Yarra Park Tree Strategy

January 2013

Melbourne Cricket Club

Tree Logic Pty. Ltd.
Unit 4 21 Eugene Terrace
Ringwood, VIC 3134
T 03 98707700 **F** 03 9870 8177

Executive Summary

Tree Logic was commissioned to develop a tree strategy for Yarra Park to assist with meeting the objectives pertaining to tree management outlined in the Yarra Park Master Plan, September 2010.

Any efforts to proactively manage a population of trees in an urban landscape to provide the greatest amount of benefits requires a targeted, strategic approach that is collaborative in nature and considers the wide range of stakeholders with interests in the very public use of Yarra Park in conjunction with urban forest sustainability.

The objectives of the Yarra Park Tree Strategy are to:

- Assist with achieving the Melbourne Cricket Club's vision for a sustainable, multi-use Yarra Park.
- Reinvigorate the park and improve the health of the existing trees.
- Establish a program for tree and avenue renewal.
- Protect and enhance the 'overlay' of remnant indigenous vegetation (the important River Red Gum Woodland elements).
- Recommend strategies to reduce and minimise the impact on grass surfaces and trees from event car parking activities.

The Yarra Park Tree Strategy will assist the Melbourne Cricket Club in the preparation of the annual Management and Improvement Plan for Yarra Park, as required by *The Melbourne Cricket Ground and Yarra Park Amendment Act 2009*.

The area of Yarra Park is approximately 28 Hectares (280,000m^2). The area covered by tree canopies is approximately 126,048m^2 (12.6048 hectares), or approximately 45% of the total park area. There are 1,212 trees comprising 58 different species and cultivars.

An i-Tree Eco assessment that quantifies the environmental benefits of urban trees, found that:

- According to the tree valuation method adapted for Australian conditions the trees are worth $11,788,608.00.
- Carbon stored by the trees within the park is approximately 966,325 kilograms (966.32 tonne). Carbon sequestered annually is approximately 23,207 kilograms/year (23.207 tonne/year). Based on the price per tonne of carbon being $23.00 (Australia's fixed carbon price), the total carbon stored is $22,225.36 and $533.60 is being sequestered each year.
- The annual value for pollution removal from the trees within Yarra Park is $5,164.21.

A 20-year Tree Strategy has been developed that aims to protect this valuable resource and enhance and increase the canopy coverage of the treed landscape of Yarra Park in a sustainable manner to provide a healthy, diverse and aesthetically pleasing tree population that continually benefits the multi-user community that enjoys this prominent Melbourne open space.

The key management areas to assist in achieving the vision are to:

- Increase relative canopy coverage, ensured through a comprehensive tree establishment program.
- Increase age diversity, ensured through a tree removal and replacement program.
- Maintain full tree tree inventory with maintenance records and i-Tree Eco data.

- Implement best practice tree maintenance.
- Implement appropriate tree protection measures.
- Implement a systematic tree risk management process.
- Undertake periodic reviews of the strategy.

A temporal framework for tree management has been developed that proposes a three-tier framework with a 20-year Strategic Plan, 5-year management plans and annual operating plans.

The 2012 tree assessment identified three-hundred and forty (340) trees, or approximately 28% of the assessed trees, as requiring works. The recommended works comprised either tree removal or various forms of tree pruning. The recommended works were prioritised over a twenty-year period with work priority reviews required at the end of each five year period.

Over the 20-year period, three-hundred and sixteen (316) trees have been recommended for removal and replacement works. This is approximately 26% of total trees, which equates to approximately 1.3% of total trees per year.

The assessment also identified one-hundred and twenty-five (125) vacant sites that could be planted out immediately.

The estimated cost to undertake the 20-year Strategic Plan is $$621,341.00. This does not include the works associated with the nominated cyclic maintenance regime, annual risk assessment and pest and disease management.

Other recommended tree works:

- Development of a 5-year cyclic maintenance program. Properly maintained trees develop fewer hazardous defects and pose less risk to public safety.
- Annual tree risk assessment of all trees to identify other tree hazards that require reactive maintenance to improve safety.
- On-going pest and disease management, particularly in regard to Elm Leaf Beetle and possum damage.
- Undertake continued tree protection by excluding vehicles with bollards and mulching. Continue to develop strategies to mitigate potential tree impacts from MCG events.

All tree works are to carried out to best tree care practices, in line with relevant legislative requirements, and strategic policies. The Melbourne Cricket Club needs to employ or contract adequate, qualified staff and develop and maintain adequate funding to implement the Yarra Park Tree Strategy.

The Yarra Park Tree Strategy provides a viable means of maintaining and enhancing the treed landscape of Yarra Park. The implementation of the strategy requires commitment to the goals, community support and on-going allocation of appropriate resources. The value of a strategic and collaborative approach to urban forest planning is that future generations might enjoy all of the important benefits that the trees of Yarra Park provide us with today.

1. Introduction

Yarra Park surrounds Australia's best known sports ground, the Melbourne Cricket Ground (MCG). The trees are the major landscape element of Yarra Park with approximately 1,212 (1,230 - 2009) trees, comprising 58 different species and cultivars.

The dominant landscape use of trees within the park are the formal avenue plantings of English Elm (*Ulmus procera*) along the internal roads. There are other dominant canopy trees, either remnant or planted as specimens or groups within the open grassed areas, and primarily comprise the remnant River Red Gums (*Eucalyptus camaldulensis*) and other Australian native tree species.

The challenges to growing and maintaining healthy trees within public open space such as Yarra Park are numerous and, by necessity, must be addressed on a long-term horizon. Trees are a long-term investment, and successes and failures are rarely realised overnight because trees can take years to respond to stress factors (other than acute malaises) or improvements designed to promote their health and longevity.

Any efforts to proactively manage a population of trees in an urban landscape (urban forest) to provide the greatest amount of benefits requires a targeted, strategic approach that is collaborative in nature and considers the wide range of stakeholders with interests in the very public use of Yarra Park in conjunction with urban forest sustainability.

The value of a strategic and collaborative approach to urban forest planning is that future generations might enjoy all of the important benefits that the trees of Yarra Park provide us with today.

1.1 Objectives of the Yarra Park Tree Strategy

To assist with meeting the objectives pertaining to tree management outlined in the Yarra Park Master Plan September 2010.

The Yarra Park Master Plan Vision

"*The vision of Yarra Park is to enhance and reinvigorate the existing attractive landscape qualities, as a sustainable and multi-use resource for the future - befitting its role as one of the major public open spaces within Melbourne's renowned suite of inner city parks and gardens, and as a key component of Melbourne's high quality Sports and Entertainment Precinct, with the MCG at its 'heart'*."

Key implementation actions identified in the Yarra Park Master Plan pertaining to trees:

- Enhancement of the tree lined pedestrian avenues.
- Continued use of Elm trees (*Ulmus* spp.), as the main avenue theme tree.
- Preparation of a detailed management plan, and prioritised program for replacement planting of avenue trees. Avenue trees to be replaced in sections over a 20-year program. The majority of the trees within the significant avenues are approaching their useful life expectancies. Over ensuing years many of these trees will need to be removed and replaced. A tree management strategy will assist in the development of programs that responsibly approach the removal and replacement of these trees.
- Recent infill planting of isolated\landmark, native indigenous trees, to be reviewed, and the *ad hoc* placement to be checked.

- Protection and delineation of the avenues with crisp linear mulched beds.

Underpinning the landscape upgrades is the establishment of a sustainable water supply, which is underway with the installation of the underground water recycling facility. This will ensure that Yarra Park has a reliable water supply to reduce the impacts of future drought events.

The vision for the Yarra Park Tree Strategy;

To enhance and increase the canopy coverage of the treed landscape of Yarra Park in a sustainable manner to provide a healthy, diverse and aesthetically pleasing tree population that continually benefits the multi-user community that enjoys this prominent Melbourne open space.

The Yarra Park Tree Strategy will endeavour to maintain the treed character and appearance of Yarra Park based as far as possible on original design themes. The proposed tree maintenance, tree removal and replacement and tree protection works will not have an adverse effect on Yarra Park.

The objectives of the Yarra Park Tree Strategy are to:

- Assist with attaining the Melbourne Cricket Club's vision for a sustainable, multi-use Yarra Park.
- Reinvigorate the park and improve the health of the existing trees.
- Establish a program for tree and avenue renewal.
- Protect and enhance the 'overlay' of remnant indigenous vegetation (the important River Red Gum Woodland elements).
- Recommend strategies to reduce and minimise the impact on grass surfaces and trees from event car parking activities.

The Tree Strategy and the operational plans will assist with the annual Yarra Park Management and Improvement Plan (M&I Plan) to be submitted to the State Government of Victoria. Specifically, it will provide the strategies to improve the long-term health and sustainability of the Yarra Park and its trees.

The Tree Strategy will be developed with the aim to also placate permit requirements or assist with an exemption from planning applications on an on-going basis. Unless a permit policy and permit exemptions apply, a Heritage Permit under the Heritage Act 1995 will be required for all changes to Yarra Park.

The strategic tree management plan for Yarra Park will provide a long-term planning horizon in order to outline required action items, prioritise implementation and accommodate long-term budget planning.

A 20-year horizon is deemed appropriate for the planning of a sustainable and healthy tree population for Yarra Park.

The strategic management plan will:

- Outline long-term goals for the trees within Yarra Park.
- Establish a temporal framework for tree management (propose a three-tier framework with a 20 year Strategic Plan, 5 year management plans and annual operating plans - See appendix 1. The framework will also aid in the development of Key Performance Indicators (KPI) for the tree management components of the annual Yarra Park Management and Improvement Plan (M&I Plan).

- Establish tree related criteria and indicators to measure performance of the management inputs and the development of the tree resource within the Park. Criteria and indicators (C&I) provide a standardised set of performance measures that can relate to urban forests anywhere and help guide managers to improve the health of their tree resource and the effectiveness of their management approach.

2. Overview of existing trees

A review of the existing trees and associated data from the 2009 'Yarra Park - Tree assessment and tree management plan' took place over July 2012. The review assessment comprised a visual, ground-based arboricultural assessment of the tree population within Yarra Park. The updated data reflects the trees current condition and those trees removed and planted since the 2009 audit.

The individual trees were assessed according to arboricultural criteria, however the review also collected data to allow an i-Tree Eco assessment. i-Tree Eco is a system that quantifies the environmental benefits of urban trees. i-Tree Eco is a science-based, peer-reviewed computer model designed to calculate urban forest ecosystem services and values based on field data inputs and available data sets from external sources (e.g., weather and pollution data sets).

i-Tree Eco is the only application that has been successfully used for these purposes outside of the United States of America to gain a comprehensive and specific understanding of the environmental benefits of urban trees.

2.1 Yarra Park trees

The area of Yarra Park is approximately 28 Hectares (280,000m^2). The area covered by tree canopies is approximately 126,048m^2 (12.6048 hectares), or approximately 45% of the total park area.

There are 1,212 trees comprising 58 different species and cultivars. A breakdown of the most common trees growing within the park can be seen in Diagram 1.

Exotic deciduous tree species, such as Elms (*Ulmus procera* and *U*. x *hollandica*), with 325 and 62 specimens respectively, and London Plane (*Platanus* X *acerifolia*), with 77 specimens, were the dominant trees used in the avenues.

Diagram 1. Most common tree species used in Yarra Park (>10 specimens).

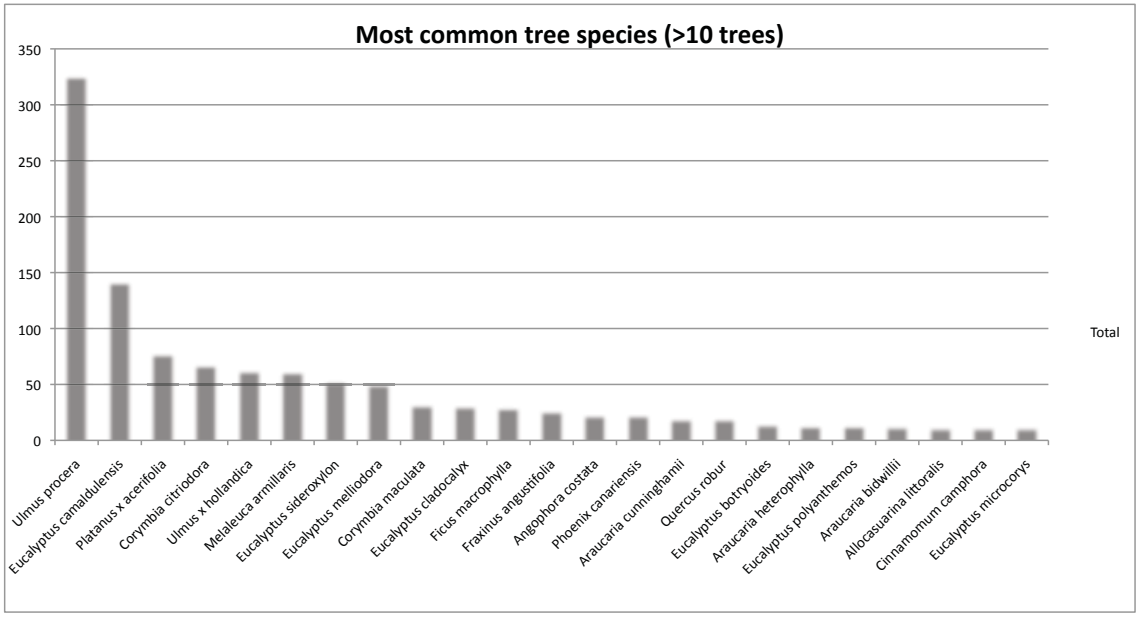


Diagram 1 shows the high percentage of elm trees within the park (combined 387 of 1212 trees). Approximately 32% of all trees are *Ulmus* spp.

Eucalypts dominated the specimen plantings in the open grassed areas. The most significant eucalypts, particularly in terms of conservation value, were the remnant River Red Gums (*Eucalyptus camaldulensis*) with 141 specimens. The significance of the River Red Gums also relates to the aboriginal heritage of the site with the 'Scarred Tree' (Tree No. 143) being testament to the Wurundjeri people as traditional custodians of the land.

Eucalypts, such as Lemon-scented Gum (*Corymbia citriodora*) along Pavilion Walk and the Red Ironbark (*Eucalyptus sideroxylon*) leading to Gate 5, are being utilised in more contemporary avenue plantings.

In general, the majority of trees were displaying health and structural characteristics that could be considered typical of the species growing in Melbourne landscapes.

Since the 2009 survey and assessment approximately 45 trees have been removed and 27 new trees planted. Another 10 trees were assessed as dead (not including the Scar tree - № 143).

In terms of age categories, five-hundred and seventy-six trees were assessed as maturing specimens and six being over-mature (senescent) (collectively approximately 48% of total population). As indicated in the Yarra Park Master Plan, the majority of the avenue trees are ageing trees that have reached the extent of their useful life expectancies. It is expected that a large percentage of these trees will enter the decline stage of their life cycle over ensuing years. One of the primary goals of the Yarra Park Tree Strategy is to develop a prioritised program for tree removal and replacement planting of avenue trees.

Four-hundred and seventy-four trees were categorised as semi-mature (still actively growing and yet to achieve expected size in location) and one-hundred and fifty-five trees were categorised as Young trees (planted within the last 7 to 10 years).

The issue of tree age diversity and how it relates to tree management is discussed in section (4.2).

2.2 i-Tree key findings

The trees within Yarra Park were assessed in 2012 using i-Tree ECO. i-Tree is a contemporary, peer-reviewed software suite from the United States Department of Agriculture (USDA) Forest Service that provides urban forestry analysis and benefits assessment tools.

It allows tree managers to strengthen their urban forest management and advocacy efforts by quantifying the structure of tree populations and the environmental services that trees provide.

For each tree the following information was measured/recorded:

- Species
- Number of stems
- DBH (trunk diameter) of each stem (or if greater than six stems, diameter recorded below fork and height of measure recorded)
- Tree height
- Height to base of live crown
- Crown width (average of two perpendicular N-S & E-W measurements).
- Percent of branch dieback in crown (used to rate tree crown condition) (100 = no leaves)
- Percent of canopy volume devoid of leaves (0-100%)
- Crown Light Exposure: Number of sides of the tree receiving sunlight from above

- Street tree: Y if a street tree, N if not.
- Land use (LAND USE): Majority is Park (P).

