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Arborology WA
Arboricultural Consultants

Planning
Safety Inspections
Structural Integrity
Risk Assessments
Tree Protection
Selection

Tree Survey and Arboricultural Impact Assessment Report

(For Development Application)

Report Prepared for: **Ocean Gardens Pty Ltd.**
Landowners: Julie Wyatt and Shelley Terril
Care Of: **Doepel Marsh Architects**
Contact Person: Felicity Coombe
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Report Date: **29th July 2025**

Site Address: **Capel Inn, Capel Drive, Capel, W.A.**

Instructions for Report

Phillip Matthews from Arborology WA Arboricultural Consultants has been commissioned by Felicity Coombe from Doepel Marsh, to undertake a Tree Survey and Arboricultural Report (for Development Application), in accordance with the Australian Standards (4970-2009) *Protection of Trees on Development Sites* and the Western Australian *Planning and Development Act 2005,* for the development project, located within the property known as Lot 12, 28 and 165 Capel Drive, Forrest and Roe Road, Caple, (referred to within this report as the subject property). Felicity's instructions were to visit the site, inspect and review the primary trees located within the subject property and to prepare the findings in this report.

Site Inspection

Phillip Matthews, as the Arboricultural Consultant, from Arborology WA Arboricultural Consultants verifies that a site inspection was carried out on Tuesday and Wednesday, the 22nd and 23rd of July 2025, on the one hundred and twenty-six (126) trees located within and near the subject property, due to the development project.

Purpose for Report

The purpose of this Tree Survey and Arboricultural Report is to undertake an "above ground 360° Walkaround" tree inspection to carry out a detailed examination of these trees. Each tree has been tagged and numbered, and their location has been placed on the separate site map titled, **Site Map - Capel Drive, Capel**, and on the site plan titled, **Site Building Plan - Capel Drive, Capel** so that the position of each tree can be clearly identified. Each tree's botanical name, height, canopy spread, trunk's diameter at base, trunk's diameter at breast height, age/maturity, form and vigour, structural condition, viability in the landscape significance (VLS), useful life expectancy (ULE), tree problems, tree works list, tree retainability, trees to be removed, construction encroachment instructions, tree protection zone (TPZ) and structural root zone (SRZ) measurements, tree protection plan and construction methodology, have been recorded, according to the Australian Standards (4970-2009) *Protection of Trees on Development Sites* This information is used to provide a record of each tree prior to the construction works.

NOTE: The author's qualifications and experience are included within **Appendix 1.**

Report Methodology

Tree inspections are usually conducted at ground level using the "Visual Tree Assessment" (VTA) method. The VTA is used by Arboricultural Consultants to evaluate the structural integrity of a tree, relying on observation of the tree's biomechanical and physiological features. The VTA method of tree assessment is adapted from Mattheck & Breloer (2007), Scott (2005), Ellison (2010) and is recognised by Arboriculture Australia and The Institute of Australian Consulting Arboriculturists.

The **Guidelines used Throughout this Report**: The Western Australian *Planning and Development Act 2005*, the *Planning and Development Regulations 2009*, and the Australian Standards (4970-2009) *Protection of Trees on Development Sites*. A brief version of the essential procedures for the Australian Standards (4970-2009) *Protection of Trees on Development Sites*, can be seen within **Appendix 2**.

Each **Tree's Dimensions**: The tree canopy spread was measured with an Empire measuring wheel on the ground, from the canopy edges. The trunk Diameter at Breast Height (DBH) was measured by a Richter-Qualitor diameter tape measure at 1.4m from ground level, and the tree height was estimated using a laser Forest Pro 2 clinometer.

The full Spreadsheet Explanations are listed within **Appendix 3**.

The **Useful Life Expectancy (ULE)** was estimated using SULE categories and subgroups, from Barrell, J, (1993), *Pre-planning tree surveys*. Explanatory notes, SULE categories and terminology can be found within **Appendix 3**.

The **Viability in the Landscape Significance (VIS)** and the Tree's Retention Values were estimated using the IACA *Significance of Tree Assessment Rating System (STARS)*, (2010). Explanatory notes, categories and terminology can be found within **Appendix 3**.

The **Construction Impact Classifications** were estimated using the proposed design to determine the level of encroachment into the TPZ of each tree as specified in the Australian Standards (4970-2009) *Protection of Trees on Development Sites.* Explanatory notes can be found within **Appendix 3**.

The separate site map and plan titled, **Site Map - Capel Drive, Capel** and **Site Building Plan - Capel Drive, Capel**, the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel** and

the separate photographic file titled, **Tree Photographs - Capel, Capel**, can all be downloaded onto your devices for convenient access in the office and/or out in the field.

Limitations of This Report

This Arborist Report only refers to the one hundred and twenty-six (126) trees located within and near the subject property. This report has been prepared based on information supplied by the parties involved in this project. No responsibility is accepted for any errors or omissions which appear in this report which result from incorrect or incomplete information supplied to Phillip Matthews (Arborology W.A. Arboricultural Consultants), by the parties involved. Any alterations to the site or to council policies could change the current circumstances and may invalidate this report and any recommendations made. Due to the changing nature of trees and other site circumstances, the validity of this report and any recommendations made are strictly limited to 12 months from the date stipulated in the report and the report will need to be updated after this.

NOTE: No diagnostic devices were used on these trees.

The Aerial Site Map and Plan

The separate site map titled, **Site Map - Capel Drive, Capel**, can be downloaded onto your devices for convenient access in the office and/or out in the field.

This Arboricultural Consultant also provided the tree numbers on the plan titled, **Site Building Plan - Capel Drive, Capel**, for the architects to view and place onto their plans.

Tree Data Survey Spreadsheet

The separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**, can be downloaded onto your devices for convenient access in the office and/or out in the field. Also, the full Spreadsheet explanations are listed within **Appendix 3**.

Tree Problems

A list of characteristics is provided to assist in gathering information on the trees' current conditions, and to give an indication of tree works that may be required. This list of problems identifies issues with the overall structure of trees and any damage, injury and abnormal symptoms such as pests or diseases. The list of tree problems can be viewed on the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**.

Tree Surgery Works

Tree surgery works are only recommended where there is a significant advantage gained from the works or a significant disadvantage if the works are not performed. Works are generally only recommended where the tree represents a risk to people or property. All pruning works should be undertaken by a (minimum AQF level 3) qualified and experienced tree surgeon and must comply with Australian Standards 4373 (2007) "*Pruning of Amenity Trees*". The list of tree surgery works can be viewed on the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**.

Arboricultural Observations

This Arboricultural Consultant's inspection of the one hundred and twenty-six (126) trees located within and near the subject property found them to be in the following health and structural condition.

Eight (8) trees were found to be in **good** health and **good** structural condition. These are **Trees No. 1, 75, 77, 78, 84, 85, 98** and **100.**

Forty-one (41) trees were found to be in **good** health and **fair** structural condition. These are **Trees No. 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 24, 56, 57, 58, 60, 61, 62, 63, 68, 76, 82, 91, 92, 93, 94, 95, 96 (group of 5 trees), 97, 107, 109,** and **111 (group of 6 trees).**

Seven (7) trees were found to be in **good** health and **poor** structural condition. These are **Trees No. 5, 41, 42, 54, 55, 59** and **65.**

Two (2) trees were found to be in **fair** health and **fair** structural condition. These are **Trees No. 27, 66.**

Thirty-one (31) trees were found to be in **fair** health and **poor** structural condition. These are **Trees No. 3, 17, 18, 19, 20, 21, 23, 28, 31, 44, 35, 36, 39, 46, 49, 50, 51, 53, 64, 69, 71, 86, 90, 101, 102, 103, 104, 105, 106, 108** and **110.**

Three (3) trees were found to be in **fair** health and **very poor** structural condition. These are **Trees No. 2, 48** and **74.**

Five (5) trees were found to be in **poor** health and **poor** structural condition. These are **Trees No. 72, 83, 87, 88** and **99.**

Three (3) trees were found to be in **poor** health and **very poor** structural condition. These are **Trees No. 9, 79** and **112.**

One (1) tree was found to be in **very poor** health and **fair** structural condition. This is **Tree No. 47.**

One (1) tree was found to be in **very poor** health and **poor** structural condition. This is **Tree No. 73.**

Six (6) trees were found to be in **very poor** health and **very poor** structural condition. These are **Trees No. 34, 37, 38, 43, 80** and **81.**

Fifteen (15) trees were found to be **severely declined, morbidly dead, completely dead,** have **fallen over** or are **dangerous**. These are **Trees No. 9, 22, 25, 26, 29, 30, 32, 33, 40, 45, 52, 67, 70, 89** and **113.**

Other Comments

Out of the one hundred and twenty-six (126) trees located within and near the subject property, two **Trees No. 9, 12** were located precariously on the top of a steep riverbank, leaning towards the east (the river), displayed large cavities, trunk decay and termite infestation.

Four (4) **Trees No. 74, 81, 89** and **90** were found to be noxious weeds.

Ten (10) **Trees No. 1, 2, 95, 97, 101, 102, 103, 104, 105** and **106** are council verge trees, which are the property of the Shire of Capel, and each tree has an asset value. These trees must be protected and not removed or pruned.

Eleven (11) trees are outside the subject property, **along the river foreshore.** I am presuming they are also the property of the Shire of Capel, and each tree has an asset value. These are **Trees No. 107, 108, 109, 111 (group of 6 trees), 112,** and **113. NOTE: Tree No. 113** is a dead tree and should be removed by the Shire of Capel for the safety and welfare of the construction workers.

Summary of Trees to be Retained and Removed

Therefore, there are sixty-five (65) trees worthy of retention and sixty-one (61) trees to be removed within the subject property for the construction of the proposed new buildings.

Justification for Removing the 61 Trees

This Arboricultural Consultant's inspection of the sixty-one (61) trees to be removed within the subject property for the proposed construction of the short stay accommodation buildings, short stay recreation, carparks and the over 55 buildings, found most of these trees to be in **poor** to **fair** health and **very poor** to **poor** structural condition. Along with these are trees that are **severely declined**, **morbidly dead, completely dead,** have **fallen over** or are **noxious weeds**. To be removed are **Trees No. 9, 12, 17, 18, 19, 20, 21, 22, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 52, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 70, 73, 76, 79, 80, 81, 86, 87, 88, 89, 90, 98, 99, 100** and **113.**

Even though there are fourteen (14) trees **No. 24, 46, 56, 57, 58, 60, 61, 62, 63, 66, 68, 76, 98** and **100** (highlighted in red as seen above), that were found to be in **fair to good** health and **fair to good** structural condition, they are within the design layout of the proposed buildings and car park areas.

The Viability in the Landscape Significance (VLS) was estimated using the IACA *Significance of Tree Assessment Rating System (STARS)*, (2010). The fifty-nine (59) trees to be removed have a **LOW** viability in the landscape significance, because of their poor health and poor structure.

