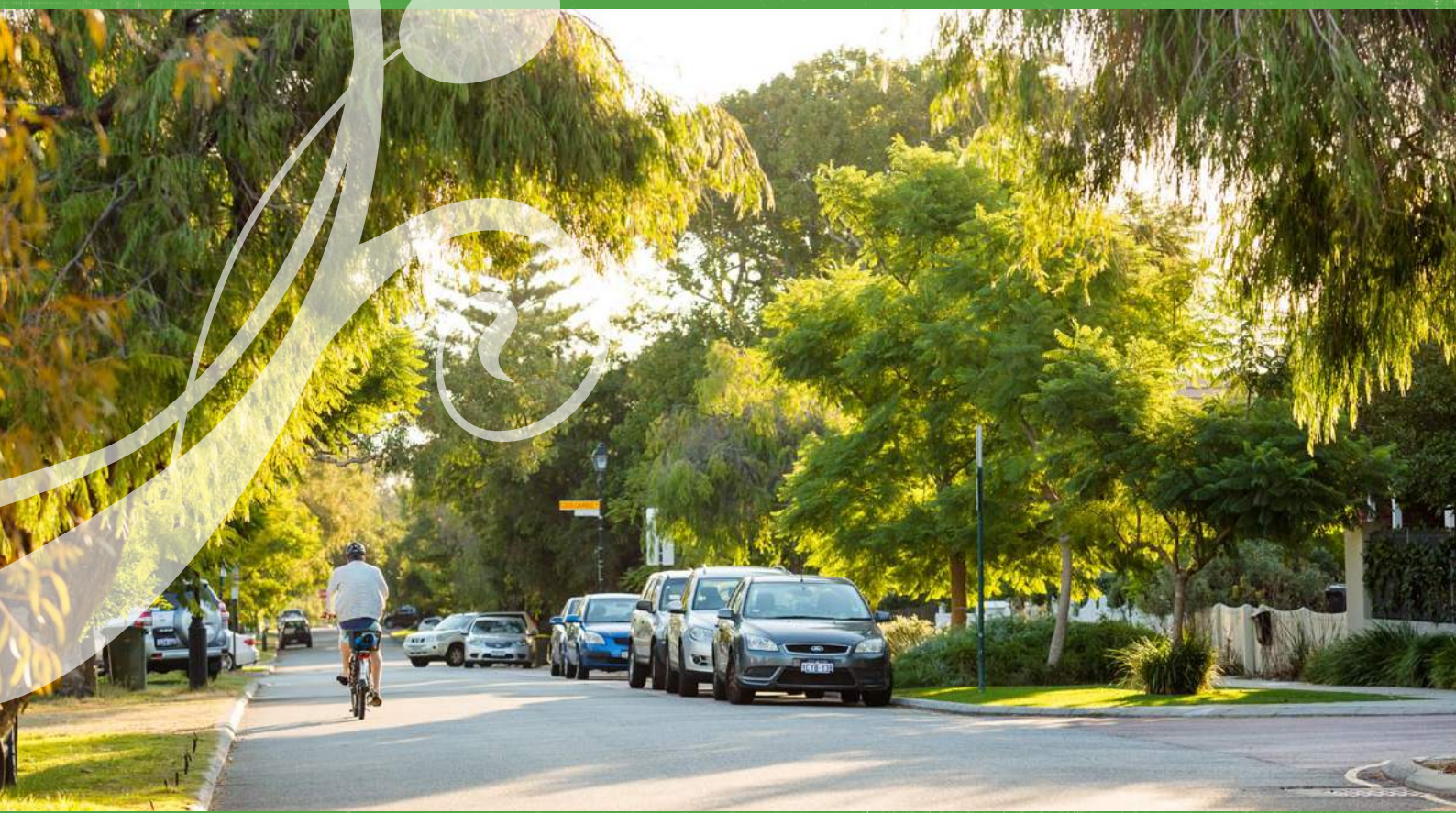
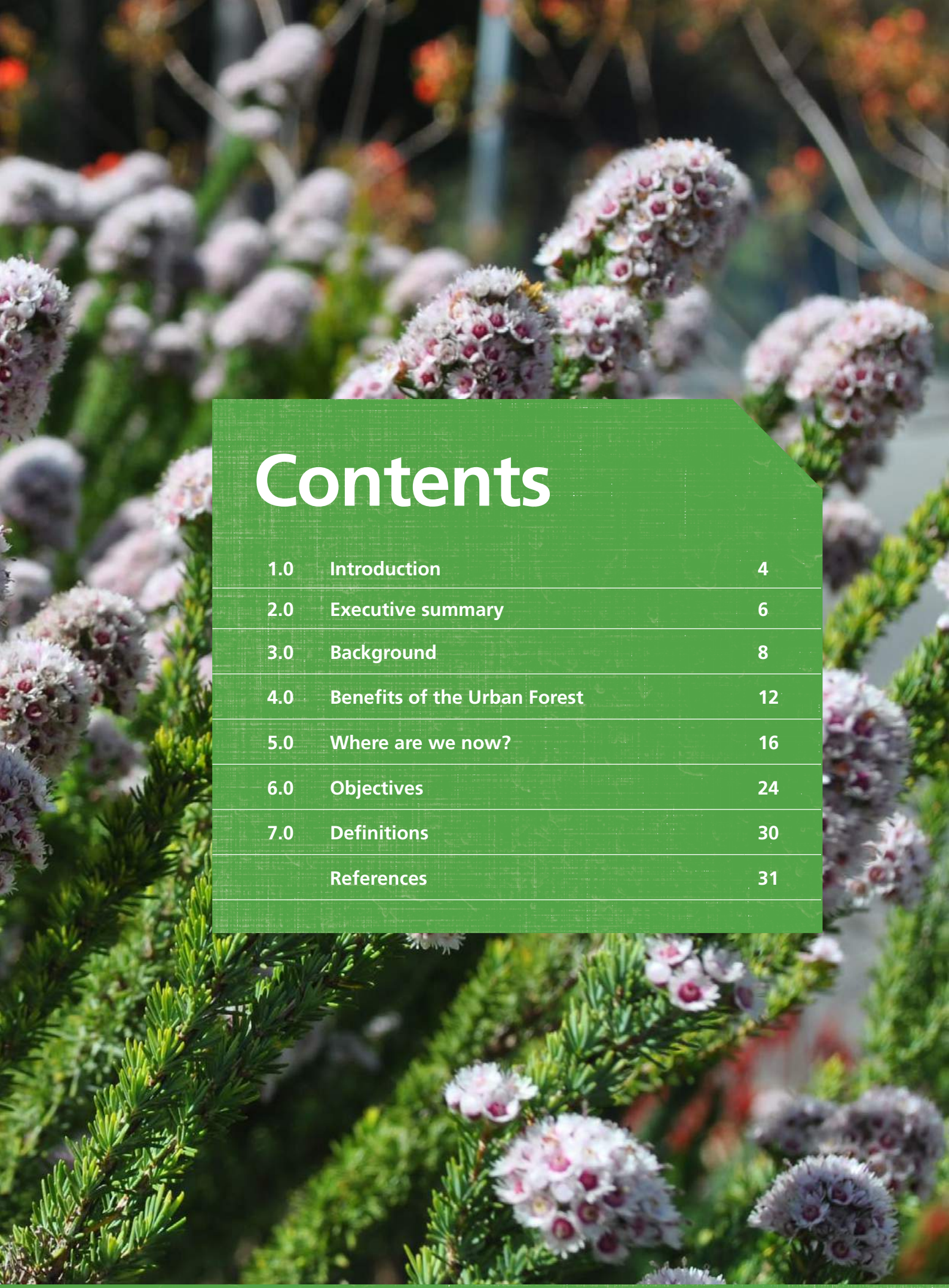
CITY OF SUBIACO

