

Arboricultural Impact Assessment and Report



**Steve Moneghetti Track
Lake Wendouree Foreshore
Ballarat, VIC**

20 March 2020

C91757

ASSESSMENT & REPORT COMMISSIONED BY:

Mr David Turley
Team Leader City Design
City of Ballarat
PO Box 655
Ballarat VIC 3353

ASSESSMENT & REPORT PREPARED BY:

Lachlan Andrews
BA. App. Sci (Hort.), Dip. App. Sci. (Hort.), Adv. Cert. (Hort.) AQF Level 7
Consulting Arborist

20 March 2020

Mr David Turley
Team Leader City Design
City of Ballarat
PO Box 655
Ballarat VIC 3353

RE: Arboricultural Impact Assessment and Report regarding the potential impacts of proposed construction works on four hundred (400) trees located around the Lake Wendouree foreshore

Dear David,

We are pleased to provide you with the following Arboricultural Impact Assessment and Report regarding the Lake Wendouree foreshore.

Complete use of this report is authorised under the conditions limiting its use as stated in Appendix A Item 7 of "*Arboricultural Reporting Assumptions and Limiting Conditions*".

Should you have any queries relating to this report, its recommendations, or the options considered please do not hesitate to contact me on 0407-505-772.

Yours sincerely,



Lachlan Andrews

Consulting Arborist

BA. App. Sci. (Hort.), Dip. App. Sci. (Hort.), Adv. Cert. (Hort.) AQF Level 7

Table of Contents

1	Executive Summary	4
2	Introduction.....	5
3	Scope	5
4	Methodology.....	6
	4.1 Data Collection	6
	4.2 Images and Site Photographs.....	6
5	Observations	6
	5.1 Site Details and Tree Locations	6
	5.2 Proposed Works.....	8
	5.3 Tree Observations – Overview.....	8
	5.4 Tree Health	10
	5.5 Tree Structure	10
	5.6 Useful Life Expectancy (ULE)	10
	5.7 National Trust Registered Trees	11
	5.8 Soil compaction	11
	5.9 <i>Pinus radiata</i> (Monterey Pine).....	12
	5.10 <i>Quercus robur</i> (English Oak)	13
	5.11 <i>Populus</i> sp. (Poplar).....	14
6	Discussion	15
	6.1 Epicormic growth.....	15
	6.2 Senescence	15
	6.3 <i>Phaeolus schweinitzii</i> (Velvet-top Fungus)	15
	6.4 TPZ's and Major and Minor Encroachment.....	15
	6.5 TPZ Encroachment and the Subject Trees	16
7	Recommendations	17
	7.1 Design Finalisation	17
	7.2 Light Pole Positions.....	17
8	Pre-construction activities	17
	8.1 Tree Protection Fencing.....	17
	8.2 Site Hygiene.....	19
9	Activities during construction.....	19
	9.1 Pre-start Induction	19
	9.2 Contacting the Project Arborist	19
	9.3 Electrical Conduit Installation	19
	9.4 Light Pole Connection	20
	9.5 Ground Protection	20
	9.6 Marking-out TPZs and SRZs.....	21
	9.7 Machinery Breakdowns.....	21
	9.8 Backfilling of Trenches	21
	9.9 Site Visits by the Project Arborist	21
10	Post construction activities	22
	10.1 Tree Protection Fencing.....	22
	10.2 Arborist Inspection	22
11	References	22
12	Appendices.....	23
	12.1 Appendix A – Arboricultural Reporting Assumptions and Limiting Conditions	23
	12.2 Appendix B – Explanation of Tree Assessment Terms	24
	12.3 Appendix C – Tree protection measures and recommendations adopted from the Australian Standard AS 4970–2009: <i>Protection of Trees on Development Sites</i> (Version 2 (October 2010)).....	26
	12.4 Appendix D – Lake Wendouree Tree Data Table	29
	12.5 Appendix E – Additional Tree Management Considerations.....	37

1 Executive Summary

- 1.1.1 The following Arboricultural Impact Assessment and Report regards four hundred (400) trees located within the Lake Wendouree foreshore area.
- 1.1.2 This does not encompass every tree in this area as the trees selected for assessment were those whose calculated tree protection zone (TPZ) and/or structural root zone (SRZ) encroached upon the Steve Moneghetti Track which surrounds the lake. Trees were therefore those which could potentially be impacted upon by the proposed installation of lighting around Lake Wendouree.
- 1.1.3 Tree protection zones (TPZ) and structural root zones (SRZ) were calculated in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.
- 1.1.4 The tree population surrounding Lake Wendouree was found to be highly significant and formed a strong landscape backdrop for the lake and connected it to other significant Ballarat treescapes such as the Botanic Gardens precinct, the Sturt Street Boulevard and Victoria Park.
- 1.1.5 The four hundred (400) assessed trees encompassed a range of predominantly exotic deciduous and exotic evergreen species with a small range of Australian native species observed. *Eucalyptus camaldulensis* (River Red Gum) was the only species assessed that was indigenous to the local area.
- 1.1.6 The proposed works are to involve the installation of electrical conduit within the entire Steve Moneghetti Track with one hundred and ninety-four (194) light poles connected to it. The probability for root damage/severance to occur during these works therefore is high and as a result must be planned and executed with this in mind.
- 1.1.7 The nature of the proposed works, their proximity to the subject trees, the significance and prominence of the tree population, combined with the potential for direct damage to be caused from machinery and/or the compaction they can cause validated the need for a range of tree protection recommendations to be made.
- 1.1.8 These recommendations involve the finalisation of the design proposal illustrating the extent of all TPZ's and SRZ's so as an accurate determination of where open trenching, underground boring and the appropriate location of light poles should be.
- 1.1.9 Sections 7 to 10 of this report contain a range of recommendations in relation to tree protection and minimising the potential impacts upon future tree health and/or structural condition. It is these sections that are most important for all engaged contractors to read so as they have a clear understanding of how trees relate to the project and how they are to be managed before, during and after the proposed works.
- 1.1.10 In cases involving the protection of the above and below ground components of trees during construction works, there is one chance to get it right. A failure to do so often results in damage to tree parts which can have lasting, and sometimes, fatal consequences on their future health and/or stability. The measures needed to repair construction related tree damage are more often than not ongoing, costly, and not always effective.
- 1.1.11 As a result, whilst well intentioned, documents such as this are only effectual if all parties involved with the in-situ and ex-situ management of construction projects are furnished with a copy of the document and become cognisant with its requirements. The successful protection of trees on development sites can only occur in these circumstances and if there is a genuine interest to do so.
- 1.1.12 Trees in many cases seem large and robust, however their above and below ground components can easily be damaged by construction related activities. Therefore, it is imperative that all recommendations made in this report are carried out in full and at the times prescribed.

2 Introduction

- 2.1.1 ArborSafe Australia Pty Ltd was engaged by the City of Ballarat to complete an Arboricultural Impact Assessment and Report regarding selected trees located around the Lake Wendouree foreshore.
- 2.1.2 Development planning by way of the construction of lighting around the six-kilometre Steve Moneghetti running/walking track which surrounds Lake Wendouree was currently underway and this report was requested to provide information on the trees in close proximity to the running track and how they may be impacted upon by the proposed works.
- 2.1.3 Trees selected for assessment were those whose calculated tree protection zone (TPZ) and/or structural root zone (SRZ) encroached upon the running track. The final number of assessed trees totalled four hundred (400).
- 2.1.4 As the City of Ballarat already had relevant and recent tree assessment data on all the trees within the Lake Wendouree foreshore, it was requested by them that said data be used as part of the formulation of this report to negate data replication.
- 2.1.5 Report findings and recommendations provided are based upon guidance within the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.
- 2.1.6 Observations and recommendations within this report are based upon information and plans provided by the City of Ballarat and an arborist site visit.
- 2.1.7 During the days of assessment ArborSafe was accompanied by the City of Ballarat's Vegetation Officer, Mr Tony Marshall, who updated council's asset management database (CONFIRM) with newly collected TPZ and SRZ data as well as updating information on individual trees where applicable.

3 Scope

- 3.1.1 Collect trunk diameter at breast height (DBH) and trunk diameter at the root crown (DRC) measurements to allow for accurate TPZ and SRZ distances to be calculated and update council's CONFIRM database accordingly.
- 3.1.2 For the purposes of this report, existing City of Ballarat data regarding tree species, age, height, canopy spread and useful life expectancy (ULE) were not reviewed. In some instances tree health and structure ratings were altered where these parameters had changed since council's last inspection.
- 3.1.3 Inspect the subject trees and their growing environment in the context of the proposed development.
- 3.1.4 Using existing City of Ballarat data provide information on the subject trees in relation to their species, estimated age, health, structural condition and projected longevity.
- 3.1.5 Review the proposed development plans in the context of their potential to impact upon the future health and/or structural integrity of the subject trees.
- 3.1.6 Identify and reduce potential conflicts between the subject trees and site development by providing accurate information on the area required for successful tree retention and preservation.

4 Methodology

4.1 Data Collection

- 4.1.1 Lachlan Andrews of ArborSafe Australia Pty Ltd and Tony Marshall of the City of Ballarat carried out a site inspection of the subject trees on 25, 26 and 27 February 2020. Additional, on-site observations were also carried out by Lachlan Andrews on 28 February.
- 4.1.2 The subject trees were inspected from the ground using the initial component of Visual Tree Assessment (VTA) (Mattheck and Breloer, 1994). No foliage or soil samples were taken and no aerial or internal investigations were undertaken.
- 4.1.3 Tree height and canopy width were previously estimated by City of Ballarat arborists during past routine inspections. Trunk diameter at breast height (DBH) and trunk diameter at the root crown (DRC) were measured with a diameter tape.
- 4.1.4 Data collected on site was analysed by Lachlan Andrews of ArborSafe Australia Pty Ltd, collated into report format and relevant recommendations formulated.
- 4.1.5 Tree protection zones (TPZ) and structural root zones (SRZ) were calculated in accordance with the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites*.

4.2 Images and Site Photographs

- 4.2.1 All photographs were taken at the time of the site inspection by the author and have not been altered for brightness or contrast, nor have they been cropped.

5 Observations

5.1 Site Details and Tree Locations

- 5.1.1 Located in central Ballarat next to the Ballarat Botanic Gardens and near Victoria Park, Lake Wendouree has long been a community destination and is one of Ballarat's many key attractions. The lake is located a short distance from the Ballarat central business district and is within the City of Ballarat Local Government Area (LGA).
- 5.1.2 Facilities at the lake include the six-kilometre Steve Moneghetti running and walking track, cycling trails, playgrounds as well as picnic and BBQ facilities. The lake offers opportunities for fishing, sailing and rowing. The world-class 2000 metre rowing course hosts many regattas and was the location for the sport at the 1956 Melbourne Olympic Games and remains a venue for school, club and high-level rowing and sailing competitions (City of Ballarat, 2019).
- 5.1.3 Whilst called Lake Wendouree, the area originally started out as a swamp and was known as Black Swamp by early European settlers. It later became known as Yuille's Swamp after William Cross Yuille settled just south of it. When Ballarat was first surveyed in 1851 by William Swan Urquhart, the swamp was recorded as Wendouree and a misunderstood aboriginal word became the official name. Plans to dam the outlet stream that flowed from the swamp began soon after the first surveying. Banks were raised and pipes installed and it became Ballarat's first permanent water supply for the burgeoning gold rush settlement (Anon, 2020).

- 5.1.4 Throughout its history since European settlement the area surrounding Lake Wendouree has been planted with a wide array of exotic and Australian native trees and has remained an indelible feature of the lakes' character to this day. The tree canopy of the Lake Wendouree foreshore forms a strong landscape backdrop (Figure 1) for the lake and connects it to other significant Ballarat treescapes such as the Botanic Gardens precinct, the Sturt Street Boulevard and Victoria Park.
- 5.1.5 Whilst many large and mature trees existed around the lake foreshore and dominated the surrounding skyline, the City of Ballarat in recent years has made a concerted effort to renew the lake's tree population with a dedicated tree planting program. This has seen the establishment of many new trees around the entire lake foreshore, which if it continues, will ensure the successful perpetuation of the lakes' tree population.
- 5.1.6 Such is the prominence and significance of the Lake Wendouree precinct that it is covered by a number of City of Ballarat planning controls and overlays (Victoria State Government, 2020) such as:
- Design and Development Overlay
 - Heritage Overlay
 - Vegetation Protection Overlay.
- 5.1.7 The soil profile around Lake Wendouree was likely to have been disturbed/modified given the sites' history and the development of significant infrastructure around it over an extended period.



Figure 1. View of the tree canopy to the north-west, Lake Wendouree. (Lachlan Andrews, 28 February 2020).

5.2 Proposed Works

5.2.1 Plans of the existing site and of the proposed lighting installation were provided to ArborSafe on 31 January 2020 by the City of Ballarat and included:

- Lake Lighting Concept Layout (South East Quadrant)
- Lake Lighting Concept Layout (North East Quadrant)
- Lake Lighting Concept Layout (North West Quadrant)
- Lake Lighting Concept Layout (South West Quadrant)
- Lake Lighting Concept Design Context Matters & Site Electrical Infrastructure
- Pole Lighting Options
- City of Ballarat survey of the Steve Moneghetti Track.

5.2.2 The proposed development (relative to the subject trees) has been reviewed and in summary consisted of the installation of one hundred and ninety-four (194) light poles of an approximate 6m height with each pole requiring a concrete footing as well as electrical connection. The size of the concrete footings is not known at this time.

5.2.3 Underground electrical cabling is to be installed along the entire length of the Steve Moneghetti Track to a depth of 600mm.

5.2.4 There will also be a number of electrical cabinets installed for each of the lighting zones.

5.2.5 Provisions have also been made for seven (7) renewable power sites around the lake where photo-voltaic panels are to be installed on top of existing infrastructure, e.g. the Paddle Steamer Museum.

5.3 Tree Observations – Overview

5.3.1 The four hundred (400) subject trees (Figure 2) assessed as part of this report were located around the entire length of the Steve Moneghetti Track and were by and large quite evenly spaced. They are indicated in Figure 2 by the green dots throughout the lake foreshore.

5.3.2 The assessed trees encompassed a range of predominantly exotic deciduous and exotic evergreen species with a small range of Australian native species observed, e.g. *Eucalyptus globulus* (Southern Blue Gum). *Eucalyptus camaldulensis* (River Red Gum) was the only species assessed that was indigenous to the local area with only two (2) trees observed. The five (5) most common species, along with the number of trees assessed can be found in Table 1.