The following were not assessed; Plantable Space - percent of land area beneath entire tree canopy's drip line that is impervious or percent of land area beneath canopy drip line that is occupied by shrubs

Did not assess for:

- Energy - Distance or direction to buildings (if within 18 metres of a tree).
- Hydro issues - pervious land percentage.
- Pests. Effects on leaf coverage as a result of defoliation.

The method for an i-Tree assessment and analysis can be seen in Nowak *et al* (2008).

2.3 i-Tree valuation

The structural value estimation was determined using an approach by the Council of Tree and Landscape Appraisers (CTLA,1992), which has been adapted for Australia. This was coordinated between the U.S. Forest Service by Arboriculture Australia during the build of the Australian adaptation of i-Tree. The Melbourne Urban Forest Accord Group driven by Melbourne City Council and Arboriculture Australia™ commenced work on researching and changing the algorithms and pollution data for i-Tree ECO to make a total Victoria version which would then be expanded out to each state of Australia.

This procedure calculates a value based on cross-sectional area at trunk diameter at breast height (DBH - approximately 1.4 metres above grade). This value is calculated using the current value of trees available for transplanting. This basic price is then adjusted for species, tree condition and location. The approach applied here may overestimate some trees, but will also underestimate others. It will, nonetheless, yield a credible value for all the trees in the park, but should not be used for individual tree valuation purposes.

According to the tree valuation method adapted from the CTLA method for Australian conditions the trees are worth $11,788,608.00.

The average value per tree is $9,710.55.

The most valuable tree at $47,606.00 was Tree No. 1133 Moreton Bay Fig (*Ficus macrophylla*), due to it's size and condition.

The least valuable tree at $13.00 was Tree No. 133, which was a small, recently planted, stressed River Red Gum (*Eucalyptus camaldulensis*).

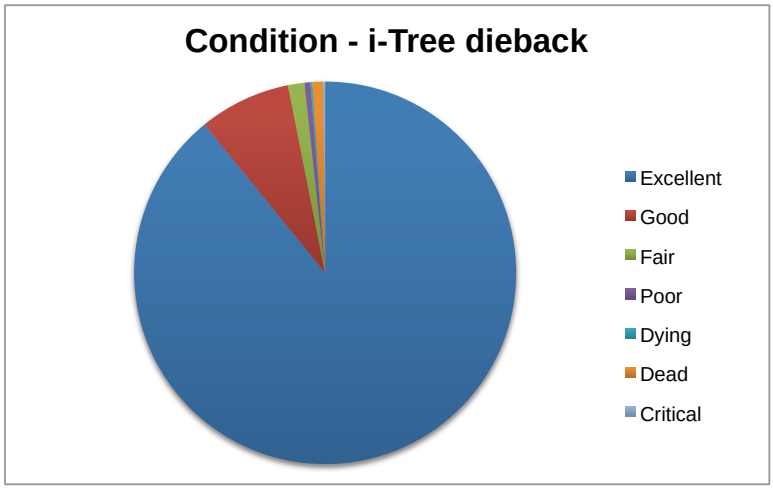
2.4 Tree condition

Average tree condition was calculated by assigning each condition class a numeric condition rating. Estimates of tree leaf area (LA) and leaf biomass are adjusted downward based on crown leaf dieback (tree condition). Trees are assigned to one of seven condition classes: excellent (less than 1% die- back); good (1% to 10% dieback); fair (11% to 25% dieback); poor (26% to 50% dieback); critical (51% to 75% dieback); dying (76% to 99% dieback); and dead (100% dieback). Condition ratings range between 1 indicating no dieback and 0 indicating 100% dieback (dead tree). Each class between excellent and dead is given a rating between 1 and 0 based on the mid-value of the class (e.g., fair = 11% to 25% dieback is given a rating of

0.82 or 82% healthy crown). Tree leaf area is multiplied by the tree condition factor to produce the final LA estimate.

See Diagram 2 for tree condition breakdown based on the i-Tree dieback rating.

Diagram 2. i-Tree condition rating based on percent of crown dieback.



Average Leaf Area Index (LAI) of 4.09. (LAI: m^2 leaf area per m^2 projected ground area of canopy).

2.5 Carbon storage and annual sequestration

i-Tree calculates total stored carbon and gross and net carbon sequestered annually by the trees in Yarra Park. Carbon stored by the trees within the park is approximately 966,325 kilograms (966.32 tonne). Carbon sequestered annually is approximately 23,207 kilograms/ year (23.207 tonne/year). Based on the price per tonne of carbon being $23.00 (Australia's fixed carbon price), the total carbon stored is $22,225.36 and $533.60 is being sequestered each year. Note that the Federal Government plans to link Australia's scheme to Europe's emissions trading scheme from 2015. This could make the carbon price cheaper overall for Australian businesses from 2015.

2.6 Air pollution removal

Dry deposition of air pollution, quantifies the hourly amount of pollution removed by the trees, its value, and associated percent improvement in air quality throughout a year. Pollution removal and percent air quality improvement are calculated based on field, pollution concentration, and meteorologic data.

This module is used to estimate dry deposition of air pollution (i.e., pollution removal during non-precipitation periods) to trees and shrubs (Nowak et al. 1998, 2000). This module calculates the hourly dry deposition of ozone (O_3), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), and particulate matter less than 10 µm (PM10) to tree and shrub canopies throughout the year based on tree-cover data, hourly NCDC weather data, and U.S. Environmental Protection Agency pollution concentration monitoring data. Australian pollution and weather data for Victoria has been integrated into the Eco application.

The ability of individual trees to remove pollutants was estimated for each diameter class. The formula used yields an estimate of pollution removal by individual trees based on leaf surface area (the major surface for pollutant removal).

The monetary value of pollution removal by trees is estimated using the median externality values for the United States for each pollutant. As of 2008 (Nowak, *et al*, 2008), these values, in dollars per tonne were: NO_2 = $6,752/tonne, PM10 = $4,508//tonne, SO_2 = $1,653/tonne, and CO = $959/tonne (Murray et al. 1994). Recently, these values were adjusted to 2007 values based on the producer's price index (Capital District Planning Commission 2008) and are now (in dollars per tonne): NO_2 = $9,906/tonne, PM10 = $6,614/tonne, SO_2 = $2,425/tonne, and CO = $1,407/tonne. Externality values for O_3 are set to equal the value for NO_2.

The annual value for pollution removal from the trees within Yarra Park is $5,164.21.

Table 1. Air pollution removed by trees within Yarra Park and associated values

Type of pollution	Amount removed per year in grams	$ Values per year
Carbon monoxide (CO)	8,928.09	$12.56
Ozone (O_3)	235,766.31	$2,335.50
Nitrogen dioxide (NO_2)	79,325.93	$785.80
Particulate matter less than 10 µm (PM10)	297,427.95	$1,967.19
Sulphur dioxide (SO_2)	26,043.92	$63.16
	TOTALS	**$5,164.21**

2.7 i-Tree summary table

Table 2. Summary of i-Tree values associated with the trees in Yarra Park

Characteristic		
Tree valuation (based on CTLA method)	$11,788,608.00.	Average tree value - $9,710.55. Values will initially decrease due to removal of mature trees and replacement with new. Net gain of tree canopy will see value increase in longer term.
Carbon sequestration	$22,225.00 (currently stored)	$533.60 being sequestered each year. Values will initially decrease due to removal of mature trees and replacement with new. Net gain of tree canopy will see value increase in longer term.
Air pollution	$5,164.21. Value per year	Values will initially decrease due to removal of mature trees and replacement with new. Net gain of tree canopy will see value increase in longer term.
Current value	**$11,810,833.00**	
Annual values	**$5,698.00**	

3. Yarra Park Tree Strategy

Any efforts to proactively manage the trees within Yarra Park to provide the greatest amount of benefits requires a targeted, strategic approach that is collaborative in nature and considers the wide range of stakeholders with interests in a sustainable Yarra Park landscape.

The strategic tree management plan for Yarra Park will provide a long-term planning horizon in order to outline required action items, prioritise implementation and accommodate long-term budget planning.

A 20-year horizon is deemed appropriate for the planning of a sustainable and healthy tree population for Yarra Park. There are obviously many factors that could impact the direction of the tree strategy during this period. Even with the best laid plans, unexpected occurrences such as long-term droughts, invasive pests, or worsening economic circumstances may force significant re-prioritisation of short- and medium-term operations.

Within the Tree Strategy there are several years where a full review of the strategy is required in order to ascertain the current tree condition and review operational plans, community expectations and associated budgets.

The review would also allow an update of the tree data. As an example, the i-Tree model only estimates structure and functions at one point in time. It does provide a means, however, through permanent recording of tree data to accurately assess urban forest change through time.

The aim of the 20-year Tree Strategy is to enhance and increase the canopy coverage of the treed landscape of Yarra Park in a sustainable manner to provide a healthy, diverse and aesthetically pleasing tree population that continually benefits the multi-user community that enjoys this prominent Melbourne open space.

The key management areas to assist in achieving the vision are to:

- Increase relative canopy coverage, ensured through a comprehensive tree establishment program.
- Increase age diversity, ensured through a tree removal and replacement program.
- Maintain full tree tree inventory with maintenance records and i-Tree Eco data.
- Implement best practice tree maintenance.
- Implement appropriate tree protection measures.
- Implement a systematic tree risk management process.
- Periodic reviews of the strategy.

A temporal framework for tree management has been developed that proposes a three-tier framework with a 20 year Strategic Plan, 5 year management plans and annual operating plans - See diagram 3 from van Wassenaer, P. J. E., Satel, A. L., Kenney, W. A., & Ursic, M. (2011).

The Yarra Park Tree Strategy framework can be seen in appendix 1.

Diagram 3. Temporal framework for a strategic urban forest management plan (from van Wassenaer, et al, 2011).

Tree related criteria and indicators to measure performance of the management inputs and the development of the tree resource within the Park have also been developed. Criteria and indicators (C&I) provide a standardised set of performance measures that can relate to urban forest management and help guide managers to improve the health of their tree resource and the effectiveness of their management approach.

Table 3. Tree management criteria and indicators for Yarra Park

Criteria	Key objective	Performance indicator		Status
		Good	Optimal	
Relative canopy cover.	Achieve climate and park appropriate degree of tree cover.	The existing canopy cover equals 50–75% of the potential.	The existing canopy cover equals 75–100% of the potential.	Need to establish appropriate park-wide canopy coverage targets, (establish appropriate % open space, road network, tree canopy, other infrastructure).
Age distribution of trees.	Provide for uneven aged distribution across Yarra Park.	No age category represents more than 50% of the tree population.	Age categories within specified ranges, such as Richards 1982-1983.	Majority of avenue trees are of similar age and approaching end of life cycle.
Tree inventory.	Complete inventory of the tree resource to direct its management, including age distribution, species mix, tree condition, i-Tree assessment and risk assessment.	Complete inventory of trees with Yarra Park.	Complete inventory of trees with Yarra Park. Continually updated. Used to direct management actions.	Full tree inventory, including i-Tree assessment. Updated in 2012. Need to use inventory to address tree management initiatives. Need for on-going updates.

Criteria	Key objective	Performance indicator		Status
		Good	Optimal	
Tree maintenance.	All trees within Yarra Park are maintained to maximise current and future benefits. Tree health and condition ensure maximum longevity.	All publicly owned trees are systematically maintained on a cycle longer than five years.	All mature trees are maintained on a five-year cycle. All immature trees are structurally (formatively) pruned.	Trees are currently maintained on a two-year cycle and reactive basis.
Tree risk management.	Tree risk is managed with a systematic approach that implements corrective measures within a reasonable timeframe. Hazard abatement is also incorporated into maintenance programs.	Complete tree inventory that includes detailed tree failure risk ratings. Risk abatement program is in effect mitigating hazards within a maximum one month from assessment record.	Complete tree inventory that includes detailed tree failure risk ratings. Risk abatement program is in effect mitigating hazards within a maximum one week from assessment record.	Complete tree inventory that identifies maintenance requirements to rectify hazards. Does not include a tree risk rating. No current timeframe for rectification works. No systematic risk assessment procedure.
Tree establishment planning and implementation.	Tree renewal is ensured through a comprehensive tree establishment program driven by canopy cover, age diversity, and species distribution objectives.	Tree establishment is directed by needs derived from a tree inventory.	Tree establishment is directed by needs derived from a tree inventory and is sufficient to meet set objectives, such as canopy coverage, age diversity & desired tree stocking levels.	Tree establishment occurs on an annual basis in an *ad hoc* manner.
Tree protection.	Protect trees and their growing conditions by mitigating potential impacts from vehicles and pedestrian traffic.	Majority of trees are afforded good growing conditions. Majority of trees have demarkation between them and vehicles.	All trees are afforded optimal growing conditions. Clear demarkation between trees and vehicles.	Not all trees protected with bollards to guide traffic or mulched. Large areas of compacted soil conditions.

To assist in achieving the objectives of the Yarra Park Tree Strategy the Melbourne Cricket Club need to employ or contract adequate, qualified staff and develop and maintain adequate funding to implement the Yarra Park Tree Strategy.

4. Tree Management Issues

The following sub-sections discuss the primary tree management issues that are applicable for the trees within Yarra Park. These tree management issues have assisted in guiding the development of the tree strategy.

4.1 Tree diversity

Species diversity is often regarded as a valuable assessable component of urban forest structure. Without appropriate species diversity, some would argue that the tree population could be at greater risk from pest and disease incursions (Santamour, 1990). However, there are also those that are less rigid in their measurements and less concerned about the dangers of inadequate species diversity; arguing that species suitability and growth performance are more critical factors for long term sustainability and performance success (Richards 1982/1983).

There is a common belief that communities should plant a variety of tree species. Historical events provide examples where a major pest or disease has devastated populations of urban trees (primarily in the Northern Hemisphere), which emphasises the need for species diversity.

Species diversity within an urban forest landscape does provide functional and aesthetic benefits, as well as biological and ecological advantages. “A common tenet of popular ecology is that high species diversity contributes to the stability of ecosystems by reducing hazards of catastrophic loss of a particular species” (Richards, 1983). However, there is a significant amount of evidence from plant ecological studies that relationships between diversity and stability cannot be as simply expressed as this proposition suggests.

Achieving an appropriate diversity of tree species is one important factor in achieving a sustainable urban forest. However, there should be a suite of management tools utilised to manage and sustain a healthy, vibrant urban forest.

Tree species within urban landscapes (parks and streets) would rarely occur as a monoculture to the extent found in agricultural crops or forest plantations; nor are monocultures logical or suitable over the range of landscape conditions encountered in a city. However, most urban tree populations around the world are dominated by relatively few species; they include those trees that have proven adaptable and useful under fairly trying conditions.

The Santamour (1990) model was developed on the back of the significant losses of elm trees due to Dutch Elm Disease (DED), during the 1950’s and 60’s. However, the implementation of more contemporary approaches to pest and disease management, sanitation cutting and appropriate plant spacing probably would have reduced the losses and impact on the landscape during this disease (Richards, 1983).

Regardless of percentage, a species might be considered overused if it is often planted where other proven species are likely to be better suited (Richards, 1993). It is hardly a criticism to use a proven species for critical/high profile planting sites; particularly where certain species may form iconic avenues. A logical process would be to use these proven species where they are believed to provide the most benefit, or best available choice, and to encourage suitable alternatives elsewhere. This would result in a reduced planting rate for a common species, such as the English Elm (*Ulmus procera*), but its relatively high success rate will maintain its prominence in the population (Richards, 1993).

“Street tree diversity should relate to the range of conditions and objectives in a community rather than to simple numerical standards” (Richards, 1993). In the case of Yarra Park, the elm avenues have been deemed as significant and the continued use of elms is to be encouraged.

The ‘great risks presented’, perceived or real, to the tree population should be clarified as being chronic or acute with appropriate contemporary management techniques described to control them. History suggests that it is impossible to predict when the next devastating pathogen will strike (Gilman, 1997). Developing a diverse species population does provide some risk mitigation; but much of arboricultural management is predicated on risk management concepts. The concept of species diversity should not be considered sacrosanct over and above issues of species prominence, urban adaptability, canopy cover and management resource allocation.

As opposed to natural tree populations, which rely on species long-term success and reproduction, stable street tree populations depend primarily on the longevity of individual trees and sufficient numbers of successful planted replacements (Richards, 1993).

The focus of more recent urban forest management programs seems to be the modification of populations to achieve age diversity, more so than species diversity. Trees ultimately die, and their expected longevity can be estimated from experience for any given species and growth situation, which should allow proactive tree removal and replacement programs.