The Tree's Retention Value (TRV) was estimated using TRV categories and subgroups, from Morton, A, (2006) *Determining the Retention Value of Trees on Development Sites*. The fifty-nine (59) trees to be removed have a **Priority for Removal,** because they are within the design layout of the proposed buildings and the car park areas.

The construction impact for the proposed construction of the two buildings, for the fifty- nine (59) trees to be removed will be **Impact – Remove**, which means these trees are within the footprint of the proposed design and will require removal to facilitate the design.

Arboricultural Impact Assessment

This Arboricultural Consultant's inspection of the one hundred and twenty-six (126) trees located within and near the subject property, found most of them to be in poor to good health and poor to fair structural condition.

This Arboricultural Consultant reviewed the construction site plan for this project. Along with the 360° Walkover tree inspection this was enough information, at the time, to provide the impacts and protection measurements required for the sixty-five (65) retained trees including the twenty-two (22) trees that are council verge trees or found along the river foreshore.

Construction Impact for the REMOVAL of **Trees No. 17, 18, 19, 20, 21, 24, 28, 31, 34, 39, 41, 42, 44, 46, 48, 49, 55 - 66, 68, 73, 76, 81, 86, 90, 98, 99, 100,** and the **fruit trees** between the retained trees No. 73 and 82. The construction impact for the proposed construction of the buildings, on these trees will be **Impact – Remove.**

Impact – Remove, means these trees are within the footprint of the proposed design and will require removal or to be transplanted to facilitate the design.

NOTE: This would exclude the twenty-six (26) Trees No. 9, 12, 19, 22, 25, 26, 29, 30, 32, 33, 36, 37, 38, 40, 43, 45, 47, 52, 67, 70, 79, 80, 87, 88, 89 and 113 that were found to be poor structural condition to severely declined, morbidly dead, completely dead, have fallen over or are dangerous, and which must also be removed.

Construction Impact on the RETAINED Trees **No. 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 13, 24, 15, 16, 23, 27, 35, 69, 71, 72, 74, 75, 77, 78, 84, 91, 92, 93, 94, 95, 96 (Group of 5 trees).**

The Crossover on Roe Road:

The construction impact for the proposed construction of the crossover near **trees No. 1** and **2** is **Impact – Major, Viable.**

The Reception and Clubhouse and Men's Shed:

The construction impact for the proposed construction of the Reception and Clubhouse and Men's Shed near **trees No. 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16** is **Impact – Major, Viable.**

The Car Park areas near the Short Stay Reception two Short Stay Accommodation Buildings:

The construction impact for the proposed construction of the Car Park areas near **trees No. 23, 69, 72, 74, 75, 77, 78, 84, 91, 92, 93, 94, 95, 96 (Group of 5 trees),** is **Impact – Major, Viable.**

Impact – Major, Viable, means the proposed design has a TPZ area encroachment greater than 10%, and/or may impact the SRZ. These trees are expected to remain viable because of the following:

- Alternative construction methods are proposed which will reduce the impact on these trees.
- A non-destructive excavation will take place to reduce root distribution in the proposed area of works.
- Site conditions have limited root development within the proposed area of works.

The Short Stay Reception and the two Short Stay Accommodation Buildings:

The construction impact for the proposed construction of the Short Stay Reception and the two Short Stay Accommodation near **trees No. 27** and **85** is **Impact – Minor**.

Impact – Minor, means the proposed design has a TPZ area encroachment that is less than 10% and does not impact the SRZ. These trees are expected to remain a viable component with the establishment of a TPZ prior to the commencement of construction works.

The Short Stay Accommodation on the East side of the Existing Tavern:

The construction impact for the proposed construction of the Short Stay Accommodation near **trees No. 50, 51, 53, 54, 107, 108, 109, 110, 111** and **112** is **None or No Impact.**

The Existing Tavern:

This Arboricultural Consultant is unaware of any construction at the existing Tavern near **trees No. 82, 83, 97, 101 - 106.** Therefore, there is **No Impact**, at this present time.

None or No Impact, means the proposed design does not enter the TPZ area. These trees are expected to remain a viable component with the establishment of a TPZ prior to the commencement of construction works.

Tree Management and Protection Plan

By now, there is an understanding that established trees of good to fair health and structure are an asset to any development site. These trees are living organisms that require certain environmental conditions in order to maintain their value as an asset. All trees consist of three main sections: a canopy or crown, a trunk and a root system. Each one of these sections carries out specific functions necessary for the survival of the tree as all of the parts interact. A tree is in a state of physiological equilibrium between the above ground and below ground sections, so that if one of these sections is damaged, the entire tree will suffer, and symptoms may appear in any part of the tree. Thus, damage to the retained trees and any soil disturbance must be avoided or minimized during the construction works with design and engineering procedures to ensure the protection of these trees being in place at all stages. Therefore, any construction that occurs around the retained trees must be carried out in such a way as to minimise the impact on the health of the trees.

Review of the Site Plan

This Arboricultural Consultant reviewed the site plan for this project. Along with the tree inspection on the 22nd and 23rd of July 2025, this was enough information, at the time, to provide the trees' protection measurements required for this project.

The Structural Root Zone (SRZ) and the Tree Protection Zone (TPZ)

The Structural Root Zone (SRZ) and the Tree Protection Zone (TPZ) must be considered during the construction works near the retained trees. All construction workers need to be notified about the **SRZ** and the **TPZ** prior to commencing any works near these trees.

The **SRZ** is the area required for tree stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. Tree roots could be injured by machinery such as excavators, bobcats, trench diggers etc. causing root damage, therefore a SRZ area of a tree is required for tree stability and root anchorage. Cutting, severing, or damaging of any roots within this zone may cause the tree to become unstable, due to the wind movement of the canopy placing an increased loading on the root plate, and/or due to a dramatic decline in the tree's health and vitality. **NOTE:** The SRZ considers a tree's structural stability, but the larger TPZ area is required for a tree's vigour and long-term viability.

This arboricultural report adopts Australian Standards (4970-2009) "*Protection of trees on development sites*" as the preferred SRZ tree protection method. This method provides a SRZ distance (radius from trunk centre) by using the trunk's diameter measurement at the base, just above the root buttress. The formula for the SRZ is, $R_{SRZ} = (D \times 50)^{0.42} \times 0.64$. In the SRZ calculation the "R_{SRZ}" represents the SRZ radius and the "D" represents the trunk diameter. **NOTE:** The minimum SRZ should be no less than 1.5m.

Using the Australian Standards (4970-2009) "*Protection of trees on development sites*", we are able to calculate the SRZ area of each tree which is required for tree stability. The structural root zone (**SRZ**) calculation for all the trees on this property can be found on the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**, highlighted in **GREEN.** The SRZ calculations must be drawn onto the site plan.

The **TPZ** is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and the canopy area requiring protection. The TPZ is an area isolated from demolition or construction disturbance, so that the tree remains viable. The TPZ is a restricted area

for parking vehicles and machinery equipment, excavation works, storage and preparation of chemical and/or cement products, spillage of toxic materials on the roots, trunk, soil level changes and physical damage to the trees.

This arboricultural report adopts the Australian Standards (4970-2009) "*Protection of trees on development sites*" as the preferred tree protection method. This method provides a TPZ distance (radius from trunk centre) by multiplying the trunk's DBH measurement, at a height of 1.4m, by twelve. The calculation represents TPZ = DBH X 12. **NOTE:** The TPZ should not be less than 2m nor greater than 15m.

Using the Australian Standards (4970-2009) "*Protection of trees on development sites*", we are able to calculate the tree protection zone area of each tree which is the principal means of protection for the tree's canopy, branches, trunk and root system. The Tree Protection Zone (**TPZ**) calculation for all the trees on this property can be found on the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**, highlighted in **YELLOW.** The TPZ calculations must be drawn onto the site plan.

Tree Protection Fences

VERY IMPORTANT: Before the construction work starts, the temporary Tree Protection Fences and Tree Protection Signs must[1] be installed around each retained tree. The portable Tree Protection Fences must be installed **2-3m** from the tree trunk/s. In addition, the fence must be at least **1.8m** high and stay in place during the construction works. Tree Protection Signs must be placed around the edge of the fences and be visible from within the construction site (**See Diagrams 1 and 2**). The Tree Protection Signs can be printed and laminated (See **Tree Protection Signs** on **page 22**). The Tree Protection Fences acts as a physical and visual reminder to protect the trees during the construction works. It reduces root compaction because no vehicles/machinery and material can be parked or stored within the TPZs; It also reduces spillage of toxic materials on the roots and trunk, and physical damage to the trees.

The designated TPZ of each tree is recommended to be clearly marked out and/or fenced off from the site in accordance with the Australian Standards (4970-2009) "*Protection of Trees on Development Sites*" guidelines prior to any construction, machinery or materials being brought onto the site, and certainly before construction works commence.

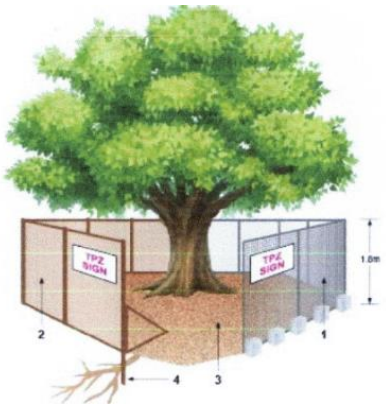


Diagram 1 Diagram source AS 4970-2009 Guidelines

1 All throughout this report, the use of the word, "must" underlined, makes it clear that tree protection is very important.

This Arboricultural Consultant recommends the steel panel fencing with the plastic-coated concrete footings or chain wire fencing with star pickets, which all comply with the Australian Standards (4687-2007) "*Temporary Fencing and Hoardings*".

Diagram 2 Diagram source AS 4687-2007

AS 4970-2009 Compliance Monitoring and Reporting

After the Tree Protection Fences and the Tree Protection Signs have been installed, a delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must undertake a **Pre-construction Arboricultural Compliance Report No. 1.** This states that the tree protection fences and signs have all been installed and that the tree protection measures comply for the retained trees, which includes taking photos as evidence, in accordance with the Australian Standards (4970-2009) *Protection of Trees on Development Sites*, Sections 3.3.3 and 5.4.3). This Brief Email Report must be submitted to the Local Government Authority.

Failure to Comply Notice

Any failure to comply with the tree protection recommendations is a *breach* of the AS 4970-2009 *Protection of Trees on Development Sites* (p. 4) and an *offence* under the *Planning and Development Act 2005* (s. 216). Such a breach or offense may result in the stopping of the demolition and/or the construction works and/or an *infringement notice* of $500.00 (s. 42 of the *Planning and Development Regulations 2009*), or "a *fine* of $200,000.00 and, in the case of a continuing offence, a *further fine* of $25,000.00 for each day during which the offence continues" (s. 223).

Tree Bonds

Therefore, this Arboricultural Consultant recommends that a $500.00 tree bond be placed onto the contractual conditions for the building contractor and every other contractor that is involved in this project. These bonds should be sent to the Local Government Authority and returned after the Completion Certification Report No. 2. These bonds should act as a deterrent and a reminder to protect the retained trees during the construction works.