# Urban Forest Strategy

## 2018 – 2022

Growing a greener Subi



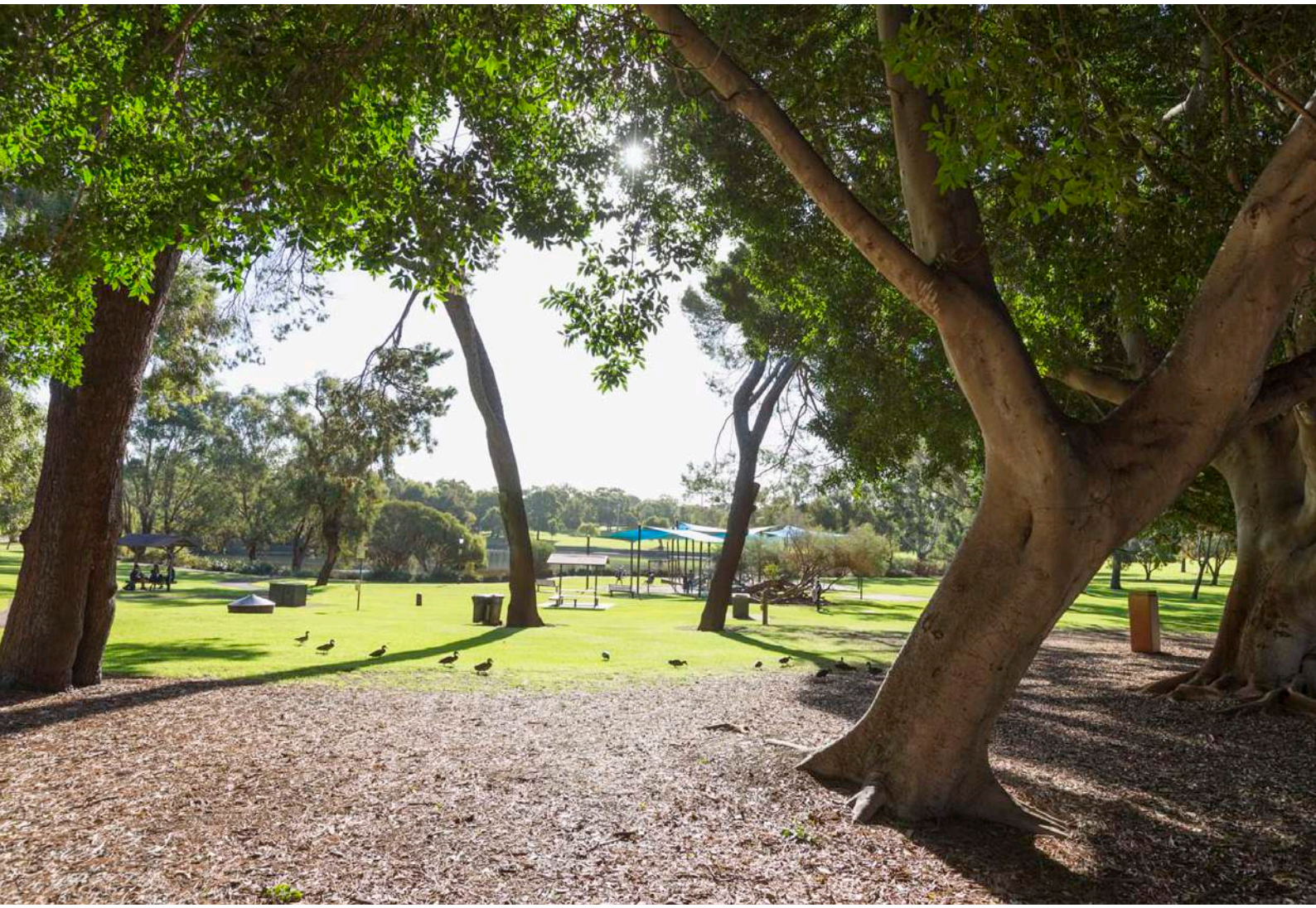


# Contents

# Introduction

An urban forest is broadly defined as the collection of green spaces, trees and other vegetation that grow within an urban area, on both public and private land. Together, these green elements provide a range of benefits that enrich the quality of life for those in the area, and promote human well-being. The primary difference of an urban forest, compared to a 'natural' forest, is that it exists within a man-made environment, characterised by hard surfaces, a range of building types and concentrated human activity. This poses many challenges for its planning and management compared to more naturally vegetated areas. Modern urban forest management focuses on the art and science of managing trees in urban environments to maximise the range of community benefits. Its focus is on the health and resilience of the urban forest as a whole.

***All trees within the City of Subiaco are considered to be significant.***



# Executive summary

The purpose of this *Urban Forest Strategy* is to create and maintain a fully sustainable urban forest in the City of Subiaco which is both appropriate and well-positioned to ensure it has the opportunity to achieve its horticultural potential with the associated benefits of a thriving urban forest.

This strategy defines the urban forest as all vegetation growing within the city, which is divided into two categories: the understory such as turf, groundcover, shrubs and hedges up to three metres, and the canopy which is any vegetation above three metres.