Richards (1983) states that “...inadequate replacement of the species predominant and proven adapted in the older age classes is a more certain threat to future stability than is low species diversity among the older trees”.

4.2 Age diversity appropriateness

There are many urban management guidelines and published papers that suggest the urban forest should contain a certain proportion of trees in different age classes, or certain percentages of trees within certain trunk diameter classes. However, there is often concern raised about how simplistic the modelling is for biological organisms, and this is often coupled with political uncertainty, meaning there is little consistency in budgets, personnel and management; factors that influence change (Norris, 2005). Regardless of the evidence that might be made available on age profile deficiencies in a tree population, the need for tree removal is the most difficult management tool to implement.

Age analysis and diversity models basically focus on the need to develop a spread of ages within the tree population. Richards (1982/1983) puts forward the following set of criteria for the public urban forest of Syracuse, New York, with the proviso ‘the model is suited to adapted, long-lived species’. Longer-lived species and medium-lived species dominate Yarra Park so it may be helpful to consider this model. The model provides quite broad categories and allows a general understanding of what Richards (1982/1983) deems to be an appropriate age model using age or stem diameters. Table 4 provides Richards’ indicative optimum percentages of tree age classes across a population.

Table 4. Richards (1982/1983) age model

Optimum percentage	Lifecycle Stage	Diameter at Breast Height
40%	Young	<20 cm
30%	Early functional	20-40 cm
20%	Functionally mature	40-60 cm
10%	Senescent	>60 cm

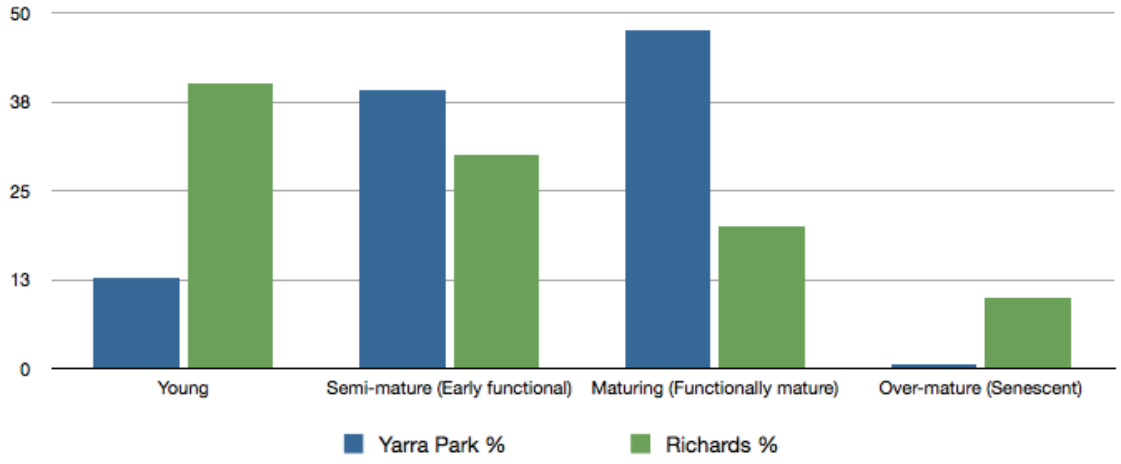
Table 5 and Diagram 4 provides the age category percentages of the trees within Yarra Park compared to the Richards (1983) hypothetical optimum categories. There are two significant distinctions with the Richards model, the percentage of Young trees is too low (approximately 27% lower) and that the Maturing tree percentage in Yarra Park is too high, approximately 27% higher than the model.

Table 5. Age categories for Yarra Park

Age category	Total	Yarra Park %	Richards %
Young	155	12.8	40.0
Semi-mature (Early functional)	474	39.1	30.0
Maturing (Functionally mature)	576	47.5	20.0
Over-mature (Senescent)	6	0.5	10.0
N/A (Scar tree)	1	0.08	
Grand Total	**1,212**	**100**	**100**

It would be expected that in the short-term that a significant percentage of the trees within the maturing category will move into the over-mature or senescent category.

Diagram 4. Graphical representation of age categories of the Yarra Park trees compared to a hypothetical optimum (Richards,1983).



Bartsch (1985) also provides a very specific age profile model that determines the minimum number of trees (of a given species) to be planted each year by dividing the average useful life of that species into the total number of trees of the species to be maintained in the forest. The example provided suggests that if the urban forest is to include 5,000 trees, with an average useful life of 50 years, the average annual plantings of this species must be at least 100 trees. Ideally, this will result in a forest where at any time there are 100 trees aged 1, 100 aged 2, 100 aged 3... 100 aged 49, and 100 aged 50.

If we expand on the approach by Bartsch (1985), and accept a 100-year useful life as an average, the urban forest would need 1% of the population replaced every year. This model provides a diversity of age classes across the average 100-year life expectancy timeframe.

This optimum model maybe something to plan for, however in the case of Yarra Park, with its similar aged avenues, a higher rate of removal and replacement is required in order to rectify existing age category proportions.

The 2012 assessment of the trees within Yarra Park identified one-hundred and twenty-five existing vacant sites suitable for planting (without one tree being removed). This would increase the overall tree population by over 10% and almost double the percentage of Young trees.

4.3 Tree risk management

Trees in the urban landscape provide many benefits and their importance is accepted. There are occasions, however, when trees within urban landscapes can become liabilities. Tree failures that cause harm are relatively rare occurrences, so the risk with living amongst trees is quite low. Nevertheless, it is not possible to maintain risk-free trees; some level of risk must be accepted in order to enjoy the benefits.

The management have a duty of care under law to ensure that a reasonable degree of safety is maintained. Measuring the level of risk through hazard assessment becomes necessary to ensure personal safety and confidence in the integrity of the trees within Yarra Park.

Trees are living organisms and are not static in time or permanent fixtures in the landscape, they are assets that need to be maintained. Properly maintained trees develop fewer hazardous defects and pose less risk to public safety.

All trees, no matter how long lived, will eventually succumb to decline leading to death, collapse and decomposition. While any large tree poses a risk of failure in high winds (historically most tree failures occur during storm events), in situations where people and trees must coexist in an urban landscape, it is important to identify where a tree has become an unacceptable risk.

In all situations close to people or property, safety has to be the priority consideration above economics or amenity. The measure for action is risk potential. Risk potential is related to tree size, tree structure (tree hazard) and the number or type of targets that it could hit. As trees grow bigger their potential to cause damage increases; as tree structure becomes more suspect so the probability of failure increases; as the number and value of targets that could be hit increases so the potential cost of damage or injury increases. The priority when managing trees with a high risk potential should be to reduce the risk to an acceptable level. This can be achieved through removing the tree, removing the targets or treating the tree.

In the case of Yarra Park with its regular public events, there is not scope to move targets, consequently, excluding targets, tree pruning and tree removal are the more viable management options.

Tree removal figured significantly in the recommendations because in many cases the decline (mortality spiral) of the trees recommended for removal has reached a point where the trees cannot be arboriculturally sustained and the trees will continue to decline, regardless of input. Significant reductions of mature trees would not be generally considered as good practice or acceptable, however it is also not good practice to artificially keep trees in a position that they are clearly unsuitable for. The available resources would be better used to rejuvenate the landscape with replanting of appropriate trees that will be long-term components of the landscape.

A tree risk management plan will not rectify all of the possible risk involved with the trees within the park as the size and nature of the resource and the unpredictability of the climate eliminates the option of risk avoidance. There will always be a residual risk following any mitigation works.

Therefore, it is not possible to attain zero tree risk, as this would require the removal of all trees within public open space and this is not acceptable.

The following tree risk management processes need to be instigated;

- Undertake 5-year cyclic maintenance program. Divide park up into 5 management areas and undertake all tree related maintenance in that area (See section 5.2 for further detail).
- Undertake annual visual assessment of every tree, other than the trees within that years maintenance area. This visual assessment would identify other tree hazards that require reactive maintenance to improve safety.
- Continue to exclude vehicles from underneath the canopies of mature trees.

Other tree risk management considerations

The following should be considered for a comprehensive tree risk management program.

- Properly maintained trees develop fewer hazardous defects and pose less risk to public safety. Any pruning is to be carried out in-line with Australian Standard, *AS 4373 – 2007 Pruning of Amenity Trees*. Includes a comprehensive formative pruning program to enhance form and improve structure, or to directionally shape the young tree.
- Select appropriate species suitable for site conditions and constraints. Allow space for trees to attain expected mature size.
- Select good quality nursery stock (refer to 'S*pecifying trees - a guide to assessment of tree quality*. Ross Clark, 2003'). Plant and implement post-planting maintenance of trees to match site conditions and industry best standard.
- Undertake scheduled tree inspections by qualified, experienced arborist. Recommend annual visual assessment of total tree population. Recommend inspection of individual trees in high target areas after severe storm events and when impacted by construction or maintenance activities.
- Implement appropriate tree protection during construction activities. Refer to the Australian Standard *AS 4970-2009 Protection of trees on development sites* for guidelines.
- Exclude vehicles from within the allocated tree protection zones of trees (See section 7).
- Maintain documentation on tree maintenance and inspection activities.

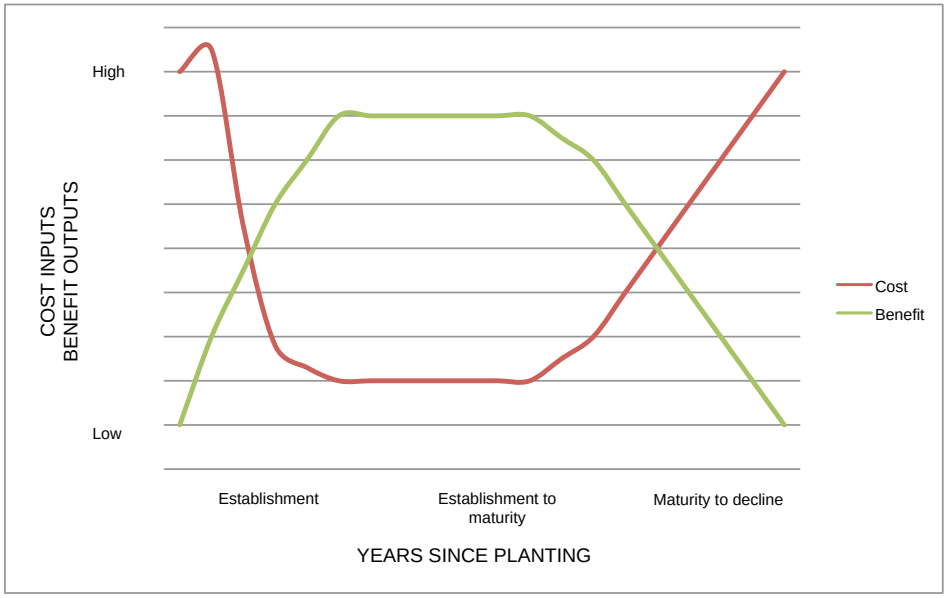
4.4 Tree removal and replacement

The goal of the tree management is based on an understanding of the dynamic nature of the resource, its aesthetic and safety requirements, and public attitude and perception. In order to sustain the landscape and meet public needs, trees require to be planted, maintained and removed. Planning is required in order to facilitate each of the processes to the benefit of the landscape and public requirements.

All avenues and stands of trees have a finite lifespan and at some point in time trees need to be removed and replaced. As trees age they require increasing management to maintain them in a safe and attractive condition. Hitchmough (1994) suggests that the aesthetic return of a tree in the landscape increases as it ages. It reaches a plateau for a period and then begins to fall away as a tree enters its decline phase. Conversely to this management costs increase as a tree ages as it requires more arboricultural input to maintain it in a safe, attractive manner (See diagram 5).

At some point a difficult decision has to be made about how to manage mature avenues, including how, when and over what period of time to replace old or declining trees.

Diagram 5. Relationship between time since planting and the aesthetic returns and management costs generated by a tree (from Hitchmough, 1994).



As indicated there are significant numbers of the elm trees within Yarra Park that are approximately 110 years of age. A reasonable useful life expectancy for most elm trees in Australia is 100 to 150 years (Spencer Hawker & Lumley, 1991). It is presumed that the majority of these trees will begin to decline over the next few decades, indeed the 2012 assessment has identified existing avenue trees that are in poor condition and require removal. Significant reductions of mature trees would not be generally considered as good practice or acceptable. It is also not good practice to artificially keep trees that are declining and are in a position that they are clearly unsuitable for. A proactive approach to removal and replacement of these trees is required.

The Yarra Park Tree Strategy proposes a removal and replacement program of both avenue and specimen trees which are detailed in section 5.1 and can be seen on the copy of the plan in appendix 3.

5. Tree maintenance works

The Melbourne Cricket Club (MCC) maintains trees within Yarra Park to fulfil its legislative and management obligations to users and visitors to the park. The key to maintaining and enhancing the treed landscape is ensuring quality tree work. Maintenance work performed on trees aims to manage tree health and enhance the quality of the trees within the park as well as reducing the inherent risks associated with trees in an urban area.

MCC undertakes maintenance programs on the trees to;

- manage tree health and aesthetics,
- reduce the risk to public safety,
- provide clearances for pedestrians, vehicles and sight lines,
- provide clearances around lights, services and utility lines,
- manage tree health, and
- to formatively shape young trees.

The following are the primary tree care practices undertaken on the trees within Yarra Park:

Inspection: Trees within the park are inspected annually from ground level, to monitor tree health, responses to routine maintenance practices and identify potential hazards. Inspecting trees regularly ensures that structural defects and/or other risk factors are identified, documented and managed in a reasonable timeframe.

Pruning: Formative pruning of young trees is carried out to remove co-dominant stems, space main limbs and to generally develop strong structure. Trees are pruned to avoid interference with signage, street lights and other services. Lower branches may be removed in order to give clear pedestrian and traffic access and clear sight lines. Trees are shaped by shortening heavy limbs and general pruning to give a balanced weight distribution in the tree framework. Dead, diseased, cracked, hollow or otherwise unsound wood is removed. All pruning work will be carried out by trained and competent arborists who have a thorough knowledge of tree physiology and pruning methods and carry out pruning to the Australian Standard, AS 4373 – 2007 Pruning of Amenity Trees.

Planting: Tree planting is undertaken on an annual basis. Only recommended stock size and quality will be chosen for planting within the park. All stock will be approved by MCC. Trees will be planted according to current best practice. Newly planted trees will receive maintenance to ensure their establishment and survival. Newly planted trees receive two years establishment maintenance. Trees in non-irrigated areas are hand-watered on a fortnightly basis from November to April or as specified by MCC. During unusually dry weather, trees may receive additional water.

Peat and disease management: Pest and diseases are a component of the urban landscape and control measures will be required at times to maintain healthy and aesthetically pleasing landscapes. A range of methods will be utilised in the management of pest and disease outbreaks and it will be the identification of damage thresholds that will initiate the implementation of a pest and disease program.

Removal: Trees are removed when they are dead, damaged or are in severe decline and cannot be sustained with contemporary arboricultural techniques. Ageing and over-mature trees trees within the park may also be removed in order to reinvigorate the avenues and

maintain appropriate age diversity levels. Trees are also removed if they are deemed to constitute a high risk potential to public safety which can't be corrected by pruning or other remedial works.

Where trees are identified and/or scheduled for removal and replacement, every effort is made to consult with the community about the reasons for replacement. Where a group of trees are to be removed the level of consultation will be more extensive.

5.1 Recommended works

Three-hundred and forty (340) trees, or approximately 28% of the assessed trees, were identified as requiring works. The recommended works comprised either tree removal or various forms of tree pruning. The recommended works were prioritised over a twenty-year period with work priority reviews required at the end of each five year period.

Details of trees recommended for specific works within the next 10 years works can be seen in appendix 2 and the removals are plotted and colour coded (based on priority) on the copy of the site layout plans in appendix 3.

Priority for works was predominately dependent on species, degree of hazard, potential for failure and target rating (risk potential).

The recommended works need to be documented when they have been undertaken. Date(s) of completion can be incorporated into the supplied Excel® spreadsheet for future reference.

Table 6. Recommended works and indicative costing summary table. Costing does not include 5-year cyclic pruning program, pest and disease management or annual tree assessment of entire population (risk management).

