

ADVANCED TREESCAPE CONSULTING
AQF5 ARBORICULTURIST & HORTICULTURIST

☎ 02 4340 2964 ☎ 0408 439 186 ✉ advancedtreescape@bigpond.com

📦 PO Box 7192 KARIONG NSW 2250

ABN: 30 138 200 388



ARBORICULTURAL TREE HEALTH & HAZARD ASSESSMENT

[2018 update]

**TreeTop Adventure Park
Yarra Flats
IVANHOE EAST VIC 3079**

**requested by
Ecoline Pty Ltd**

**prepared by
Russell Kingdom
Qualified AQF5 Arboriculturist**

31/08/2018

Principal: Russell Kingdom

Fully Insured: Public Liability \$20M, Professional Indemnity \$5M & Personal Accident.

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1.0 Proposal

Advanced Treescape Consulting was commissioned to assist with the establishment of TreeTop Adventure Park in Yarra Flat. Frederic Galimard contacted Advanced Treescape Consulting after permission was given by Parks Victoria to develop the area of land for a TreeTop Adventure Park.

1.1 Background

Advanced Treescape Consulting inspected the site to assess the suitability of trees selected to have apparatus erected on them. Some trees that were initially selected were considered unsuitable for the use required of them. Other trees that were in close proximity were selected. All trees used within the park are more than able to cope with the apparatus that will be attached and their function within the park. The apparatuses are to be attached to the trees using a method utilized in three other TreeTop Adventure Parks in NSW. There is not a single locating nail or bolt used in the entire park, which in turn should have a very low impact on the individual trees used for each piece of apparatus.

2.0 Method of Assessment

An objective visual inspection was made from the ground of the health and condition of the trees based on the Levels of Visual Assessment method (Appendix 6a) – ‘Level 2: Basic Assessment Process’ International Society of Arboriculture (ISA) (Dunster, et al., 2013) as well as the *Visual Tree Assessment* (VTA) technique described by Mattheck and Breloer (Mattheck, et al., 1994), (Appendix 6b). The Tree Schedule (provided in Appendix 3) was based upon:

- Visual inspection of tree crowns by binoculars.
- Assessment of soil compaction by an 8mm x 400mm steel spike pushed by hand vertically into the ground.
- All photographs that appear in this report are unaltered originals which were taken during site inspection (see Appendix 2).
- Estimation of tree heights by Silva Clinomaster/Heightmeter™ plus visual estimates of canopy spreads.
- Distances of trees, etc. are measured using a Leica Disto™ D2 Laser Distance Meter.
- Code Explanations (Appendix 4).
- Safe & Useful Life Expectancy (SULE) (Appendix 7).
- Glossary (Appendix 8).

This information has guided the conclusions in this report.

This assessment has been carried out by Russell Kingdom: Diploma in Arboriculture (AQF5), Graduate Diploma of Horticulture (AQF8) - Australian Qualification Framework (AQF)ⁱ (Department of Education and Training, Australian Government) (see Appendix 10).

3.0 Site Inspection

The subject site was initially inspected in 19/02/2010 and then reinspected on 28/10/2013.

The map in Appendix 1a and 1b illustrates the location of all surveyed trees and reference numbers.

The site is located on natural and reclaimed land in the Yarra Flats. It has a naturally occurring slope from the south to the north.

The site is located within the Banyule Planning Scheme.

Schedule 1 to the Environmental Significance Overlay (ESO), referred to as ESO 1 – Yarra River, Plenty River and Darebin Creek. Information required for ESO 1 will be addressed by the project ecologist.

Schedule 4 to the ESO, referred to as ESO 4 – Significant Trees and Areas of Vegetation. Information required for ESO 4 are addressed in this report.

Schedule 1 to the Significant Landscape Overlay (SLO), referred to as SLO 1 – Yarra (Birrarung) River Corridor Environs. Information required for SLO 1 are addressed in this report.

The site has been previously used for various purposes including mining, walking and mountain biking. Currently the site appears to be bush.

The site has access from the Park Access Road and there is a large carpark at the site.



3.1 Site Assessment

- The microclimate of the site is excellent as all trees have been able to grow to their genetic potential.
- There are no re-reflected heat load issues as the carpark is located to the south of the trees used in the Adventure Park.
- Sunlight levels on the site are not affected.
- There is currently no irrigation and there has previously been no irrigation on the site.
- The site is exposed to all winds. The area would be susceptible to wind damage. The most likely trees to be damaged by winds would be those located on the edge of the stand of trees. This is called edge effect.
- Some of the site becomes flooded by increases in Yarra River levels.
- There are noxious weeds growing around the trees identified for use within the TreeTop Adventure Park (see clause 3.3 'Other Soil Considerations' for more details)

3.1.1 Discussion of Site Assessment

The site conditions allow all vegetation to achieve its genetic potential.

Re-reflected heat load issues caused by the carpark would only affect trees located on the edge of the carpark. Established trees should have minimal impact from the re-reflected heat loads. Establishment of new plantings in this area would be more difficult than usual.

Noxious weeds will need to be removed from around the trees used in the course for access by staff to construct the course.

3.2 Soil Factors

The soil texture was sandy loam. Drainage characteristics are good due to the soil type.

3.3 Other Soil Considerations

- There has been soil disturbance on some of the site to the north as fill soils have been used.
- There is no damage to any tree roots as the trees grew after fill soils deposited.
- There are many weeds visible on site e.g. *Tradescantia fluminensis* (Weeping Jew), *Rubus fruticosus* (Blackberry), *Celtis sinensis* (Japanese Hackberry), *Acer negundo* (Box Elder) and *Onopordum acanthium* (Scotch Thistle) and others.
- There is no salt injury, soil erosion or evidence of soil contamination.
- There was no usage that would compact the soil in the site.
- No compaction was detected.

4.0 Tree Schedule

Appendix 3 summarises existing trees upon the site in terms of species, height and canopy spread, structural condition, health, hazard rating and Safe and Useful Life Expectancy (SULE).

The trees contained within the Tree Schedule all have long SULEs. These trees also have low hazard ratings.

4.1 Comments on VTA and Recommendations of Impact by Proposed Plans

Please note that this assessment and related VTA assessments are based upon health and condition that were observed at the time of inspection.

Accepted tree management practices recommend removal of trees where SULE ratings are 3 or 4, and/or where hazard ratings are high [where ratings adapted from Matheny and Clark (Matheny, et al., 1994) range from low=3 to dangerous=12]. A detailed explanation of SULE ratings is provided in Appendix 4. Height/Diameter Ratio should not exceed 1:30 (Mattheck, et al., 1994).

GREEN COURSE

Tree 24 is a *E. camaldulensis* (River Red Gum). This tree is young mature, in good health and structural condition. There is small deadwood present and some trunk lesions. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 25 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and fair structural condition. There is an inclusive main fork union, small deadwood and a tropism to the East.

- **The office deck is located within the TPZ of this tree. Refer to section 6.0 'Guidelines for Design' for information regarding impacts.**
- **Upright leader of inclusive fork union only to be used. It is suitable for retention and proposed use.**

Tree 26 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There are small trunk wounds (scars?). It passes the VTA. Hazard rating is 6. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 27 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 28 is an *Acacia spp.* This tree is very mature, in good health and structural condition. There is an inclusive main fork union and large deadwood present in the crown. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 29 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. This tree has a 3° trunk lean to the south and there is some small deadwood. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 30 is a *E. camaldulensis* (River Red Gum). This tree is very mature, co-dominant, in good health and structural condition. There is a habitat site at 10 metres up the trunk. The tree is located on a bank. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 31 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and an old trunk wound. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 32 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. There are minor bark cracks. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 33 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. There are minor bark cracks. There is an inclusive fork union above the apparatus. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

BLUE COURSE

Tree 1 is a *Eucalyptus camaldulensis* (River Red Gum). This tree is mature, in good health and very good structural condition. It is co-dominant at 6 metres. There is small deadwood, epicormics and a previous failure site. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **The office deck is located within the TPZ of this tree. Refer to section 6.0 'Guidelines for Design' for information regarding impacts.**
- **Removal of deadwood required. It is suitable for retention and proposed use.**

Tree 34 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is some small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 3 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 36 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 38 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and a hanger in the crown. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 41 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. It has small and large deadwood. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 42 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. It has small deadwood and trunk lesions. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 47 is a *E. camaldulensis* (River Red Gum). This tree is mature, co-dominant in good health and structural condition. There is a 5° trunk lean to the west and small deadwood present. The big leader is being used. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 48 is a *E. camaldulensis* (River Red Gum). This tree is mature, co-dominant, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 49 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and fair structural condition. There is a failure at 4 metres, decay, termites and an unbalanced canopy. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **Removal of deadwood is required, and the wound requires an inspection. The tree is acceptable for apparatus. It is suitable for retention and proposed use.**

Tree 50 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. There is small deadwood and a previous failure site. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 51 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 52 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is a tropism to the east, a previous failure site and trunk lesions. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

RED COURSE

Tree 1 is a *Eucalyptus camaldulensis* (River Red Gum). This tree is mature, in good health and very good structural condition. It is co-dominant at 6 metres. There is small deadwood, epicormics and a previous failure site. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **The office deck is located within the TPZ of this tree. Refer to section 6.0 'Guidelines for Design' for information regarding impacts.**
- **Removal of deadwood required. It is suitable for retention and proposed use.**

Tree 9 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and very good structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 12 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 10 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 15 is a *E. camaldulensis* (River Red Gum). This tree is very mature, co-dominant, in good health and structural condition. There is small deadwood present and weed species. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 16 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is a trunk lean 20° to the south which is natural, the canopy is unbalanced and there is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **Removal of deadwood is required. It is suitable for retention and proposed use.**

Tree 17 is a *E. camaldulensis* (River Red Gum). This tree is very mature, co-dominant, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 18/19 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and weed species. 2 x apparatus in the same tree. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 20 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is large and small deadwood present, big roots visible and is on the edge of the swamp. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 20A is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. Habitat site. This is a reserve spare tree which may not be used. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 21 is a *E. camaldulensis* (River Red Gum). This tree is very mature, co-dominant, in good health and structural condition. There is a habitat site at 10 metres up the trunk. The tree is located on a bank. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 22 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and weed species. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 23 is a *E. camaldulensis* (River Red Gum). This tree is mature, co-dominant, in good health and structural condition. There is a tropism to the north. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 41 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. It has small and large deadwood. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 46 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 45 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and fair structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of deadwood is required. It is suitable for retention and proposed use.**

BLACK COURSE

Tree 1 is a *Eucalyptus camaldulensis* (River Red Gum). This tree is mature, in good health and very good structural condition. It is co-dominant at 6 metres. There is small deadwood, epicormics and a previous failure site. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **The office deck is located within the TPZ of this tree. Refer to section 6.0 'Guidelines for Design' for information regarding impacts.**
- **Removal of deadwood required. It is suitable for retention and proposed use.**

Tree 12 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 10 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 9 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and very good structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 53 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. There is an inclusive fork union and small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 54 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and fair structural condition. There is a hollow at 3 metres and small deadwood present.

- **It is suitable for retention and proposed use.**

Tree 55 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. There is a tropism to the south. There is leaf damage and evidence of chewing mouthpiece insects present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 56 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 57 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There are epicormic shoots present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 58 is a *E. camaldulensis* (River Red Gum). This tree is young mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 42 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. It has small deadwood and trunk lesions. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 43 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and fair structural condition. There is a failure at 4 metres, decay, termites and an unbalanced canopy. It passes the VTA. Hazard rating is 4. SULE is 1B.

- **Removal of deadwood is required, and the wound requires an inspection. The tree is acceptable for apparatus. It is suitable for retention and proposed use.**

Tree 49 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and fair structural condition. There is a failure at 4 metres, decay, termites and an unbalanced canopy. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **Removal of deadwood is required, and the wound requires an inspection. The tree is acceptable for apparatus. It is suitable for retention and proposed use.**

Tree 44 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is a tropism to the south. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

ORANGE COURSE

Tree 3 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 4 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 7 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and weed species. It passes the VTA. Hazard rating is 6. SULE is 2D.

- **Remove hanging branch and inspect failure site. It is suitable for retention and proposed use (after inspection and work completed).**

Tree 8 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. The trunk has a natural lean 3° to the north and small deadwood present. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 6 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. The trunk leans 3° to the east and small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 1 is a *Eucalyptus camaldulensis* (River Red Gum). This tree is mature, in good health and very good structural condition. It is co-dominant at 6 metres. There is small deadwood, epicormics and a previous failure site. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **The office deck is located within the TPZ of this tree. Refer to section 6.0 'Guidelines for Design' for information regarding impacts.**
- **Removal of deadwood required. It is suitable for retention and proposed use.**

PURPLE COURSE

Tree 5 is a *E. camaldulensis* (River Red Gum). This tree is young mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 9 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and very good structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 58 is a *E. camaldulensis* (River Red Gum). This tree is young mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 10 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 11 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and the canopy is unbalanced. The tree is located on a bank. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 13/14 is an *E. camaldulensis* (River Red Gum). This tree is very mature, co-dominant, in good health and structural condition. It has a trunk lean 8° to the south and small deadwood present. It passes the VTA. Hazard rating is 6. SULE is 1B.

- **Removal of deadwood is required. It is suitable for retention and proposed use.**

Tree 15 is a *E. camaldulensis* (River Red Gum). This tree is very mature, co-dominant, in good health and structural condition. There is small deadwood present and weed species. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**

Tree 16 is a *E. camaldulensis* (River Red Gum). This tree is very mature, in good health and structural condition. There is a trunk lean 20° to the south which is natural, the canopy is unbalanced and there is small deadwood present. The tree is located on a bank. It passes the VTA. Hazard rating is 6. SULE is 2B.

- **Removal of deadwood is required. It is suitable for retention and proposed use.**

Tree 12 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**

Tree 1 is a *Eucalyptus camaldulensis* (River Red Gum). This tree is mature, in good health and very good structural condition. It is co-dominant at 6 metres. There is small deadwood, epicormics and a previous failure site. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **The office deck is located within the TPZ of this tree. Refer to section 6.0 'Guidelines for Design' for information regarding impacts.**
 - **Removal of deadwood required. It is suitable for retention and proposed use.**
-

YELLOW COURSE

Tree 3 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**
-

Tree 4 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**
-

Tree 35 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, co-dominant in good health and structural condition. There is some small deadwood present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of deadwood is required. It is suitable for retention and proposed use.**
-

Tree 37 is an *Acacia spp.* This tree is very mature, in good health and structural condition. There is an inclusive fork union at 6m and small deadwood present. It passes the VTA. Hazard rating is 5. SULE is 2B.

- **It is suitable for retention and proposed use.**
-

Tree 38 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and structural condition. There is small deadwood present and a hanger in the crown. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **It is suitable for retention and proposed use.**
-

Tree 39 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of weed species around the trunk is required. It is suitable for retention and proposed use.**
-

Tree 40 is a *E. camaldulensis* (River Red Gum). This tree is a young mature, in good health and structural condition. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of deadwood is required. It is suitable for retention and proposed use.**
-

Tree 2 is a *E. camaldulensis* (River Red Gum). This tree is mature, in good health and fair structural condition. There is an inclusive main fork union, the leader has an anti-clockwise twist, small deadwood and epicormics present. It passes the VTA. Hazard rating is 4. SULE is 2B.

