WESTWORKS
—CONSULTANCY—

# Visual Tree Assessment

**Location:** Creaney Education support centre

**Date:** 29 January 2025

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[redacted]

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# 1.0 Introduction

An Individual Visual Tree Assessment (VTA) was undertaken on the one specimen of *Eucalyptus gomphocephala* (Tuart) located at Creaney Education support Centre, Kingsley Drive, Kingsley, on the 29 January 2025. An Individual VTA is a ground level assessment that inspects a trees status of health and structural integrity, inclusive of Risk Assessment.

This inspection was requested following concerns for the structural integrity and health condition of the tree with particular concerns for recent branch failures.

The objective of this report is to provide details of those findings, advise recommendations moving forward and where applicable, to provide a Tree Management Plan to reduce risk and/or improve health over the longer term.

Please note: As ground-level inspections have limitations to observing areas of concern, potential outcomes may include the recommendation or requirement for more advanced assessments.

# 2.0 Methodology

This tree assessment consisted of a ground based basic tree assessment utilising the principals of Visual Tree Assessment (VTA) as outlined by Mattheck and Breloer (1994) and Lonsdale's approach (1999).

Following positive identification, the trees were assessed against the following areas: height (in meters), canopy spread, diameter of the trunk, health, structure, age and inspected from ground level for any evidence of defect and pest and diseases, using the following tools.

- Acoustic hammer.
- Clinometer.
- Forestry Workers Measuring Tape.
- Camera.
- Probing tools

Additionally, a Risk Assessment was undertaken using the Quantified Tree Risk Assessment (QTRA) system.

## 2.1 Species Identification.

This consultant and associates have a combined over 20 years' experience working with Western Australian tree species, with key proficiency identifying those which are endemic and native to the local Perth regions. Additionally, there are resources to the disposal of Westworks Consultancy to assist in tree species identification including, but not limited to, peer reviewed books and journals, outsourced associates with particular expertise and access to the Western Australian Herbarium (Department of Biodiversity, Conservation and Attractions).

## 2.2 Tree Measurements

- The height of the tree is an approximate height taken in meters (m)
- The canopy spread gives an indication of the general spread of the canopy in meters.
- The diameter of the trunk (DBH) is measures at 1.4m above ground level.

