CITY OF
YaRRA

URBAN FOREST
STRATEGY 2017

ACKNOWLEDGEMENT

Yarra City Council acknowledges the Wurundjeri as the Traditional Owners of this country, pays tribute to all Aboriginal and Torres Strait Islander people in Yarra and gives respect to Elders past and present.

Disclaimer

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MESSAGE FROM THE MAYOR

Yarra's first Urban Forest Strategy presents our vision for planning, managing, caring for and renewing trees in Yarra's streets and parks.

Trees are one of Yarra's most valuable assets and provide a range of social, economic and environmental benefits to our community.

They provide shade, add beauty and character to our streets, and work quietly behind the scenes to make Yarra a healthy and enjoyable place to live.

Critically, in the context of rising temperatures and more extreme weather events, trees are becoming increasingly important to help cool the city.

This strategy tells a comprehensive story of Yarra's urban forest by combining data and science with community values.

The robust development of the strategy has allowed us to make informed decisions and to develop a strong action plan to successfully manage trees in Yarra and maximise the benefits our urban forest provides.

The strategy focuses on planning for the future climate in Yarra and planting the right tree in the right location, and in the best conditions, to thrive. This will increase the tree canopy, size, health, vigour and growth of the tree and help to further enhance Yarra's liveability.

I would like to acknowledge our community who participated in the development of this Urban Forest Strategy, and helped shape our vision for managing this valuable living asset now and for the generations to come.

Cr Daniel Nguyen
Mayor

INTRODUCTION

The urban forest is made up of all trees and plants in Yarra, including in streets and parks, in front and back yards, and along Yarra's extensive waterways.

There are 20,854 public street trees and a great many more park and private trees in the City of Yarra. Together, they provide a 17% tree canopy cover over the municipality.

Individually these trees provide shade and character for local streets, creating an important green backdrop behind the daily comings and goings of the community. As a whole population these trees help enhance the liveability of Yarra by providing a number of very important environmental, social and economic benefits: they reduce stormwater loads, reduce air pollution, provide oxygen, store and sequester carbon, provide biodiversity corridors and habitat for animals, and provide strong wellbeing benefits for humans seeing and being in and around trees. Perhaps most importantly in the inner-urban context of Yarra, an urban forest is an efficient and cost effective mechanism in mitigating the urban heat island effect by providing shade and cooling on hot days, which also helps Yarra better adapt to climate change.

The planning, management, care and renewal of the urban forest is therefore critical to the overall liveability of Yarra.

Council currently manages its street and park trees via city-wide annual planting and replacement programs guided by a Tree Policy and set of technical guidelines. A recent street tree audit has provided Council with significant data for each street tree, including its health and expected longevity. The data has aided the development of the Urban Forest Strategy by examining it with additional existing data sets and evidence. This has provided a snapshot of Council's street tree population to develop a strategy which ensures Yarra's urban forest meets the needs of the future.

SCOPE OF STRATEGY

Strategic purpose

The aim of this strategy is to provide a clear charter for the future custodianship of Yarra's street and park tree population. The vision, objectives and action plan will set the scene for Yarra's urban forest agenda, providing high-level direction to help guide decision making at planning and operational levels for the next 10 years.

Vision

A more liveable city supported by a healthy and growing urban forest.

Objectives of the Urban Forest Strategy

- To enhance Yarra's healthy and growing urban forest, improving liveability and mitigating the impacts of the urban heat island effect

- To manage current and future tree-stock through best practice urban tree management using evidence-based planning and decision making, together with cross-organisational implementation and innovation

- To engage and support community involvement in the development of a flourishing and unique urban forest

BACKGROUND

What is an urban forest?

The 'urban forest' is made up of all vegetation within the municipality. This includes trees, plants and grasses and the environment in which they grow.

Other living systems, such as parks, waterways, grasslands, understorey shrubs and bushes, as well as vegetation in schools, on private land, on green roofs, walls and balconies are considered a part of the complex urban forest.

Why is an Urban Forest Strategy important?

All vegetation, especially urban trees through their canopy cover, can help to reduce the impacts of heat and contribute to improved liveability.

Setting a strong and clear direction for the future of Yarra urban forest, will allow better evidence based decision-making and improve future outcomes. Given the slow growth rates and long lifespans of trees, planning for the urban forest needs to go beyond short-term planning cycles and consider the many decades ahead.

Whilst the strategy covers the whole of Yarra's urban forest, the focus will predominately look at street tree canopy cover, health, and diversity (of species, height and age). Canopy in streets are identified as the most effective way for quickly achieving the Urban Forest Strategy objectives due to its ability to cool the city in frequently accessed areas and where heat is shown to be most retained.

People interact with streets in many different ways, allowing the area to provide the greatest number of urban forest benefits to reach the most people.

Additionally, whilst the need to influence the broader urban forest such as in the private realm, public trees are wholly within the Council's control and therefore where the greatest benefits of this strategy can be realised.

CANOPY IN STREETS ARE IDENTIFIED AS THE MOST EFFECTIVE WAY FOR QUICKLY ACHIEVING THE URBAN FOREST STRATEGY OBJECTIVES

BENEFITS OF THE URBAN FOREST

The average Yarra street or park tree performs a range of functions over and above just that of public amenity. When considered as a whole population, the urban forest makes a significant contribution to the resilience, functionality and character of the City of Yarra.

Vegetated landscapes are better places for people to live, work and play in Yarra. These many, and sometimes intangible, benefits can be grouped together under the banner of 'liveability'.

Health and wellbeing benefits

- Provision of natural shade and shelter for people: Canopy trees reduce daytime temperatures between 5 and 20 degrees Celsius *(Akbari et al., 1997; Livesley, 2010)*

- Improved desirability of a neighbourhood and encourage people to spend time outdoors and interact with their community, particularly in areas of socio-economic disadvantage *(Mullaney, 2014)*

- Improved amenity and aesthetics of public open space, encouraging people to be active *(Mullaney, 2014)*

- Encouragement of pedestrian and cycling activity, which can contribute to more sustainable transport use

- Provision of uniform, avenue like plantings along streets encourages motorists to drive more slowly and creates safer streets *(Mullaney, 2014)*

- Reduced air, water and soil pollution *(Mullaney, 2014)*

VEGETATED LANDSCAPES ARE BETTER PLACES FOR PEOPLE TO LIVE, WORK AND PLAY IN YARRA

Environmental benefits

- One of the most effective mechanisms for reducing the Urban Heat Island Effect (i.e. the build-up of heat in hard surfaces during periods of hot weather)
  (Silva 2010, Rozenzwieg 2009, Gober 2010 etc) (Adams Smith 2014) (GHD, 2011)

- Sequestering carbon, particulate matter and other air pollutants
  (Mullaney, 2014)

- Reducing the severity of localised flooding by intercepting stormwater
  (Mullaney, 2014)

- A healthy urban forest can help mitigate the impacts of storms and extreme weather events.

- Connecting biodiverse locations and provide localised biodiversity habitat (including understory)
  (Mullaney, 2014)

Economic benefits

- Reducing energy use in buildings: a 10% increase in deciduous tree cover can reduce heating and cooling costs in houses by 5-10%
  (Simpson and McPherson, 1996; Akbari et al., 2001)

- Improved retail activity by up to 20%, helping to improve business viability. Shoppers spend longer and more money in retail areas that are well treed and landscaped
  (Wolf, 2005)

- Improved character, amenity, and brand of the region (Mullaney, 2014), which encourages more people into an area to work, live and visit.

- Reduction in health costs may occur through associated well-being benefits mentioned above, including reduced heat-stress.

TREES, THE URBAN HEAT ISLAND EFFECT AND CLIMATE

Climate change is resulting in the urban environment getting hotter and drier, with more extreme weather events. This impact is felt on people as well as ecosystems by changing the growing conditions of urban trees and placing further reliance on trees for shade and cooling.

Being an inner-city municipality, Yarra is especially impacted by climate change and an exacerbating Urban Heat Island (UHI) effect. The UHI effect is a phenomenon affecting cities where hard dense surfaces such as concrete and asphalt store excessive amounts of heat during the day, releasing it slowing during the night after sunset. These areas therefore do not achieve overnight relief from heatwaves. Urban areas suffer from the urban heat island more than surrounding peri-urban or rural areas as they are not able to release heat as quickly due to higher amounts of hard surfaces that have stored heat.

As demonstrated in recent heatwaves in Melbourne, the UHI effect exacerbates the heat loading of cities during heatwaves which has proven significant human health and urban ecosystem impacts. Rates of mortality and heat related illness spike in urban areas during heatwaves. Prolonged heat and low rainfall periods also negatively impact the quality of urban vegetation. Excessive heat can cause extreme stress to trees, causing them to defoliate, which in turns reduces their capacity to provide benefits. *(Norton et el, 2013).*

Aerial thermal imaging of the city provides a more detailed view of the heat island by showing where in Yarra heat is most being retained. *Figure 1* shows a thermal image of Yarra taken at night time in summer during an extreme heat event. The picture highlights the areas that retain more heat (dark red = hotter) versus those that are cooler (the whiter areas). Roads (especially major roads) stand out as the key source of heat retention in Yarra. There are also some areas of private land with large areas of hardstand and pavement, such as Victoria Gardens

Shopping Centre or the MFB Burnley Complex, which provide significant sources of retained urban heat. Parkland, such as Edinburgh Gardens, Darling Gardens, and Yarra Bend stand out as areas where it is cooler.

The Urban Heat Island effect means trees, and canopy cover, is vital in areas where people may be more affected to extreme heat conditions.

These include:

Areas of social vulnerability

Areas of social vulnerability to heat include concentrations of young children, older people living alone, those who do not speak English at home, and the most socio-economically disadvantaged *(Loughnan, 2013).* Census based data from Social Atlas id. has been used to map these populations across Yarra shown in *Figure 2*. Public housing, those identified by Council as needing assistance, childcare centres where young children frequent and aged care facilities have also been mapped to further identify socially vulnerable areas.

Pedestrian activity zones

High pedestrian activity zones are prevalent across Yarra due to its inner city locale, array of public transport offerings and breadth of commercial/retail areas that align with the transport network. Schools and commercial zones have also been mapped to identify areas where people are most likely to walk to and within, shown in *Figure 3*. These pedestrian activity zones present opportunities for tree planting which will improve micro-climatic moderation for people using the area.
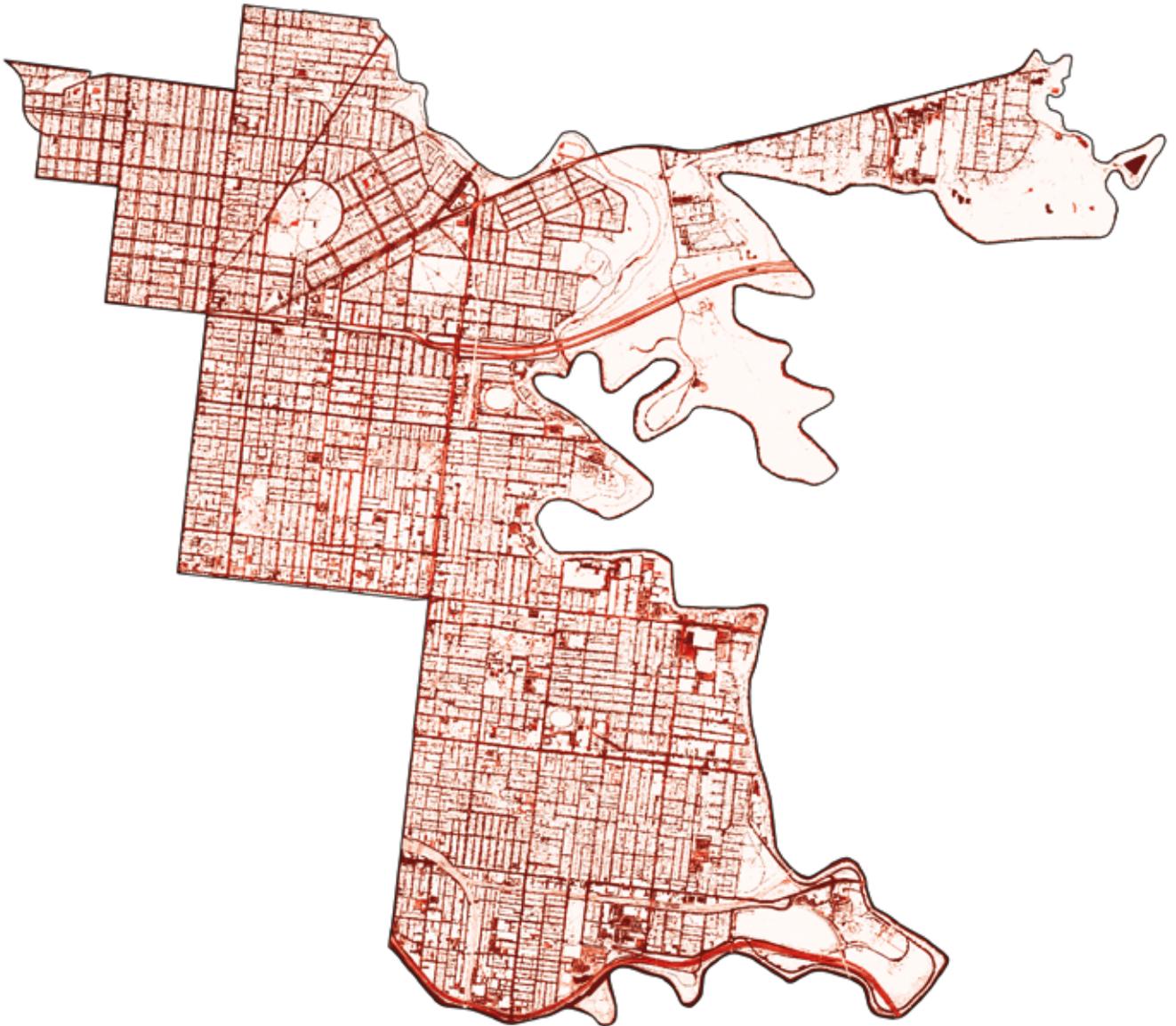
Figure 1: Aerial thermal imaging of the City of Yarra showing thermal hotspots (in dark red).