This Report Must be Available Onsite:

This entire Arboricultural Report must be available onsite, prior to the commencement of and during the construction works. The Tree Management and Protection Plan will identify key stages where monitoring and certification will be required in accordance with the Australian Standards (4970-2009) *Protection of Trees on Development Sites*, in section 5 "Monitoring and Certification" 5.2.

Encroachments

Prior to the commencement of any excavation and/ or construction works near the retained tress, the encroachments into the TPZ's must be considered.

Minor Encroachments - Any excavation and/ or construction encroachments into the TPZs that are less than 10% of the area of the TPZ and are outside the SRZ will not require detailed root investigation. The area lost to this encroachment should be compensated elsewhere. For example, an excavation and/ or construction encroaching 10% of the TPZ should be compensated on the other side of the tree.

Major Encroachments - Any excavation and/ or construction encroachments into the TPZ that are greater than 10% of the area of the TPZ or are inside the SRZ to any extent are considered major encroachments and will require detailed root investigation by the consulting arborist to ensure the ongoing viability of these trees. This follows Section 3.3 of the Australian Standards (4970-2009) "*Protection of Trees on Development Sites*".

VERY IMPORTANT: - This Arboricultural Consultant must demonstrate that these trees would remain viable. Therefore, within any **major encroachments**, ***vacuum excavation*** is the recommended method for construction works within the TPZ encroachments.

Nevertheless, outside the TPZ area, **Mechanical** excavation can be used.

AS 4970-2009 Compliance Monitoring and Reporting

IMPORTANT: For any construction works within a **major encroachment**, a delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must be present, during the soil vacuum excavation, to demonstrate that the retained trees would remain viable. Documenting the encroachments, taking photos to go into a **Brief Email Report**, in accordance with the Australian Standards (4970-2009) *Protection of Trees on Development Sites*, Sections 3.3.3 and 5.4.3). This Brief Email Report must be submitted to the Local Government Authority.

Any Damage to the Retained Trees During the Construction Works

Any damage to the protected trees, during the construction works must be reported immediately to the site supervisor, who must then immediately report it to the delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens. Documenting the damage, taking photos to go into a **Brief Email Report**, in accordance with the Australian Standards (4970-2009) "Protection of *Trees on Development Sites*", "Actions and Certification" in TABLE 1, Section 4 and 5 and Section 5.4.2 and 5.4.3). This report also must be submitted to the Local Government Authority.

How Construction Work Damage Trees?

The root system of trees are typically shallow and widespread as shown below.

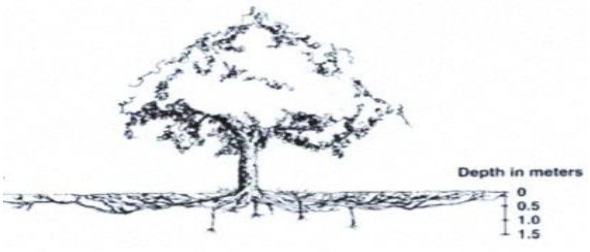


Image source: Harris, R. et.al. (2004) Arboriculture, Prentice Hill.

Disturbance to a tree's root system and surrounding soil from construction activities can ***impact*** tree health, strucural integrity and aesthetics. This may lead to an increase in branch failure and may even cause whole tree failure. Impacts of construction works can be difficult to repair, and it may take several years for a tree to display the full impacts of development.

All parts of the tree, including its root system, surrounding soil, the trunk and branches may be damaged by development and construction activities, including:

- Excavation including cut and fill.
- Soil compaction from vehicle movements or material storage.
- Mechanical trenching for footings or services.
- Sealing of surfaces with impermeable material

If any of these activities occur near a tree on a construction site, these could be in Tree Damaging Activities. To avoid this damage, ensure that trees are protected during development.

Photo: Showing tree root damage from service trenching within the TPZ.

Construction Completion

On completion of the construction the Site Supervisor must remove the Tree Protection Fences from around the retained trees. This Arboricultural Consultant must re-visit the site and provide the Local Government Authority with a **Completion Certification Report No. 2** that the tree protection measures have been removed and to verify the retained trees' health, structural condition and safety, in accordance with the Australian Standards (4970-2009) "Protection of *Trees on Development Sites*". Failure to do this could hold up the Building Work 'Notice of Completion'.

Construction Methodology

The following construction methodology near the **RETAINED** trees must be followed.

Construction of the Post and Pole Footings for the Reception and Clubhouse

The excavation of the proposed post and pole footing works near **trees No. 7, 8, 10, 11, 13** and **14** are within the TPZ's of these trees. The excavation works must be done by ***hand or vacuum excavation***. However, if any tree roots are discovered in the trench poles, they must be cleanly pruned.

VERY IMPORTANT: These trees are located precariously on the top of a steep riverbank. They are potentially dangerous and on the east side (near the riverbank) the tree roots have been established on the steep embankment, where the tree's roots are on the west side (the side where the reception and clubhouse has been proposed). Therefore, the root system of each tree is under a large amount of tension to keep them upright. Any severing of major anchor roots could render these large trees unstable.

Outside the **TPZ** area **Mechanical excavation** can be used.

Construction of the Bin area near **tree No. 3**

No excavation is to be undertaken for the bin area near tree No. 3. Place yellow sand on top of the existing soil, level it out by hand and lay the concrete pad onto the yellow sand.

IMPORTANT: Tree No. 3 leans slightly towards the north, there the tension in the tree root is on the south side.

Construction of the Footings for the Short Stay Reception and the Short Stay Accommodation Buildings

The excavation of the proposed footing works near **trees No. 23, 36, 72** are outside the TPZ's of these trees. However, if any tree roots are discovered in the excavation, they must be cleanly pruned.

Construction of the Footings for the Car Park areas near the Short Stay Reception

The excavation of the proposed carpark works for the Short Stay Reception near and around **trees No. 27, 69, 72, 75, 77, 78, 84, 85, 91, 92, 93, 94, 95, 96 (Group of 5 trees),** within the TPZs must not damage any of the tree roots to minimise the detrimental impact to these trees. Therefore, this Arboricultural Consultant recommends first the use of manual excavation controls (e.g., ***vacuum excavation***), when undertaking the preparation of these carparks.

NOTE: The road base material must be clay and must be laid on top of the existing soil. No limestone road base is to be used, because it will change the pH in the soil and would be toxic to these trees.

Then use a Mini tracked machine with a flat bladed bucket to undertake the earthworks in close proximity to these retained trees to minimise any root damage, using a spotter at all times, to avoid damaging any exposed tree roots. When using a bobcat, it must be driven in a forward and backwards motion and no turning is to be carried out within the **TPZ** radius from these trees, always using a spotter at all times. This will ensure that the soil and/or the clay road base are not dug into when turning which will rip and tear surface roots. Any excavated soil must not be stored or built up around the trunks of these trees.

The car park bitumen must be constructed with permeable material for better water/rain penetration into the soil.

The car park islands near the trunk of these trees must not change the soil levels around the trunk's bases, it must not be raised or lowered.

For any excavation and/or construction outside the **TPZs** mechanical excavation can be used. Always use a spotter to prevent ripping tree roots out of the soil. Any tree roots that might need to be removed must not to be cut without permission from the delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens, which then must provide the Site Supervisor/Manager with a **Brief email report** on any unforeseen issues that may arise.

Construction of the Crossover on Roe Road:

The excavation of the proposed crossover works near **trees No. 1 and 2** are within the **SRZ** and the **TPZ** areas of these trees. Therefore, ***vacuum excavation*** must be the method for this excavation works.

VERY IMPORTANT: No mechanical excavation is to be used for the crossover works, whatsoever. Also, no chemicals, solvents, fuel, oil, herbicides, machinery or vehicles to be parked or stored or parked within all **TPZ** areas.

After the ***vacuum excavation*** has been completed the delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must provide the Site Manager/Supervisor with on-site tree advice and a **Brief Email Report** to determine which roots to remove to ensure these trees are stable.

The road base material must be made of clay and must be placed within and/or under the tree roots. (No limestone road base is to be installed, because that will change the pH in the soil). After the clay road base, lay the yellow sand for the brick pavers. This Arboricultural Consultant recommends using permeable pavers for the crossover. This will allow the winter rain to penetrate into the soil in the crossover area.

Construction of the Short Stay Accommodation on the East side of the Existing Tavern:

The excavation of the proposed footing works near **trees No. 35, 36, 50, 51, 53, 54, 107, 108, 109, 110, 111** and **112** are outside the TPZ's. However, if any tree roots are discovered in the excavation, they must be cleanly pruned.

Landscape Construction

All landscape construction works within the SRZ and the TPZ must not cut or damage any of the tree roots. Within the SRZs and the TPZs, reticulation trenches must be done by ***vacuum excavation*** or by ***hand*** and must not cut or damage the tree roots.

Any Other Construction within the TPZ

Any construction and/or excavation trenches near the **RETAINED** trees within the **TPZ** radius must not damage the tree roots or any other part of the tree. The excavation works must be done by ***hand or vacuum excavation***. Outside the **TPZ** area **Mechanical excavation** can be used.

Conclusion

Established trees in good health and structure, are considered an asset, and must be protected, prior to and during the construction works. Consequently, damage to these trees and any soil disturbance must be avoided or minimized, during the construction. Works are to be carried out in such a way as to minimise the impact on the health of each tree.

All the trees in this Tree Survey have been tagged and numbered, and their location has been placed onto the separate site map and the plan titled, **Site Map - Capel Drive, Capel** and **Site Building Plan - Capel Drive, Capel.**

The tree data spreadsheets for this Tree Survey can be found on separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**.

All the tree photographs can be viewed on the separate photographic file titled, **Photographs - Capel Drive, Capel**.

All the above can be downloaded onto your devices for convenient access in the office and/or out in the field.

Trees to be Removed:

There are 61 trees that must be **REMOVED**. All the trees to be removed are highlighted in **RED** on the separate site map titled, **Site Map - Capel Drive, Capel**.

Justification for Removing Trees:

Out of the 61 trees to be removed within the subject property, there are fifteen (15) trees that were found to be severely declined, morbidly dead, completely dead, have fallen over or are dangerous and three (3) trees were found to be noxious weeds.

This Arboricultural Consultant's inspection of the sixty-one (61) trees to be removed within the subject property for the proposed construction of the short stays, short stay recreation, carparks and the over 55 buildings, found most of these trees to be in poor to fair health and very poor to poor structural condition. Along with these are the trees that are severely declined, morbidly dead, completely dead, have fallen over or are noxious weeds.

The fourteen (14) trees that were found to be in fair to good health and fair to good structural condition are within the design layout of the proposed buildings and car park areas.

The sixty-one (61) trees to be removed have a LOW viability in the landscape significance, because of their very poor to fair health and very poor to fair structural condition.

The sixty-one (61) trees to be removed have a Priority for Removal, because they are within the design layout of the proposed buildings and the car park areas.

The construction impact for the proposed construction of the two buildings, for the sixty-one (61) trees to be removed will be Impact – Remove, which means that these trees are within the footprint of the proposed design and will require removal to facilitate the design.