## 2.3 Tree Health

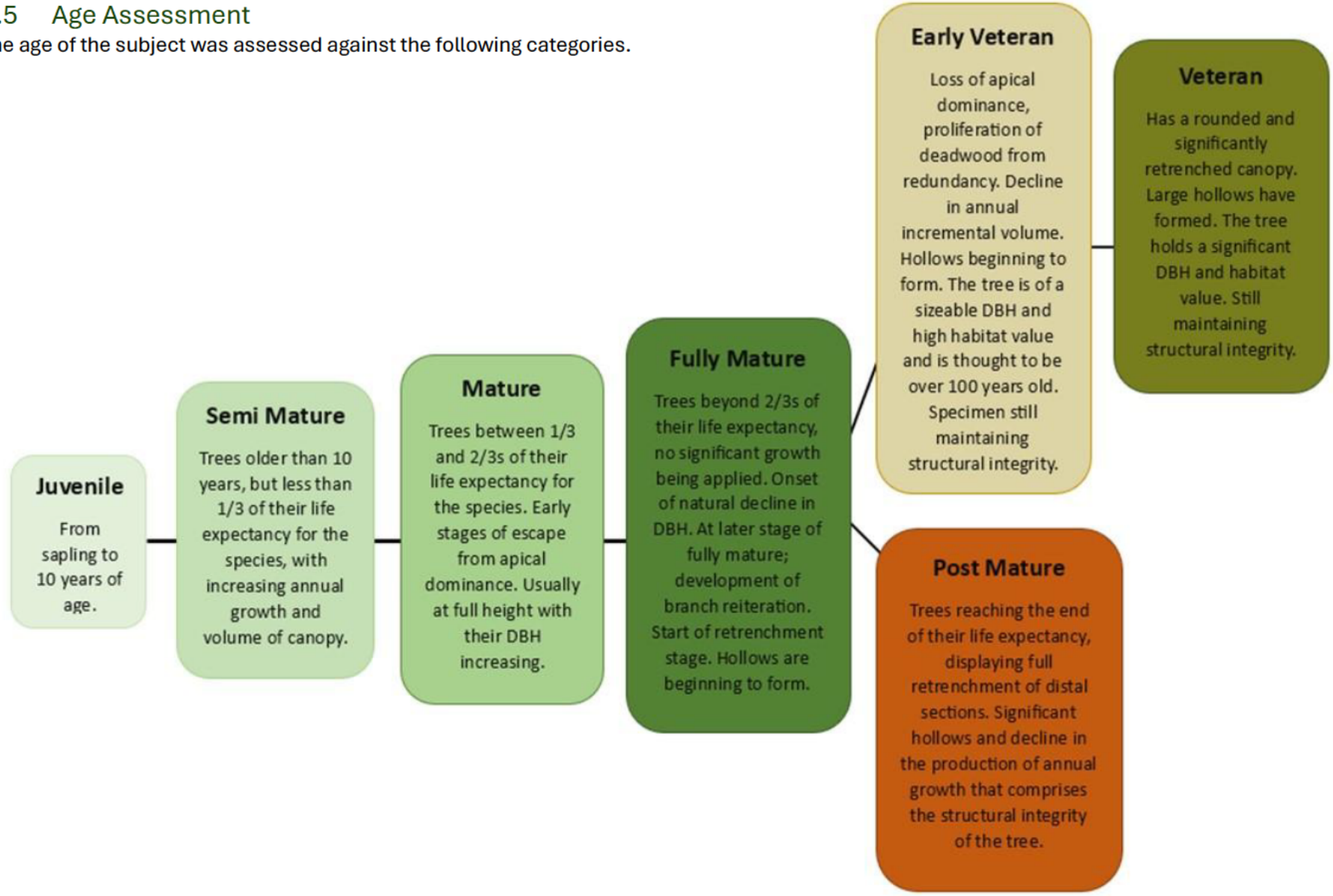
- **Good:** The tree will show good to excellent vigour throughout the tree for the species. The tree will exhibit a full and healthy canopy of foliage with only minimal pest or diseases evident.
- **Fair:** The tree is growing in a reasonable condition and shape with adequate canopy foliage for the species. Minor dead wood may be present throughout the crown, with reasonable colour and density when compared to a typical healthy specimen of that species.
- **Poor:** The tree appears to not be growing to its full capability with the canopy potentially visibly showing signs of openness and thinning with excessive amounts of dead or dying limbs. Evidence of established pest and disease issues will be evident or symptoms of stress indicating the tree is in decline.
- **Very Poor:** The tree is in decline with a very sparse canopy, and little chance of recovery. There would typically be excessive amounts of dead and dying material throughout its canopy.
- **Dead:** No living tissue was found; the tree is dead and should be removed. Unless it is otherwise noted as holding potential as a habitat tree.

## 2.4 Structure

- **Good:** The tree will have optimum spacings of first order branches, with open angles of attachment and no inclusions, the trunk is applying very visible signs of annualised response growth. There are no observable defects. This is a high-quality specimen for the species.
- **Fair:** The tree is displaying evenly spaced first order branches, with structurally sound unions, the trunk is applying annualised wood to maintain optimum structural integrity. There may be some minor defects, yet the tree is managing these appropriately. This is a "normal" specimen for the species.
- **Poor:** Minor structural defects observed, there may be damage to the cambium, included bark, which reduces the structural integrity of a union, and/or the tree may have been lopped, which has significantly altered its form.
- **Very poor:** The tree is in a state of decline with poor branch spacings and attachment. Major structural defects have been observed.
- **Has Failed:** The tree is of a significantly poor structural integrity to the point where A failure event was observed to have occurred.

## 2.5 Age Assessment

The age of the subject was assessed against the following categories.



## 2.6 Useful Life Expectancy

- **Greater than 40 + years**

  Very high quality and high value, these trees would hold such a condition that make them a valuable part of the environment/ landscape, would be considered to hold a Useful Life Expectancy (ULE) of greater than 40 years, thus allowing them to make a substantial contribution for a long period of time.

- **Greater than 20 to 40 years**

  High quality and high value, these trees would hold such a condition that make them a valuable part of the environment/ landscape, would be considered to hold a Useful Life Expectancy (ULE) of 40 years of greater, thus allowing them to make a substantial contribution.

- **11 and 20 years**

  Medium quality and medium value, trees of this category are thought of as making a significant contribution to the area they dwell in and would be considered to hold a ULE of a minimum of 20 years.