- **Removal of deadwood required. Apparatus will need to be erected below the inclusive main fork union. It is suitable for retention and proposed use.**
-

4.2 Existing Tree Problems

There are a few selected trees with minor problems visible. There will be some minor branch removal required. All branches to be removed are less than 100mm in diameter.

The works will be minor pruning of vegetation to maintain or improve its health or appearance.

The required works would be covered as specified in '3.0 Permit requirement - To the pruning of vegetation to maintain or improve its health or appearance' in the Banyule Planning Scheme, Schedule 4 -To the Environmental Significance Overlay, referred to as ESO 4 - Significant Trees and Areas of Vegetation.

Each tree that does have a small problem has been carefully inspected and is considered to pose an acceptable level of risk despite the visual defects.

Details of individual tree problems are listed in the comments section of the Tree Schedule (Appendix 3).

4.2.1 Future Problems with the Trees

With apparatus attached to trees there is always the possibility of future problems with trees. To manage this issue, it is recommended that the trees are inspected annually and carefully detail the health and condition of the tree, and the area, where the apparatus was attached to the trunk of the tree.

The assessment needs to detail if there is any-

- cambial reaction wood growing,
- areas of dieback within the crown,
- any pathogen attacks,
- has the apparatus caused any conditions that have allowed for an insect attack?
- any other issues

Once the inspection is completed and carefully photographed, the apparatus should be re-installed at a place that was pre-determined from the inspection. It may be necessary that every 3 years all apparatus' may need to be moved either up or down on the tree trunks. This would ensure that the point of contact (of apparatus) is not weakened and cause an increased level of risk of failure due to the apparatus.

These inspections need to be carried out regularly, well documented and at the end of every 3 years we then need to compile all the results. This works would be most useful for affixing various types of apparatus to trees I am very impressed with its application and lack of impact on the trees compared to other methods which use shackles and bolts drilled through the centre of the tree.

Extra inspections should also be carried out after severe weather events.

4.2.2 Remedial or Beneficial Work Recommended

The majority of beneficial work recommended is the removal of deadwood. These works need to be completed preferably prior to the opening of the Park to the public.

4.3 Environment Considerations

A) TREE REMOVAL

No trees have to be removed for the construction and there will be minimal environmental impact due to the activities of the TreeTop Adventure Park in the immediate area.

B) WEED SPECIES

The weed species on the site include *Tradescantia fluminensis* (Weeping Jew), *Rubus fruticosus* (Blackberry), *Celtis sinensis* (Japanese Hackberry), *Acer negundo* (Box Elder) and *Onopordum acanthium* (Scotch Thistle) and others. These weeds should be managed.

C) BANYULE PLANNING SCHEME (ESO4)

Banyule Planning Scheme, Schedule 4 -To the Environmental Significance Overlay, referred to as ESO 4 - Significant Trees and Areas of Vegetation.

The establishment of the TreeTop Adventure Park will not require the removal, destruction, or the lopping of significant trees or areas of vegetation as specified in this report to establish the park.

The only works to the trees that will be required will be the removal of deadwood and possibly the removal of a small branch that would be in the line of sight of the course. The trees within the course have been detailed in the tree schedule (Appendix 3) as well as any works that is required.

The required works would be covered as specified in '3.0 Permit requirement - To the pruning of vegetation to maintain or improve its health or appearance' of the above-mentioned document referred to as ESO 4. This would adequately describe any works that were required within the proposed course.

D) SCHEDULE TO THE SIGNIFICANT LANDSCAPE OVERLAY OF THE YARRA (BIRRARUNG) RIVER CORRIDOR ENVIRONS.

The establishment of the TreeTop Adventure Park will not require the removal, destruction, or lopping of significant trees, or area of vegetation, as specified in '3.0 Permit requirement - To the pruning of vegetation to maintain or improve its health or appearance' of the above-mentioned document referred to as ESO 4.

The only works that these trees will require will be the removal of deadwood, and possibly the removal of a small branch that would be in the line of sight of the course.

The trees within the course have been detailed in the tree schedule (Appendix 3) as well as any works that are required. The works that would be required are covered in point 1 'To the pruning of vegetation to maintain its health or appearance' in '3.0 Permit requirement - To the pruning of vegetation to maintain or improve its health or appearance' of the above-mentioned document referred to as ESO 4. This adequately describes any works that were required within the proposed course.

5.0 Impacts on Tree Health & Stability Due to Construction of Apparatus

Impact on tree health and stability will be addressed with the inspection and assessment of the trees annually.

Due to the TreeTop Adventure Park's commercial activities there will be compaction on the footpath/trails through the site. This could be managed if there was some leaf mulch, woodchip mulch or gravels spread onto the ground surface. Path construction is to be guided by Parks Victoria's guidelines.

All of the climbing courses will have paths located in close proximity to the climbing apparatus. The paths are not yet constructed.

6.0 Guidelines for Design

Any new apparatus to be installed on trees should comply with existing methods (see Appendix 2: Photographs).

Tree 1

This tree has an important role to play in the proposed TreeTop Adventure Park course. It is used in the blue, red and black courses as the starting tree. Due to the multiple course usage, having a tree with a raised timber deck around it will be of great benefit to the tree because it will stop compaction of the soil from the clients using each of these courses.

The proposed site office deck will be constructed on piers from Cyprus timber and will have gaps between boards.

This method of construction will have an acceptable low inground impact on the subject tree as the excavation for the piers can be supervised by the project arborist and moved to accommodate any roots >50mm that may be located. The structure will allow water to flow between the decking boards onto the tree's root plate. It must be noted that there needs to be a gap of at least 100mm between the trunk of the tree and the Cyprus timber deck boards. These works will have an acceptable impact on this tree.

The deck for the office will be located over the TPZ of Tree 1 and within the TPZ of Tree 25. The project arborist is to be onsite during any inground works/excavation within the TPZ of Tree 1 and Tree 25.

Refer to Appendix 1a: Site Plan for Deck (Elevation View), Appendix 1b: Site Plan for Deck (Plan View) for deck details.

6.1 Tree Protection Zones

TPZs are not required.

7.0 Tree Works

- All trees to be retained will require some remedial work in the future such as crown clean-up and dead-wooding.
- All tree work is to be carried out by a suitably qualified and insured Arborist (AQF3).
- Any crown reduction/management works required must comply with AS 4373-2007 Pruning of amenity trees (Australian Standard®, 2007).

8.0 Risk Management

All trees in the park are assessed for their suitability for use for apparatus attachment.

The trees on site need to be managed, to deliver an acceptably low level of risk and enjoyable environment for clients. The flow chart (Appendix 9) has been developed to fulfil 'Duty of Care' obligations and provide a simple criterion to assess if a tree needs to be removed or action is needed to be taken to abate a hazardous situation.

Any tree failure will need to have the Flow Chart criteria applied to them.

Notes on each box within Flow Chart (Appendix 9)

- **Report of Tree Problem** - by staff or public.
- **Locate and Inspect Tree, Assess and Secure Area (CLOSE COURSE)** - if needed.
 - If tree damage includes structural scaffold branch, trunk or roots, contact Consultant Arborist immediately.
 - If branch damage or deadwood, contact Tree Worker
- **Note Details in Database and Advise Manager** – (Action taken: tree worker, Consultant Arborist contacted & when) – This is important information, especially if there is injury or damage.
 - Implement advice of consultant arborist *OR*
- **Can Tree Work fix problem?**
- **Yes** → Do works and note details of works then reopen course
- **No** → Contact Consultant Arborist
 - Apply the recommendations & note details
 - Keep course closed until consultant arborist deems the subject area poses an acceptable level of risk
 - Then reopen Course

NOTE: The cost of tree management for its life is minimal when compared to a day in court!

9.0 Recommendations

- a) Selected trees are to be monitored annually. The monitoring will require the removal of the apparatus from the trunks of the trees, carefully assess the trunk for any form of damage, defect or reaction to the apparatus. Detail the observations and reinspect the same trees annually.
- b) Any increases in the number of apparatus should have a Consultant Arboriculturist contacted before the new apparatus is installed on any trees.
- c) The paths through the park should comply with Parks Victoria guidelines and continue to have the mulch spread on them. This will greatly assist with the reduction of compaction in the footpaths.
- d) The trees will need to be inspected after any severe weather events.
- e) Tree work is to be carried out by a suitably qualified, insured Arborist.
- f) Recommendations as stated in 4.0, 4.1, 4.2, 4.2.1, 4.2.2, 4.2.3, 4.3, 5.0, 6.0, 6.1, 7.0 and Appendix 3 are to be implemented.

10.0 Conclusions

The TreeTop Adventure Park has been carefully developed from its initial stages right through to the opening of the park. Best practice in Tree Assessment and apparatus application to trees has been employed. Regular monitoring of all trees is the best form of Risk Management. In the event of a failure the Flow Chart (Appendix 9) is applied.

The Banyule Planning Scheme's – Schedule 1 To the Significant Landscape Overlay, referred to as SLO 1 and Schedule 4 To the Environment Significance Overlay, referred to as ESO 4.

Both schedules have been applied to the proposed TreeTop Adventure Course. The necessary works to establish the various courses do not require permits.

The impact of the office and associated deck will have an acceptable impact on all trees located nearby.

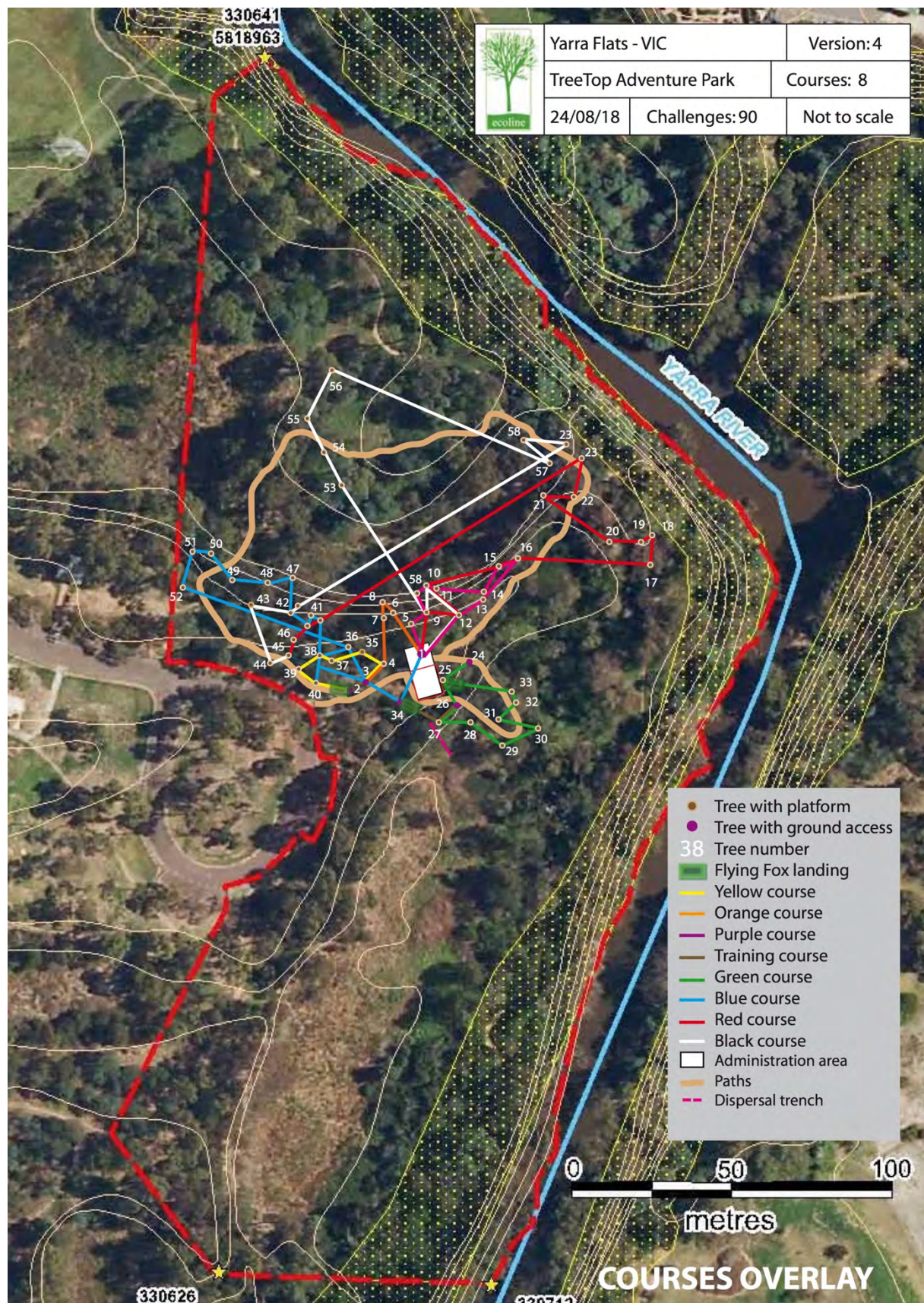
The TreeTop Adventure Park has been well thought out and the management, construction and risk management for the entire set up is impressive.



