
- The importance of tree preservation must be communicated to all relevant parties involved with the site.
- Inspection of trees during excavation works.

**Exploratory excavation**

The most reliable way to estimate root disturbance is to find out where the roots are in relation to the demolition, excavation or construction works that will take place (Matheny & Clark, 1998).

Exploratory excavation prior to commencement of construction can help establish the extent of the root system and where it may be appropriate to excavate or build. This also allows management decisions to be made and allows time for redesign works if required.

Any exploratory excavation within the allocated TPZ is to be undertaken with due care of the roots. Minor exploration is possible with hand tools. More extensive exploration may require the use of high pressure water or air excavation techniques. Either hydraulic or pneumatic excavation techniques will safely expose tree roots; both have specific benefits dependent on the situation and soil type. An arborist is to be consulted on which system is best suited for the site conditions.

Substantial roots are to be exposed and left intact.

Once roots are exposed decisions can be made regarding the management of the tree. Decisions will be dependent on the tree species, its condition, its age, its relative tolerance to root loss, and the amount of root system exposed and requiring pruning.

Other alternative measures to encroaching the TPZ may include boring or tunnelling.

**How to determine the diameter of a substantial root**

The size of a substantial root will vary according to the distance of the exposed root to the trunk of the tree. The further away from the trunk of a tree that a root is, the less significant the root is likely to be to the tree's health and stability.

The determination of what is a substantial root is often difficult because the form, depth and spread of roots will vary between species and sites. However, because smaller roots are connected to larger roots in a framework, there can be no doubt that if larger roots are severed, the smaller roots attached to them will die. Therefore, the larger the root, the more significant it may be.

Gilman (1997) suggests that trees may contain 4-11 major lateral roots and that the five largest lateral roots account (act as a conduit) for 75% of the total root system. These large lateral roots quickly taper within a distance to the tree, this distance is identified as the Structural Root Zone (SRZ). Within the SRZ distance, all roots and the soil surrounding the roots are deemed significant.

No root or soil disturbance is permitted within the SRZ.

In the area outside the SRZ the tree may tolerate the loss of one or a number of roots. The table below indicates the size of tree roots, outside the SRZ that would be deemed substantial for various tree heights. The assessment of combined root loss within the TPZ would need to be undertaken by an arborist on an individual basis because the location of the tree, its condition and environment would need to be assessed.

**Table 1: Estimated significant root sizes outside SRZ**

<table>
<thead>
<tr>
<th>Height of tree</th>
<th>Diameter of root</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 8m</td>
<td>≥ 30mm</td>
</tr>
</tbody>
</table>
Ground buffering

Where works are required to be undertaken within the Tree root zone without penetration of the surface, ground buffering and trunk and limb protection must be provided to minimise the potential for soil to become compacted and avoid potential for impact wounds to occur to surface roots, trunk or limbs. Refer below.

Diagram 2: Examples of ground buffering and trunk and limb protection.

Construction Guidelines

The following are guidelines that must be implemented to minimise the impact of the proposed construction works on the retained trees.

- The Tree Protection Zone (TPZ) is fenced and clearly marked at all times. The actual fence specifications should be a minimum of 1.2 - 1.5 metres of chain mesh or like fence with 1.8 meter posts (e.g. treated pine or star pickets) or like support every 3-4 metres and a top line of high visibility plastic hazard tape. The posts should be strong enough to sustain knocks from on site excavation equipment. This fence will deter the placement of building materials, entry of heavy equipment and vehicles and also the entry of workers and/or the public into the TPZ. Note: There are many different variations on the construction type and material used for TPZ fences, suffice to say that the fence should satisfy the responsible authority.

- Contractors and site workers should receive written and verbal instruction as to the importance of tree protection and preservation within the site. Successful tree preservation occurs when there is a commitment from all relevant parties involved in designing, constructing and managing a development project. Members of the project team need to interact with each other to minimise the impacts to the trees, either through design decisions or construction practices. The importance of tree preservation must be communicated to all relevant parties involved with the site.

- The consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.

- A layer of organic mulch (woodchips) to a depth of no more than 100mm should be placed over the root systems within the TPZ of trees, which are to be retained so as to assist with moisture retention and to reduce the impact of compaction.
• No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.

• Where machinery is required to operate inside the TPZ it must be a small skid drive machine (i.e. Dingo or similar) operating only forwards and backwards in a radial direction facing the tree trunk and not altering direction whilst inside the TPZ to avoid damaging, compacting or scuffing the roots.

• Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.

• No fuel, oil dumps or chemicals shall be allowed in or stored on the TPZ and the servicing and re-fuelling of equipment and vehicles should be carried out away from the root zones.

• No storage of material, equipment or temporary building should take place over the root zone of any tree.

• Nothing whatsoever should be attached to any tree including temporary services wires, nails, screws or any other fixing devices.

• Supplementary watering should be provided to all trees through any dry periods during and after the construction process. Proper watering is the most important maintenance task in terms of successfully retaining the designated trees. The areas under the canopy drip lines should be mulched with woodchip to a depth of no more than 100mm. The mulch will help maintain soil moisture levels. Testing with a soil probe in a number of locations around the tree will help ascertain soil moisture levels and requirements to irrigate. Water needs to be applied slowly to avoid runoff. A daily watering with 5 litres of water for every 30 mm of trunk caliper may provide the most evenly soil moisture level for roots (Watson & Himelick, 1997), however light frequent irrigations should be avoided. Irrigation should wet the entire root zone and be allowed to dry out prior to another application. Watering should continue from October until April.

References
Mattheck C. 2002. Tree Mechanik, Forschungszentrum Karlsruhe GMBH

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