Priority	No. of trees	Type of works	Indicative costs
Within 12 months	71	Predominately pruning	$38,471.00
Within 12 months	125	Planting of nominated vacant sites	$90,000.00*
<5 years	163	Removals	$81,995.00
6-10 years	77	Removals	$72,365.00
10-20 years	76	On-going avenue tree removal/ replacement program	$110,990.00
Tree planting	316	Replanting of removed trees over the 20 year period	$227,520.00
		TOTALS	**$621,341.00**

**Note that tree planting cost is based on 200 litre stock (average of evergreen and deciduous stock - $720.00 per tree) and 2 years maintenance. Prices will vary dependent on stock size, production method and species. Prices exclude GST.*

5.2 Tree removals

Over 20 years, three-hundred and sixteen trees have been recommended for removal and replacement works. This is approximately 26% of total trees, which equates to approximately 1.3% of total trees per year. Note that some of the trees listed for removal, particularly those listed on longer timeframes, would also require pruning maintenance during that period.

Table 7 lists recommended tree works by priority. The recommended works could be completed sooner dependent on available funding to undertake the works.

Table 7. Tree removal recommendations and priorities.

Priority	Work type	No. of trees	Comment
<5 years	Consider removal	5	Generally Young trees inappropriately located.
6-10 years	Consider removal	22	Generally Young trees inappropriately located.
<5 years	Removal	158	Generally trees in poor condition. Includes 61 *Melaleuca armillaris* on northern boundary.
6-10 years	Removal	55	Trees with deteriorating condition.
10-20 years	Consider removal	76	Continuation of removal /replacement program. Primarily elm avenues.
	TOTAL	**316**	

Table 8 provides some indicative costing for the nominated tree removals. The costings are based on a 3-person crew with a stump machine at a day rate of $2,400.00. Log wood to be removed off-site. Wood chip mulch to be left on-site. Includes grubbing of stumps. Protective hoops around younger trees would require removal to allow access for the stump grinder. The removal of the protective hoops has not been accounted for. Note that costs are indicative and applicable for 2012.

Table 8. Tree removal indicative costing. Prices exclude GST.

Priority	No. of trees	Indicative costs	Estimated timeframe for competition
<5 years	163	$81,995.00. Average - $503.00 per tree	7 weeks. Includes the 61 Bracelet Honey Myrtle along northern boundary.
6-10 years	77	$72,365.00. Average - $939.80 per tree	6 weeks. Generally larger trees.
10-20 years	76	$110,990.00. Average - $1,460.40 per tree	On-going tree removal/ replacement program Predominately larger elm trees
TOTALS	**316**	**$265,350.00**	Average $839.71 per tree

A number of different methods and alternatives for avenue tree replacement are available:

1. Replace each tree as it dies or becomes dangerous.
2. Remove and replant the entire stand or avenue of trees.
3. Remove and replant every second or third tree, followed in ten or twenty years by the removal and replanting of the remaining older trees.
4. Plant a new row of trees, outside or in-between the line of the existing row of trees, and remove the latter when the new row of trees is established.
5. Remove and replant in smaller manageable sections, over regular time intervals.

Apart from Method 4, which would detract from original avenue alignments, each method would have some application within Yarra Park.

Method 5 is the preferred method for the removal and replacement of avenue trees. The advantages of this method of tree replacement are that it can be staged over time to meet the available resources and budget, it avoids problems of competition between juvenile and established trees, and specific short-term 'problem' areas can be targeted, while working towards the overall long-term landscape objectives.

A successful tree removal and replacement program will require extensive publicity before, during and after the removals to stress the reasons for the actions. The tree replacement component of the program requires particular emphasis. Positive reinforcement can also be conveyed by undertaking the planting of nominated vacant sites prior to the commencement of the removal program. A timetable of actions should accompany any information supplied to the community.

5.3 Tree pruning

Properly maintained trees develop fewer hazardous defects and pose less risk to public safety. Development of a proactive 5-year cyclic maintenance program will ensure that all trees within the park are assessed and maintained within a five year period.

Miller and Sylvester (1981) found that the length of the pruning cycle has a significant effect on tree value. Longer pruning cycles may save the managing organisation in the short-term, however there will be a decline in tree value with an increase in tree hazards and associated risk potential. A pruning cycle of between four and five years was found to provide the best cost:benefit ratio (Miller & Sylvester, 1981).

A five-year pruning cycle is recommended for Yarra Park. The park has been broken up into five maintenance areas, which can be seen in appendix 4. During a cycle all trees within the maintenance area are assessed for works. This would include all pruning requirements (crown maintenance and modification), formative pruning of younger trees, and adjustment/removal of possum guards.

Any pruning that is required must be carried out by trained and competent arborists who have a thorough knowledge of tree physiology and pruning methods and carry out pruning to the Australian Standard, *AS 4373 – 2007 Pruning of Amenity Trees*.

To ensure that pruning is appropriate for the species and tree/site conditions, it is important to have a clear understanding of the specific needs of the tree and the objectives for pruning.

Pruning objectives include the following:

- Improve structural strength and reduce failure potential (including dead branch removal)
- Prevent or mitigate a pest problem
- Improve aesthetic characteristics
- Provide clearance for pedestrians, vehicles, and structures
- Improve safety and security for park users
- Repair structural damage from wind loading
- Reduce maintenance costs (i.e., when applied to young trees)

Removal of live branches and associated leaf area can have a negative impact on the health of trees. When relatively large amounts of leaf area are removed, the capacity of a tree to produce energy for growth and pest resistance is diminished. Pruning should be limited to that amount needed to accomplish the pruning objective. In some cases, it may be best to complete pruning over a two- or three-year period rather than do all that is needed in one year.

In addition, excessive pruning or over-thinning stimulates epicormic (adventitious shoot) development in many species. Epicormic growth is usually weakly attached and prone to breaking at the point of attachment. Crown density can increase substantially due to epicormic production, resulting in a loss of tree form and reduction in light penetration. Also, excessive pruning can lead to sunburn injury to bark tissue of branches and the trunk.

Not more than 25% of the crown shall be removed within an annual growing season. The percentage of foliage removed shall be adjusted according to age, health, and species considerations. Stressed trees are less tolerant of pruning and leaf area removal should be minimal.

Generally, trees can be pruned throughout the year, but the following times need to be avoided: 1) when leaves are forming or falling, and 2) when pest problems may result from pruning (e.g., insect infestation or disease infection). For deciduous species, do not prune during bud swell, bud break, or leaf expansion in the spring. Do not prune from the time leaves begin to turn colour in autumn through the leaf drop period.

The 2012 tree assessment identified seventy-one trees require tree maintenance works within the next 12 months. Based on the costings supplied for tree removals, the indicative cost for these tree maintenance works would be $38,471.00.

The works recommended for completion within the next 12 months should be undertaken in conjunction with the commencement of the 5-year cyclic maintenance program. The costing to undertake works within the 5-year maintenance area would need to be sought.

5.4 Tree planting

One-hundred and twenty-five vacant sites were identified during the 2012 tree assessment and data update.

The location of the vacant sites can be seen on the plan in Appendix 3.

Pricing for these works is difficult as prices will vary dependent on stock size, production method and species. $90,000.00 has been estimated for the planting of the nominated vacant sites based on 200 litre stock (average of evergreen and deciduous stock - $720.00 per tree) and 2 years maintenance.

Table 9. Indicative costing for advanced tree stock

Tree Type	Pot Size	Approx. calliper	Approx. height	$ Supply/Install (per tree) EX GST	$ Maintain (per tree) EX GST	$ Total (per tree) EX GST
Evergreen native	100L	50mm	3.5m	$413.00	$153.00	$566.00
Evergreen native	200L	60mm	4.5m	$735.00	$153.00	$888.00
Deciduous exotic	100L	35mm	2.6m	$307.00	$153.00	$460.00

Tree Type	Pot Size	Approx. calliper	Approx. height	$ Supply/Install (per tree) EX GST	$ Maintain (per tree) EX GST	$ Total (per tree) EX GST
Deciduous exotic	200L	50mm	3.2m	$400.00	$153.00	$553.00
Deciduous exotic	300L	60mm	4m	$568.00	$153.00	$721.00

Please note the following;

- All prices exclude GST
- Install of 100L and 200L evergreen native stock includes supply of 2 x hardwood stakes per tree.
- Install of all trees includes supply of BK20 mulch
- Maintenance is included for a period of two years
- Maintenance of all trees consists of fortnightly visits from Sept- Mar and monthly visits from Apr- Aug
- Maintenance in regards to weed control consists of four visits per year.
- Maintenance in regards to mulch top up will occur once per year.
- Costs of irrigation to trees is not included in the below price. As a contingency in the case of failure to irrigate from installed system, irrigation to be undertaken by Logical Tree Management will be charged at $5.80 per tree per cycle.

Size of stock

The larger the size of the transplanted tree, the longer tree establishment takes in the new landscape. There is a compromise between super advanced stock and stock that is smaller in size yet is more vigorous and establishes quicker. Planting stock size will dictate the resources required for achieving successful establishment.

The size of planting stock is dependent upon the particular planting site, stock availability and post-planting maintenance resources. The size of stock should be large enough to survive urban abuse (and crowds at MCG events), have a reasonable presence in the landscape, and will easily recover after planting.

Taking into consideration the points listed above, Urban (2008) suggests a tree with a trunk calliper of between 75mm to 100mm is the optimum size to plant in an urban landscape. This would equate to an approximate stock size of 4.5 metres and 300 to 500 litre container volume. This size stock would be more expensive per plant, and due to the size and weight of the root balls, require more machinery to move them into place. This sized stock should be used in high profile areas and where there are concerns about damage to smaller stock.

The preferred stock size for Yarra Park should be between 3.0 to 4.0 metres in height, trunk callipers between 40mm (for thin-stemmed trees) to 60mm calliper (for thick-stemmed trees) (3.0m tall tree) and 60mm (for thin-stemmed trees) to 85mm calliper (for thick-stemmed trees) (4.0m tall tree). Trunk callipers are measured at 300mm above ground level; these dimensions should equate to 100 to 300 litre container volumes.

There are three main production methods for tree stock:

- bare root: no soil; usually on smaller deciduous trees;
- root balled: roots in soil held in place by burlap or some other fabric; and,
- container grown: roots and soil in a container.

Container grown stock is the most commonly used method, although all the three production methods could have application in Yarra Park dependent on species selection.

Planting stock quality

The MCC should purchase and plant high quality trees to help ensure a successful landscape outcome.

Factors to consider when evaluating nursery stock include; root ball size, shape and root structure; nursery planting depth; presence of included bark; trunk form, flare, taper, strength and branch attachment; old pruning cuts (including cuts on roots on bare root stock); presence of pests and diseases; leaf colour; decline or tip dieback; and canopy uniformity.

All tree stock supplied should conform to the NATSPEC " Specifying trees - a guide to assessment of tree quality - Second edition" (Clark, 2003).

Planting trees in the landscape

It is not the scope of this strategy to provide detailed specifications for tree planting techniques and after-care maintenance programs.

Suffice to say that trees will be planted properly and an after-care maintenance program implemented so as to achieve a successful tree establishment rate of greater than 90%.

Tree planting should take place between May and September.

Planting and establishing trees is all about managing air and moisture in the soil. Manage these correctly and trees will grow quickly following planting. Four of the most common causes of poor plant establishment are 1) planting too deeply, 2) under watering, 3) over watering, and 4) over-mulching.

Planting too deeply in compacted soil can also lead to very slow root development. Each of these problems can lead to extensive tree death, poor growth, or a slow decline after planting. If appropriate trees are planted at the right depth and they are irrigated properly, the planting has a good chance of success. See diagram 6 for tree planting detail.

The following points need to be considered:

- The depth of the planting hole is determined by the depth root ball of the stock. The depth of the root ball is measured from the bottom of the trunk flare to the bottom of the hole. Dig the hole slightly shallower than the root-ball depth and as wide as possible; minimum 1.5 times the width of the root-ball (Dig a much wider and shallower hole in compacted soil).
- The planting hole should have sloping sides rather than vertical walls. The sides are to be scarified.
- The bottom of the trunk flare shall be at or slightly above finished grade. The top of the root ball should be set slightly above the soil level to account for any drop in the soil level at the base of the planting hole.
- Backfill should be similar to the soil at the planting site. Backfill soil can be amended to meet specific objectives. Fertilising is not required on newly planted trees. Most nursery-grown trees are well fertilised during production and seldom respond to fertilising at planting except in the most infertile soils.
- The back soil fill should be installed and settled in layers to limit future settling and exclude air pockets. The top of the root ball should not be covered with any soil. Backfill soil must not be compacted to a density that inhibits root growth.

- It can be beneficial to form a temporary basin around the outside edge of the root ball, make the wall about 75 mm to 100 mm high and firm the soil into place with hands. This will greatly decrease soil moisture run-off and will also direct water down into the root zone.
- Water the root ball and backfill soil to bring the root ball to field capacity.
- Approved mulch is to be applied near, but not touching, the trunk out to, as a minimum, the perimeter of the planting. A 75 mm to 100 mm layer of approved woodchip mulch is ideal. Mulch should be thinnest over the root ball. Mulching further out from the planting hole has good benefits.
- If good quality tree stock has been purchased staking for support will not be necessary in most landscape situations. Protective staking may be required in planting sites around Yarra Park. Two stakes used in conjunction with a wide, flexible tie material on the lower half of the tree will hold the tree upright, provide flexibility, and minimise injury to the trunk. Support staking and ties should be removed after the first year of growth. Steel hoops can also be used to protect the base of newly planted trees from vehicles (see section 7.1).

Planting in compacted soils

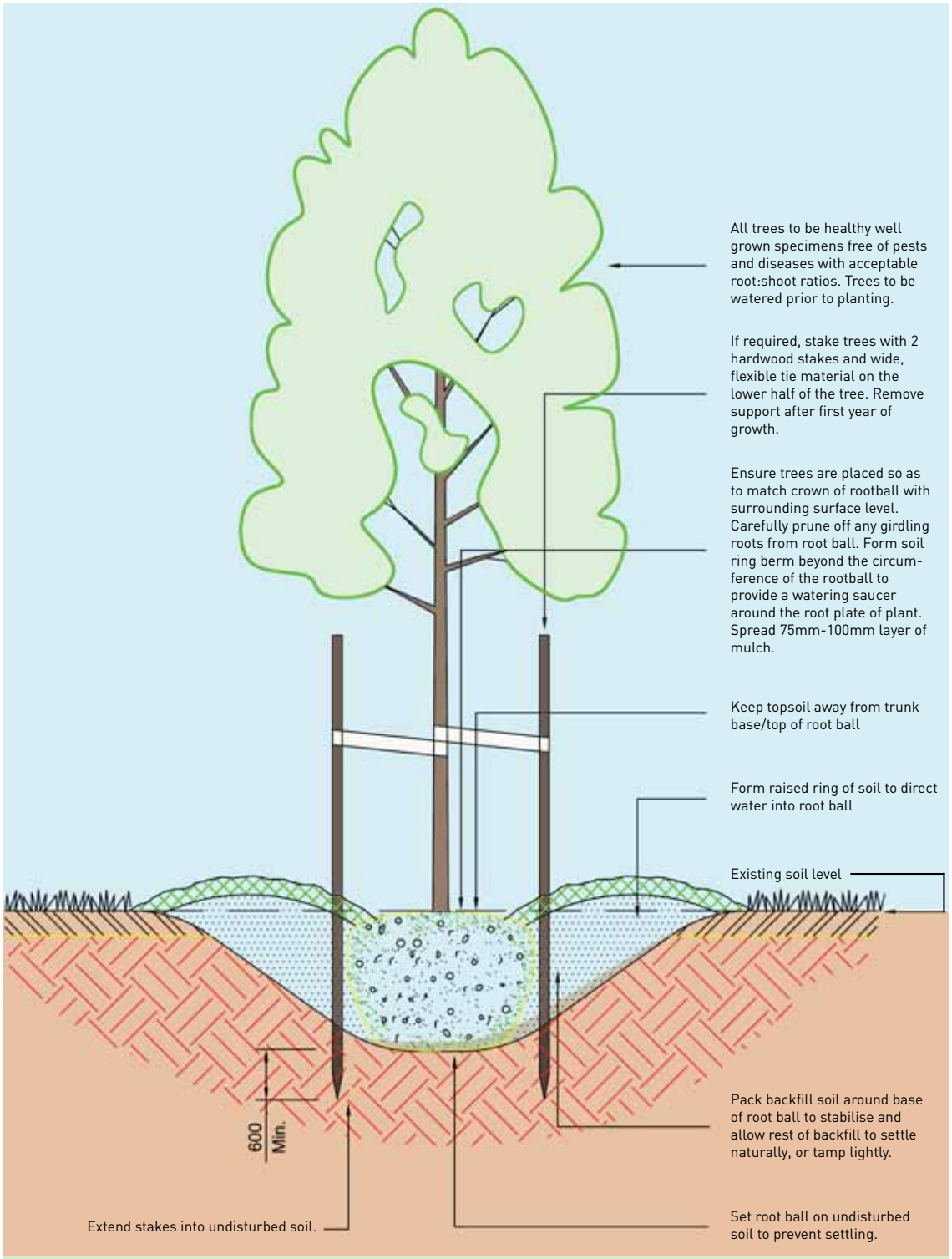
Because roots grow poorly in compacted soil, it should be tilled or broken up with specialised heavy equipment prior to planting. This must not be done beneath the canopy of existing mature trees as significant root damage could occur leading to decline.