It is this Arboricultural Consultant's opinion that the above are sound arboricultural justifications to remove the 61 trees and should satisfy the *Shire of Capel,* in accordance with the Australian Standards (4970-2009) "Protection of *Trees on Development Sites*".

Trees to be Retained:

There are 65 trees that must be **RETAINED** and protected. All the retained trees are highlighted in **BLUE** on the separate site map titled, **Site Map - Capel Drive, Capel.** This Arboricultural Consultant's inspection of these trees found them to be in fair to good health and structural condition and worthy to be retained.

This Arboricultural Consultant also provided the tree numbers on the plan titled, **Site Building Plan - Capel Drive, Capel**, for the architects to view and place onto their plans.

IMPORTANT: Ten (10) **Trees No. 1, 2, 95, 97, 101, 102, 103, 104, 105** and **106** are council verge trees, which are the property of the Shire of Capel, and each tree has an asset value. These trees must be protected and not removed or pruned.

Eleven (11) trees are outside the subject property, **along the river foreshore** presuming they are also the property of the Shire of Capel, and each tree has an asset value. These are **Trees No. 107, 108, 109, 111 (group of 6 trees), 112,** and **113. NOTE: Tree No. 113** is a dead tree and should be removed by the Shire of Capel for the safety and welfare of the construction workers.

Construction Impact on the RETAINED:

The construction impact for the proposed construction of the Reception and Clubhouse near **trees No. 3, 4, 5, 6, 7, 8, 10, 11, 13, 14, 15, 16** is **Impact – Major, Viable.**

The construction impact for the proposed construction of the Car Park areas for the Short Stay Reception near **trees No. 23, 69, 72, 74, 75, 77, 78, 84, 91, 92, 93, 94, 95, 96 (Group of 5 trees),** is **Impact – Major, Viable.**

The construction impact for the proposed construction of the crossover near **trees No. 1** and **2** is **Impact – Major, Viable.**

Impact – Major, Viable, means the proposed design has a TPZ area encroachment greater than 10%, and/or may impact the SRZ. These trees are expected to remain viable because of the following:

- Alternative construction methods are proposed which will reduce the impact on these trees.
- A non-destructive excavation will take place to reduce root distribution in the proposed area of works.
- Site conditions have limited root development within the proposed area of works.

The construction impact for the proposed construction of the Short Stay Reception and the two Short Stay Accommodation near **trees No. 27,** and **85** is **Impact – Minor**.

Impact – Minor, means the proposed design has a TPZ area encroachment that is less than 10% and does not impact the SRZ. These trees are expected to remain a viable component with the establishment of a TPZ prior to the commencement of construction works.

The construction impact for the proposed construction of the Short Stay Accommodation near **trees No. 50, 51, 52, 53, 54, 107, 108, 109** and **112** is **None or No Impact.**

This Arboricultural Consultant is unaware of any construction at the existing Tavern near **trees No. 82, 83, 97, 101, 102, 103, 104, 105, 106.** Therefore, there is **No Impact**, at this present time.

None or No Impact, means the proposed design does not enter the TPZ area. These trees are expected to remain a viable component with the establishment of a TPZ prior to the commencement of construction works.

Tree Protection Fences and Sign for the Retained Trees:
Prior to the construction works the Tree Protection Fences and the Signs must be installed around the retained trees, which are highlighted in the **RED** squares or lines on the separate site map titled, **Site Map - Site Map - Capel Drive, Capel**.

Tree Surgery Works:
Prior to the start of the construction works, all tree surgery works should be undertaken by a (minimum AQF level 3) qualified and experienced tree surgeon and must comply with Australian Standards (4373 2007) "Pruning of Amenity Trees". The tree surgery list can be found on separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**, along with the separate site map titled, **Site Map - Capel Drive, Capel**. **NOTE:** All the trees to be removed are highlighted in **RED**.

Compliance Monitoring and Reporting:
After the Tree Protection Fences and the Signs have been installed around single trees or installed around groups of trees, and after the tree surgery works are completed, a delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must undertake a **Pre-construction Compliance Report No. 1** that the tree protection measures and the tree surgery works do comply to the Australian Standards (4970-2009) "*Protection of trees on development sites*". Failure to do this will hold up the start of the construction works.

The TPZ and SRZ:
The Tree Protection Zone (**TPZ**) calculations [highlighted in yellow] and the Structural Root Zone (**SRZ**) calculations [highlighted in green] for each **RETAINED** tree, can be seen on the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Cape**.

The TPZ and the SRZ calculations must be drawn onto the site plan.

VERY IMPORTANT: These Protection Zones must be maintained prior to and during the construction works.

This Report Must be Available Onsite:
This entire Arboricultural Report must be available onsite prior to the commencement of the demolition works and all through the construction works. The Tree Management and Protection Plan and the Construction Methodology will identify key stages where monitoring and certification will be required, in accordance with the Australian Standards (4970-2009) "*Protection of Trees on Development Sites*", in section 5 "Monitoring and Certification" 5.2.

Construction Methodology:
IMPORTANT: Following the Construction Methodology as seen on **pages 13** to **14** is essential. If any of the retained trees are damaged and/or die by any construction/building company, the Shire of Capel and the owners of the subject property may seek reimbursement for the Helliwell tree valuation for the tree/s.

Major Encroachments:
Any excavation and/ or construction encroachments into the TPZ that are greater than 10% of the area of the TPZ or are inside the SRZ must use ***vacuum excavation*** method, according to the Australian Standards (4970-2009) "*Protection of Trees on Development Sites*".

Nevertheless, outside the TPZ area, **Mechanical** excavation can be used.

Any Damage to the Retained Trees:

Any damage to the protected trees, during the construction works must be reported immediately to the site supervisor, who must then immediately report it to the delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens. They must document the damage, taking photos to go into a **Brief Email Report**, in accordance with the Australian Standards (4970-2009) "Protection of *Trees on Development Sites*", "Actions and Certification" in TABLE 1, Section 4 and 5 and Section 5.4.2 and 5.4.3). This report also must be submitted to the Local Government Authority.

Compliance Monitoring:

The delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must inspect these trees sometime during the construction works, if any excavation works are within any major encroachments, or any unforeseen issues that may arise, inside the TPZ, to document and demonstrate that these trees would remain viable, by providing a **Brief Email Report**, in compliance with the Australian Standards (4970-2009) "*Protection of Trees on Development Sites*". This report should then be submitted to the Local Government Authority.

Construction Completion:

On completion of the construction the Tree Protection Signs must be removed, and this Arboricultural Consultant must provide the Local Government Authority with a **Completion Certification Report No. 2**. This documents that the tree protection measures have been removed and verifies the trees' health, structural condition and safety of the retained trees, in accordance with the Australian Standards (4970-2009) "Protection of *Trees on Development Sites,*" in "Actions" in section 2 and 5.4.3 in section 5. Failure to do this could hold up the Building Work 'Notice of Completion'.

This information has been provided as a record of the trees before the construction works; to help understand the risks to the trees, and their potential future impacts. It also gives recommendations for construction methodology based on the potential future impacts on the trees and the necessary Tree Protection measures.

It is this Arboricultural Consultant's opinion that if the recommended **Tree Management and Protection Plan** on **pages 8** to **12**, the **Construction Methodology** on **pages 13** to **14**, and the following **Recommendations** on **pages 19** and **20** are followed, the retained trees will not be adversely affected.

Recommendations

Pre-Construction

Print Out the Entire Report. This report must be available onsite prior to the commencement of and during the construction works.

Tree Removal and/or Pruning Works. Prior to any construction works, the tree surgery works must be done, as presented on the separate spreadsheets titled, **Tree Data Spreadsheets - Capel Drive, Capel**, along with the separate site map titled, **Site Map - Capel Drive, Capel**. The tree removal and pruning works are to be carried out by a qualified Arborist minimum (AQF level 3), in accordance with the Australian Standard 4373-2007 "*Pruning of Amenity Trees*".

NOTE: All the trees to be removed are highlighted in **RED.**

Tree Protection Signs. Prior to the construction works, the Tree Protection Fences and the Tree Protection Signs must be installed around the retained trees. The signs can be printed and laminated (See **Tree Protection Signs** on **page 22**).

Compliance Monitoring. After the Tree Protection Fence, and the Tree Protection Signs have been installed, and the tree works have been completed, a delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must undertake a **Pre-construction Compliance Report No. 1** that the tree protection measures and the tree surgery works do comply to the Australian Standards (4970-2009) "*Protection of trees on development sites,*" under "Actions" in section 2 and 5.3.1, 5.4.2, 5.4.3.

Construction

The **Tree Management and Protection Plan**, on **pages 8** to **12** and the **Construction Methodology** on **pages 13** to **14** must be used at the critical stages of construction around the retained trees. This includes any construction works that have Major Encroachments.

Compliance Monitoring. This delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens must be present, during the soil vacuum excavation within any major encroachments, to document and demonstrate that these trees would remain viable, by providing a **Brief Email Report**, in compliance with the (AS 4970-2009) "*Protection of trees on development sites*".

Any Damage to the Retained Trees, during the construction works must be reported immediately to the site supervisor, who must then immediately report it to the delegated employee from the Shire of Capel's Planning Department or from the Parks and Gardens. They must document the damage, taking photos to go into a **Brief Email Report**, in compliance with the (AS 4970-2009) "*Protection of trees on development sites*".

> The quote for travelling to Capel and back, the site inspection and the **Brief Email Report** is **$1,750.00** + GST, for each time.

Construction Completion

On completion of the construction works, the site supervisor must remove the Tree Protection Fences, this Arboricultural Consultant must provide the Local Government Authority with a **Completion Certification Report No. 2** that the tree protection measures have been removed and verify the trees' health, structural condition and safety, in accordance with the Australian Standards (4970-2009) "Protection of *Trees on Development Sites,*" under "Monitoring and

Certification" 5.2 and 5.3.1, 5.4.2, 5.4.3 in section 5 and section 2, Table 1, Post construction (section 5). Failure to do this could hold up the Building Work 'Notice of Completion'.

The quote for travelling to Capel and back, the site inspection and the **Completion Certification Report No. 2** is **$1,750.00** + GST.

Further Alterations to this Report:

Any amendments to this report, to the Arboricultural Report and/or email correspondence and/or Re-inspections are at an Hourly Tree Inspection Rate of $175.00/hr + GST, including travel.

