WELLINGTON STREET TREE MASTER PLAN

FEBRUARY 2023

DUBBO REGIONAL COUNCIL

URBAN FOREST CONSULTING

Acknowledgement of Country

Dubbo Regional Council acknowledge the Wiradjuri People who are the Traditional Custodians of the Land. Council pay respect to all Elders past, present and emerging of the Wiradjuri Nation and extend that respect to other First Nations peoples who are present.

Contents

Purpose

This Street Tree Master Plan identifies a range of prioritised streets in Wellington for street tree planting and recommends species to be planted in each. The Master Plan will guide Council's investment in street trees as and when funding allows for works to be completed. The Master Plan aims to meet a range of outcomes including:

- Improving the look and amenity of the gateway roads in and out of Wellington
- Increasing shade cover over areas in need e.g., in socially vulnerable areas
- Strengthening the overall health, vitality and biological resilience of the main thoroughfare that runs north to south of the township
- Improving the amenity of the main township streets in the commercial area
- Improving the vegetation corridors that run north south and east west from the rivers, through town and out to the surrounding rural land.

Strategic Context

This Master Plan forms a companion document to the Dubbo Street Tree Master Plan 2016. All tree planting in Wellington and Montefiores will follow the species and planting guidance included in the following sections of the Dubbo Street Tree Master Plan:

Book 2 – Street trees for the City of Dubbo
Book 3 – Toolkit booklet

A further review of these documents will be undertaken to ensure they're relevant to all urban areas of the Local Government Area.

Wellington Context

Wellington is framed by an impressive natural environment where the junction of the Macquarie and Bell rivers meet at the foot of Mount Arthur.

Due to its slightly higher elevation than Dubbo and the proximity of Mt Arthur to the west which protects the town from the hot westerly winds in summer, the township has a good base cover of existing vegetation that can be built upon.

The township is characterised by wide streets with distinct avenues of mostly deciduous trees, low density buildings and an array of parkland. Some of the parkland is distinctly exotic in nature, such as Cameron Park, while other areas are dominated with native plantings, such as Apex Park.

Average annual rainfall is around 615mm, compared to Dubbo's which is around 555mm.

The cooler winter and summers along with the slightly higher rainfall mean that Wellington can support a greater variety of trees, especially exotic deciduous trees that form such an important part of the townships existing character.

Wellington has its fair share of social issues, driven by pockets of social disadvantage spread throughout the northwest and southwest of the township. The potential to improve the amenity and shade cover of the town for the benefit of the socially vulnerable is significant.

Research that suggests tree cover is greater in urban areas of affluence, rings true in Wellington.

Areas within the township where social disadvantage is high correspondingly have less tree cover, despite the need for respite from the summer heat being higher.

Recent civic beautification and infrastructure projects such as the Nanima Crescent upgrade and the new Aquatic Centre have greatly improved the amenity and character of the central township.

Benefits of Street Trees

Environmental Benefits

- **Provide shade and cool our townships.** An increase in tree canopy and greening can reduce air and surface temperatures by 3 to 20oC (Gil *et al.*, 2007)
- **Reduce storm water flows, pollution, and nutrient loads.** Tree canopies and root systems reduce storm water flows and nutrient runoff into our waterways. Streets with higher vegetation cover are three to six times more effective in managing storm water than conventional methods (Norton *et al.*,2013)
- **Provide habitat and enhance levels of biodiversity.** Urban and rural roadside trees support a wide range of species, even endangered animals, and other species of high conservation value (Kendal *et al.*,2016)

Economic Benefits

- **Reducing energy costs.** Energy saving benefits come through shading and sheltering buildings from the sun in summer and allowing sunlight in winter (Simpson, 1996)
- **Increasing property values.** Trees in streets enhance neighbourhood aesthetics and increase property values. Properties in tree-lined streets are valued approximately 30% higher than those in streets without trees (Plant, 2017)
- **Increased retail activity.** Shoppers spend longer and more money in retail areas where the area is landscaped, and trees provide shade and amenity (Wolf, 2005)
- **Return on investment.** Cities across the world have demonstrated that trees create a positive return on investment. In the City of New York, it has been calculated that for every dollar spent on a tree, $5.60 worth of benefits were returned. (US Forest Service, 2020)

Social Benefits

- **Encouraging outdoor activity.** Well-vegetated parks, gardens and streets encourage the use of open spaces, with health benefits such as reduced obesity and increased physical activity levels and promotes more sustainable forms of transportation (van Dillen, 2012)
- **Reducing sun exposure.** The prevalence of skin cancer and other illnesses due to sun exposure have shown that protection from sunlight's UV rays is vital. Tree shade can reduce overall exposure to UV radiation by up to 75 per cent. (Mullaney *et al.*, 2015)
- **Improving mental wellbeing.** Access to, and views of, green spaces and trees have positive effects on people's wellbeing (Karden, 2016)

Cultural Benefits

- **Creation of local identity.** A township's landscape helps define its character. Trees and vegetation can physically define a place. Trees provide landscape amenity and integrate nature into the urban environment.
- **Marketing plans.** Green spaces play a role in defining the culture and image of a town. A town is more competitive with an expanded influence when the built and natural urban environment is attractive and welcoming.
- **Reinforcing First Nations status.** Culturally significant trees are a vital and tangible link to the continuous connection to place for First Nations people. Culturally significant trees are clear evidence of Indigenous community's existence on this land for thousands of years, prior to colonial settlement.
  Culturally significant trees are important sentinels to interpret and connect to the landscape and a cultural marker to pass valuable cultural knowledge to subsequent generations.

Key Considerations

Community

Energy saving benefits come through shading and sheltering buildings from the sun in summer and allowing sunlight in winter (Simpson, 1996)

Wellington is home to a community where around half the community are either 0-14 years old or are over 65 years old. There are low levels of immigrants, with the majority of residents being born in Australia and coming from Australian heritage. The unemployment rate is higher than the NSW average and the majority of people work in Community and Personal Services industry. The biggest employers are aged care and correctional services as well as food services (takeaway and supermarkets). Median household income is approximately half the NSW average. Wellington is also home to a large indigenous population.

The areas of social disadvantage are concentrated in the south and northwest of the township and correspondingly have low tree cover.

It is projected that Wellington's population will grow from 8,976 people to almost 9,976 by 2040 and that the population will continue ageing, meaning that aged care services will continue to be important for the township (Community Strategic Plan 2040).

It is also predicted that Wellington has the potential to become a more popular tourist destination due to its natural environment offerings including the Wellington Caves, Lake Burrendong and Mt Arthur.

It is therefore important that any street tree planting ensures that shade is targeted in areas of social disadvantage, around aged care facilities and ageing populations but also along main thoroughfares and within the centre of town to improve overall amenity.

Species Selection

Selecting species for planting in Wellington will take into account both their required form and function to ensure the right tree is planted in the right location. Council will discontinue planting ash tree species and will actively seek to renew and replace these trees with more appropriate species for each location. Shade and aesthetics will also be key functions required from upcoming street trees and species will be chosen accordingly.

This Master Plan will also identify which species will be replanted in each of the priority locations. Species selection will consider the following:

- The continuation of existing avenues where appropriate or the creation of new ones
- Species are selected for their ability to thrive under climate predicted scenarios
- Maintaining the exotic, deciduous theme of the township where appropriate
- Enhancing pockets of biodiverse areas with the selection of native and endemic species

Climate Change

AdaptNSW, research funded by the NSW government, provides an overview of predicted climatic changes to 2050 and to 2070 in the Central West and Orana Region of NSW (Image 1).

The results show that heatwaves, bushfires, and average temperatures will all increase in the near and far future. The number of cold nights and average rainfall in Spring and Summer will decrease. These will all impact the ability of urban trees to thrive and survive and may even exclude some species from being viable in the region.

However, street trees are critically important for helping our urban areas adapt to climate change.

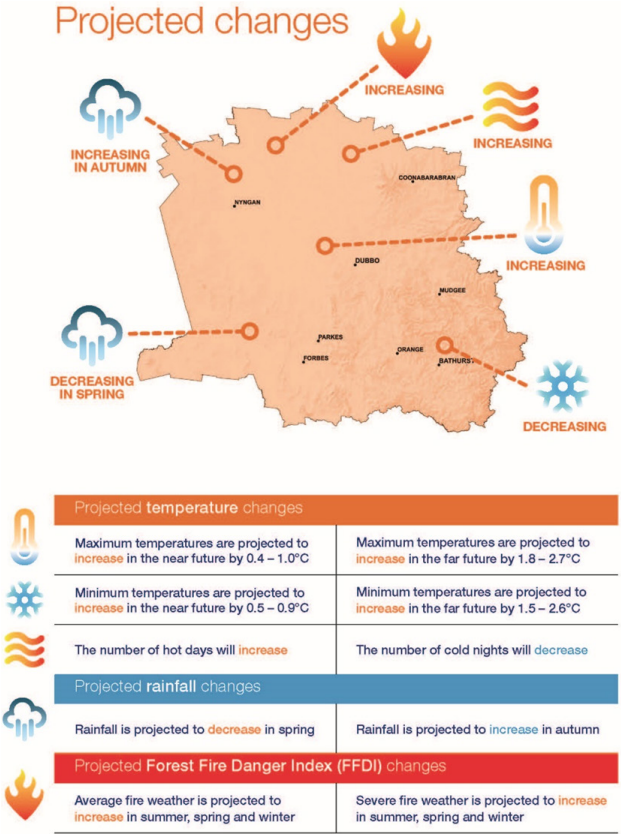


Image 1: Projected changes to temperature, rainfall, and Forest Fire Danger Index (FFDI). Image source NSW Government 2015.

Trees in Wellington

Tree Canopy Cover

Wellington and Montefiores are covered by 12% and 17% tree canopy cover respectively.

Wellington has 36% impervious surface cover such as concrete, asphalt, paving and buildings. 41% grass cover, 1% shrub cover and 12% tree cover mean that Wellington has over 50% green cover (Image 2).

Montefiores on the other hand, which is less developed has a much higher green cover at 76% with tree canopy cover at 17% and grass cover at 57%. It also has less hard surface cover (Image 3).

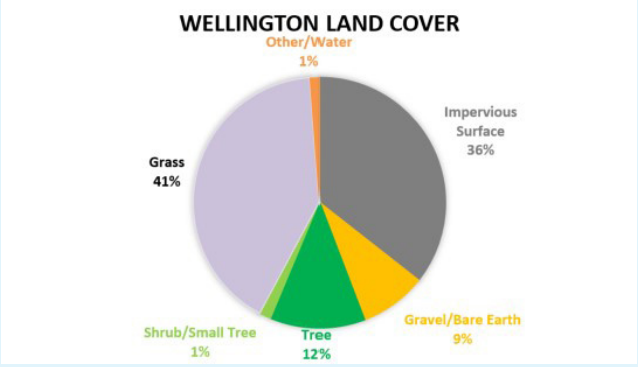


Image 2: Land cover by type for the township of Wellington.

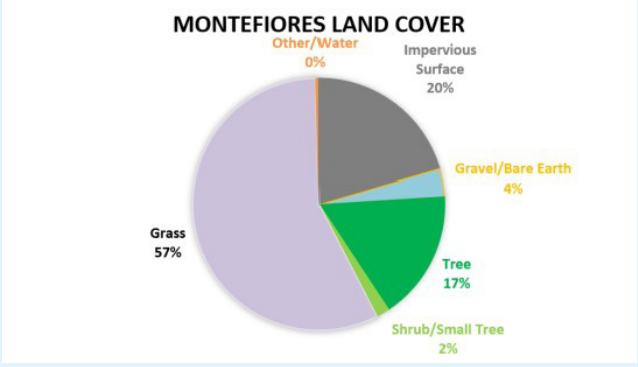


Image 3: Land cover by type for the township of Montefiores.