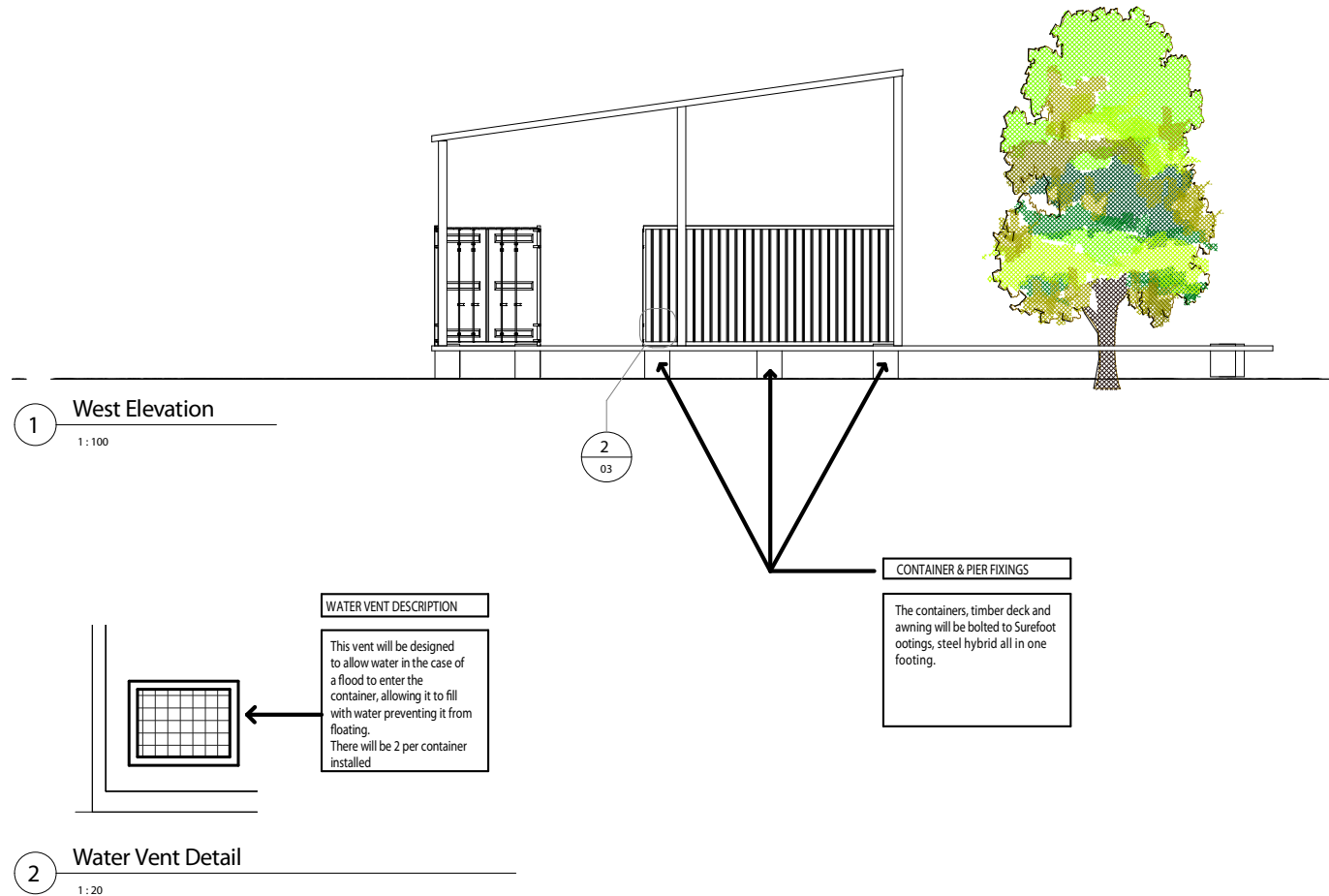
Russell Kingdom
Arboriculturist & Horticulturist

MIACA MAIH MAA
Diploma of Arboriculture (AQF5) | Graduate Diploma of Horticulture (AQF8)

Appendix 1: Site Plan

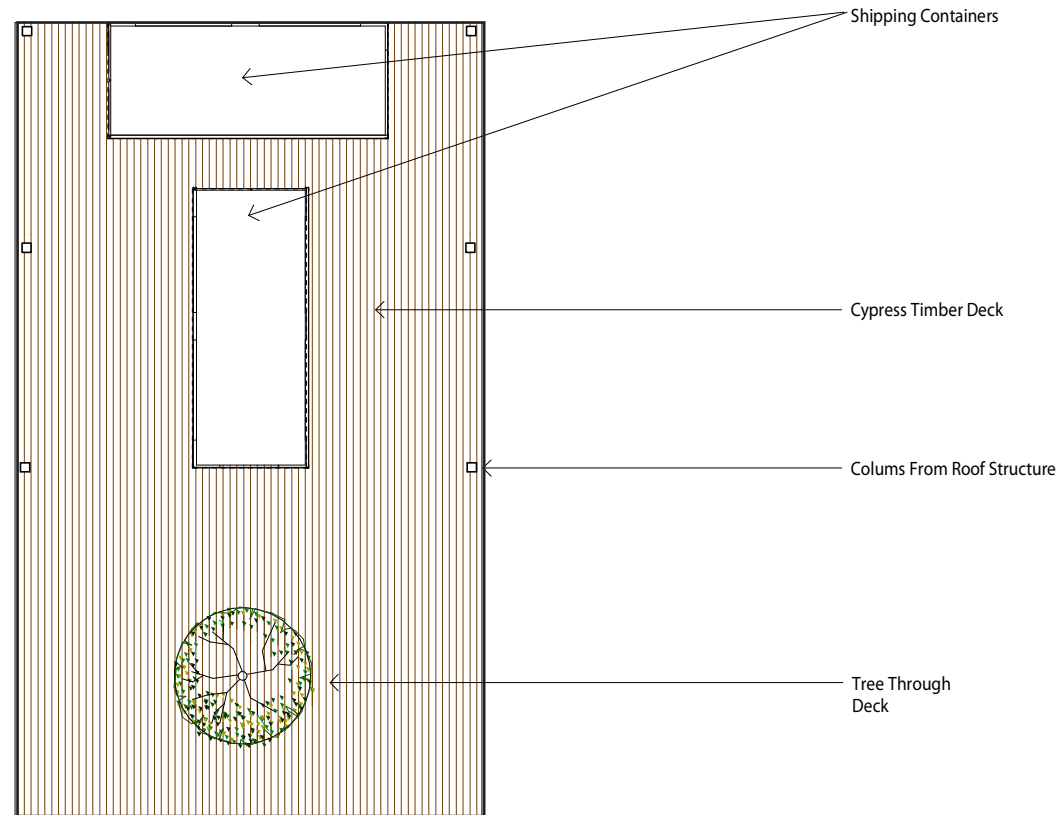


Appendix 1a: Site Plan for Deck (Elevation View)



Issued by	Revision Number	Revision Description	Date	Building Designer	DISCLAIMER	NOTES	Legend	Client	Sheet Name :	Scale	As Indicated
				Josh Clarke	THESE DRAWINGS ARE PRELIMINARY DRAWINGS AND ARE SUBJECT TO CHANGE WITHOUT NOTICE DURING THE COURSE OF THE PROJECT. THE BUILDING DESIGNER DOES NOT CONSTITUTE A REPRESENTATION OR WARRANTY BY THE BUILDING DESIGNER AS TO THE ACCURACY OF THE INFORMATION PROVIDED HEREIN. THE BUILDING DESIGNER SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS IN THE DRAWINGS OR FOR ANY CONSEQUENCES ARISING FROM THE USE OF THE DRAWINGS. THE BUILDING DESIGNER SHALL NOT BE RESPONSIBLE FOR ANY CONSEQUENCES ARISING FROM THE USE OF THE DRAWINGS.	ALL WORK SHOULD CONFORM TO THE CONTRACT DOCUMENTS WHICH INCLUDE SPECIFICATIONS, THE DRAWINGS, ALL ADDENDUMS, TENDERS, SCHEDULES AND MODIFICATIONS ISSUED BY THE BUILDING DESIGNER. THE GENERAL CONTRACTOR SHALL REVIEW ALL DOCUMENTS AND VERIFY ALL DIMENSIONS AND FIELD CONDITIONS AND SHALL CONFIRM THAT WORK IS BUILDABLE. ALL DIMENSIONS AND FIELD CONDITIONS SHALL BE IMMEDIATELY REPORTED TO THE BUILDING DESIGNER FOR CLARIFICATION PRIOR TO THE PERFORMANCE OF ANY WORK IN QUESTION. ALL THE CONSTRUCTION DRAWINGS SHALL BE READ IN CONNECTION WITH ALL CONSULTANTS AND CONTRACTOR DRAWINGS, SCHEDULES AND SPECIFICATIONS. IN CASE OF CONFLICT BETWEEN BUILDING DESIGNER AND CONSULTANTS DRAWINGS IN LOCATIONS, STRUCTURES, EQUIPMENT, MATERIALS, THE BUILDING DESIGNER SHALL BE RESPONSIBLE FOR CLARIFICATION PRIOR TO PROCEEDING WITH CONSTRUCTION. DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS GOVERN PARTITION LOCATIONS, DIMENSIONS AND TYPES. IN CASE OF CONFLICT, NOTIFY THE BUILDING DESIGNER OR WRITTEN CLARIFICATION PRIOR TO PROCEEDING OR COMMENCEMENT OF CONSTRUCTION.	CONCEPT DESIGN PROPOSAL	TREETOPS Project Address YARRA FLATS, VIC Project Discription SITE OFFICE	Elevations Amendment : A	Date : 20/09/2018 Drawing Number : Commencement Date :	

Appendix 1b: Site Plan for Deck (Plan View)



1 02 Timber Deck Level
1 : 100

Issued by	Revision Number	Revision Description	Date

Building Designer

Josh Clarke

DISCLAIMER

"THESE DRAWINGS ARE PRELIMINARY DRAWINGS AND ARE SUBJECT TO CHANGE WITHOUT NOTICE DURING THE COURSE OF THE PROPOSED DEVELOPMENT AND IN CONSULTATION WITH COUNCIL. SUBMISSION OF THE DRAWINGS DOES NOT CONSTITUTE A REPRESENTATION OR WARRANTY BY THE DEVELOPER OR ITS SERVANTS, AGENTS OR CONTRACTORS THAT THE PROPOSED DEVELOPMENT WILL TAKE PLACE IN ACCORDANCE WITH THESE DRAWINGS."

BEFORE CARRYING OUT ANY WORK ENSURE THAT THE DRAWINGS USED CARRY THE LATEST AMENDMENTS NO.

NOTES

ALL WORK SHOULD CONFORM TO THE CONTRACT DOCUMENTS WHICH INCLUDE SPECIFICATIONS, THE DRAWINGS, ALL ADDENDUMS, FINISHES, SCHEDULES AND MODIFICATIONS ISSUED BY THE BUILDING DESIGNER.

THE GENERAL CONTRACTOR SHALL REVIEW ALL DOCUMENTS AND VERIFY ALL DIMENSIONS AND FIELD CONDITIONS AND SHALL CONFIRM THAT WORK IS BUILDABLE AS SHOWN. ANY CONFLICTS OR OMISSIONS, ETC. SHALL BE IMMEDIATELY REPORTED TO THE BUILDING DESIGNER FOR CLARIFICATION PRIOR TO THE PERFORMANCE OF ANY WORK IN QUESTION.

DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS GOVERN PARTITION LOCATIONS, DIMENSIONS AND TYPES. IN CASE OF CONFLICT, NOTIFY THE BUILDING DESIGNER OR WRITTEN CLARIFICATION PRIOR TO PROCEEDING OR COMMENCEMENT OF CONSTRUCTION.

Legend

CONCEPT DESIGN PROPOSAL

Client

TREETOPS
Project Address
YARRA FLATS, VIC
Project Description
SITE OFFICE

Sheet Name :

Site Plan
Amendment :
A

Scale 1 : 100

Date : 20/09/18
Drawing Number :
Drawing Status :
Commencement Date :

Appendix 2: Photographs - Examples of Apparatus to be used



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10

Appendix 3 Tree Schedule

ABBREVIATIONS: m-metres, mm-millimetres, DBH-trunk diameter @ 1.4m, DGL-trunk diameter at ground level, VP-very poor, P-poor, F-fair, G-good, VG-very good, CD-co-dominant trunk, TD-tri-dominant trunk, QD-4x trunk, TL-trunk lean, TW-trunk wound, Insp-inspect, L-longicorns, E-epicormics, FA-forest architecture, FR-Forest Remnant, dw-deadwood small, DW-deadwood large, TDB-tip dieback, PFS-previous failure site, RFS-recent failure site, BEW-branch end weight, MTU-multi tree union, MFU-main fork union, IFU-inclusive fork union, IMFU-inclusive main fork union, IMBU-inclusive main branch union, MBA-Multiple branch attachments, FB-fruiting body, BF-bracket fungus, U/C-under canopy, Decl-declining, bor-borers, PD-parrot damage, LD-leaf damage, CMP-chewing mouth piece, RW-reaction wood, H/D-Height/Diameter ratio test (Mattheck 2004), J-juvenile, YM-young mature, SM-semi mature, M-mature, OM-over mature, HFP-high failure potential, D-dangerous, VD-very dangerous, X-no room to grow/unsuitable, H-habitat, HB-habitat box, Rec-recommendation, S-save, R-remove, T-transplant, C-council determination, W-work needed to be carried out, mon-monitor, TPO-tree preservation order, VTA (P-pass, F-fail) **Hazard Rating-3**=low hazard, **12**=dangerous, **N/A**=not applicable, **SULE**=Safe & Useful Life Expectancy.

Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m)				Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
GREEN COURSE																		
24	<i>Eucalyptus camaldulensis</i> (River Red Gum)	16	390	450	4.8	2.4	G	G	3	3	3	3	YM	dw, trunk lesions, good callus.	P	4	2B	S
25	<i>E.camaldulensis</i> (River Red Gum)	16	540	750	6.6	2.9	G	G	4	6	3	10	M	IMFU, dw, tropism to E, Note: use upright leader only.	P	4	2B	S
26	<i>E.camaldulensis</i> (River Red Gum)	16	800	1070	9.6	3.4	G	G	10	6	6	7	VM	small TWs (scars?).	P	4	2B	S
27	<i>E.camaldulensis</i> (River Red Gum)	21	420	510	5.1	2.5	G	G	4	4	2	6	M	dw.	P	4	2B	S
28	<i>Acacia spp.</i>	14	410	500	5.1	2.5	G	G	4	4	4	4	VM	IFU, DW in crown.	P	4	2B	S
29	<i>E.camaldulensis</i> (River Red Gum)	21	CD 900 700 (1140)	1400	13.8	3.8	G	G	10	10	10	4	VM	3° TL to the south, dw.	P	4	2B	S
30	<i>E.camaldulensis</i> (River Red Gum)	20	370	460	4.5	2.4	G	G	10	6	8	8	M	Lesions in trunk and crown, DW, LDCMP.	P	6	2B	S
31	<i>E.camaldulensis</i> (River Red Gum)	23	510	620	6.3	2.7	G	G	4	4	4	4	M	IFUs, dw, old TW, good callus.	P	4	2B	S
32	<i>E.camaldulensis</i> (River Red Gum)	18	250	330	3.0	2.1	G	G	3	3	3	3	YM	Minor bark cracks.	P	4	2B	S
33	<i>E.camaldulensis</i> (River Red Gum)	17	360	450	4.5	2.4	G	G	3	3	3	3	YM	Minor bark cracks. IFU above apparatus.	P	4	2B	S

ABBREVIATIONS: m-metres, mm-millimetres, DBH-trunk diameter @ 1.4m, DGL-trunk diameter at ground level, VP-very poor, P-poor, F-fair, G-good, VG-very good, CD-co-dominant trunk, TD-tri-dominant trunk, QD-4x trunk, TL-trunk lean, TW-trunk wound, Insp-inspect, L-longicorns, E-epicormics, FA-forest architecture, FR-Forest Remnant, dw-deadwood small, DW-deadwood large, TDB-tip dieback, PFS-previous failure site, RFS-recent failure site, BEW-branch end weight, MTU-multi tree union, MFU-main fork union, IFU-inclusive fork union, IMFU-inclusive main fork union, IMBU-inclusive main branch union, MBA-Multiple branch attachments, FB-fruited body, BF-bracket fungus, U/C-under canopy, Decl-declining, bor-borers, PD-parrot damage, LD-leaf damage, CMP-chewing mouth piece, RW-reaction wood, H/D-Height/Diameter ratio test (Mattheck 2004), J-juvenile, YM-young mature, SM-semi mature, M-mature, OM-over mature, HFP-high failure potential, D-dangerous, VD-very dangerous, X-no room to grow/unsuitable, H-habitat, HB-habitat box, Rec-recommendation, S-save, R-remove, T-transplant, C-council determination, W-work needed to be carried out, mon-monitor, TPO-tree preservation order, VTA (P-pass, F-fail) **Hazard Rating-3**=low hazard, **12**=dangerous, **N/A**=not applicable, **SULE**=Safe & Useful Life Expectancy.

Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m) N S E W	Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
BLUE COURSE															
1	<i>E.camaldulensis</i> (River Red Gum)	18	940	1150	11.4	3.5	G	VG	6 10 10 8	M	dw, CD@6m, E, Pfs, W-R.	P	5	2B	S
34	<i>E.camaldulensis</i> (River Red Gum)	17	410	500	5.1	2.5	G	G	3 4 2 3	M	dw.	P	4	2B	S
3	<i>E.camaldulensis</i> (River Red Gum)	14	390	590	4.8	2.7	G	G	4 4 4 4	M	dw.	P	4	2B	S
36	<i>E.camaldulensis</i> (River Red Gum)	14	590	840	7.2	3.1	G	G	4 6 4 7	M	dw.	P	4	2B	S
38	<i>E.camaldulensis</i> (River Red Gum)	14	390	480	4.8	2.5	G	G	4 6 4 4	M	dw, hanger in crown.	P	4	2B	S
41	<i>E.camaldulensis</i> (River Red Gum)	15	TD 380	750	4.8	2.9	G	G	4 4 4 4	M	dw, DW.	P	4	2B	S
42	<i>E.camaldulensis</i> (River Red Gum)	16	CD 500 580 (770)	1090	9.3	3.4	G	G	6 4 4 8	M	dw, trunk lesions, good callus.	P	4	2B	S
47	<i>E.camaldulensis</i> (River Red Gum)	16	CD 450 200 (490)	900	6.0	3.2	G	G	6 6 6 6	M	5° TL to the west, dw. Big leader is being used.	P	4	1B	S
48	<i>E.camaldulensis</i> (River Red Gum)	14	CD 540 300 (620)	940	7.5	3.2	G	G	10 10 10 10	M	FA, dw.	P	6	2B	S
49	<i>E.camaldulensis</i> (River Red Gum)	26	700	1000	8.4	3.3	G	G	12 12 8 8	VM	Solid tree, dw.	P	5	2B	S
50	<i>E.camaldulensis</i> (River Red Gum)	26	1000	1200	12.0	3.6	G	G		YM	dw, PFS, 3x 1.8m	P	4	2B	S

ABBREVIATIONS: m-metres, mm-millimetres, DBH-trunk diameter @ 1.4m, DGL-trunk diameter at ground level, VP-very poor, P-poor, F-fair, G-good, VG-very good, CD-co-dominant trunk, TD-tri-dominant trunk, QD-4x trunk, TL-trunk lean, TW-trunk wound, Insp-inspect, L-longicorns, E-epicormics, FA-forest architecture, FR-Forest Remnant, dw-deadwood small, DW-deadwood large, TDB-tip dieback, PFS-previous failure site, RFS-recent failure site, BEW-branch end weight, MTU-multi tree union, MFU-main fork union, IFU-inclusive fork union, IMFU-inclusive main fork union, IMBU-inclusive main branch union, MBA-Multiple branch attachments, FB-fruited body, BF-bracket fungus, U/C-under canopy, Decl-declining, bor-borers, PD-parrot damage, LD-leaf damage, CMP-chewing mouth piece, RW-reaction wood, H/D-Height/Diameter ratio test (Mattheck 2004), J-juvenile, YM-young mature, SM-semi mature, M-mature, OM-over mature, HFP-high failure potential, D-dangerous, VD-very dangerous, X-no room to grow/unsuitable, H-habitat, HB-habitat box, Rec-recommendation, S-save, R-remove, T-transplant, C-council determination, W-work needed to be carried out, mon-monitor, TPO-tree preservation order, VTA (P-pass, F-fail) **Hazard Rating-3**=low hazard, **12**=dangerous, **N/A**=not applicable, **SULE**=Safe & Useful Life Expectancy.

Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m)				Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
									N	S	E	W						
51	<i>E.camaldulensis</i> (River Red Gum)	20	460	600	5.7	2.7	G	G	2	4	3	2	M		P	4	2B	S
52	<i>E.camaldulensis</i> (River Red Gum)	19	600	820	7.2	3.1	G	G	8	6	12	6	M	Tropism to the east, old PFS, trunk lesions, good callus.	P	4	2B	S

RED COURSE

1	<i>E.camaldulensis</i> (River Red Gum)	18	940	1150	11.4	3.5	G	VG	6	10	10	8	M	dw, CD@6m, E, Pfs, W-R.	P	5	2B	S
9	<i>E.camaldulensis</i> (River Red Gum)	23	820	1150	9.9	3.5	G	G	6	12	8	8	VM	3° TL to the south, on bank, dw, E.	P	5	2B	S
12	<i>E.camaldulensis</i> (River Red Gum)	15	700	1050	8.4	3.4	G	G	6	6	6	6	VM	5° TL to the south, dw.	P	5	2B	S
10	<i>E.camaldulensis</i> (River Red Gum)	16	680	850	8.4	3.1	G	G	8	8	2	8	VM	dw, on bank. 2 x apparatus on the same tree.	P	4	2B	S
15	<i>E.camaldulensis</i> (River Red Gum)	17	CD 850 750 (1130)	1500	13.8	3.9	G	G	6	8	10	8	VM	dw, weeds, W-R weeds/dw.	P	4	2B	S
16	<i>E.camaldulensis</i> (River Red Gum)	17	950	1360	11.4	3.8	G	G	6	18	14	8	VM	3° TL to the south-west, dw. canopy, dw, on bank. W-R dw.	P	6	2B	S
17	<i>E.camaldulensis</i> (River Red Gum)	25	850	1230	10.2	3.6	G	G	12	12	12	10	VM	Big roots are visible on the edge of the swamp.	P	6	2B	S
18 & 19	<i>E.camaldulensis</i> (River Red Gum)	15	480	680	6.0	2.8	G	G	4	4	4	4	VM	dw, witches brooms. Both apparatus are on same trunk.	P	5	2B	S
20	<i>E.camaldulensis</i> (River Red Gum)	24	1050	1400	12.6	3.8	G	G	15	10	15	10	VM	DW, dw, big roots visible, on edge of swamp.	P	5	2B	S
20A	<i>E.camaldulensis</i> (River Red Gum)	25	1200	1450	14.4	3.9	G	G	10	10	10	10	VM	Twisted trunk but balanced, dw, hollow (parrot habitat hole) - (Reserve/spare tree)	P	5	2B	S

ABBREVIATIONS: m-metres, mm-millimetres, DBH-trunk diameter @ 1.4m, DGL-trunk diameter at ground level, VP-very poor, P-poor, F-fair, G-good, VG-very good, CD-co-dominant trunk, TD-tri-dominant trunk, QD-4x trunk, TL-trunk lean, TW-trunk wound, Insp-inspect, L-longicorns, E-epicormics, FA-forest architecture, FR-Forest Remnant, dw-deadwood small, DW-deadwood large, TDB-tip dieback, PFS-previous failure site, RFS-recent failure site, BEW-branch end weight, MTU-multi tree union, MFU-main fork union, IFU-inclusive fork union, IMFU-inclusive main fork union, IMBU-inclusive main branch union, MBA-Multiple branch attachments, FB-fruited body, BF-bracket fungus, U/C-under canopy, Decl-declining, bor-borers, PD-parrot damage, LD-leaf damage, CMP-chewing mouth piece, RW-reaction wood, H/D-Height/Diameter ratio test (Mattheck 2004), J-juvenile, YM-young mature, SM-semi mature, M-mature, OM-over mature, HFP-high failure potential, D-dangerous, VD-very dangerous, X-no room to grow/unsuitable, H-habitat, HB-habitat box, Rec-recommendation, S-save, R-remove, T-transplant, C-council determination, W-work needed to be carried out, mon-monitor, TPO-tree preservation order, VTA (P-pass, F-fail) **Hazard Rating-3**=low hazard, **12**=dangerous, **N/A**-not applicable, **SULE**-Safe & Useful Life Expectancy.

Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m)				Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
									N	S	E	W						
21	<i>E.camaldulensis</i> (River Red Gum)	24	410	590	5.1	2.7	G	G	2	5	3	3	M	dw.	P	4	2B	S
22	<i>E.camaldulensis</i> (River Red Gum)	18	430	600	5.4	2.7	G	G	8	8	8	8	M	dw. weeds, W-R weeds.	P	4	2B	S
23	<i>E.camaldulensis</i> (River Red Gum)	24	CD 800 550 (970)	1400	11.7	3.8	G	G	10	15	8	10	M	PFS, dw. tropism to the north.	P	5	2B	S
41	<i>E.camaldulensis</i> (River Red Gum)	14	440	710	5.4	2.9	G	G	6	6	8	4	M	Also Blue – 2 platforms Red – 1 platform 3 platforms in total	P	4	2B	S
45	<i>E.camaldulensis</i> (River Red Gum)	16	390	540	4.8	2.6	G	G	5	5	5	5	YM	dw.	P	4	2B	S
46	<i>E.camaldulensis</i> (River Red Gum)	17	420	560	5.1	2.6	G	G	4	4	4	4	YM	dw.	P	4	2B	S

BLACK COURSE

1	<i>E.camaldulensis</i> (River Red Gum)	18	940	1150	11.4	3.5	G	VG	6	10	10	8	M	dw, CD@6m, E, Pfs, W-R.	P	5	2B	S
12	<i>E.camaldulensis</i> (River Red Gum)	15	700	1050	8.4	3.4	G	G	6	6	6	6	VM	5° TL to the south, dw.	P	5	2B	S
10	<i>E.camaldulensis</i> (River Red Gum)	16	680	850	8.4	3.1	G	G	8	8	2	8	VM	dw, on bank. 2 x apparatus on the same tree.	P	4	2B	S
9	<i>E.camaldulensis</i> (River Red Gum)	23	820	1150	9.9	3.5	G	G	6	12	8	8	VM	3° TL to the south, on bank, dw, E.	P	5	2B	S
53	<i>E.camaldulensis</i> (River Red Gum)	21	CD 400 440 (590)	680	7.2	2.8	G	G	6	6	6	6	YM	IFU, dw.	P	4	2B	S
54	<i>E.camaldulensis</i> (River Red Gum)	14	470	710	5.7	2.9	G	F	6	6	6	2	M,	dw, H@3m.	P	6	2B	S

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Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m)				Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
									N	S	E	W						
55	<i>E.camaldulensis</i> (River Red Gum)	20	480	700	6.0	2.8	G	G	4	6	2	12	YM	Tropism to the south, LD CMP.	P	4	2B	S
56	<i>E.camaldulensis</i> (River Red Gum)	26	CD 750 750 (1060)	1400	12.9	3.8	G	G	10	10	10	10	VM	dw.	P	4	2B	S W
57	<i>E.camaldulensis</i> (River Red Gum)	20	460	540	5.7	2.6	G	G	6	6	6	6	M	dw.	P	4	2B	S
58	<i>E.camaldulensis</i> (River Red Gum)	17	400	550	4.8	2.6	G	G	4	4	4	4	YM	E.	P	4	2B	S
42	<i>E.camaldulensis</i> (River Red Gum)	16	600	750	7.2	2.9	G	G	6	4	4	8	M	TL 3° to the north.	P	4	2B	S
43	<i>E.camaldulensis</i> (River Red Gum)	16	440	690	5.4	2.8	G	G	6	6	6	6	M		P	4	1B	S
49	<i>E.camaldulensis</i> (River Red Gum)	17	900	1210	10.8	3.6	G	F	6	12	6	12	VM	Failure @4m, dw, TW, unbalanced canopy, decay, termites, OK for apparatus. W-R dw, inspect wound. Apparatus above tri-dominant union.	P	6	2B	S W
44	<i>E.camaldulensis</i> (River Red Gum)	18	480	650	6.0	2.8	G	G	3	8	4	5	M	Tropism to the south	P	4	2B	S

ORANGE COURSE

3	<i>E.camaldulensis</i> (River Red Gum)	14	390	530	4.8	2.6	G	G	4	4	4	4	M	dw.	P	4	2B	S
4	<i>E.camaldulensis</i> (River Red Gum)	14	400	680	4.8	2.8	G	G	4	4	5	4	M	dw.	P	4	2B	S
7	<i>E.camaldulensis</i> (River Red Gum)	18	720	900	8.7	3.2	G	F	4	12	8	6	M	Crown failure, hanger, split crown, remove and upright leader.	P	6	2D	just OK
8	<i>E.camaldulensis</i> (River Red Gum)	16	520	780	6.3	3.0	G	G	12	2	6	6	M	TL 3° to the north, tropism to the north.	P	5	2B	S
6	<i>E.camaldulensis</i> (River Red Gum)	16	400	720	4.8	2.9	G	G	6	4	10	1	M	Probably CD of Tree 7, 3° TL to the east.	P	4	2B	S

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Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m)				Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
									N	S	E	W						
1	<i>E.camaldulensis</i> (River Red Gum)	18	940	1150	11.4	3.5	G	VG	6	10	10	8	M	dw, CD@6m, E, Pfs, W-R.	P	5	2B	S
PURPLE COURSE																		
5	<i>E.camaldulensis</i> (River Red Gum)	14	400	610	4.8	2.7	G	G	4	6	8	0	YM	dw.	P	5	2B	S
9	<i>E.camaldulensis</i> (River Red Gum)	23	820	1150	9.9	3.5	G	G	6	12	8	8	VM	3° TL to the south, on bank, dw, E.	P	5	2B	S
58	<i>E.camaldulensis</i> (River Red Gum)	15	360	550	4.5	2.6	G	G	8	8	8	6	YM	CD@3m, dw.	P	4	2B	S
10	<i>E.camaldulensis</i> (River Red Gum)	16	680	850	8.4	3.1	G	G	8	8	2	8	VM	dw, on bank. 2 x apparatus on the same tree.	P	4	2B	S
11	<i>E.camaldulensis</i> (River Red Gum)	15	400	650	4.8	2.8	G	G	10	4	8	0	M	dw, unbalanced canopy, on bank.	P	4	2B	S
13 & 14	<i>E.camaldulensis</i> (River Red Gum)	18	CD 1010 610 (1180)	2500	14.4	4.9	G	G	8	20	10	8	VM	TL 10° to the south	P	6	2B	S
15	<i>E.camaldulensis</i> (River Red Gum)	17	CD 850 750 (1130)	1550	13.8	4.0	G	G	6	8	10	8	VM	dw, weeds, W-R weeds.	P	4	2B	S
16	<i>E.camaldulensis</i> (River Red Gum)	17	950	1340	11.4	3.8	G	G	6	18	14	8	VM	3° TL to the south-west, dw. canopy, dw, on bank. W-R dw.	P	4	2B	S
12	<i>E.camaldulensis</i> (River Red Gum)	15	700	1050	8.4	3.4	G	G	6	6	6	6	VM	5° TL to the south, dw.	P	5	2B	S
1	<i>E.camaldulensis</i> (River Red Gum)	18	940	1150	11.4	3.5	G	VG	6	10	10	8	M	dw, CD@6m, E, Pfs, W-R.	P	5	2B	S

ABBREVIATIONS: m-metres, mm-millimetres, DBH-trunk diameter @ 1.4m, DGL-trunk diameter at ground level, VP-very poor, P-poor, F-fair, G-good, VG-very good, CD-co-dominant trunk, TD-tri-dominant trunk, QD-4x trunk, TL-trunk lean, TW-trunk wound, Insp-inspect, L-longicorns, E-epicormics, FA-forest architecture, FR-Forest Remnant, dw-deadwood small, DW-deadwood large, TDB-tip dieback, PFS-previous failure site, RFS-recent failure site, BEW-branch end weight, MTU-multi tree union, MFU-main fork union, IFU-inclusive fork union, IMFU-inclusive main fork union, IMBU-inclusive main branch union, MBA-Multiple branch attachments, FB-fruited body, BF-bracket fungus, U/C-under canopy, Decl-declining, bor-borers, PD-parrot damage, LD-leaf damage, CMP-chewing mouth piece, RW-reaction wood, H/D-Height/Diameter ratio test (Mattheck 2004), J-juvenile, YM-young mature, SM-semi mature, M-mature, OM-over mature, HFP-high failure potential, D-dangerous, VD-very dangerous, X-no room to grow/unsuitable, H-habitat, HB-habitat box, Rec-recommendation, S-save, R-remove, T-transplant, C-council determination, W-work needed to be carried out, mon-monitor, TPO-tree preservation order, VTA (P-pass, F-fail) **Hazard Rating-3**=low hazard, **12**=dangerous, **N/A**=not applicable, **SULE**=Safe & Useful Life Expectancy.