Phillip Matthews (Principal Arboricultural Consultant)
Dip. Hort (Arbor), B. Min, M.A. (AQF Level 9)
Arborology WA Arboricultural Consultants
Qualified Tree Protection & New Tree Planting Specialist
Certified Tree Health & Structural Integrity Expert
Email: **phillip.arborologywa@gmail.com**
Phone: **040 342 3377**
Website: **www.arborologyWA.com.au**

QTRA Quantified Tree Risk Assessment **QTRA No. 2726**

Liability limitations

This tree report remains the property of Phillip Matthews (Arboricultural Consultant) as the author of this report and would prefer that this report not be shown copied or distributed onto social media without his prior written permission. The contents of reports such as tree heights, life expectancies and ages of trees are approximate. Trees are inspected from the ground only. The findings of this report are preliminary in nature. Activities such as taking root samples for laboratory analysis are not taken unless by prior arrangement. Sketches or not-to-scale drawings, photos and maps are usually provided with the report for illustration purposes only. All duty of care has been taken to gather this information, nevertheless. No responsibility is accepted for any errors of fact or omissions which appear in this report which result from incorrect or incomplete information supplied to Phillip Matthews by the parties involved in the project. Due to the changing nature of trees and other site circumstances, this report and any recommendations made are limited to a 12-month period. Any alteration to the site and any new development proposals could change the current circumstances and may invalidate this report and any recommendations made. No employee of or Phillip Mathews shall be required to give testimony or to attend court because of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services. If due to limitations in your instructions any amendments to the report or reinspection are required to be carried out, travel to and from site and the revisit hours will be invoiced at the hourly rate of $175.00. Phillip Matthews (Arboricultural Consultant) accepts no liability due to the loss of, or damage to, or the failure of, the subject of this advice.

Insurances:

Professional Indemnity	AON	$5,000,000.00
Public Liability	AON	$5,000,000.00
Personal Accident Insurance	AON	
Motor Vehicle	RAC	

Police Checks:

National Police Certificate	Valid as at 13/06/2023
Working With Children Check	Expiry Date 7/02/2024

Industry Certifications and Licenses:

Construction Induction Issued 16/08/2018
QTRA Guide to Visual Tree Assessment
Power Line Safety
Urban Tree Management in WA
Traffic Management
EWP Operator High Risk Work
St John First Aid 21/09/18

COVID – 19 Vaccination:

Phil has received all require **COVID 19** vaccines. (1st) April, (2nd) July, (3rd) December 2021 and (4th) August 2022.
Phil has received all require **Influenza** vaccines. April 2020, April 2021, April 2022, April 2023, Jun3 2024 and May 2025.

Tree Protection Zone

KEEP OUT

Contact:

Arborology WA
Arboricultural Consultants

040 342 3377

Appendix 1: Author's Qualifications & Experience

Phillip Matthews is an AQF level 5, Consulting Arborist, Dip Hort (Arbor), QTRA VTA and Urban Tree Management in WA trained, with a B.Min, Grad Dip.Min and an AQF Level 9, Master of Arts (See the following pages).

Phil has worked within the arboricultural and horticultural profession for over 30 years in Perth. He has worked closely with Local and State Government Departments, Demolition Companies, Builders, Developers, Architects, Landscape Architects, Engineers, Environmental and Ecological Consultants, Strata Managers, Real Estate Consultants, Golf Courses, Schools, Colleges, Universities and Retirement Villages. He is a well-qualified tree protection, root mapping, new tree planting, tree health and structural integrity expert. He has a passion for sustainable urban canopy forest both now and in the future.

His work ranges from individual expert tree inspections to managing trees on major multimillion-dollar housing developments and infrastructure projects. His work often involves trees with preservation orders, tree surveys for tree protection on development sites and tree selection for new tree plantings DA's. This involves tree inspections, tree risk assessments, structural integrity and safety assessments, Arboricultural Forensic Investigation Helliwell tree valuations, new tree planting selection, root mapping, Preliminary Tree Surveys (Pre DA), building arboricultural reports (For DA), arboricultural impact assessments, construction methodology and tree protection plans, in accordance with the Australian Standards: (AS 4970-2009) "*Protection of Trees on Development Sites*".

Project and Client List

Street and Park Tree Data Collection – **Street and Park Tree Survey.** Year **2025.**
for the **City of Melville.**
Wollaston Avenue, Haynes Subdivision – **114 Tree Survey, Arboricultural Report** (**AS 4970-2009**)
for **EPCAD Pty Ltd.**
Industrial Development – **113 Tree Survey, Arboricultural Impact Assessment Report** (**AS 4970-2009**),
for **Sarich Building.**
CSR Limited Factory Expansion – **70 Tree Arboricultural Impact Assessment Report** (**AS 4970-2009**) for
Beca Group.
Rockingham Senior High School Carpark Extension – **Arboricultural Impact Assessment Report** (**AS 4970-2009**)
for **Ecoscape Australia.**
Department of Education Asbestos Removal – **6 sites Arboricultural Report** (**AS 4970-2009**)
for **West Coast Construction and Demolition.**
Kemp Street, Pearsall Subdivision – **79 Tree Survey, Arboricultural Reports** (**AS 4970-2009**)
for the **Porter Consulting Engineers** and **Sam Trimboli & Co.**
Street Tree Data Collection – **Street Tree Survey.** Year **2023** and **2024.**
for the **City of Melville.**
Esperance Town – **42 Tree Audit, Arboricultural Report**
for **Shire of Esperance.**
South Hedland Sports Hub Redevelopment – **513 Tree Survey, Arboricultural Reports** (**AS 4970-2009**)
for the **Town of Port Hedland.**
Water Corporation's William Traylen Park – **113 Tree Audit, Arboricultural Report, Tree Works Schedules**
for **The Garden Gurus Landscape Design and Maintenance**.
Point Walter Mountain Bike Trail Project – **54 Tree Survey, Arboricultural Reports** (**AS 4970-2009**)
for **Common Ground Trails** and the **City of Melville.**
Elizabeth Quay Project, Perth – **387 Tree Survey, Arboricultural and Horticultural Reports** (**AS 4970-2009**)
for **CPB Contractors Pty Ltd.**
Thomas Road, Byford - Solar Cable Project – **605 Tree Survey and Arboricultural Report (Pre DA)**
for **Western Power.**
Department of Defence – **RAAF Pearce Demolition Works & CSI Communication Trench Works –**
79 & 94 Tree Survey and Arboricultural Reports (**AS 4970-2009**)
for **Duratec Limited.**
Point Walter Mountain Bike Trail Project – **54 Tree Survey, Arboricultural Reports** (**AS 4970-2009**)
for **Common Ground Trails** and the **City of Melville.**
Madora Bay East Project – **49 Tree Survey and Arboricultural Report (For DA)** (**AS 4970-2009**)
for **Environmental Industries.**

Arborology WA
Arboricultural Consultants

Arbuckle Reserve, Carine – Underground Power Construction Project 42 Tree Survey (AS 4970-2009)
Dragonfly Boulevard, Mandurah – Urban Re-development Project (AS 4970-2009)
Stock Road, Lakelands – Urban Development Project (AS 4970-2009)
Jubata Court, Maida Vale – Urban Re-development Project (AS 4970-2009)
for **Buckby Contracting Pty Ltd.**
Queensland Fruit Fly Baiting
for **Department of Primary Industries and Regional Developments** (37 days between Oct & Dec 2021).

Arboricultural Reports (For DA) Housing Construction (AS 4970-2009)

ACERO Construction Pty Ltd	Domination Homes	New Imperial Co
ADCO Construction	GDD Design Group	Oceancorp
Allstyle Homes	Germano Designs	Perkins Builders
APD&C Pty Ltd	Integrity Development	Pyramid Construction (WA)
Asset Build	IQ Construction	Serneke Australia
BGC Housing Group	Individual Developments	Snell Building Services
Broadhurst & Bott Architects	Integro Homes	Shelford Homes
CARDNO Engineering Services	Jubilee Homes Builders	Summit Homes Group
Customised Projects	Klopper & Davis Architects	Urbanista Planning
Danmar Homes/ Developments	KPA Architects	Waterford PBSA Pty Ltd
Dale Alcock Homes/Projects	Mustang Group	Yuro Building Design
Department of Communities	Now Living	Zircon Living

New Tree Planting Arboricultural Reports (For DA)

Allstyle Homes	Danmar Homes	Element Drafting & Design
Germano Designs	Shelford Homes	Yuro Building Design

Tree Audit/Survey and Arboricultural Report for Tree Works Schedules

Al-Ameen College	Kingsway Christian College	Rehoboth Christian College
Beechboro Christian School	Metropolitan Cemeteries Board	Rockingham Golf Club
Foundation Christian College	Natural Area Consulting	Sun City Country Club
Irene McCormack Catholic College	Perth Bible College	Swan Christian College
Kennedy Baptist College	Providence Christian College	Water Corporation

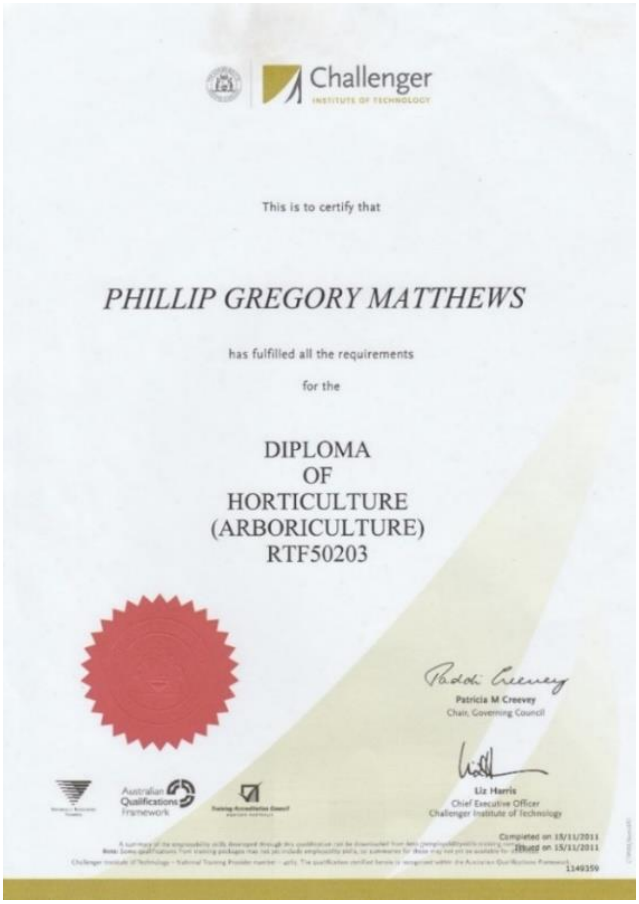
Tree Inspections and Arboricultural Report for Local and State Government Departments

Australian Federal Police	City of Melville	Department of Education
Department of Communities	Department of Defence	Town of Cambridge
Town of Port Hedland	Western Power	Shire of Esperance

Tree Inspections and Arboricultural Report for Environmental, Engineering and Real Estate company's

Environmental Industries	Exal Group Pty Ltd	Engenuity Engineering
Smithwick Strata	Buckby Contracting Pty Ltd	CPB Contractors Pty Ltd
Duratec Limited		

Asset Tree Valuation Surveys and Reports
for **Bethanie on the Park - Retirement village** (271 trees with a tree valuation of $760,000.00)
And 1000's of individual clients