Several 60cm to 90cm deep, 7 to 10cm wide, trenches can be dug from the planting hole like spokes in a wheel (See image 1). A backhoe or trenching machine can dig trenches quickly. This technique is also referred to as as vertical mulching and can be used for decompacting soil around established trees (using sympathetic excavation methods). Amended or original soil can be placed back into the trench although there is no evidence that amended soil increases root growth more than backfilling with original soil.

Although this may not provide all the benefits of loosening the soil around the entire planting hole, it may be less expensive and roots should be able to grow well in the loose, aerated soil in the trenches.

Image 1. Radial trenching used in compacted soil for newly planted tree

Diagram 6. Tree planting detail



NOTE
Width of planting hole is:
3 times root ball diameter in highly compacted soil.
2 times root ball diameter minimum in all others.

Regularly check soil moisture of root ball with soil probe.

Trees are to be placed to ensure the root ball is not higher than the surrounding soil.

Keep the topsoil and mulch away from the base of the tree trunk, to avoid collar rot or trunk damage.

Post-planting maintenance

The importance of after-care tree maintenance requirements cannot be emphasised enough. This facet of the tree planting process can greatly increase the success of the planting if carried out rigourously. The establishment program shall include:

- A watering program to ensure an optimum soil moisture level is maintained and growth continues unaffected by drought or soil saturation;
- Monitoring and control of pest and disease;
- Replacement of planted trees that do not survive the maintenance period (excluding vandalised trees);
- Maintaining tree stakes and ties;
- Maintaining planting sites free of weeds;
- Maintaining specified depths of mulch.

A program of post-planting maintenance will extend for two years after planting. The period of post-planting maintenance may be extended, depending upon seasonal conditions and tree establishment.

Watering

Frequently irrigated trees establish more quickly than those receiving infrequent irrigation (Gilman, Black & Dehgan, 1998) . The amount of water necessary for successful plant establishment is dependant on the size of the tree that has been planted, the soil conditions and the climatic conditions. The root ball of the tree must have constant moisture until the tree has established.

Irrigation from Recycled Water facility will enable sufficient supply to newly planted trees. The Water recycling facility provides for 110ML of water to Yarra Park. The avenues of trees have a dedicated dripper system installed to provide water. Trees planted in open space areas receive water from irrigation sprinklers and supplementary manual watering.

Tree watering should be frequent with watering at least 3 times per week from the 1st September to the 30th April inclusive for two years after planting (the commencement and completion of the watering season may be varied). Ongoing monitoring during the cooler months may result in supplementary watering when required.

Formative pruning

This consists of the selective removal of specific branches to enhance form and improve structure, or to directionally shape the young tree. Formative pruning reduces the development of structural weaknesses, it can also be used to accommodate site constraints and reduce encroachment on utilities or buildings as the tree grows. It is worth noting that the less a young tree is pruned, the more total growth the tree will make. Any tree pruning is to be carried out to the Australian Standard – *AS 4373 – 2007 Pruning of Amenity Trees*.

5.5 Pest and disease management

Pest and diseases are a component of the urban landscape and control measures will be required at times to maintain healthy and aesthetically pleasing landscapes.

A range of methods will be utilised in the management of pest and disease outbreaks and it will be the identification of damage thresholds that will initiate the implementation of a pest and disease program.

Pest and disease management will be approached in the following ways:

- Tree managers (MCC) will have a thorough understanding of the biology of the plants and key pests in relation to the ecosystems they are managing. On-going training and education will occur for the staff to maintain current best practice approach to pest management.
- MCC will support research into biological controls for pests and diseases that pose a threat.
- If a pest outbreak is identified and damage thresholds exceed accepted levels and other trees are at risk, all possible action will be taken to effectively decrease the risk to other trees from the pest outbreak.
- An integrated approach to pest management will be adopted that employs methods and materials that preserve and augment the ecosystem while facilitating permanent control of the pest.
- Advice and management programs will be sought from other agencies or pest control regulator, for example Department of Primary Industries, to ensure the best approach is being adopted for any pest outbreak.
- Trees will be removed when they are infected with an epidemic insect or disease where the recommended control is not applicable and removal is the recommended practice to prevent transmission.
- Species of tree will be selected that are known to be pest and disease resistant.
- Monitoring systems will be developed to check pests and tree health regularly.
- Trees that are recognised woody weed species will be removed when opportunities are presented through the normal management of the Yarra Park tree population.

Elm Leaf Beetle

Possibly the most damaging current pest within the park would be Elm Leaf Beetle (ELB) (*Xanthogaleruca (=Pyrrhalta) luteola*). Repeated defoliation over successive seasons can weaken elms, increasing their susceptibility to other stresses and may therefore contribute to their death.

Elm leaf beetle will be managed with an integrated program that incorporates good cultural practices, conservation of natural enemies, regular monitoring, the use of less-toxic insecticides, bark banding with insecticides, or systemic insecticides.

Damage predictions and treatment decisions will be based on survey data and the continual monitoring of trees and elm thickets in the affected areas. Monitoring should also undertake damage prediction sampling in affected areas.

Elm leaf beetle populations fluctuate dramatically from year-to-year and most trees do not require treatment every year. Healthy elms can tolerate substantial defoliation. Where elm leaf beetle is a problem, use a combination of methods because no single method kills 100% of the pests. Relying solely on the same technique year-after-year selects for pest populations less susceptible to that treatment. Because adult beetles fly from tree to tree, management efforts directed at single trees may give less satisfactory results in comparison with control efforts aimed at all elms in an area.

Soil injection with systemic insecticides on a 3 year cycle will form the basis of chemical control methods used on the elms within the park.

The current ELB control program is to apply chemical control on an ad hoc basis. The last tree spraying program occurred in 2009.

Brushtail & Ringtail Possums

The MCC recognises that possums, flying foxes and other native animals are protected species under the Wildlife Act 1975.

In the event that a tree is showing signs of excessive damage from possum grazing, management shall inspect the tree and determine a suitable course of action to reduce further grazing.

The installation of possum guards or bands around the trunks or major branches of the affected tree is the most commonly used technique within the park. These guards are typically constructed from sheet metal or clear polycarbonate and should be a minimum of 60cm wide. Where possible the guard will be placed above the first fork of the tree to provide refuge for possums if pursued by other animals, provided that it is not possible for the possum to access the remainder of the tree. nPossum guards may also be placed on surrounding trees to restrict access to a combined tree canopy. Possum guards are only effective if they are maintained on a regular basis. There also needs to be a clear distance of 2m created between the tree/s and surrounding structures to stop possums jumping onto trees with guards.

A review of possum guard use in Yarra park needs to occur as their effectiveness is not apparent and they are not adjusted, which can lead to damage to trees (See image on right).

The affected tree and surrounding trees may be pruned to reduce the crown away from structures or other trees, to prevent the development of ‘possum highways’. A clear distance of 2m should be created between the tree/s and surrounding structures.

The ability to limit den sites in buildings and trees should be investigated. Tree hollows will not be filled as this can cause more damage to the tree.

A specific possum management strategy could be developed to manage the possum population within Yarra Park. In addition to the possum control strategies outlined above, the following could also be implemented.

- Surveys could be conducted to determine the size of the possum population, the number of dens, whether the possums are local or live in properties surrounding the park, and access to artificial food sources, such as unsecured rubbish bins, food scraps or deliberate feeding by the public.
- Modifying public bins to restrict access by possums.
- Public education campaigns to discourage deliberate feeding and dumping of possums in parks.

6. Species selection

In terms of tree selection, one of the key implementation actions identified in the Yarra Park Master Plan was the continued use of Elm trees (*Ulmus* spp.), as the main avenue theme tree, as well as to protect and enhance the 'overlay' of remnant indigenous vegetation (the important River Red Gum Woodland elements).

6.1 Recommended species

Taking into consideration those two important selection criteria, the following tree species are recommended for use within Yarra Park. Trees listed in alphabetical order. Note that the list is not definitive.

Table 10. Tree species recommended for Yarra Park

Species and description	Photograph
Angophora costata (Smooth-barked Apple) Broad-domed tree 18-20 m x 13-15 m. Dense crown of dark green foliage. Smooth rusty-red bark. White flowers in summer. Adaptable to a wide range of conditions and soils. Plant in space to enable development of full crown. Use as avenue tree or as specimen planting.	
Corymbia citriodora (Lemon-scented Gum) Large, open crowned tree, up to 30m in height and spread. Smooth, white to coppery pink bark throughout. Crown of glossy green lanceolate foliage. Use in avenues, such as Pavilion Walk and as a specimen tree.	

Species and description	Photograph
Corymbia maculata (Spotted Gum) Narrow to broad-domed tall tree, 18 to 20 metres in height with a 12-15 metre spread. Dense crown of glossy leaves. Smooth mottled grey trunk. Adaptable to a wide range of climatic conditions & soils. High drought tolerance. Useful for compacted sites. Use as specimen planting.	
Eucalyptus camaldulensis (River Red Gum) Large broad domed to spreading evergreen tree. A fast growing and long lived species that can attain dimensions of 20-30m high x 12-25m wide at maturity. Leaves a dull grey-green, flowers are white appearing in December to January. Bark decorticating white, pink and grey over whole trunk. An adaptable species that grows in a range of soils. High tolerance to waterlogging/compaction, relatively tolerant of soil salinity. Use in natural groupings and as specimen trees.	
Eucalyptus microcorys (Tallowwood) Large tree to 30 m high with dense crown. Adult leaves dark green, glossy, & discolorous. Persistent red-brown to black stringybark. Tree performing well as a scattered specimen tree throughout the park.	

Species and description	Photograph
Eucalyptus sideroxylon (Red Ironbark) Medium to large evergreen tree. Fast growing and with a rounded habit, mature dimensions can range between 15-20m in height x 7-10 in width. Dull grey green leaves. Bark reddish-brown to black, deeply furrowed on the trunk and persistent to the smaller branches. Good drought tolerance. Needs formative pruning to develop good structure. Use as avenue tree and specimen planting.	
Ficus macrophylla (Moreton Bay Fig) Very large spreading tree, 30 to 40 metres in height and spread. The large leaves are oval-shaped to elliptical, dark glossy green above and rusty beneath. Large buttressed trunk when mature. According to i-Tree valuation, one of the most valuable trees species used in Yarra Park. Use as specimen tree.	
Ficus rubiginosa (Port Jackson Fig) Small to large spreading tree, 10-15m height and spread. With dense canopy of leathery, dark green, glossy oval leaves with lower surface mostly hairy and rusty-coloured. Often with buttressed trunk; young stems rusty-pubescent. Use as specimen tree.	
Phoenix canariensis (Canary Island Date Palm) Very large (to about 20m), majestic palm, with a tall, solid trunk, with a broad crown of large, arching, divided feathery leaves with spined petioles held on sturdy dark grey trunk. Use in formal row plantings. Should also be considered for use along sloping grassed concourse area on eastern side of MCG; adjacent to Premiership Alley.	

Species and description	Photograph
Platanus X *acerifolia* (London Plane) A large, rounded canopy, deciduous tree 15-25m in height with 15-20m spread. Leaves matt, mid to dark green with 3-5 shallow lobes turning yellow to brown in autumn. Bark olive-green to cream, flaky, striking in the winter. Adapts to moist soils. Use as an avenue tree.	
Quercus canariensis (Algerian Oak) Stately, broad-domed tree 20-30m in height and can get wider than height at maturity. Large, lobed leaves. Can be a variable tree as it readily hybridises with English Oak. Very good drought tolerance. Use as avenue tree alternative and specimen tree.	
Ulmus minor 'Variegata' (Silver Elm) Stately, narrow-domed to rounded form with ascending branches, spreading with age. 25 to 30m in height. Green leaves with variable white flecks and blotches. The leaf colour in autumn is yellow. Soft textured, open canopy. Adaptable to a wide range of site conditions. Use as an alternative avenue species.	
Ulmus parvifolia 'Todd' (Chinese Elm variety) Broad-domed tree 10-15m tall with similar spread. Small, glossy, dark green leaves. Orange-brown flaking bark. Adapts to most soils, can cope with extremes. High drought tolerance. Good shade tree. Ensure the variety is used as it develops better structure. Could be alternative avenue species. Use as specimen planting.	

Species and description	Photograph
Ulmus procera (English Elm) Compact, densely branched tree 20-25m in height with a similar spread. Fine tracery of branchlets in winter. Rough, fissured grey bark. Dominant avenue species.	
Zelkova serrata 'Green Vase' (Japanese Zelkova var.) Medium to large vase-shaped, exotic, deciduous tree with upright arching branches. 18-25m in height by 15-18m in width. Leaves oblong-ovate dark green to 12 cm long with serrated margin, autumn colours range from yellow, copper to red. Bark is smooth grey exfoliating in patches to reveal orange, brown and pink. Very adaptable - good tree for urban landscapes. Avenue alternative.	

Other species worth considering

Eucalyptus melliodora (Yellow Box). Specimen planting.

Recommended species for avenues

Avenue	Recommended species	Comment
Queens Walk	*Ulmus procera* (English Elm)	Maintain existing.
Police Paddock Lane	*Ulmus minor* 'Variegata' (Silver Elm) *Zelkova serrata* 'Green Vase' (Japanese Zelkova var.)	Interplant between existing Desert Ash. Continue all the way to the concourse.
Vale Street	*Phoenix canariensis* (Canary Island Date Palm)	Maintain existing.
Vale Street South	*Ulmus procera* (English Elm)	Maintain existing. Continue along walkway to Sheffield Walk.
Avenue Walk from East Melbourne pedestrian bridge south towards Olympic Stand.	*Ulmus procera* (English Elm)	Replace Dutch Elm (*Ulmus* x *hollandica*) over time.
Marathon Way	*Ulmus procera* (English Elm)	Maintain and enhance existing.

Avenue	Recommended species	Comment
Olympic Promenade	*Ulmus procera* (English Elm) *Ulmus minor* 'Variegata' (Silver Elm	Opportunity to start new avenue with removal / replacement program.
MCC Avenue	*Ulmus procera* (English Elm)	Maintain existing.
Pavilion Walk	*Corymbia citriodora* (Lemon-scented Gum)	Maintain existing.
Jolimont Terrace boundary	*Ulmus procera* (English Elm)	Maintain existing species. Could remove double row and replace with single row over time.
Jolimont Street pathway	*Ulmus procera* (English Elm), inside, *Cinnamomum camphora* (Camphor Laurel) street side	Maintain existing.
Walkway from Birrarung Marr footbridge towards Gate 2	*Ulmus procera* (English Elm)	Opportunity for planting.
Walkway from near Gate 1 towards Tennis Centre footbridge	*Ulmus procera* (English Elm)	Maintain existing.
Brunton Avenue row, between Jolimont St & Tennis Centre footbridge	*Quercus canariensis* (Algerian Oak)	Maintain existing.
Sheffield Walk	*Ulmus procera* (English Elm)	Maintain and enhance existing. Continue form Punt Rd to Police Paddock Lane
Avenue from Punt Road (Gate 6) towards Marathon Way.	*Angophora costata* (Smooth-barked Apple) *Corymbia citriodora* (Lemon-scented Gum)	Opportunity for new avenue. Existing new trees in mixed condition. Strong eucalypt feel at this end of park. *Angophora costata* has been used at Punt Road end.
Avenue from Gate 5 south/west towards AFL Way.	*Ulmus minor* 'Variegata' (Silver Elm) *Ulmus parvifolia* 'Todd' (Chinese Elm variety) *Zelkova serrata* 'Green Vase' (Japanese Zelkova var.)	Opportunity to start new avenue with removal / replacement program.
Avenue from Gate 7 (Brunton Ave.) north to Sheffield Way	Need to decide either; *Angophora costata* (Smooth-barked Apple) or *Ulmus* sp. (Elm)	Younger planting of Dutch Elm not performing consistently. More recent interplanting with *Angophora costata*. Extend avenue for entire length.
AFL Way from Brunton Avenue to Gate 7 Avenue	*Ulmus procera* (English Elm)	Maintain existing.
AFL Way from Gate 7 to Brownlow Way	*Quercus canariensis (Algerian Oak)*	Change from elm.
Avenue from AFL Way towards Don Bradman, Gate 3	*Eucalyptus sideroxylon* (Red Ironbark)	Maintain existing.
Avenue from Yarra Park footbridge to Premiership Alley	*Platanus x acerifolia* (London Plane)	Maintain existing.