Tree No.	Species	Height (m)	DBH (mm)	DGL (mm)	Radius of full TPZ (m)	Radius of full SRZ (m)	Health Vigour	Structural Condition	Canopy Spread (m) N S E W	Age Class	Comments	VTA	Hazard Rating 3-12	SULE	Rec
YELLOW COURSE															
3	<i>E.camaldulensis</i> (River Red Gum)	14	390	560	4.8	2.6	G	G	4 4 4 4	M	dw.	P	4	2B	S
4	<i>E.camaldulensis</i> (River Red Gum)	14	400	720	4.8	2.9	G	G	4 4 5 4	M	dw.	P	4	2B	S
35	<i>E.camaldulensis</i> (River Red Gum)	14	CD 180 300 (350)	450	4.2	2.4	G	G	3 4 4 2	YM	dw.	P	4	2B	S
37	<i>Acacia spp.</i>	12	250	380	3.0	2.3	G	G	2 2 2 2	VM	dw, IFU@6m.	P	5	2B	S
38	<i>E.camaldulensis</i> (River Red Gum)	14	390	520	4.8	2.5	G	G	4 6 4 4	M	dw, hanger in crown.	P	4	2B	S
39	<i>E.camaldulensis</i> (River Red Gum)	16	280	360	3.6	2.2	G	G	4 4 4 4	YM		P	4	2B	S
40	<i>E.camaldulensis</i> (River Red Gum)	14	430	500	5.4	2.5	G	G	6 8 8 3	M	IFU@5m	P	4	2B	S
2	<i>E.camaldulensis</i> (River Red Gum)	16	450	680	5.4	2.8	G	F	5 5 4 5	M	IMFU, dw, E, leader has an anti-clockwise twist, apparatus to be erected below IMFU, W-R dw.	P	4	2B	S

Appendix 4: Notes on Tree Assessment

Key	Criteria	Comments
Tree No	Must relate to the number on your site diagram	
Species	Botanical name and common name of Tree	
Diameter of trunk	DBH Diameter at Breast Height (1.4 metres) DGL Diameter at Ground Level	
Height	In metres	
Spread	Average diameter of canopy in metres	
Crown Condition	Overall vigour and vitality 0 Dead 1 Severe decline (<20% canopy; major dead wood) 2 Declining (20-60% canopy density; twig and branch dieback) 3 Average/low vigour (60-90% canopy density; twig dieback) 4 Good (90-100% crown cover; little or no dieback or other problems) 5 Excellent (100% crown cover, no deadwood or other problems)	This requires knowledge of species.
Age class	Y Young = recently planted S Semi-mature (< 20% of life expectancy) M Mature (20-80% of life expectancy) O Over-mature (> 80% of life expectancy)	
Special Significance	A Aboriginal C Commemorative Ha Habitat Hi Historic M Memorial R Rare U Unique form O Other	This may require specialist knowledge.
Services/adjacent structures	Bs Bus stop Bu Building within 3m HVo High voltage open-wire construction HVB High Voltage bundled (ABC) LVo Low Voltage open-wire construction LVB Low Voltage bundled (ABC) Na No services above Nb No services below ground Si Signage Sl Street light T Transmission lines (>33KV) U Underground services O Other	More than one of these may apply.
Defects	B Borers C Cavity D Decay dw Deadwood E Epicormics FA Forest Architecture H/D Height/Diameter ratio I Inclusions L Lopped LDCMP Leaf damage by chewing mouthpiece insects M Mistletoe/Parasites MBA Multiple Branch Attachments PD Parrot Damage PFS Previous Failure Sites S Splits/cracks T Termites TL Trunk Lean TW Trunk Wound O Other	More than one of these may apply. H/D if ratio is higher than 50:1 then tree is defective (Mattheck, et al., 1994).

Key	Criteria	Comments
Root zone	C Compaction D Damaged/wounded roots (e.g. by mowers) E Exposed roots Ga Tree in garden bed Gi Girdled roots Gr Grass Kb Kerb close to tree L+ Raised soil level L- Lowered soil level M Mulched Pa Paving/concrete/bitumen Pr Roots pruned O Other	More than one of these may apply.
Failure Potential	Identifies the most likely failure and rates the likelihood that the structural defect(s) will result in failure within the inspection period. 1. Low – defects are minor (e.g. dieback of twigs, small wounds with good wound wood development) 2. Medium – defects are present and obvious (e.g. cavity encompassing 10-25% of the circumference of the trunk) 3. High – numerous and or significant defects present (e.g. cavity encompassing 30-50% of the circumference of the trunk, major bark inclusions) 4. Severe – defects are very severe (e.g. heart rot fruiting bodies, cavity encompassing more than 50% of the trunk)	This requires specialist knowledge
Size of defective part	Rates the size of the part most likely to fail. The larger the part that fails, the greater the potential for damage. 1. Most likely failure less than 150mm in diameter 2. Most likely failure 150-450mm in diameter 3. Most likely failure 450-750mm in diameter 4. Most likely failure more than 750mm in diameter	
Target Rating*	Rates the use and occupancy of the area that would be struck by the defective part 1. Occasional use (e.g. jogging/cycle track) 2. Intermittent use (e.g. picnic area, day use parking) 3. Frequent use, secondary structure (e.g. seasonal camping area, storage facilities) 4. Constant use, structures (e.g. year-round use for a number of hours each day, residences)	
Hazard rating*	Failure potential + size of part + target rating Add each of the above sections for a number out of 12	The final number identifies the degree of risk. The next step is to determine a management strategy. A rating in this column does not condemn a tree but may indicate the need for more investigation and a risk management strategy.

Appendix 5: Planting Instructions

Protective fencing would assist the trees to become established.

Specifying timing of initial timeout, stock selection, the expected standard and size of stock

The trees should not be planted until the Landscaping Phase of the development when all construction activity has ceased, and all services will be connected. The trees should be planted during the Autumn, so they can establish themselves through the cooler part of the year. Trees planted in spring, particularly late spring, are trying to establish as they enter the harshest time of the year. In the case of spring or summer plantings, longer nursing and greater vigilance are essential.

Trees selected should be grown to Natspecs. The standard of the trees and the size of the plant is addressed within the Natspec specifications. The following table gives the height of the tree, container volume and calliper at 300mm.

I would recommend a tree 1.5 metres high with a single leader, in a 30-40 litre container with a calliper of 40mm.

Rootball volume (litres)	Calliper (mm)																	
	20	25	30	35	40	45	50	60	70	80	90	100	110	120	140	160	180	200
20	1.5	1.2																
25	1.9	1.5	1.3															
30		1.8	1.5	1.3														
35			1.8	1.5	1.3													
40			2.0	1.7	1.5													
45			2.3	1.9	1.7	1.5												
50				2.1	1.9	1.7												
60				2.2	2.0	1.7	1.6											
75					2.4	2.2	2.0	1.6										
90					2.9	2.6	2.3	2.0										
100						2.7	2.4	2.0	1.7	1.5								
125						3.4	3.0	2.5	2.2	1.9	1.7							
150						3.8	3.4	2.9	2.4	2.1	1.9							
200							4.3	3.6	3.1	2.7	2.4	2.1						
250								4.5	3.8	3.3	3.0	2.7						
300								4.9	4.2	3.6	3.2	2.9	2.6					
400									5.5	4.9	4.3	3.9	3.5	3.2				
500										6.1	5.4	4.9	4.4	4.0				
600											6.2	5.6	5.1	4.7	4.0	3.5		
800												7.4	6.8	6.2	5.3	4.7	4.1	
1000														7.5	6.4	5.6	5.0	4.5

Height (m)

Height, given container and calliper at 300mm

Figures in the body of the table are tree height (metres) (tolerances of $\pm 10\%$ are not shown).

Required watering/fertilising programs for the first 2 years of the trees development.

EXCAVATION OF PLANTING HOLES

The holes should be dug with a diameter of no less than 3 times the diameter of the root ball or root spread. The hole should be dug with sloping sides and have a shape not dissimilar to that of a wok. This provides for greater volume of loose cultivated soil in which rapid shoot initiation can occur and as vigorous roots generally proliferate closer to the soil surface. The shape is ideal and eliminates the need to dig a full depth of the root ball for the diameter of the hole. (Clark 2003) The depth of the hole shall be equivalent to the depth of the root ball (or roots) or in circumstances where water logging may be an issue, the depth of the hole may be 2/3 of the depth of the root ball. This situation should not occur on each site as they are free draining soils.

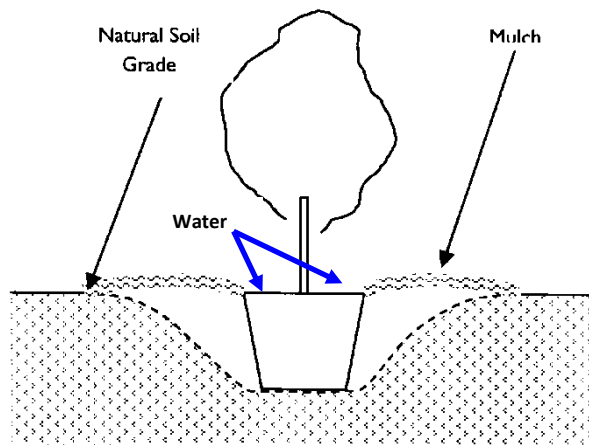


Diagram I – Typical planting pit cross section in well drained soils. Note that the root ball is set to the same level as natural surrounding soil.

ROOT BALL PREPARATION

Ensure that the plants that are purchased to be placed in the ground are grown to Australian Natspecs. If these trees are sourced from a Natspec grower you will have no problems with poorly developed root balls, ensuring that the trees will have a vigorous and long-life expectancy.

SETTING OF THE TREES

The hole should be thoroughly tamped and watered prior to the setting of the trees so as to prevent settlement following planting. Plants should be placed at such a level so that the top of the root ball is level with the existing grade on a well-drained site.

WATERING BASIN

The watering basin in the top of the trees needs to be constructed with the mulches and the soils. A 50-100mm high saucer shaped basin should be formed around the root ball to receive and hold water.

IRRIGATION

Watering to comply with your local council's water restriction usage policy.

The best and simplest way to deliver moisture into the rootball is via drippers placed directly on top of the rootball and connected to an automatic irrigation system.

Should an irrigation system not be available then supplementary watering should be carried out by watering cans and moveable hoses. Trees should be watered twice a week for the first 3 months, then once a week for the next 6 months or to the start of Autumn. Supplementary watering should be given to established or planted trees after no rain for a month for the next 2 years.

MAINTENANCE OF THE TREE

Maintain mulch covering at 50-75mm throughout the establishment period increasing the size of the ring as the tree becomes established.

Note: No turfgrasses are to be grown in the drip zone of the tree.

FERTILIZING

Tree fertilisation generally provides benefits in establishment especially in poor soils. It has been my experience that good quality mulches and suitable fertilizers assist the trees establishment and maintenance. Fertilizers used need to be formulated specifically for native trees. The type of fertilizer is unimportant, what is important is that the manufacturers' directions must be complied with accurately. This includes volume, positioning and frequency of the product used.

WEED CONTROL

Maintain the root ball and the mulched area around the tree planting free of all weeds for the duration of the establishment period. Weeds will compete for precious water and nutrient resources. Manual removal of weeds is recommended. **Do not use herbicides on weeds** that are found to be within the mulch zone.

Appendix 6: Significance of a Tree, Assessment Rating System (STARS) (IACA)

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2001.

The landscape significance of a tree is an essential criterion to establish the importance that a tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is, therefore, necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the Tree Significance - Assessment Criteria and Tree Retention Value - Priority Matrix, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009 (Draper, et al., 2009).

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of High, Medium and Low significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined.

TREE SIGNIFICANCE - ASSESSMENT CRITERIA

1. High Significance in landscape

- The tree is in good condition, or normal vigour and form typical of the species,
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of grand age.
- The tree is listed as a Heritage Item, Threatened Species or part of a Threatened Community or listed on council's significant tree register.
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape by bulk and scale and makes a positive contribution to the local amenity.
- The tree has been influenced by historic figures, events or part of the heritage development of the place.
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values. (ICOMOS)
- The growing environment supports the tree to its full dimensions above and below ground without conflict or constraint.

2. Medium Significance in landscape

- The tree is in fair-good condition, or normal or low vigour and form typical or atypical of the species.
- The tree is a planted locally indigenous or a common species with its taxa readily planted in the local area.
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street.
- The tree provides a fair contribution to the visual character and amenity of the area.
- The tree is moderately constrained by above or below ground influences of the built environment to reach full dimensions.

3. Low Significance in landscape

- The tree is in fair-poor condition, or normal or low vigour and form typical or atypical of the species,
- The tree is not visible or is partly from surrounding properties as obstructed by other vegetation or buildings.
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the area.
- The tree is severely constrained by above or below ground by influences of the built environment and therefore will not reach full dimensions; the tree is inappropriate to the site conditions.
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order.
- The tree has a wound or defect that has the potential to become structurally unsound.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g. hedge.

TABLE 1.0 TREE RETENTION VALUE - PRIORITY MATRIX.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					
Legend for Matrix Assessment						
		Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or relocation of building/s should be considered to accommodate the setbacks as detailed in Table 2. Special construction works must be implemented e.g. pier and beam, etc if works are to proceed within the Tree Protection Zone.				
		Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however, their retention should remain a priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.				
		Consider for Removal (Low) – These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.				
		Priority for Removal – These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.				

Appendix 6a: Levels of Visual Assessment

The following Visual Assessment information is from 'Tree Risk Assessment Manual', published by International Society of Arboriculture (Dunster, et al., 2013).

The level of assessment used in this report is specified in '4.0 Method of Assessment' (Page 4).

LEVEL 1: LIMITED VISUAL ASSESSMENT PROCESS

- Identify the location and/or selection criteria of trees to be assessed.
- Determine the most efficient route for assessing large populations of trees and documenting the route taken.
- Assess the tree(s) of concern from the defined perspective (for example, walk-by, drive-by).
- Record information about the tree as specified in the scope of work (for example, significant defects or other conditions of concern), and identify locations of trees that need a higher level of assessment and/or prompt action.
- Evaluate the risk of trees that meet the selection criteria (a risk rating is optional).
- Submit a report indicating risk level and mitigation options and/or recommendations.

