Appendix 3 - Arboricultural Descriptors (August 2013)

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. 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 may not constitute an increased risk of failure. These trees may be assigned a structural rating of fair-poor (rather than poor) at the discretion of the author.

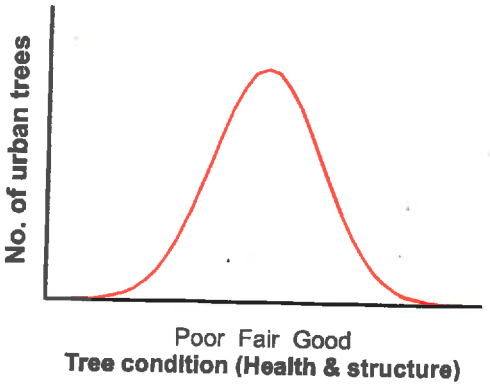


Diagram 1: Indicative normal distribution curve for tree condition

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.

Category	Description
Indigenous	Occurs naturally in the area or region of the subject site
Victorian native	Occurs naturally within some part of the State of Victoria (not exclusively) but is not indigenous
Australian native	Occurs naturally within Australia but is not a Victorian native or indigenous
Exotic deciduous	Occurs outside of Australia and typically sheds its leaves during winter
Exotic evergreen	Occurs outside of Australia and typically holds its leaves all year round
Exotic conifer	Occurs outside of Australia and is classified as a gymnosperm
Native conifer	Occurs naturally within Australia and is classified as a gymnosperm
Native Palm	Occurs naturally within Australia. Woody monocotyledon
Exotic Palm	Occurs outside of Australia. Woody monocotyledon

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 author's experience. Crown widths are generally paced (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).

5. Trunk diameters

The position where trunk diameters are captured may vary dependent on the requirements of the specific assessment. 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 ascertain requirements.

- ***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 site*s. Measurements undertaken with forestersø 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.

Category	Vigour/Extension growth	Decline symptoms/ Deadwood/Dieback	Foliage density, colour, size, intactness	Pests and or disease
Good	Above typical	Negligible	Better than typical	Negligible
Fair	Typical	Minor or expected	Typical	Minor, within damage thresholds
Fair to Poor	Below typical	More than typical	Exhibiting deficiencies	Exceeds damage thresholds
Poor	Minimal	Excessive, large and/or prominent amount/size	Exhibiting severe deficiencies	Extreme and contributing to decline
Dead	N/A	N/A	N/A	N/A

7. Structure

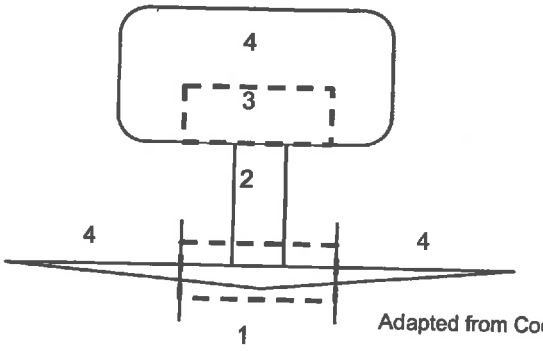
Assesses principal components of tree structure (Diagram 2).

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Good	No obvious damage, disease or decay; obvious basal flare / stable in ground	No obvious damage, disease or decay; well tapered	Well formed, attached, spaced and tapered	No obvious damage, disease, decay or structural defect
Fair	Minor damage or decay. Basal flare present.	Minor damage or decay	Typically formed, attached, spaced and tapered	Minor damage, disease or decay; minor branch end-weight or over-extension
Fair to Poor	Moderate damage or decay; minimal basal flare	Moderate damage or decay; approaching recognised thresholds	Weak, decayed or with acute branch attachments; previous branch failure evidence	Moderate damage, disease or decay; moderate branch end-weight or over-extension
Poor	Major damage, disease or decay; fungal fruiting bodies present. Excessive lean placing pressure on root plate	Major damage, disease or decay; exceeds recognised thresholds; fungal fruiting bodies present. Acute lean. Stump resprout	Decayed, cavities or has acute branch attachments with included bark; excessive compression flaring; failure likely	Major damage, disease or decay; fungal fruiting bodies present; major branch end-weight or over-extension