Vacant Sites

A desktop study using aerial imagery has shown that there are potentially almost 1,100 vacant street tree sites across Wellington. These have been validated by an on-ground survey of each site, however there may be instances when underground services of future land use change may result in some of these vacant sites becoming obsolete.

This shows significant potential to increase the street tree population in Wellington, especially in the lower socio-economic areas of the north-east and south-east areas.

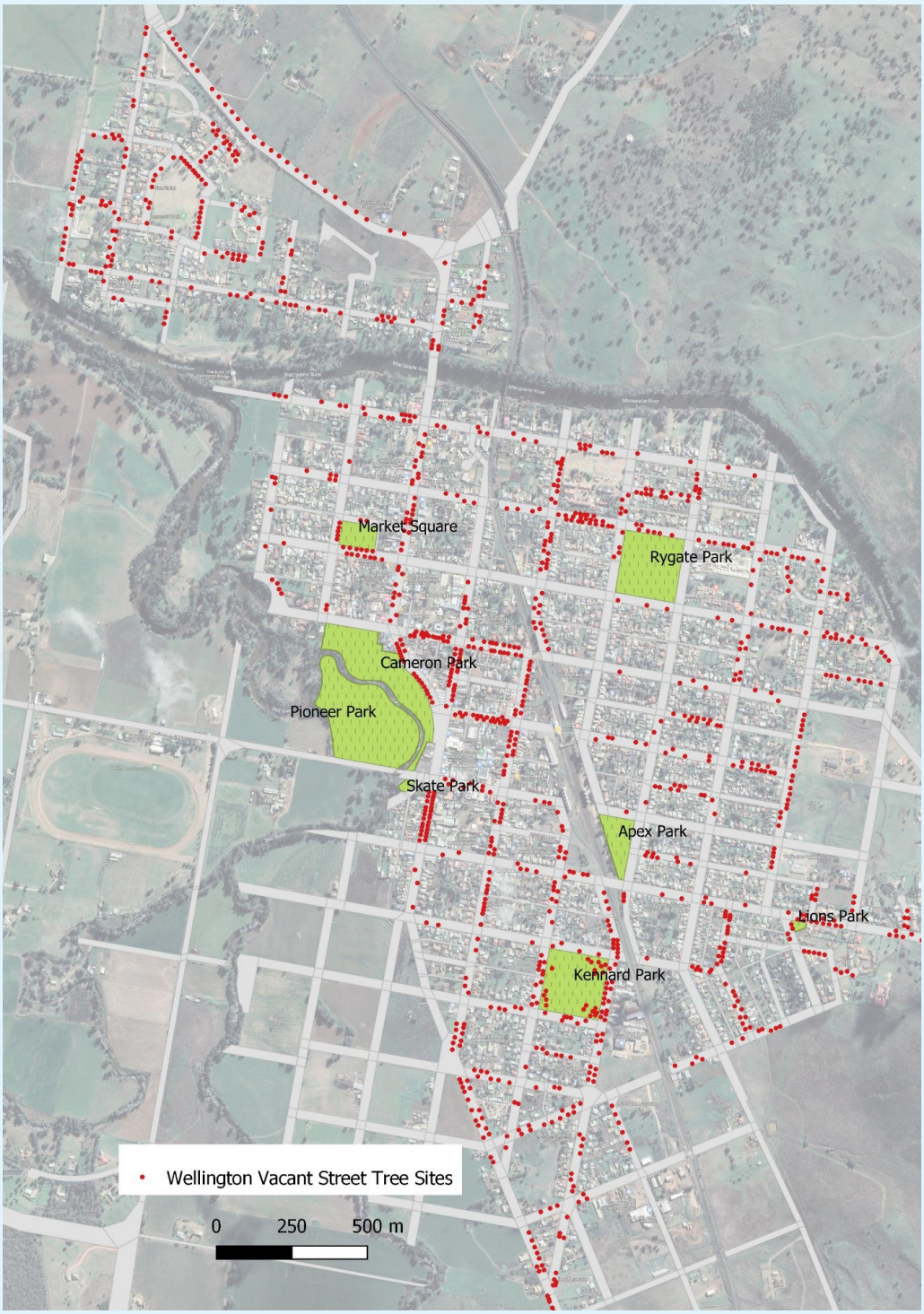


Image 4: Distribution of vacant street tree sites across Wellington

Street Trees

Top 20 Tree Species

18.6% of all street trees in Wellington are Claret Ash, Fraxinus raywood. This is a very high representation of one species within the population and far exceeds the industry guidelines of no one species representing more than 5-10% of a population. Further to this, other Fraxinus species also dominate the street tree population. Cumulatively, the genus Fraxinus, or all Ash trees, represent 28% or greater than one quarter of Wellington's entire street tree population. Table 1 displays this data.

This indicates a significant lack of diversity within the tree population, refer to Table 1.

The top ten species alone make up 54% or more than half of the population, further indicating that only a few species dominate the urban landscape through stochastic events such as disease, insect infestation, or storms.

This lack of species diversity in Wellington increases the tree assets vulnerability and potential risk of landscape failure.

Image 5 shows the distribution of these Fraxinus species. It also shows how whole streets have been planted with one species, such as Claret Ash and are therefore vulnerable to landscape failure.

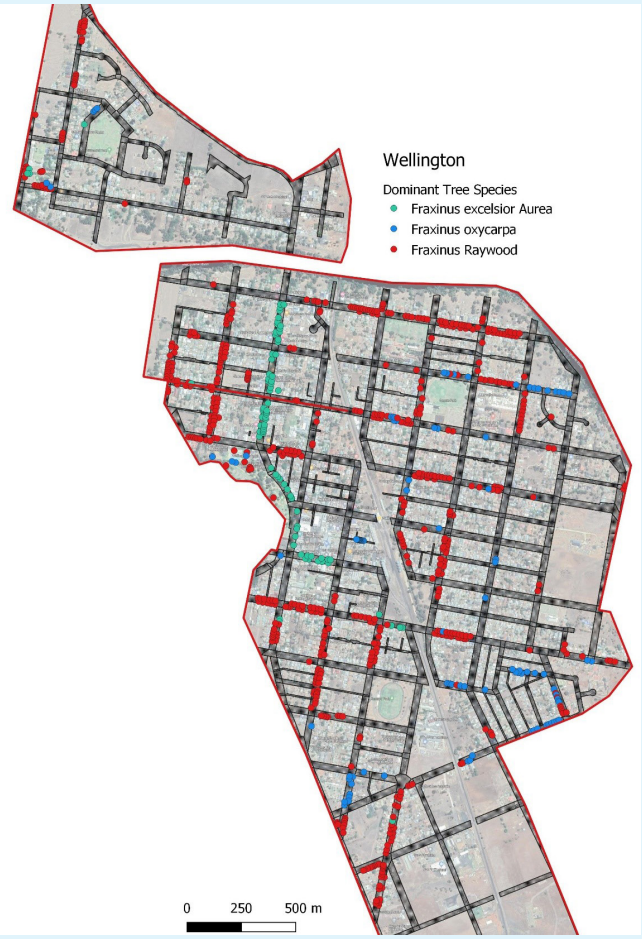


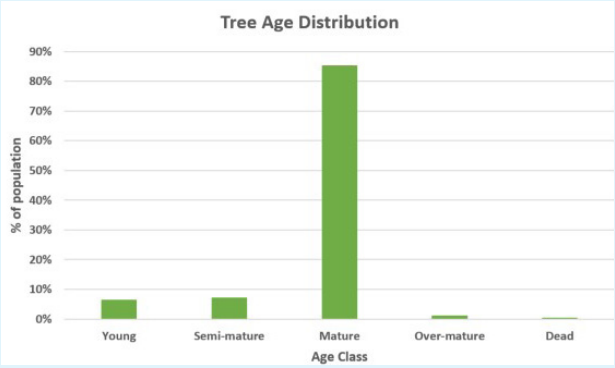
Image 5: Distribution of commonly planted Fraxinus (ash) trees

Table 1: The most commonly occuring species in Wellington's streets.

Scientific Name	Common Name	Number	% of Population
Fraxinus raywood	Claret Ash	575	18.6%
Callistemon viminalis cv	Weeping bottlebrush	258	7.4%
Brachychiton populneus	Kurrajong	156	5.1%
Grevillea robusta	Silky Oak	124	4.0%
Fraxinus oxycarpa	Narrow leaved Ash	120	3.9%
Pyrus calleryana cv	Ornamental Pear	119	3.8%
Celtis australis	Nettle Tree	111	3.6%
Fraxinus excelsior Aurea	Golden Ash	82	2.7%
Triadica sebifera	Chinese Tallow	76	2.5%
Eucalyptus camaldulensis	Redgum	75	2.4%
Callistemon salignus	Willow bottlebrush	73	2.4%
Acer buergerianum	Trident Maple	55	1.8%
Pistacia chinensis	Chinese Pistachio	55	1.8%
Platanus X acerifolia	London Plane Tree	53	1.7%
Melia azedarach	White Cedar	51	1.7%
Eucalyptus melliodora	Yellow Box	48	1.6%
Lagerstroemia indica	Crepe Myrtle	42	1.4%
Jacaranda mimosifolia	Jacaranda	39	1.3%
Corymbia torelliana	Cadaghi	38	1.2%
Melaleuca styphelioides	Prickly Paperbark	38	1.2%

Tree Age

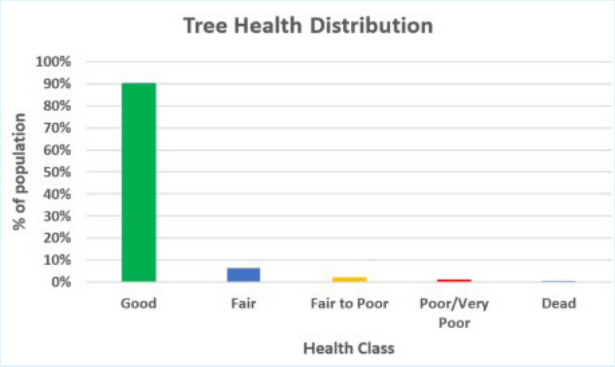
Almost 85% of Wellington's trees are mature aged. This indicates a lack of age diversity within the tree population and reflects only the small of number of trees planted over the last decade. An active street tree planting program to fill in vacant sites will improve the overall age diversity.



Graph 1: Distribution of age classes amongst Wellington's Street trees

Tree Health

Over 96% of street and park trees are in good to fair health which indicates a tree population in relatively good health. The 20 dead and 32 very poor and poor specimens will be targeted for tree removal and/or replacement.

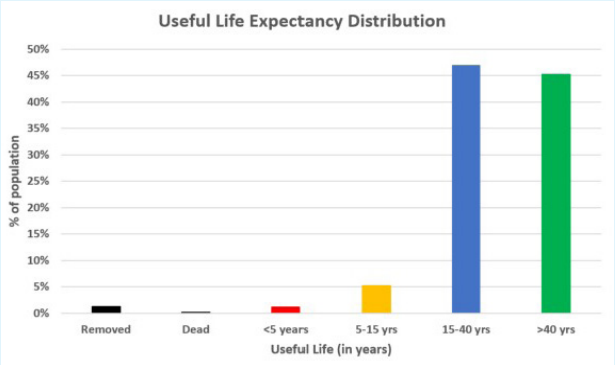


Graph 2: Distribution of tree health amongst Wellington's Street trees

Useful Life Expectancy

Wellington's trees have a good spread of useful life expectancies. 7.8% of trees are likely to reach end of life within a 15-year period. As these trees reach end of life and need to be removed, they will actively be replaced with a species appropriate for the location.