- **6 and 10 years**

  Low quality and low value. These trees would be regarded as being in an adequate condition that would see them being retained for a period that would allow new plantings to establish. They would be considered as having a ULE of 5 to 10 years.

- **1 to 5 years**

  Very Low quality and very low value, these trees would be regarded as having a poor form, displaying a low vitality, and may be exhibiting initial signs of structural decline. They would be considered to have a ULE of less than 5 years and are to be included in a plan for replacement.

- **No remaining ULE**. (Dead or hazardous)

  Trees in this category would be considered to hold such a condition that would potentially hold no value or in their current state it would be reasonable to undertake their removal for reasons of sound Arboricultural management, due to a high level of risk.

## 2.7 Origin of species

- **Endemic** – A species of plant indigenous to the subject location, not found outside this region (South-West Province).
- **Native** – A species of plant indigenous to Australia.

**Exotic** – A species of plant introduced to Australia via anthropogenic activities.

## 2.8 Habitat (Nesting) Value

- **High** – Trees with a DBH ≥500mm, with hollows of an estimated diameter ≥150mm.
- **Medium** Trees with a DBH ≥300mm to ≤500mm with hollows of any size up to an estimated 140mm in diameter. Trees with one or more nests throughout the canopy.
- **Low** – Trees without hollows, but with nests, or the potential for either and with the presence of one or more beehives.
- **Future Value** – Trees with size or spread suitable for potential habitat formation or selection, or young trees of suitable species for future habitat value.
- **Roosting Value** – Tree is dead or near-dead, but suitable for habitat or perching.
- **No Value** – Tree is not suitable for hollows, nesting, or hives.

## 2.9 Priority of Works

The priority rating of an individual tree is determined by a number of factors, that not only take consideration of the QTRA outcome, but, provision of pedestrian and vehicle access, prevention of growth characteristics that may cause damage to infrastructure and action that may improve the long-term structural integrity of a tree. The priority ratings assist a tree owner/manager to schedule work in conjunction with available physical and monetary resources.

| Recommended timeframes for works | |
|---|---|
| High Priority | As soon as practicable |
| Medium Priority | Within 8 weeks of the date of the report |
| Low Priority | Within 6 months of the date of the report |

## 2.10 Quantified Tree Risk Assessment Explained

The Quantified Tree Risk Assessment (QTRA) system, developed by Mike Ellison at Cheshire Woodlands, applies established and accepted risk management principles to tree safety management. QTRA quantifies the risk of significant harm from tree failure in a way that considers the benefits conferred by trees and the monetary cost of management.

Though it may seem counterintuitive, the first step in this assessment is not the condition of the tree, but the usage of the land (Target) on which the tree stands. By valuing the target first, the tree owner and risk assessor can determine whether or not, and by what degree of rigour, further inspection or management is required. Where necessary, the tree is then evaluated in terms of its size and Probability of Failure (PoF). Ranges of value for target size, and PoF are entered into a QTRA calculator which generates a colour-coded Risk of Harm (RoH).

This system moves the judgment of tree safety away from the labelling of trees as either 'safe' or 'unsafe', to a quantifiable probability, with predetermined limits of tolerable or acceptable risk (see appendix 2).

- Trees with an RoH less than 1/1,000,000 are 'Broadly Acceptable'. The risks in this category are described as being 'As Low As Reasonably Practicable' (ALARP) and only require review by the owner or stakeholder.
- Trees with an RoH from 1/10,000 up to 1/1,000,000 are 'Tolerable'. The risks in this category are considered tolerable where imposed on others, provided they are ALARP.
- Trees with an RoH from 1/1,000 up to 1/10,000 are 'Tolerable by Agreement' or 'Unacceptable'. Orange tolerable trees are only tolerable if all those exposed to the risk agree to it. Orange unacceptable trees will not be tolerated when risks are imposed on others, the risk must be controlled.
- Trees with an RoH greater than 1/1,000 up to 1/1 are 'Unacceptable' and must have the risk removed.

By taking a QTRA approach, tree owners commonly find they spend substantially less resources on assessing and managing tree risk than they did previously, whilst maximising the many benefits their trees provide. Moreover, in the event of a 'tolerable' or 'acceptable' risk being realised, they are in a position to demonstrate the risk has been managed reasonably and proportionately.

## 3.0 Location of Subject Tree

Subject tree is marked with a red dot, correlating to their species name in the legend provided.