Challenger
INSTITUTE OF TECHNOLOGY

This is to certify that

PHILLIP GREGORY MATTHEWS

has fulfilled all the requirements

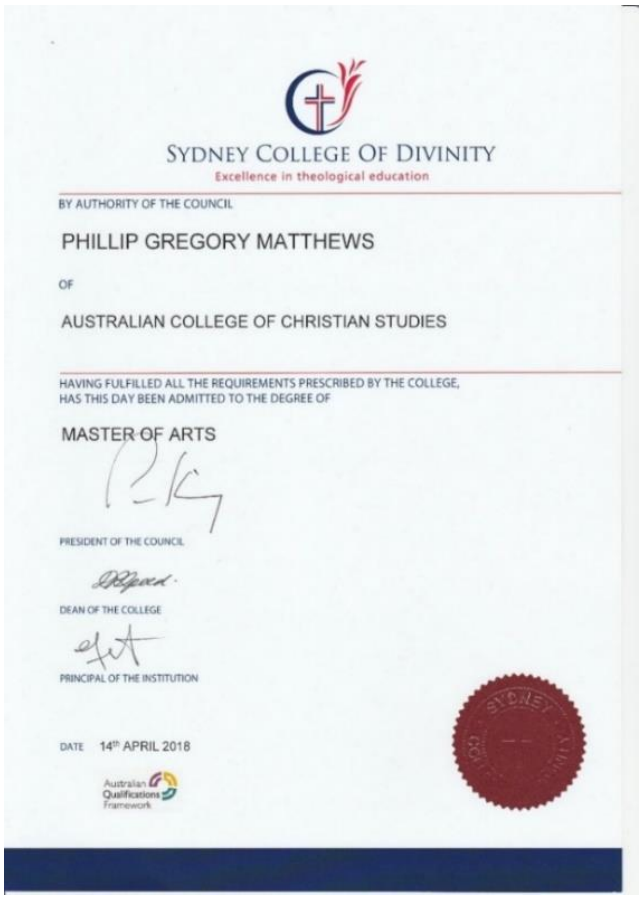
for the

DIPLOMA
OF
HORTICULTURE
(ARBORICULTURE)
RTF50203

Patricia M Creevey
Chair, Governing Council

Liz Harris
Chief Executive Officer
Challenger Institute of Technology

Completed on 15/11/2011
Issued on 15/11/2011



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PHILLIP GREGORY MATTHEWS

OF

AUSTRALIAN COLLEGE OF CHRISTIAN STUDIES

HAVING FULFILLED ALL THE REQUIREMENTS PRESCRIBED BY THE COLLEGE,
HAS THIS DAY BEEN ADMITTED TO THE DEGREE OF

MASTER OF ARTS

PRESIDENT OF THE COUNCIL

DEAN OF THE COLLEGE

PRINCIPAL OF THE INSTITUTION

DATE 14th APRIL 2018

Certificate of Attendance

Quantified Tree Risk Assessment Limited certifies that on the 09 March 2010

Phillip Matthews

attended a course of training entitled

A PRACTITIONERS GUIDE TO VISUAL TREE ASSESSMENT

Signature M. J. Ellison (Director)

09 March 2010
Date

Quantified Tree Risk Assessment Ltd.
9 Lowe Street, Macclesfield
Cheshire, SK11 7NJ, ENGLAND

QTRA

Quantified Tree Risk Assessment Ltd.

Certifies that on 22 March 2011

Phillip Matthews

completed a course of training in the principles and application of the

QUANTIFIED TREE RISK ASSESSMENT SYSTEM

and is a **Representative** of **Registered Licensee Paperbark Technologies**
from **22 March 2011**

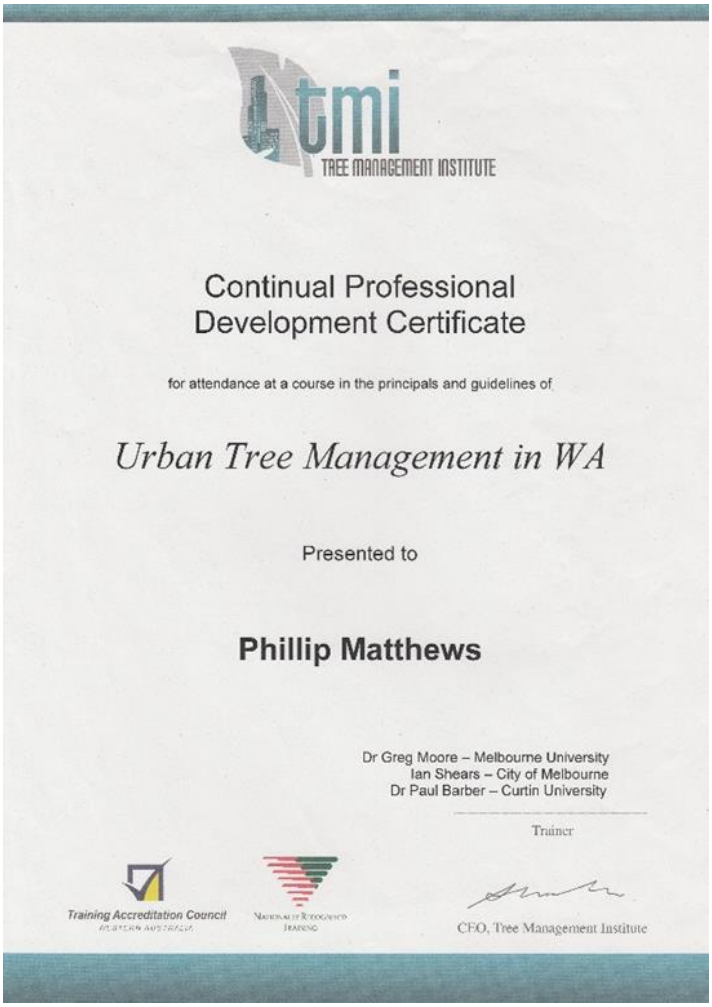
To verify the current status of the Licence please enter the Licence number at 'Check a Licence' in the Licensed User Directory at www.qtra.co.uk

Signature M. J. Ellison (Director)

22 March 2011
Date

Quantified Tree Risk Assessment Limited
9 Lowe Street, Macclesfield
Cheshire, SK11 7NJ, ENGLAND

QTRA
(No 2726)



tmi
TREE MANAGEMENT INSTITUTE

Continual Professional Development Certificate

for attendance at a course in the principals and guidelines of

Urban Tree Management in WA

Presented to

Phillip Matthews

Dr Greg Moore – Melbourne University
Ian Shears – City of Melbourne
Dr Paul Barber – Curtin University

Trainer

Training Accreditation Council

CEO, Tree Management Institute

Appendix 2: The Planning Stages and the Tree Management Process

These stages and processes are according to the AS (4970-2009) "*Protection of Trees on Development Sites*" pages 7-10 and 20 – 22, and under the ***Planning and Development Act 2005*** (s. 216, s. 223) and the **Planning and Development Regulations 2009** (s. 42).

As professionally experienced Project Managers, Builders, Land and Property Developers, you understand councils protect many trees, and these councils will require the submission of **No. 1** the **Preliminary Tree Survey** and **No. 2** the **Arboricultural/Arborist Report** and later **No. 3** the **Arboricultural Impact Assessment** for your Development Application (DA).

According to the AS 4970-2009 "*Protection of Trees on Development Sites*" on pages 7-10, the planning stages on development sites and the tree management process are as stated below.

PLANNING

NOTE: Prior to the demolition of the old house and the construction of the new house.

STAGE 1.

Site Surveyor's Survey - This is done "by a registered surveyor". Survey plans include the location of **ALL** existing trees (AS 4970-2009, 2.3.1, page 8). **Note:** The surveyor's tree survey is not a tree assessment, trees to be retained and it does not display the Tree Protection Zones' (TPZ) to guide the development layout. One finds this information on the "Preliminary Tree Assessment Survey".

STAGE 2.

No. 1 Preliminary Tree Assessment Survey - This "should take place at the beginning of the project, once the surveyor's site survey has been completed" (AS 4970-2009, 1.4.4, page 9). The purpose of this report is to "list **all** the trees, providing a detailed tree assessment", including the trees "for retention" (AS 4970-2009, 2.3.3 on pages 9 - 10). All the trees are to be "assessed by the project arborist" or Arboricultural Consultant (AS 4970-2009, 2.3.2 on page 9), who has a "minimum Australian Qualification Framework (AQF) Level 5 Diploma of Horticulture (Arboriculture)" (AS 4970-2009, 1.4.4, on page 6).

STAGE 3.

No. 2 Preliminary Arboricultural Report or sometime call the **Arborist Report**- This report is not intended to be the comprehensive tree protection report (AS 4970-2009, 1.4.4, page 10). However, this report lists all the trees, providing all the details collected in the previous tree assessment survey. This report looks at what trees to be retained and displays the TPZ's to guide development layout. Then this report should guide the development layout. "Tree protection is most effective when considered at the earliest stage of development planning" (AS 4970-2009, 2.3.3 on page 6).

STAGE 4.

Developer's preliminary design and review of the housing development and or roads, services and landscape design. The Preliminary Arboricultural/ Arborist Report should guide the development layout.(AS 4970-2009, 1.4.4, page 7). When the Arboricultural Consultant is involved in the ongoing review of plans and drawings, it will help determine the potential impacts on the tree/s (AS 4970-2009, 2.3.4 on page 10).

STAGE 5.

No. 3 Arboricultural Impact Assessment- This assessment will recommend measures necessary to protect the tree/s throughout all demolition and construction stages. The Arboricultural Impact Assessment will be prepared once the final layout is complete. It will identify trees to be removed, retained or transplanted. It will identify any impacts on trees to be retained and construction methods to minimize the impacts on these trees where there are encroachments into the TPZ (AS 4970-2009, 2.3.5 on page 10)

NOTE: No. 1 the **Preliminary Tree Assessment** Survey, **No. 2** the **Preliminary Arboricultural/Arborist Report** can all be in one report. Then after the design review, **No. 3** the **Arboricultural Impact Assessment** and **Construction Methodology** are written.

It is necessary for best practice to do these Arboricultural reports before the construction planning stage or the demolition of any buildings or tree removals.

PRE-CONSTRUCTION

STAGE 6.

The arboricultural consultant must instruct the tree pruning workers, prior to starting, and certify the works when completed in a Progress Report, in accordance with the (AS 4970-2009) in 5.3.1. page 20. This report must be submitted to the Local Government Authority.

The TPZ must be marked out on the ground with BLUE marking paint around each tree. The Tree Protection Fence must be installed around the TPZ or at a minimum of **2-3m** around each tree. The Tree Protection fences can be grouped together into one fence, approx. **2m** from the trees. The fences must be at a minimum height of **1.8m**. And the Tree Protection signs must be placed out onto the fences.

On Completion of the Tree Protection Fences. The arboricultural consultant must provide a Pre-construction Verification Progress Report on the tree protection measures to certify that the tree protection measures comply with the tree management plan for each tree, which includes taking photos, in accordance with the (AS 4970-2009) under "Actions" in section 2 and 5.3.1, 5.4.2, 5.4.3 pages 20 - 21). This report must be submitted to the Local Government Authority.