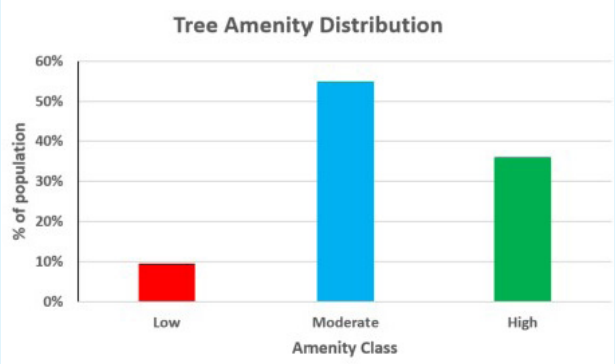
The most common species reaching end of life within 15 years is the Claret Ash, Fraxinus raywood. Site inspections of streets in Wellington show that many of the Claret Ash in some streets are not performing well and are likely to reach end of life within the next decade. This will mean some specimens will need to be removed and replaced with other species.



Graph 3: Distribution of useful life expectancy amongst Wellington's Street trees

Amenity

90.7% of Wellington's trees are of moderate or high amenity. Ideally, more trees would be in the high category which can be improved by investment in cyclic maintenance and pruning program for all street trees.



Graph 4: Distribution of tree amenity class amongst Wellington's Street trees

Street Tree Prioritisation

A priority-based planting plan has been established for Wellington which identifies the streets that are a priority for street tree planting and investment.

The criteria for determining streets as a planting priority include:

Table 2: The most commonly occuring species in Wellington's streets.

Criteria	Qualification for inclusion as priority
Road Hierarchy	Street is a major Arterial
	Street is a connector Road
ULE	Street contains 5 or more trees with ULE less than 15 years
	Street contains 1-5 trees with ULE less than 15 years
Vacant Sites	Street contains more than 10 vacant sites
	Street contains 5-10 vacant sites
Retail/Shopping strip	Street contains shopping strip
School, Community facility	Street contains school or community facility
Park/open pace	Street contains park or open space
Gateway Road	Street is a gateway entry into town
Socio Economic disadvantage	Street contains social housing
EM Priority	Street has been identified by Elected Members as a priority
Equity of priority	Scores were then redistributed to ensure equity of tree planting delivery across the township

Tree Canopy Targets

Council will aim to increase tree canopy cover over both Wellington and Montefiores from 12% and 17% respectively to 30% by 2050. We will achieve this through maintaining our existing tree population and filling the vacant sites through delivery of our Street Tree Master Plan.

Wellington Street Tree Master Plan

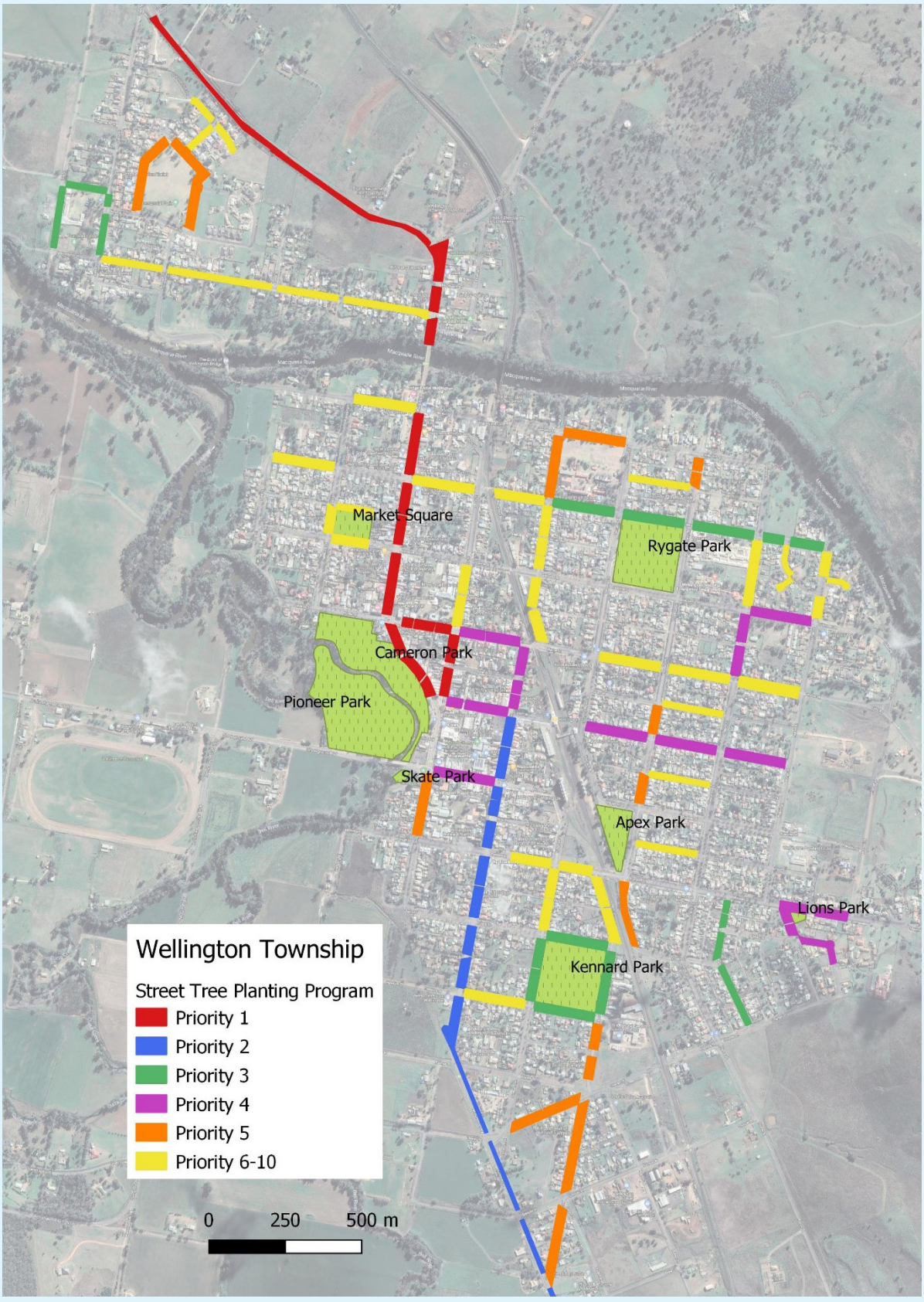


Image 6: Priority streets for street tree planting in Wellington

Road Name	Vacant Sites	Dominant Species
PRIORITY 1		
WARNE ST	18	Fraxinus raywood
PERCY ST	18	Pyrus calleryana
LEE ST	34	Fraxinus excelsior
NANIMA CR	19	Fraxinus excel
MITCHELL HWY (NTH)	38	Mixed
Total Plantings: 127		
PRIORITY 2		
ARTHUR ST	46	Fraxinus raywood
CURTIS ST	33	Mixed
Total Plantings: 79		
PRIORITY 3		
PARKES ST	28	Callistemon/Brachychiton
WHITELEY ST	46	Fraxinus raywood
GIPPS ST	11	Callistemon
LAY ST	9	Fraxinus raywood
TAYLOR ST	6	Callistemon vim
SIMPSON ST	12	Fraxinus excelsior
ZOUCH ST	4	Acer beur
HAWKINS ST	6	Grevillea robusta
THORNTON ST	15	Mixed
Total Plantings: 137		
PRIORITY 4		
PIERCE ST	8	Mixed
SWIFT ST	42	Acer, Grevillea, Callistemon
WARNE ST	19	Phoenix canariensis
MAUGHAN ST	8	Fraxinus excel
ARTHUR ST	12	Fraxinus, Pyrus
GISBORNE ST	6	Fraxinus raywood
WILLIAM ST	4	Brachychiton
MAXWELL ST	11	Mixed
BANGALLA CR	6	N/A
Total Plantings: 116		
Total Priority 1 to 4 Plantings: 459		

Road Name	Vacant Sites	Dominant Species
PRIORITY 5		
CHARLES ST	22	Pittosporum
EUCALYPTUS DR	27	Eucalyptus scoparia
THORNTON ST	38	Mixed
MITCHELL HWY	28	N/A
ARTHUR ST	12	Red Ironbark
GOBOLION ST	8	Grevillea rob, Fraxinus
RAILWAY AVE	3	Callistemon
Total Plantings: 138		
PRIORITY 6-10		
ARTHUR ST	19	Mixed
CASUARINA CL	4	Mixed
CLIVE ST	8	Hibiscus
CROSS ST	12	Pistachio
GISBORNE ST	11	N/A
GOBOLION ST	11	N/A
HAWKINS ST	5	Grevillea robusta
JEAN ST	11	Bottlebrush
MARSH ST	4	Triadica
MAXWELL ST	9	Fraxinus raywood
MELALEUCA DR	12	N/A
MONTEFIORES ST	24	Callistemon
PARINGA PL	4	N/A
PERCY ST	9	Mixed
PIERCE ST	4	Fraxinus raywood
QUIRK ST	7	Corymbia maculata
RAYMOND ST	5	Fraxinus raywood
REID ST	12	Mixed
SHORT ST	9	Mixed
SIMPSON ST	6	Fraxinus raywood
SOLDIERS LANE	2	Triadica
WALKER CR	1	Prunus cerasifera
WARNE ST	7	Fraxinus raywood
WHITELEY ST	13	Platanus x acerifolia
Total Plantings: 209		
Total Priority 5 to 10 Plantings: 347		

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Appendix 1 | Wellington - Trees by Street (Nov 2022)

Precinct	Street	Species 1	Species 2	Series 3	Replacement Series 1	Replacement Series 2	Replacement Series 3
CBD	Bank Street	Fraxinus griffithii (9)	Callistemon viminalis (5)	Lagerstroemia indica (1)	Fraxinus griffithii	Callistemon "Harkness"	Lagerstroemia indica x L. fauriei "Biloxi"
CBD	Maughan Street	Fraxinus excelsior Aurea			Acer freemanii "armstrong"		
CBD	Swift Street	Fraxinus oxycarpa (12)	Acer saccharum (7)	Brachychiton populneus (3)	Acer freemanii "armstrong"		
CBD	Soldiers Lane				Tricadia sebifera		
CBD	Swift Street	Fraxinus oxycarpa (11)	Acer saccharum (7)	Brachychiton populneus (3)	Melaleuca linarifolia	Callistemon "Harkness"	
CBD / North Wellington	Warne Street	Fraxinus Raywood (21)	Pyrus callenyana cv (14)	Phoenix canariensis (6)	Acer freemanii "armstrong"	Phoenix canariensis	
Highway	Lee Street	Fraxinus excelsior Aurea (19)			Acer freemanii "armstrong"		
Highway	Nanima Crescent	Fraxinus excelsior Aurea	Acer freemanii "armstrong"		Acer freemanii "armstrong"		
Montefiores	Tollemache Street				Tristaniopsis laurina "Luscious"		
Montefiores	Casuarina Close	Eucalyptus sp (1)	Tricadia sebifera (1)		Tristaniopsis laurina "Luscious"	Pyrus calleryana "Chanticleer"	Lagerstroemia indica x L. fauriei "Tuscarora"
Montefiores	Eucalyptus Drive	Pittosporum angustifolium (4)	Gleditsia triacanthos (3)	Prunus callenyana (2)	Pittosporum augustifolia	Eucalyptus scoparia (oval)	
Montefiores	Federal Street				Callistemon "Harkness"	Acacia vestita	
Montefiores	Gipps Street	Triadica sebifera (23)	Fraxinus Raywood (16)	Callistemon viminalis cv (10)	Liqudambar styraciflua (entrance - no power lines)	Tricadia sebifera (east)	Lagerstroemia indica x L. fauriei "Biloxi" (west)
Montefiores	Goolma Road				Corymbia citriodoria	Brachychiton populneum	
Montefiores	Grevillea Place	Pyrus callenyana cv (1)			Pittosporum augustifolia	Acacia salicina	Lagerstroemia indica x L. fauriei "Tuscarora"
Montefiores	Herbert Street	Viburnum tinus (1)			River Red Gum (south)	Acer freemanii "armstrong"	Tristaniopsis laurina "Luscious"
Montefiores	King Street				Pittosporum augustifolia	Acacia salicina	Lagerstroemia indica x L. fauriei "Tuscarora"
Montefiores	Lay Street	Fraxinus Raywood (16)	Fraxinus excelsior Aurea (3)	Gleditsia triacanthos (2)	Fraxinus pennsylica "Urbanite"	Meleleuca quinquinervia	
Montefiores	Macquarie Street	Callistemon viminalis (2)			Callistemon "Harkness"		
Montefiores	Melaluca Drive	Melaleuca stypheliodes (2)	Eucalytus sp (1)		Melaleuca styphelioides		
Montefiores	Montefiores Street	Callistemon viminalis cv (58)	Eucalyptus scoparia (8)	Eucalyptus spp (41)	Callistemon "Harkness"		
Montefiores	Nicolli Street	Pittosporum angustifolium (10)	Ulmus glabra lutescens (2)		Pittosporum augustifolia	Lagerstroemia indica x L. fauriei "Tuscarora"	Tristaniopsis laurina "Luscious"
Montefiores	Queen Street	Acer negundo (5)	Hibiscus sp. (4)	Callistemon viminalis cv (4)	Acacia salicina	Fraxinus griffithii	Eucalyptus leucoxylon "Magnet"
Montefiores	Sutton Street	Eucalyptus camaldulensis (1)	Grevillea robusta (1)	Acacia baileyana (1)	Pittosporum augustifolia	Acacia salicina	
Montefiores	Tristania Street	Tristaniopsis laurina (6)	Fraxinus Raywood (1)		Tristaniopsis laurina "Luscious"	Pyrus calleryana "Chanticleer"	Lagerstroemia indica x L. fauriei "Tuscarora"