# 4.0 Tree Assessment

**Tuart** Tree ID #1

| Tree Details | |
|---|---|
| Latin Name: | Eucalyptus gomphocephala |
| Common Name: | Tuart |
| Tree Age: | Post Mature |
| Health: | Fair |
| Structure: | Fair |
| Tree Height (Estimated) [m]: | 22 |
| Canopy Spread [m]: | 22 |
| DBH [cm]: | 155 |
| DBH Range: | >75cm |
| Useful Life Expectancy: | 40+ years |
| Observations-Structural Issues: | Deadwood |
| Species origin: | Endemic |
| Habitat value: | Low |
| Work Requirements: | Supplemental Water required, Fertiliser required |
| Work Priority: | High |
| QTRA Risk Category: | Broadly Acceptable |

| Tree Location | |
|---|---|
| Longitude: | 115.788105 |
| Latitude: | -31.804311 |

Photos Street View Map View



image.jpg
29/01/2025

## Root zone

The subject tree is located within a playground area and is approximately 5m away from a building to its west, with soft and artificial turf surrounding the remainder of the trunk to the north east and south.

The softfall is being lifted in numerous places due to structural root activity, but there are no signs that indicate instability in the root plate at this time nor are there any signs of pest disease or fungal activity?

This combined with the observed flare of the root crown indicate that the tree is maintaining structural integrity of its root plate at this time.



## Trunk

The Tree has a single trunk to 1.5 m. where it divides to form 3 leaders. One to the east, one to the northwest and one to the south. The union of these leaders were observed to be open with no included bark, and the trunk was generally observed to be applying annualised response to the full length of the three trunks.

All first order branches also appeared to be open with no included bark, likewise with second order branch unions.

No structural conditions of concern were noted at the time of the inspection.



## Canopy

The tree has a normal density in its canopy for the species and there are no signs of nutrient deficiency.

There is small diameter deadwood ranging from 10 to 20mm sporadically throughout The canopy, but this is not a cause for remedial actions.

There are a number of printing events observed, mostly on the southern side of the canopy that are apparently linked with branch failure events.

All pruning cuts were observed to have been made before the branch ridge and branch collar, which indicates that that the unions have remained intact and that the failures have occurred as a result of “Mid Stem Failures” which is to attributable to any structural defect in the tree, but rather as a result of wind and heat stress.



# 5.0 Conclusion

The subject trees was found top be maintaining a normal level of health and condition for the species. This consultant did not observe any failure points within the tree, but rather, numerous pruning events that are either as a result of failure events for end weight reduction pruning.

The rusk assessment undertaken using the QTRA system, found that the level of risk form falling parts if1/1,000,000, which is regarded as “Broadley Acceptable”

Staff at the school claim that there have been approximately 6 branch failure events over the last 6 months.

Whilst the condition of the tree and risk assessment outcome does not warrant removal of the tree at this time, it must be acknowledged that failure events are occurring, and that there are actions that can be taken to help mitigate the risk further.



The best way of combatting such events is to provide the tree with supplemental water over the summer period. Mature trees still require water, and with the alterations that have been made the ground around the tree over a number of years, this has changed water flow not the soil around the tree, reducing the trees overall level of water availability.

As such, a tree Mature tree within a developed area requires supplemental water to help alleviate the stressors that hot weather has on the wood within a tree.

The only way this would be possible is to lift the softfall and artificial lawn around the tree and lay subsurface irrigation, such as Netafim, or a generic poly with drippers, then re-lay the turf and soft fall.

Once installed the following table should be followed.

| Watering Regime for large trees | | |
|---|---|---|
| **Time period** | **Volume** | **Frequency** |
| 15 Oct to 30 April | 1000 L | every second day |
| 1 May to 30 June | 500 L | every second day |
| 1 July to 15 Sept | 200 L | every second day - do not water on days of heavy rain fall |
| 16 Sept to 15 Oct | 500 | every second day |

In addition, shade sails could be installed beneath the tree to act as a fall arrest system for any failure events.



# 6.0 Conclusion

It is not recommended to undertake any further pruning on the tree, as over pruning can cause failure events, but altering wind movement around the tree.

It is crucial that the tree does receive additional water in the summer in some form, subsurface irrigation would be the least invasive method of delivery.

As such it is recommended that a subsurface irrigation system be installed around the tree, starting 2m out from the trunk to cover the entire area of the ESC playground and that irrigation from the Primary school be used to compliment this on the northern side, and that he table on page 14 be followed.