Older Lone Persons
0 - 4 Year Olds
Non English at home
SEIFA Disadvantage
In need of Assistance
Social Housing
Aged Care Facilities
Childcare
Parks
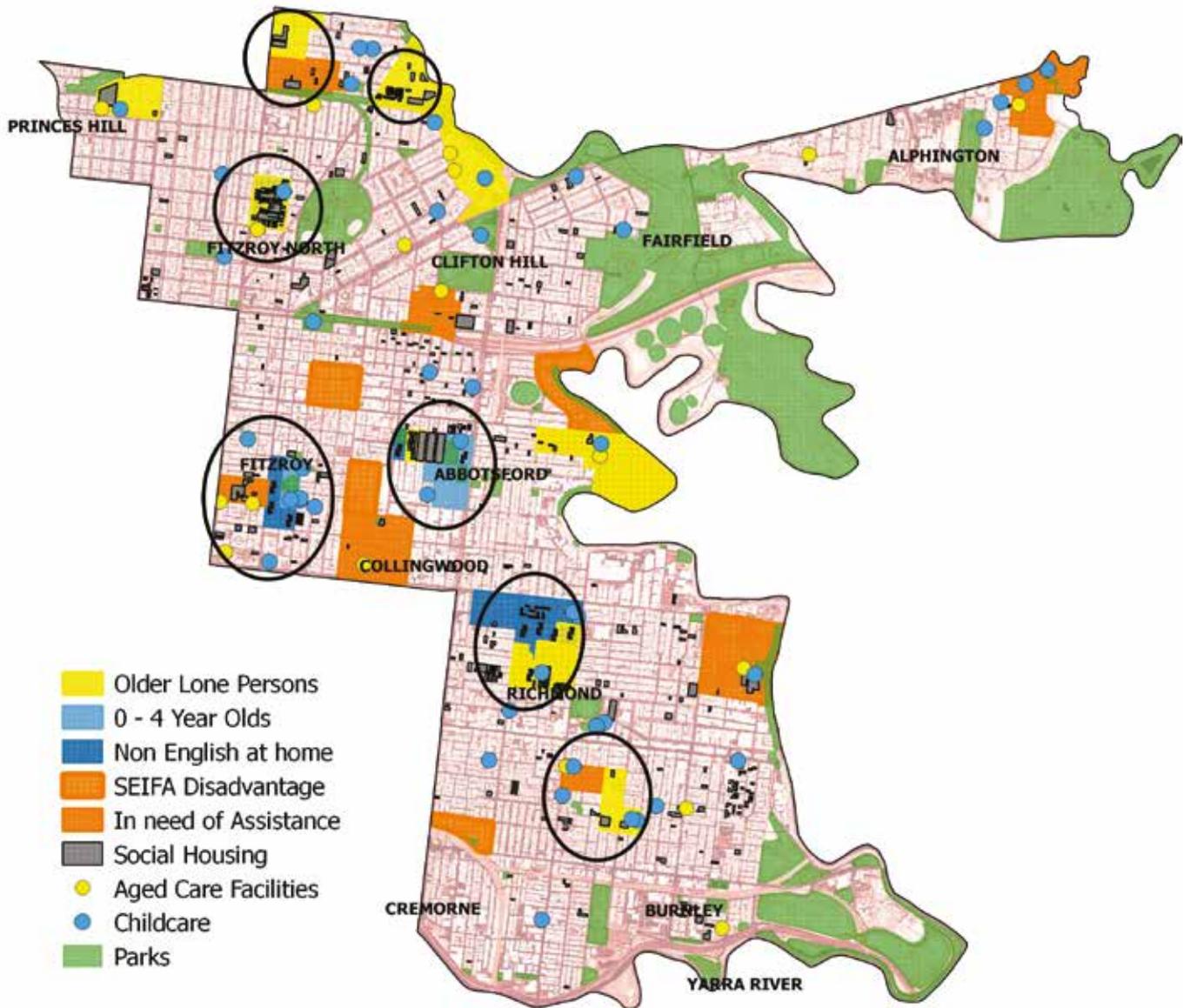
Figure 2: Social vulnerability distribution for City of Yarra, showing areas of concentration in Fitzroy, Collingwood and Richmond, which are all suburbs with low canopy cover.
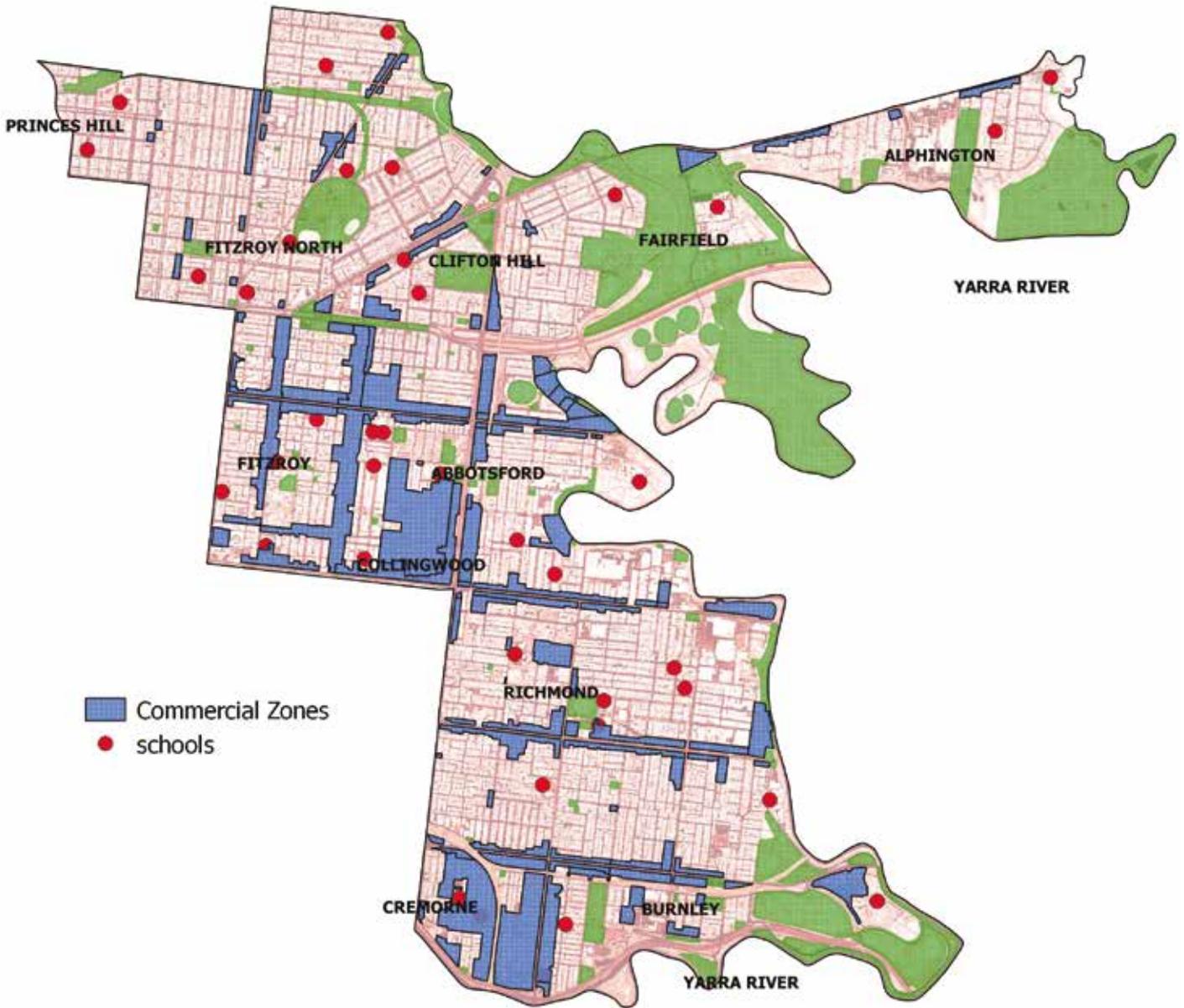
Figure 3: Areas of high pedestrian activity in Yarra in commercial zones and around schools.

A HEALTHY URBAN FOREST FOR COOLING

A healthy and thriving urban forest is one of the most cost effective and efficient mechanisms for mitigating urban heat due to two factors:

1) Through its canopy of leaves, the urban forest shades hard surfaces such as roads, footpaths and buildings so they do not retain maximum heat (broad leafed canopy trees provide greater shading)

2) Through the process of evapotranspiration, water particles are released from the surface of leaves, increasing moisture content in the surrounding air, thereby reducing ambient temperature.
(Silva 2010) (Rozenzwieg 2009) (Gober 2010) (ACEEE 2014)

The presence of trees within the urban areas can have significant UHI mitigation effects as outlined below:

Shade trees reduce daytime temperatures between 5-20°C
(Adams and Smith, 2014)

To reduce urban heat island by 1°C in an extreme heat event, there needs to be a 10% increase in vegetation
(Norton et al, 2013)

A 1-2°C temperature reduction can significantly reduce heat mortality rates for old and frail people
(Coutts et al, 2012)

Improving the health of the existing vegetation is the most effective strategy for mitigating the urban heat island
(Coutts et al, 2012)

Irrigated parks can be 2-3°C cooler than neighbouring streets. Dry parks can actually be hotter than neighbouring streets
(Coutts et al, 2012)

Therefore, it is important to ensure the health and vigour of the urban forest so that it is most effective during adverse climatic conditions.
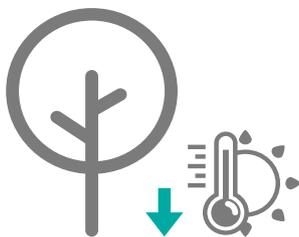
SHADE TREES REDUCE DAYTIME TEMPERATURES BETWEEN 5-20°C
(ADAMS AND SMITH 2014)

Planting conditions

A key ingredient of tree health is access to soil moisture. The underground growing conditions, including soil type and root growing space, are very important in supplying this soil moisture to urban trees.

Therefore, water needs to be provided to the soil surrounding urban trees either actively through irrigation or passively, through stormwater and rainfall interception. Water sensitive urban design, including passive interception of stormwater into grassed medians and parks helps to keep more water in the landscape for use by trees. This also has the added benefit of reducing the urban heat island, as water in the urban landscape can evaporate, again providing localised cooling.

Tree species in a changing climate

As with planting conditions, the species selected can greatly contribute to many urban forest benefits, including improving biodiversity and climatic reliance.

Plant health can be detrimentally affected by increased temperatures, excessive urban heat events, and longer periods of low rainfall. With the predicted climatic changes some species will experience health declines and reduction in useful life expectancy, causing them to fail to provide the much needed benefits of cooling and shade during periods of excessive heat.

Therefore species selection today must be robust and considerate of current needs as well as the future climatic conditions of Yarra.

It is critical that Council plans now for the future climate in Yarra, planting the right tree in the right location with optimal planting conditions to thrive.

This will increase the tree canopy, size, health, vigour and growth of the tree, in turn improving Yarra's overall liveability.

THE STRATEGIC CONTEXT

Management and decision making that influences the urban forest spans many different areas of Council and interacts with numerous priorities in the municipality. Yarra's Urban Forest Strategy will therefore act as a high-level strategy, prioritising key principles to help guide holistic and integrated decision making at planning and operational levels to ensure the urban forest can adequately meet the needs of the future. The strategy will also provide further guidance and support to new strategies such as the Open Space and Biodiversity Strategies.

The strategy has also been developed to effectively integrate and strengthen existing priorities in Council. This includes environmental and social challenges that pose a future risk to both tree population health and asset longevity. These challenges include climate change, the urban heat island effect, population increase and resulting urban densification.

A series of priorities already exist within Council to help frame the way Council operates. These are outlined in the most recent Council Plan 2017-2021 and other Yarra strategies.