The city's urban forest is a vital urban element that transforms the city's streets, parks, reserves and properties to provide numerous environmental, aesthetic, cultural and economic benefits. In the long term, it creates a sense of place and enhances the city.

A 2017 analysis of the city's urban forest has identified that the local government area has a total vegetation cover of 34% and a canopy cover of 20.8%. A marginal increase in canopy cover has been achieved since 2012 which appears to be as a result of an increase in canopy in residential areas and in the road reserve.

The vegetation and canopy composition of the urban forest can be broken down into height categories:

| Vegetation class | Vegetation cover |
|---|---|
| **0-3m** | 13.2% |
| **3-10m** | 13.8% |
| **10-15m** | 4.6% |
| **15m+** | 2.4% |
| **Total vegetation cover** | 34% |

| Canopy class | Canopy cover |
|---|---|
| **3-10m** | 13.8% |
| **10-15m** | 4.6% |
| **15m+** | 2.4% |
| **Total canopy cover** | 20.8% |

***Source:*** *City of Subiaco Vegetation cover, May 2017.*

The City of Subiaco underwent a boundary change on 1 July 2016, whereby the area south of Aberdare Road including The University of Western Australia was transferred to the City of Perth. Following the loss of a large portion of the well-treed South Ward, achieving any increase in canopy cover is commendable. This increase has primarily come from the 3-10m height class, which is compensating for a loss in canopy cover in the 15m+ height class. Total vegetation cover appears to have declined, however this can be attributed to the seasonal variation in grass cover, as areas of dead grass are classified as non-living material.

The city's strategic planning documents outline the city's approach to an increasing residential population and changing land use in the city, including the challenges that future development poses to the urban forest. Modelling has indicated that the removal of all vegetation within the re-zoned areas would reduce vegetation cover from 34% to between 31.6% and 25.4% and canopy cover from 20.8% to between 19.3% and 16.0% within the city as a whole, dependent on the level of infill development.

The city aspires to increase canopy cover in all height classes and reduce the total area of non-living material which will in turn increase vegetation and canopy cover.

It is intended that the *Urban Forest Strategy* be used as a guiding document when developing the strategic financial plan and prioritising capital works within the city, with a review of the strategy undertaken every two years.

The city takes a systematic approach to the selection, planting and maintenance of its urban forest. This strategy sets the framework for the future development, protection and management of the urban forest with a consideration to the city's aesthetic and environmental goals.

The key objectives of the *Urban Forest Strategy* are to:

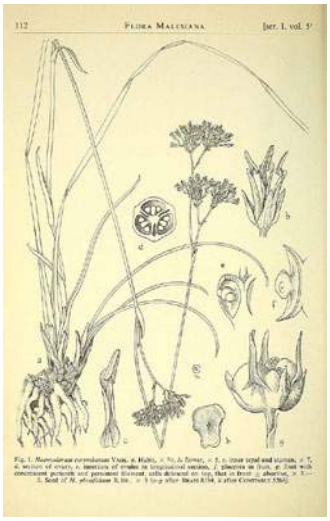
- preserve and protect the city's urban forest
- mitigate loss of canopy from urban infill
- maintain the high standard of the city's urban forest
- increase the urban forest canopy
- improve soil health
- improve onsite infiltration of water
- implement a replacement program for senescent trees
- improve resilience and species diversity
- reduce heat island effects/hot spots
- adapt to the changing needs of public open space
- educate our community
- respect the heritage components of our urban forest.

# Background

## Aboriginal history

Prior to European settlement the area now known as Subiaco was inhabited by the local Whadjuk Nyungah people, the traditional owners of the area. The land was treated according to a system of management embedded within the culture of the Whadjuk, with early accounts describing the landscape of the swan coastal plain as "like parkland"[1], with areas of grassland interspersed with forested landscapes. Despite the original misconceptions that the Aboriginal people were hunter-gatherers, the landscape was a managed landscape; for resource and food production with hundreds of native plant and animal species cultivated and utilised as part of the local diet.[2]

Trees were utilised for medicine, canoes, shields and other equipment. Food was plentiful to the extent that, according to accounts of early settlers, the local people had no words in their language for a shortage of food.[3] Trees were also of spiritual importance in Aboriginal culture, with certain species demarcating the resting place of spirits, and tree hollows utilised for burials.



*Haemodorum corymbosum, bloodroot*

292 RULES FOR GATHERING ROOTS AND PLANTS.

The natives have, however, a law that no plant bearing seeds is to be dug up after it has flowered; they then call them (for example) the mother of Buhn, the mother of Mud-ja, &c. ; and so strict are they in their observance of this rule, that I have never seen a native violate it, unless requested by an European, and even then they betray a great dislike to do so.

***Source:*** *Journals of Two Expeditions of discovery in North-West and Western Australia, George Gray 1841.*

## Local History

Beautification was an important feature on the municipality's agenda from its gazettal. Alexander Rankin, the Municipality's first Town Clerk, was responsible for encouraging the planting of street trees and the establishment of parks and gardens, including the creation of a municipal garden at the corner of Rokeby and Hamersley Roads.

During the 1920s Rankin's street planting scheme was again revived and Alexander Dickson Esson Bruce, a highly qualified gardener trained in horticulture in Edinburgh, was appointed Municipal Gardener at Subiaco. He was responsible for the creation of a municipal nursery in Kitchener Park.

The importance of street planting to the physical appearance of Subiaco and its visual identity is reflected in a speech made by Mayor Richardson in 1922:

"It is necessary now... not only to properly maintain the trees we have already in our streets, and which are one of Subiaco's greatest assets, but to continue the policy of tree planting in new streets". (Mayors Report 1922, cited in Spillman, Identity Prized, p220)[4]

In August 1925, James Thomson (West Australian Newspaper 31 August 1925)[5] commended the foresight of the Municipality in making generous provision for street trees, parks and gardens. He drew attention to the 'beautifully kept' Municipal Gardens, and Kitchener Park, 'a magnificent heritage in itself', and gave a detailed description of the nursery and the wide variety of plants propagated there.

The established Municipal Gardens were visited by garden people from the Eastern States and the Municipal Nursery supplied all the flowers, shrubs, plants and trees for parks, gardens, streets, recreation and play grounds in the district and the greater metropolitan area.