Precinct	Street	Species 1	Species 2	Series 3	Replacement Series 1	Replacement Series 2	Replacement Series 3
North Wellington	Gisbourne Lane				Tricadia sebifera		
North Wellington	Ford Street	Fraxinus Raywood (19)	Prunus cerasifera nigra (2)		Acer campestre "Elsijk"	Meleleuca styphelioides	Callistemon "Harkness"
North Wellington	Falls Road	Fraxinus Raywood (2)			Eucalyptus melliodora	Brachychiton populneus x acerifolius "Jerilderie Red"	
North Wellington	Jean Street	Callistemon viminalis (9)	Triadica sebifera (5)	Pistacia chinensis (2)	Callistemon "Harkness"	Pistachia chinensis	
North Wellington	Little Arthur Street	Liquidambar styraciflua (1)	Fraxinus excelsior (1)	Salix matsudana (1)	Callistemon salignus	Agonis flexuosa	
North Wellington	Paringa Place				Callistemon "Harkness"	Lagerstroemia indica x L. fauriei "Biloxi"	
North Wellington	Quirk Street	Corymbia maculata (3)			Eucalyptus tricarpa (west)	Eucalyptus leucoxylon "Magnet"	
North Wellington	Raymond Street	Fraxinus Raywood (19)	Brachychiton populneus (7)	Triadica sebifera (2)	Melaleuca stypheliodes	Fraxinus pennslyvanica "Aerial"	
North Wellington	Reid Street	Callistemon viminalis cv (2)	Fraxinus griffithii (3)	Triadica sebifera (1)	Callistemon "Harkness"	Agonis flexuosa	
North Wellington	Riverview Avenue				Lagerstroemia indica x L. fauriei "Tuscarora"	Tristaniopsis laurina "Luscious"	
North Wellington	Short Street	Celtis australis (14)	Callistemon salignus (3)	Fraxinus griffithii (1)	Thompson to Pierce - Callistemon "Harkness"	Pierce to Marsh - Celtis occidentalis (north)	Pierce to Marsh - Fraxinus pennslyvanica "Aerial"
North Wellington	Gobolion Street	Fraxinus Raywood (63)	Melia azedarach (7)	Brachychiton populneus (4)	Fraxinus pennslyvanica "Aerial"	Brachychiton populneus x acerifolius "Jerilderie Red"	Grevellea robusta (Rygate Park)
North Wellington	Gobolion Street				Pyrus calleryana	Acacia salicina	
North Wellington	Whiteley Street	Platanus x hybrida			Platanus x hybrida		
North Wellington	Marsh Street	Triadica sebifera (23)	Callistemon viminalis (23)	Celtis australis (10)	Tricadia sebifera	Melaleuca linarifolia	Callistemon "Harkness"
North Wellington	McLeod Street	Celtis occidentalis (1)	Celtis occidentalis (1)	Melaleuca linariifolia (1)	Eucalyptus sideroxylon	Corymbia torelliana	
North Wellington	Gisborne Street (west)				Pyrus calleryana (centre)	Liquidambar styraciflua	
North Wellington (east)	Whiteley Street	Platanus X acerifolia (30)	Fraxinus Raywood (23)	Eucalyptus tricarpa (8)	Fraxinus pennslyvanica "Aerial"	Brachychiton populneus x acerifolius "Jerilderie Red"	
North Wellington / CBD / South Wellington	Percy Street	Brachychiton populneus (1)			Fraxinus griffithii	Tristaniopsis laurina "Luscious"	Lagerstroemia indica x L. fauriei "Tuscarora"
North Wellington / South Wellington	Pierce Street	Celtis australis (20)	Fraxinus oxycarpa		Melaleuca stypheliodes	Fraxinus pennslyvanica "Aerial"	
North Wellington / South Wellington	Thornton Street	Fraxinus Raywood (26)	Pyrus callenyana cv (13)	Brachychiton populneus (4)	Tricadia sebifera	Pyrus calleryana	Eucalyptus sideroxylon and Eucalyptus sideroxylon adjacent to Apex Park
North Wellington / South Wellington	Pierce Street	Celtis australis (20)	Acer buergerianum (13)	Fraxinus Raywood (10)	Melia azederach "Elite"		
South Wellington	Maughan Street	Ulmus parvifolia (19)	Celtis australis (16)	Fraxinus excelsior Aurea (11)	Celtis occidentalis (north)	Fraxinus pennslyvanica "Aerial" (south)	
South Wellington	Arthur Street	Fraxinus Raywood (41)	Fraxinus sp. (9)	Callistemon sp. (7)	Fraxinus griffithii		
South Wellington	Arthur Street				Eucalyptus tricarpa (west)	Eucalyptus leucoxylon "Magnet"	

Precinct	Street	Species 1	Species 2	Series 3	Replacement Series 1	Replacement Series 2	Replacement Series 3
South Wellington	Kennard Street	Triadica sebifera (2)	Eucalyptus sideroxylon (1)	Fraxinus Raywood (1)	Eucalyptus tricarpa		
South Wellington	Simpson Street	Fraxinus Raywood (26)	Grevillea robusta (24)	Acer buergerianum (8)	Pistacia chinensis	Melaleuca styphelioides	
South Wellington	University Road	Pyrus callenyana cv (1)			Pyrus calleryana		
South Wellington	Warrawee Place				Fraxinus griffithii	Tristaniopsis laurina "Luscious"	Melaleuca linarifolia
South Wellington	Maxwell Street	Fraxinus Raywood (48)	Melaleuca styphelioides (13)	Brachychiton populneus (6)	Melaleuca stypheliodes	Agonis flexuosa	
South Wellington	Arthur Street				Fraxinus pennslyvanica "Aerial"	Tristaniopsis laurina "Luscious"	
South Wellington	Bangalla Crescent	Acacia baileyana (1)	Melaleuca armillaris (1)		Acacia vestita	Acacia salicina	jacaranda mimosifolia
South Wellington	Barton Street				Callistemon viminalis		
South Wellington	Belle Street	Brachychiton populneus (16)	Eucalyptus melliodora (5)	Grevillea robusta (2)	Pittosporum augustifolia	Brachychiton populneus x acerifolius "Jerilderie Red"	
South Wellington	Charles Street	Fraxinus oxycarpa (9)	Fraxinus Raywood (8)	Pittosporum sp. (5)	Pittosporum augustifolia	Tristaniopsis laurina "Luscious"	
South Wellington	Clive Street	Celtis australis (15)	Acer buergerianum (4)	Callistemon salignus (3)	Celtis occidentalis (north)	Fraxinus pennslyvanica "Aerial" (south)	
South Wellington	Cousin Drive	Fraxinus Raywood (10	Ulmus parvifolia (1)	Callistemon viminalis cv (1)	Backhousia citriodora	Atalaya hemiglauca	Callistemon viminalis
South Wellington	Cross Street	Pistacia chinensis (1)	Callistemon Kings Park Special (1)	Eucalyptus nicholii (1)	Melia azederach "Elite"	Callistemon viminalis	Pistacia chinensis
South Wellington	Curtis Street	Populus nigra italica (16)	Eucalyptus melliodora (15)	Fraxinus Raywood (13)	Melia azederach "Elite"	Brachychiton populneus x acerifolius "Jerilderie Red"	
South Wellington	Dibbs Street	Fraxinus oxycarpa (8)	Lagerstroemia indica (1)		Fraxinus pennslyvanica "Aerial" (south)	Lagerstroemia indica x L. fauriei "Tuscarora"	
South Wellington	Elizabeth Street	Fraxinus oxycarpa (2)	Melia azedarach (1)	Eucalyptus mannifera (1)	Angophora melanoxylon	Agonis flexuosa	Melia azederach "Elite"
South Wellington	Glasson Street	Callistemon viminalis cv (2)	Callistemon salignus (1)	Ligustrum sp. (1)	Callistemon viminalis	Melaleuca linarifolia	
South Wellington	Hawkins Street	Grevillea robusta (13)	Fraxinus Raywood (7)	Brachychiton populneus (2)	Grevillea robusta	Lophestomen confertus	
South Wellington	Palmer Street	Fraxinus oxycarpa (4)	Corymbia torelliana (1)	Eucalyptus albens (1)	Grevillea robusta	Jacaranda mimosifolia	Corymbia torelliana
South Wellington	Parkes Street	Callistemon salignus (4)	Brachychiton populneus (2)	Melaleuca styphelioides (2)	Backhousia citriodora	Atalaya hemiglauca	Lagerstroemia indica x L. fauriei "Tuscarora"
South Wellington	Railway Avenue	Callistemon viminalis cv (8)	Callistemon Kings Park Special (2)	Pistacia chinensis (1)	Callistemon viminalis	Pistacia chinensis	Tristaniopsis laurina "Luscious"
South Wellington	Samuel Street	Callistemon citrinus (2)	Callistemon viminalis cv (2)	Melia azedarach (2)	Melaleuca linarifolia	Callistemon "Harkness"	
South Wellington	Simpson Lane	Pistacia chinensis (3)	Nerium oleander (1)	Lagerstroemia indica (1)	no street trees proposed		
South Wellington	Simpson Street	Fraxinus Raywood (26)	Grevillea robusta (24)	Acer buergerianum (8)	Melia azederach "Elite"	Pistacia chinensis	
South Wellington	Warruga Place	Cupressocyparis leylandii (2)			Pittosporum augustifolia	Lagerstroemia indica x L. fauriei "Biloxi"	Kunzea ericifolia
South Wellington	William Street	Fraxinus Raywood (8)	Fraxinus oxycarpa (7)	Fraxinus griffithii (3)	Pittosporum augustifolia	Acacia salicina	Kunzea ericifolia
South Wellington	Zouch Street	Fraxinus sp. (22)	Pistacia chinensis (6)	Fraxinus oxycarpa (5)	Pistacia chinesis	Acer campestre Var "Elsrijk or Evelyn"	

TREE PLANTING PLAN

LOCATION: CAMERON PARK, WELLINGTON

COMPLETED FOR: DUBBO CITY COUNCIL

DATE: 10TH APRIL 2019

ENSPEC®
ENVIRONMENT AND RISK

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SWAN HILL

TASMANIA
LAUNCESTON

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Attachments –

- *ENSPEC - Cameron Park Tree Data 20190410.xlsx*

Reference documents –

- *Heritage Impact Statement Cameron Park, Wellington Masterplan (Urbis 25/9/2018)*
- *D2016 011655 Somewhere Landscape Architects - Cameron Park - Tree Listing - Plan - Analysis Draft - January 2008.pdf*

1. EXECUTIVE SUMMARY

ENSPEC was requested by Dubbo City Council to develop a tree planting plan for Cameron Park, Wellington. The plan is to provide an overview of the existing tree population and provide clear guidance for future planting that will develop coherent themes for tree canopy and the major aesthetic structure of the park for the next 100 years.