Avenue	Recommended species	Comment
Sloping area between concourse and Premiership Alley & Brownlow Way	*Phoenix canariensis* (Canary Island Date Palm)	Remove poor performing Planes. Palms suited to shallow soil profile.
Northern boundary - Vale Street to pedestrian footbridge	*Acer campestre* 'Evelyn' (Hedge Maple) *Carpinus betulus* 'Fastigiata' (Upright European hornbeam)	Trees to form an informal deciduous hedge/screen to strengthen character to Queens Walk.

7. Tree protection

Trees within Yarra Park will be protected from vehicle parking, construction works and other activities that threaten tree condition, safety or amenity. The conflicting requirements of trees and park usage, maintenance or enhancements will be minimised where possible.

The primary goal of tree protection is the long-term survival and viability of a tree.

The trees within Yarra Park are subject to a variety of pressures, conflicts, and public requirements. These pressures lead to damaged trees which may effect their function and viability in the landscape.

Protecting and maintaining healthy, safe and aesthetically pleasing trees is vital in achieving the desired landscape, social and environmental objectives for the park. Protecting the trees is a multi-disciplinary, community wide endeavour.

Major principles;

1. Tree preservation programs that respect tree physiology and natural patterns of tree growth,
2. Prevention of injury to trees, and
3. Allocation of appropriate space for trees (Harris, Clark & Matheny, 2004).

Trees vary in their ability to adapt to altered growing conditions. Mature trees have established stable biological systems in the pre-existing physical environment. Disruption of this environment by human activities, such as construction and car parking, interrupts the tree's physiological processes, causing depletion of energy reserves and a decline in vigour, often resulting in the tree's death. Expected tree reactions to compaction, construction or excavation damage vary resulting in: immediate to out-right death; single year decline and death; multiple year decline and death; and decline with major living mass loss. The last two reactions are the most common expectations among urban trees, and the most difficult to prove a cause and effect relationship with construction activities as symptoms are exhibited long after the event. Trees are living organisms and they will respond to dramatic changes in their growing environment. Structural damage and chronic stress problems are evident in a tree for its life.

Tree protection requirements are intended to guide a disruptive activities to ensure that appropriate practices will be implemented in the field in order to preserve trees while eliminating undesirable consequences that may result from uninformed or careless acts.

The Australian Standard AS 4970 - 2009 Protection of trees on development sites, provides guidelines for the allocation of tree protection zones and other tree protection measures.

AS 4373 - 2007 Australian Standard - Pruning of amenity trees. Provides the principles of tree pruning to encourage practices that reduce the risk of hazard development, branch failure, pathogen infection and premature tree death.

7.1 Traffic management and tree protection

The majority of park use, including car parking, is related to MCG events. There has been an on-going debate about the impact that these intense events are having on the trees. *The Melbourne Cricket Ground and Yarra Park Amendment Act 2009* provides for continued car parking within the park under certain conditions, therefore the trees need to be actively managed in order to mitigate potential impacts.

The parking of vehicles in turfed areas or within the root zones of trees will lead to compacted soil conditions. Compaction is also exacerbated when soils are moist; soils are particularly susceptible if the soil is at field capacity (such as following a heavy rainfall event).

It is easier to avoid compaction with thoughtful design and construction of the landscape than to correct it after it occurs. The most obvious design solution to reduce compaction adjacent to the trees is to separate vehicles from the trees.

As indicated in *Section 7.0 Access + Circulation of the Yarra Park Master Plan*, the strategies to be implemented in order to reduce the impact of vehicles on the trees include:

- Reduction in car parking numbers (recommended limit of 4,500 vehicles per event).
- Implementation of 'no-go' parking areas and rotation of allowable areas.
- Recommendation that all avenues are mulched.

Because mulching is perceived to have beneficial effects there is a danger to over-apply mulch. Excessive mulch can lead to poor gas exchange of the soil with the atmosphere, leading to root suffocation, and excessive water around the roots because it cannot be evaporated, resulting in poor aeration of the roots. Mulch should not be spread deeper than 15 cm; 10 to 12 cm is optimal when using wood chip material.

It is the recommendation of this strategy that no vehicles are to be parked within the allocated tree protection zone (TPZ) of a tree within Yarra Park (the TPZ as designated by the Australian Standard AS 4970 - 2009 Protection of trees on development sites and is listed for each tree in the tree database).

It should be noted that this is also good risk management. Keeping vehicles away from maturing elms and River Red Gums, which are well-documented as indiscriminately shedding large limbs, is good management.

Where allocated tree protection zones need to be traversed for entry/egress purposes a ground protection system (preferably permeable) needs to be constructed (See section 7.3). Research into suitable entry/egress treatments is to be undertaken to ascertain the best approach to enable vehicles to pass through tree protections zones with little impact to the root systems.

The tree protection zones are to be mulched and delineated by bollards. This may require creating permanent mulched garden beds in the corners of the triangular grassed areas as well as along the avenues. There will be existing trees within designated car parking areas where it is not practical to install permanent bollards. Temporary bollards and tape during MCG events to keep cars away from root zones and to help direct traffic would be useful. Car parking staff need to be educated on the importance of maintaining tree protection zones clear of vehicles.

The placement of new tree plantings need to consider car parking. It is easier to manage a tree protection zone adjacent to the boundaries or in corners of designated triangular parking areas, rather than manage single specimen trees.

Steel hoops are used to protect new trees from vehicles. These consist of two semi-circle steel hoops concreted into the ground on two side of the tree (See photograph on right). These steel hoops are effective in protecting the base of the trees from physical damage. They will not stop compaction of the broader root zone. They also need to be removed if the newly planted tree has died (there are examples of unplanted hoops in the park) and they also will need to be removed in order to grub out a stump when older trees die.

7.2 Soil decompaction

There are a number of areas throughout the park that have been heavily compacted to the point where it would preclude the ability to plant a tree. The areas can be seen in the plan of compacted areas in appendix 5. These areas need to be treated prior to planting. There are a number of techniques that could be utilised to alleviate compacted areas.

- Subsoiling: using the bucket of a mechanical excavator to lift soil from the ground to a depth of approximately 50 cm, and then replace it, after light shaking. Not to be used within the allocated tree protection zones of the trees.
- Radial trenching: To be used within the root zone of existing trees. Radial trenching is performed with root sensitive excavation equipment such as an Air-spade® or other root sympathetic excavation technique, to remove soil radially from the trunk out to the roots. Narrow trenches are created using high air pressure in a radial pattern throughout the root zone. These trenches appear similar to the spokes of a wagon wheel and should extend at least as far as the drip line of the tree. Trenches are 20 to 30cm deep and 7 to 10cm wide. The narrow trenches can be backfilled with topsoil or compost.

Also see section 5.3 for techniques for tree planting in compacted soils.

The MCC will be undertaking regular soil decompaction measures as part of their maintenance program. Compacted areas that have undergone remediation works should also be mulched.

7.3 Entry/exit points

Entry and exit points from turfed areas onto the criss-cross network of paths is an on-going difficult management issue and there is no specific ‘off-the-shelf’ solution.

The ‘B’ grade crushed rock stabilised with cement being specified would have similar effects on tree root growth as concrete. However, unlike concrete, the edges could chip away after continued vehicle use.

The other issue is that there will always be the wear point; the demarkation line between the entry surface and the turf area. Another challenge is how you could disperse this loading/wear at these 'traffic funnel' points.

There are a number of options that could be applicable for these entry/egress points into the car parking areas. The stabilised crushed rock could be used as an interim measure, however the following could be considered in a series of trials through the park to ascertain what might be the best longer-term option.

There is a perceived marketing benefit as the use of turf in car parking areas would be an increase in the use of ‘green infrastructure’ elements for the park.

Cornell University in the United States has combined turf with structural soil to create a healthy growing medium for the grass that withstands traffic, is designed to be virtually maintenance free, and can be used in areas that receive high levels of both pedestrian and vehicular traffic, including car parking areas and driveways.

Soil compaction is the longer-term, chronic effect on maintaining healthy turf in traffic areas. Structural soils are designed to be compacted, and will therefore withstand heavy amounts of traffic, allowing both people, cars and temporary structures to safely use a turf covered surface installed on structural soil. The profile would be between 450mm to 600mm, which will need to be considered if such a system were to be installed adjacent to mature trees. Conversely, the turf covered structural soil would capture and store storm water and allow root growth from adjacent trees.

The structural soil would be approximately 200mm deep. The areas could also be extended into the car parking areas (paddocks) to reduce the wear points.

Other grass protection systems, such as GrassProtecta® (Heavy Grade) or Netlon Advanced Turf® could be incorporated into the system or used in trials.

Obviously the use of turf in heavily used traffic areas requires a specialised turf, such as a kikuyu variety, and an increase in maintenance (particularly after events). Even if the turf did not work the structural soil would still enable a firm compacted surface for vehicle traffic.

Alternatively, another product that could be considered is the driveway areas be covered with a modular system that could help contain a more porous gravel. Products such as Netpave®50 or 25 or Terram Cellular Confinement System or Geoweb® (http://www.geofabrics.com.au/detailproduct.asp?pid=70). In some cases turf could be incorporated into these systems. These systems could also be installed at existing grade after the removal of the organic layer (no more than 100mm deep).

The MCC will be undertaking research into potential root sympathetic systems that could be used within the park to allow vehicles to traverse over root systems with little adverse effect.

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Appendix 1 - Yarra Park Tree Strategy Plan

20-year Strategic Plan
To enhance and increase the canopy coverage of the treed landscape of Yarra Park in a sustainable manner to provide a healthy, diverse and aesthetically pleasing tree population that continually benefits the multi-user community that enjoys this prominent Melbourne open space. Key management areas: • Increase relative canopy coverage, ensured through comprehensive tree establishment program. • Increase age diversity, ensured through a tree removal and replacement program. • Maintain full tree tree inventory with maintenance records and i-Tree Eco data. • Implement best practice maintenance. • Implement appropriate tree protection measures. • Systematic tree risk management process. • Periodic reviews of the strategy to ascertain the current tree condition and review operational plans, community expectations and associated budgets.

5-Year Management Plan 1	**5-Year Management Plan 2**	**5-Year Management Plan 3**	**5-Year Management Plan 4**
First year requires greater resource input in order to address urgent works. Initiate tree removal and replacement program. Increase tree numbers by planting out identified vacant sites (125). Undertake initial tree pruning works (identified works within 12 months) and then commence 5 year comprehensive maintenance programs. Undertake decompaction & mulching works and traffic management (bollards & entrance/exit areas) initiatives.	Continue with Year 6 to 10 tree removal and replacement program. Continue with 5-year cyclic comprehensive tree maintenance program. Update tree data. Produce updated condition status. Continue with mulching works (re-mulching) and traffic management (bollards & entrance/exit areas) initiatives.	Review and update tree strategy to reflect current condition status of trees. Update tree inventory and undertake i-Tree assessment to ascertain environmental benefits of tree strategy Develop a 10 to 20 year tree removal and replacement plan based on updated data. Continue with mulching works (re-mulching) and traffic management (bollards & entrance/exit areas) initiatives.	Continue with Year 10 to 20 tree removal and replacement program. Continue with 5-year cyclic comprehensive tree maintenance program. Update tree data. Produce updated condition status. Adjust strategy if required. Continue with mulching works (re-mulching) and traffic management (bollards & entrance/exit areas) initiatives.

Annual Operating Plans			
Year 1 • Implement first year removals - trees that are dead (9), trees rated as Very Poor structure (7), trees rated as Poor health and Poor structure (11). Eastern section of Bracelet Honey Myrtle along northern boundary (31 of 61 trees). • Initiate tree planting in nominated vacant sites (125 vacant sites). • Undertake nominated pruning works (72 trees to be completed in 1st year). • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 1 (Area 1) of 5-year comprehensive maintenance program.	Year 6 • Review Strategy. • Overview of tree population and condition. • Update i-Tree data to quantify changes in environmental benefits derived from the trees. Includes visual tree risk assessment of all site (may lead to some additional reactive works). • Establish priorities for next five years removal / replacement program. • Implement 6th year removal program (1st year of 6-10 year program). • Initiate replanting of trees removed in Year 5. • Start Year 1 (Area 1) of 5-year comprehensive maintenance program.	Year 11 • Review Strategy. • Overview of tree population and condition. • Update i-Tree data to quantify changes in environmental benefits derived from the trees. Includes visual tree risk assessment of all site (may lead to some additional reactive works). • Establish priorities for next five years removal / replacement program. • Implement 11th year removal program (1st year of 11-20 year program). • Initiate replanting of trees removed in Year 10. • Start Year 1 (Area 1) of 5-year comprehensive maintenance program.	Year 16 • Review Strategy. • Overview of tree population and condition. • Update i-Tree data to quantify changes in environmental benefits derived from the trees. Includes visual tree risk assessment of all site (may lead to some additional reactive works). • Establish priorities for next five years removal / replacement program. • Implement 16th year removal program. • Initiate replanting of trees removed in Year 15. • Start Year 1 (Area 1) of 5-year comprehensive maintenance program.
Year 2 • Implement 2nd year removal program. Trees with Fair to poor health and Poor structure (17 trees), trees with Fair to poor health and Fair to poor structure (8 trees). Trees with Fair health and Fair to poor structure (3 trees). Remainder of western section of Bracelet Honey Myrtle along northern boundary (30). Total 58 trees. • Continue with planting of vacant sites. Initiate replanting of trees removed in Year 1. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 2 (Area 2) of 5-year comprehensive maintenance program.	Year 7 • Implement 7th year removal program. • Initiate replanting of trees removed in Year 6. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 2 (Area 2) of 5-year comprehensive maintenance program.	Year 12 • Implement 12th year removal program. • Initiate replanting of trees removed in Year 11. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 2 (Area 2) of 5-year comprehensive maintenance program.	Year 17 • Implement 17th year removal program. • Initiate replanting of trees removed in Year 16. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 2 (Area 2) of 5-year comprehensive maintenance program.

Year 3 • Implement 3rd year removal program. • Initiate replanting of trees removed in Year 2. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 3 (Area 3) of 5-year comprehensive maintenance program.	Year 8 • Implement 8th year removal program. • Initiate replanting of trees removed in Year 7. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 3 (Area 3) of 5-year comprehensive maintenance program.	Year 13 • Implement 13th year removal program. • Initiate replanting of trees removed in Year 12. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 3 (Area 3) of 5-year comprehensive maintenance program.	Year 18 • Implement 18th year removal program. • Initiate replanting of trees removed in Year 17. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 3 (Area 3) of 5-year comprehensive maintenance program.
Year 4 • Implement 4th year removal program. • Initiate replanting of trees removed in Year 3. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 4 (Area 4) of 5-year comprehensive maintenance program.	Year 9 • Implement 9th year removal program. • Initiate replanting of trees removed in Year 8. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 4 (Area 4) of 5-year comprehensive maintenance program.	Year 14 • Implement 14th year removal program. • Initiate replanting of trees removed in Year 13. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 4 (Area 4) of 5-year comprehensive maintenance program.	Year 19 • Implement 19th year removal program. • Initiate replanting of trees removed in Year 18. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 4 (Area 4) of 5-year comprehensive maintenance program.
Year 5 • Implement 5th year removal program. Remainder of 1-5 year recommended removals. • Initiate replanting of trees removed in Year 4. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 5 (Area 5) of 5-year comprehensive maintenance program.	Year 10 • Implement 10th year removal program (Remainder of 6-10 year program). • Initiate replanting of trees removed in Year 9. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 5 (Area 5) of 5-year comprehensive maintenance program.	Year 15 • Implement 15th year removal program. • Initiate replanting of trees removed in Year 14. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 5 (Area 5) of 5-year comprehensive maintenance program.	Year 20 • Implement 20th year removal program (Remainder of 11-20 year program). • Initiate replanting of trees removed in Year 19. • Undertake visual tree risk assessment of all site (may lead to some additional reactive works). • Start Year 5 (Area 5) of 5-year comprehensive maintenance program.