CONSTRUCTION

STAGE 7.

The Tree Management Plan, the Root Management Plan and the Construction Methodology must be used at the critical stages of construction around the SRZ and the TPZs. Regarding the critical stages of construction e.g., the building footings that are near certain trees. The arboricultural consultant must be present during the manual excavation, to demonstrate that the trees will remain viable. This includes documenting any encroachment, taking photos, and providing a Progress Report, in accordance with the (AS 4970-2009), in sections 3.3.3 on page 11 and in "Monitoring and Certification" 5.2 on page 20). This report must be submitted to the Local Government Authority.

CONSTRUCTION COMPLETION

STAGE 8.

The Tree Protection Fences must be removed. The arboricultural consultant must provide a Completion Certification Report that the tree protection fences have been removed and report on the health, vigour and structural condition of the retained trees, taking photos, in accordance with
the (AS 4970-2009) under "Actions" in section 2 on page 8 and 5.4.3 on page 21. This report must be submitted to the Local Government Authority.

DEFECTS LIABILITY PERIOD AND FINAL CERTIFICATION

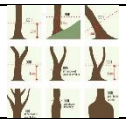
STAGE 9.

This arboricultural consultant must provide Quarterly Reports (over 12 months), on the retained trees, monitoring their vigour and structural condition, providing a report, in accordance with the (AS 4970-2009), under "Actions" in section 2 on page 8, under "Monitoring and Certification" - Post Construction (Section 5 on page 21 and 22). The last inspection is the "Final Certification". These reports must be submitted to the Local Government Authority.

The funding for these reports must be put aside and made available at the required times.

The cost and expense of these reports, the Tree Protection fences, and all the other re-inspections and Certification Reports, might seem to be a lot of extra money, to protect the trees on this development site. However, they are insignificant compared to the *infringement notices* and *fines* under the ***Planning and Development Act 2005*** and the **Planning and Development Regulations 2009**.

Appendix 3: Spreadsheet Explanation

Tree ID Number	Provides the schedule numerical character so the tree's location can be clearly identified on the site map/plan.
Botanical Name	Provides the most used botanical name of the tree specimen.
Height	Provides the vertical distance range between the base of the tree and the tip of the highest branch on the tree. The height of the tree is measured by a clinometer from ground level. Tree heights are in metres.
Spread	Provides the canopy spread (width) measurement from north to south or east to west. Tree canopy spreads are in metres.
Trunk DAB	Provides the trunk diameter measurement (in metres) immediately above the root buttress of the tree specimen. **DAB** = Trunk Diameter Above the Root Buttress.
Trunk DBH	Provides the trunk diameter (in metres, and generally measured at 1.4 metres above ground level) of the tree specimen. **DBH** = Trunk diameter at breast height. 
The Structural Root Zone (SRZ)	The SRZ is the area required for tree stability. Tree roots could be injured by machinery such as excavators, bobcats, trench diggers etc. causing root damage, therefore the SRZ area of a tree is required for tree stability and root anchorage. Cutting, severing or damaging of any roots within this zone may cause the tree to become unstable, due to the wind movement of the canopy placing an increased loading on the root plate, and/or due to a dramatic decline in the tree's health and vitality. The SRZ is the area around the base of a tree essential for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is technically circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area. This arboricultural report adopts the Australian Standards 4970-2009 "*Protection of Trees on Development Sites*" as the preferred tree protection method. This method provides a SRZ distance (radius from trunk centre) by using the diameter of the trunk just above the root buttress, which represents, "D" in the SRZ calculation – $R_{SRZ} = (D \times 50)^{0.42} \times 0.64$.
Tree Protection Zone (TPZ)	The TPZ is the principal means of protecting trees on development sites. The TPZ is a combination of the root area and the canopy area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. This arboricultural report adopts the Australian Standards 4970-2009 "*Protection of Trees on Development Sites*" as the preferred tree protection method. This method provides a TPZ distance (radius from trunk centre) by using the diameter of the trunk at 1.4m, which represents, "DBH" in the TPZ calculation – TPZ = DBH X 12. Using the Australian Standards 4970-2009 "*Protection of Trees on Development Sites*", we can calculate the TPZ area for each tree which is the principal means of protection for the tree's canopy, branches, trunk and root system.
Age class	Provides the tree's age. **Note:** The tree's age does not depend on the tree's health. The tree's age is then placed into one of eight (8) classifications. **Y** Young or juvenile **PM** Post mature **SM** Semi mature **DS** Declined severely **EM** Early mature **A** Ancient **M** Mature **T** Transplanted
Young / Juvenile	A young or juvenile tree is under 2m in height and is easily replaced.

Semi Mature	A semi mature tree would have a single trunk that is greater than 2m in height. Semi mature trees have branched out and may or may not have developed flowers.
Early Mature	An early mature tree is about 2/3 of its expected mature height. The tree has become well developed in the landscape, is normally vigorous and increasing in height. It has increasing landscape significance and may be approaching mature size.
Mature	A mature tree is fully established; the tree is around the middle half of its usual life-expectancy; generally retaining good vigour, vitality, and has branched out and developed flowers. A mature tree has achieved full height and size for the species.
Post Mature	The tree has passed the mature stage of its life and would be considered; (1) very slow in its growth rate and (2) it cannot be disturbed. The tree has insufficient energy reserves to fight decay and pests particularly through pruning cuts or wounds and has poor vigour and vitality.
Declined Severely	The tree is in its last stage of life and has started to lose its capacity to protect itself. It is vulnerable to pests and diseases. The tree should be inspected for branch hazards and may need reduction pruning or to be entirely removed.
Ancient	The tree is very old, has low vigour, and is liable to decline. It may be an important tree, historically or culturally. The tree should be assessed for hazards and may require reduction pruning or total removal.
Transplanted	The tree has been removed from its original site, transported to another site, for the purpose of creating an established tree. Tree transplanting should always be dated.
Tree Health	Each tree was assessed to determine its health and vitality and then placed into one of six (6) categories. **G** Good **VP** Very poor **F** Fair **MDT** Moribund Dead tree **P** Poor **DT** Dead Tree
Good	The tree shows good or outstanding health and vitality for that tree species. The tree displays an overall full canopy of foliage. The foliage colour, size and density, should be characteristic of a healthy tree. The tree is free of pest and disease problems. The tree has a Normal (N) range of vitality for its species and age. The tree is able to produce sufficient carbohydrate and is able to make structurally adaptive growth.
Fair	The tree shows fair health and vitality and is in a reasonable condition for that tree species. The tree displays a satisfactory or adequate canopy of foliage. The tree may display some chlorotic leaves in the canopy and it may have some minor pest damage or disease problems. The foliage colour, size or density may be different from a healthy specimen of that species and age.
Poor	The tree is not growing to its full capacity. The tree may show minor extension growth in the lateral branch structure. The crown may be light, thin or sparse. There may be large amounts of chlorotic or dead leaves throughout the canopy. The tree may display lots of pest and disease problems or the tree may be in decline, indicating signs of stress. The tree cannot produce enough carbohydrate to make structurally adaptive growth. There may be some root damage; Reduced (R) or Poor (P) vitality may indicate the presence of issues such as root death that affect the health and vitality of the tree.
Very Poor	The tree is in decline and the canopy may be sparse or very thin. A significant volume of dead wood may be present in the canopy and pest and disease problems may be causing a severe decline in tree health. Poor vitality may indicate the presence of issues such as root death that could affect the stability of the tree.
Moribund Tree	The tree is at the point of death. A significant volume of dead wood will be present which will be of a size and weight to represent a risk to the surrounding targets. The tree should be totally removed.
Dead Tree	The tree has no life and is dead. A significant volume of dead wood will be present which will be of a size and weight to represent a risk to the surrounding targets. The tree should be totally removed.

Tree Structural Condition	The structural condition of the tree refers to the physiological condition that is observed at the time of inspection. Each tree was assessed to determine its structural condition and then placed into one of five (5) categories. **G** Good **VP** Very poor **F** Fair **FD** Failed **P** Poor
Good	The tree has a healthy and balanced canopy with little or no physiological damage. The branch unions seem to be strongly attached, with no defects or mechanical degradation in the trunk or in the branch limbs. Main branch limbs are well delineated and are not exposed to any new mechanical loads. The tree would be viewed as a good specimen for its kind. The tree has a Normal (N) range of vitality for that species and its age. The tree has good stability.
Fair	The tree has some minor complications in the structure of the canopy. The canopy may be somewhat out of balance, and some branches or branch unions may be showing minor structural physiological damage. The tree has a Reduced (R) vitality from the Normal (N) range for its species and age. The tree may be on a slight lean or be showing insignificant structural faults.
Poor	The tree has a poor structure and perhaps an unbalanced canopy or is displaying large openings. Some branches are not well formed. Branch unions may be structurally poor or physiologically damaged at the attachments. The tree has a Reduced (R) or Poor (P) vitality that may indicate the presence of issues such as root death that could affect the health of the tree.
Very Poor	The tree has a very poor structure and unbalanced canopy with very large holes. Major branches are not well formed. Minor or major branches may be structurally very poor or physiologically damaged at the attachments. The tree has a Very Poor (VP) vitality that may indicate the presence of issues such as root death that could affect the stability of the tree. A portion of the tree has broken off and/or has failed and danger of failure is looming. The tree would be considered physiologically unstable.
Failed & dead	A substantial portion of the tree or the whole tree has failed, and the tree is dead.
Useful Life Expectancy (ULE) From Barrell, J, (1993), *Pre-planning tree surveys*.	The criteria used to calculate the remaining safe useful life expectancy of a tree is based on numerous factors. The key information required for long term planning is how long each tree can be expected to remain on site with an acceptable degree of safety. The assessment for each tree is based on the potential of the species in the locality, and the final assessment made gives particular consideration to the following: • Obvious past influences. • Health and Vitality – present and future potential for the species on the site. • Estimated age in relation to the expected life expectancy for the species. • Structural defects, which may influence the potential life expectancy of the tree or represent a risk factor to the proposed development. On the basis of the above ULE guidelines, trees are allocated an expected useful life expectancy from 1 to 100 years and then placed into one of five (5) categories. **EL Extra-long - 100+ years.** **SM Short to Medium - 10-20 years.** **L Long - 40-100 years.** **S Short - 1-10 years.** **M Medium - 20-50 years.**
Extra-long SULE	**Trees that appear to be retainable with an acceptable level of risk for 100+ years.** Trees of Good health and structurally sound located in the landscape that can accommodate future growth.
Long SULE	**Trees that appear to be retainable with an acceptable level of risk for 40-100 years.** Structurally sound trees located in positions that can accommodate future growth. Trees that could be made suitable for retention in the long term by remedial tree care.