Trees are not specifically noted for heritage values, but the historical layout, general aesthetics, vistas and visual links to the river have local heritage value. Future tree planting should take these values into account.

Generally, the existing tree population is in good condition and has a long-life expectancy. As a result, the larger trees will continue to form the basis of the structural themes for many years. 254 trees are currently recorded across Cameron Park, Bell Park and the Wellington swimming pool site. This data does not incorporate vegetation on the bank of the Bell River. These trees are providing the following environmental and structural benefits -

Benefit	Value
Total Current Carbon Storage	129 tonnes
Annual Carbon Sequestered	5.4 tonnes
Annual Oxygen (O_2) Production	14.4 tonnes
Annual Pollution Removal	76kg
Canopy cover	1.5Ha
Amenity Value	$1.76m

The current tree population represents a reasonably broad diversity of tree size and type with a good balance between evergreen and deciduous species that should be maintained. There are existing structural elements within the current tree population that can be enhanced to develop stronger themes and a more coherent structure.

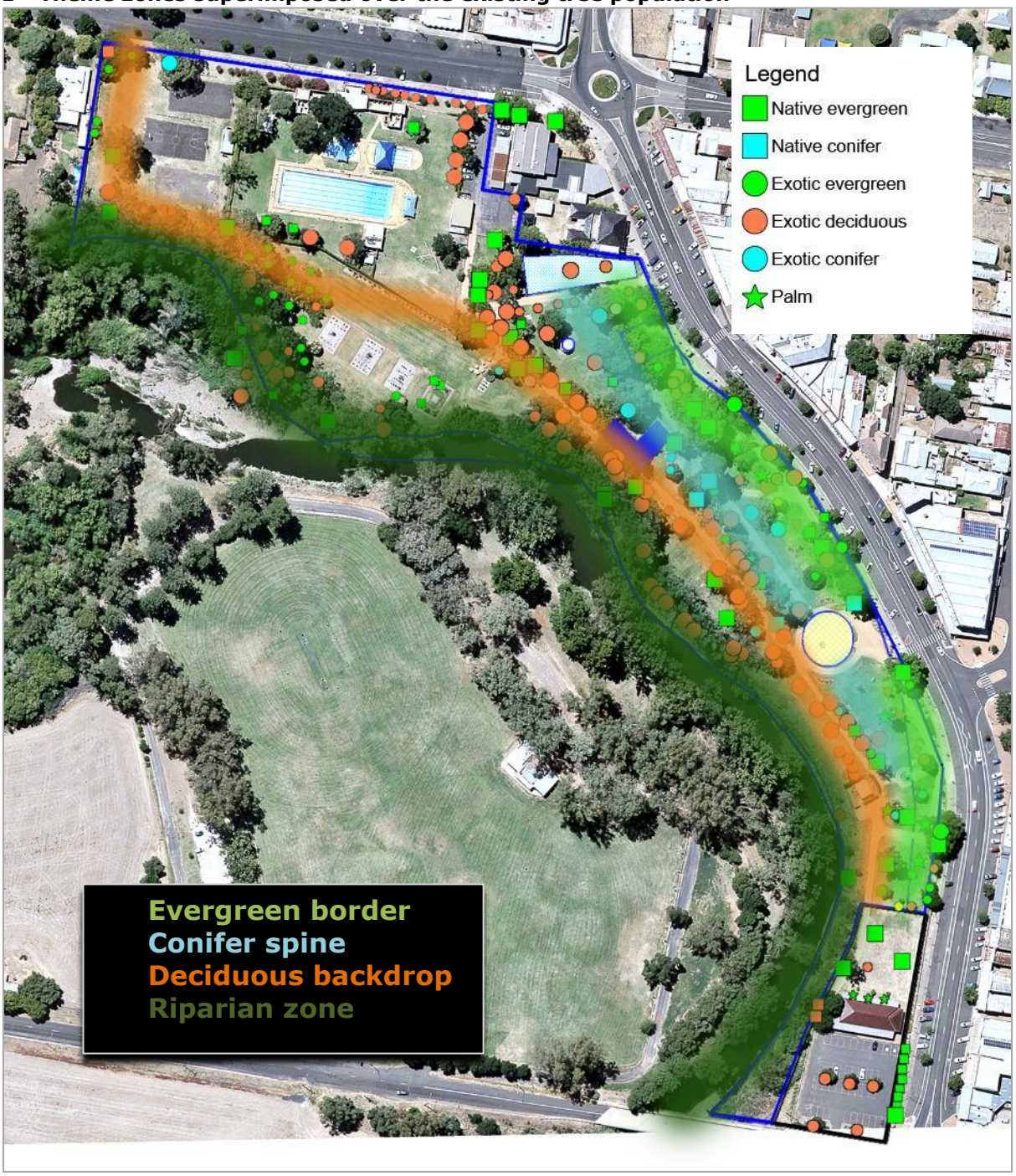
For an open landscape park, the proportion of small species is high, and these small trees interrupt the potential long vistas through the park, particularly along the north-south axis. Small species in the border beds on the east also break up views from the main street into the park and to the river and Pioneer Park beyond. In general, planting of small species of trees and large shrubs should be limited.

As a result of the generally good condition of the existing population, the current larger trees will continue to form the basis of the structural themes for many years. Implementing new planting to enhance and develop the key themes should therefore focus on replacing large trees lost through natural attrition, combined with targeted removal of small trees and shrubs and either leaving more openness in the landscape or strategic replacement with larger species in line with the planting theme.

Four broad themed zones have been identified within the existing planting that can be reinforced to deliver the major landscape goals (Figure 1). These are –

Evergreen border	The eastern lawn and border along the Mitchell Hwy. Well-spaced large evergreen trees providing a patchwork of sunny and shaded areas with clean views into and through the park.
Conifer spine	A strong structural element of large conifers running north-south between the two main paths that provides a visual link from the north to the south.
Deciduous backdrop	A row or avenue of large deciduous trees that provide a backdrop to the park from the main street and link Cameron Park through the back of the swimming pool to Bell Park.
Riparian zone	A restored indigenous ecological community providing improved environment, habitat and aesthetics along the banks of the river.

Figure 1 - Theme zones superimposed over the existing tree population



2. BRIEF

ENSPEC was requested by Dubbo City Council to develop a tree planting plan for Cameron Park, Wellington. The plan is to provide an overview of the existing tree population and provide clear guidance for future planting that will develop coherent themes for tree canopy and major aesthetic structure of the park for the next 100 years.

3. DATE OF INSPECTION

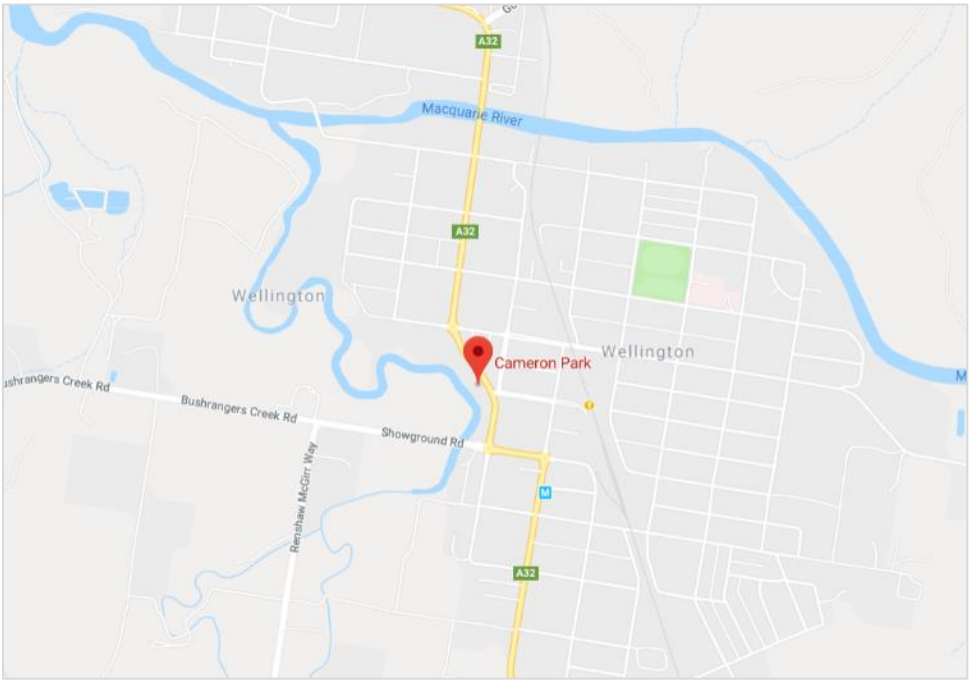
The June 2017 Wellington township tree survey undertaken by ENSPEC was used as a basis for the analysis in this report, with selective verification of the data undertaken on 27th February 2019.

4. REPORT AUTHOR

Name of Arborist	**Craig Hinton**
Qualifications	B. App. Sci. (Hort. [Env. Hort.]) Dip. Arb. Dip. App. Sci. (Hort.) Cert V Ecology (currently studying) Cert IV Assessment and Workplace Training
Contact phone number	+61 428 193 626
E-mail Address	craig.hinton@enspec.com