A healthy and resilient urban forest can help Council work towards many of these priorities, as demonstrated in *Figures 4 and 5.*

COUNCIL PLAN

OPEN SPACE
STRATEGY
(TO BE DEVELOPED)

BIODIVERSITY
STRATEGY
(TO BE DEVELOPED)

BUSINESS AND
INDUSTRIAL LAND
STRATEGY (2012)

THE URBAN DESIGN
STRATEGY (2011)
AND URBAN DESIGN
FRAMEWORKS
AND STREETSCAPE
MASTERPLANS

URBAN FOREST
STRATEGY

YARRA HERITAGE
STRATEGY
(2015-2018)

YARRA SAFE TRAVEL
STRATEGY
(2016-2026)

YARRA ENVIRONMENT
STRATEGY
(2013-2017)

STRATEGIC
COMMUNITY
INFRASTRUCTURE
FRAMEWORK
(2016-2026)

Figure 4: Illustrates the relationship of the Urban Forest Strategy to City of Yarra Council Plan and other strategies and frameworks. This demonstrates that healthy and resilient urban forest can positively influence many areas of Council and implementation requires coordination across the organisation.

SUSTAINABLE ENVIRONMENTS

SUSTAINABLE TRANSPORT

LIVEABILITY

URBAN FOREST STRATEGY

PLACEMAKING

QUALITY ASSETS

ENGAGED AND HEALTHY COMMUNITIES
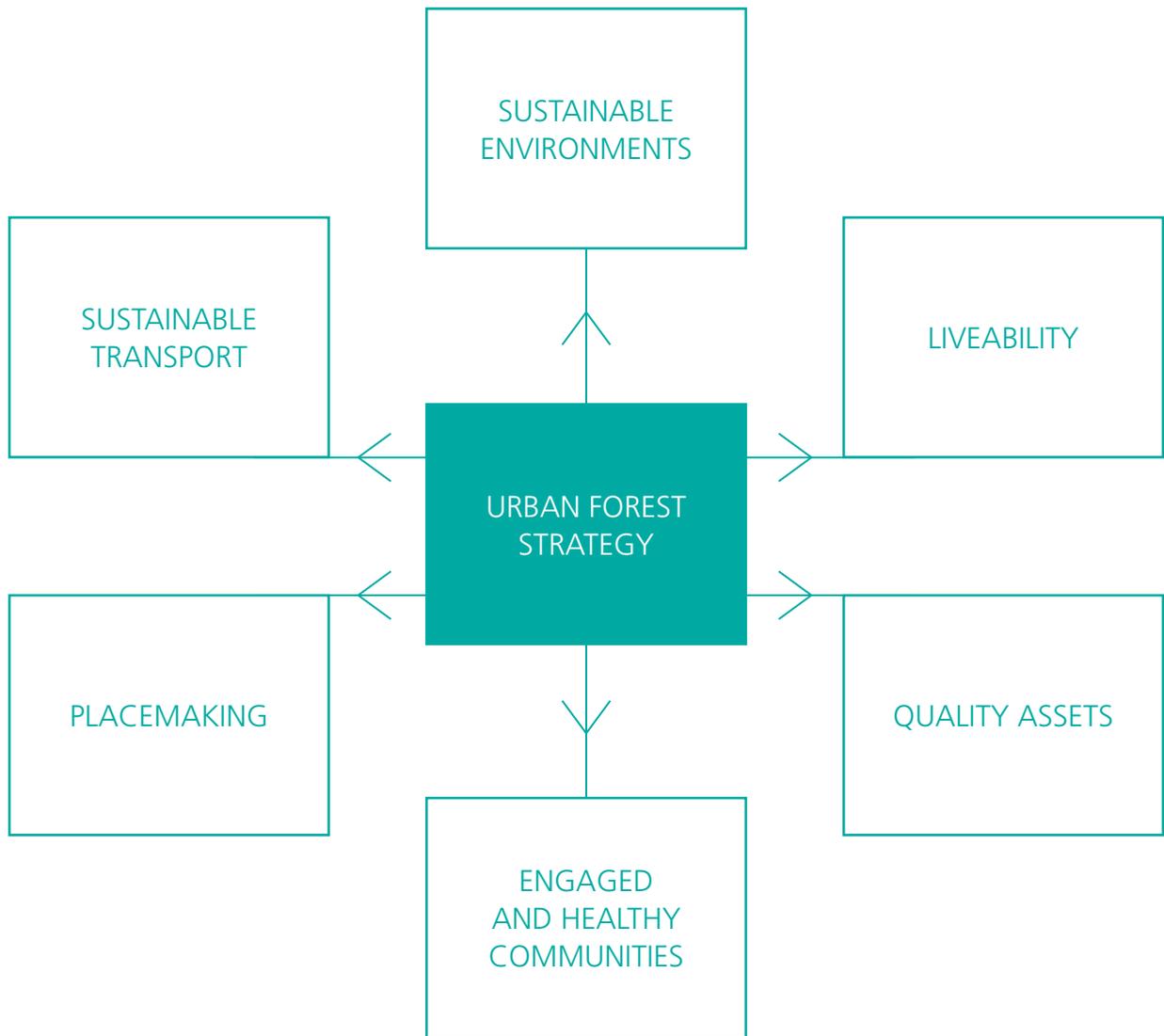
Image 5: Existing Council priorities that can be positively influenced by a healthy resilient urban forest.

The Broader regional context

Regionally, there is a suite of programs and collaborations that support the need for a City of Yarra Urban Forest Strategy and opportunities to work together. These include:

202020 Vision

The 202020 Vision is a national collaboration of industry, businesses, NGOs, individuals and governments, including Yarra, working toward 20% more green space in urban areas by 2020. The vision and associated plan utilises tools, resources and networks to help achieve the shared goal.

Resilient Melbourne

Melbourne was selected as one of the first 32 cities around the world to become a member of the 100 Resilient Cities network.

Resilient Melbourne sets out the first resilience strategy for Greater Melbourne. It is a joint project of 32 metropolitan Melbourne councils, Melbourne's academic, business and community sectors, and the Victorian Government, all supported by 100 Resilient Cities – Pioneered by the Rockefeller Foundation.

The strategy has set a flagship action to develop a Metropolitan Melbourne Urban Forest Strategy with the primary aim to "Extend and link existing urban greening, reforestation and nature initiatives across Melbourne, to improve wellbeing and reduce our exposure to hazards such as heatwaves and flooding".

Yarra's Urban Forest Strategy will help inform the development of this regional piece of work and provide an open platform for data and knowledge sharing about the urban forest.

IMAP

The Inner Melbourne Action Plan (IMAP) is a collaboration between the cities of Melbourne, Yarra, Maribyrnong, Port Phillip and Stonnington working together to strengthen liveability, attraction and prosperity of the region.

A revised action plan was endorsed in 2016 stipulating a key objective that Yarra's Urban Forest Strategy directly links into:

Strategy 4.2
We will work together to integrate water sensitive landscapes, substantial tree canopies, biodiversity and habitat into the design of all parks and public space (i.e. streets) areas right across inner Melbourne.

Plan Melbourne

The Victorian State Government's Plan Melbourne initiative seeks to guide the growth of Melbourne for the next 35 years by setting a strategy for supporting jobs, housing and transport while building on Melbourne's legacy of distinctiveness, liveability and sustainability.

A primary direction of this plan aims to make Melbourne cooler and greener through integrated metropolitan spaces. Yarra's urban forest strategy objectives will complement the plan and foster future potential collaboration.

Metropolitan Partnerships

As part of the Department of Environment, Land, Water and Planning the Metropolitan Partnerships program, of which Yarra is part of the Inner Metro Partnership, seeks a coordinated way for communities to help advise governments on priorities in their region.

Working closely with the communities, the partnerships are intended to help drive improved social, economic and environmental outcomes for the liveability of the region. This includes opportunity to develop green linkages across the partnering Councils.

Yarra River Action Plan

The Victorian Government released the Yarra River Action Plan on 26 February 2017.

The plan aims to ensure the long-term protection of the Yarra River and its parklands. The Yarra River is a key landmark in the Yarra municipality and the Urban Forest Strategy provides the opportunity to work together and strengthen the resilience of the river and surrounding areas to the impacts of climate change and population growth.

Community engagement for strategy development

Yarra's Urban Forest Strategy was developed in partnership with the community through a broad engagement and consultation process.

The consultation period commenced in February 2017 and ran for four weeks.

More than 250 members of the community contributed to the consultation, sharing their views about Yarra's trees, and aspirations for the city's urban forest into the future.

Community members were heard via:

• The Your Say Yarra online portal, which included a survey and online mapping tool where people could locate their favourite trees in Yarra

• Face-to-face conversations at local parks and community events

• Social media posts on Council's Facebook, Twitter and Instagram accounts

• Presentations to the Yarra Environment Advisory Committee and Disability Advisory Committee.

Feedback received during the consultation process suggested there is a high level of community interest in the strategy and future implementation.

A significant majority of people indicated they want to see more trees in the municipality. The community also expressed a willingness to be involved in local tree planting activities.

The community consultation process has been used to inform and refine the Urban Forest Strategy to ensure the strategy reflects the views and expectations of people who live, work in and visit Yarra.

Items raised by the community include space limitations for new and existing trees; Yarra's ageing tree population and Council's strategic approach to selecting tree species.

The engagement process also helped to identify the diversity of views relating to trees on a street-by-street level.

THE STORY OF YARRA'S URBAN FOREST
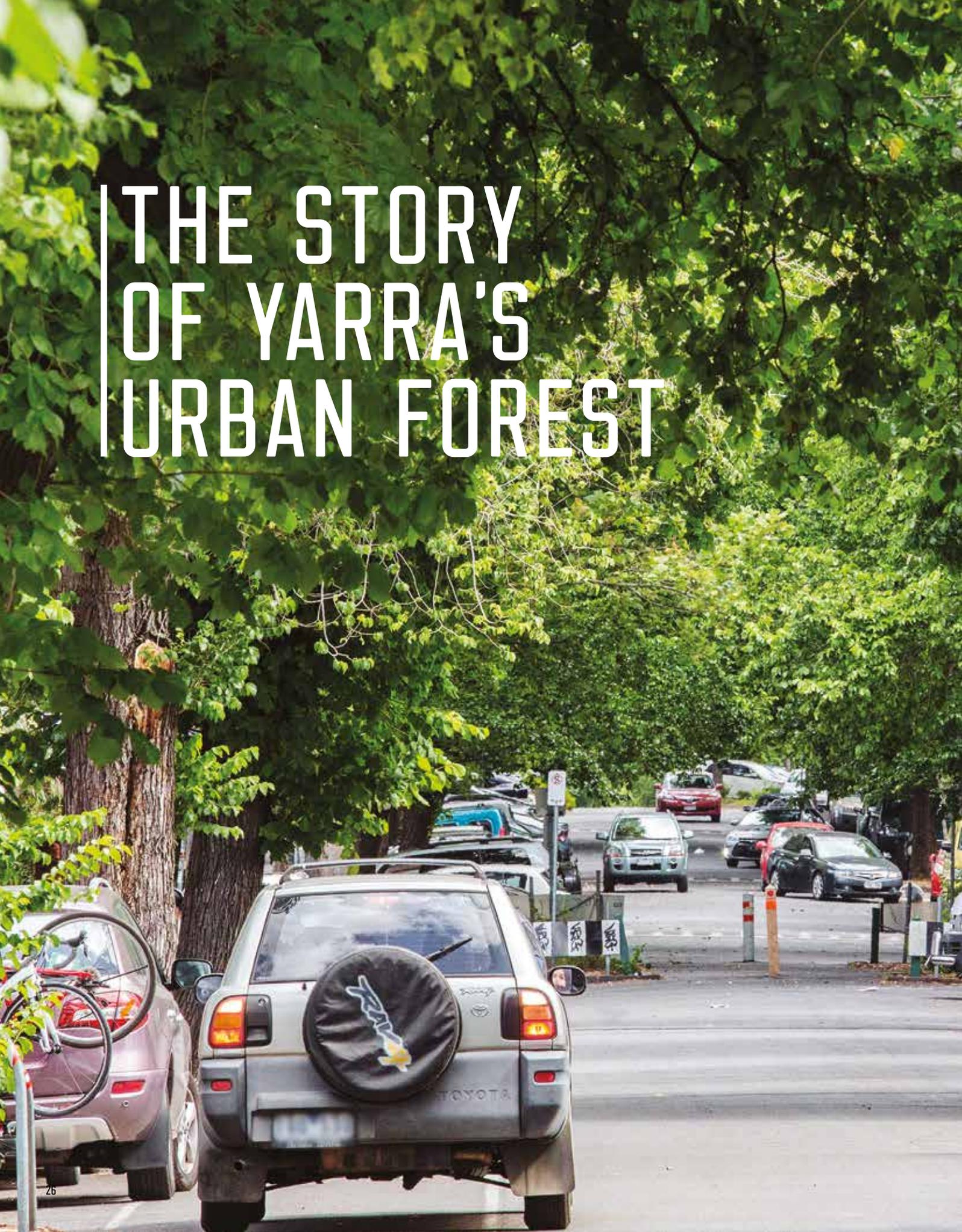
There are 20,854 street trees in the City of Yarra. An audit conducted in 2016 by an independent consulting arborist collected a range of qualitative information for each of these street trees to help Council understand the current health, structure and diversity of the street tree population. This data was then analysed with other evidence and data sets to best inform the development of the strategy.