Subiaco's heritage includes the trees and plants that were grown in the municipal nursery and are now planted on both public and private land. The trees were given to residents for their gardens and the planting of trees was also used to give employment to out-of-work men home from war.[6] [7]

## European history

Some Europeans saw the forest primarily as a resource. Timber was utilised by early settlers for the construction of dwellings, for heating, cooking and various other uses. Wildlife was seen as either a food resource or competition with agriculture and a pest to be exterminated. As the colony developed, timber cutters became active throughout the forest and many areas were cleared for agriculture. As the colony grew and technology improved timber mills became active throughout the forest within the western suburbs and beyond.[8]

*Mary, Dorothy and Eileen Newman of Subiaco on a leisurely walk through Subiaco bushland.* ***Source****: Subiaco Museum collection, 1915.*

One of the botanists accompanying an early expedition to the colony, Ferdinand von Mueller (namesake of Subiaco's Mueller Park), is quoted as saying "It is such a shame that not one small remnant of the original primeval forest was retained so that people could see its magnificence."[9]

As Subiaco grew and developed much of the forest was cleared for housing and industrial development. As Subiaco's urban area developed and the parks movement of the nineteenth century took hold, parks were developed and trees planted for beauty and interest.

*The view looking south to Subiaco railway station with what is now the Subiaco CBD and Rokeby Road in the background.* ***Source:*** *Subiaco Museum collection, 1894.*

## Current context

Subiaco is known as a well-treed western suburbs council. Urban forests are now recognised as green infrastructure, a vital infrastructure component of a healthy city. Trees are individual assets for local government, private and other landowners, but collectively function as a community wide resource, proving a multitude of ecosystem and health benefits while grounding the community in a sense of place.

The City of Subiaco is recognised as one of the leaders in urban forest management and development within Western Australia. The city's forest is diverse both in species and age class. The city has undertaken extensive tree planting programs over the last few decades that have resulted in significant tree coverage and the retention of the city's canopy coverage under increasing pressure from urban infill development. The city has a comprehensive annual tree planting program which has resulted in thousands of trees being planted on verges and within natural regeneration areas across the municipality. Trees on city managed land are assets and are managed as such via a proactive inspection program that sees every tree inspected on a cyclical basis, reducing the city's liability and identifying and addressing issues within the forest.

The forest as a whole is monitored for its size, health and composition on a regular basis to inform management decisions and required planting locations. The forethought of Council to undertake and complete the undergrounding of power within the city has allowed for significant development of the city's tree canopy. Trees add a sense of beauty and character for the residents of Subiaco and are enjoyed by many of the visitors to the city. The wildlife inhabiting the urban forest add an extra dimension of interest and pleasure into the lives of residents.

## Strategic context

The city's integrated planning and reporting framework allows for Council and the community to track the city's progress in delivering its urban forest goals and implementation actions. The framework is informed by the community aspirations and vision set out within the city's *Strategic Community Plan*. During the 2017 review of the *Strategic Community Plan* the city's parks, open spaces and places were rated by the community as the city's most high performing area, with significant support for their ongoing growth and development. This expresses the value the community places on the city's greenery and urban forest.

The city has further operational and strategic documents that will be utilised in the ongoing delivery of the *Urban Forest Strategy*.

- *Strategic Community Plan 2017-2027*
- *Corporate Business Plan 2015-2019*
- *Sustainability and Resilience Strategy 2016-2021*

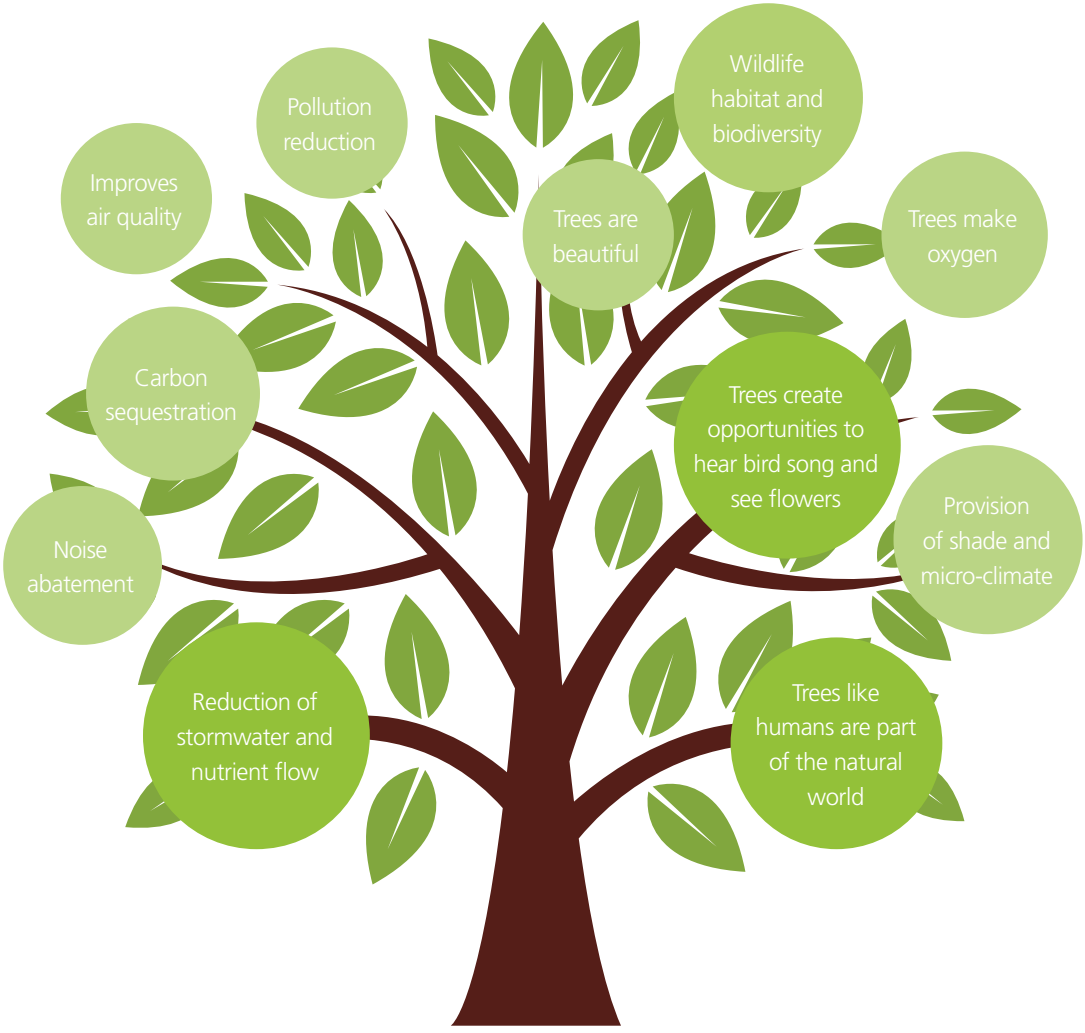
These plans are supported by the city's policies and protocols.