5. SITE LOCATION

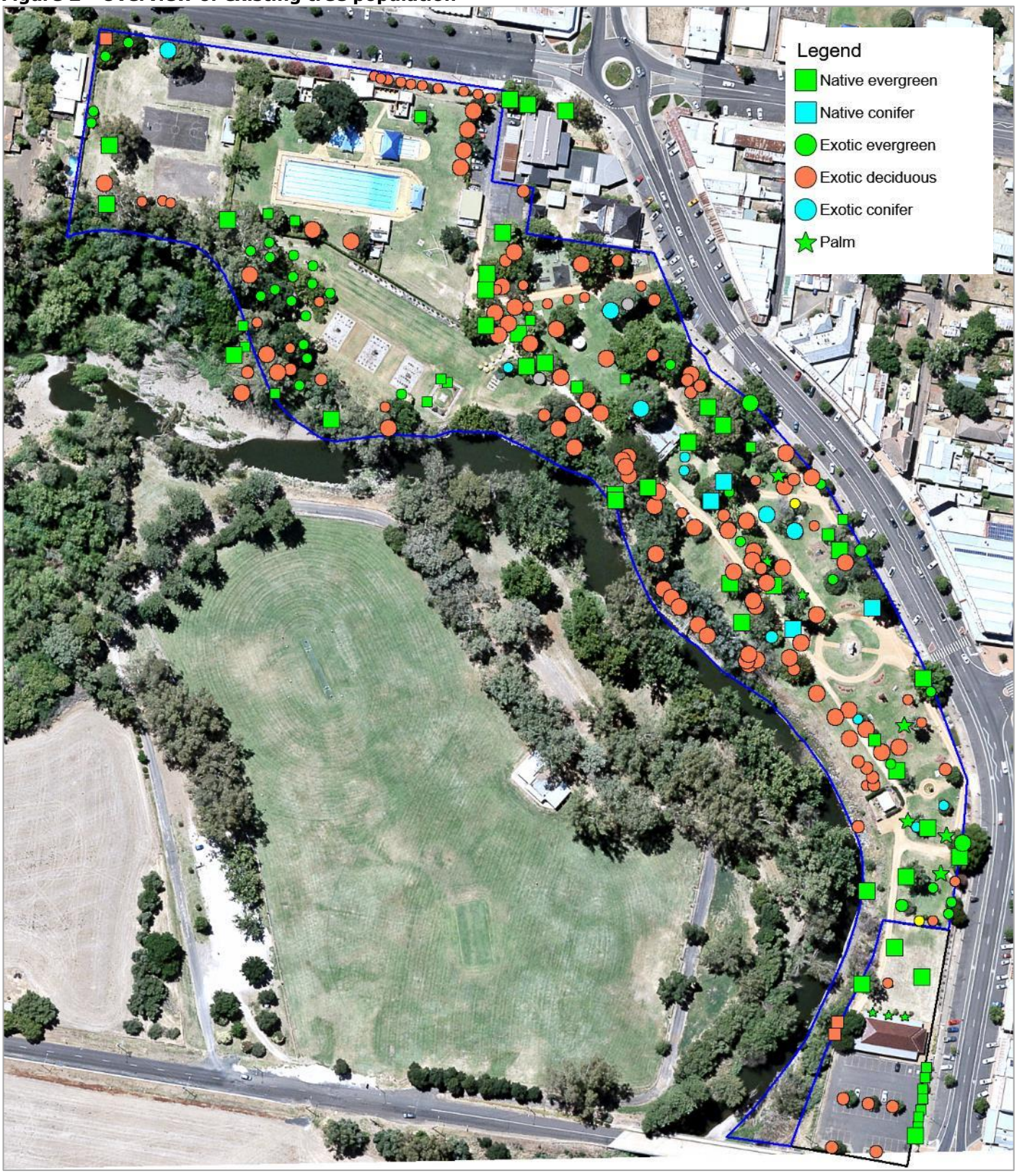
Cameron Park is the main feature park in Wellington, lying on the east side of the Bell River adjacent to the Mitchell Hwy.



6. OVERVIEW MAP

An overview of the existing tree population is presented in Figure 2. The legend provided guidance as to the tree type while the relative size of the symbol provides guidance as to the expected mature size of the species – small, medium or large. Note: this is not necessarily the current size of the individual specimen as there are young trees that have not achieved mature size.

Figure 2 - Overview of existing tree population



7. BACKGROUND

A comprehensive discussion of the site history and context is provided in the *Heritage Impact Statement Cameron Park, Wellington Masterplan* (Urbis 25/9/2018), so this will not be covered here.

The Heritage Impact Statement provides the following Statement of Significance –

> Cameron Park, located at Nanima Crescent, Wellington, has a heritage significance at local level for being a public recreational park laid out in the Federation period. Cameron Park is a representative example of a local passive and active recreational parkland with historic, historic association, aesthetic and social significance. Cameron Park has strong overlays of the Inter-War period, associated with the phase of development that reveals the impact of the World War I and World War II on the township of Wellington. Significant elements within Cameron Park include the Gilbert Doble sculptural bronze Winged Victory memorial monument, memorial gates, fences and formal garden layout, have high aesthetic significance.
>
> The wider park has aesthetic significance for its landmark qualities within the town of Wellington including a strong visual connection between Cameron Park cenotaph, the township of Nanima Crescent and the railway station and views to the picturesque Bell River.
>
> Sporting and community facilities within the parklands, dating to the mid-20th century have moderate heritage significance, however, add to the historic development and layering of the parklands.
>
> Cameron Park has social significance for its longstanding history as a place of commemorative and social events. Victoria Park cenotaph and associated war memorial features, is representative of a suite of Inter-War monuments and sculptures in public parks in the local area.

The trees are not specifically noted as contributing to heritage values, but the historical layout, general aesthetics, vistas and visual links to the river are noted. Future tree planting should take these values into account.

8. EXISTING TREE POPULATION

The June 2017 Wellington township tree survey was used as a basis for analysis, with selective verification of the data undertaken in February 2019. 254 trees are currently recorded across Cameron Park, Bell Park and the Wellington swimming pool site. A significant proportion of trees on the swimming pool site have recently been removed as part of the construction of the new pool. This data does not incorporate vegetation on the bank of the Bell River.

8.a. Species present

A summary of the species currently present is presented in the following table.

Species	Common name	No. of trees	% of total
Acer buergerianum	Trident Maple	1	0.4%
Acer variety	Maple Tree	7	2.8%
Acer negundo	Box Elder	3	1.2%
Acer negundo Variegatum	Variegated Box Elder	1	0.4%
Acer palmatum	Japanese Maple	2	0.8%
Acer sp.	Maple Tree	1	0.4%
Albizia julibrissin	Mimosa	1	0.4%
Araucaria bidwillii	Bunya Bunya Pine	4	1.6%
Arbutus unedo	Irish Strawberry Tree	4	1.6%
Betula pendula	Silver Birch	1	0.4%
Brachychiton acerifolius	Illawarra Flame Tree	1	0.4%
Brachychiton discolor	Lacebark	1	0.4%
Brachychiton populneus	Kurrajong	9	3.5%
Brachychiton rupestris	Bottle Tree	1	0.4%

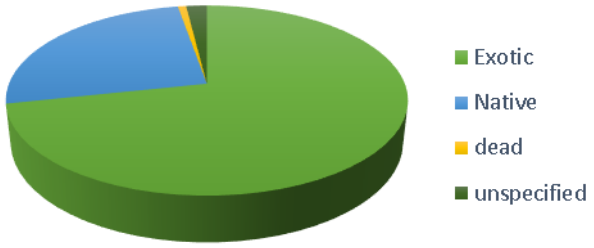
Species	Common name	No. of trees	% of total
Callistemon citrinus variety	Crimson Bottlebrush	5	2.0%
Callistemon viminalis	Weeping Bottlebrush	1	0.4%
Callistemon viminalis variety	Weeping Bottlebrush variety	7	2.8%
Casuarina cunninghamiana	River She-oak	2	0.8%
Cedrus deodara	Deodar Cedar	3	1.2%
Celtis australis	Nettle Tree	1	0.4%
Cercis siliquastrum	Judas Tree	1	0.4%
Chamaerops humilis	Mediterranean Fan Palm	3	1.2%
Cinnamomum camphora	Camphor Laurel	2	0.8%
Corymbia citriodora	Lemon Scented Gum	1	0.4%
Corymbia maculata	Spotted Gum	2	0.8%
Corymbia torelliana	Cadagi	2	0.8%
Cotoneaster sp.	Cotoneaster species	1	0.4%
Eucalyptus camaldulensis	River Red Gum	5	2.0%
Eucalyptus mannifera	Brittle Gum	1	0.4%
Eucalyptus melliodora	Yellow Box	1	0.4%
Fraxinus ornus	Manna Ash	1	0.4%
Fraxinus oxycarpa	Desert Ash	4	1.6%
Fraxinus Raywood	Claret Ash	6	2.4%
Ginkgo biloba	Maidenhair Tree	2	0.8%
Gleditsia triacanthos	Honey Locust	10	3.9%
Grevillea robusta	Silky Oak	8	3.1%
Hymenosporum flavum	Native Frangipani	1	0.4%
Jacaranda mimosifolia	Jacaranda	2	0.8%
Juniperus sp.	Juniperus species	5	2.0%
Lagerstroemia indica	Crepe Myrtle	14	5.5%
Ligustrum sp.	privet	5	2.0%
Liquidambar styraciflua	Liquidambar or Sweetgum	5	2.0%
Liriodendron tulipifera	Tulip Tree	24	9.4%
Lophostemon confertus	Brush Box	1	0.4%
Magnolia grandiflora	Southern Magnolia	13	5.1%
Magnolia sp.	Magnolia	3	1.2%
Melaleuca bracteata	River Teatree	6	2.4%
Melaleuca linariifolia	Snow-in-Summer	1	0.4%
Melaleuca styphelioides	Prickly-leaved Paperbark	2	0.8%
Melia azedarach	White Cedar	3	1.2%
Metasequoia glyptostroboides	Dawn Redwood	1	0.4%
Nerium oleander	Oleander	2	0.8%
Olea europaea	Common Olive	1	0.4%
Parrotia persica	Persian Ironwood	1	0.4%
Phoenix canariensis	Canary Island Date Palm	3	1.2%
Photinia robusta	Red-Leaf Photinia	1	0.4%
Pinus brutia	Turkish Pine	1	0.4%
Pinus pinea	Stone Pine	1	0.4%
Pistacia chinensis	Chinese Pistachio	7	2.8%
Platanus X *acerifolia*	London Plane	3	1.2%
Populus canescens	Grey Poplar	1	0.4%
Populus deltoides	Eastern Cottonwood	2	0.8%

Species	Common name	No. of trees	% of total
Populus X *canadensis*	Canadian Poplar	4	1.6%
Prunus sp.	Cherry species	1	0.4%
Prunus X *blireana*	Double-rose Cherry Plum	2	0.8%
Pyrus calleryana variety	Callery Pear variety	6	2.4%
Pyrus sp.	pear variety	1	0.4%
Quercus palustris	Pin Oak	1	0.4%
Salix matsudana	Chinese Willow	1	0.4%
Thuja plicata	Western Redcedar	1	0.4%
Tilia cordata	Small-leaved Linden	1	0.4%
Trachycarpus fortunei	Windmill Palm	2	0.8%
Triadica sebifera	Tallowtree	3	1.2%
Ulmus parvifolia	Chinese Elm	1	0.4%
Ulmus procera	English Elm	4	1.6%
Ulmus x hollandica	Dutch Elm	2	0.8%
Washingtonia robusta	Mexican or Washington Palm	2	0.8%
dead tree	dead tree	2	0.8%
shrub or creeper	shrub or creeper	1	0.4%
unidentified	unidentified	4	1.6%
Grand Total		**254**	**100.0%**

8.b. Summary of species origin, size and type

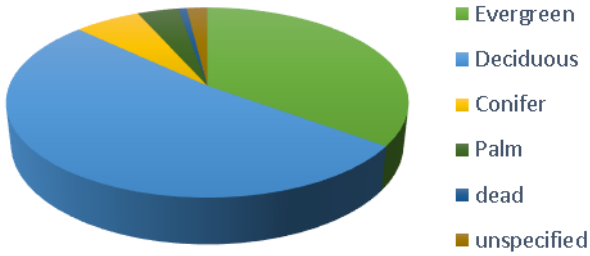
A summary of the origins of the current trees is provided in the following table.

Origin	No. of trees	% of total
Exotic	182	71.7%
Native	65	25.6%
dead	2	0.8%
unspecified	5	2.0%
Grand Total	**254**	**100.0%**



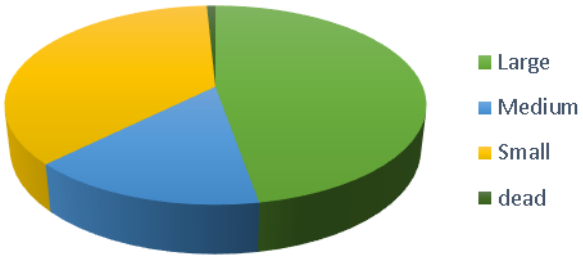
A summary of the tree type of the current trees is provided in the following table.

Type	No. of trees	% of total
Evergreen	89	35.0%
Deciduous	132	52.0%
Conifer	16	6.3%
Palm	10	3.9%
dead	2	0.8%
unspecified	5	2.0%
Grand Total	**254**	**100.0%**



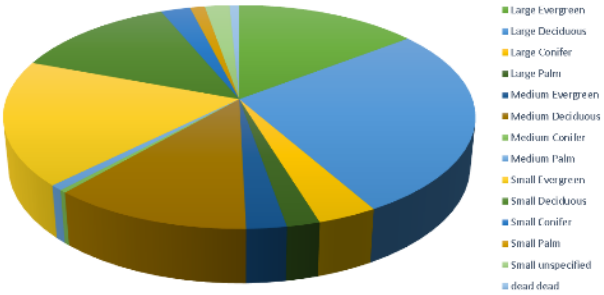
A summary of the expected mature tree size of the current trees is provided in the following table. This does not reflect the current size of existing new and young trees that are of a species that will ultimately grow to a larger size.