Table 1

Species	Common Name	# Trees Assessed
<i>Ulmus x hollandica</i>	Dutch Elm	76
<i>Quercus robur</i>	English Oak	62
<i>Salix</i> sp.	Willow	49
<i>Pinus radiata</i>	Monterey Pine	44
<i>Populus alba</i>	White Poplar	25

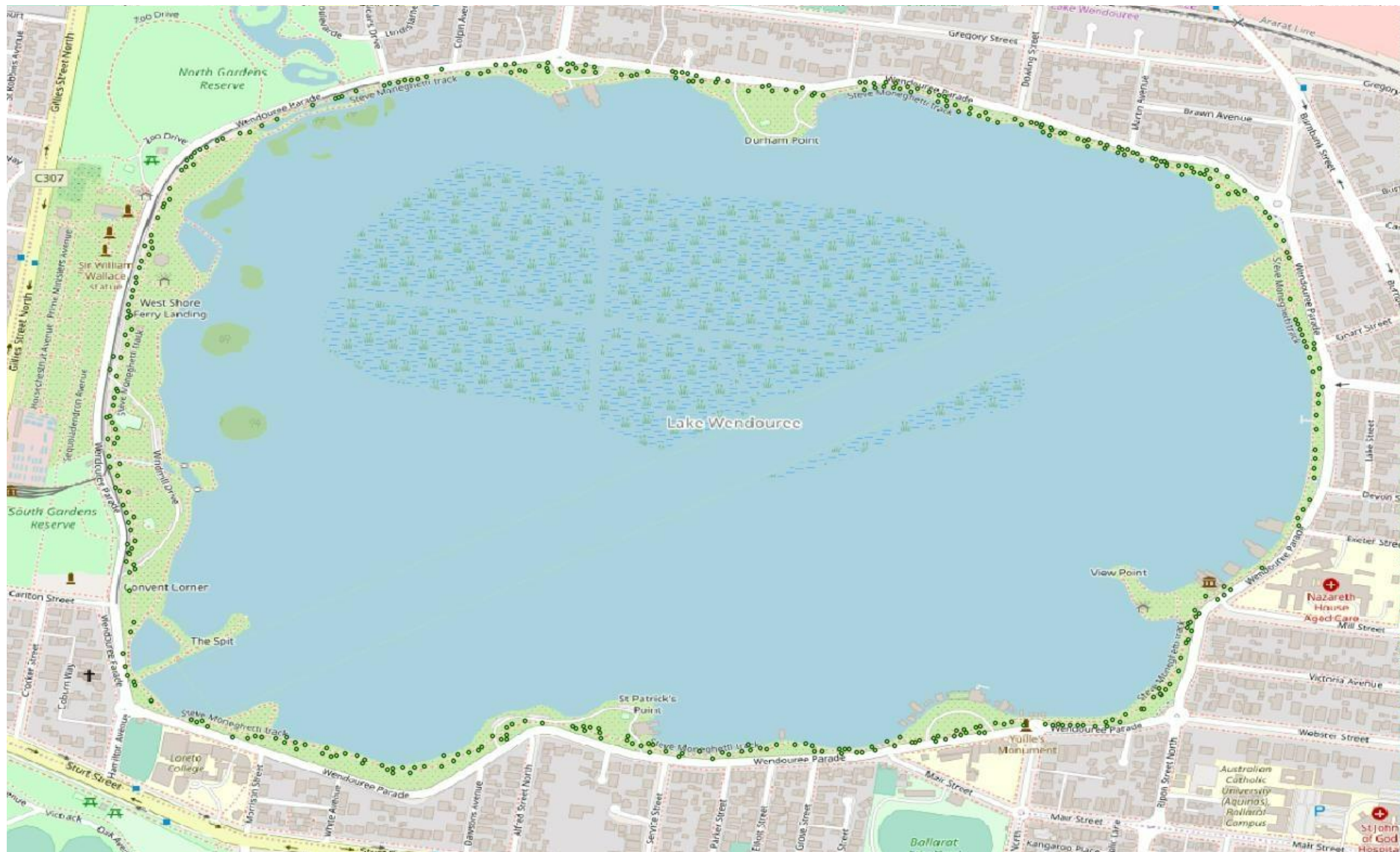


Figure 2. View of the location of the subject trees, Lake Wendouree. (City of Ballarat, 3 March 2020)

5.4 Tree Health

- 5.4.1 As one might expect when surveying a large number of trees, variations in the attributes of health and structure were found to vary markedly. Trees rated as being in good or excellent health displayed full and dense canopy foliage that was of a size, colour and density typical of healthy trees of their species under cultivation in Victoria. Such trees also displayed minimal canopy deadwood and an absence of branch tip dieback and/or epicormic growth production. Trees matching these descriptions were generally allocated lengthy useful life expectancies (ULE) of greater than 40 years, e.g. Tree 158424.
- 5.4.2 Trees rated as being fair in health displayed a thinning of their canopy density, the dying back of branch extremities and/or the production of epicormic growth which was likely associated with extended periods of soil aridity and/or soil compaction in combination with poor quality or possibly inverted soil profiles, e.g. Tree 230906.
- 5.4.3 Trees rated in poor health displayed a noticeably thin and depleted canopy density with noticeable levels of deadwood, branch tip dieback and epicormic growth production. Such trees also displayed minimal seasonal extension growth. In some cases, tree health was in such a state that any form of recovery to a point where it could be retained as a viable landscape asset was deemed most unlikely. Trees of this character were offered low ULE's such as Tree 158426.

5.5 Tree Structure

- 5.5.1 The structural condition of the subject trees ranged from excellent down to poor. Trees of good and excellent structure were observed to contain a branching framework that was visually free of defects with first order scaffold and lateral branches displaying a wide angle of attachment which were of a diameter that was less than the trunk or first order scaffold branch to which they were attached. No defects such as trunk bifurcations containing included bark were observed within trees given these structure ratings.
- 5.5.2 Trees of fair structure were observed to contain imperfections such as co-dominant stems with minor bark inclusions and/or small areas of decay in trunks, roots and/or branches. Such defects may also have led to a reduction in their ULE and/or a recommendation for remedial pruning works.
- 5.5.3 Trees of poor structure were observed to contain noticeable structural defects such as co-dominant stems with significant bark inclusions, moderate to large areas of decay in trunks, roots and/or branches and/or have incurred root damage in the past caused by machinery such as excavators or lawn mowers.

5.6 Useful Life Expectancy (ULE)

- 5.6.1 The wide variation in species, age, tree health and structure unsurprisingly resulted in a wide range of ULE allocations (Figure 3) from trees of poor health and/or structure receiving a ULE of none or less than five years, through to healthy, well-structured trees been allocated ULE's of greater than 40 years.
- 5.6.2 The graph in Figure 3 illustrates that two hundred and seventy-nine (279) trees (69.75%) of the assessed trees have a ULE in excess of 15 years. It also illustrates that one hundred and twenty-one (121) trees (30.25%) have a ULE of 5 year or less. This is not necessarily a representation of all the trees within the Lake Wendouree foreshore, however the survey sample indicates that further, significant tree planting needs to occur in order to offset expected tree losses in the next fifteen (15) years.

Useful Life Expectancy (ULE) (years)

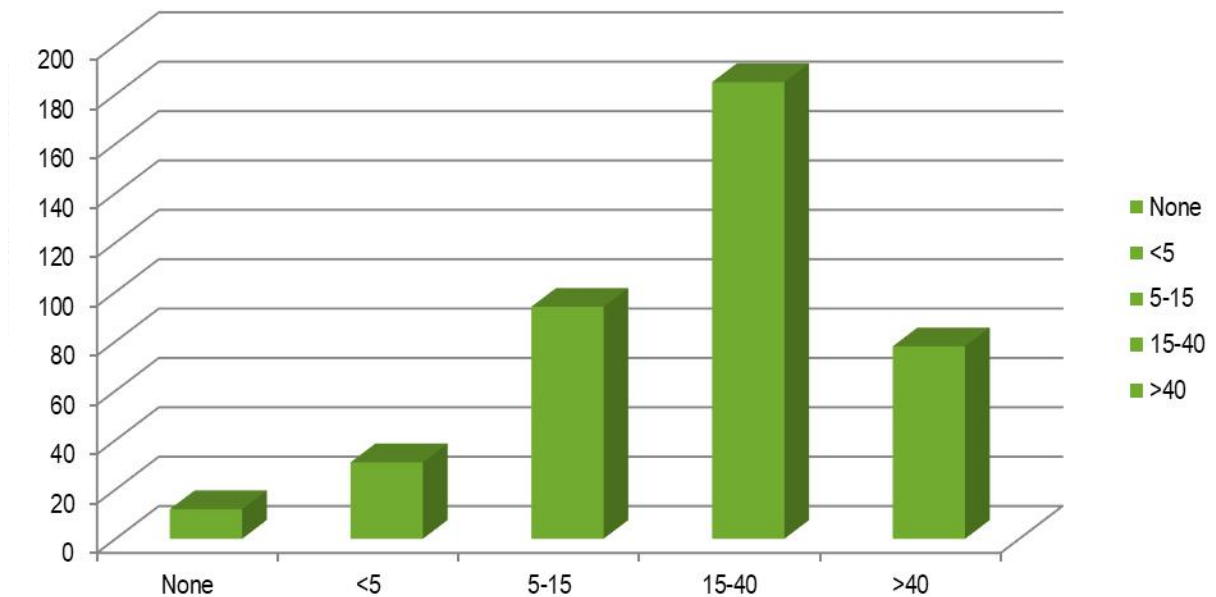


Figure 3. Bar graph illustrating ULE ranges of the subject trees. (ArborSafe, March 2020).

5.7 National Trust Registered Trees

5.7.1 Whilst many of the subject trees were deemed to be significant as a result of their age, physical dimensions and strong landscape contribution, one (1) tree (157722) was listed on the National Trust of Australia (Vic.) Register of Significant Trees. This *Juniperus virginiana* (Eastern Juniper) was located near the statue of Mercury on the western side of the lake and is an outstanding tree, being the best example of this species under cultivation in Victoria (Heritage Council Victoria, 2004).

5.8 Soil compaction

5.8.1 Compaction of the soil profile around many trees was observed in many locations around the lake, and in some cases was severe. This was due to the heavy foot traffic the Steve Moneghetti Track (and its surrounds) receives on a daily basis. This compaction was predicted to have been long-term and will persist into the future. It was also observed in some areas to be contributing to tree decline and hampering the establishment of young trees.

5.9 *Pinus radiata* (Monterey Pine)

- 5.9.1 Forty four (44) specimens of *Pinus radiata* were assessed as part of this report with several of them being observed to be in the senescent stage of their life cycle (Figure 4), evidenced by an overall reduction in canopy density, the dying back of branch extremities, the accumulation of canopy deadwood and the shortening of their foliage length.



Figure 4. Example of a senescent *Pinus radiata*, Lake Wendouree. (Lachlan Andrews, 5 March, 2020).

- 5.9.2 Senescent *Pinus radiata* were therefore predicted to continue to decline, ultimately resulting in their death. This decline can at time be rapid, especially in the presence of fungal pathogens such as *Phaeolus schweinitzii* (Velvet-top Fungus) (Figure 5). Fruiting bodies of this pathogen were observed close to the base of a large tree adjacent Loreto College and is possibly more prevalent around Lake Wendouree than it appears given the level of decline observed in many *Pinus radiata*.
- 5.9.3 Despite the current absence of visible fruiting bodies, the recent, rapid decline and death of a tree to the east of the St. Patrick's Boat Sheds (not assessed for this report) may also have been linked to *Phaeolus schweinitzii*.



Figure 5. View of *Phaeolus schweinitzii*, Glendaruel. (Lachlan Andrews, 3 March 2020).

5.10 *Quercus robur* (English Oak)

- 5.10.1 With sixty-two (62) trees assessed, *Quercus robur* was the second most common species within the subject trees. Examples of this species were generally observed to be of a semi-mature or mature age and were largely of good health and structure with long ULE's.
- 5.10.2 This species has been cultivated in Victoria for in excess of 150 years and has proven itself tolerant to a number of environmental factors such as frost, poor quality soils, compacted soil and periods of soil aridity.

5.11 *Populus* sp. (Poplar)

- 5.11.1 Fifty seven (57) examples of *Populus* sp. were assessed covering six (6) species and cultivars. Whilst they covered a range of age classes they were mostly of a mature age with varying health and structure ratings (Figure 6) ascribed to them. Their ULE's also ranged significantly with the vast majority being in the 5–15 year range, which is of a concern given the number of trees in this category and their physical dimensions.
- 5.11.2 Members of the *Salicaceae*, to which *Populus* sp. belong are generally known for their moderate to poor compartmentalisation capabilities and are therefore prone to decreases in strength as a result of the onset of decay. Monitoring areas of decay resulting from root scalping, past pruning works and/or branch failure is an important management consideration for this genus due to their relative inability to control the spread of decay, thereby increasing some specimens' probability of branch or trunk failure.
- 5.11.3 Complete attributes for the subject trees can be found in the table of results in Appendix D of this report.



Figure 6. Typical example of *Populus alba* 'Pyramidalis', Lake Wendouree. (Lachlan Andrews, 5 March, 2020).

6 Discussion

6.1 Epicormic growth

- 6.1.1 Epicormic growth is a growth type able to be produced by many tree species from dormant buds that lie on, or just underneath the surface of the bark and are initiated in times of stress such as after bushfire, root damage/severance, soil compaction, poor pruning (lopping) or extended periods of soil aridity. *Eucalyptus* sp. (Eucalypts) in particular are renowned for the production of this growth type, especially after bushfire.
- 6.1.2 Derived from the Greek words *epi* (upon) and *kormos* (a branchless tree trunk), the production of epicormic growth is a way a tree can quickly raise its total photosynthetic mass from which it can produce energy in an attempt to overcome the applied stress(es).

6.2 Senescence

- 6.2.1 Senescence is the stage of a tree's life between maturity and death when a natural, gradual deterioration in health occurs often resulting in the abscission of fruit, foliage and/or branches.

6.3 *Phaeolus schweinitzii* (Velvet-top Fungus)

- 6.3.1 Typically known for attacking a range of conifers, especially *Pinus radiata* (Monterey Pine), *Phaeolus schweinitzii* is a moderately aggressive pathogenic, root-rotting fungus. As a part of its pathogenic nature it degrades cellulose, thereby resulting in a loss of tensile strength which can result in failure of the lower trunk or root crown. Early detection is therefore important.
- 6.3.2 Late summer and early autumn is generally a good time to inspect near to, and around the base of your conifers (especially if there has been some rain) as the appearance of fruiting bodies is an annual event and so for much of the year they cannot be seen.