# Benefits of the Urban Forest

Urban forests provide the community with countless benefits; ongoing research is continually identifying more and more benefits which have a profound impact on the liveability of communities. Trees provide more than just clean air and shade; they assist in the mental health of the community, stormwater management, environmental impact and noise reduction. The urban forest of Subiaco is diverse, with a variety of native and exotic species, age classes and historic or cultural significance.

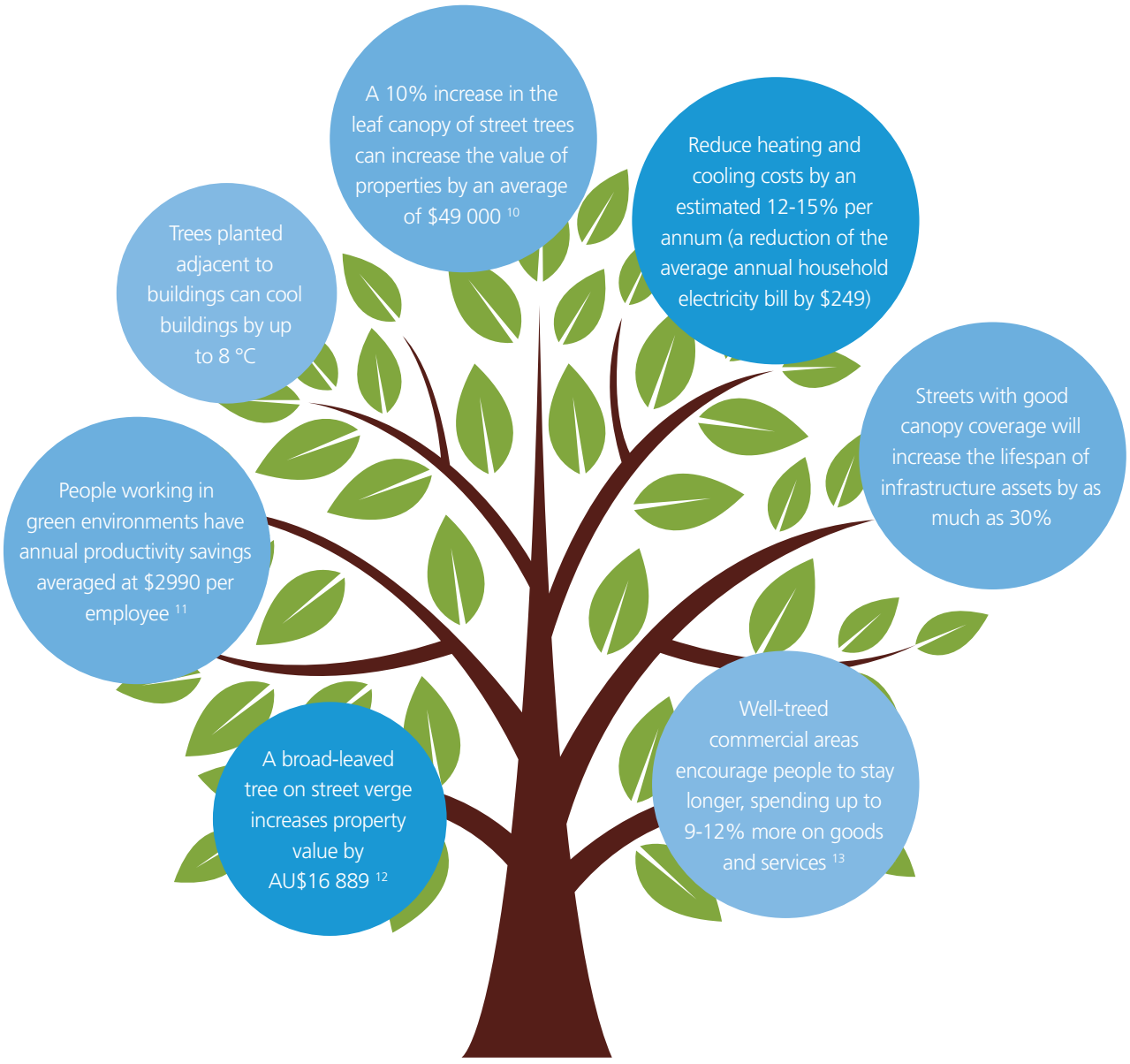
## Environmental benefits

Trees help create ecosystems that provide habitat and food for birds and other animals which allow these native species to move between reserves. Trees provide a myriad of ecosystem services such as cleaning and producing the air that we breathe.