These works should be treated as a High priority.

# 7.0 Glossary of Arboricultural Terminology

**Abscission** - The shedding of a leaf or other short-lived part of a woody plant, involving the formation of a corky layer across its base; in some tree species twigs can be shed in this way.

**Abiotic** - Pertaining to non-living agents, e.g., environmental factors.

**Absorptive roots** - non-woody, short-lived roots, generally having a diameter of less than one millimetre, the primary function of which is uptake of water and nutrients.

**Adaptive growth** - In tree biomechanics, the process whereby the rate of wood formation in the cambial zone, as well as wood quality, responds to gravity and other forces acting on the cambium. This helps to maintain a uniform distribution of mechanical stress.

**Adaptive roots** - The adaptive growth of existing roots; or the production of new roots in response to damage, decay or altered mechanical loading.

**Adventitious shoots** - Shoots that develop other than from apical, axillary, or dormant buds; see also 'epicormic'

**Anchorage** - The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree.

**Axil** - The place where a bud is borne between a leaf and its parent shoot.

**Bacteria** - Microscopic single-celled organisms, many species of which break down dead organic matter, and some of which cause diseases in other organisms.

**Bark** - A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex, and periderm; occasionally applied only to the periderm or the phellem.

**Basidiomycotina (Basidiomycetes)** - One of the major taxonomic groups of fungi.

**Bolling** - A term sometimes used to describe pollard heads.

**Bottle-butt** - A broadening of the stem base and buttresses of a tree, in excess of normal and sometimes denoting a growth response to weakening in that region, especially due to decay.

**Bracing** - The use of rods or cables to restrain the movement between parts of a tree.

**Branch:**

- **Primary** - A first order branch arising from a trunk or stem
- **Lateral** - A second order branch, subordinate to a primary branch
- **Sub-lateral** - A third order branch, originating from lateral branch

**Branch bark ridge** - The raised arc of bark tissues that forms within the acute angle between a branch and its parent stem.

**Branch-collar** - A visible swelling formed at the base of a branch.

**Brown-rot** - A type of wood decay in which cellulose is degraded, while lignin is only modified.

**Buckling** - An irreversible deformation of a structure subjected to a bending load.

**Buttress zone** - The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions.

**Cambium** - Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally.

**Canker** - A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria.

**Canopy species** - Tree species that mature to form a closed forest canopy.

**Cleaning out** - The removal of dead, crossing, weak, and damaged branches, where this will not damage or spoil the overall appearance of the tree.

**Compartmentalisation** - The chemical confinement of disease, decay, or other dysfunction within a trees tissue, due to passive and/or active defences operating at the boundaries of the affected region.

**Compression fork** - An acute angled fork that is mechanically optimised for the growth pressure that two or more adjacent stems exert on each other.

**Compression strength** - The ability of a material or structure to resist failure when subjected to compressive loading, measurable in trees with special drilling devices.

**Compressive loading** - Mechanical loading which exerts a positive pressure, the opposite to tensile loading.

**Tree Protection Zone** - Area from which access is prohibited for the duration of the project to prevent damage to a tree.

**Crown/Canopy** - The main foliage bearing section of the tree.

**Crown lifting** - The removal of limbs and small branches to a specified height above ground level.

**Crown thinning** - The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure.

**Crown reduction/shaping** - A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape.

**Crown reduction/thinning** - Reduction of the canopy volume by thinning to remove selected branches whilst preserving the natural tree shape.

**Deadwood** - Branch or stem wood bearing no live tissues.

**Decurrent** - A system of branching in which the crown is borne on a number of major widely spreading limbs of similar size.

**Defect** - In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment.

**Delamination** - The separation of wood layers along their length, visible as longitudinal splitting.

**Dieback** - The death of parts of a woody plant, starting at shoot-tips or root-tips.

**Disease** - A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused pathogens.

**Distal** - In the direction away from the main body of a tree or subject organism (cf. proximal)

**Dominance** - In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also, the tendency of a tree to maintain a taller crown than its neighbours.

**Dormant bud** - An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so.

**Dysfunction** - In woody tissues, the loss of physiological function, especially water conduction, in sapwood.

**DBH (Diameter at Breast Height)** - Stem diameter measured at a height of 1.4 metres or the nearest measurable point. Where measurement at a height of 1.4 metres is not possible, another height may be specified.