Presently, the data for the approximately 20,000 – 30,000 trees in parks and along the Merri Creek and Yarra River corridors is incomplete. There is also no detailed information regarding trees on other parcels of land owned either privately or by other governmental agencies.

Tree canopy cover has also been measured for the municipality. Tree canopy cover is the measure of tree leaf canopy that shades the ground when viewed from above. Tree canopy cover includes all trees within the municipality from street and park trees to those in backyards, in private carparks, on commercial and industrial land and along waterways. Tree canopy cover is one of the strongest measurements in representing the objectives of the Urban Forest Strategy as it can measurably quantify the benefits of the urban forest such as shade, stormwater interception and carbon storage.

Other than canopy cover, very little is known about the components of the private tree population and its diversity given the difficulty and requirements in gaining access to assess each tree.

These factors are examined below:

Tree canopy cover

A pixel analysis of 2014 infrared imagery was undertaken by Council to measure all tree canopy cover for the whole municipality. City of Yarra's urban tree canopy cover is 17% across the municipality. This includes not only street trees, but also those in parks, private land, along creeks, and in industrial and commercial areas.

To examine the opportunities for canopy cover influenced by the Urban Forest Strategy, the municipality can be divided into three distinct land use types:

• private land, (representing 60% of total municipality area)

• streets, including state owned major roads and intersections

• parks, including Council and public managed open spaces.

When examined as these land use types and canopy cover, Yarra's streets (red) and the private realm (green) each have 13% canopy cover, whilst Yarra's parks and public space network (blue) house 34% canopy cover, refer to *Figure 6*. Given the density in housing, commercial and industrial areas and the opportunity for planting in public open spaces, this is to be expected.

The total canopy cover across the municipality is split across the private realm (46%) and the public realm (54%) - the public realm comprised of parks (35%) and streets (19%).

As the Urban Heat Island Effect, and the many benefits of trees, is predominately felt at the street level the focus of the Urban Forest Strategy, and increase in canopy cover, is focused in the public realm where the most people are affected.

Legend

▮ ROAD coverage

▮ PARKS / PPRZ coverage

▮ PROPERTY coverage
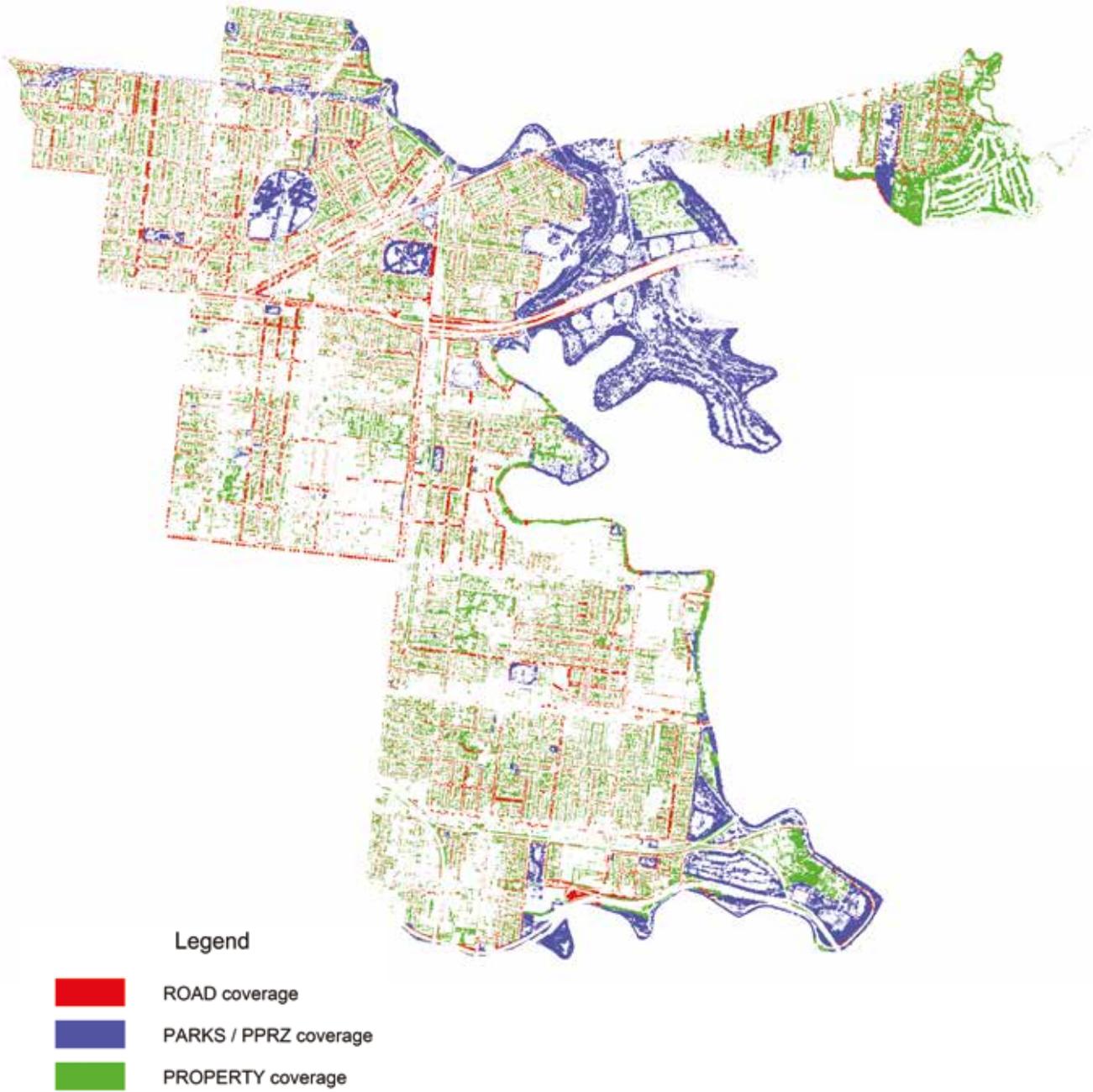
Figure 6: Tree canopy cover for the City of Yarra.

Yarra is experiencing significant development growth due to its inner city location and access to many facilities. As further in-fill development occurs there may be less space on private land for future trees to be planted and there is the potential threat that that private realm canopy cover may decrease into the future. However, there is possible scope through planning for large developments to actually increase green and permeable space on available lots as compared to existing building stock. The solution is not one size fits all and requires complex planning mechanisms to be reviewed.

Overall, these issues place further reliance on streets and parks to provide overall canopy cover for the Municipality, with street trees providing the strongest health, wellbeing and environmental benefits to the community.

Whilst the overall tree canopy cover is 17%, it varies significantly according to suburb, refer to *Figure 7*.

Canopy cover (% of total population)

| Suburb	Canopy cover
Burnley	29%
Fairfield	28%
Alphington	26%
Clifton Hill	18%
Fitzroy North	17%
Princess Hill	15%
Richmond	14%
Abbotsford	14%
Carlton North	12%
Fitzroy	11%
Cremorne	8%
Collingwood	8%
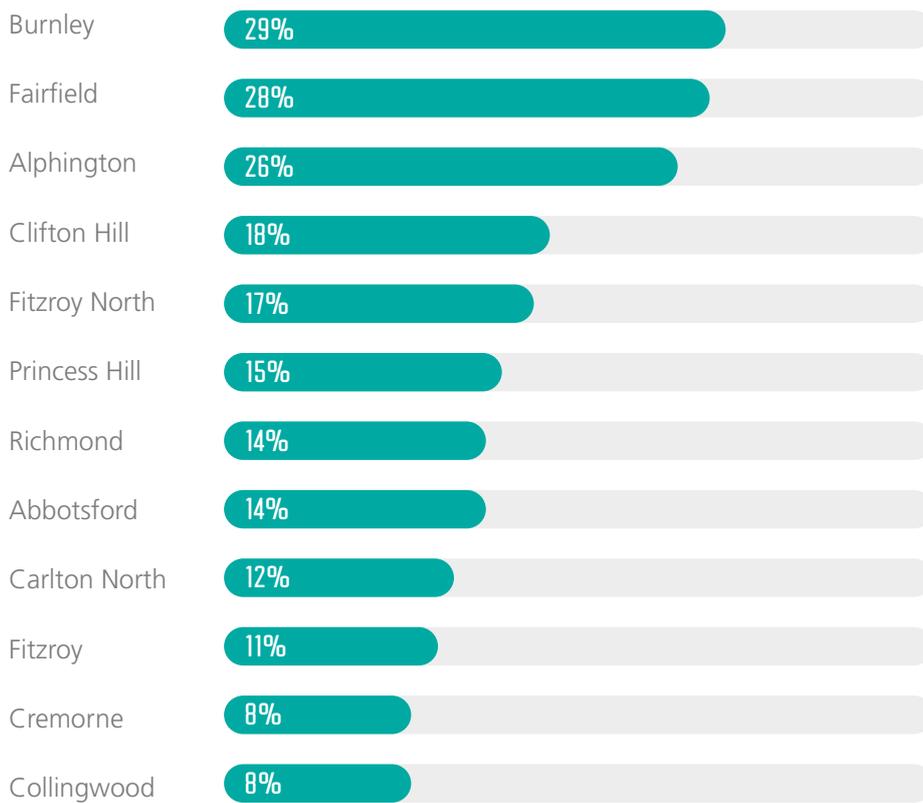
Figure 7: Canopy cover for the City of Yarra by suburb.

The areas of Burnley to the south-east and Fairfield and Alphington to the north east have much higher overall canopy cover due to their extensive Yarra river corridor parkland. Fitzroy, Cremorne and Collingwood, however, display very low levels of overall tree cover. Individual canopy cover maps have been included in Appendix 1.

Public tree canopy, and especially street tree canopy, will be increasingly important for the future of Yarra's Urban Forest. Further analysis shows that street tree canopy coverage is fairly even across the municipality - between 9% and 16% - except for the outliers of Fairfield and Alphington, refer to *Figure 8.* Alphington is a small residential pocket with tree-lined streets, which is why road canopy cover is so high at 43%. The area of Fairfield, which is within the City of Yarra is mostly parkland and the few roads which are in the Yarra area are not tree lined, hence the very low road canopy cover for this area.

Road canopy cover (% of total population)

| Suburb	Road canopy cover
Burnley	16%
Fairfield	5%
Alphington	43%
Clifton Hill	13%
Fitzroy North	15%
Princess Hill	13%
Richmond	12%
Abbotsford	14%
Carlton North	13%
Fitzroy	14%
Cremorne	10%
Collingwood	9%
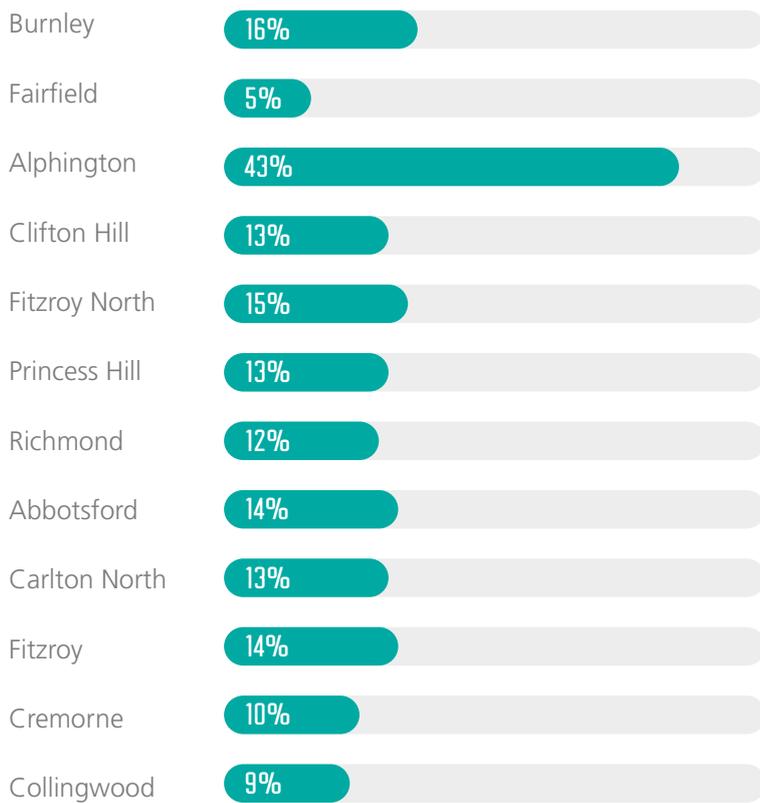
Figure 8: Road based canopy cover for the City of Yarra by suburb.

Street tree species diversity

The tree audit provides a series of qualitative and quantitative attributes about each street tree in order to assess the current condition, health, structure and diversity of the public urban forest.