Descriptor	Zone 1 - Root plate & lower stem	Zone 2 - Trunk	Zone 3 - Primary branch support	Zone 4 - Outer crown and roots
Very Poor	Excessive damage, disease or decay; unstable / loose in ground; altered exposure; failure probable	Excessive damage, disease or decay; cavities. Excessive lean. Stump resprout	Decayed, cavities or branch attachments with active split; failure imminent	Excessive damage, disease or decay; excessive branch end-weight or over-extension

Diagram 2: Tree structure zones

1. Root plate & lower stem
2. Trunk
3. Primary branch support
4. Outer crown & roots



Adapted from Coder (1996)

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 the 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. Life Stage

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

Category	Description
Young	Sapling tree and/or recently planted. Approximately 5 or less years in location.
Semi-mature	Tree increasing in size and yet to achieve expected size in situation. Primary developmental stage.
Maturing	Specimen approaching expected size in situation, with reduced incremental growth
Over-mature	Tree is senescent and in decline. Significant decay generally present

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.

Category	Description
High	Tree of high quality in good to fair condition. Generally a prominent arboricultural 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.

Moderate	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.
Low	Tree of low quality and/or little amenity value. Tree in poor health and/or with poor structure. Tree is not significant because of its size and/or age. 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 expenditure of resources for a tree in its condition and location.
None	Tree has a severe structural defect and/or health problem that cannot be sustained with practical arboricultural techniques and the loss of tree would be expected in the short term. 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 woody weed with potential to spread into waterways or natural areas.

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.

Significance	**Description**
Horticultural Value/ Rarity	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.
Historic, Aboriginal Cultural or Heritage Value	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.
Ecological Value	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

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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.

More specific tree protection distances and other measures could be provided during the fine design phase of a development project.

The Structural Root Zone (SRZ)

A Structural Root Zone (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 woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is calculated using the formula provided in AS4970.

It is important to note that the SRZ relates to a tree's structural stability only, it does not include the absorbing root system involved with maintaining the tree's vigour and long-term viability. The maintenance of the SRZ is integral to the tree and should not be encroached under any circumstances.

Tree protection fencing

Tree protection fencing is to be erected before any machinery or materials are brought on site and before the commencement of any construction works. Examples of fencing type and signage can be seen in photographs below.

Photograph above left - Example of signage for TPZ. Photograph above right - Example of appropriate TPZ fencing.

The photograph above shows indicative protection fencing for a street tree, such fencing would extend to the allocated tree protection distances of the retained trees within the subject site.

Once erected the protection fencing must not be removed or altered without approval from the project arborist. No persons, vehicles or machinery to enter the TPZ without the consent of the project arborist or site manager. The TPZ fencing must be secured to restrict access. *AS 4687 - 2007 Temporary fencing and hoardings*, specifies appropriate fencing requirements. Existing perimeter fencing can be incorporated into the protective fencing. Signs identifying the TPZ are to be placed on the fencing.

Tree protection fencing is to be placed around the retained trees within the site. The trees along the southern boundary can be incorporated into one fenced area.

Ground protection systems

The TPZ area can be temporarily encroached if the area is protected. This area will require ground protection to prevent root damage and avoid compaction. Measures may include a permeable membrane, such as a geotextile, to cover the TPZ area beneath a 100 mm layer of crushed rock below rumble boards (See Diagram 2). This will allow temporary access.

Rumble boards

Permeable membrane

Natural sub-grade

Diagram 2 Indicative ground protection system - adapted from AS4970 Clause 4.5.3 Ground protection.

Process for installation and removal of ground protection system (GPS).

- No need to remove organic matter layer. Close mow of all grass within area. If excavation is required to attain levels, no more than 50 mm in depth is to be removed.
- The entire area is to be covered with a geotextile that will extend beyond the area by a distance to account for any crimping when a surface material is laid on top. Geotextile to be firmly anchored into soil. The geofabric shall comprise Bidim U34 filter fabric or equivalent. Install by hand.
- Place 100 mm crushed rock onto the geotextile and then place rumble boards on top of crushed rock. Crushed rock can be installed with light machinery working over the area already covered. The same principle applies when removing the material with the geotextile removed by hand.