Appendix 2 - Proposed maintenance works over 10 year period

Maintenance works to be undertaken within the next 12 months - 71 trees

Tree ID	Species	Age	Health	Structure	Works	Comment
10	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years. Crown decline
31	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years. Co-dominant leaders
38	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years. Co-dominant leaders
60	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Large wound on trunk, south side. Over extension of northern, lower scaffold branches. Upper crown previously reduced.
71	Ulmus procera (English Elm)	Maturing	Fair	Poor	General crown maintenance/ reduction	Consider removal 10-20 years. Co-dominant leaders Upper crown previously reduced.
79	Cupressus macrocarpa (Monterey Cypress)	Over-mature	Fair	Fair to Poor	General crown maintenance/ reduction	Reduce weight from north/ western scaffold
80	Eucalyptus botryoides (Southern Mahogany)	Semi-mature	Fair	Fair	General crown maintenance/ reduction	
106	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair	General crown maintenance/ reduction	Consider removal 10-20 years
179	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	
180	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair to Poor	Fair	General crown maintenance/ reduction	
181	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Large wound/cavity in trunk. Not an aboriginal scar tree.
183	Eucalyptus cladocalyx (Sugar Gum)	Maturing	Fair	Fair	General crown maintenance/ reduction	
195	Ulmus procera (English Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Consider removal 10-20 years
196	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
197	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
293	Ficus macrophylla (Moreton Bay Fig)	Maturing	Fair to Poor	Fair	General crown maintenance/ reduction	Crown decline
296	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
297	Ulmus procera (English Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Street tree

Tree ID	Species	Age	Health	Structure	Works	Comment
298	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years. Crown opening up on south side.
342	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Dead wood pruning. Remove lower scaffold limb growing over footpath.	Street tree. Lower limb orientated to north is over extending. End branches delaminated.
380	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Dead wood pruning. Remove cracked branch over Brunton av.	Street tree
382	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Dead wood pruning Reduce weight over Brunton av.	Street tree
385	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
389	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
391	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
392	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
393	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
394	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
396	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Street tree. Extensive decay & cavity in trunk
428	Platanus Xacerifolia (London Plane)	Maturing	Fair	Fair	General crown maintenance/ reduction	
429	Platanus Xacerifolia (London Plane)	Maturing	Fair	Fair	General crown maintenance/ reduction	
430	Platanus Xacerifolia (London Plane)	Maturing	Fair	Fair	General crown maintenance/ reduction	
432	Platanus Xacerifolia (London Plane)	Maturing	Fair	Fair	General crown maintenance/ reduction	
437	Eucalyptus camaldulensis (River Red Gum)	Maturing	Fair to Poor	Fair	General crown maintenance/ reduction	Conservation value
484	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Shed limbs in the past. Crown dieback, upper south
486	Ulmus x hollandica (Dutch Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	
487	Ulmus procera (English Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	

Tree ID	Species	Age	Health	Structure	Works	Comment
489	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Shed limbs in the past.
491	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Shed limbs in the past.
493	Eucalyptus camaldulensis (River Red Gum)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Conservation value
515	Platanus Xacerifolia (London Plane)	Semi-mature	Fair	Fair	Pruning clearance - Clear light	
520	Ulmus parvifolia (Chinese Elm)	Semi-mature	Fair to Poor	Fair	Plant tree	Plant tree, rootball still above grade. Remove container. Slope soil. Mulch
527	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Co dominant leaders
529	Eucalyptus camaldulensis (River Red Gum)	Maturing	Fair	Fair to Poor	Take off possum guard	Conservation value. Wound in trunk on north side
544	Eucalyptus microcorys (Tallowwood)	Maturing	Fair	Fair	Remove/adjust possum guard. Dead wood pruning	
564	Eucalyptus microcorys (Tallowwood)	Maturing	Poor	Fair to Poor	General crown maintenance/ reduction	Decline symptoms. Co dominant leaders. Compacted soil conditions
566	Eucalyptus microcorys (Tallowwood)	Maturing	Fair to Poor	Fair	General crown maintenance/ reduction	Compacted soil conditions
567	Eucalyptus microcorys (Tallowwood)	Maturing	Fair to Poor	Fair	General crown maintenance/ reduction	Crown decline. Compacted soil conditions
579	Eucalyptus cladocalyx (Sugar Gum)	Maturing	Fair	Poor	Reduce weight off two main leaders	Consider removal 10-20 years. Extensive decay in trunk and at union of two central leaders
734	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	
930	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	
931	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	
940	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years. Need to reduce northern scaffold within next pruning cycle.
950	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Fungal bracket at union over informal path. Reduce weight over path
978	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
979	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
980	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years

Tree ID	Species	Age	Health	Structure	Works	Comment
981	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
1088	Ulmus procera (English Elm)	Maturing	Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
1089	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
1090	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
1091	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Consider removal 10-20 years
1154	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	
1156	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	
1187	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	General crown maintenance/ reduction	
1200	Ulmus procera (English Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Reduce weight of lower northern branch.
1202	Ulmus procera (English Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Reduction of upper northern branch. 100mm hanger caught up Sth side
1204	Ulmus procera (English Elm)	Maturing	Fair	Fair	General crown maintenance/ reduction	Lift off roof of shelter. Dead wood
1210	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	Weight reduction on east side. Dead wood over path
1212	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	General crown maintenance/ reduction	
1262	Eucalyptus sideroxylon (Red Ironbark)	Young	Fair	Fair	Remove stakes	

Proposed maintenance works to be undertaken in less than 5 years - 163 trees

Tree ID	Species	Age	Health	Structure	Works	Comment
35	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Extensive decay in trunk & central leader
52	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Poor	Fair to Poor	Removal	Severe decline
104	Eucalyptus melliodora (Yellow Box)	Semi-mature	Dead	Poor	Removal	Tree dead
105	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Poor	Fair	Removal	
107	Ulmus procera (English Elm)	Maturing	Poor	Fair to Poor	Removal	In decline
109	Pinus radiata (Monterey Pine)	Maturing	Fair to Poor	Poor	Removal	Decay in central leader
110	Pinus radiata (Monterey Pine)	Maturing	Fair	Fair to Poor	Removal	Wound in central leader. Has shed scaffold limb on north side
133	Eucalyptus camaldulensis (River Red Gum)	Young	Poor	Poor	Removal	
137	Eucalyptus botryoides (Southern Mahogany)	Maturing	Poor	Poor	Removal	Tree in decline. Extensive decay in trunk. Co dominant leaders. Crown dieback
147	Eucalyptus cladocalyx (Sugar Gum)	Semi-mature	Dead	Poor	Removal	Tree dead
165	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Poor	Fair	Removal	Grazed. Severe decline
185	Eucalyptus cladocalyx (Sugar Gum)	Over-mature	Fair to Poor	Poor	Removal	Numerous structural faults. History of limb shedding.
247	Angophora costata (Smooth-barked Apple)	Young	Fair	Very Poor	Removal	Tree has been knocked. Very loose in ground
254	Ulmus procera (English Elm)	Maturing	Poor	Poor	Removal	Decay in trunk, crown previously reduced
256	Ulmus procera (English Elm)	Maturing	Poor	Fair to Poor	Removal	Tree in decline
257	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	Remove/replace program
258	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	Remove/replace program
259	Ulmus procera (English Elm)	Maturing	Poor	Poor	Removal	Tree in decline
305	Ulmus x hollandica (Dutch Elm)	Semi-mature	Poor	Poor	Removal	Poor location. Extensive decay in trunk
307	Ulmus x hollandica (Dutch Elm)	Semi-mature	Fair	Poor	Removal	Poor location. Extensive decay in trunk, borer damage.
341	Eucalyptus cladocalyx (Sugar Gum)	Semi-mature	Fair	Poor	Removal	Recent limb failure
355	Ulmus x hollandica (Dutch Elm)	Semi-mature	Fair to Poor	Poor	Removal	Decay in trunk, borer damage.
415	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to Poor	Fair	Removal	Remove/replace program
417	Platanus Xacerifolia (London Plane)	Semi-mature	Poor	Fair to Poor	Removal	Extensive dieback
418	Platanus Xacerifolia (London Plane)	Semi-mature	Poor	Fair to Poor	Removal	

Tree ID	Species	Age	Health	Structure	Works	Comment
420	Platanus Xacerifolia (London Plane)	Semi-mature	Poor	Fair	Removal	
421	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to poor	Fair	Removal	Remove/replace program
424	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to Poor	Fair	Removal	Remove/replace program
425	Platanus Xacerifolia (London Plane)	Semi-mature	Poor	Fair	Removal	
426	Platanus Xacerifolia (London Plane)	Semi-mature	Poor	Fair	Removal	
431	Platanus Xacerifolia (London Plane)	Maturing	Poor	Poor	Removal	Severe decline
467	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Dead	Fair to Poor	Removal	Tree dead
482	Ulmus procera (English Elm)	Maturing	Poor	Poor	Removal	Large wound and decay in trunk, west side. Crown dieback. High target zone
510	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to Poor	Fair	Removal	Tree in decline
511	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to Poor	Fair	Removal	Anthracnose
512	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to Poor	Fair	Removal	Anthracnose
513	Platanus Xacerifolia (London Plane)	Semi-mature	Fair to Poor	Fair	Removal	Anthracnose
514	Platanus Xacerifolia (London Plane)	Semi-mature	Poor	Fair	Removal	In decline
519	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Shed limbs in the past. Decay in trunk
530	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Crown reduced in the past
552	Ulmus x hollandica (Dutch Elm)	Semi-mature	Fair	Poor	Removal	Extensive wound in trunk
553	Ulmus x hollandica (Dutch Elm)	Semi-mature	Fair	Poor	Removal	Wound in trunk. Poor attachments
558	Eucalyptus botryoides (Southern Mahogany)	Over-mature	Fair to Poor	Poor	Removal	Crown decline, decay in main branches. High target area
576	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Poor	Fair	Removal	
577	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Dead	Fair to Poor	Removal	Stump resprout
578	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Poor	Poor	Removal	80% dead, wound in trunk
591	Araucaria heterophylla (Norfolk Island Pine)	Semi-mature	Dead	Fair	Removal	Tree dead
592	Araucaria heterophylla (Norfolk Island Pine)	Semi-mature	Fair to Poor	Fair	Consider removal	Main leader dead. Too crowded for species
593	Araucaria heterophylla (Norfolk Island Pine)	Semi-mature	Fair	Fair	Consider removal	Too crowded for species
605	Araucaria heterophylla (Norfolk Island Pine)	Semi-mature	Fair to Poor	Fair	Consider removal	Too crowded for species
607	Araucaria heterophylla (Norfolk Island Pine)	Semi-mature	Fair to Poor	Fair	Consider removal	Lost main leader. Too crowded for species

Tree ID	Species	Age	Health	Structure	Works	Comment
608	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Crown reduced in the past
696	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Suppressed
724	Eucalyptus melliodora (Yellow Box)	Semi-mature	Dead	Fair	Removal	Tree dead
726	Eucalyptus melliodora (Yellow Box)	Semi-mature	Dead	Fair	Removal	Tree dead
758	Fraxinus angustifolia (Narrow-leaved Ash)	Maturing	Poor	Fair to Poor	Removal	
769	Eucalyptus melliodora (Yellow Box)	Semi-mature	Dead	Fair	Removal	Tree dead
770	Eucalyptus camaldulensis (River Red Gum)	Semi-mature	Fair	Fair to Poor	Consider removal	Make room for avenue tree.
785	Pinus radiata (Monterey Pine)	Maturing	Poor	Fair	Removal	Tree in decline
839	Ulmus procera (English Elm)	Maturing	Fair to Poor	Very Poor	Removal	
841	Ulmus procera (English Elm)	Maturing	Poor	Fair to Poor	Removal	
842	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
843	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Very Poor	Removal	Tree collapsing
844	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
845	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
846	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	Tree in decline
847	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair	Removal	
848	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair	Removal	
849	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair	Removal	
850	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	Tree in decline
851	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	Tree in decline
852	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
854	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
855	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	Tree in decline

Tree ID	Species	Age	Health	Structure	Works	Comment
856	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
857	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
858	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
859	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
861	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
862	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	
863	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
865	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Poor	Removal	Tree collapsing
866	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Poor	Removal	Tree collapsing
868	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
869	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
870	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
872	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
873	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	
874	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
875	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair	Removal	
877	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair	Removal	
878	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
880	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair	Removal	
881	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
883	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair	Removal	

Tree ID	Species	Age	Health	Structure	Works	Comment
884	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
886	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	
887	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
888	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
890	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Poor	Removal	
891	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Poor	Removal	
893	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Poor	Removal	
894	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Poor	Removal	
896	Melaleuca armillaris (Bracelet Honey Myrtle)	Semi-mature	Fair	Fair to Poor	Removal	
897	Melaleuca armillaris (Bracelet Honey Myrtle)	Over-mature	Fair to Poor	Poor	Removal	
898	Melaleuca armillaris (Bracelet Honey Myrtle)	Over-mature	Fair to Poor	Poor	Removal	
900	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Poor	Removal	
901	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
903	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
904	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Dead	Poor	Removal	Tree dead
905	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Poor	Removal	
906	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Poor	Fair to Poor	Removal	
908	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
909	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
910	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	
911	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Fair to Poor	Removal	

Tree ID	Species	Age	Health	Structure	Works	Comment
913	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
914	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
915	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair	Removal	
916	Fraxinus angustifolia (Narrow-leaved Ash)	Semi-mature	Poor	Poor	Removal	
918	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Poor	Removal	Tree collapsing
919	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair to Poor	Poor	Removal	Tree collapsing
920	Melaleuca armillaris (Bracelet Honey Myrtle)	Maturing	Fair	Fair to Poor	Removal	
922	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair	Poor	Removal	Deadwood prune if not removed.
946	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
984	Ulmus procera (English Elm)	Semi-mature	Fair to Poor	Very Poor	Removal	
1010	Ulmus procera (English Elm)	Maturing	Fair to Poor	Very Poor	Removal	
1015	Ulmus procera (English Elm)	Maturing	Poor	Fair to Poor	Removal	
1016	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Extensive decay in trunk
1040	Ulmus procera (English Elm)	Young	Fair	Fair to Poor	Removal	stump regrowth
1041	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Decay in trunk
1042	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
1055	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1056	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Previously lopped
1058	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1059	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1060	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1061	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Previously lopped
1077	Ulmus ?x hollandica (Dutch Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1079	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1080	Ulmus ?x hollandica (Dutch Elm)	Maturing	Poor	Poor	Removal	Previously lopped
1081	Ulmus x hollandica (Dutch Elm)	Maturing	Poor	Poor	Removal	Extensive decay in trunk
1082	Ulmus x hollandica (Dutch Elm)	Maturing	Fair to Poor	Poor	Removal	Extensive decay in trunk
1083	Ulmus x hollandica (Dutch Elm)	Maturing	Fair to Poor	Poor	Removal	Extensive decay in trunk

Tree ID	Species	Age	Health	Structure	Works	Comment
1092	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1094	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Previously lopped
1095	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1096	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1097	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1113	Eucalyptus camaldulensis (River Red Gum)	Young	Poor	Fair	Removal	Heavily grazed - defoliated
1125	Ulmus procera (English Elm)	Maturing	Fair to Poor	Very Poor	Removal	
1141	Eucalyptus sideroxylon (Red Ironbark)	Semi-mature	Fair to Poor	Fair	Removal	Heavily grazed - defoliated. Allow Lemon-scented Gums to develop
1142	Eucalyptus sideroxylon (Red Ironbark)	Semi-mature	Poor	Fair	Removal	Heavily grazed - defoliated. Allow Lemon-scented Gums to develop
1168	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Previously lopped
1169	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped
1170	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	Previously lopped
1172	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1174	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1176	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1178	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1181	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1183	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1259	Eucalyptus sideroxylon (Red Ironbark)	Young	Fair to Poor	Very Poor	Removal	Tree very loose in ground