Figure 9 provides a breakdown of the 10 most common street tree species in Yarra. Six of the top ten species are exotic deciduous species, meaning they drop their leaves for winter. The other four species are natives, though not indigenous to the Yarra region.

10 most common street tree species
(% of total population)

- *Platanus X acerifolia*
  London plane **12%**
- *Ulmus procera*
  English elm **5%**
- *Melaleuca linariifolia*
  Paperbark (Snow in Summer) **4%**
- *Lophostemon confertus*
  Queensland brushbox **4%**
- *Tristaniopsis laurina*
  Water gum **4%**
- *Melia azedarach*
  White cedar **3%**
- *Pyrus calleryana*
  'Capital' Ornamental pear **2%**
- *Acer buergerianum*
  Trident maple **2%**
- *Lagerstroemia indica*
  Crepe myrtle **2%**
- *Acacia implexa*
  Hickory wattle **2%**

Figure 9: Top 10 public tree species found in City of Yarra.
Footnote: The Snow in Summer paperbark and Acacia implexa are no longer being planted as urban street trees.

The most common street tree in Yarra is the London plane representing 12% of the population, followed by the English elm, at 5%. Many London plane trees are large and healthy specimens providing lush green shade and forming a distinct neighbourhood character in some streets. However at 12% of the overall population, best practice suggests they are overrepresented. Leading practice urban forest management suggests that in order to minimise the risk of pest and disease incursions, no one species should represent more than 5-10% of the population.
(Santamour 1990, Jaenson et al 1992).

The distribution of both elms and planes are aligned along linear roadways, refer to *Figure 10*. They form boulevards and tree-lined avenues synonymous with the character of inner Melbourne and are very important contributors to shade cover. However, when considering a) the overrepresentation of Plane Trees in the broader urban forest population and b) the risk of loss due to a pest or disease incursion, such as Sycamore Lace bug or a disease such as Anthracnose, whole streetscapes would be severely impacted if those planes or elms were lost.

KEY FINDINGS

In general Yarra has a good distribution of street tree species

London plane trees are currently over represented in Yarra streets compared to best practice

City of Yarra Public Trees
- Elms
- Planes
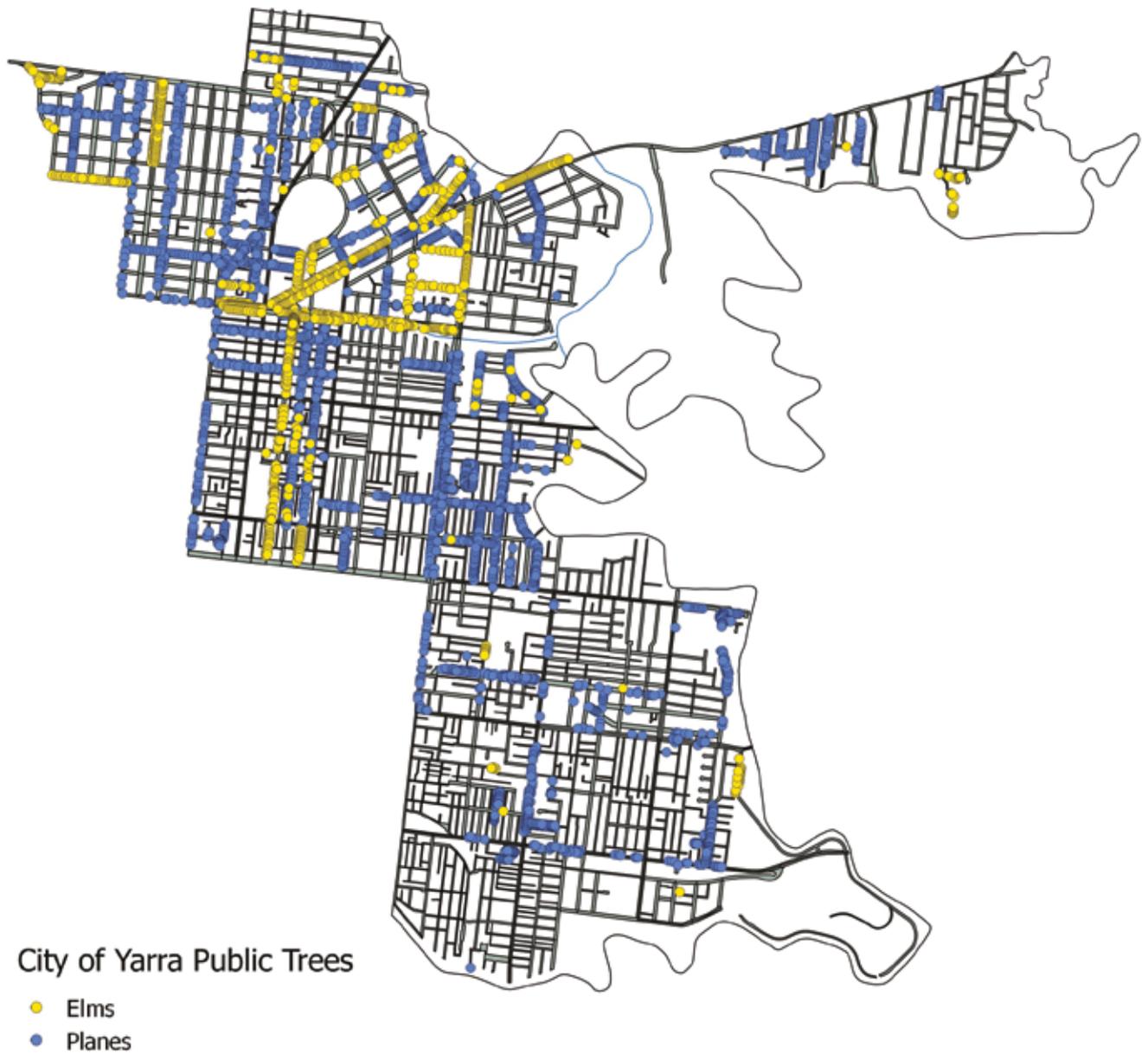
Figure 10: *Distribution of London Plane and English Elm street trees across the City of Yarra.*

Useful life expectancy

Useful Life Expectancy (ULE) of a tree is the measure of how long it will remain in the landscape before needing to be removed. A tree's health, its structure, its age and also its site appropriateness are all taken into account when calculating a tree's useful life expectancy.

Industry wide, it is usual to strive for no more than 10% of a tree population reaching the end of its useful life each decade.

Almost 10% of Yarra's street tree population will reach the end of its useful life in the next 10 years, refer to *Figure 11*. A staged renewal plan is therefore required to ensure the succession of these trees as they are removed.

In the decade between 2027 and 2037 (ULE 11-20 years) 24% of the tree population, equalling 5,051 trees, are likely to reach the end of their useful life and need removing and replacing.

This is more than double the recommended proportion of the tree population expected to reach end of life in one decade. A strategic approach is therefore required to minimise the impact of tree and canopy loss at one point in time. In terms of potential impact, the canopy area of trees with a ULE of 11-20 years is 232,600m^2, refer to *Figure 12*.

This is approximately 37% of all road tree canopy cover. The loss of these trees will have significant landscape impacts and therefore must be planned for now. Programs are required to be developed to extend the life of these trees where possible, to prioritise planting locations to compensate for the future loss and put in place a clear and strategic renewal and replacement framework, particularly for avenues and boulevards.

Useful life expectancy
(% of total population)

- 0 years **1%**
- 1-5 years **2%**
- 6-10 years **7%**
- 11-20 years **24%**
- 20+ years **66%**

Figure 11: Distribution of Useful Life Expectancy for Yarra's street trees.

Public Trees (ULE)
• 11-20 years
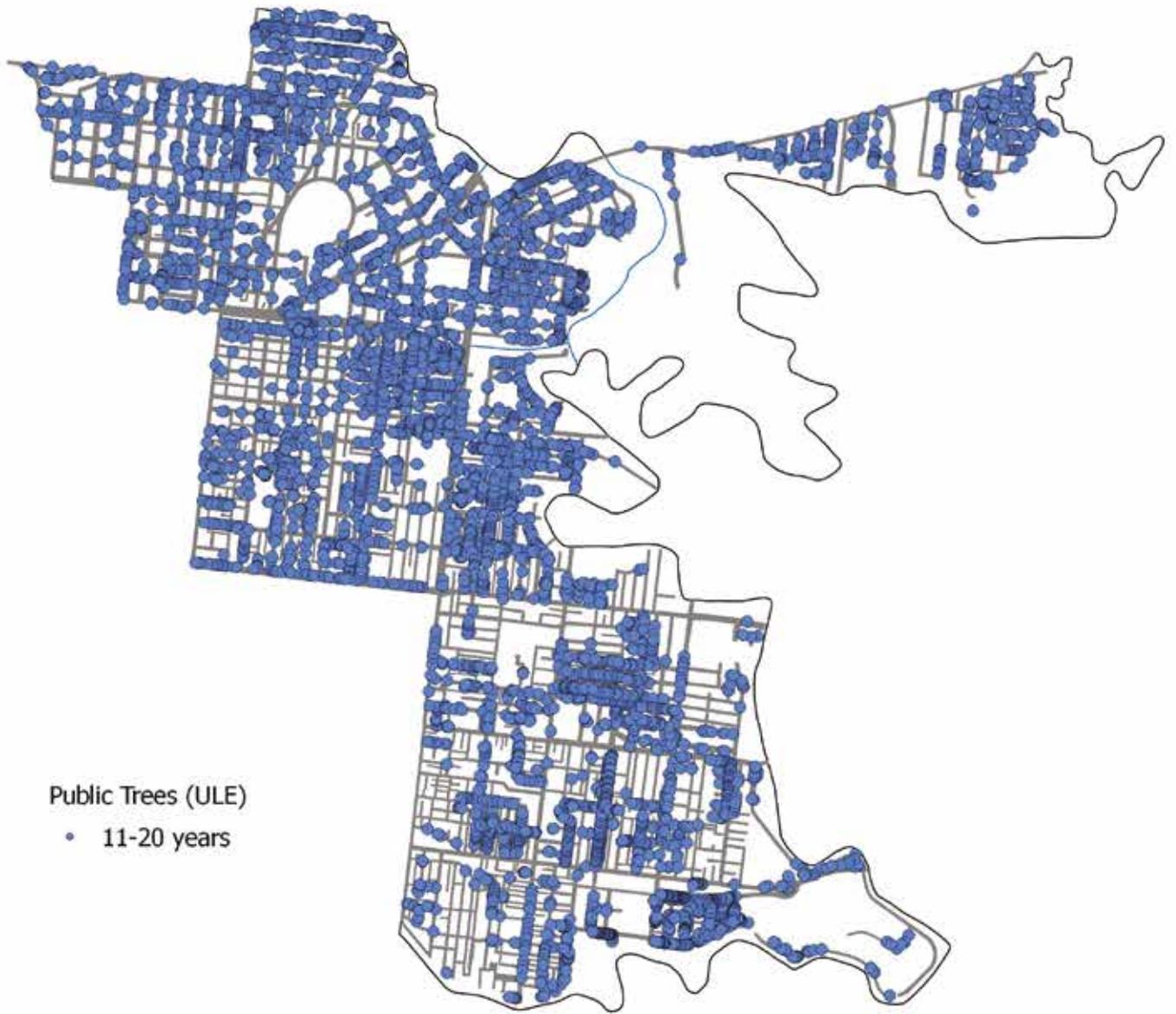
Figure 12: Distribution of trees with a Useful Life Expectancy of between 11 and 20 years.

KEY FINDINGS

With 10% of street trees requiring replacement in the next 10 years, Council will need to consider carefully how to manage the potential impact on the landscape and the succession of removed trees

Council needs to plan now for significant replacement of street trees between
2027 and 2037

Council should investigate how to extend the life of trees with an 11-20 year ULE, with consideration also given to new plantings, which will have the chance to grow up and minimise the impact of tree removals

Tree health

As compared to ULE, tree heath is an indicator of the health of a tree based on assessment of the base, collar trunk and crown.

Against this measurement, Yarra's trees are generally in good health; with 97.3% of the street tree population either in good or fair condition. There are 484 trees in poor or senescent condition and these trees have been placed on a proactive maintenance schedule to manage their decline or improve their health with pruning and other procedures.

There were only 79 dead trees found, which have been programmed for removal and replacement in the next planting season. *Figure 13* provides the breakdown of current street tree health and total percentages.

Tree health category
(% of total street tree population)

- Dead **0.4%**
- Senescent **0.2%**
- Poor **2.1%**
- Fair **15.7%**
- Good **81.6%**

Figure 13: Breakdown of 2017 street health by percentage.

Tree age

Leading practice urban tree management suggests that a tree population should have a broad range of ages. Ideally, young trees should represent 40% of the population, semi-mature 30%, mature 20% and over mature, 10% of the population.

In comparison, Yarra's tree population has less than half the recommended proportion of younger trees at only 17% and over double the amount of mature trees at 55%.

KEY FINDINGS

Yarra's street tree population is under represented by 'Young' trees, and over represented by 'Mature' Trees.

An evidenced-based tree planting program and maintenance program for older trees will help to gradually lower the mature tree population and increase the young and semi-mature tree numbers.