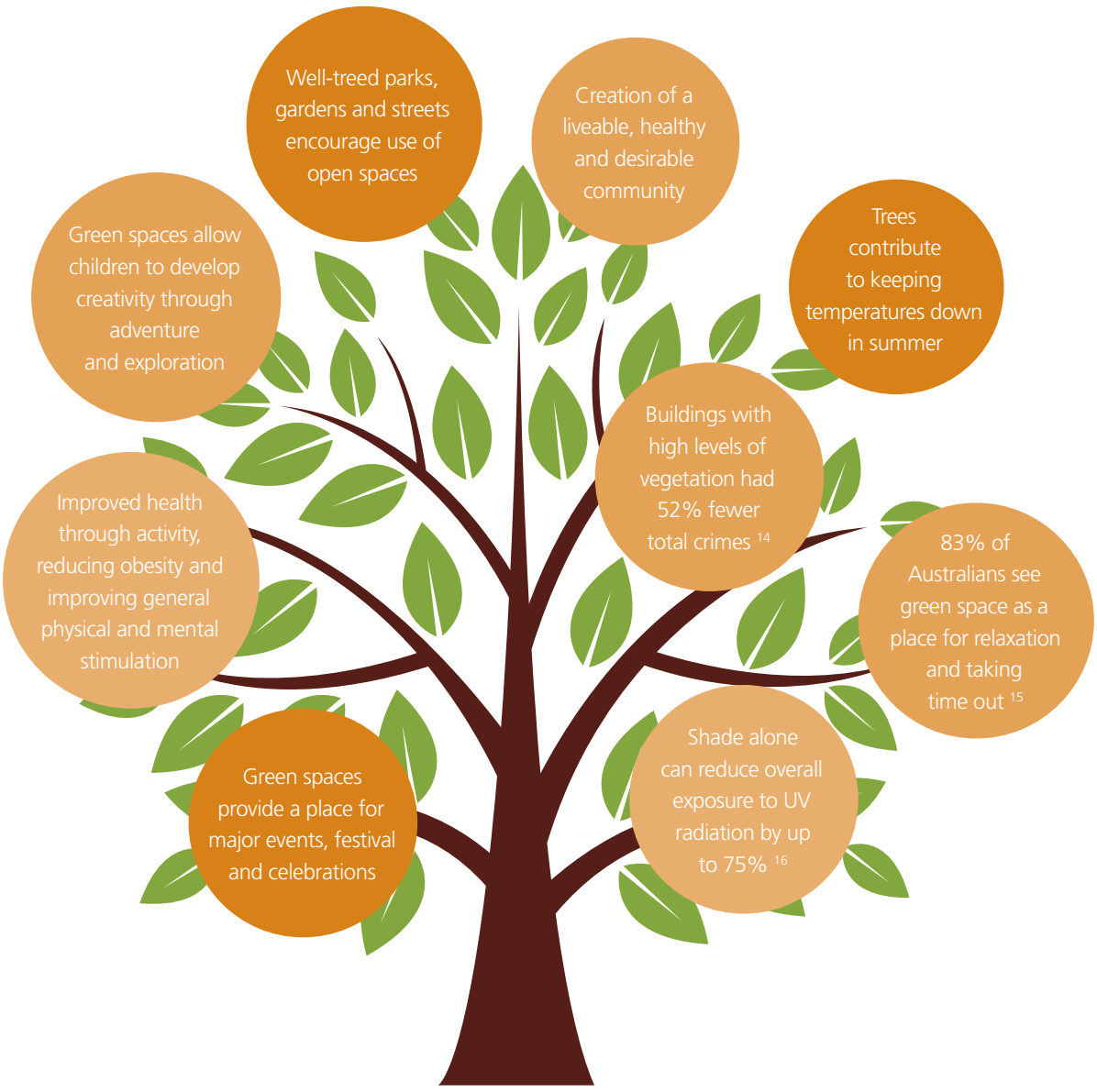
## Economic benefits

Economic benefits of the urban green infrastructure can be demonstrated in impacts of spending, operating costs, staff motivation and economic benefit.



## Social benefits

The social benefits within the urban environment are the sense of community, the overall health of the community and changing social issues such as crime and vandalism.



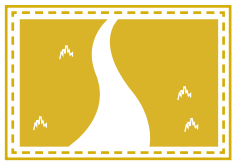
# Where are we now?

## Introduction

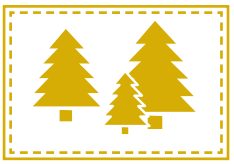
The urban forest contributes significantly to the character, liveability and identity of Subiaco and encompasses both vegetation on private property and vegetation on land managed by the city. The city manages 42% of the total area, meaning 58% is managed privately or by other government agencies.

Within this 42%, our urban forest consists of approximately:

15 000
street, park and reserve trees



66
hectares of irrigated garden beds and turf



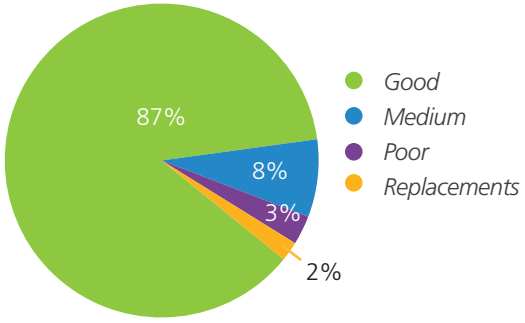
12.7
hectares of green corridors

The city actively promotes the preservation and growth of our urban forest through:

- annual planting programs
- community planting events (such as National Tree Day)
- increasing community awareness through education and promotion
- completing regular visual tree audits on all city trees
- ongoing cyclical tree maintenance programs
- proactive pest and disease management

## Measuring the urban forest and benchmarking

It is possible to examine our urban forest in a number of ways. In order to best manage existing vegetation and to guide the development of the urban forest for the future, the city has undertaken extensive mapping of tree health, species composition, canopy cover and useful life expectancy for the trees managed by the City of Subiaco. This mapping provides key indicators with which to benchmark the urban forest, set future targets and measure change over time.




*Tree vitality, City of Subiaco, 2018.*

The total area of the City of Subiaco is approximately 561.7 hectares.

| Land area by class | | |
|---|---|---|
| Land cover class | Area (ha) | Percent (%) |
| **0-3m** | 74.1 | 13.2 |
| **3-10m** | 77.3 | 13.8 |
| **10-15m** | 26.0 | 4.6 |
| **15m+** | 13.7 | 2.4 |
| **Total vegetation** | 191.1 | 34.0 |
| **Total canopy (>3m)** | 117.0 | 20.8 |
| **Total non-living material** | 370.6 | 66.0 |

***Source:*** *City of Subiaco, May 2017.*

| Height stratification by ward (areas in hectares) | | | | |
|---|---|---|---|---|
| Land cover class | Central Ward | East Ward | North Ward | South Ward |
| **0-3m** | 18.71 | 17.89 | 20.13 | 17.35 |
| **3-10m** | 23.53 | 20.87 | 20.74 | 12.19 |
| **10-15m** | 6.17 | 6.73 | 7.89 | 5.35 |
| **15m+** | 2.16 | 3.93 | 4.32 | 3.25 |
| **Vegetation cover** | 50.38 | 49.42 | 53.09 | 38.03 |
| **Canopy cover (>3m)** | 31.86 | 31.53 | 32.96 | 20.69 |

***Source:*** *City of Subiaco, May 2017.*

Since 2012, the city has planted or subsidised 2818 trees and 97 164 shrubs, grasses and ground covers, with significant achievements made in increasing the number of trees within our urban forest, particularly in the number of street and reserve trees. In the last decade, new tree planting has mainly been carried out as part of streetscape and park upgrades, dead tree replacements and capital works. The increased number of street trees has created a greener city, improved the quality of public open space and will in time increase our urban forest canopy.

| Planting numbers | | |
|---|---|---|
| Year | Number of trees | Number of plants |
| **2011 – 2012** | 243 | 11 700 |
| **2012 – 2013** | 285 | 12 912 |
| **2013 – 2014** | 470 | 13 916 |
| **2014 – 2015** | 662 | 20 093 |
| **2015 – 2016** | 657 | 18 555 |
| **2016 – 2017** | 601 | 19 988 |

## Tree canopy cover

Canopy cover is a measure of the physical coverage of the tree canopy over the land. It represents a way of expressing, as a percentage, how much of any given area is shaded by trees. In the City of Subiaco we are seeking to increase summertime shade and biomass to combat the urban heat island effect (see page 21), adapt to climate change and to enhance our streetscapes for the benefit of people.