6.4 TPZ's and Major and Minor Encroachment

- 6.4.1 Invariably, during the planning and design phases of construction projects, tree protection zones (TPZ) and structural root zones (SRZ) are calculated by arborists to guide the planning, design and construction phases in relation to the successful retention of trees.
- 6.4.2 TPZs are designed to provide adequate space for the protection of the above and below ground components of a tree to ensure health and stability. The area allocated for a TPZ is determined by the tree's species, age, size, tolerance to changes in site conditions and site constraints.
- 6.4.3 The method for determining the TPZ in this report is based on the Australian Standard AS 4970-2009: *Protection of Trees on Development Sites* which states that the TPZ is equal to twelve (12) times the measured DBH. The TPZ is measured radially away from the centre of the tree's trunk and is measured in metres (m). This standard also states that no tree shall have a TPZ greater than 15m or less than 2m.
- 6.4.4 Within the TPZ and close to the tree's base is an area known as the structural root zone (SRZ). Root damage/severance at, or within the SRZ can not only heavily deplete a tree's health but can jeopardise its stability within the soil profile. Soil excavations within this distance are therefore strongly discouraged.
- 6.4.5 Limited encroachment/manipulation of the TPZ (~10%) may occur, however this is dependent on the type of the works proposed, the characteristics of the tree and the site. If encroachment into the TPZ greater than 10%, the Australian Standard states that clear demonstration that the tree will remain viable must be shown, e.g. via non-destructive soil excavations. Modifications to the designated TPZ should only be made under the guidance of a suitably qualified and experienced consulting arborist. Refer to the table of results in Appendix D of this report for individual TPZ and SRZ distances.

6.5 TPZ Encroachment and the Subject Trees

- 6.5.1 As a result of the assessment and measurements made as part of this report, and from viewing the supplied plans, all four hundred (400) subject trees have the potential to be impacted upon by the proposed works for it is these trees whose TPZ and/or SRZ (Figure 7) falls within the Steve Moneghetti Track.



Figure 7. Area where proposed works fall within an SRZ, Lake Wendouree. (Lachlan Andrews, 20 February 2020).

- 6.5.2 The proposed works are to involve the installation of electrical conduit around the entire Steve Moneghetti Track with each of the one hundred and ninety-four (194) proposed light poles connected to it. Each light pole will also require a footing, which also involves soil excavation. The probability for root damage/severance to occur during these works therefore is high and as a result must be planned and executed with this in mind.
- 6.5.3 Therefore, the nature of the proposed works, their proximity to the subject trees, the significance and prominence of the tree population, combined with the potential for direct damage to be caused from machinery and/or the compaction they can cause validates the need for a range of tree protection recommendations to be made.
- 6.5.4 There will also be construction related activities that will occur outside of the TPZ of the subject trees yet will be in proximity to other trees not assessed as part of this report. As a result, certain activities will need to be mindful of these trees also.

7 Recommendations

7.1 Design Finalisation

- 7.1.1 To aid in the finalisation of the design proposal and efficiencies when works commence, it is recommended that the City of Ballarat take TPZ and SRZ data from this report and transpose it over existing (and accurate) surveys to clearly show the extent of the TPZ and SRZ for each of the subject trees.
- 7.1.2 The creation of such a plan will allow for the exact route of the electrical conduit to be determined and where open trenching and underground boring are required.
- 7.1.3 Where possible, the route of the main electrical conduit should be located outside the TPZ and/or SRZ of the subject trees. Where placement of a light pole is required within a TPZ, design consideration should be given to using short branch lines, off the main electrical conduit line which would be situated outside the TPZ, coming in at right angles to the trunk to minimise root damage due to excessive 'cutting' across the root zone.

7.2 Light Pole Positions

- 7.2.1 Due to the need to excavate a footing for each light pole and its connection to the electrical conduit, the height, performance and location of each pole is to be thought out thoroughly. For example, the height of the pole is to ensure that no unnecessary tree pruning is required. The performance of the light is to be such to minimise the number of light poles required and their location is to be determined by eliminating light poles from within the SRZ of all the subject trees and minimising their positioning within TPZ's wherever possible.
- 7.2.2 With TPZ and SRZ distances clearly shown on a plan, as per 7.1.1, this will allow the appropriate location of each light pole to be determined.

8 Pre-construction activities

8.1 Tree Protection Fencing

- 8.1.1 Due to the mobile nature of the proposed works, it is not deemed necessary in this case to install tree protection fencing or mulch around individual trees. It may however be necessary at times during the project to install temporary fencing along the sides of the Steve Moneghetti Track for short distances to protect tree trunks and/or root buttresses that are very close to the sides of the track. To this end there may be a need to have a 'walking' tree protection zone that moves along with the works team and trenching equipment as it makes its way around the Steve Moneghetti Track.
- 8.1.2 The requirement for such a tree protection mechanism is to be determined by the designated City of Ballarat or independent project arborist.
- 8.1.3 If required, tree protection fencing must be made from sturdy materials such as chain and mesh panels or plywood hoarding and posts and must be permanent, locked to negate access by contractors and/or the general public and be incapable of being readily moved or adjusted once erected. Any holes that need to be dug to support the fencing where possible must be located outside of TPZ's, otherwise such holes must be hand dug under the supervision of the designated City of Ballarat or independent project arborist. Materials such as rope or orange para-webbing must not be used. Refer to Appendix C for all tree protection details.

8.1.4 Arborist's Inspection

8.1.5 When utilised, all tree protection fencing and the materials from which it is made is to be inspected and approved by the designated City of Ballarat or independent project arborist. Requirements for any alterations and/or additions to TPZ's are to be discussed with the site manager at this time.

8.1.6 TPZ Signs

8.1.7 Signs (Figure 8) must be placed on the tree protection fencing and is to display, at a minimum, that the area is a tree protection zone and must not be accessed and the contact phone numbers of the site manager and the project arborist.



Figure 8. Example TPZ sign. (AS 4970–2008).

When utilised, tree protection fencing and signs **must** remain intact throughout **all** proposed construction works and must only be dismantled after their conclusion. The temporary dismantling of tree protection fencing must only be done with the authorisation of the City of Ballarat or independent project arborist.

No excavations, site scraping, soil level changes or works are to occur inside the TPZ or SRZ of any retained tree without the guidance and on site supervision of the City of Ballarat or independent project arborist.

Tree protection zones **are not** to be used as storage facilities for building materials, fuels, oils, paints or chemicals of any type. The subject trees must also not be used as a billboard to support advertising material. Affixing nails, screws, cabling or fastenings of any type to the trunks, branches or roots of trees is prohibited.

8.1.8 Site Sheds and Car Parking

8.1.9 All site sheds and car parking for engaged contractors must be located outside of the Lake Wendouree foreshore area. This will serve to negate excessive soil compaction of tree root zones and root damage/severance that may occur as a result of the installation of temporary services for the sheds such as water and electricity etc.

8.1.10 The exact location for site sheds and parking is recommended to be determined by the City of Ballarat, however a location such as the existing car park at Durham Point may prove appropriate.

8.2 Site Hygiene

- 8.2.1 Before any construction related vehicles enter the site, they are to be washed down thoroughly to remove all soil from upon and under them. This is to ensure that no vehicle can transfer soil borne plant diseases onto the site, particularly the destructive soil borne fungus *Phytophthora cinnamomi* (Cinnamon Fungus) which is known to cause root rot in a wide range of species.
- 8.2.2 Should any construction related machinery leave the Lake Wendouree site to conduct work on another site, it is likewise to be washed down thoroughly before recommencing works at the lake.

9 Activities during construction

9.1 Pre-start Induction

- 9.1.1 Any and all construction contractors who are to work on the subject site are to undertake a pre-start induction in regards to the importance and significance of the subject trees, the need to ensure all tree protection measures are maintained as well as reading a copy of this report. In particular, sections 8 to 10.

9.2 Contacting the Project Arborist

- 9.2.1 The designated City of Ballarat or independent project arborist must be contacted and/or called to the site at any time during the proposed works where issues and/or concerns arise regarding any of the subject trees. Sometimes issues can be dealt with over the course of a phone call, or if not, during a site visit, and in the process can:
1. Negate unnecessary damage from occurring to the tree(s), and
 2. Potentially avoid any bond placed on the trees from being called upon by the City of Ballarat.

Other than in an emergency, the designated City of Ballarat or independent project arborist will be afforded at least five (5) working days' notice of a requirement to attend the site. Notice of less than this period will not guarantee their attendance on the day required.

9.3 Electrical Conduit Installation

- 9.3.1 Due to the age, species, size and significance of the subject trees, it is recommended that the installation of the underground electrical conduit via open trench should only occur outside the TPZ of the subject trees.
- 9.3.2 Open trenching within the TPZ may be considered within strict parameters and following guidance from the designated City of Ballarat or independent project arborist who will assess the tree's health, structure and significance, alignment of the trench, percentage of encroachment and species tolerance to root damage. It is recommended this option only be considered if the TPZ encroachment is not more than 20%, with compensatory area available, and/or the alignment of the proposed trench is at 90 degrees to the trunk. Excavation would need to be with root sensitive techniques such as hydrovac, airspade, manual hand or small machinery with a spotter (starting at the edge of the TPZ and working in).
- 9.3.3 In all instances where the route of the electrical conduit is to encroach upon the SRZ of a subject tree, underground boring must be utilised.
- 9.3.4 Underground boring is to occur at a minimum depth of 800mm (top of pipe) below the existing grade for trees with a trunk DBH of <100cm, 900mm for trees with a trunk DBH of 100–150cm and 1000mm for trees with a trunk DBH of >150cm. To minimise soil disturbance associated with service installation, communal service lines must be used where appropriate. The entry and exit pits for underground boring must also be positioned outside the designated TPZ for any subject tree.
- 9.3.5 Based on the extent of some TPZ's (15m) and the close proximity of subject trees to one another, extensive underground boring will need to be utilised throughout the course of the installation.

9.4 Light Pole Connection

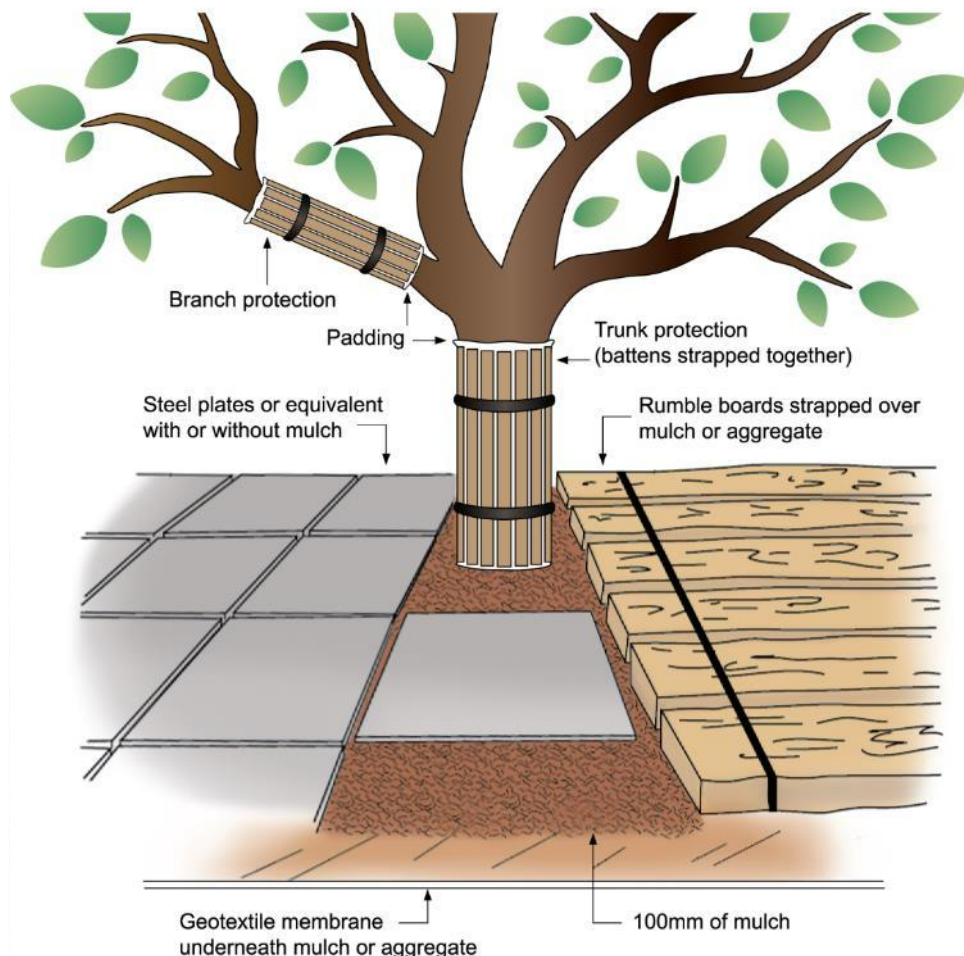
9.4.1 All trenching required to connect light poles to the electrical conduit are recommended to be dug by non-destructive means if they are to occur within the TPZ of a subject tree. This may include hand excavation, hydro excavation or air spade.

9.5 Ground Protection

9.5.1 Given that proposed works are often within the TPZs of retained trees, standard protective fencing may not always be a viable method of protection. In these areas trunk protection and ground protection should be installed prior to the commencement of works and remain in place until after construction works have been completed.

9.5.2 Where construction access into the TPZ of retained trees cannot be avoided, the root zone of each tree must be protected using either steel plates or rumble board strapped over mulch/aggregate.

9.5.3 Trunk and ground protection should be undertaken in line with the Australian Standard AS 4790–2009: *Protection of Trees on Development Sites* as per Figure 9.



Notes:

1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2. Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

Figure 9. Depicts trunk and ground protection techniques. (AS 4970–2009).

9.6 Marking-out TPZs and SRZs

9.6.1 At the beginning of each work week during the development, the designated City of Ballarat or independent project arborist is recommended to attend site and mark out on the ground the extent of TPZs and SRZs for trees anticipated to be worked in proximity of for that week. This will provide further and clear guidance to the engaged contractors as to where open trenching and underground boring is required.

9.7 Machinery Breakdowns

9.7.1 In the event of underground boring equipment breaking down whilst boring within the TPZ of a subject tree, the designated City of Ballarat or independent project arborist is then recommended to be called to supervise and assist in the excavations required to retrieve the broken/damaged part, e.g. drill head.

9.8 Backfilling of Trenches

9.8.1 Trenches created as part of the project are recommended to be backfilled as soon as practicable in order to expose tree roots for the shortest time possible.

9.8.2 Trenches are to be backfilled with spoil created as part of the works and/or clean fill bought to site specifically for the job. 'Foreign' soil from other locations is not recommended to be used as fill.

9.8.3 Once back filled, trenches are to be watered to field capacity to assist in the effective resettling of the disturbed soil.