**Endophytes** - Micro-organisms that live inside plant tissues without causing overt disease, but in some cases capable of causing disease if the tissues become physiologically stressed.

**Epicormic shoot** - A shoot having developed from a dormant or adventitious bud and not having developed from a first-year shoot.

**Excrescence** - Any abnormal outgrowth on the surface of tree or other organism.

**Excurren**t - In trees, a system of branching in which there is a well-defined central main stem, bearing branches which are limited in their length, diameter, and secondary branching (cf. decurrent).

**Fastigiate** - Having upright, often clustered branches.

**Flush cut** - A pruning cut which removes part of the branch bark ridge and or branch-collar.

**Girdling root** - A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue.

**Habit** - The overall growth characteristics, shape of the tree and branch structure.

**Haloing** - Removing or pruning trees from around the crown of another (usually mature or post-mature) tree to prevent it becoming supressed.

**Hazard beam** - An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth, prone to longitudinal splitting.

**Heartwood/false-heartwood** - The dead central wood that has become dysfunctional as part of the aging processes and being distinct from the sapwood.

**Heave** - The lifting of pavements and other structures by root diameter expansion; also, the lifting of one side of a wind-rocked root-plate.

**High canopy tree species** - Tree species having potential to contribute to the closed canopy of a mature forest.

**Incipient failure** - In wood tissues, a mechanical failure which results only in deformation or cracking, and not in the fall or detachment of the affected part.

**Included bark (ingrown bark)** - Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact.

**Infection** - The establishment of a parasitic micro-organism in the tissues of a tree or other organism.

**Internode** - The part of a stem between two nodes; not to be confused with a length of stem which bear nodes but no branches.

**Lever arm** - A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or individual branch.

**Lignin** - The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification.

**Lions tailing** - When a branch of a tree that has few if any side branches except at its end and is thus liable to snap due to end-loading.

**Loading** - A mechanical term describing the force acting on a structure from a particular source, e.g., the weight of the structure itself or wind pressure.

**Longitudinal** - Along the length (of a stem, root, or branch).

**Lopping** - A term often used to describe the removal of large branches from a tree, but also used to describe other forms of cutting

**Minor deadwood** - Deadwood of a diameter less than 25mm and or unlikely to cause significant harm or damage upon impact with a target.

**Mulch** - Material laid down over the rooting area of plants to help conserve moisture; mulch may consist of organic matter, or artificial material.

**Mycelium** - The body of a fungus, consisting of branched filaments (hyphae).

**Occlusion** - The process whereby a wound is progressively closed by the formation of new wood and bark around it.

**Pathogen** - A micro-organism which causes disease in another organism.

**Photosynthesis** - The process whereby plants use light energy to split hydrogen from water molecules and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products.

**Phytotoxic** - Toxic to plants.

**Pollarding** - The removal of the tree canopy, back to the stem or primary branches, usually to a point just outside that of the previous cutting.

**Primary branch** - A major branch, generally having a basal diameter greater than 0.25 x stem diameter.

**Probability** - A statistical measure of the likelihood that a particular event might occur.

**Pruning** - The removal or cutting back tree parts to growth points.

**Rams-horn** - In connection with wounds on trees, a roll of occluding tissues which has a spiral structure as seen in cross section.

**Reactive Growth/Reaction Wood** - Production of woody tissue in response to altered mechanical or external loading.

**Residual wall** - The amount of non-decayed wood remaining following decay of internal wood

**Rib** - A ridge of wood that has usually developed because of locally increased mechanical loading. Often associated with internal cracking in the wood of the stem, branch, or root.

**Ringbarking (girdling**) - The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates above or below the area of damage.

**Ripewood** - The older central wood of those tree species in which sapwood gradually ages without being converted to heartwood.

**Root-collar** - The transitional area between the stem/s and roots.

**Root zone** - Area of soils containing absorptive roots of the tree/s described. The Primary root zone is that which we consider of primary importance to the physiological well-being of the tree.

**Sapwood** - Living xylem tissues.

**Selective delignification** - A kind of wood decay (white-rot) in which lignin is degraded faster than cellulose.

**Shedding** - In woody plants, the normal abscission, rotting off or sloughing of leaves, floral parts, twigs, fine roots, and bark scales.

**Shrub species** - Woody perennial species forming the lowest level of woody plants in a forest or garden and not normally considered to be trees.