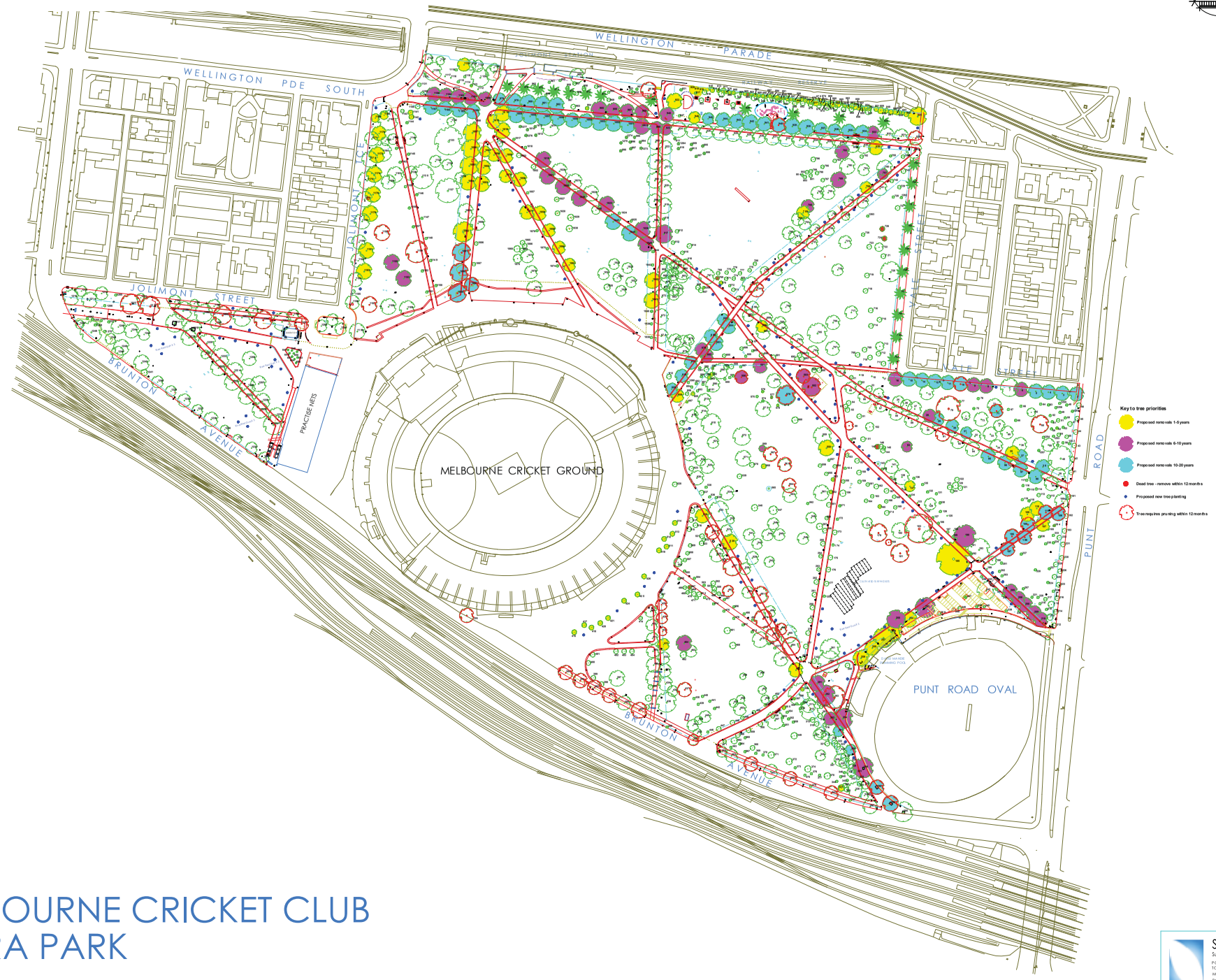
Proposed maintenance works to be undertaken in 6 to 10 years - 77 trees

Tree ID	Species	Age	Health	Structure	Works	Comment
6	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped. Regrowth off decaying stubs. May require pruning prior to removal.
8	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped. Regrowth off decaying stubs
9	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped. Regrowth off decaying stubs
16	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously reduced. Overextension of western crown
28	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	Previously lopped. Regrowth off decaying stubs
93	Pinus radiata (Monterey Pine)	Semi-mature	Fair to Poor	Fair	Removal	Tree in decline
190	Eucalyptus cladocalyx (Sugar Gum)	Maturing	Fair to Poor	Fair to Poor	Removal	Decline in northern leader
205	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
206	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
208	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
209	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
210	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	
253	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	Part of removal & replacement of western avenue next to Punt Road Oval
255	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	Co dominant leaders.
291	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	Decay in upper crown
292	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	
294	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	
299	Ulmus procera (English Elm)	Maturing	Fair	Fair to Poor	Removal	Crown opening up on north side.
302	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	Crown reduced in the past.
464	Eucalyptus nicholii (Narrow-leaved Peppermint)	Maturing	Poor	Fair to Poor	Removal	In decline
560	Cedrus deodara (Deodar)	Maturing	Fair	Fair	Removal	Stunted form. Will never achieve good cedar form
568	Cedrus deodara (Deodar)	Semi-mature	Poor	Fair to Poor	Removal	Wound in trunk, poor vigour. Will never achieve good cedar form
569	Cedrus deodara (Deodar)	Semi-mature	Fair to Poor	Fair	Removal	Will never achieve good cedar form
581	Eucalyptus botryoides (Southern Mahogany)	Maturing	Fair	Poor	Removal	Decay in trunk on plane of lean. Crown biased to north.
582	Eucalyptus cladocalyx (Sugar Gum)	Maturing	Fair	Poor	Removal	Extensive decay in main central leader & main branches. May require pruning in interim. Remove seat from under western crown
583	Eucalyptus cladocalyx (Sugar Gum)	Maturing	Fair	Poor	Removal	Recent limb failure. Decay in northern scaffold

Tree ID	Species	Age	Health	Structure	Works	Comment
586	Ulmus x hollandica (Dutch Elm)	Maturing	Poor	Fair to Poor	Removal	Decline symptoms. May need deadwooding in interim.
679	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
682	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
757	Fraxinus angustifolia (Narrow-leaved Ash)	Maturing	Fair	Fair to Poor	Consider removal	Inappropriate location - suppresssed. Do not replace
786	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
789	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
793	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
805	Casuarina cunninghamiana (River She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
806	Casuarina cunninghamiana (River She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
807	Allocasuarina littoralis (Black She-oak)	Young	Fair to Poor	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
808	Allocasuarina littoralis (Black She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
809	Allocasuarina littoralis (Black She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
810	Allocasuarina littoralis (Black She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
811	Allocasuarina verticillata (Drooping She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
817	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	May require pruning in interim
823	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
948	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
985	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
986	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
987	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
988	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
994	Allocasuarina littoralis (Black She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
995	Allocasuarina littoralis (Black She-oak)	Semi-mature	Fair to Poor	Fair to Poor	Consider removal	Inappropriate species in location. Replace with River Red Gum
996	Casuarina cunninghamiana (River She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
997	Allocasuarina littoralis (Black She-oak)	Semi-mature	Fair	Fair to Poor	Consider removal	Inappropriate species in location. Replace with River Red Gum
998	Allocasuarina littoralis (Black She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum

Tree ID	Species	Age	Health	Structure	Works	Comment
999	Ulmus procera (English Elm)	Maturing	Poor	Fair to Poor	Removal	
1000	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1012	Allocasuarina verticillata (Drooping She-oak)	Semi-mature	Fair	Fair to Poor	Consider removal	Inappropriate species in location. Replace with River Red Gum
1013	Allocasuarina verticillata (Drooping She-oak)	Semi-mature	Fair	Fair to Poor	Consider removal	Inappropriate species in location. Replace with River Red Gum
1014	Allocasuarina verticillata (Drooping She-oak)	Semi-mature	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
1019	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
1023	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1026	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1045	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
1049	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1050	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1051	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1099	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1101	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1102	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1104	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1106	Ulmus procera (English Elm)	Maturing	Fair to Poor	Fair to Poor	Removal	
1153	Ulmus procera (English Elm)	Maturing	Fair to Poor	Poor	Removal	
1155	Ulmus procera (English Elm)	Maturing	Fair	Poor	Removal	
1264	Allocasuarina littoralis (Black She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
1273	Allocasuarina littoralis (Black She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
1274	Allocasuarina littoralis (Black She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
1275	Allocasuarina torulosa (Rose She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
1276	Allocasuarina verticillata (Drooping She-oak)	Young	Fair	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum
1277	Allocasuarina verticillata (Drooping She-oak)	Young	Fair to poor	Fair	Consider removal	Inappropriate species in location. Replace with River Red Gum

Appendix 3 - Plan of trees nominated for removals

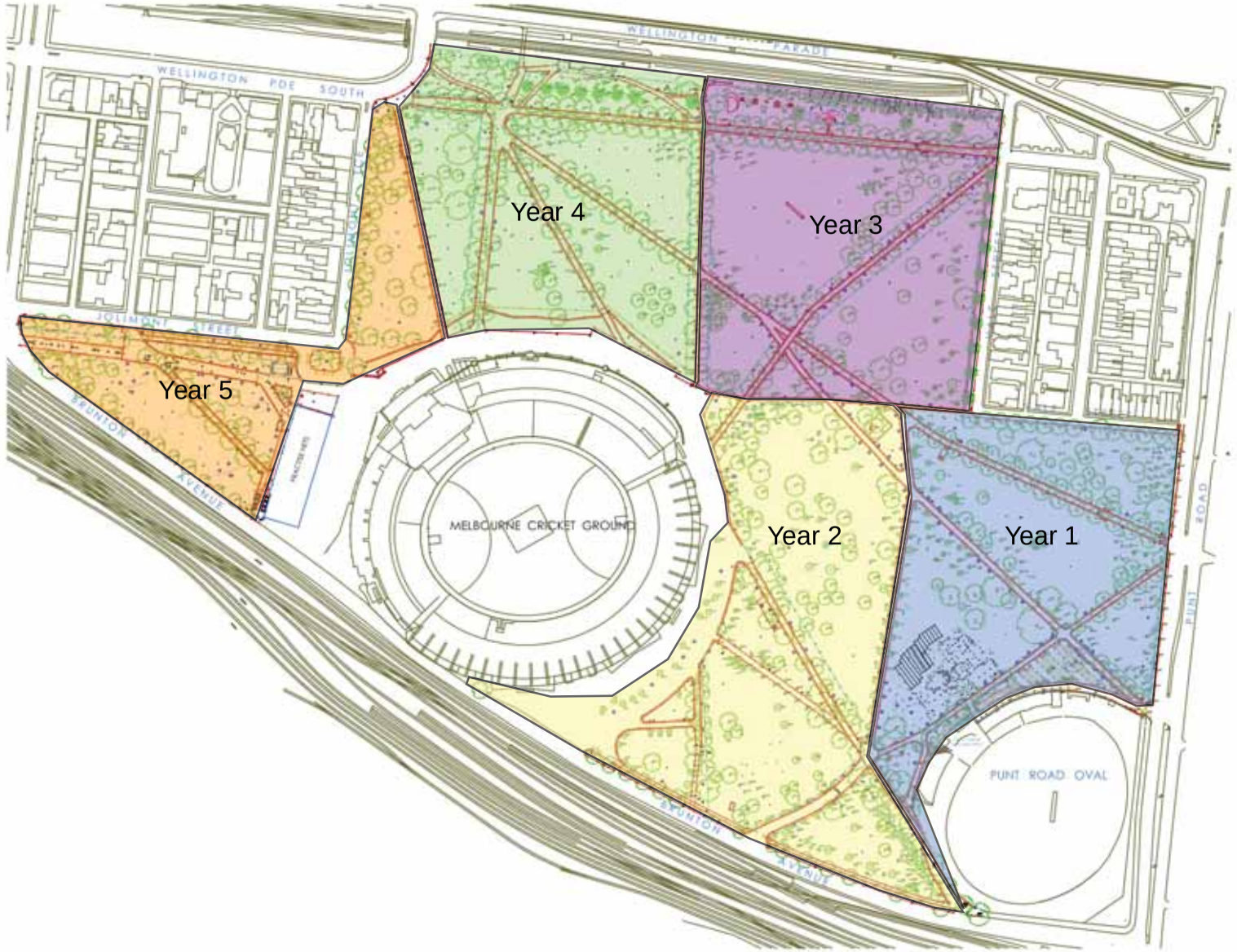


MELBOURNE CRICKET CLUB
YARRA PARK

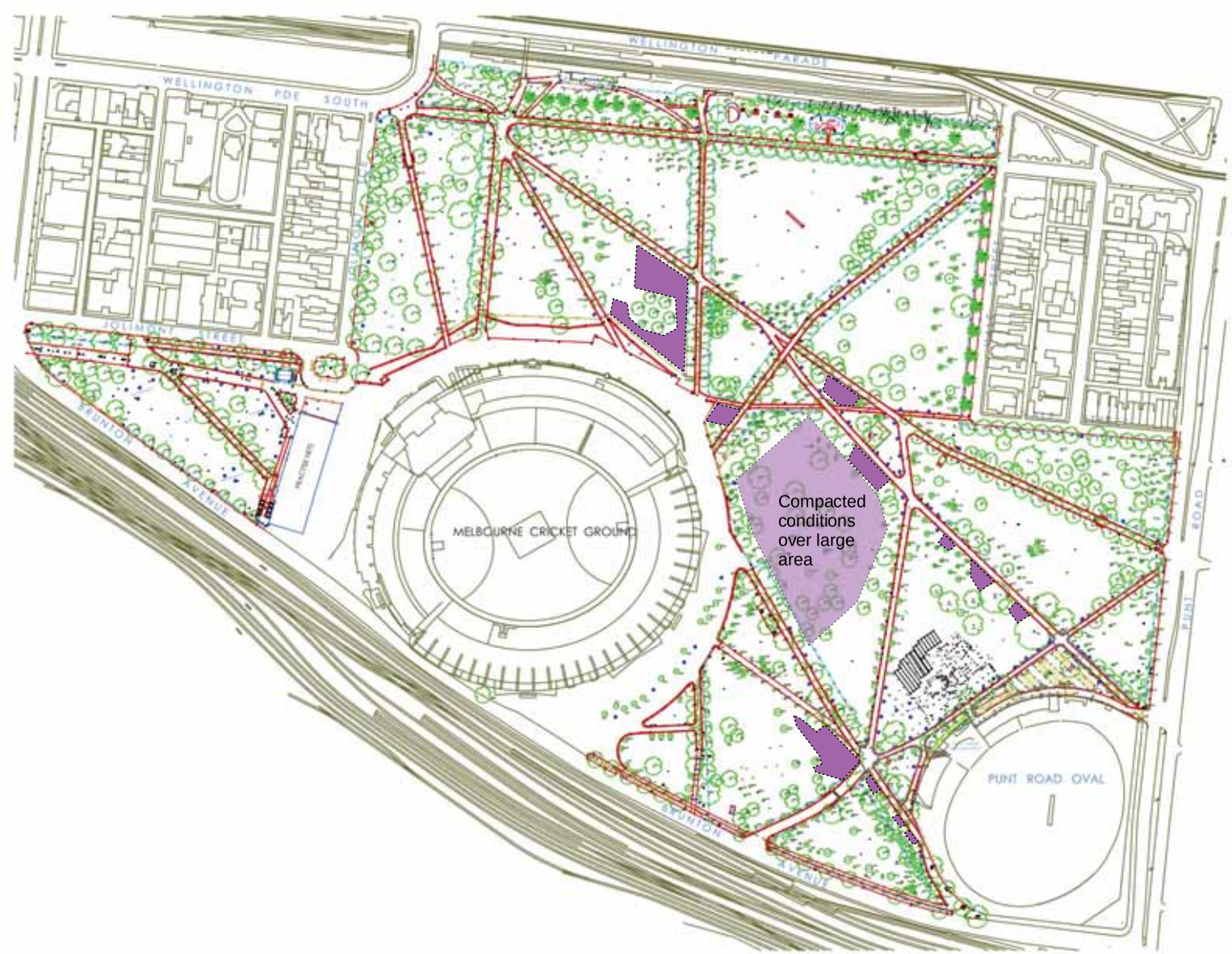
EXISTING CONDITIONS PLAN

SURFCOAST
Survey & Drafting Services P/L
PO BOX 881
TORQUAY VIC 3228
Mobile : 0402 024 011
Facsimile : 5261 9990
Email : paramet@bigpond.com
ABN: 80 101 114 363

Appendix 4. Yarra Park tree maintenance areas



Appendix 5. Compacted areas



Tree Logic Pty. Ltd.
Unit 4, 21 Eugene Terrace,
Ringwood. VIC. 3134.

Arboricultural Consultancy:
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