9.9 Site Visits by the Project Arborist

9.9.1 The following is a suggested schedule of site visits for attendance to site by the project arborist and/or council's planning arborist.

Item	Purpose of Visit	Timing of Visit(s)	Prerequisites
1	Pre-start induction	Following sign off from Item 1. Contractor to provide a minimum of 5 days advance notice for this visit.	Prior to commencement of works. All parties involved in the project to attend.
2	Supervision of works inside TPZ's /SRZ's	Whenever there is work planned to be performed within TPZ's. Contractor to provide a minimum of five (5) days advance notice for such visits.	
3	Regular site inspections	Minimum frequency weekly for the duration of the project to mark out TPZ's and SRZ's and to discuss current work logistics with the site manager.	A checklist must be completed by the project arborist at each site inspection and signed by both parties.
4	Final sign off	Following completion of works.	Practical completion of works and prior to tree protection fencing removal.

9.9.2 The designated City of Ballarat or independent project arborist may need to attend site at other times during the project at the request of the approved contractor such as to provide further guidance related to the subject trees, if there are potential impacts upon the trees that need to be discussed and agreed upon, if there has been a breach of permit or attendance at site meetings, etc.

9.9.3 The City of Ballarat must be notified within 24 hours of any breach of permit or where unexpected damage has occurred to any subject tree. Should such an event(s) occur, the designated City of Ballarat or independent project arborist is to be immediately contacted and requested to attend site and to document the event in the checklist and provide guidance on the course of action required.

10 Post construction activities

10.1 Tree Protection Fencing

10.1.1 After the completion of all proposed construction works, tree protection fencing may be dismantled.

10.2 Arborist Inspection

10.2.1 Prior to the dismantling of the tree protection zones and the finalisation of the project, the designated City of Ballarat or independent project arborist is to be called to the site and make a final inspection and complete the final sign-off. At this time any applicable arboricultural and/or plant health care works are to be discussed with the site foreman/manager and or the City of Ballarat.

11 References

- Anon, 2020, *Lake Wendouree*, https://en.wikipedia.org/wiki/Lake_Wendouree, viewed 3 March, 2020.
- City of Ballarat, 2019, *Lake Wendouree*, <https://www.ballarat.vic.gov.au/city/parks-and-outdoors/find-park/lake-wendouree>, viewed 3 March, 2020.
- City of Ballarat, n.d., *Survey of Steve Moneghetti Track*, City of Ballarat, PO Box 655, Ballarat, 3353.
- City of Ballarat, 2018, *Tree Management Plan Version 2*, City of Ballarat, PO Box 655, Ballarat, 3353.
- Martin Butcher Lighting Design, 2019, *Lake Lighting Concept Plan (BLT125-FCPT 01-04)*, 6 Beatrice Court, Blackburn, 3130.
- Martin Butcher Lighting Design, 2019, *Lake Lighting Concept Design, Context Matters, & Site Electrical Infrastructure*, 6 Beatrice Court, Blackburn, 3130.
- Martin Butcher Lighting Design, 2019, *Public Lighting – Light Pole Options (Sheet 1-2)*, 6 Beatrice Court, Blackburn, 3130.
- Mattheck, C. and Breloer, H., 1994, *The Body Language of Trees: A Handbook for Failure Analysis*, H. M. Stationary Office, University of Michigan.
- Standards Australia, 2009, *AS 4970–2009: Protection of Trees on Development Sites*, Standards Australia, GPO Box 476, Sydney, New South Wales, 2001.
- Standards Australia, 2007, *AS:4373-2007 Pruning of Amenity Trees*, Standards Australia, G.P.O. Box 476, Sydney, New South Wales, 2001.
- Victorian Heritage Council, 2004, *Juniperus virginiana – Statement of Significance*, <https://vhd.heritagecouncil.vic.gov.au/places/70815>, viewed 5 March, 2020.
- Victoria State Government, 2020, *Planning Schemes Online; Ballarat Planning Scheme*, <https://planning-schemes.delwp.vic.gov.au/schemes/ballarat/maps>, viewed 4 March, 2020.

12 Appendices

12.1 Appendix A – Arboricultural Reporting Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownership of any property are assumed to be good. No responsibility is assumed for matters legal in character.
2. It is assumed that any property/project is not in violation of any applicable codes, ordinances, statutes or other government regulations.
3. Care has been taken to obtain all information from reliable sources. All data has been verified in so far as possible, however, the consultant can neither guarantee nor be responsible for the accuracy of the information provided by others.
4. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.
5. Loss or alteration of any part of this report invalidates the entire report.
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by anyone but the person to whom it is addressed, without the prior written consent of the consultant.
7. Neither all nor any part of the contents of this report, nor any copy thereof, shall be used for any purpose by anyone but the person to whom it is addressed, without the written consent of the consultant. Nor shall it be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales or other media, without the written consent of the consultant.
8. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
9. Sketches, diagrams, graphs and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys unless expressed otherwise.
10. Information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection.
11. Inspection is limited to visual examination of accessible components without dissection, excavation or probing. There is no warranty or guarantee expressed or implied that the problems or deficiencies of the plants or property in question may not arise in the future.

12.2 Appendix B – Explanation of Tree Assessment Terms

Tree name: Provides the botanic name, (Genus, species, sub-species, variety and cultivar where applicable) in accordance with the International Code of Botanical Nomenclature (ICBN), and an accepted common name.

Age: Refers to the life cycle of the tree.

Category	Description
Young	Newly planted tree not fully established may be capable of being transplanted or easily replaced.
Juvenile	Tree is small in terms of its potential physical size and has not reached its full reproductive ability.
Semi-mature	Tree in active growth phase of life cycle and has not yet attained an expected maximum physical size for its species and/or its location.
Mature	Tree has reached an expected maximum physical size for the species and/or location and is showing a reduction in the rate of seasonal extension growth.
Senescent	Tree is approaching the end of its life cycle and is exhibiting a reduction in vigour often evidenced by natural deterioration in health and structure.

Health: Summarises the health and vigour of the tree.

Category	Description
Excellent	Canopy full with dense foliage coverage throughout, leaves are entire and are of an excellent size and colour for the species with no visible pathogen damage. Excellent growth indicators, e.g. seasonal extension growth.
Good	Canopy full with minor variations in foliage density throughout, leaves are entire and are of good size and colour for the species with minimal or no visible pathogen damage. Good growth indicators.
Fair	Canopy with moderate variations in foliage density throughout, leaves not entire with reduced size and/or atypical in colour, moderate pathogen damage. Reduced growth indicators, visible amounts of deadwood/dieback, and epicormic growth.
Poor	Canopy density significantly reduced throughout, leaves are not entire, are significantly reduced in size and/or are discoloured, significant pathogen damage. Significant amounts of deadwood and/or epicormic growth, noticeable dieback of branch tips, possibly extensive.
Dead	No live plant material observed throughout the canopy, bark may be visibly delaminating from the trunk and/or branches.

Structure: Summarises the structure of the tree from roots to crown.

Category	Description
Good	Good form and branching habit. Minor structural defects that are insignificant and typical or common within the species. e.g. included bark, co-dominant stems. No fungal pathogens present. No visible wounds to the trunk and/or root plate.
Fair	Moderate structural defects present that impact longevity e.g. apical leaders sharing common union(s). Minor damage to structural roots. Small wounds present where decay could begin. No fungal pathogens present. A fair representation of the species.
Poor	Significant structural defects present that have a significant impact on longevity and result in a poor representation of the species e.g. Branch/stems with included bark with failure likely within 0–5 years. Wounding evident with cavities and/or decay present. Damage to structural roots.
Hazardous	Serious structural defects with failure determined to be imminent (<12 months). Defects may include active splits and/or partial branch or root plate failures. Tree requires immediate arboricultural works to alleviate the associated risk.

Useful Life Expectancy (ULE): Useful Life Expectancy refers to an expected period of time the tree can be retained within the landscape before its amenity value declines to a point where it may detract from the appearance of the landscape and/or becomes potentially hazardous to people and/or property. ULE values consider tree species, current age, health, structure and location. ULE values are based on the tree at the time of assessment and do not consider future changes to the tree’s location and environment which may influence the ULE value.

Category:
0–5 Years
5–10 Years
10–20 Years
20–30 Years
30–50 Years
>50 Years

12.3 Appendix C – Tree protection measures and recommendations adopted from the Australian Standard AS 4970–2009: *Protection of Trees on Development Sites* (Version 2 (October 2010))

Introduction

Tree protection guidelines relate specifically to the protection of trees before, during and after construction with each site requiring specific tree protection measures. Tree protection, or exclusion zones are necessary to prevent detrimental effects resulting from a range of construction activities. To be effective exclusion zones must be installed to protect the designated tree protection zone (TPZ). Tree protection zones must be secured by a lockable gate and identified with signs. The area of the TPZ must be mulched and kept free of weeds. Where encroachment is required within the TPZ, this must be done only with the approval of a consulting arborist.

Signs

Signs identifying the TPZ must be placed around the edge of the TPZ and be visible from within the development site. The lettering on the sign must comply with AS 1319.

The sign must display the following information:

- No persons, vehicles or machinery are to enter the tree protection/exclusion zone without the consent of the site manager or project Arborist
- No fuels, chemicals, building material, equipment or temporary buildings shall be stored within the tree protection/exclusion zone
- Servicing and re-fueling of equipment and vehicles must be undertaken away from the tree protection/exclusion zone
- Attaching temporary service wires, nails, screw or any other fixing device is strictly prohibited
- Contact phone number of the project arborist.

Restricted activities within the TPZ

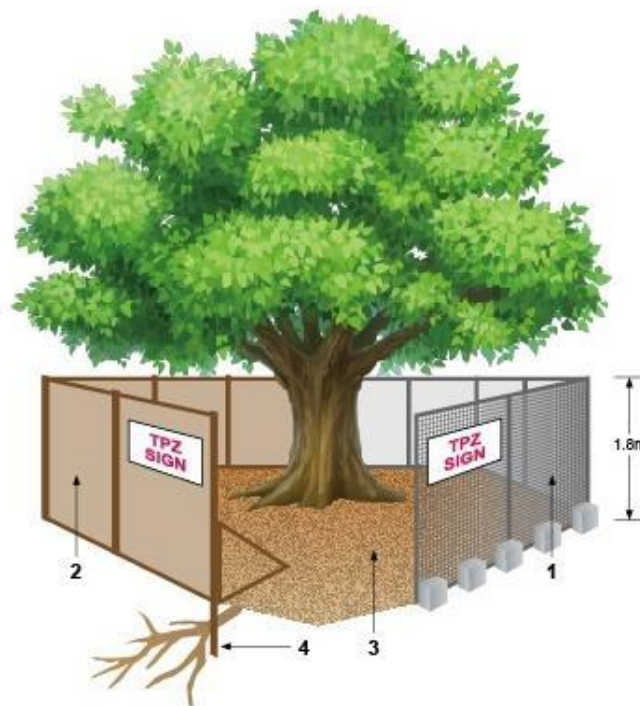
Activities to be excluded from the TPZ include:

1. Machine excavation (including trenching of underground services)
2. Excavation for silt fencing
3. Soil cultivation
4. Storage of all building materials
5. Preparation of chemicals, including preparation of cement products
6. Parking of vehicles and plant
7. Refuelling of machinery
8. Dumping of waste and/or building debris
9. Wash down and cleaning of plant and equipment
10. Placement of fill
11. Soil level changes.

Fencing

Tree protection fencing (Figure 10) needs to be erected before any materials or machinery is brought to the site and before any demolition or development works commence, including the erection of site sheds; tree removal or pruning being the exception). Once erected, protective fencing must not be removed or altered without prior approval by the project arborist and/or the responsible authority.

Tree protection fencing must be made from sturdy material so as it is not readily moved or blown over, thereby ensuring the protection area is not altered once established. Fencing used needs to be self-supporting and be of a minimum height of 1.8 metres and type (such as chain wire or reinforcing mesh fencing) to restrict access by persons and equipment, and to prevent depositing of waste materials and storage of materials. Where fence posts are placed in the ground within the TPZ, they must be located so as to avoid damage to roots with a diameter greater than 20mm. Existing perimeter fencing may be suitable as part of the protective fencing where appropriate.



Legend:

3. Chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet
4. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ
5. Mulch installation across surface of TPZ (at discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage materials of any kind are permitted within the TPZ
6. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

Figure 10. Depicts standard fencing techniques. (AS 4970–2009).

Mulching

Mulching must be undertaken around the tree to the extent of the TPZ and can also include areas outside the tree protection/exclusion zone if necessary. If weeds and/or grass are present within the TPZ they must be sprayed with a non-selective herbicide and allowed to turn yellow/brown in colour or wilt before the mulch is applied.

After spraying, a layer of composted organic mulch must be placed over the TPZ area to a depth of 75–100 millimetres to regulate soil moisture and temperature levels, suppress weeds and reduce the impact of compaction. After construction activities are completed organic mulch may be substituted with other materials, which may include

permeable surfaces such as granitic sands, crushed rock, or surface cultivation landscaping such as the establishment of garden bed areas and lawns subject to the approval of a qualified arborist. Silt fencing may need to be installed around the edges of the fence in readily eroded soil or on steep sites. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required.