Age class distribution (% of total street tree population)
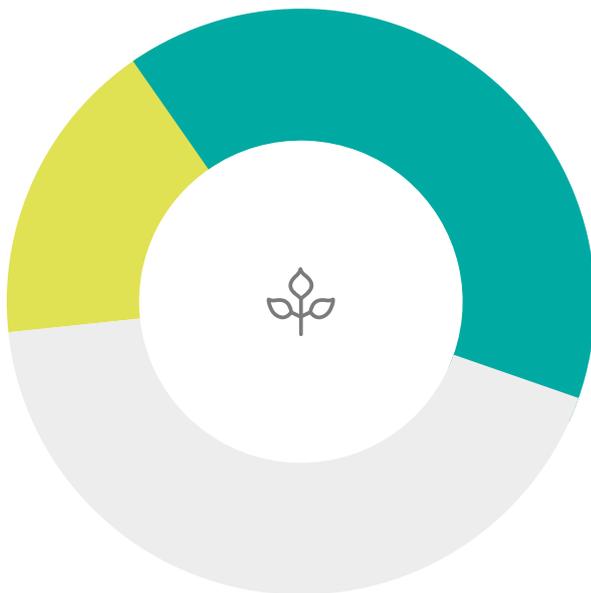
Young
Actual 17%   Best Practice 40%
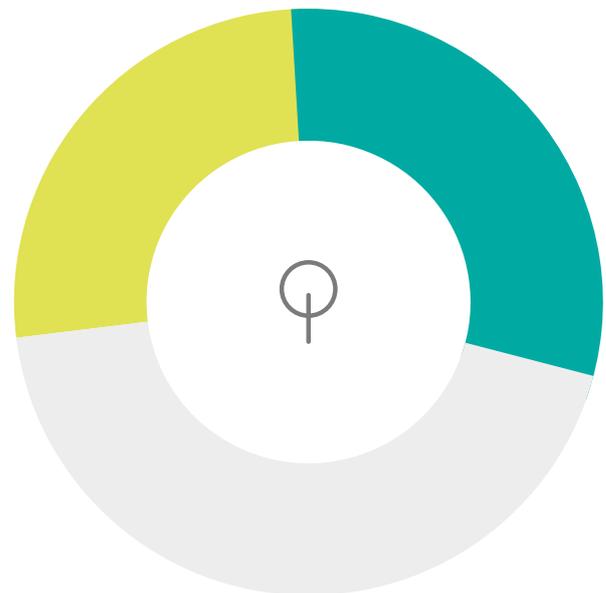
Semi mature
Actual 26%   Best Practice 30%

Figure 14: Age class distribution for Yarra's public tree population against best practice.
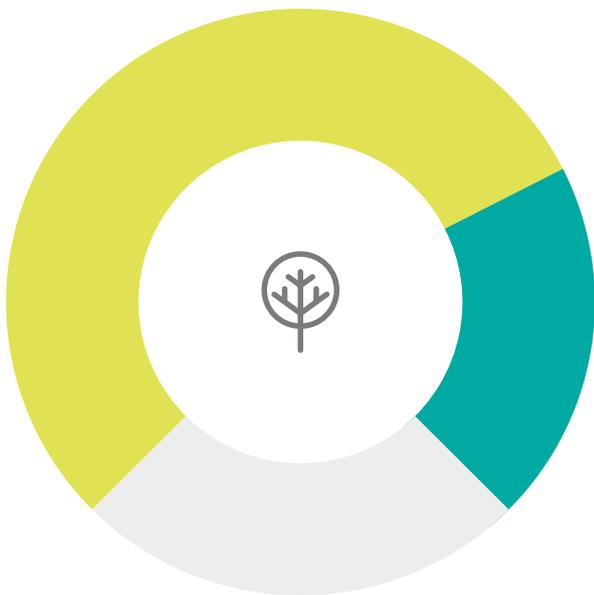
Mature

🟡 Actual **55%**   🟢 Best Practice **20%**
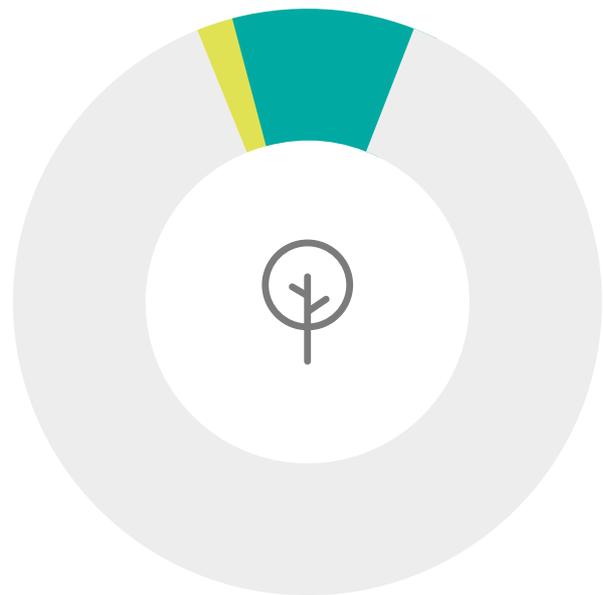
Over mature

🟡 Actual **2%**   🟢 Best Practice **10%**

Tree heights

87% of all street trees are 12m or under (medium and small sized trees), with only 1% of trees over 16m tall, refer to *Figure 15*. Yarra's street tree profile has smaller trees due to space constraints and shared use.

Achieving a significant number of tall trees in an inner-urban setting can be challenging due to competition for growing space, therefore more small-median heights are common in most areas, with taller trees left to flourish in wide streets or open space.

Each tree height category has an important place in a diverse and healthy urban forest. Allowing for larger trees with lush canopy can be a useful way of maximising shade and cooling benefits in streets and is seen as a priority. However, many smaller-median trees planted in close proximity may have a similar canopy benefit and be a more appropriate selection in space constrained areas. Planting the right tree for the right location therefore becomes the vital objective.

Tree height (% of total street tree population)

| Height	%
0 - 4 metres	32%
5 - 7 metres	31%
8 - 12 metres	24%
13 -16 metres	11%
> 16 metres	1%
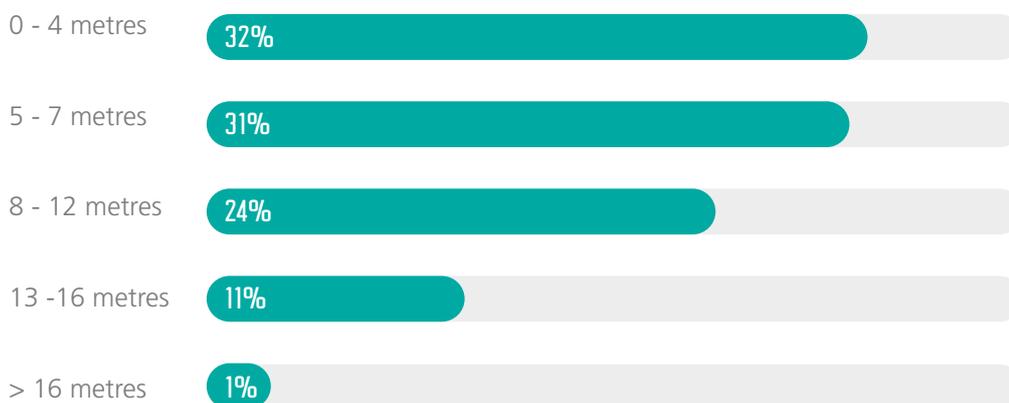
Figure 15: Distribution of tree heights amongst Yarra's public tree population.

The smaller height trees are due to a range of factors:

- young trees which have not reached their mature height yet

- the use of smaller statured trees e.g. Callistemon, Ornamental Pears, Water Gums and Crepe Myrtles due to space constraints in inner-urban streets

- Trees planted under powerlines are required to be pruned according to electrical line clearance guidelines, not allowing them to attain their optimal height.

Going forward, Council's tree planting program will continue to focus on identifying the right tree for the right location, planting larger trees in locations that can adequately support them.

KEY FINDINGS

Yarra's street tree population is over represented by 'medium and small' sized trees, and under represented by 'large' Trees.

Prioritisation should be given to opportunities for planting trees in locations conducive to large trees.

The right tree for the right location, should underpin tree species selection with preference given to larger canopy trees (where possible).

Biodiversity

Biodiversity plays an important role in a unique and thriving urban forest by providing an intertwining network of ecosystems which sustain a healthy environment.

Due to this importance, where possible, contribution to biodiversity needs to be considered and prioritised, for example along corridors and links to waterways.

A Biodiversity Health Survey was conducted on 40 parks (30 reserves and 10 pocket parks) across the municipality in 2016. Of these reserves and parks, land use cover was calculated to determine how vegetated they were. 6% of the reserves and parks land was un-vegetated, 32% was grassed and 34% covered in tree canopy, refer to *Figure 16*.

KEY FINDINGS

One of the major recommendations from the survey was to improve connectivity from biodiversity areas like Merri Creek and Yarra River corridors to other parks like Edinburgh Gardens.

Large significant canopy trees are required along the streets that connect these areas to act as stepping stones for birds, bats and other fauna.

Land use
(% of total land use types across Yarra Reserve system)

- Unvegetated **6%**
- Garden beds **10%**
- Canopy **34%**
- Open water **1%**
- Lawns **32%**
- Bushland **17%**
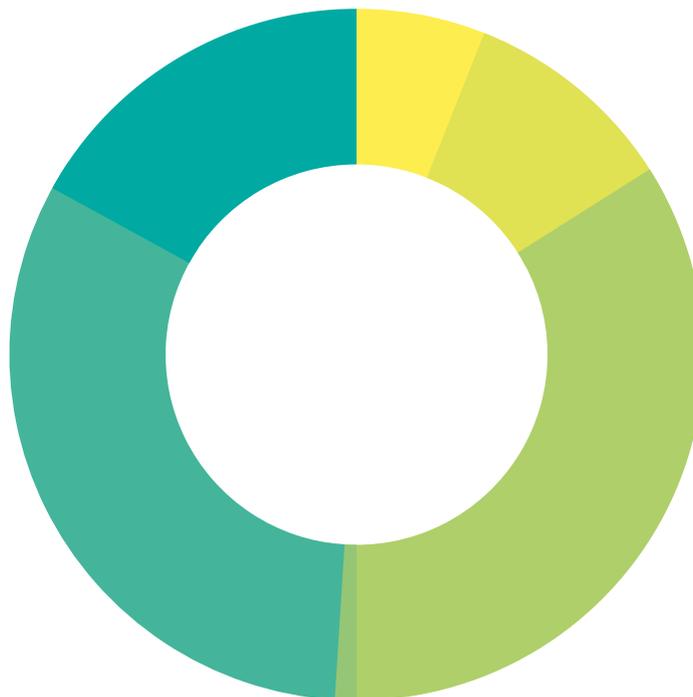
Figure 16: Land use types measured for the Biodiversity Health Survey of 30 reserves, 10 pocket parks.

Asset value

The street tree data from the 2017 audit has also been used to calculate a dollar valuation of the assets. Understanding the asset and environmental value of the urban forest provides further insight into the benefits of trees.

The below values have been calculated using the global I-Tree Eco model.

Yarra's urban forest:

• has an asset worth $68.5 million. This is the value of having to replace the urban forest to a similar state. The value can increase with a rise in the number and size of healthy trees

• returns $106,000 in environmental benefits (air pollution removal and stormwater interception)

• removes over 4 tonnes of air pollution each year worth $90,000

• stores 5,540 tonnes of carbon worth $126,000

• produces 471 tonnes of oxygen every year

• sequesters $4,000 worth of carbon each year

• intercepts 5,431 cubic metres of stormwater each year worth $12,300.

CURRENT TREE MANAGEMENT

Council employs qualified arborists and landscape professionals and also engages a range of professional tree contractors that are committed to the care of Council's public tree population. These internal staff deliver the following services:

• Customer service requests

• Street and park tree planning

• Contract supervision and auditing

• Planning advice in relation to tree matters

Contractors are engaged to deliver the following services:

• Pruning and removals

• Tree and garden bed planting and establishment

• Pest and disease management

• Tree root management

Council has developed long-term policies and procedures to manage trees and to encourage their safe and healthy growth thereby improving the benefits they provide to the community for now and future generations. The City of Yarra Street Tree Policy guides street tree planning, planting, maintenance, removal and replacement across the municipality.

The Street Tree Policy has six major objectives to help improve liveability and amenity through greener streets:

1. Achieve a net increase in the number of street trees planted and overall street tree canopy

2. Improve the quality of street trees

3. Increase the diversity of street tree species

4. Recognise and contribute to natural and built heritage

5. Ensure integrated landscape design

6. Provide education and communication around street trees

The policy can be found online at
www.yarracity.vic.gov.au

Tree planting and removals

Council plants around 800 - 1,000 street and park trees per year and removes around 200 trees per year. Council adheres to a species selection list that encompasses both native and exotic trees that are currently suitable for planting in Yarra.