Size	No. of trees	% of total
Large	120	47.2%
Medium	39	15.4%
Small	93	36.6%
dead	2	0.8%
Grand Total	**254**	**100.0%**



A combined summary of tree size and type of the current trees is provided in the following table.

Size	Type	No. of trees	% of total
Large	Evergreen	37	14.6%
	Deciduous	69	27.2%
	Conifer	9	3.5%
	Palm	5	2.0%
Medium	Evergreen	6	2.4%
	Deciduous	30	11.8%
	Conifer	1	0.4%
	Palm	2	0.8%
Small	Evergreen	46	18.1%
	Deciduous	33	13.0%
	Conifer	6	2.4%
	Palm	3	1.2%
	unspecified	5	2.0%
dead	dead	2	0.8%
Grand Total		**254**	**100.0%**



9. OBSERVATIONS OF TREE CONDITION

9.a. Summary tree population information

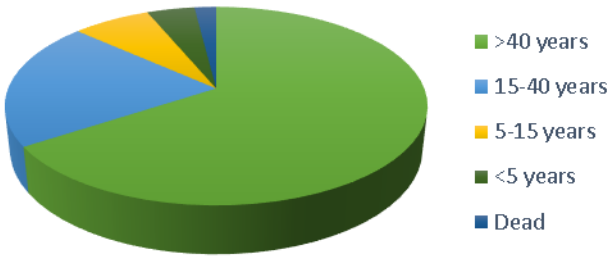
A summary of the general tree data for the surveyed population is provided in the following section.

9.a.1 Life expectancy

An estimate of the life expectancy for each tree was made based on the tree's current health, condition and growing environment. Any significant change in these factors in the future will affect the life expectancy of the tree.

A summary of the life expectancy of the trees on the site is provided in the following table.

Life Expectancy	No. of trees	% of total
>40 years	167	65.7%
15-40 years	53	20.9%
5-15 years	18	7.1%
<5 years	11	4.3%
Dead	5	2.0%
Grand Total	**254**	**100.0%**



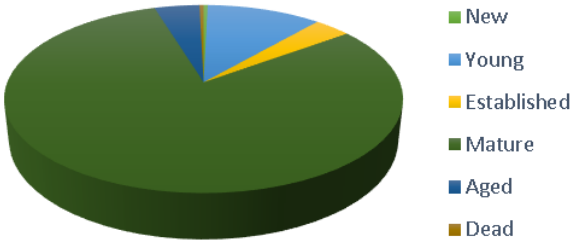
9.a.2 Life stage

The life stage of each tree was assessed and is expressed as described in the following descriptions.

Life stage	Description
New	• Planting hardware present and under maintenance (watered) • Self-seeded sapling
Established	• Planting hardware absent/unmaintained • Not being watered • Susceptible to casual vandalism
Young	• Established • Rapid vertical growth phase • Too big to be damaged by casual vandalism
Mature	• Vertical growth slowed • Canopy spreading or stable
Aged	• Older specimen • Self-retrenchment may have started • Likely to have habitat hollows • Large dead or broken branches may be present in upper canopy
Veteran	• Very old specimen for the species in the local area • Usually has started to shed limbs with age, develop hollows • High value habitat • Generally, requires target management in well used areas • Not suitable for short-lived species e.g. most *Acacia* spp., *Hakea* spp.
Senescent	• Old tree in terminal decline • Majority of canopy is dead wood • A stag with very limited canopy

A summary of the life stage of the trees on the site is provided in the following table.

Life stage	No. of trees	% of total
New	1	0.4%
Young	28	11.0%
Established	9	3.5%
Mature	204	80.3%
Aged	11	4.3%
Dead	1	0.4%
Grand Total	**254**	**100.0%**

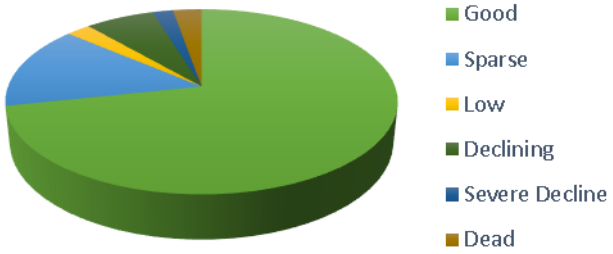


9.a.3 Health / Canopy condition

The health of the tree was assessed based on visual factors including foliage colour, canopy density, shoot extension growth, the presence of deadwood and dieback.

A summary of the health of the trees on the site is provided in the following table.

Health	No. of trees	% of total
Good	182	71.7%
Sparse	37	14.6%
Low	6	2.4%
Declining	17	6.7%
Severe Decline	5	2.0%
Dead	7	2.8%
Grand Total	**254**	**100.0%**

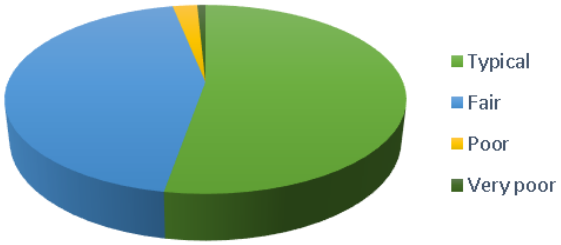


9.a.4 Structure

An overall assessment of the mechanical structure of the tree was made based on observable factors including tree form, branch attachment and taper, wood decay and cavities, previous pruning and any damage the tree has suffered.

A summary of the structure of the trees on the site is provided in the following table.

Structure	No. of trees	% of total
Typical	134	52.8%
Fair	112	44.1%
Poor	6	2.4%
Very poor	2	0.8%
Grand Total	**254**	**100.0%**



10. BENFEITS OF THE TREES

Trees in urban areas contribute significantly to human health and environmental quality by providing various ecosystem services (i.e. the conditions and processes through which ecosystems sustain and enhance human life). To better understand the ecosystem services and values provided by trees, the U.S. Forest Service and worked with Arboriculture Australia to customise it for use in Australia. The results from i-Tree models developed i-Tree Eco are used to advance the understanding of tree and forest resources; improve urban forest policies, planning and management; provide data to support the potential inclusion of trees within environmental regulations; and determine how trees affect the environment and consequently enhance human health and environmental quality in urban and rural areas. Further details about the methodology, calculations and values can be sourced at: http://www.itreetools.org.

These trees are providing the following environmental and structural benefits -

Benefit	Value
Total Current Carbon Storage	129 tonnes
Annual Carbon Sequestered	5.4 tonnes
Annual Oxygen (O_2) Production	14.4 tonnes
Annual Pollution Removal	76kg
Canopy cover	1.5Ha
Amenity Value *	$1.76m

** The amenity value provided is a statistically derived value based large samples in the United States (Nowak et al, 2002). The value provided is conservative. Individual calculations for the trees using methods common in Australia typically provide higher values.*

11. DISCUSSION

11.a. Current planting

The current tree population represents a reasonably broad diversity of tree size and type as shown in the data in 8.b. As seen in Figure 3, there are some structural elements to the population distribution that can be enhanced to develop stronger themes and a more coherent structure to the tree population. This is discussed further in 11.b. A clear vista from the train station along Swift St to the Cenotaph has been maintained as shown by the broken line on Figure 3.

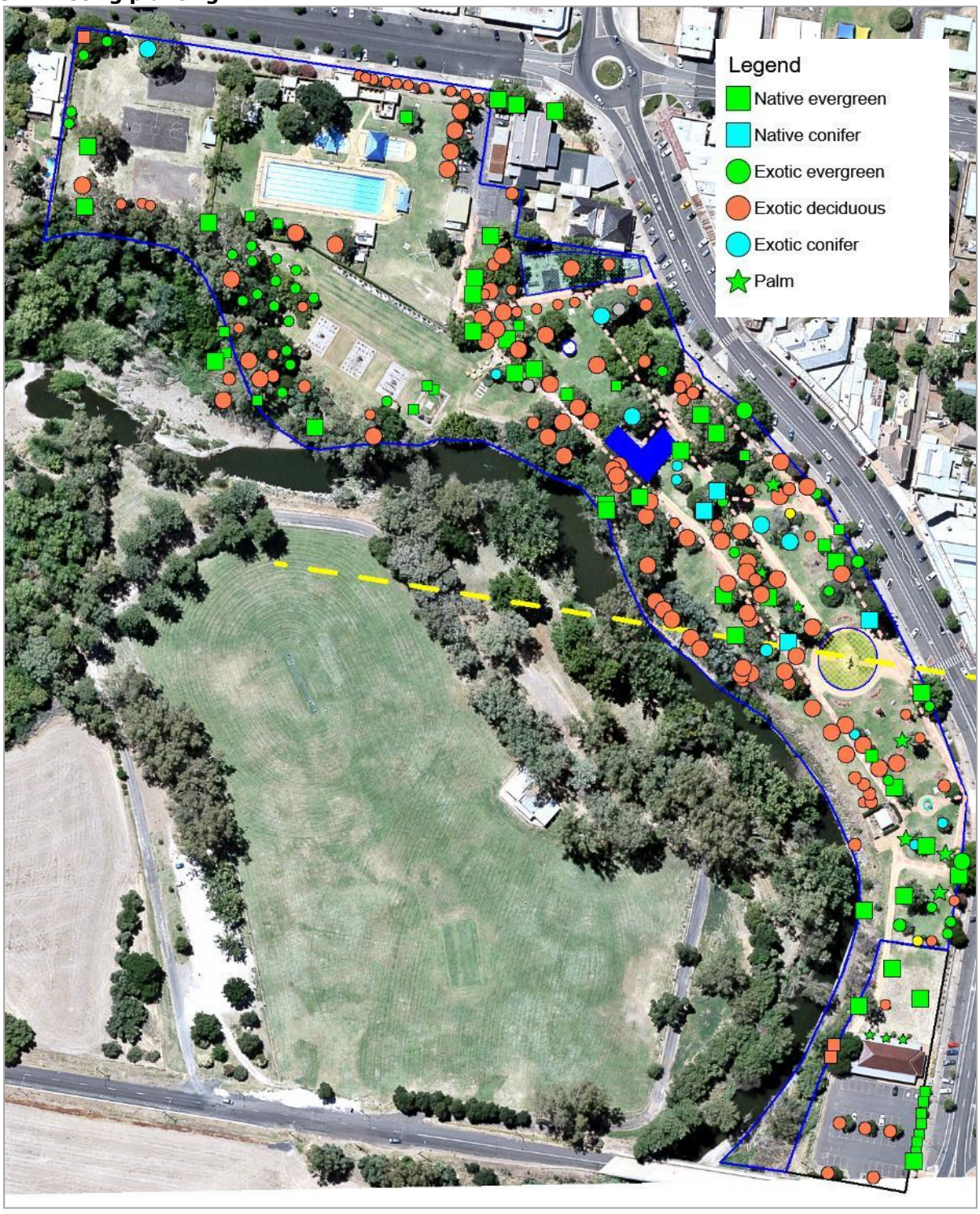
Photo 1 - Shrubs interrupting vistas

For an open landscape park, the proportion of small species at 36.6% is high, especially as many are planted in lawn areas. These small trees interrupt the potential long vistas through the park, particularly along the north-south axis. Small species in the border beds on the east also break up views from the main street into

the park and to the river and Pioneer Park beyond. In general, planting of small species of trees and large shrubs should be limited.

Generally, the existing tree population is in good condition and has a long-life expectancy. As a result, the larger trees will continue to form the basis of the structural themes for many years.