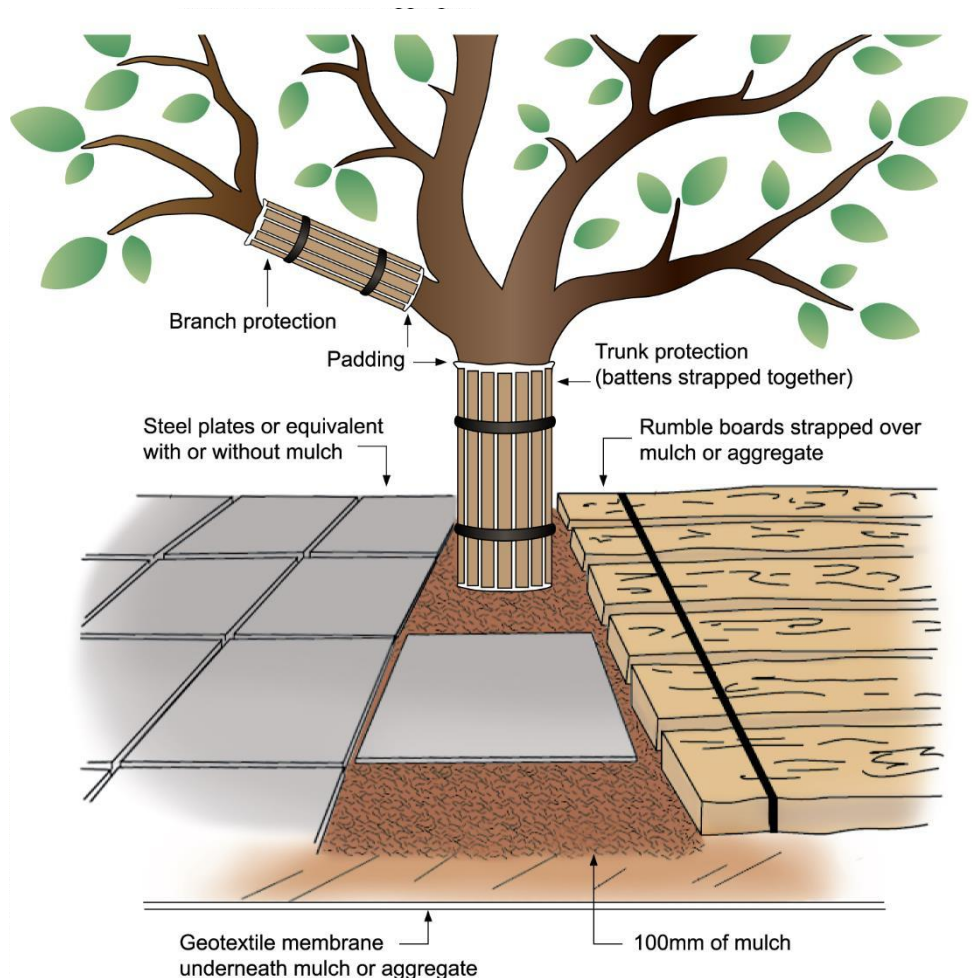
Irrigation

Temporary irrigation lines (~300–400mm apart) must be established within the TPZ under the mulch to maintain optimum soil moisture. The installation of a low-pressure, drip irrigation system connected to a timer is recommended and must be installed and maintained by a competent individual. Soil moisture levels must be regularly monitored.

Nutrient and plant health care requirements

Any nutrient deficiencies and/or plant health care issues such as pest attack need to be treated as part of the installation of tree protection zones.

Branch and trunk protection



Notes:

1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2. Rumble boards must be of a suitable thickness to prevent soil compaction and root damage.

Figure 11. Depicts trunk and ground protection techniques. (AS 4970–2009).

12.4 Appendix D – Lake Wendouree Tree Data Table

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
152106	<i>Cedrus sp.</i>	Cedar	Mature	Good	Excellent	6-10m	15-25m	0.73	0.96	> 40 years	8.8	3.3
152107	<i>Cedrus libani</i>	Cedar of Lebanon	Decline	Poor	Poor	6-10m	15-25m	0.63	0.82	< 5 years	7.6	3.0
152116	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Fair	15-25m	25-40m	1.19	1.44	< 5 years	14.3	3.9
152127	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	6-10m	0.64	0.85	> 40 years	7.7	3.1
152131	<i>Cedrus deodara</i>	Hamalayan Cedar	Semi-mature	Excellent	Excellent	6-10m	15-25m	0.73	0.93	> 40 years	8.8	3.2
152150	<i>Pinus ponderosa</i>	Western Yellow Pine	Mature	Excellent	Fair	6-10m	15-25m	0.75	0.90	15 to 40 years	9.0	3.2
152152	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Fair	15-25m	15-25m	1.02	1.24	5 to 15 years	12.2	3.6
157620	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	6-10m	0.72	0.87	15 to 40 years	8.6	3.1
157624	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Excellent	Excellent	10-15m	15-25m	0.88	1.16	> 40 years	10.6	3.5
157632	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	10-15m	0.64	0.79	15 to 40 years	7.7	3.0
157633	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Fair	Good	6-10m	6-10m	0.63	0.77	15 to 40 years	7.6	3.0
157652	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Excellent	Excellent	10-15m	15-25m	0.85	1.01	> 40 years	10.2	3.3
157659	<i>Cedrus deodara</i>	Hamalayan Cedar	Semi-mature	Excellent	Good	6-10m	10-15m	0.56	0.68	15 to 40 years	6.7	2.8
157661	<i>Ulmus x hollandica</i>	Dutch Elm	Young	Good	Fair	3-6m	3-6m	0.28	0.34	15 to 40 years	3.4	2.1
157665	<i>Quercus robur</i>	English Oak	Young	Good	Good	6-10m	6-10m	0.44	0.57	> 40 years	5.3	2.6
157666	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	6-10m	0.78	0.98	15 to 40 years	9.4	3.3
157672	<i>Quercus sp.</i>	Oak	Mature	Good	Good	15-25m	15-25m	0.86	1.10	15 to 40 years	10.3	3.4
157673	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Fair	10-15m	15-25m	0.74	0.96	5 to 15 years	8.9	3.3
157677	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	10-15m	0.82	0.96	15 to 40 years	9.8	3.3
157678	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	15-25m	0.89	1.01	15 to 40 years	10.7	3.3
157683	<i>Quercus robur</i>	English Oak	Semi-mature	Fair	Good	10-15m	10-15m	0.7	0.89	15 to 40 years	8.4	3.1
157702	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	10-15m	0.58	0.76	15 to 40 years	7.0	3.0
157707	<i>Fraxinus sp.</i>	Ash	Semi-mature	Fair	Fair	6-10m	6-10m	0.57	0.66	15 to 40 years	6.8	2.8
157708	<i>Ulmus x hollandica</i>	Dutch Elm	Young	Excellent	Excellent	3-6m	3-6m	0.38	0.48	> 40 years	4.6	2.4
157709	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Fair	Fair	15-25m	10-15m	0.75	0.88	5 to 15 years	9.0	3.1
157721	<i>Corymbia maculata</i>	Spotted Gum	Young	Excellent	Good	3-6m	3-6m	0.3	0.39	> 40 years	3.6	2.2
157722	<i>Juniperus virginiana</i>	Eastern Juniper	Mature	Excellent	Fair	10-15m	10-15m	0.85	1.03	15 to 40 years	10.2	3.4
157732	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Fair	15-25m	15-25m	1.06	1.33	15 to 40 years	12.7	3.7
157736	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Fair	15-25m	15-25m	1.07	1.29	5 to 15 years	12.8	3.7
157743	<i>Quercus robur</i>	English Oak	Mature	Good	Good	15-25m	6-10m	0.66	0.79	15 to 40 years	7.9	3.0
157744	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Excellent	Excellent	10-15m	15-25m	0.73	0.89	> 40 years	8.8	3.1
157745	<i>Quercus robur</i>	English Oak	Mature	Fair	Fair	10-15m	10-15m	0.73	1.01	5 to 15 years	8.8	3.3
157747	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Good	Good	10-15m	15-25m	0.68	0.84	15 to 40 years	8.2	3.1
157754	<i>Corymbia maculata</i>	Spotted Gum	Young	Excellent	Good	3-6m	3-6m	0.22	0.36	> 40 years	2.6	2.2
157770	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	6-10m	10-15m	0.69	0.85	15 to 40 years	8.3	3.1
157771	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	10-15m	10-15m	0.81	0.96	15 to 40 years	9.7	3.3
157772	<i>Salix sp.</i>	Willow	Mature	Good	Good	15-25m	10-15m	1.15	1.27	15 to 40 years	13.8	3.7
157774	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	10-15m	10-15m	0.63	0.75	15 to 40 years	7.6	2.9
157798	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Good	Good	10-15m	10-15m	1	1.36	15 to 40 years	12.0	3.8
157802	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	10-15m	0.91	1.13	15 to 40 years	10.9	3.5
157805	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	1.11	1.31	15 to 40 years	13.3	3.7
157808	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.84	1.75	15 to 40 years	10.1	4.2
157810	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.94	1.20	15 to 40 years	11.3	3.6
157812	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Fair	10-15m	25-40m	0.91	1.07	5 to 15 years	10.9	3.4
157814	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	25-40m	0.92	1.19	15 to 40 years	11.0	3.6
157823	<i>Robinia pseudoacacia</i>	False Locust	Young	Excellent	Good	3-6m	3-6m	0.25	0.36	15 to 40 years	3.0	2.2
157828	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	6-10m	0.8	0.95	15 to 40 years	9.6	3.2
157830	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Good	Good	15-25m	10-15m	0.94	1.17	5 to 15 years	11.3	3.5
157831	<i>Quercus robur</i>	English Oak	Semi-mature	Excellent	Excellent	10-15m	6-10m	0.68	1.02	> 40 years	8.2	3.3
157832	<i>Quercus robur</i>	English Oak	Mature	Excellent	Good	15-25m	15-25m	0.82	1.02	15 to 40 years	9.8	3.3
157839	<i>Quercus robur</i>	English Oak	Mature	Fair	Good	6-10m	15-25m	0.68	0.89	15 to 40 years	8.2	3.1

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
157855	<i>Fraxinus americana</i>	American Ash	Young	Good	Good	3-6m	3-6m	0.28	0.36	> 40 years	3.4	2.2
157861	<i>Pinus ponderosa</i>	Western Yellow Pine	Mature	Good	Good	6-10m	25-40m	0.84	1.04	15 to 40 years	10.1	3.4
157863	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Excellent	6-10m	10-15m	0.49	0.63	> 40 years	5.9	2.7
157870	<i>Quercus robur</i>	English Oak	Decline	Good	Poor	10-15m	10-15m	0.91	1.04	< 5 years	10.9	3.4
157896	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Decline	Fair	Poor	10-15m	15-25m	2.23	2.56	< 5 years	15.0	4.9
157903	<i>Cupressus sempervirens</i>	Italian Cypress	Young	Excellent	Excellent	3-6m	6-10m	0.3	0.42	> 40 years	3.6	2.3
157904	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Good	Good	6-10m	15-25m	0.85	1.06	15 to 40 years	10.2	3.4
157905	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Excellent	Excellent	6-10m	15-25m	0.76	0.96	> 40 years	9.1	3.3
157911	<i>Cedrus deodara</i>	Hamalayan Cedar	Mature	Fair	Good	10-15m	15-25m	0.78	0.96	5 to 15 years	9.4	3.3
157931	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Fair	10-15m	15-25m	0.97	1.13	5 to 15 years	11.6	3.5
157933	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	6-10m	0.52	0.72	> 40 years	6.2	2.9
157959	<i>Quercus robur</i>	English Oak	Young	Good	Good	3-6m	3-6m	0.28	0.43	15 to 40 years	3.4	2.3
157972	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Good	Good	10-15m	10-15m	0.89	1.21	15 to 40 years	10.7	3.6
157973	<i>Salix sp.</i>	Willow	Semi-mature	Good	Fair	6-10m	6-10m	0.78	0.98	5 to 15 years	9.4	3.3
157974	<i>Populus x canadensis</i>	Canadian Poplar	Young	Excellent	Excellent	3-6m	10-15m	0.36	0.54	> 40 years	4.3	2.6
157975	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	10-15m	0.61	0.98	> 40 years	7.3	3.3
157977	<i>Populus x canadensis</i>	Canadian Poplar	Young	Excellent	Excellent	3-6m	15-25m	0.44	0.63	> 40 years	5.3	2.7
157979	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Fair	Good	3-6m	3-6m	0.36	0.46	5 to 15 years	4.3	2.4
157988	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Good	10-15m	15-25m	1.04	1.25	15 to 40 years	12.5	3.6
157989	<i>Quercus robur</i>	English Oak	Decline	Fair	Fair	10-15m	6-10m	0.57	0.67	5 to 15 years	6.8	2.8
157990	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.41	1.64	15 to 40 years	15.0	4.1
157991	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Good	Good	15-25m	10-15m	0.94	1.31	15 to 40 years	11.3	3.7
157993	<i>Quercus cerris</i>	Turkey Oak	Young	Excellent	Excellent	6-10m	6-10m	0.51	0.76	> 40 years	6.1	3.0
157994	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	10-15m	0.64	0.77	15 to 40 years	7.7	3.0
158003	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Excellent	Good	10-15m	15-25m	0.91	1.22	15 to 40 years	10.9	3.6
158004	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Poor	10-15m	15-25m	1.03	1.20	5 to 15 years	12.4	3.6
158005	<i>Acer buergerianum</i>	Trident Maple	Semi-mature	Excellent	Good	6-10m	6-10m	0.41	0.50	> 40 years	4.9	2.5
158006	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.9	1.13	> 40 years	10.8	3.5
158009	<i>Pinus radiata</i>	Monterey Pine	Mature	Failed	Poor	15-25m	15-25m	1.09	1.33	< 5 years	13.1	3.7
158010	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Good	Excellent	3-6m	3-6m	0.34	0.45	> 40 years	4.1	2.4
158014	<i>Salix sp.</i>	Willow	Decline	Fair	Good	10-15m	6-10m	1.16	1.16	15 to 40 years	13.9	3.5
158029	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Fair	6-10m	3-6m	0.56	0.62	5 to 15 years	6.7	2.7
158031	<i>Quercus robur</i>	English Oak	Semi-mature	Excellent	Good	6-10m	6-10m	0.61	0.87	15 to 40 years	7.3	3.1
158036	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Good	Good	6-10m	6-10m	0.6	0.73	15 to 40 years	7.2	2.9
158038	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	10-15m	0.6	0.80	> 40 years	7.2	3.0
158042	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Fair	Good	15-25m	15-25m	0.9	0.98	15 to 40 years	10.8	3.3
158050	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Fair	Good	6-10m	3-6m	0.53	0.70	15 to 40 years	6.4	2.8
158051	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Good	15-25m	25-40m	1.39	1.70	5 to 15 years	15.0	4.1
158055	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	10-15m	0.82	0.92	15 to 40 years	9.8	3.2
158070	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Excellent	6-10m	10-15m	0.61	0.75	15 to 40 years	7.3	2.9
158071	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Good	10-15m	10-15m	0.96	1.20	5 to 15 years	11.5	3.6
158072	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	15-25m	0.68	0.78	15 to 40 years	8.2	3.0
158073	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Fair	10-15m	6-10m	0.6	0.74	5 to 15 years	7.2	2.9
158074	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Fair	10-15m	10-15m	0.82	1.04	5 to 15 years	9.8	3.4
158088	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Poor	Fair	15-25m	10-15m	0.85	0.97	< 5 years	10.2	3.3
158097	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Fair	6-10m	6-10m	0.51	0.59	15 to 40 years	6.1	2.6
158099	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Fair	Good	10-15m	15-25m	0.87	0.98	15 to 40 years	10.4	3.3
158103	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Fair	Fair	15-25m	15-25m	0.77	0.89	15 to 40 years	9.2	3.1
158105	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.75	0.83	15 to 40 years	9.0	3.1
158107	<i>Ulmus x hollandica</i>	Dutch Elm	Young	Good	Good	6-10m	6-10m	0.43	0.53	15 to 40 years	5.2	2.5
158109	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Fair	15-25m	15-25m	1.05	1.22	< 5 years	12.6	3.6