Canopy cover is an important way of measuring the character of any urban forest. Broad calculations suggest that large mature trees provide 75% more environmental benefits than smaller trees. As a single large tree can shade a larger area than several small trees, the measure of canopy cover is more valuable than simply counting the total number of trees.

**20.8%**
total canopy cover (3m+) within Subiaco

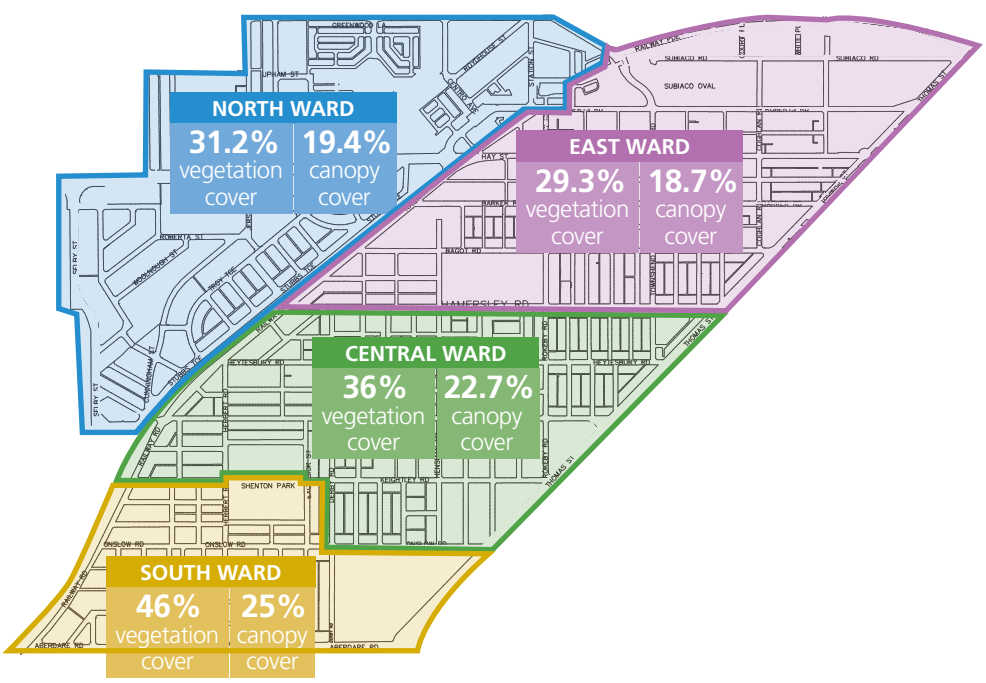
**79.2%**
of Subiaco is without natural shade

**34.0%**
canopy coverage of parks

**28.5%**
canopy coverage of road and road reserves

**16.1%**
canopy coverage of residential areas

**8.1%**
canopy coverage of commercial and municipal areas




*Vegetation and canopy cover by wards, City of Subiaco, 2017.*

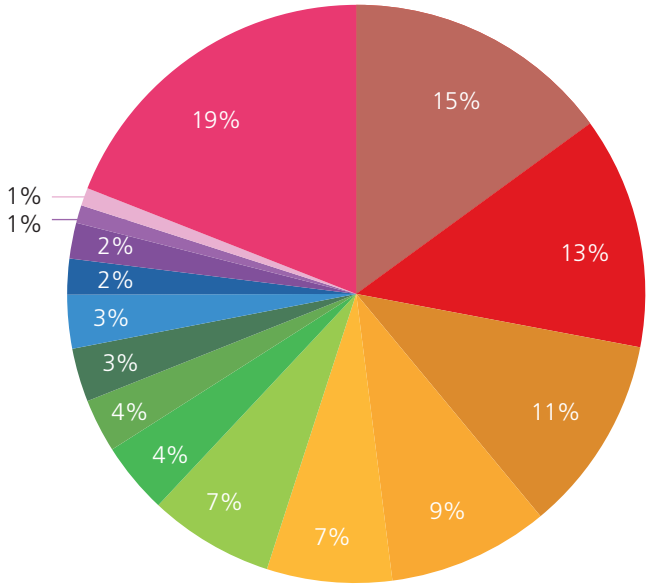
## Environmental values

We can calculate the amenity value of our trees by evaluating tree condition, species type, aesthetics, environmental values of air pollution amelioration, carbon storage and sequestration and energy savings benefits. A conservative estimate of the value of the city's forest is $110 million dollars which will continue to increase if we continue to grow our urban forest.

## Tree diversity and vulnerability

The urban environment is highly modified, with harsher conditions for plant growth than in natural landscapes with similar climates and terrain. Urban soils are compacted, root volumes reduced, heating and shading more severe, space is limited and regular disruptions of roots and canopies occur. Not every tree species copes well with these conditions and reliance on a few species is risky.

A lack of diversity leaves the urban forest vulnerable to threats from pests, disease and climate change. A diverse range of species provides greater resilience and long term stability for the forest as a whole. A robust urban forest also features age diversity, with species of varying life spans and growth rates as a uniform age profile makes it likely that many trees will decline and senesce at the same time.