Figure 3 - Existing planting



11.b. Future planting scheme

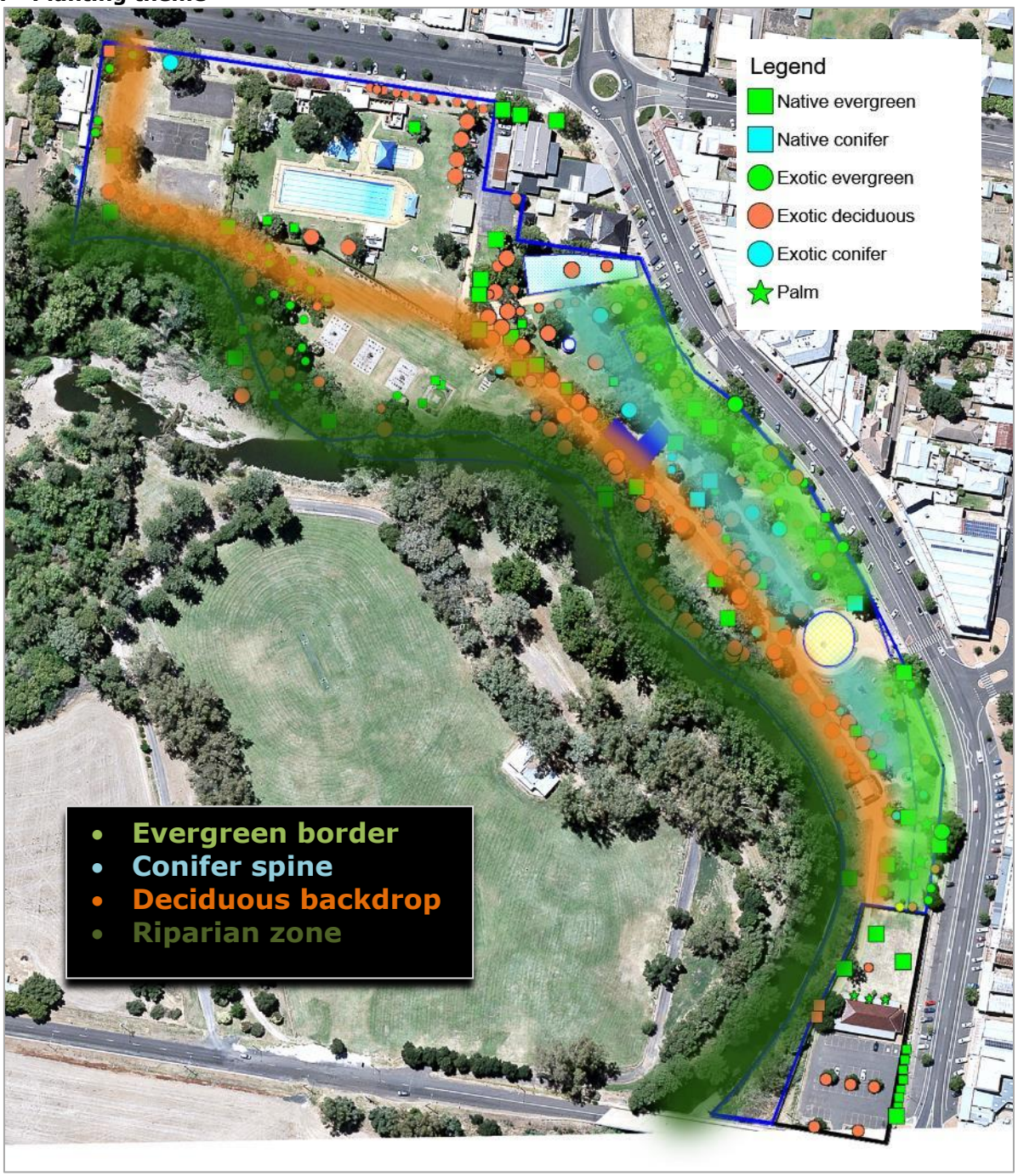
Generally, the current basic structure of the tree population is a solid basis for future planting. Figure 4 provides a broad theme for future planting that is described further below.

Overall, future planting needs to maintain and improve the vistas within and into the park. These are quite obscured at present by the presence of shrubs and low-growing species within the lawns and edge garden beds.

As a result of the generally good condition of the existing population, the current larger trees will continue to form the basis of the structural themes for many years. Implementing new planting to enhance and develop the key themes should therefore focus on replacing large trees lost through natural attrition, combined with targeted removal of small trees and shrubs and either leaving more openness in the landscape or strategic replacement with larger species in line with the planting theme.

Tree species suggested in the following sections are not exhaustive lists and can be taken as a guide to the types of trees for each of the theme zones.

Figure 4 - Planting theme



11.b.1 Evergreen border

The Evergreen Border is currently composed of a mix of tree types and sizes in both lawn feature planting, edge garden beds, and in recently added lawn garden beds in the southern section of the park.

Planting through this area should be focussed on achieving a strong canopy structure without impeding views into the park from the east and maintaining vistas once within the park. Broad spacing of large evergreen species is therefore recommended. A connecting theme of large palms such as *Phoenix canariensis* (Canary Island Date Palm) adding to the few already in place would further enhance this. While there are several *Washingtonia robusta* (Mexican Fan Palm) already present, these provide very limited landscape value are therefore not recommended.

Spacing of large trees through this area should provide a patchwork of sun and shade to encourage usage and be inviting both in warmer and cooler seasons. Dense blocks of trees should be avoided so as not to discourage use of the park in winter.

The use of native species, especially eucalypts, is not generally in keeping with the existing nor the historical theme. Therefore, more sympathetic species are recommended.

Suggested species for the Evergreen border include –

Species	Common name	Origin
*Brachychiton acerifolius**	Illawarra Flame Tree	Native
Brachychiton populneus	Kurrajong	Local indigenous
Corymbia calophylla	Marri	Native
Flindersia australis	Crow's Ash	Native
Grevillea robusta	Silky Oak	Native
Lophostemon confertus	Queensland Brush Box	Native
Quercus ilex	Holm Oak	Exotic
Quercus suber	Cork Oak	Exotic
Quercus virginiana	Live Oak	Exotic

* Summer deciduous/partial deciduous

11.b.2 Conifer spine

An existing spine of conifers including *Cedrus* spp. and *Araucaria bidwillii* (Bunya Bunya Pine) exists from the Cenotaph though to the playground. These form a strong foundation for this central spine that can be enhanced through selected planting of appropriate large coniferous species at broad spacing of not less than 30 metres between specimens along the north-south axis. In particular, it is recommended to extend the spine south of the Centoaph to increase the visual link between the north and south of the park. It is; however, important not to break the vista from Swift St to the Cenotaph and beyond to the river.

Suggested species for the Conifer spine include -

Species	Common name	Origin
Araucaria araucana	Monkey Puzzle	Exotic
Araucaria bidwillii	Bunya Bunya Pine	Native
Cedrus atlantica f. glauca	Blue Atlas Cedar	Exotic
Cedrus deodara	Deodar Cedar	Exotic
*Metasequoia glyptostroboides**	Dawn Redwood	Exotic
Pinus canariensis	Canary Island Pine	Exotic
Pinus pinea	Stone Pine	Exotic
Sequoia sempervirens	Coast Redwood	Exotic
Wollemia nobilis	Wollemi Pine	Native

* deciduous

11.b.3 Deciduous backdrop

There is an existing but discontinuous backdrop to the park along its western side of large deciduous trees. Building on this and extending it as a link through the south of the swimming pool and into Bell Park will provide a dramatic backdrop to the evergreen trees to the east as well as provide a connecting link that contrasts with the riparian zone along the river. Some of this has already occurred with the recent planting of *Liriodendron tulipifera* along the path on the western side of the park.

To provide a solid backdrop, relatively large trees with dense canopy that provide good autumn colour are recommended. Fine-leaf species are not recommended for this section.

Suggested species include -

Species	Common name	Origin
Fagus sylvatica 'Purpurea'	Copper Beech	Exotic
Fraxinus excelsior 'Aurea'	Golden Ash	Exotic
Ginkgo biloba	Maidenhair Tree	Exotic
Liquidambar styraciflua	Liquidambar	Exotic
Liriodendron tulipifera	Tulip Tree	Exotic
Quercus palustris	Pin Oak	Exotic
Quercus rubra	Red Oak	Exotic
Tilia cordata	Small-leaved Lime	Exotic
Ulmus X *hollandica*	Dutch Elm	Exotic

11.b.4 Riparian zone

The river edge is currently an area with some remnant native trees but is significantly degraded by exotic self-seeded trees and ground level weeds. Restoration of the natural riparian vegetation would both enhance the river environment itself and improve local ecological values, as well as improve the aesthetics from within Cameron Park and Pioneer Park.

A plan to achieve natural restoration of the river bank is beyond the scope of this report.

Photo 2 - Degraded riparian zone

11.c. Pruning

Maximising the longevity and aesthetics of large trees requires specialist management. There is evidence within Cameron Park that trees have been pruned excessively or unnecessarily. In particular, canopy lifting is excessive on some species such as *Araucaria bidwillii*. Excessive pruning can reduce tree vitality and adversely affect canopy balance and branch structure.

Specialist arboricultural skills and advice need to be employed in managing the trees in Cameron Park. Pruning by under-trained or non-specialist personnel must not occur.

All pruning work must be carried out by appropriately qualified arborists working to AS4373-2007 *Pruning of amenity trees*.

12. DISCLOSURE STATEMENT

ENSPEC Pty Ltd and their employees are specialists who use their knowledge, training and education (qualifications), infield learning experiences, personal experiences research, diagnostic tools, scientific equipment to examine trees, recommend measures to enhance the beauty, health and preservation of trees, to reduce the risk of living near trees.

Trees are living organisms that can be affected by pests, diseases and natural events outside of ENSPEC control. ENSPEC and their employees cannot detect every condition that affects a trees health, condition and structural integrity. Conditions are often hidden within trees and below ground where humans cannot naturally see. Unless otherwise stated, ENSPEC's employee's observations have been visually made from ground level.

In the event that ENSPEC recommends retesting or inspection of trees at stated intervals, or ENSPEC recommends the installation engineering solutions, ENSPEC must inspect the engineering solution at intervals of not greater than 12 months, unless otherwise specified in writing. It is the client's responsibility to make arrangements with ENSPEC to conduct re-inspections.

Intervention treatments of trees may involve considerations beyond the scope of ENSPEC's service, such as property boundaries and ownership, disputes between neighbours, sight lines, landlord-tenant matters and other related incidents. ENSPEC cannot take such issues into account unless complete and accurate information is given prior or at the time of the site inspection. Likewise, ENSPEC Pty Ltd cannot accept responsibility for the authorisation or non-authorisation of any recommended treatment or remedial measures undertaken.

ENSPEC Pty Ltd cannot guarantee that a tree will be healthy or safe under all circumstances or for a specified period of time after our initial inspection and recommendations.

If this written report is to be used in a court of law, or any other legal situation, or by other parties ENSPEC must be advised in writing prior to the written report being presented in any form to any other party. All written reports must be read in their entirety. At no time shall part of the written assessment be referred to unless taken in full context with the whole written report.

Clients may choose to accept or disregard the recommendations of the assessment and written report.

Notwithstanding anything in the report, express or implied, the client is not entitled to recover from ENSPEC Pty Ltd, its employees, agents and/or subcontractors any damages for business interruption or loss of actual or anticipated revenue, income or profits or any consequential, special, contingent or penal damage, whatsoever, and the client releases ENSPEC Pty Ltd from any such liability. Without limitation of the foregoing, a party shall at all times be limited (to the extent permitted by law) damages in the amount paid by the Client to ENSPEC Pty Ltd for ENSPEC Pty Ltd services. The limitation applies whether the claim is based on warranty, contract, statute, tort (including negligence) or otherwise.

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