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
158112	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Fair	10-15m	6-10m	0.95	1.17	< 5 years	11.4	3.5
158113	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	10-15m	0.74	0.80	15 to 40 years	8.9	3.0
158114	<i>Ulmus sp.</i>	Elm	Mature	Good	Fair	10-15m	10-15m	0.97	1.33	5 to 15 years	11.6	3.7
158115	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	15-25m	10-15m	0.65	0.85	5 to 15 years	7.8	3.1
158118	<i>Crataegus sp.</i>	Hawthorn	Mature	Excellent	Poor	3-6m	3-6m	0.41	0.49	< 5 years	4.9	2.5
158128	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	15-25m	0.62	0.76	15 to 40 years	7.4	3.0
158132	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	10-15m	10-15m	0.66	0.78	15 to 40 years	7.9	3.0
158133	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	10-15m	0.53	0.69	> 40 years	6.4	2.8
158137	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	6-10m	15-25m	0.57	0.73	5 to 15 years	6.8	2.9
158140	<i>Populus simonii</i>	Simon Poplar	Young	Excellent	Excellent	<3m	6-10m	0.22	0.30	15 to 40 years	2.6	2.0
158148	<i>Quercus robur</i>	English Oak	Semi-mature	Excellent	Good	6-10m	10-15m	0.67	0.91	15 to 40 years	8.0	3.2
158150	<i>Salix sp.</i>	Willow	Mature	Fair	Good	10-15m	6-10m	0.69	0.83	15 to 40 years	8.3	3.1
158153	<i>Salix sp.</i>	Willow	Semi-mature	Good	Good	6-10m	10-15m	0.59	0.66	15 to 40 years	7.1	2.8
158154	<i>Salix sp.</i>	Willow	Semi-mature	Good	Good	6-10m	10-15m	0.54	0.66	15 to 40 years	6.5	2.8
158155	<i>Salix sp.</i>	Willow	Semi-mature	Good	Good	6-10m	10-15m	0.56	0.66	15 to 40 years	6.7	2.8
158157	<i>Salix sp.</i>	Willow	Semi-mature	Good	Good	6-10m	10-15m	0.52	0.66	15 to 40 years	6.2	2.8
158158	<i>Salix sp.</i>	Willow	Semi-mature	Good	Good	6-10m	10-15m	0.55	0.66	15 to 40 years	6.6	2.8
158162	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	15-25m	0.58	0.72	> 40 years	7.0	2.9
158164	<i>Salix sp.</i>	Willow	Decline	Poor	Fair	6-10m	6-10m	0.73	0.92	None	8.8	3.2
158177	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Fair	3-6m	3-6m	0.51	0.73	5 to 15 years	6.1	2.9
158185	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Good	15-25m	25-40m	1.17	1.32	< 5 years	14.0	3.7
158187	<i>Quercus robur</i>	English Oak	Mature	Excellent	Good	10-15m	15-25m	0.72	0.84	> 40 years	8.6	3.1
158188	<i>Quercus robur</i>	English Oak	Young	Good	Excellent	3-6m	3-6m	0.34	0.44	> 40 years	4.1	2.3
158189	<i>Ulmus x hollandica</i>	Dutch Elm	Young	Good	Good	3-6m	6-10m	0.44	0.57	15 to 40 years	5.3	2.6
158191	<i>Salix sp.</i>	Willow	Young	Good	Good	6-10m	10-15m	0.52	0.61	15 to 40 years	6.2	2.7
158193	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Good	15-25m	25-40m	1.28	1.41	< 5 years	15.4	3.8
158211	<i>Cupressus sempervirens</i>	Italian Cypress	Semi-mature	Excellent	Fair	6-10m	15-25m	0.91	1.08	15 to 40 years	10.9	3.4
158214	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Good	15-25m	25-40m	1.45	1.71	< 5 years	17.4	4.1
158216	<i>Populus simonii</i>	Simon Poplar	Young	Excellent	Good	<3m	6-10m	0.19	0.25	15 to 40 years	2.3	1.8
158225	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	10-15m	15-25m	0.58	0.64	15 to 40 years	7.0	2.7
158226	<i>Salix sp.</i>	Willow	Semi-mature	Good	Excellent	10-15m	15-25m	0.66	0.71	15 to 40 years	7.9	2.9
158228	<i>Populus simonii</i>	Simon Poplar	Young	Excellent	Excellent	3-6m	10-15m	0.22	0.28	15 to 40 years	2.6	1.9
158229	<i>Quercus robur</i>	English Oak	Young	Good	Good	3-6m	3-6m	0.27	0.33	> 40 years	3.2	2.1
158232	<i>Eucalyptus globulus</i>	Southern Blue Gum	Decline	Fair	Fair	6-10m	10-15m	1	1.23	5 to 15 years	12.0	3.6
158233	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	10-15m	0.52	0.66	15 to 40 years	6.2	2.8
158236	<i>Pinus sp.</i>	Pine	Decline	Fair	Fair	15-25m	25-40m	0.84	1.01	5 to 15 years	10.1	3.3
158241	<i>Pinus sp.</i>	Pine	Mature	Good	Good	15-25m	15-25m	0.84	1.10	15 to 40 years	10.1	3.4
158243	Not Assessed	Pine	Decline	Fair	Good	15-25m	25-40m	1.36	1.74	5 to 15 years	15.0	4.2
158245	<i>Pinus sp.</i>	Pine	Mature	Good	Good	15-25m	25-40m	0.88	1.12	15 to 40 years	10.6	3.5
158246	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Excellent	6-10m	10-15m	0.52	0.70	> 40 years	6.2	2.8
158261	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Good	Fair	10-15m	6-10m	1.1	1.41	< 5 years	13.2	3.8
158267	<i>Quercus robur</i>	English Oak	Mature	Fair	Good	6-10m	6-10m	0.63	0.73	15 to 40 years	7.6	2.9
158281	<i>Ulmus parvifolia</i>	Chinese Elm	Semi-mature	Excellent	Excellent	6-10m	6-10m	0.33	0.45	> 40 years	4.0	2.4
158282	<i>Eucalyptus camaldulensis</i>	River Red Gum	Young	Excellent	Excellent	10-15m	15-25m	0.71	0.98	> 40 years	8.5	3.3
158283	<i>Eucalyptus camaldulensis</i>	River Red Gum	Young	Excellent	Good	10-15m	15-25m	0.81	1.09	15 to 40 years	9.7	3.4
158289	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Poor	10-15m	15-25m	0.82	1.01	5 to 15 years	9.8	3.3
158290	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.67	0.85	15 to 40 years	8.0	3.1
158302	<i>Salix sp.</i>	Willow	Mature	Good	Good	10-15m	10-15m	0.83	1.03	15 to 40 years	10.0	3.4
158304	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	10-15m	15-25m	1.1	1.35	15 to 40 years	13.2	3.8
158306	<i>Salix sp.</i>	Willow	Semi-mature	Good	Good	10-15m	10-15m	0.63	0.90	15 to 40 years	7.6	3.2
158308	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	6-10m	0.58	0.79	> 40 years	7.0	3.0

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
158322	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	15-25m	0.59	0.71	15 to 40 years	7.1	2.9
158323	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Excellent	Good	10-15m	15-25m	0.64	0.83	> 40 years	7.7	3.1
158346	<i>Fraxinus sp.</i>	Ash	Semi-mature	Fair	Good	6-10m	6-10m	0.45	0.62	15 to 40 years	5.4	2.7
158347	<i>Salix sp.</i>	Willow	Decline	Fair	Fair	10-15m	6-10m	0.69	0.82	< 5 years	8.3	3.0
158349	<i>Salix sp.</i>	Willow	Decline	Poor	Good	15-25m	10-15m	1.02	1.11	None	12.2	3.5
158350	<i>Salix sp.</i>	Willow	Mature	Fair	Fair	10-15m	10-15m	0.88	0.99	< 5 years	10.6	3.3
158352	<i>Salix fragilis</i>	Crack Willow	Decline	Fair	Fair	15-25m	15-25m	1.57	1.57	5 to 15 years	15.0	4.0
158355	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Fair	Good	3-6m	3-6m	0.47	0.66	5 to 15 years	5.6	2.8
158360	<i>Salix sp.</i>	Willow	Decline	Fair	Fair	10-15m	6-10m	0.93	1.04	< 5 years	11.2	3.4
158370	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.65	1.98	15 to 40 years	15.0	4.4
158373	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Fair	6-10m	10-15m	0.58	0.78	15 to 40 years	7.0	3.0
158376	<i>Quercus robur</i>	English Oak	Decline	Fair	Poor	6-10m	15-25m	0.62	0.75	None	7.4	2.9
158381	<i>Quercus robur</i>	English Oak	Mature	Excellent	Excellent	15-25m	15-25m	0.87	1.17	> 40 years	10.4	3.5
158385	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	10-15m	0.86	1.02	15 to 40 years	10.3	3.3
158387	<i>Pinus ponderosa</i>	Western Yellow Pine	Semi-mature	Good	Excellent	3-6m	15-25m	0.62	0.78	15 to 40 years	7.4	3.0
158388	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	15-25m	0.93	1.16	15 to 40 years	11.2	3.5
158391	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Fair	Poor	15-25m	10-15m	1.75	1.75	< 5 years	15.0	4.2
158394	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Fair	15-25m	15-25m	1.22	1.60	5 to 15 years	14.6	4.0
158403	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	10-15m	0.45	0.58	15 to 40 years	5.4	2.6
158405	<i>Pinus sp.</i>	Pine	Young	Excellent	Good	3-6m	3-6m	0.41	0.57	15 to 40 years	4.9	2.6
158406	<i>Ulmus x hollandica 'Vegeta'</i>	Huntingdon Elm	Semi-mature	Good	Excellent	10-15m	10-15m	0.65	0.88	> 40 years	7.8	3.1
158417	<i>Pinus sp.</i>	Pine	Young	Excellent	Excellent	<3m	6-10m	0.31	0.40	> 40 years	3.7	2.3
158419	<i>Ulmus x hollandica</i>	Dutch Elm	Young	Good	Good	6-10m	6-10m	0.43	0.56	15 to 40 years	5.2	2.6
158424	<i>Cupressus torulosa</i>	Bhutan Cypress	Semi-mature	Excellent	Excellent	3-6m	15-25m	0.59	0.86	> 40 years	7.1	3.1
158425	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Excellent	6-10m	10-15m	0.7	0.88	> 40 years	8.4	3.1
158426	<i>Pinus radiata</i>	Monterey Pine	Decline	Poor	Good	15-25m	15-25m	1.32	1.67	< 5 years	15.8	4.1
158428	<i>Salix chilensis</i>	Chilean Willow	Mature	Fair	Good	10-15m	6-10m	0.8	0.90	< 5 years	9.6	3.2
158429	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Good	10-15m	25-40m	1.41	1.84	5 to 15 years	15.0	4.3
158437	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	10-15m	6-10m	0.57	0.67	15 to 40 years	6.8	2.8
158438	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	6-10m	3-6m	0.38	0.46	5 to 15 years	4.6	2.4
158441	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Fair	10-15m	15-25m	1.26	1.72	< 5 years	15.1	4.2
158458	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	10-15m	0.6	0.83	15 to 40 years	7.2	3.1
158460	<i>Salix sp.</i>	Willow	Mature	Good	Good	15-25m	15-25m	1.15	1.42	15 to 40 years	13.8	3.8
158461	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	10-15m	15-25m	0.73	0.90	15 to 40 years	8.8	3.2
158463	<i>Quercus robur</i>	English Oak	Semi-mature	Excellent	Excellent	10-15m	6-10m	0.61	0.86	> 40 years	7.3	3.1
158466	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	10-15m	0.62	0.84	15 to 40 years	7.4	3.1
158468	Not Assessed	Cypress	Decline	Fair	Fair	15-25m	15-25m	1.42	1.74	5 to 15 years	15.0	4.2
158490	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	15-25m	0.84	1.00	15 to 40 years	10.1	3.3
158499	<i>Quercus sp.</i>	Oak	Young	Good	Good	10-15m	10-15m	0.6	0.75	15 to 40 years	7.2	2.9
158504	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Fair	Excellent	3-6m	6-10m	0.46	0.53	15 to 40 years	5.5	2.5
158510	<i>Populus simonii</i>	Simon Poplar	Young	Excellent	Excellent	3-6m	6-10m	0.22	0.34	15 to 40 years	2.6	2.1
158536	<i>Quercus robur</i>	English Oak	Decline	Fair	Fair	3-6m	6-10m	0.4	0.50	5 to 15 years	4.8	2.5
158537	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	6-10m	0.55	0.73	15 to 40 years	6.6	2.9
158538	<i>Salix sp.</i>	Willow	Mature	Fair	Good	10-15m	15-25m	0.89	1.16	5 to 15 years	10.7	3.5
158540	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	6-10m	6-10m	0.54	0.84	15 to 40 years	6.5	3.1
158541	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Fair	3-6m	6-10m	0.37	0.45	15 to 40 years	4.4	2.4
158542	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Good	15-25m	15-25m	1.2	1.56	15 to 40 years	14.4	4.0
158543	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	15-25m	1.2	1.54	5 to 15 years	14.4	4.0
158544	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	6-10m	0.48	0.62	15 to 40 years	5.8	2.7
158546	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	6-10m	0.48	0.65	15 to 40 years	5.8	2.8
158547	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	10-15m	15-25m	0.57	0.82	15 to 40 years	6.8	3.0