**Simultaneous white rot** - A kind of wood decay in which lignin and cellulose are degraded at about the same rate.

**Soft-rot** - A kind of wood decay in which a fungus degrades cellulose within the cells,

**Spores** - Propagules of fungi; most spores are microscopic and dispersed in air or water.

**Sporophore** - The spore bearing structure of fungi.

**Stem/s** - Principle above-ground structural component(s) of a tree that supports its branches.

**Stress** - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition, or extremes of temperature: In mechanics, the application of an external force to an object.

**Stringy white-rot** - The kind of wood decay produced by selective delignification.

**Structural roots** - Roots, generally having a diameter greater than 50 millimetres, and contributing significantly to the structural support and stability of the tree.

**Structural root zone (SRZ)** - The zone of the root plate most likely to contain roots that are critical for anchorage and the stability of the tree.

**Subsidence** - In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots.

**Subsidence** - In relation to branches of trees, a term that can be used to describe a progressive downward bending due to increasing weight.

**Taper** - In stems and branches, the degree of change in girth along a given length.

**Targets** - In tree risk assessment persons or property or other things of value which might be harmed or damaged by falling parts of a tree

**Topping/ Lopping** - In arboriculture, the removal of the crown of a tree, or of a major proportion of it.

**Torsional stress** - Mechanical stress applied by a twisting force.

**Translocation** - In plant physiology, the movement of water and dissolved materials through the body of the plant.

**Transpiration** - The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells.

**Tree Protection Zone (TRZ)** - This is an area left around a tree to ensure protection of the above and below ground parts of the tree during construction works. It will usually include the SRZ and is usually recommended to be fenced off for the period of the works.

**Understorey** - A layer of vegetation consisting of younger or smaller trees and shrubs which are adapted to grow under lower light conditions.

**Understorey tree species** - Tree species not having potential to attain a size at which they can contribute to the closed high canopy of a forest or garden.

**Vascular wilt** - A type of plant disease in which water-conducting cells become dysfunctional.

**Vessels** - Water-conducting cells in plants, usually wide and long for hydraulic efficiency; generally, not present in coniferous trees.

**Vigour** - The expression of carbohydrate expenditure to growth (in trees).

**Vitality** - A measure of physiological condition.

**White-rot** - A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded.

**Wind exposure** - The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity.

**Windthrow** - The blowing over of a tree at its roots.

**Woundwood** - Wood with atypical anatomical features, formed in the vicinity of a wound.

# 8.0 References

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# 9.0 Disclaimer and Limitations

a. References in this report to the "Consultant" means that person listed on the cover page as an employee of Westworks Consultancy.

b. References in this report to Westworks Consultancy means Westworks Group Pty Ltd as trustee for Ussheridan Trust trading as Westworks Consultancy (ACN 156 131 010 ABN 23 100 208 057).

c. In this report a reference to a group of persons includes a reference to all of them collectively, any two or more collectively and each of them individually.

d. The releases and limitations in this report apply to the Arborist, Westworks Consultancy and any employees, directors, contractors, and agents of the Arborist and/or Westworks Consultancy.

e. This report only covers identifiable defects present at the time of inspection. The Arborist and Westworks Consultancy accept no responsibility and cannot be held liable for any structural defect or unforeseen event/situation that may occur after the time of inspection.

f. The Arborist and Westworks Consultancy cannot and do not guarantee trees contained within this report will be structurally sound under all circumstances and cannot and do not guarantee that the recommendations made will categorically result in the tree being made "safe." Unless specifically mentioned this report will only be concerned with above ground inspections, that will be undertaken visually from ground level.

g. Trees are living organisms and as such cannot be classified as "safe" under any circumstances.

h. Failure events can occur for any number of reasons at any time and cannot always reasonably be foreseen, as any number of circumstances can come about at any time before or after an inspection that the Arborist and Westworks Consultancy may not be aware of.

i. All recommendations are made based on what can be reasonably identified at the time of inspection therefore the author accepts no liability for any recommendations made.

j. Care has been taken to obtain all information from reliable sources. All data has been verified or as much as possible; however, the Arborist and Westworks Consultancy can neither guarantee nor be responsible for the accuracy of information provided by others.

k. Booking of re-assessment after the prescribed period is the responsibility of the land manager/owner only. The Arborist and Westworks Consultancy are not responsible for providing reminders or notification that re assessment may be due and will not be held responsible to reinspect the listed trees until requested.

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