Medium SULE	**Trees that appear to be retainable with an acceptable level of risk for 20-50 years.** Trees that may only have between 20-50 years remaining life span. Trees that may live for more than 20-50 years but would be removed in that time during the course of management for safety and nuisance reasons. Damaged or defective trees that can be made suitable for retention in the medium term by remedial work.
Short to Medium SULE	**Trees that appear to be retainable with an acceptable level of risk for 10-20 years.** Trees that may only have 10-20 years of remaining life span. Trees that may live for more than 10-20 years but would be removed in that period during the course of management for safety or nuisance reasons. Defective trees that require substantial remedial work to be made safe and are only suitable for retention in the short-term.
Short to SULE	**Trees with a high level of risk that would need removing within the next 1-10 years.** Dying trees or suppressed and declining trees through disease. Dangerous trees through instability. Dangerous trees through structural defects including cavities, decay wounds or poor form. Damaged trees, which are considered unsafe to retain. Dead trees.
Construction Impact Classifications Australian Standards (4970-2009) *Protection of Trees on Development Sites.*	Each tree was assessed to determine the construction impact and then placed into one of five (5) categories. **IR** **Impact – Remove** **IMNV** **Impact – Major, not viable** **IMV** **Impact – Major, viable** **IMR** **Impact – Minor** **NI** **None or No Impact**
Impact – Remove	The tree is within the footprint of the proposed design and will require removal to facilitate the design. In order to successfully retain the tree, a design modification would be required.
Impact – Major, not viable	The proposed design has a TPZ area encroachment greater than 10%, or it impacts the SRZ. The proposed works are expected to have a significant impact on the tree such that it is expected to die or fail in the future as a result of the works. In order to successfully retain the tree, a design modification would be required which reduces the impact to an acceptable level.
Impact – Major, viable	The proposed design has a TPZ area encroachment greater than 10%, or it impacts the SRZ. The tree is expected to remain viable because of one, or a combination of the following: • Alternative construction methods are proposed which reduce the impact on the tree. • Site conditions have limited root development within the proposed area of works. • The species is known to be particularly tolerant to root disturbance. • A non-destructive root exploration was undertaken and demonstrated that root distribution was limited in the proposed area of works.
Impact – Minor	The proposed design has a TPZ area encroachment of less than 10% and does not impact the SRZ. The tree is expected to remain a viable component with the establishment of a TPZ prior to the commencement of works, which may require compensation for the area lost to encroachment.
None or No Impact	The proposed design does not enter the TPZ area. The tree is expected to remain a viable component with the establishment of a TPZ prior to the commencement of works.
Viability in the Landscape	A tree's viability in the landscape refers to the importance it may have on a particular site. Each tree was assessed to determine its viability in the landscape and then placed into one of three (3) categories.

From the IACA Significance of Tree Assessment Rating System, from Footprint Green Ltd, (June 2001).	**HS** High Significance **MS** Medium Significance **LS** Low Significance **NOTE:** A tree must have a minimum of three (3) criteria in a category to be classified in that group.
High Significance	• The tree is in good health and good structure. • The tree is in good form. • The tree is a locally indigenous species and/or rare. • The tree is a Heritage tree or is listed on Council's Significant Tree Register. • The tree is visually prominent when viewed from a distance within the landscape. • The tree has a social, cultural or spiritual association within the broader community.
Medium Significance	• The tree is in fair-good health and fair-good structure. • The tree is in fair-good form. • The tree is a locally indigenous species, or a common species planted in the local area. • The tree is visible within its surroundings but is not visually prominent from the street. • The tree provides a fair contribution to the visual amenity of the local area.
Low Significance	• The tree is in poor-fair health and poor-fair structure or lower. • The tree has a form that is not representative of its species. • The tree is not visible or is partly visible within its surroundings. • The tree provides minor contribution or negative impact on the visual amenity of the local area. • The tree is a young specimen that will not reach its full potential. • The tree has a wound or defect that has potential to become structurally unsound. • The tree is a noxious weed. • The tree is hazardous or in irreversible decline, structurally unsound and/or unstable • The tree is dead and/or has the potential to fail or collapse.
Tree's Retention Values From the IACA Significance of Tree Assessment Rating System, from Footprint Green Ltd, (June 2001).	Each tree was assessed to determine its priority for retention and then placed into one of five (5) classifications, with the following colours. **High – Priority for Retention** **Medium – Consider for Retention** **Low – Consider for Removal** **Removal – Priority for Removal** **Transplant – Priority for Transplant**
High – Priority for Retention	• A tree that is in good health and structure condition, with a **long** or **medium to long ULE**. • A tree that has a horticultural or botanical significance. • A tree that should be **incorporated within the development layout/design**. • A tree that is not located within the subject site i.e., nature strip, adjoining properties.
Medium – Consider for Retention	• A tree that is in fair health and structure condition, with a **medium ULE**. • A tree that has some horticultural or botanical significance. • A tree that is not located within the design layout.
Low – Consider for Removal	• A tree that is in poor health and structure condition, with a **short to medium ULE.** • A tree that has no or little horticultural or botanical significance. • A tree or shrub.

Removal – Priority for Removal	• A tree that is in the wrong spot. • A tree that is a noxious weed. • A tree that is within the development layout/design. • A tree that is dead or dying.
Transplant – Priority for Transplant to another location	• The tree in question could be transplanted to another site. • The tree in question could be sold and transplanted to another location. • The tree in question could be transplanted and sold to a tree nursery.

Appendix 4: Arboricultural Terms and Definitions

Branch - A secondary shoot or stem arising from the main stem of trunk.

Branch Attachment - The structural linkage of branch to stem.

Branch Bark Ridge - A ridge of bark in a branch crotch that marks where branch and trunk tissue meet and often extends down the trunk.

Branch Collar - Wood that forms around a branch attachment, frequently more pronounced below the branch. The branch collar is used to identify the correct location of all thinning cuts.

Brown Rot - Form of decay where cellulose is digested. The result of brown rot is brittle wood with no tensile strength.

Buttress – Support branch, stem, or root; usually associated with exaggerated growth.

Canopy – The part of the crown composed of leaves and small twigs.

Cavity – An open wound, characterized by the presence of decay and resulting in a hollow structure.

Codominant – A situation where a tree has two or more stems which are of equal diameter and relative amounts of leaf area. Trees with codominant primary scaffolding stems are inherently weaker than stems, which are of unequal diameter and size.

Compartmentalization – The boundary-setting process that resists loss of normal wood function and resists the spread of discoloration and decay; a process that separates injured or decayed tissue from healthy tissue.

Compression Wood – Type of reaction wood that develops on the underside of branches and leaning trunks in coniferous trees; tends to maintain branch angle of growth or straighten the trunk.

Conker – Fruiting or spore producing body of wood decay fungi, forming on the external surface of branches and trunks.

Decay – The process of degradation of woody tissues by fungi and bacteria through decomposition of cellulose and lignin.

Defect – A fault or weakness in a tree support system.

Dominant Leader/Trunk/Stem – The stem that grows much larger than all other stems and branches.

Dripline –The width of the crown, as measured by the lateral extent of the foliage.

Epicormic growth – Shoot that arises from latent or adventitious buds that occur on stems and branches and on suckers produced from the base of trees.

Fungi – Simple plants that lack photosynthetic pigment. The individual cells have a nucleus surrounded by a membrane, and they may be linked together in long filaments called hyphae.

Girdling Roots – Roots that grow around the trunk in a circular manner, constricting other roots or restricting trunk growth.

Heart Rot – Decay present in the heartwood (center) of a tree.

Heartwood – Darker-coloured wood toward the center of a stem or root that has become physiologically inactive. It no longer functions for the transport of water and nutrients but may be a site for storage.

Included Bark or Embedded Bark – Included bark occurs when bark is included into the attachment between two stems, preventing the joining of wood tissue in the area between the stems. Included bark attachments always have an extremely narrow angle between the stems, resembling the letter "V" (rather than the letter "U" or "L" typical in strong attachments). As stems having included bark increase in size, pressure is exerted from the stem expansion and a crack often develops in the crotch between the stems. Included bark attachments have a higher potential for failure in later years.

Lateral branch – A branch or twig growing from a parent branch or stem in a horizontal direction from the parent stem.

Lean – A tree trunk grows or moves away from an upright position. The degree of leaning can be categorized as *Slight Lean*, *Moderate Lean, Severe Lea*n and *Critical Lean.*

Slight Lean A leaning tree where the trunk is growing at an angle within 0° – 15° from upright.

Moderate Lean A leaning tree where the trunk is growing at an angle within 15° – 30° from upright.

Severe Lean A leaning tree where the trunk is growing at an angle within 30° – 45° from upright.

Critical Lean A leaning tree where the trunk is growing at an angle greater > 45° from upright.

Progressive Lean A tree where the degree of *leaning* appears to be increasing over time.

Static Lean A tree where the degree of *leaning* appears to have stabilized over time.

Self-correcting *Atypical* stem growth subsequently influenced and modified by *tropism*, e.g., *gravitropism* and *phototropism*, where *reaction wood* attempts to return it to a more *typical* habit or *form*, e.g., a *trunk* with a *butt sweep* where it is returning to upright.

Limb – Same as branch, but usually larger and more prominent.

Lion Tailing – The improper practice of removing all or most secondary and tertiary branches from the interior portion of the crown, leaving most live foliage at the edge of the canopy.

Photosynthesis – The transformation, in the presence of chlorophyll and light, of carbon dioxide (from air) and water (primarily from soil) into a simple carbohydrate and oxygen.

Reaction Wood – Specialized secondary xylem that develops in response to lean or similar mechanical stress, to restore the stem to the vertical. Occurs as compression wood in conifers and tension wood in angiosperms.

Root – An organ of a tree that serves to maintain mechanical support, to provide water and essential elements from the soil through absorption, and to store energy reserves.

Root Crown – Same as Root Collar.

Sapwood – The outer portion of the wood that has living cells and transports water and nutrients and stores carbohydrates.

Scaffold branch – A large limb that is or will be part of the permanent branch structure of a tree.

Species – A group of plants that resemble each other closely and that interbreed freely.

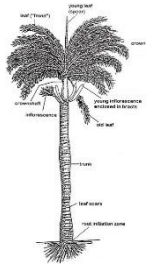
Stem – A woody structure bearing foliage and buds that gives rise to other stems.

Stress and Strain – Stress is a potentially injurious, reversible condition, caused by energy drain, disruption, or blockage, or by life processes operating near the limits for which they were genetically programmed. When stress goes to strain, the tree dies; Generally attributed to over-pruning and root loss due to construction activity.

Suckers – Adventitious stems arising from the lower trunk or roots.

Target – People or property potentially affected by a tree failure.

Taper – The change in diameter within the length of the trunk and/or branches, (See diagram on the right). Important to mechanical strength.



Tension Wood – Type of reaction wood in angiosperms that forms on the upper side of branch and stems, acting to pull the member back to a vertical orientation or a genetically programmed angle of growth.

Union (Crotch) – The junction between stem and branch or between stems.

Wound – An opening that is created when the tree's protective bark covering is penetrated, cut, or removed, injuring or destroying tissue. Pruning a live branch creates a wound, even when the cut is properly made.

Appendix 5: Technical References

This Arboricultural Report is based on the following primary technical references:

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