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
158551	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Fair	6-10m	6-10m	0.44	0.61	15 to 40 years	5.3	2.7
158552	<i>Salix sp.</i>	Willow	Young	Good	Good	6-10m	10-15m	0.53	0.69	15 to 40 years	6.4	2.8
158557	<i>Quercus robur</i>	English Oak	Semi-mature	Fair	Fair	3-6m	3-6m	0.39	0.47	5 to 15 years	4.7	2.4
158561	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	6-10m	6-10m	0.5	0.66	> 40 years	6.0	2.8
158564	<i>Quercus robur</i>	English Oak	Mature	Fair	Fair	6-10m	6-10m	0.64	0.83	5 to 15 years	7.7	3.1
158566	<i>Salix sp.</i>	Willow	Mature	Good	Good	10-15m	15-25m	0.88	1.12	15 to 40 years	10.6	3.5
158567	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	15-25m	15-25m	0.88	1.22	15 to 40 years	10.6	3.6
158572	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	15-25m	0.63	1.00	5 to 15 years	7.6	3.3
158574	<i>Salix sp.</i>	Willow	Young	Poor	Good	6-10m	10-15m	0.65	0.85	15 to 40 years	7.8	3.1
158576	<i>Quercus ilex</i>	Holm Oak	Semi-mature	Excellent	Good	10-15m	6-10m	0.68	0.77	5 to 15 years	8.2	3.0
158578	<i>Quercus ilex</i>	Holm Oak	Semi-mature	Excellent	Fair	15-25m	6-10m	1.02	1.07	15 to 40 years	12.2	3.4
158580	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Fair	Fair	15-25m	15-25m	1.55	2.00	5 to 15 years	15.0	4.4
158581	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	10-15m	0.63	0.80	15 to 40 years	7.6	3.0
158582	<i>Pinus sp.</i>	Pine	Mature	Good	Poor	15-25m	15-25m	1.27	1.50	5 to 15 years	15.0	3.9
158594	<i>Populus x canadensis</i>	Canadian Poplar	Decline	Fair	Good	6-10m	15-25m	0.6	0.95	5 to 15 years	7.2	3.2
158595	<i>Salix sp.</i>	Willow	Mature	Fair	Good	6-10m	3-6m	0.53	0.74	15 to 40 years	6.4	2.9
158603	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Good	Fair	15-25m	15-25m	2.01	2.32	5 to 15 years	15.0	4.7
158609	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Good	Good	15-25m	15-25m	1.5	1.79	15 to 40 years	15.0	4.2
158620	<i>Pinus sp.</i>	Pine	Young	Excellent	Good	3-6m	3-6m	0.38	0.46	> 40 years	4.6	2.4
158624	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Young	Excellent	Good	6-10m	6-10m	1.27	1.27	> 40 years	15.0	3.7
158625	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Young	Excellent	Fair	6-10m	6-10m	1.22	1.22	5 to 15 years	14.6	3.6
158626	<i>Quercus robur</i>	English Oak	Semi-mature	Excellent	Good	6-10m	6-10m	0.51	0.69	> 40 years	6.1	2.8
158629	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	1.09	1.17	15 to 40 years	13.1	3.5
158631	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	6-10m	10-15m	0.57	0.62	< 5 years	6.8	2.7
158632	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	6-10m	6-10m	0.66	0.79	5 to 15 years	7.9	3.0
158633	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Fair	Good	10-15m	15-25m	0.86	1.12	5 to 15 years	10.3	3.5
158634	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	10-15m	0.68	0.79	15 to 40 years	8.2	3.0
158639	<i>Quercus robur</i>	English Oak	Mature	Fair	Fair	6-10m	10-15m	0.6	0.71	5 to 15 years	7.2	2.9
158640	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Excellent	3-6m	6-10m	0.41	0.48	15 to 40 years	4.9	2.4
158641	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Good	3-6m	6-10m	0.45	0.56	15 to 40 years	5.4	2.6
158642	<i>Quercus robur</i>	English Oak	Mature	Fair	Fair	6-10m	6-10m	0.62	0.76	5 to 15 years	7.4	3.0
158644	<i>Ulmus x hollandica 'Wredei'</i>	Golden-leaved Dutch Elm	Mature	Fair	Fair	6-10m	3-6m	0.55	0.56	15 to 40 years	6.6	2.6
158646	<i>Quercus ilex</i>	Holm Oak	Semi-mature	Excellent	Excellent	10-15m	6-10m	0.53	0.67	> 40 years	6.4	2.8
158652	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Good	Poor	15-25m	15-25m	1.84	2.19	15 to 40 years	15.0	4.6
158655	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	10-15m	10-15m	0.81	0.91	15 to 40 years	9.7	3.2
158672	<i>Pinus radiata</i>	Monterey Pine	Decline	Poor	Good	15-25m	25-40m	1.24	1.49	None	14.9	3.9
158676	<i>Ulmus x hollandica</i>	Dutch Elm	Decline	Poor	Fair	15-25m	10-15m	0.92	1.12	None	11.0	3.5
158680	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	10-15m	15-25m	0.4	1.13	15 to 40 years	4.8	3.5
158690	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Good	Good	10-15m	6-10m	0.65	0.88	15 to 40 years	7.8	3.1
158692	<i>Salix sp.</i>	Willow	Semi-mature	Good	Fair	3-6m	3-6m	0.4	0.51	5 to 15 years	4.8	2.5
158695	<i>Robinia pseudoacacia</i>	False Locust	Young	Excellent	Excellent	<3m	3-6m	0.2	0.27	> 40 years	2.4	1.9
158697	<i>Platanus x acerifolia</i>	London Plane	Young	Excellent	Poor	<3m	3-6m	0.13	0.19	5 to 15 years	1.6	1.6
158710	<i>Ulmus sp.</i>	Elm	Mature	Good	Good	15-25m	15-25m	0.85	1.02	15 to 40 years	10.2	3.3
158711	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Excellent	Good	10-15m	15-25m	0.69	0.87	15 to 40 years	8.3	3.1
158718	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Good	Good	6-10m	10-15m	0.64	0.81	15 to 40 years	7.7	3.0
158719	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Fair	Good	10-15m	15-25m	0.79	0.87	15 to 40 years	9.5	3.1
158720	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	6-10m	0.66	0.89	> 40 years	7.9	3.1
158726	<i>Cedrus deodara</i>	Hamalayan Cedar	Semi-mature	Excellent	Excellent	6-10m	15-25m	0.58	0.72	> 40 years	7.0	2.9
158733	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Good	Good	15-25m	15-25m	1.65	2.15	15 to 40 years	15.0	4.6
158738	<i>Quercus ilex</i>	Holm Oak	Mature	Good	Fair	6-10m	6-10m	0.91	0.91	5 to 15 years	10.9	3.2
158739	<i>Salix sp.</i>	Willow	Semi-mature	Fair	Good	10-15m	6-10m	0.75	0.89	15 to 40 years	9.0	3.1

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
158740	Not Assessed	Willow	Semi-mature	Poor	Fair	15-25m	15-25m	1.33	1.33	5 to 15 years	15.0	3.7
158741	<i>Quercus ilex</i>	Holm Oak	Semi-mature	Fair	Good	6-10m	3-6m	0.49	0.55	< 5 years	5.9	2.6
158745	Not Assessed	Oak	Mature	Fair	Fair	6-10m	3-6m	0.58	0.65	5 to 15 years	7.0	2.8
158746	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	10-15m	0.72	0.94	15 to 40 years	8.6	3.2
158747	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Excellent	Good	15-25m	15-25m	2.31	2.63	15 to 40 years	15.0	5.0
158752	<i>Grevillea robusta</i>	Silky Oak	Young	Good	Good	3-6m	6-10m	0.36	0.45	15 to 40 years	4.3	2.4
158753	<i>Quercus ilex</i>	Holm Oak	Mature	Fair	Good	6-10m	6-10m	0.57	0.71	5 to 15 years	6.8	2.9
158756	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Decline	Fair	Poor	15-25m	15-25m	2.14	2.54	< 5 years	15.0	4.9
158759	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Excellent	10-15m	6-10m	0.62	0.82	> 40 years	7.4	3.0
158767	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Fair	Fair	15-25m	10-15m	0.97	1.14	5 to 15 years	11.6	3.5
158770	<i>Ulmus x hollandica</i>	Dutch Elm	Young	Excellent	Good	10-15m	3-6m	0.47	0.60	> 40 years	5.6	2.7
158777	<i>Quercus palustris</i>	Pin Oak	Young	Good	Good	3-6m	3-6m	0.24	0.32	> 40 years	2.9	2.0
158780	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	10-15m	6-10m	0.67	0.75	15 to 40 years	8.0	2.9
158783	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.12	1.57	15 to 40 years	13.4	4.0
230568	<i>Fraxinus oxycarpa</i> subsp. <i>angustifolia</i> 'Raywood'	Claret Ash	Mature	Excellent	Fair	10-15m	10-15m	0.77	0.99	> 40 years	9.2	3.3
230686	<i>Hesperocyparis macrocarpa</i>	Monterey Cypress	Mature	Excellent	Fair	15-25m	15-25m	1.77	2.06	15 to 40 years	15.0	4.5
230904	<i>Populus alba</i>	White Poplar	Mature	Good	Fair	10-15m	10-15m	0.85	1.11	5 to 15 years	10.2	3.5
230906	<i>Populus alba</i>	White Poplar	Mature	Fair	Fair	15-25m	15-25m	1.29	1.41	5 to 15 years	15.5	3.8
230963	<i>Populus alba</i>	White Poplar	Mature	Good	Poor	10-15m	10-15m	1.14	1.42	None	13.7	3.8
231016	<i>Populus alba</i>	White Poplar	Mature	Good	Good	15-25m	15-25m	1.13	1.41	5 to 15 years	13.6	3.8
231019	<i>Populus alba</i>	White Poplar	Mature	Fair	Poor	10-15m	10-15m	1.03	1.18	< 5 years	12.4	3.5
231022	<i>Populus alba</i>	White Poplar	Mature	Good	Poor	15-25m	10-15m	1	1.20	5 to 15 years	12.0	3.6
231028	<i>Populus alba</i>	White Poplar	Mature	Good	Good	10-15m	10-15m	1.5	1.26	5 to 15 years	18.0	3.6
231044	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Fair	Poor	3-6m	10-15m	0.67	0.88	None	8.0	3.1
231045	<i>Populus alba</i>	White Poplar	Semi-mature	Fair	Fair	15-25m	10-15m	8	3.00	5 to 15 years	96.0	5.2
231072	<i>Populus alba</i>	White Poplar	Decline	Poor	Poor	6-10m	6-10m	0.72	0.84	< 5 years	8.6	3.1
231102	<i>Populus alba</i>	White Poplar	Mature	Good	Fair	10-15m	15-25m	0.9	1.03	< 5 years	10.8	3.4
231103	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Excellent	Good	6-10m	10-15m	0.64	0.78	15 to 40 years	7.7	3.0
231104	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Semi-mature	Excellent	Good	6-10m	10-15m	0.66	0.82	15 to 40 years	7.9	3.0
231144	<i>Populus alba</i>	White Poplar	Mature	Good	Good	10-15m	6-10m	0.85	0.99	5 to 15 years	10.2	3.3
231148	<i>Populus alba</i>	White Poplar	Mature	Fair	Poor	6-10m	6-10m	0.73	0.83	None	8.8	3.1
231171	<i>Populus x canadensis</i>	Canadian Poplar	Mature	Fair	Fair	10-15m	15-25m	1.24	1.52	5 to 15 years	14.9	3.9
231213	<i>Populus alba</i>	White Poplar	Mature	Good	Good	10-15m	6-10m	0.89	1.09	5 to 15 years	10.7	3.4
231218	<i>Populus alba</i>	White Poplar	Mature	Good	Fair	10-15m	10-15m	1.12	1.24	5 to 15 years	13.4	3.6
231220	<i>Populus alba</i>	White Poplar	Mature	Good	Good	6-10m	10-15m	0.8	1.07	5 to 15 years	9.6	3.4
231229	<i>Populus alba</i>	White Poplar	Mature	Good	Good	10-15m	15-25m	0.89	1.16	5 to 15 years	10.7	3.5
231261	<i>Populus alba</i>	White Poplar	Decline	Fair	Good	10-15m	15-25m	0.95	1.29	5 to 15 years	11.4	3.7
231262	<i>Populus alba</i>	White Poplar	Mature	Fair	Fair	15-25m	10-15m	1.05	1.37	15 to 40 years	12.6	3.8
231263	<i>Populus nigra</i> 'Italica'	Lombardy Poplar	Semi-mature	Excellent	Good	3-6m	15-25m	0.52	0.82	15 to 40 years	6.2	3.0
231264	<i>Populus x canadensis</i>	Canadian Poplar	Semi-mature	Excellent	Good	6-10m	15-25m	0.61	0.90	> 40 years	7.3	3.2
231309	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Good	Fair	10-15m	15-25m	1.06	1.34	5 to 15 years	12.7	3.7
231310	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Fair	Good	10-15m	15-25m	0.91	1.19	5 to 15 years	10.9	3.6
231312	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Good	Fair	10-15m	15-25m	1.04	1.35	5 to 15 years	12.5	3.8
231322	<i>Populus alba</i>	White Poplar	Decline	Fair	Poor	6-10m	10-15m	0.68	0.76	None	8.2	3.0
231330	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Decline	Fair	Fair	6-10m	10-15m	0.92	1.34	5 to 15 years	11.0	3.7
231332	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Decline	Fair	Fair	6-10m	10-15m	0.84	1.15	5 to 15 years	10.1	3.5
231335	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Decline	Fair	Fair	6-10m	10-15m	0.77	1.08	5 to 15 years	9.2	3.4
231343	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Decline	Fair	Fair	3-6m	10-15m	0.74	1.08	< 5 years	8.9	3.4
231346	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Fair	Poor	6-10m	15-25m	0.69	0.99	5 to 15 years	8.3	3.3
231347	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Good	Fair	6-10m	15-25m	0.73	0.99	5 to 15 years	8.8	3.3
231348	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Mature	Good	Fair	6-10m	15-25m	0.82	1.20	5 to 15 years	9.8	3.6