Program plans for capital works, road and footpath renewal and traffic management are all viewed by the tree team to maximise opportunities to work collaboratively.

Tree protection

Development planning applications are reviewed by the Council arborist to ensure protection of public trees. Council requires tree protection zones to be installed around trees in development sites.

Council maintains a Significant Tree Register (available online) to help ensure that unique, historical, rare and environmentally important trees are not removed or lopped without Council's consideration. These are both public and privately listed trees that are protected from removal by a local law.

Some planning scheme environmental significance overlays across the city provide planning scheme provision relating to trees. Any associated works in these areas require an application to be lodged with Council for any tree lopping or removal.

Some other heritage overlays protect certain tree, further details are available online.

Tree maintenance and inspections

Council runs an annual inspection of trees in streets with high-voltage overhead wires, and a two year inspection program of all other street trees, ensuring that hazards are recorded and actively remediated.

Council adheres to the following technical specifications and guidelines:

• Tree Technical Manual

• AS 4970-2009 Protection of trees on development sites

• AS2303 - 2015 Tree Stock for Landscape Use

• City of Yarra Water Sensitive Urban Design Guidelines for Infrastructure Services Works in Yarra (2012)

Inherited legacy

Whilst the research on urban forest benefits is clear, conflicts between trees and hard infrastructure are commonplace in some areas of the municipality.

This is due to a number of reasons:

• planning from decades ago that did not take into account trees in a future environment particularly around species selection,

• ongoing densification of urban areas,

• at the time of planting a poor understanding of soil types and behaviour, and

• ageing infrastructure e.g. drainage.

Trees that were planted over 50 years ago are now living in a very different environment from when they were planted. These current conflicts require considerable resourcing and funding to manage and it is unlikely that this problem will diminish in the short term. Council has plans in place to help manage the issue.

Risk management

Council has committed to the prioritisation of street trees through integrated streetscape design, it must also be recognised that due to poor historical planning, some street trees have root networks which present an unacceptable risk to person and/or property and require intervention.

Council considers every claim of damage carefully and implements a number of controls to minimise risk and ensure the provision of a safe environment for the community.

When managing its risk profile and assessing the impacts of trees, Council must also consider the other factors that contribute to infrastructure damage, including but not limited to: soil types, construction methodology, excess soil moisture from leaky pipes and ageing infrastructure.

TREES PLANTED OVER 50 YEARS AGO ARE NOW LIVING IN A VERY DIFFERENT ENVIRONMENT FROM WHEN THEY WERE PLANTED

THE WAY FORWARD

The data collected above tells a largely positive story of Yarra's urban forest. Many opportune planting locations have already been utilised, with no widespread or significant gaps in tree canopy identified. Further, the health and diversity of Yarra's urban forest compares strongly against best practice tree management expectations. There are, however, challenges ahead.

Of particular concern is the potential loss of tree stock during the next two decades and the expected increase in temperatures and heat waves being felt in Yarra's inner-urban environment.

Data collected for the Urban Forest Strategy has identified the potential loss of 10% of Yarra's street tree population in 10 years, and a further 24% in 11-20 years. If left unmanaged this will greatly impact the liveability of the city and expand areas susceptible to excessive heat generation and retention. Council therefore needs to plan for this challenge by undertaking staged renewal, and succession planting, or manage intervention to extend tree life expectancy where possible.

Analyses of various data has also identified a targeted approach is needed to coordinate street planting and management of current tree stock across a multitude of priorities. These include areas of high heat retention, locations of significant use by populations most impacted by heat, frequent use activity areas, biodiversity corridors and areas with low canopy cover.

A multipronged approach to grow Yarra's urban forest is therefore required. With better knowledge, Council can make more informed decisions, minimising risk and maximising the benefits that the urban forest provides. The Urban Forest Strategy does not create a whole new program for Council to implement. Instead it can look to build on the success of the programs to date and by improving further integration across Council programs and projects. Using the existing tree management program integrated with capital works and asset maintenance programs will encourage better outcomes for trees across Yarra, with primary focus on street trees. Streets are not only where heat is retained but also where microclimatic moderation from trees can benefit the most people.

Whilst a focus on prioritising growing the urban forest in our streets is paramount, Council will not be able to work alone. Yarra is lucky to have an engaged community with a good understanding of the benefits and challenges of urban trees, and an overwhelming support for more trees in the municipality.

With improved integration of Council programs, together with a focus on areas of need and working with our community, Council will be in a good position to achieve Yarra's Urban Forest Vision and Objectives.

VISION

A more liveable city supported by a healthy and growing urban forest.

OBJECTIVES

• To enhance Yarra's healthy and growing urban forest, improving liveability and mitigating the impacts of the Urban Heat Island effect;

• To manage current and future treestock through best practice urban tree management using evidence-based planning and decision making, together with cross-organisational implementation and innovation;

• To engage and support community involvement in the development of
a flourishing and unique urban forest.

It is also important for Council to set a strong long-term target that is achievable and measurable, and will show tangible progress towards these objectives.

TARGET

Canopy cover in Yarra will increase by 25% (from 2014 levels) by 2040. *This represents an increase from 17% to 21.25% total canopy.*

Yarra's Urban Forest Strategy provides guidance for the next 10 years, however due to the nature of tree growth and climate need, long-term projections are needed, and hence the target is set for 2040.

The management of an urban forest is complex, with priorities, opportunities and challenges interacting in complicated ways. Therefore an evidenced based strategic approach is needed to bring all these factors together. This Way Forward section applies this strategic approach via three key themes, which work to complement each other:

• Priority planting in areas of need

• Enhanced annual planting to grow Yarra's urban forest; and

• Working with others

Priority planting plan in areas of need

The story of Yarra's urban forest identifies key opportunities to achieve the target for more canopy cover, and meet objectives, by identifying critical areas of need for new plantings, adapting how Council manages current tree stock and planning for potential tree stock loss from ULE predictions in the coming decades.

To do this, a 10 year Priority Planting Plan needs to be created, based on evidence data collected and identified priority drivers unique to Yarra urban forest context.

Information collected for the development of the Urban Forest Strategy has been arranged into the following consideration criteria to help identify areas of greatest need.

Urban forest consideration criteria:

Hotspots
where more heat is currently being retained in the urban landscape, locally exacerbating the Urban Heat Island effect;

Social vulnerability
areas with significant populations of people deemed as especially vulnerable to extreme heat and heatwaves;

Pedestrian activity zones
areas of high pedestrian thoroughfare or congregation, or active transport activity including school zones;

Using GIS mapping, the areas identified above will then be examined against priority drivers, to determine the overlapping areas, set priority planting locations and help inform decisions in the annual planting program. Priority drivers have been identified by examining the unique story of Yarra's Urban Forest and the challenges and opportunities it faces.

Yarra priority drivers, in order, are:

a) Areas of low canopy cover, as per data mapping in *Figure 6*;

b) Significant groupings of trees with ULE between 11-20 years, with the intent to:
   • renew streets with canopy trees in the right location for each tree to achieve full canopy potential; and/or
   • prolong tree ULE where possible without increasing risk.

c) Trees not appropriate for location, in accordance with the Street Tree Policy removal and replacement criteria:
   • risk to the public
   • structure
   • adverse impacts to vehicle and/or pedestrian safety
   • excessive renewal and maintenance costs

d) Areas of biodiversity need or significance as per data collected in the Biodiversity Health Survey (2016) and areas identified as linkages, including corridors and understorey linkages

Consideration will also be given to community identified areas for new planting, crossover with other upcoming works planned for Yarra's streetscapes, and municipality crossover/extension corridors.

Locations where there is an overlap of urban forest consideration criteria and priority drivers will be identified as the highest need. In instances where there is more than one overlap in either consideration criteria or priority driver, the priority of the location will elevate.

Importantly, there may be some priority areas identified that are not held by Council, for example VicRoads areas. In these instances the area will be assessed by the tree team for potential planting in close proximity or collaboration with other agencies to introduce trees in the area.

Detailed examination of all of the above will result in a 10 year, evidence based priority planting plan for areas of need and will include an assessment to forecast budget and analysis of the risk and opportunities for each identified location.

Annual planting to grow Yarra's urban forest

While Yarra will utilise the priority areas and subsequent mapping to inform future renewal and extend ULE where possible, improved annual planting with a focus on achieving the urban forest objectives will be a very important element in growing Yarra's Urban Forest and achieving the set target.

Once developed, the priority planting plan will be delivered via the annual planting program. The annual planting program will also include infill opportunities for more trees and help guide how Council works together internally to remain on the forefront of best practice urban forest management – including climatic species selection and improved water filtration.

Yarra will aim to plant between 400 - 800 street and park trees per year as part of the annual planting program. The number of trees planted and the locations will be informed by the need to plant according to opportunities, planting conditions and in consideration of the Priority Planting Plan. Council will focus on planting the right tree in the right location with the future and urban forest objectives in mind; these plantings will be more strategic and at times may be more costly per tree. With more money, the opportunity to plant more trees annually could be increased.

Planting in better conditions and making sure the right tree is in the right location will mean each tree reaches the potential canopy reach, so more canopy cover can be achieved.

Yarra will continue to include avenues and boulevards, large canopy trees, smaller canopy trees in constrained areas and a mix of species.

Any identified areas of opportunity that overlap with a priority above will take precedence in the annual planting schedule.

Maximising potential planting locations

Many areas in Yarra that are suitable for large canopy trees have already had trees planted in recent years. Therefore identifying new opportunities may need to involve trialling new and innovative streetscape designs that will support healthier, longer lived street trees.

These areas may also be highly space constrained making standard tree planting practices difficult. Streetscape redesign, car parking reconfigurations and possible road, footpath or drainage infrastructure works may be required to accommodate more and larger canopy trees. This means that the unit cost per tree planted in these locations may be higher than existing practices. This emphasises the importance of integration with streetscape improvement works for cost and design efficiency.

Traditionally trees have been planted in footpaths, however, over the last decade Council has progressively looked for additional opportunities for larger canopy trees in roadway based plantings.

Alternatively, opportunities may still exist where increased canopy cover can be achieved by planting along wider footpaths with more small trees.

This reinforces the notion that each location requires different designs to suit the needs of each street. Further encouraging innovation in streetscape design for improved functionality, liveability and trees is an ongoing opportunity within Yarra.

The change for the future will be the canopy size focus, seeking the best opportunity in each situation and allowing for the right tree for the right location.

These may include:

- Large shade providing canopy trees at locations unencumbered by overhead wires, with a focus on roundabouts and other sites with expansive hard paving

- Inter-planting of median strips and kerb outstands where opportunity for large canopy trees exist

- Infill planting to maximise diversity of tree species, height, growth potential and age

- Minimise the impact of future loss of mature trees.

- Tree height considerations, including using larger canopy trees on non-power lined side of the street and smaller species on the power line side

- Biodiversity supportive plantings and opportunities to improve connections of local ecosystems through inter-planting and under-story cover

- Opportunities in road reserves which will improve under-story cover

Some of these plantings will also occur in many of Yarra's parks. To best support evidenced based annual park plantings, a tree inventory of all trees in Yarra's public parks (excluding conservation management zones) similar to the street tree inventory is recommended. This will provide additional data to complement the upcoming Open Space Strategy.

Working better together

Management and decision making that influences public trees, other vegetation, and integrated water management occurs across many roles at Council. To achieve strong results Council will therefore need to strengthen how activities are coordinated. Strong and effective internal relationships are required for ensuring integration of urban forest principles across all Yarra works.

Council runs capital works and maintenance programs for all of its assets: footpaths, buildings, roads, drainage networks and trees. Whilst cross-Council asset planning integration already occurs, there is opportunity for more streamlined asset programming for Council with a particular focus on trees.

An integrated asset management system is paramount, as is holistic data mapping and management. Council has a detailed tree inventory that will be placed on Council's asset management system, and can include whole of life-cycle maintenance predictions. Park tree inventory data is also desirable.

Centralising data into a GIS management tool for all to access could help streamline processes and decision making. Annual asset programming meetings involving all asset managers to discuss yearly works and their impacts on other assets is also a valuable way of identifying potential conflicts and issues upfront as well as opportunities.

Whilst a tree planting program will not be wholly dependent on any other program, it should influence and be influenced by other asset programs. Also needed is a set of clear and evidence based tree planting technical guidelines illustrating specifications for trees in roadways and medians to include preferred soil volumes, use of structural cells and passive irrigation installations.

Leading best practice for species selection and water infiltration

Species selection plays an important role in Council achieving the targets and objectives. Council draws on a tree species palette that is suitable for the region and new species are trialled and tested for suitability in Yarra's landscapes. Over time, Council will also need to consider the resilience of each species to changing climates i.e. their ability to cope with hotter temperatures, longer dry periods, periods of higher rainfall, etc.

Council already has evidence about which tree species survived well after the recent millennium drought. There is a clear opportunity to continue to monitor the performance of each species within the various planting styles to develop an evidence based species palette. Not only will this ensure that the right species are being planted for the right location, but they are also being planted for the future.