LEVEL 2: BASIC ASSESSMENT PROCESS

- Locate and identify the tree or trees to be assessed.
- Determine the targets and target zone for the tree or branches of concern.
- Review site history, conditions, and species failure profile.
- Assess potential loads on the tree and its parts.
- Assess general tree health.
- Inspect the tree visually—using binoculars, mallet, probes, or shovels, as desired by the arborist or as specified in the scope of work.
- Record observations of site conditions, defects, and outward signs of possible internal defects and response growth.
- If necessary, recommend an advanced assessment.
- Analyse data to determine the likelihood and consequences of failure in order to evaluate the degree of risk.
- Develop mitigation options and estimate residual risk for each option.
- Develop and submit the report/documentation, including, when appropriate, advice on reinspection intervals.

LEVEL 3: ADVANCED TECHNIQUES

There are many techniques that can be considered for advanced risk assessment. *Some situations may be assessed with several techniques. Advanced assessment techniques include the following:

- Aerial inspection and evaluation of structural defects in branches
 - Visual inspection; Decay testing; Load testing.
- Detailed target analysis
- Detailed site evaluation
- Decay testing
 - Increment boring; Drilling with small-diameter bit; Resistance-recording drilling; Single-path sonic (stress) wave; Sonic tomography; Electrical impedance tomography; Radiation (radar, X-ray, and gamma ray)
- Health evaluation
 - Tree ring analysis (in temperate trees); Shoot length measurement; Detailed health/vigour analysis; Starch assessment
- Storm/wind load analysis
 - Detailed assessment of tree exposure and protection; Computer-based estimations according to engineering standards; Wind reaction monitoring over a defined interval
- Measuring and assessing the change in trunk lean
- Load testing
 - Hand pull; Measured static pull

*Inclusion of specific techniques in this list should not be considered an endorsement of the use of that technique.

Appendix 6b: Visual Tree Assessment

The Visual Tree Assessment (VTA) methods as described in 'The Body Language of Trees. A Handbook for Failure Analysis. Research for Amenity Trees' by Mattheck and Breloer (Mattheck, et al., 1994), is used in association with the International Society of Arboriculture's guidelines in this report.

196 THE BODY LANGUAGE OF TREES

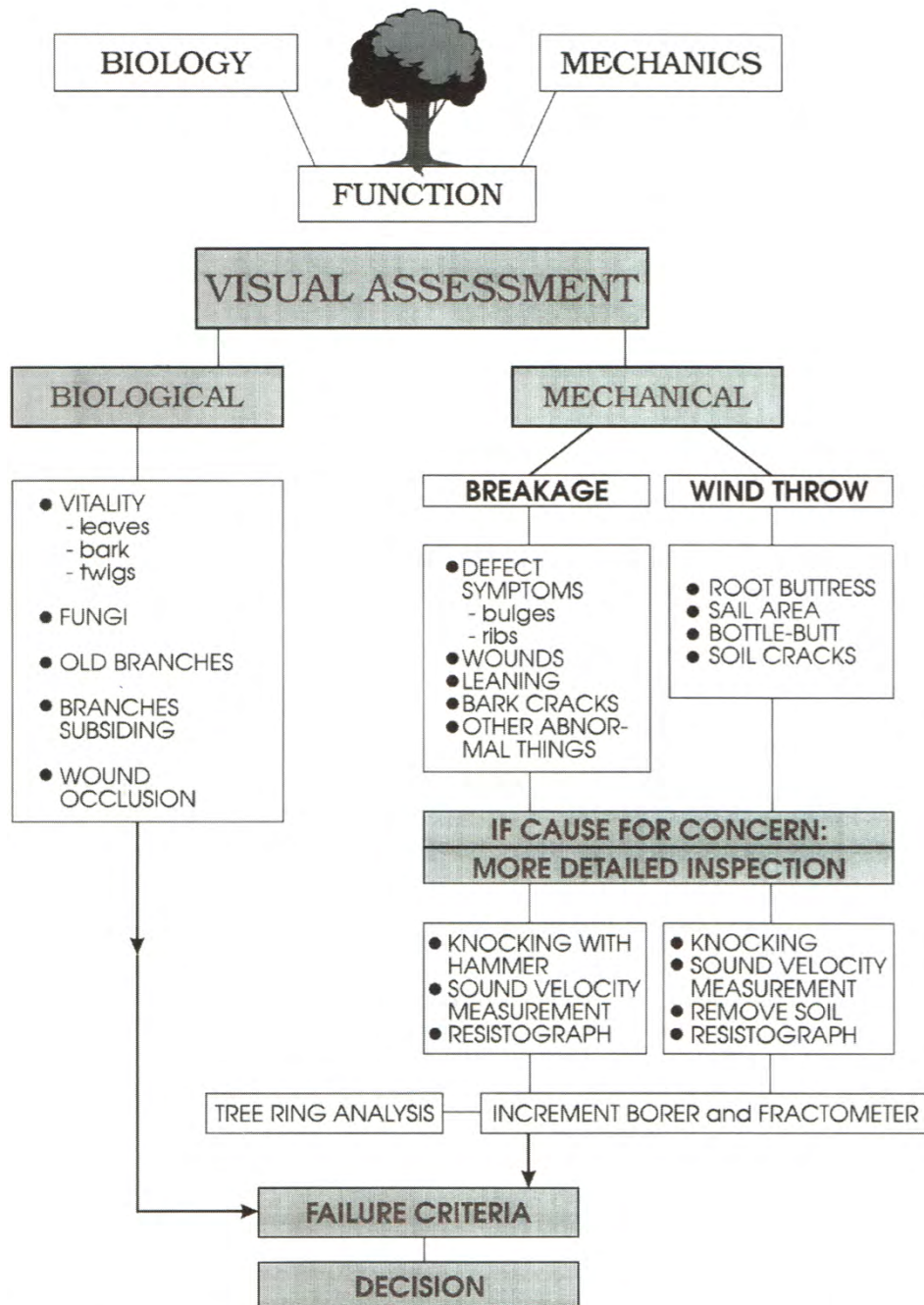


Fig 120. The Visual Tree Assessment (VTA) procedure for assessing trees. As the suspicion increases that defects are present, the examination becomes more thorough and searching.

Appendix 7: SULE

SULE (an acronym for **Safe & Useful Life Expectancy**). There are a number of SULE categories that indicate the safe useful life anticipated for each tree. Factors such as the location, age, condition and health of the tree are significant to determining this rating. Other influences such as the tree's effect on better specimens and the economics of managing the tree successfully in its location are also relevant to SULE (Barrell, 1993 - 2009).

SULE Categories and Sub Groups

1 = Long SULE OF > 40 years

A Structurally sound trees located in positions that can accommodate future growth.	B Storm damaged or defective trees that could be made suitable for retention in the long term by remedial tree surgery.	C Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.
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2 = Medium SULE of 15-40 years

A Trees that may only live between 15 and 40 more years.	B Trees that may live for more than 40 years but would be removed to allow the safe development of more suitable individuals.	C Trees that may live for more than 40 years but would be removed during the course of normal management for safety or nuisance reasons.	D Storm damaged or defective trees that can be made suitable for retention in the medium term by remedial work.
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3 = Short SULE of 1-15 years

A Trees that may only live between 1 and 15 more years.	B Trees that may live for more than 15 years but would be removed to allow the safe development of more suitable individuals.	C Trees that may live for more than 15 years but would be removed during the course of normal management for safety or nuisance reasons.	D Storm damaged or defective trees that require substantial remedial work to make safe, and are only suitable for retention in the short term.
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Dead

A Dead trees.	B Dying or suppressed and declining trees through disease or inhospitable conditions.	C Dangerous trees through instability or recent loss of adjacent trees.	D Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	E Damaged trees that are considered unsafe to retain.	F Trees that will become dangerous after removal of other trees for the reasons given in (a) to (e).
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The SULE rating given to any tree in this report assumes that reasonable maintenance will be provided by a qualified Arboriculturist (AQF 3) using the correct and acknowledged techniques. Retained trees are to be protected from root damage. Incorrect tree work practices can significantly accelerate tree decline and increase hazard potential.

Appendix 8: Glossary

All Glossary items adapted from Dictionary for Managing Trees in Urban Environments, Institute of Australian Consulting Arboriculturists (IACA) 2009. (Draper, et al., 2009), unless otherwise cited.

AGE OF TREES

Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as Young, Mature and Over-mature (British Standard®, 1991) p.13 & (Harris, et al., 2004) p.262.

Young Tree aged less than <20% of life expectancy, in situ.

Mature Tree aged 20-80% of life expectancy, in situ.

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

CONDITION OF TREES

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

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

Fair Condition Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent of or contributed to by vigour.

Poor Condition Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent of or contributed to by vigour.

Senescent / Moribund The advanced state of decline, dying or nearly dead.

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;

Processes Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves); Osmosis (the ability of the root system to take up water); Turgidity (the ability of the plant to sustain moisture pressure in its cells); Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber);

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

Removed No longer present, or tree not able to be located or having been cut down and retained on a site or having been taken away from a site prior to site inspection.

BRANCH

An elongated woody structure arising initially from the trunk to support leaves, flowers, fruit and the development of other branches. A branch may itself fork and continue to divide many times as successive orders of branches with the length and taper decreasing incrementally to the outer extremity of the crown. These may develop initially as a gradually tapering continuation of the trunk with minimal division as in a young tree or a tree of excurrent habit, or in a sapling, or may arise where the trunk terminates at or some distance from the root crown, dividing into first order branches to form and support the foliage crown. In an acaulescent tree, branches arise at or near the root crown. Similarly, branches may arise from a sprout mass from damaged roots, branches or trunk.

Orders of Branches The marked divisions between successively smaller branches (James, 2003)p. 168, commencing at the initial division where the trunk terminates on a deliquescent tree or from lateral branches on an excurrent tree. Successive branching is generally characterised by a gradual reduction in branch diameters at each division, and each gradation from the trunk can be categorised numerically, e.g. first order, second order, third order etc. (See Figure 21.)

Branch tear out Dislodging of a branch from its point of attachment where it is torn away from the branch collar snapping the branch tail causing a laceration, usually to the underside of the branch union of the branch or trunk to which it was attached forming a tear out wound.

Sudden branch drop The failure and collapse of live, usually horizontal branches, seemingly without any noticeable cause in calm hot, dry weather conditions generally after rain. Theorised to be caused by altered moisture content in the branch disturbing the longitudinal pre-stressing of the wood that normally helps support the load as formed by reaction wood in branches tending to horizontal (Lonsdale, 1999)p. 30, or incipient failure from the lengthening of existing internal cracks as the wood cools (Shigo, 1986) p. 248, or influenced by branch creep under its own weight and by wind (Mattheck, et al., 1994) p. 126, or fractures to vascular rays if pulled at right angles to their longitudinal orientation forming from subsidence cracks (Mattheck, et al., 1994) p. 169, or a

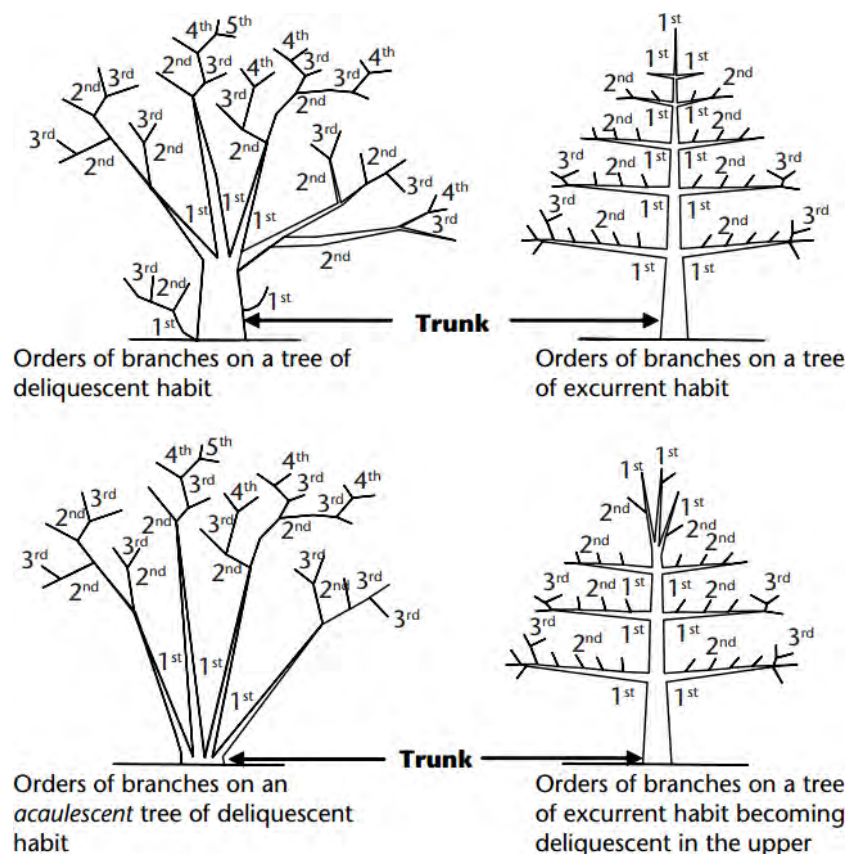


Figure 21 Orders of branches.

combination of these factors. Such branch breakages usually occur at some distance from the branch collar leaving a stub. See also *Branch tear out*.

Canopy

1. Of multiple trees, the convergence, or merging in full or part, of the crowns of two or more trees due to their proximity, or where competition for light and space available in a forest environment is limited as each tree develops forming a continuous layer of foliage.
2. Used as a plural for the crown.
3. Sometimes synonymously used for the crown (USA).

Crown Of an individual tree all the parts arising above the trunk where it terminates by its division forming branches, e.g. the branches, leaves, flowers and fruit; or the total amount of foliage supported by the branches. The crown of any tree can be divided vertically into three sections and can be categorised as lower crown, mid crown and upper crown (Figure 8). For a leaning tree these can be divided evenly into crown sections of one-third from the base to apex. The volume of a crown can be categorised as the inner crown, outer crown and outer extremity of the crown.

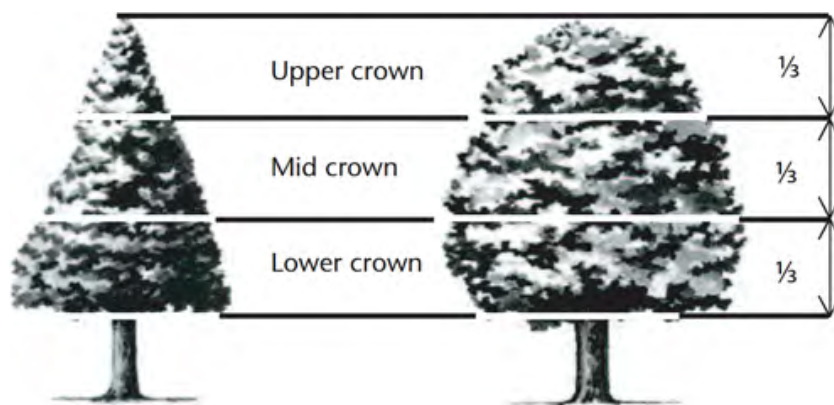


Figure 8 Crown sections.

Lower Crown The proximal or lowest section of a crown when divided vertically into one-third ($\frac{1}{3}$) increments.

Mid Crown The middle section of a crown when divided vertically into one-third ($\frac{1}{3}$) increments.

Upper Crown The distal or highest section of a crown when divided vertically into one-third ($\frac{1}{3}$) increments.