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
231349	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Decline	Fair	Fair	6-10m	15-25m	0.75	1.15	5 to 15 years	9.0	3.5
231350	<i>Populus sp.</i>	Poplar	Semi-mature	Excellent	Excellent	6-10m	10-15m	0.47	0.52	> 40 years	5.6	2.5
231351	<i>Populus sp.</i>	Poplar	Semi-mature	Excellent	Good	6-10m	10-15m	0.38	0.46	15 to 40 years	4.6	2.4
231352	<i>Populus sp.</i>	Poplar	Semi-mature	Excellent	Excellent	6-10m	10-15m	0.59	0.96	15 to 40 years	7.1	3.3
231353	<i>Populus sp.</i>	Poplar	Semi-mature	Excellent	Good	6-10m	10-15m	0.44	0.57	15 to 40 years	5.3	2.6
231354	<i>Populus alba</i> 'Fastigiata'	Fastigate White Poplar	Semi-mature	Excellent	Good	6-10m	10-15m	0.66	0.72	15 to 40 years	7.9	2.9
231361	<i>Populus alba</i>	White Poplar	Mature	Good	Good	15-25m	15-25m	1.11	1.34	15 to 40 years	13.3	3.7
231363	<i>Populus alba</i>	White Poplar	Mature	Good	Fair	15-25m	15-25m	1.02	1.27	15 to 40 years	12.2	3.7
231364	<i>Populus alba</i>	White Poplar	Mature	Fair	Fair	15-25m	15-25m	1.1	1.27	15 to 40 years	13.2	3.7
231369	<i>Populus alba</i>	White Poplar	Mature	Good	Fair	15-25m	10-15m	1.06	1.30	5 to 15 years	12.7	3.7
231374	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	6-10m	6-10m	0.51	0.61	> 40 years	6.1	2.7
231375	<i>Populus x canadensis</i>	Canadian Poplar	Mature	Fair	Poor	10-15m	15-25m	0.94	1.23	None	11.3	3.6
231377	<i>Populus nigra</i> 'Italica'	Lombardy Poplar	Mature	Good	Fair	6-10m	15-25m	1.34	1.89	5 to 15 years	15.0	4.3
231599	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Fair	10-15m	25-40m	1.22	1.58	15 to 40 years	14.6	4.0
231604	<i>Pinus radiata</i>	Monterey Pine	Decline	Poor	Fair	10-15m	15-25m	1.44	1.71	< 5 years	17.3	4.1
231605	<i>Pinus radiata</i>	Monterey Pine	Decline	Poor	Fair	10-15m	25-40m	1.3	1.58	None	15.0	4.0
238223	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	10-15m	15-25m	0.75	1.02	15 to 40 years	9.0	3.3
238224	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	15-25m	15-25m	1.09	1.34	15 to 40 years	13.1	3.7
238225	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	10-15m	25-40m	1.18	1.61	15 to 40 years	14.2	4.0
238226	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Fair	10-15m	25-40m	1.02	1.25	5 to 15 years	12.2	3.6
238228	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Fair	Good	15-25m	15-25m	0.9	1.24	15 to 40 years	10.8	3.6
238229	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Good	10-15m	15-25m	0.92	1.08	15 to 40 years	11.0	3.4
238282	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.44	1.70	15 to 40 years	15.0	4.1
238290	<i>Pinus radiata</i>	Monterey Pine	Mature	Fair	Good	15-25m	25-40m	1.24	1.52	5 to 15 years	14.9	3.9
238291	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.24	1.49	5 to 15 years	14.9	3.9
238358	<i>Pinus sp.</i>	Pine	Mature	Good	Fair	15-25m	15-25m	0.84	1.01	15 to 40 years	10.1	3.3
238359	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.24	1.47	15 to 40 years	14.9	3.9
238363	<i>Pinus pinaster</i>	Maritime Pine	Mature	Good	Excellent	10-15m	15-25m	0.75	0.94	> 40 years	9.0	3.2
238364	<i>Eucalyptus globulus</i>	Southern Blue Gum	Mature	Good	Good	15-25m	15-25m	1.51	1.89	15 to 40 years	18.1	4.3
238367	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Good	10-15m	10-15m	0.73	0.90	< 5 years	8.8	3.2
238368	<i>Pinus radiata</i>	Monterey Pine	Decline	Fair	Excellent	6-10m	15-25m	0.84	1.10	5 to 15 years	10.1	3.4
238369	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	10-15m	15-25m	0.63	0.84	15 to 40 years	7.6	3.1
238370	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	10-15m	1.05	1.18	15 to 40 years	12.6	3.5
238371	<i>Pinus radiata</i>	Monterey Pine	Semi-mature	Good	Good	10-15m	15-25m	0.85	1.06	15 to 40 years	10.2	3.4
238723	<i>Quercus robur</i>	English Oak	Semi-mature	Excellent	Good	10-15m	10-15m	0.67	0.82	15 to 40 years	8.0	3.0
250011	<i>Pinus radiata</i>	Monterey Pine	Mature	Good	Good	15-25m	25-40m	1.38	1.81	5 to 15 years	16.6	4.2
252838	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	15-25m	0.65	0.84	15 to 40 years	7.8	3.1
253237	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	15-25m	0.56	0.75	15 to 40 years	6.7	2.9
253239	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	15-25m	0.52	0.73	15 to 40 years	6.2	2.9
253354	<i>Populus alba</i>	White Poplar	Young	Good	Good	15-25m	10-15m	0.49	0.63	> 40 years	5.9	2.7
253551	<i>Populus alba</i>	White Poplar	Mature	Good	Good	10-15m	15-25m	0.96	1.38	15 to 40 years	11.5	3.8
253606	<i>Fraxinus sp.</i>	Ash	Mature	Good	Good	6-10m	10-15m	0.59	1.01	15 to 40 years	7.1	3.3
253867	<i>Salix sp.</i>	Willow	Young	Good	Good	6-10m	10-15m	0.41	0.58	15 to 40 years	4.9	2.6
253983	<i>Quercus robur</i>	English Oak	Semi-mature	Good	Fair	3-6m	15-25m	0.54	0.68	15 to 40 years	6.5	2.8
254002	<i>Quercus robur</i>	English Oak	Mature	Good	Good	6-10m	15-25m	0.65	0.77	> 40 years	7.8	3.0
256113	<i>Pittosporum sp.</i>	Pittosporum	Semi-mature	Excellent	Good	3-6m	3-6m	0.51	0.57	5 to 15 years	6.1	2.6
256989	<i>Quercus robur</i>	English Oak	Young	Good	Good	3-6m	10-15m	0.48	0.62	> 40 years	5.8	2.7
256996	<i>Quercus robur</i>	English Oak	Mature	Good	Fair	10-15m	10-15m	0.65	0.80	5 to 15 years	7.8	3.0
257017	<i>Quercus robur</i>	English Oak	Mature	Good	Good	10-15m	10-15m	0.71	0.94	15 to 40 years	8.5	3.2
257039	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Fair	6-10m	10-15m	0.74	0.91	5 to 15 years	8.9	3.2
257051	<i>Cupressus torulosa</i>	Bhutan Cypress	Semi-mature	Excellent	Excellent	3-6m	15-25m	0.75	1.09	> 40 years	9.0	3.4

Tree no.	Botanical Name	Common Name	Age	Health	Structure	Tree Height	Canopy (m)	TPZ Measurement (m)	SRZ Measurement (m)	TLE (Yrs.)	Radial TPZ (m)	Radial SRZ (m)
257052	<i>Cupressus torulosa</i>	Bhutan Cypress	Semi-mature	Excellent	Good	3-6m	10-15m	0.47	0.59	> 40 years	5.6	2.6
257054	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Excellent	6-10m	6-10m	0.58	0.71	> 40 years	7.0	2.9
257088	<i>Salix sp.</i>	Willow	Decline	Poor	Poor	6-10m	3-6m	0.88	1.03	< 5 years	10.6	3.4
257127	<i>Ulmus x hollandica</i>	Dutch Elm	Semi-mature	Good	Good	6-10m	10-15m	0.65	0.86	15 to 40 years	7.8	3.1
257229	<i>Quercus ilex</i>	Holm Oak	Mature	Good	Good	6-10m	6-10m	0.68	0.75	15 to 40 years	8.2	2.9
257467	<i>Cedrus deodara</i>	Hamalayan Cedar	Young	Excellent	Good	3-6m	6-10m	0.42	0.53	15 to 40 years	5.0	2.5
257559	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.71	0.89	15 to 40 years	8.5	3.1
257560	<i>Acer sp.</i>	Maple	Semi-mature	Excellent	Good	3-6m	6-10m	0.43	0.54	15 to 40 years	5.2	2.6
257561	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Good	15-25m	15-25m	0.82	1.03	15 to 40 years	9.8	3.4
257601	<i>Salix sp.</i>	Willow	Decline	Fair	Good	10-15m	6-10m	0.69	0.84	5 to 15 years	8.3	3.1
274413	<i>Quercus cerris</i>	Turkey Oak	Young	Excellent	Excellent	<3m	<3m	0.5	0.64	> 40 years	6.0	2.7
275264	<i>Cedrus deodara</i>	Hamalayan Cedar	Young	Excellent	Good	3-6m	6-10m	0.36	0.49	15 to 40 years	4.3	2.5
276643	<i>Salix sp.</i>	Willow	Mature	Fair	Good	6-10m	6-10m	0.72	0.83	< 5 years	8.6	3.1
276644	<i>Salix sp.</i>	Willow	Mature	Fair	Good	6-10m	6-10m	0.53	0.60	5 to 15 years	6.4	2.7
276656	<i>Quercus palustris</i>	Pin Oak	Young	Excellent	Excellent	3-6m	3-6m	0.17	0.26	> 40 years	2.0	1.9
276666	<i>Pinus sp.</i>	Pine	Young	Excellent	Excellent	<3m	<3m	0.16	0.27	> 40 years	1.9	1.9
276667	<i>Quercus robur</i>	English Oak	Young	Excellent	Excellent	3-6m	3-6m	0.13	0.20	> 40 years	1.6	1.7
276670	<i>Quercus dentata</i>	Domiyo Oak	Young	Excellent	Excellent	3-6m	3-6m	0.21	0.30	> 40 years	2.5	2.0
276845	<i>Salix chilensis</i>	Chilean Willow	Semi-mature	Good	Fair	6-10m	6-10m	0.5	0.59	5 to 15 years	6.0	2.6
276917	<i>Cedrus deodara</i>	Hamalayan Cedar	Semi-mature	Fair	Excellent	3-6m	6-10m	0.39	0.49	15 to 40 years	4.7	2.5
276928	<i>Cedrus deodara</i>	Hamalayan Cedar	Young	Good	Excellent	3-6m	6-10m	0.23	0.29	> 40 years	2.8	2.0
276929	<i>Corymbia maculata</i>	Spotted Gum	Young	Excellent	Good	3-6m	6-10m	0.25	0.32	> 40 years	3.0	2.0
277007	<i>Corymbia maculata</i>	Spotted Gum	Young	Excellent	Excellent	<3m	6-10m	0.22	0.42	> 40 years	2.6	2.3
277011	<i>Quercus ilex</i>	Holm Oak	Young	Good	Excellent	6-10m	3-6m	0.34	0.72	> 40 years	4.1	2.9
277014	<i>Sequoia sempervirens</i>	Coast Redwood	Young	Excellent	Excellent	3-6m	3-6m	0.42	0.68	> 40 years	5.0	2.8
277015	<i>Acer sp.</i>	Maple	Young	Excellent	Excellent	6-10m	3-6m	0.39	0.52	> 40 years	4.7	2.5
277016	<i>Salix sp.</i>	Willow	Mature	Fair	Good	10-15m	6-10m	0.76	0.94	15 to 40 years	9.1	3.2
277032	<i>Pinus sp.</i>	Pine	Young	Excellent	Good	<3m	<3m	0.21	0.25	> 40 years	2.5	1.8
277044	<i>Salix sp.</i>	Willow	Decline	Poor	Good	10-15m	10-15m	0.72	0.94	15 to 40 years	8.6	3.2
277045	<i>Salix sp.</i>	Willow	Mature	Good	Good	10-15m	6-10m	0.73	0.97	15 to 40 years	8.8	3.3
277046	<i>Salix sp.</i>	Willow	Mature	Good	Good	6-10m	10-15m	0.93	1.23	5 to 15 years	11.2	3.6
277049	<i>Salix sp.</i>	Willow	Mature	Fair	Good	10-15m	10-15m	0.85	0.92	15 to 40 years	10.2	3.2
277053	<i>Salix babylonica</i>	Weeping Willow	Mature	Fair	Good	6-10m	10-15m	0.83	0.95	15 to 40 years	10.0	3.2
277054	<i>Salix sp.</i>	Willow	Mature	Good	Good	6-10m	10-15m	0.8	1.10	15 to 40 years	9.6	3.4
277055	<i>Ulmus x hollandica 'Vegeta'</i>	Huntingdon Elm	Semi-mature	Excellent	Excellent	6-10m	15-25m	0.65	0.97	> 40 years	7.8	3.3
277056	<i>Salix babylonica</i>	Weeping Willow	Decline	Fair	Poor	10-15m	6-10m	0.79	1.15	None	9.5	3.5
277057	<i>Salix sp.</i>	Willow	Semi-mature	Good	Excellent	6-10m	6-10m	0.54	0.77	15 to 40 years	6.5	3.0
298835	<i>Ulmus x hollandica</i>	Dutch Elm	Mature	Good	Not Assessed	6-10m	6-10m	0.51	0.63	15 to 40 years	6.1	2.7
298857	<i>Araucaria heterophylla</i>	Norfolk Island Araucaria	Young	Excellent	Excellent	<3m	3-6m	0.11	0.16	> 40 years	1.3	1.5
298861	<i>Populus alba 'Fastigiata'</i>	Fastigate White Poplar	Mature	Good	Fair	6-10m	10-15m	0.77	1.17	5 to 15 years	9.2	3.5
298871	<i>Quercus robur</i>	English Oak	Mature	Good	Good	3-6m	6-10m	0.54	0.72	5 to 15 years	6.5	2.9
298886	<i>Quercus ilex</i>	Holm Oak	Mature	Excellent	Excellent	3-6m	3-6m	0.35	0.54	> 40 years	4.2	2.6
298893	<i>Pinus pinea</i>	Stone Pine	Young	Excellent	Excellent	<3m	<3m	0.25	0.34	> 40 years	3.0	2.1

12.5 Appendix E – Additional Tree Management Considerations

12.5.1 Tree Retention/Removal

- 12.5.2 Within the City of Ballarat's Tree Management Plan document, Lake Wendouree is denoted as a T1 (high use area). Trees in this area have a designated inspection frequency of 12 months.
- 12.5.3 If within council's inventory there are trees around the Lake Wendouree foreshore that have outstanding works itemised against them with a Response Code of A, B or C, it is recommended to have these works completed in full prior to the commencement of the Lake Wendouree Lighting Project.
- 12.5.4 From a proactive tree risk management perspective, this would be prudent to improve not only the safety of users of the Steve Moneghetti Track and surrounds, but also of the approved contractors for the project who are likely to be around some of the subject trees for extended periods of time.

12.5.5 Arboricultural Works

- 12.5.6 To ensure a high standard of works is achieved, all arboricultural works administered to the subject trees are recommended to be performed by a minimum AQF Level 3 arborist in accordance with the Australian Standard AS 4373–2007: *Pruning of Amenity Trees*.
- 12.5.7 After the completion of any arboricultural works deemed appropriate by the City of Ballarat (per section 12.5.3), at no stage during the proposed lighting project works is any part of any subject tree to be removed by contractors without the prior consent of the City of Ballarat's Vegetation Officer and/or council employed consulting arborist(s).

12.5.8 *Pinus radiata* inspections

- 12.5.9 As a result of the observation of *Phaeolus schweinitzii* at the base of one (1) of the subject trees, the decline observed in this tree species around the lake and the advent of recent rain, it was recommended that a series of inspections be undertaken by council on a fortnightly basis during March and April.
- 12.5.10 These inspections should carefully view the areas near to, and around the base of all *Pinus radiata* within the Lake Wendouree foreshore (as well as in other council managed parks) for the presence of *Phaeolus schweinitzii* brackets.
- 12.5.11 The identified presence of this fungus should then be recorded in council's asset management database along with appropriate management recommendations.