General tree protection guidelines

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

- Prior to construction works the trees nominated for tree works should be pruned to remove larger dead wood or other identified defects. Pruning works may also identify other tree hazards that require remedial works.
- The Tree Preservation Zone (TPZ) is fenced and clearly marked at all times. This fence should 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. Australian Standard *AS 4687 - 2007 Temporary fencing and hoardings*, specifies appropriate fencing requirements. Existing perimeter fencing can be incorporated into the protective fencing. Shade cloth should be attached to reduce the movement of dust and other particulates into the TPZ. Signs identifying the TPZ are to be placed on the fencing.
- If the area within the TPZ is to be accessed during the construction phase then the area will need ground protection. Measures may include a permeable membrane, such as a geotextile, to cover the TPZ area beneath a 100 mm layer of crushed rock below rumble boards.
- 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 consultant arborist is on-site to supervise excavation works around the existing trees where the TPZ will be encroached.
- Apply 60-75 mm depth of approved woodchip mulch within the TPZ area. The mulch particles should be no less than 15 mm in size with no fines. Mulching underneath the canopy will improve the soil environment and deter activity and protect the root zone beneath the canopy. Monitoring of the trees in-line with prevailing weather conditions will indicate if supplemental irrigation is required.
- No persons, vehicles or machinery to enter the TPZ without the consent of the consulting arborist or site manager.
- Any underground service installations within the allocated TPZ should be bored and utility authorities should common trench where possible.
- No level changes, either raised or lowered, are to exceed 150 mm in depth without further consultation with arborist.
- 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 device.
- Any pruning that is required must be carried out by trained and competent arborist who has a thorough knowledge of tree physiology and pruning methods and carry out pruning to the Australian Standard – *AS 4373 – 2007 Pruning of amenity trees*.
- All root excavation should be carried out by hand digging or with the use of 'Air-Excavation' techniques, and roots should be severed by saw cutting or with a sharp axe and not with a Backhoe or any machinery or blunt instrument.

Sympathetic pavement systems

The construction of load bearing surfaces beneath the tree canopy can be undertaken using a variety of methods that aim to preserve the root system. The most important factor is that the entire pavement construction occurs above natural grade (removal of organic matter is generally permissible up to 100 mm so long as no major roots are injured).

In each situation a 'no dig' type of pavement is preferred. The pavement and sub base are basically installed on top of existing natural grade. This will minimise root disturbance and soil compaction.

Diagram 3 shows the 'no dig' style which places the pavement section on top of the natural existing grade. This can reduce root disturbance and compaction. Extra reinforcing in the pavement and use of geotextile under the base material can be used to increase the stability of the pavement (Matheny & Clark, 1998).

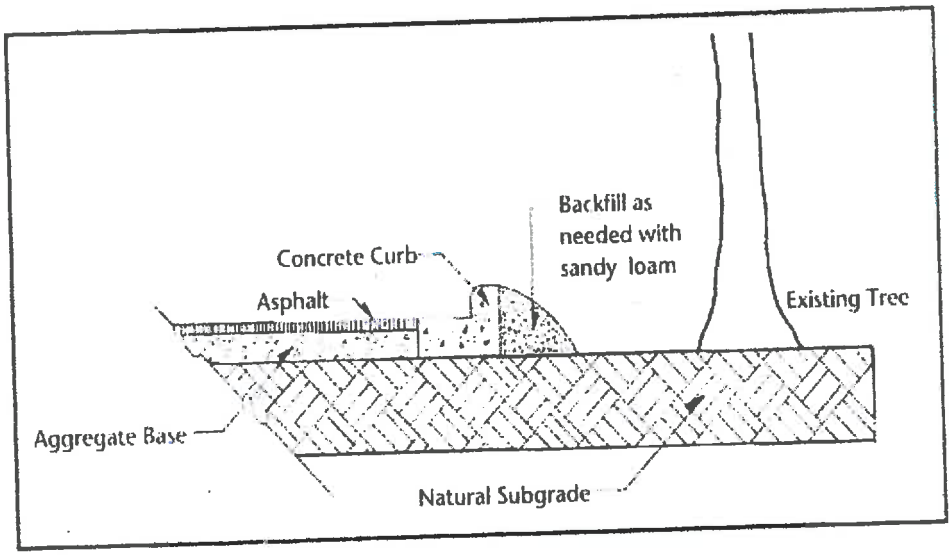

Diagram 3. The 'no dig' style places the pavement section on top of the natural existing grade. This can reduce root disturbance and compaction. Extra reinforcing in the pavement and use of geotextile under the base material can be used to increase the stability of the pavement (Matheny & Clark, 1998).

Permeable pavements are particularly useful where a hard surface is required in close proximity to trees and other planting as water flow and aeration to roots can be maintained. There are a number of materials that are suitable for the purpose, such as hydroston pavement systems (http://hydroston.com.au).

Diagram 4 shows indicative profile for a porous pavement.