Crown Projection (CP) Area within the dripline or beneath the lateral extent of the crown (Geiger, 2004) p.2.

Dripline A line formed around the edge of a tree by the lateral extent of the crown. Such a line may be evident on the ground with some trees when exposed soil is displaced by rain shed from the crown.

CROWN FORM OF TREES

The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as Dominant, Codominant, Intermediate, Emergent, Forest and Suppressed. The habit and shape of a crown may also be considered qualitatively and can be categorised as Good Form or Poor Form.

Good Form Tree of typical crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic but does not appear to have been adversely influenced in its development by environmental factors in situ such as soil water availability, prevailing wind, or cultural practices such as lopping and competition for space and light.

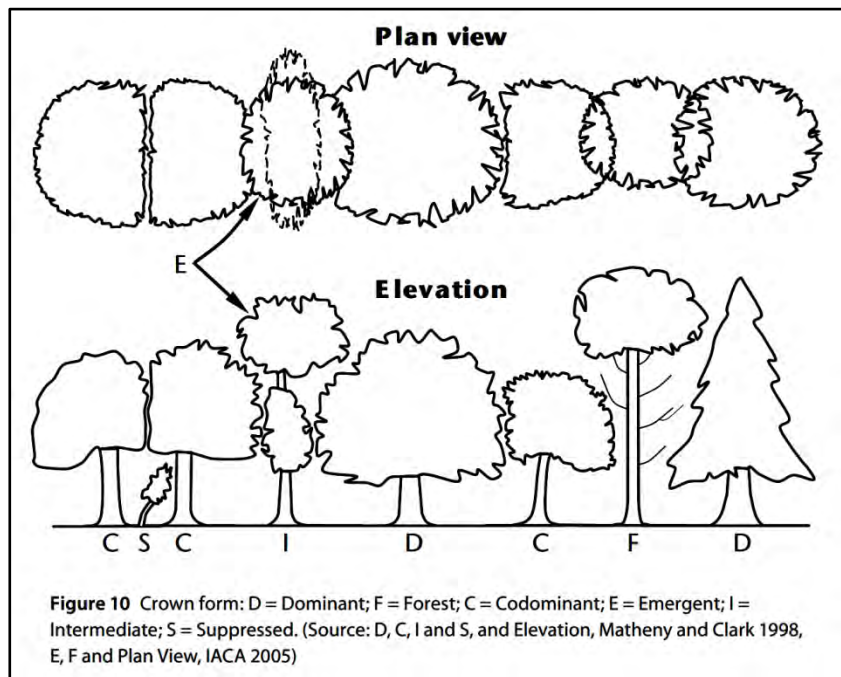
Poor Form Tree of atypical crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as soil water availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be misshapen or disfigured by disease or vandalism.

Crown Form Codominant

Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides.

Crown Form Emergent Crowns of trees restricted for space on most sides receiving most light from above until the upper crown grows to protrude above the canopy in a stand or forest environment. Such trees may be crown form dominant or transitional from crown form intermediate to crown form forest asserting both apical dominance and axillary dominance once free of constraints for space and light.



Crown Form Forest Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each inferior and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the lower crown.

Crown Form Intermediate Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

Crown Form Suppressed Crowns of trees generally not restricted for space but restricted for light by being overtopped by other trees and occupying an understorey position in the canopy and growing slowly.

DEADWOOD

Dead branches within a tree's crown and considered quantitatively as separate to crown cover and can be categorised as Small Deadwood and Large Deadwood according to diameter, length and subsequent risk potential. The amount of dead branches on a tree can be categorised as Low Volume Deadwood, Medium Volume Deadwood and High Volume Deadwood. See also Dieback.

Deadwooding Removing of dead branches by pruning. Such pruning may assist in the prevention of the spread of decay from dieback or for reasons of safety near an identifiable target.

Small Deadwood - dw A dead branch up to 10mm diameter and usually <2 metres long, generally considered of low-risk potential.

Large Deadwood - DW A dead branch >10mm diameter and usually >2 metres long, generally considered of high-risk potential.

DIEBACK

The death of some areas of the crown. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, abrupt changes in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced resistance, stress or decline which may be temporary. Dieback can be categorised as Low Volume Dieback, Medium Volume Dieback and High Volume Dieback.

High Volume Dieback Where >50% of the crown cover has died.

Medium Volume Dieback Where 10-50% of the crown cover has died.

Low Volume Dieback Where <10% of the crown cover has died. See also Dieback, High Volume Dieback and Medium Volume Dieback.

EPICORMIC SHOOTS

Juvenile shoots produced at branches or trunk from epicormic strands in some Eucalypts (Burrows, 2002) pp. 111-131, or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of stress or decline. Epicormic shoots can be categorised as Low Volume Epicormic Shoots, Medium Volume Epicormic Shoots and High Volume Epicormic Shoots.

High Volume Epicormic Shoots Where >50% of the crown cover is comprised of live epicormic shoots.

Medium Volume Epicormic Shoots Where 10-50% of the crown cover is comprised of live epicormic shoots.

Low Volume Epicormic Shoots Where <10% of the crown cover is comprised of live epicormic shoots.

GENERAL TERMS

Cavity A usually shallow void often localised initiated by a wound and subsequent decay within the trunk, branches or roots, or beneath bark, and may be enclosed or have one or more opening.

Decay The process of degradation of wood by microorganisms (Australian Standard®, 2007) p. 6, and fungus.

Hazard The threat of danger to people or property from a tree or tree part resulting from changes in the physical condition, growing environment, or existing physical attributes of the tree, e.g. included bark, soil erosion, or thorns or poisonous parts, respectively.

Included Bark The bark on the inner side of the branch union, or is within a concave crotch that is unable to be lost from the tree and accumulates or is trapped by acutely divergent branches forming a compression fork. The growth of bark at the interface of two or more branches on the inner side of a branch union or in the crotch where each branch forms a branch collar and the collars roll past one another without forming a graft where no one collar is able to subsume the other. The risk of failure is worsened in some taxa where branching is acutely divergent or acutely convergent and ascending or erect.

Hollow A large void initiated by a wound forming a cavity in the trunk, branches or roots and usually increased over time by decay or other contributing factors, e.g. fire, or fauna such as birds or insects e.g. ants or termites. A hollow can be categorised as an Ascending Hollow or a Descending Hollow.

Kino The extractive polyphenols (tannins) formed in veins in the cambial zone as a defence in response to wounding in eucalypts. Often visible as an exudate when the kino veins rupture or are injured (Boland, et al., 2006) p. 691.

Occupancy Rating The frequency of use of a likely target and possibility that people will be present when tree failure or collapse occurs.

Risk The random or potentially foreseeable possibility of an episode causing harm or damage.

Significant Important, weighty or more than ordinary.

Significant Tree A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or in situ, or contribution as a component of the overall landscape for amenity or aesthetic qualities, or curtilage to structures, or importance due to uniqueness of taxa for species, subspecies, variety, crown form, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as remnant vegetation, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of aboriginal cultural importance, or is a commemorative planting.

Substantial A tree with large dimensions or proportions in relation to its place in the landscape.

Sustainable Retention Index Value (SRIV) A visual tree assessment method to determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of age, condition and vigour. SRIV is for the professional manager of urban trees to consider the tree in situ with an assumed knowledge of the taxon and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA).

Structural Root Zone (SRZ) The minimum radial distance around the base of a tree and its root plate required for its stability in the ground against windthrow and applied only to trees with a circular root plate (Mattheck, et al., 1994) pp. 77-87.

Target People or property likely to be harmed or damaged, respectively, by being struck by a failed or collapsed tree in full or part.

Tree Protection Zone (TPZ) A combination of the root protection zone (RPZ) and crown protection zone (CPZ) as an area around a tree set aside for the protection of a tree and a sufficient proportion of its growing environment above and below ground established prior to demolition or construction and maintained until the completion of works to allow for its viable retention including stability.

Visual Tree Assessment (VTA) A visual inspection of a tree from the ground based on the principle that, when a tree exhibits apparently superfluous material in its shape, this represents repair structures to rectify defects or to reinforce weak areas in accordance with the Axiom of Uniform Stress (Mattheck, et al., 1994) pp. 12-13, 145). Such assessments should only be undertaken by suitably competent practitioners.

LEANING TREES

A tree where the trunk grows or moves away from upright. A lean may occur anywhere along the trunk influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A leaning tree may maintain a static lean or display an increasingly progressive lean over time and may be hazardous and prone to failure and collapse. The degrees of leaning can be categorised as Slightly Leaning, Moderately Leaning, Severely Leaning and Critically Leaning.

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0°-15° from upright. - Low Risk.

Moderately Leaning A leaning tree where the trunk is growing at an angle within 15°-30° from upright. - Medium Risk.

Severely Leaning A leaning tree where the trunk is growing at an angle within 30°-45° from upright. - High Risk.

Critically Leaning A leaning tree where the trunk is growing at an angle greater than >45° from upright. - Very High Risk.

Progressively Leaning A tree where the degree of leaning appears to be increasing over time. - Lodging.

Static Leaning A leaning tree whose lean appears to have stabilised over time.

SYMMETRY

Balance within a crown, or root plate, above or below the axis of the trunk or branch and foliage, and root distribution respectively and can be categorised as Asymmetrical and Symmetrical.

Asymmetrical Imbalance within a crown, where there is an uneven distribution of branches and the foliage crown or root plate around the vertical axis of the trunk. This may be due to Crown Form Codominant or Crown Form Suppressed as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to the wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to the west.

Symmetrical Balance within a crown, where there is an even distribution of branches and the foliage crown around the vertical axis of the trunk. This usually applies to trees of Crown Form Dominant or Crown Form Forest. An example of an expression of this may be crown symmetrical.

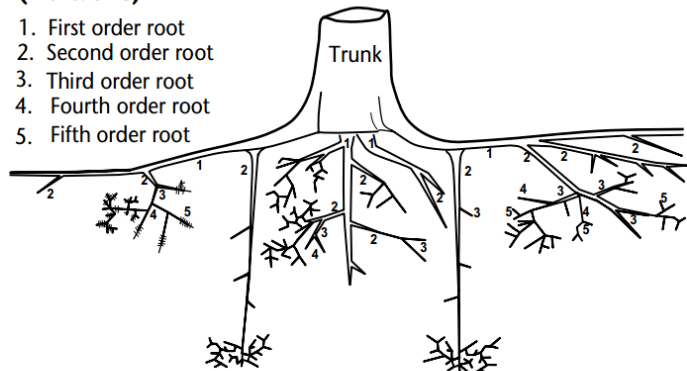
ROOTS

First Order Roots (FOR) Initial woody roots arising from the root crown at the base of the trunk, or as an adventitious root mass for structural support and stability. Woody roots may be buttressed and divided as a marked gradation, gradually tapering and continuous or tapering rapidly at a short distance from the root crown. Depending on soil type these roots may descend initially and not be evident at the root crown or become buried by changes in soil levels. Trees may develop 4-11 (Perry, 1982) pp. 197- 221, or more first order roots which may radiate from the trunk with a relatively even distribution, or be prominent on a particular aspect, dependent upon physical characteristics e.g. leaning trunk, asymmetrical crown; and constraints within the growing environment from topography e.g. slope, soil depth, rocky outcrops, exposure to predominant wind, soil moisture, depth of water table etc.

Orders of Roots The marked divisions between woody roots, commencing at the initial division from the base of the trunk, at the root crown where successive branching is generally characterised by a gradual reduction in root diameters and each gradation from the trunk and can be categorized numerically, e.g. first order roots, second order roots, third order roots etc. Roots may not always be evident at the root crown and this may be dependent on species, age class and the growing environment. Palms at maturity may form an adventitious root mass.

Orders of roots (indicative)

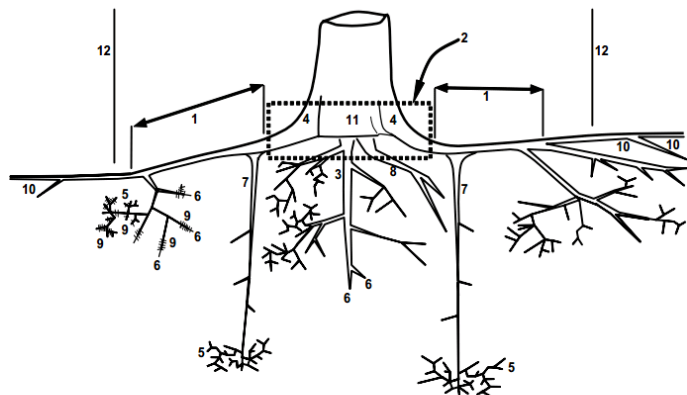
1. First order root
2. Second order root
3. Third order root
4. Fourth order root
5. Fifth order root



Root Plate The entire root system of a tree generally occupying the top 300-600mm of soil including roots at or above ground and may extend laterally for distances exceeding twice the height of the tree (Perry, 1982) pp. 197- 221. Development and extent is dependent on water availability, soil type, soil depth and the physical characteristics of the surrounding landscape.

Roots and root plate sections (indicative)

1. Zone of rapid taper
2. Root crown
3. Tap root
4. Buttress root
5. Fine roots
6. Root tip
7. Sinker roots
8. Heart root
9. Root hairs
10. Outer roots
11. Interbuttress zone
12. Dripline



Root Crown Roots arising at the base of a trunk.

Zone of Rapid Taper The area in the root plate where the diameter of structural roots reduces substantially over a short distance from the trunk. Considered to be the minimum radial distance to provide structural support and root plate stability. See also Structural Root Zone (SRZ).

Structural Roots Roots supporting the infrastructure of the root plate providing strength and stability to the tree. Such roots may taper rapidly at short distances from the root crown or become large and woody as with gymnosperms and dicotyledonous angiosperms and are usually 1st and 2nd order roots, or form an adventitious root mass in monocotyledonous angiosperms (palms). Such roots may be crossed and grafted and are usually contained within the area of crown projection or extend just beyond the dripline.

Figure 22 Orders of roots.

TRUNK

A single stem extending from the root crown to support or elevate the crown, terminating where it divides into separate stems forming first order branches. A trunk may be evident at or near the ground or be absent in acaulescent trees of deliquie habit or may be continuous in trees of excurrent habit. A trunk of any caulescent tree can be divided vertically into three (3) sections and can be categorised as Lower, Mid Trunk and Upper Trunk. For a leaning tree, these may be divided evenly into sections of one-third along the trunk (Figure 28).

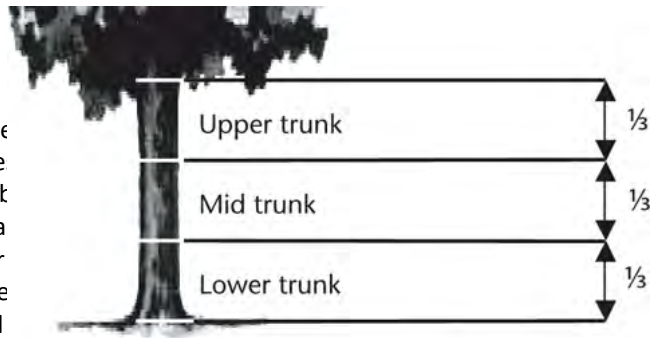


Figure 28 Trunk sections.

Co-Dominant Equal in size and relative importance, usually associated with either trunk/stems or scaffold limbs/branches in the crown; in the context of crown class, trees whose crowns form the bulk of the upper layer of the canopy but which are crowded by adjacent trees (Matheny, et al., 1994).

Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of reaction wood or adaptive wood, therefore an average diameter is determined with a diameter tape or by recording the trunk along its narrowest and widest axis, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a leaning trunk is crooked a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the trunk from the point immediately below the base of the flange of the branch collar extending the furthest down the trunk, and the distance of this point above ground recorded as trunk length. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is acaulescent or trunkless branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near the ground and noting where the measurement was recorded e.g. at ground.

Dominant One of four types of crown class; tree whose crown extends above the height of nearby trees in the stand, receiving light from above and the side

Leader The top most portion of the tree trunk (stem) that is able to grow more than the laterals below. (Harris, et al., 2004)

VIGOUR

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

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

High Vigour Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, a tree growing next to a chicken coop, or a stock feedlot, or a regularly used stockyard; a tree subject to a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

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

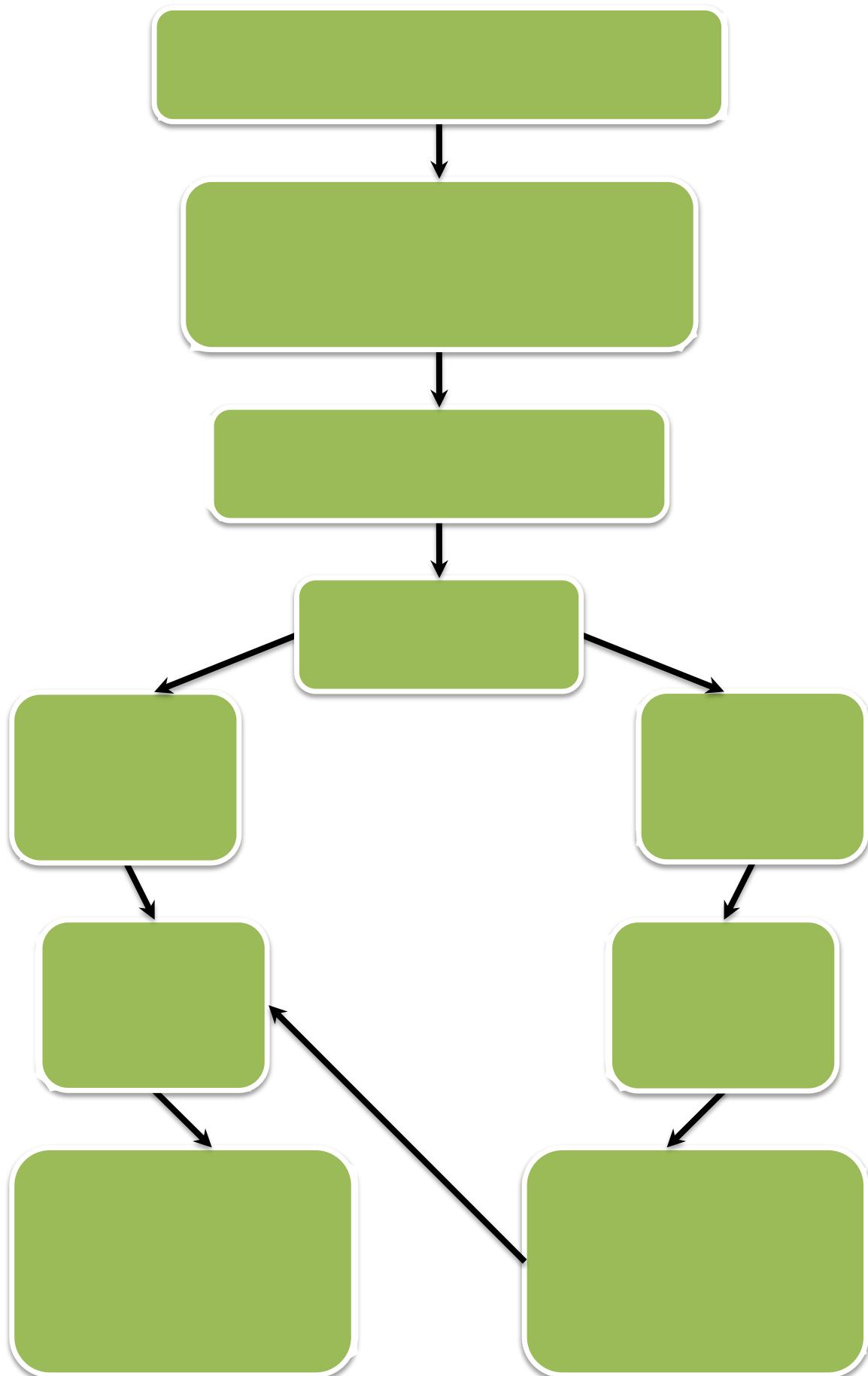
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DISCLAIMER

The author and Advanced Treescape Consulting take no responsibility for actions taken and their consequence if contrary to those expert and professional instructions are given as recommendations pertaining to safety. The conclusions and recommendations contained in this report refer to the tree(s) condition on the inspection day. All care has been taken using the most up-to-date Arboricultural information in the preparation of this report. The report is based on a visual inspection only. Tree health and environmental conditions can change irreversibly at any time due to unforeseen circumstances or events. Due to Myrtaceae family hybridisation, some tree species are difficult to accurately identify. Unless trees are in full flower identification is only probable.

Appendix 9: Flow Chart



Appendix 10: Curriculum Vitae

U W S (Hawkesbury)	Graduate Diploma in Horticulture (AQF8) Diploma in Horticulture (AQF5)
Hortus Australia	Diploma of Arboriculture (AQF5) (RTF50203-6522-6/12/2005)
Ryde School of Horticulture	Tree Surgery Arboriculture Techniques
Central Coast Community College	Excel Module 1 and 2 Excel – Advanced
Workcover	OHS General Induction for Construction Work in NSW (CGI00871464SEQ1) St Johns Ambulance First Aid Certificate

CONFERENCE ATTENDANCE & TRAINING

2016	IACA Root Mapping Seminar - Ryde TAFE IACA Report Writing Seminar - Ryde TAFE IML Resistograph® Users Course - Belmont TAFE
2015	Quantified Tree Risk Assessment System - Estimating Probability of Failure Aboriginal Scar Trees: Significance Conservation and Management of Veteran Eucalypts in the Landscape - Griffith University
2012	Australian Institute of Horticulture Inc. - 'Don Burke Field Day' Professional Development Workshop
2011	Institute of Australian Consulting Arboriculturists (IACA) AS 4970 Forum Ecological Consultants Association of NSW - Impacts of Invasive Species
2010	Root Barrier Field Day
2009	Matheny & Clark: Arboriculture
2008	Quantified Tree Risk Assessment System - Principals and Application
2007	Quantified Tree Risk Assessment System - Principals and Application Quantified Tree Risk Assessment System - A Practitioners Guide to Visual Tree Assessment
2006	Barrell Tree A-Z 2 Day Workshop IML Resistograph® F500S Training Course
2005	Urban Tree Forum – Sydney City Council Urban Tree Risk Management – Treelogic DA Workshop Preparing Development Applications for Local Council –AIH Urban Forest – The New Imperative – Parks and Leisure Australia
2004	Visual Tree Assessment Workshop – Professor Doctor Claus Mattheck
2003	Urban Trees - Our Urban Urgency – Parks and Leisure Australia
1999	Tree Hazard Assessment – Parramatta Park – NAAA
1990	Aero Advanced Climbers Seminar NSW

INDUSTRY BACKGROUND

<i>20th June 2001 to present</i>	Proprietor Advanced Treescape Consulting (formerly known as RJK Consulting)
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2002 - 2005	<i>Part Time Horticulturist</i> Acorn/Bushlands Nursery/Aquarium Centre, Erina Heights
1997 to present	<i>Consultant</i> Horticulturist
1997 to present	<i>Public Speaker</i> Horticulturist/Arboriculturist Topics
1997 - 2001	<i>Part Time Horticulturist</i> Flower Power, Glenhaven
1991 - 1995	<i>Proprietor</i> KAC Peninsula Firewood Assembled team to clear backlog of firewood
1990 - 1996	<i>Proprietor/Climber</i> Kingdom's Arbor Care (until its sale)
1986 - 1990	<i>Tree Worker</i> Arbor 2000 Pro-Climb, Sydney
1972 to present	<i>Bonsai enthusiast</i>

BUSINESS ACHIEVEMENT

Finalist in Central Coast Advocate Community Business Awards 2005 for Specialised Business category.

MEMBERSHIPS

- Institute of Australian Consulting Arboriculturists
- Australian Institute of Horticulture
- Arboriculture Australia
- Gosford City Council Tree Protection Committee - Committee Member - August 1998 to June 2004.

ⁱ Australian Qualification Framework - <https://www.aqf.edu.au>

ADVANCED TREESCAPE CONSULTING

AQF5 ARBORICULTURIST & HORTICULTURIST

☎ 02 4340 2964 ☎ 0408 439 186 ✉ advancedtreescape@bigpond.com
📦 PO Box 7192 KARIONG NSW 2250

ABN: 30 138 200 388



25/02/2019

Ecoline Pty Ltd
PO Box 148
BULAHDELAH NSW 2423

RE: TREETOP ADVENTURE PARK, YARRA FLATS - IVANHOE EAST VIC 3079

On 26/01/2019 I, Russell Kingdom of Advanced Treescape Consulting, attended the site at the above address to inspect all of the trees that are proposed to be used in the new TreeTop Adventure Park course.

All of the trees are still in good health and structural condition and suitable for the original purpose that was on the subject of the Advanced Treescape Consulting report, dated 31/08/2018.

The biggest problem with this entire site is the amount of weed species that are now choking it, making it nearly impossible for any access of the main parts.

It's been proven that the activities of the TreeTop Adventure Park and their site management greatly reduces the amount of weed species growing within the confines of the approved or used area.

Should this application be not be approved I believe that the impressive and significant native trees within this site will be seriously impacted by the weed species. It will choke out the native trees and ultimately lead to their demise if fire comes through the area.

All trees in the large depression (refer to photos numbers swale area Tree 17-22) are in excellent condition with very few issues and are suitable for their intended usage. The trees on the bank of the river, just to the east of this depression, are in excellent condition as well and could easily be utilised for something.

Please see attached photographs.

I trust that this letter meets with your approval. Should you have any further questions please do not hesitate to contact me directly.

Yours sincerely,

Russell Kingdom
Arboriculturist & Horticulturist

MIACA MAIH MAA
Diploma of Arboriculture (AQF5) | Graduate Diploma of Horticulture (AQF8)

Principal: Russell Kingdom

Fully Insured: Public Liability \$20M, Professional Indemnity \$5M & Personal Accident.
Advanced Treescape Consulting is committed to providing a safe working environment for its employees in accordance with The Occupational Health & Safety Act NSW 2000.



Photographs



Figure 1: Tree 40.

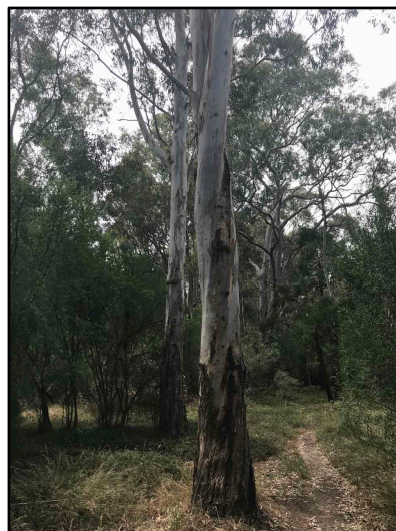


Figure 2: Tree 2 & 3.



Figure 3: Tree 3 & 4.



Figure 4: Tree 25.

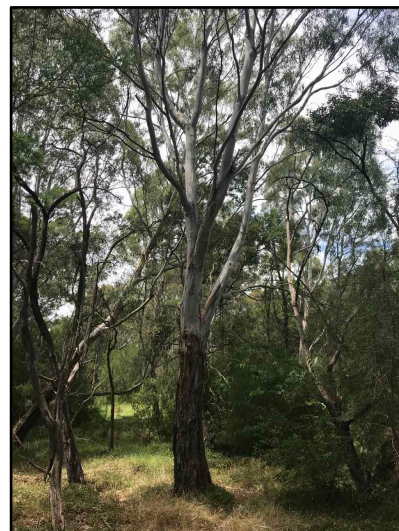


Figure 5: Tree 26.



Figure 6: Tree 27.

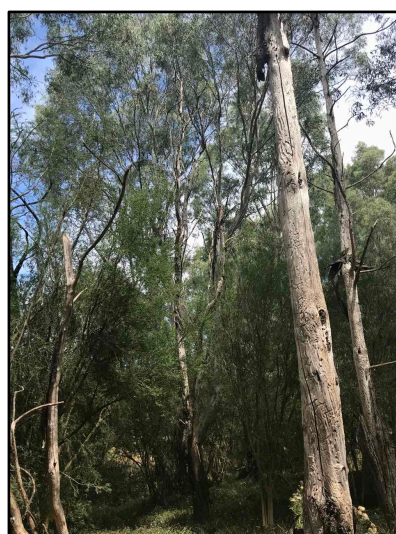


Figure 7: Tree 1.



Figure 8: Tree 23.



Figure 9: Tree 24.



Figure 10: Tree 25.



Figure 11: Large *Eucalyptus* spp. trees surrounding large depression swale.



Figure 12: Large *Eucalyptus* spp. trees surrounding large depression swale.



Figure 13: Showing swale.



Figure 14: Swale.



Figure 15: Tree 58.



Figure 16: Tree 56. This tree is in very good condition.



Figure 17: Tree 53, 54, 55 & 56. These trees are all in good condition with no issues.



Figure 18: Tree 52.

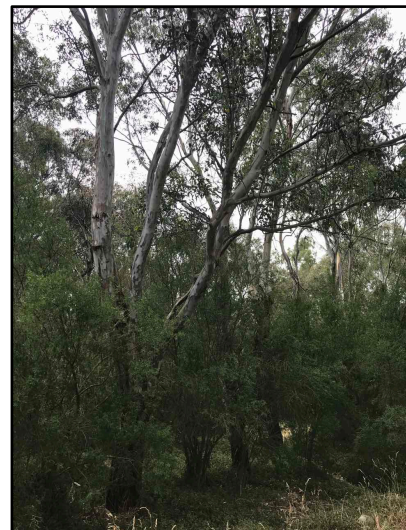


Figure 19: Tree 44, 45 & 46.

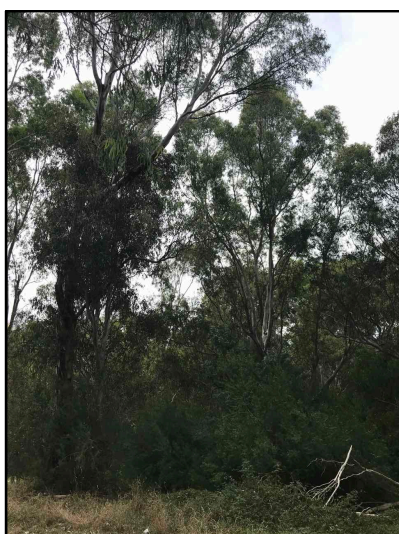


Figure 20: Tree 51 & 50.



Figure 21: Tree 48 & 47.



Figure 22: Tree 42, 41 & 49.