An adapted suite of tree species is required, that will thrive in the future climatic conditions of Yarra and meet a range of objectives such as:

• Shade

• Biodiversity connections

• Minimise likelihood of tree / infrastructure conflicts; and

• Enhanced growing conditions

Integrated into annual planting will be considerations for improved water infiltration and support for the environment in which trees grow to reach their full potential. This includes looking for opportunities to reduce impervious pavement through expanded planting squares, introduction of permeable paving, or new median strips and kerb outstands (including modifications and new construction).

The urban forest requires water to survive. Providing adequate soil moisture levels for urban trees to thrive can be a challenge, especially in inner-urban streets. Tree pits and rain gardens have been trialled within Yarra to varying degrees of success. The cost implications of these treatments can be high, limiting their ability to be rolled out as business as usual. There are opportunities to increase the inclusion of passive stormwater irrigation using evidenced based designs such as trenching and back of kerb inlets to help build appropriate soil moisture levels for street trees.

This will have a very positive impact on the health of trees and their ability to cool the city and improve liveability.

Working with others

Whilst local government controls much of the public urban forest such as streets and parks, other landholders also have a clear responsibility for managing their elements of the urban forest. This includes private land owners, public land managers such as VicRoads, VicTrack and the departments of housing and education as well as large commercial property owners.

Working with government stakeholders

Council will need to continue to advocate and build relationships with utility service providers, and other landholders to minimise the impacts of their works on the urban tree population e.g. Public Transport Victoria, VicRoads and Powercor, including advocating for undergrounding of electrical services. Additionally, Yarra will work with utilities to understand potential issues with underground services and how to work around these to ensure more centre road/median plantings.

As part of the future annual planting plans, or priority planting plan where applicable, Yarra may seek to secure potential funding from and collaborate with external agencies, such as Melbourne Water, VicRoads, and the Department of Housing to expand tree planting opportunities across the municipality.

Working with the community

Engaged communities are critical for the success of any tree planting plan and the urban forest is a topic that the community is very passionate about. It is therefore paramount that Yarra engages with the community around the importance of a well-managed, healthy and resilient urban forest for the future of Yarra.

While Council will focus on enhancing the urban forest in the public realm, the community has opportunity to have a local impact also. With 60% of Yarra being private land, the contribution to total canopy cover in this realm is important. Supporting the community to understand the benefits of trees, and tree management and planting opportunities, is important to ensure private canopy is protected or even potentially grown over time.

Based on community engagement results from the survey and face to face interactions, the community wants to know more and be more involved about trees in Yarra. An engaged and active community should be involved in caring for the urban forest of the future.

Council will work to support the community awareness of how to manage canopy tree provision in both the public and private realm.

Working with developers

Increasing densification and property development is expected to continue in Yarra due to its inner city location and metropolitan strategies of the State Government. Whilst the private realm makes up 60% of Yarra's land area, any tree canopy within this land use zone is difficult to protect and enhance.

As the private realm continues to densify, the public realm will become more critical for growing Yarra's urban forest. Whilst densification of housing often results in loss of permeable land and vegetation, change in land use (such as from industrial to residential) in some cases, may see the opposite occurring.

Single dwellings, including extensions and alterations, do however, with careful design, provide opportunity to protect or enhance canopy cover in the private realm.

Further understanding of the exact impacts of infill development on private tree canopy cover in Yarra is needed as well as an examination of potential for additional greening in developments.

YARRA'S URBAN FOREST ACTION PLAN

This action plan will support the advancement of the urban forest vision, target and objectives.

VISION

A more liveable city supported by a healthy and growing urban forest.

OBJECTIVES

- To enhance Yarra's healthy and growing urban forest, improving liveability and mitigating the impacts of the Urban Heat Island effect;

- To manage current and future tree-stock through best practice urban tree management using evidence-based planning and decision making, together with cross-organisational implementation and innovation;

- To engage and support community involvement in the development of a flourishing and unique urban forest.

TARGET

Canopy cover in Yarra will increase by 25% (from 2014 levels) by 2040. *This represents an increase from 17% to 21.25% total canopy.*

Action	Timeframe	Lead	Budget
1 **Develop a 10 year Priority Planting Plan** Priority Planting Plan designed to highlight locations of greatest need, based on consideration of criteria data maps showing: a) Hotspots b) Social Vulnerability c) Pedestrian Activity Zones Planting locations will then be decided based on primary drivers, in ranked order: a) Areas of low canopy cover, as per data mapping in *Figure 6*; b) Significant groupings of trees with ULE between 11-20 years, with the intention of: • Partially or fully renewing streets with canopy trees, with each tree in the right location to achieve its full canopy potential; and/or • Prolonging tree ULE where possible without increasing risk. c) Trees considered not appropriate for location, in accordance with the Street Tree Policy removal and replacement criteria: • risk to the public • structure • adverse impacts to vehicle and/or pedestrian safety • excessive renewal and maintenance costs d) Areas of biodiversity need or significance, as per data collected in the Biodiversity Health Survey (2016) and areas identified as linkages, including corridors and understorey linkages Consideration will also be given to community identified areas for new planting, crossover with other upcoming works planned for Yarra's streetscape, and municipality crossover/extension corridors.	Year 1	**Lead** Open Space **Support** GIS Asset Management Traffic Urban design	Within existing resources ($40,000) 2017/2018

Action	Timeframe	Lead	Budget
2 **Annual Tree Planting Program** Plant between 400-800 street and park trees per year as part of the annual planting program with the right tree in the right location and focus on canopy trees where possible. The annual tree planting program will be directed by: a) The priority planting plan (once developed); and, b) Identified infill opportunity planting (identified by cross council integration works and/or quick win locations)	Years 1-10	**Lead** Open Space **Support** Asset Management Urban design Traffic Engineering Services	Within existing resources. Any additional needs subject to annual budget request
3 **Facilitate cross Council integration** a) Support integration of urban forest objectives across Council works by allocating appropriate responsibility and accountability for delivery. b) Establish an internal asset management/ tree management working group to regularly discuss potential impacts to and opportunities for asset planning integration by other asset management programs.	Year 1 - 2	**Lead** Open Space **Support** Asset Management Traffic City Works Engineering Services	Within existing resources. *Potential additional resource subject to budget request*

Action	Timeframe	Lead	Budget
4 Implement streetscape innovation and design at all levels of Council a) Integrate Urban Forest objectives into Councils annual infrastructure and capital works programs with an aim to: • increase planting opportunities • increase ability for trees with more significant canopy • improve tree health, lifespan, and function b) Implement alternative streetscape design solutions which: • allow for taller trees and those with a broader canopy • improve root growing conditions • increase root growing space • reduce risk of root damage • provide passive irrigation to street and park trees, such as kerb inlets or trenches • increase soil moisture and water in the broader urban landscape • support healthier, longer lived street trees c) Ensure tree team consulted on all future on-road projects and works to assess potential to plant new trees or minimise impacts on surrounding trees.	Year 1-10	**Lead** Open Space **Support** GIS Asset Management Traffic Urban design Engineering Services	Subject to development and approval of annual budget bids. Possible grant opportunity

Action	Timeframe	Lead	Budget
5 **Develop support materials to embed urban forest principles** Support materials to be developed to embed urban forest principles into capital works and open space programs, including (but not limited to): a) illustrated specifications for trees in roadways and medians including preferred soil volumes, b) use of structural cells, c) designs for passive irrigation installations (back of kerb or trenching between trees) d) recommended tree species by attributes*, taking into account Yarra's future climate predictions, specific planting in different Yarra streets and parks including small, medium and large opportunities; and for provision of outcomes including: • Largest possible Canopy and Shade • Biodiversity connections • Minimisation of the likelihood of future damage to infrastructure *Species selection will be a working document to be updated and reviewed as required. The supportive materials will help embed Urban Forest principles in design and planning project phases, however the Tree Team should remain closely consulted on all planting works.*	Year 1-3 with opportunity to review	**Lead** Open Space **Support** Asset Management Traffic Sustainability	Years 1-2 within secured grant funding. ($50,000) Years 2-3 subject to annual budget bids.
6 **Include tree inventory data in Council's asset management system** a) Update Council's asset management system with tree inventory and all new/future planting b) Work with integrated asset management database to calculate life-cycle of new trees into recurrent maintenance programs, including drainage and street cleaning.	Year 1-2	**Lead** Asset Management **Support** Open Space	Within Existing resources

Action	Timeframe	Lead	Budget
7 **Collect park tree data** Collect a park tree inventory of all trees in Yarra's public parks (though not conservation management zones). Collect similar attributes as were collected for the street tree inventory. Incorporate into tree data Asset Management System.	Year 3-4	**Lead** Open Space	$40,000 subject to annual budget bid.
8 **Develop Biodiversity Strategy which** incorporates urban forest objectives Ensure Biodiversity Strategy investigates actions to support future plantings along the biodiversity rich Yarra River Corridor	Year 2-3	**Lead** Open Space	Within existing resources
9 **Engage community to support urban forest principles** a) engage with the community around the importance of a well-managed, healthy and resilient urban forest for the future of Yarra b) educate and support the community to integrate urban forest principles on private land including, including development of Yarra specific tree planting and urban forest fact sheets and technical resources for community use in private planting. Themes include, but are not limited to: • how to increase permeable land • appropriate tree species for climatic changes • ways to care for trees in the private realm c) continue to provide community planting days for public planting areas.	Year 2 -onwards	**Lead** Open Space Communications	Within existing resources

Action	Timeframe	Lead	Budget
10 Work collaboratively with other local governments and stakeholders to support urban forest principles a) Work collaboratively with Resilient Melbourne and IMAP groups of Councils to progress agendas and action common across Melbourne local governments. b) Seek collaboration and funding from external agencies, such as Melbourne Water and Vic Roads to increase tree planting, where possible, across the municipality.	Immediate and ongoing	**Lead** Open Space	Within existing resources
11 Advocate to other stakeholders to minimise impacts on Yarra urban forest a) Advocate and build relationships with utility service providers, and other landholders to minimise the impacts of their works on the urban tree population e.g. Public Transport Victoria, VicRoads and Powercor. b) Work with utilities to understand potential issues and solutions with underground services, so to ensure more centre road/median plantings. c) Advocate for bundling or undergrounding of electrical services to allow for taller and larger canopy trees.	Immediate and ongoing	**Lead** Open Space **Support** Communications Construction management	Within existing resources
12 Support opportunities for greening in new developments a) Ensure all development applications that may impact on public trees / public are referred to tree team for comment. b) Ensure creation of new streets in large developments provides opportunity for new tree planting, especially where significant canopy trees may be possible.	Ongoing	**Lead** Open Space **Support** Statutory Planning Urban Design City Strategy	Within existing resources

MONITORING AND EVALUATION

The following tasks need to occur to monitor the urban forest and also the effectiveness of the strategy after 5 years:

• Measure canopy cover using infrared imagery (to be broken down into public vs. private)

• Evaluate successful water sensitive urban design/urban forest treatments and encourage successful treatments to become business as usual

• Review technical tree management guidelines and contracts to ensure current best practice is reflected

• Review the effectiveness of budgets and resources in delivering the urban forest program

• Review action list and reprioritise based on those already achieved

• Review tree species list.

The following tasks should be undertaken to monitor the urban forest and also the effectiveness of the strategy after 10 years:

• Undertake a full tree Inventory including species, ULE, age, health, structure, etc.

• Review and update the 10 year planting plan and ascertain if priorities need changing

GLOSSARY OF TERMS

Biodiversity
The variety of all life forms on earth: the different plants, animals and micro-organisms and the ecosystems in which they are a part.

Canopy cover
The measure of the area of tree canopy when viewed from above, and is recorded as a percentage of total land area.

Capital Works Program
A program of works conducted by Council which renews, upgrades or creates new infrastructure to support the delivery of services to the Yarra community.

Carbon sequestration
The ability of trees to absorb carbon dioxide from the atmosphere through their leaves.

Evapotranspiration
The movement of water from the landscape to the atmosphere through vegetative matter by the process of evaporation and transpiration.

Hardstand
A paved area for parking heavy vehicles.

I-Tree Eco
A model built by the United States Forestry Service that analyses certain tree parameters in conjunction with air quality measures to determine an environmental value of a tree.

Liveability
As assessment of what a place is like to live in, taking into account environmental quality, crime and safety, education and health provision, access to shops and services, recreational facilities and cultural activities.

Stormwater interception
The halt or reduced flow of stormwater into the drainage system for re-use.

Urban density
The number of people inhabiting a given urbanised area.

Urban ecology
Is the scientific study of the relation of living organisms with each other and their surroundings in the context of an urban environment.

Urban forest
The sum of all urban trees including those on public and private land.

Urban Heat Island effect (UHI)
When urban areas are warmer than surrounding rural areas due to heat retention in hard surfaces. This build-up of heat is re-radiated at night time, increasing air temperatures which can have serious human health consequences particularly during heatwaves.

Useful Life Expectancy (ULE)
The amount of time a tree is estimated to remain in the landscape before it needs to be removed and replaced.

Water sensitive urban design (WSUD)
is the integration of the water cycle into urban planning and design by recognising all water streams in the urban environment as a potential resource.

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