- 15% Brush Box *Lophostemon confertus*
- 13% Eucalyptus species *Eucalyptus sp.*
- 11% Jacaranda *Jacaranda mimosifolia*
- 9% WA Peppermint *Agonis flexuosa*
- 7% Callistemon species *Callistemon sp.*
- 7% Corymbia species *Corymbia sp.*
- 4% Melaleuca species *Melaleuca sp.*
- 3% Brachychiton species *Brachychiton sp.*
- 3% Camphor Laurel *Cinnamomum camphora*
- 3% Chinese Tallow *Sapium sebiferum*
- 2% Angophora *Angophora costata*
- 2% Gleditsia *Gleditsia sp.*
- 1% Moreton Bay Fig *Ficus macrophylla*
- 1% Sweet Gum *Liquidamber styraciflua*
- 19% Other species

*Tree Diversity by species, City of Subiaco, 2018.*

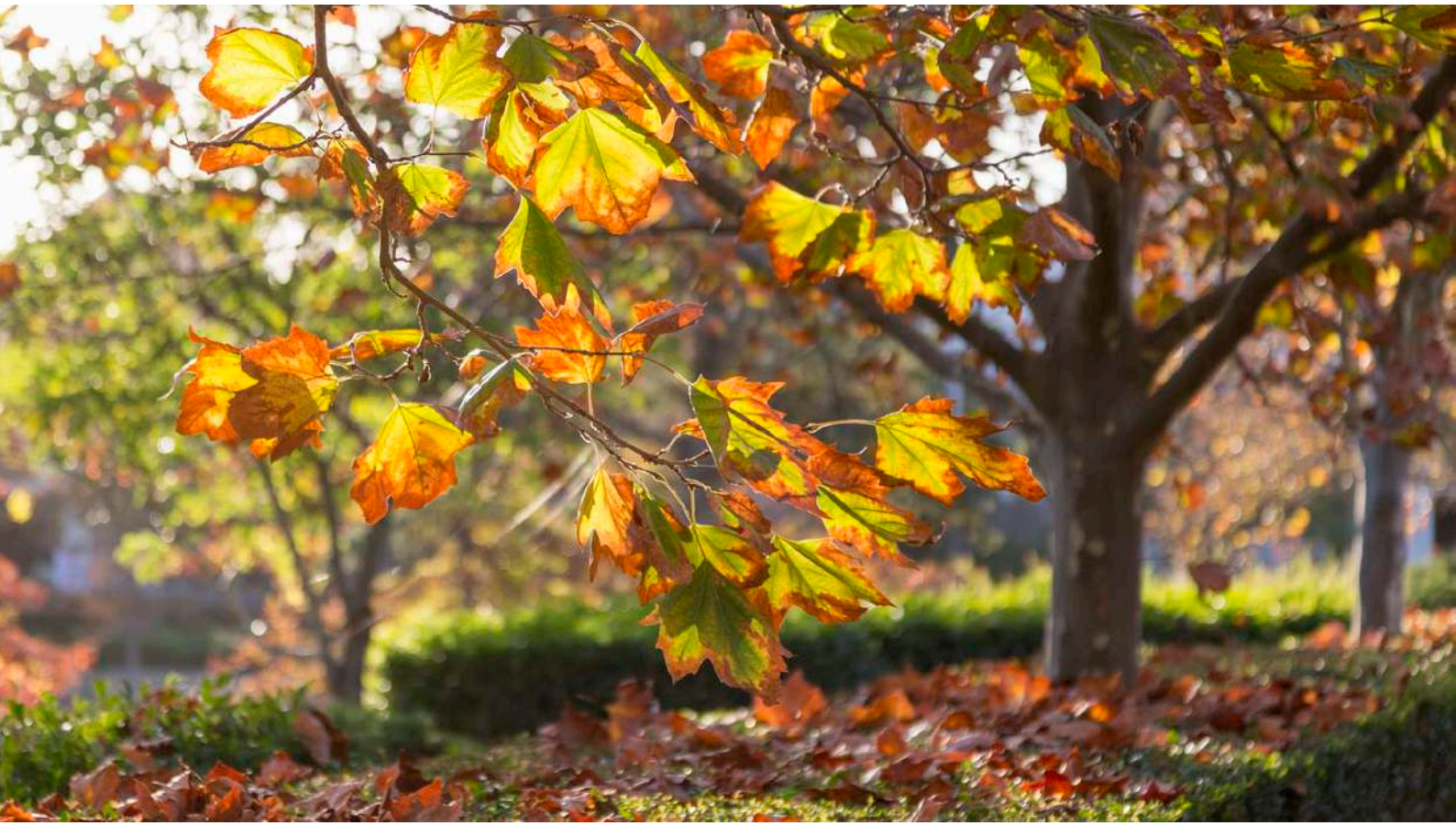
A diverse ecosystem includes groundcovers, shrubs, tree roots, trunks, branches and canopies which provide the best array of benefits. Structural diversity in the landscape includes these different vegetation strata. Every plant has its own benefits: large deciduous trees provide summer shade and allow the winter sunlight to penetrate buildings and streets; native trees (including deadwood) promote biodiversity and habitat; smaller trees can be planted in areas that are not able to accommodate larger trees; shrubs and herbs in parks and wetland areas provide screening, visual amenity and habitat for fauna; climbers can cover walls for shading and protection; and green roofs reduce stormwater flows and improve insulation.

## Useful life expectancy

Useful life expectancy (ULE) is an estimate of how long a tree is likely to remain in the landscape based on health, amenity and environmental contributions. It is not a measure of the biological life of the tree and it is not used as a timetable for scheduling tree removals. The primary benefit of a ULE assessment is that it facilitates strategic planning for the long-term.

Many of Subiaco's trees, in our established streets and parks, are well over 75 years old with some approaching the end of their useful life. They have performed remarkably well in faring against droughts, urbanisation and changing cultural trends. However, the older a tree becomes, the less tolerant it is to change.

We manage our population of ageing trees through regular assessments to determine which trees need to be managed or replaced, and by planning when, how and with what they will be replaced. Urban tree renewal is not simply a question of replacing dying trees but is also one of identifying the most resilient and appropriate species.



## Urban heat island

The urban heat island effect is common worldwide, as cities become warmer than nearby non-urban areas. This phenomenon occurs year round, but it becomes a problem during hot weather. "Heat waves already kill more Australians than any other natural disasters." [17]

The heat island effect also contributes to the decline of certain tree species. Increasing heat in heat islands, particularly if combined with low soil moisture, causes the foliage and even the bark of some trees to scorch, which can lead to decline as has happened with many of the city's trees which can no longer cope during extreme heat events. Extreme heat events are expected to increase as a result of ongoing climate change.

The urban heat island effect has three main causes: impervious hard surfaces, human activity and low vegetation coverage. Urban forests have proven to be one of the most effective methods for mitigating heat retention in urban areas, particularly central business districts.

There are several challenges we face in tackling the urban heat island, including:

- the current heat island effect being exacerbated by predicted climate changes
- the existing tree canopy does not cover 79.2% of Subiaco
- existing hot spots within Subiaco require significant capital investment to effectively reduce surface temperatures
- urban infill may increase the amount of impervious surfaces
- juvenile trees provide limited benefits (20yrs+ for significant benefits)
- species selection must be adaptive to climate change
- tree retention is pivotal in maintaining the canopy coverage
- supporting tree health in dry periods may require increased water use.

**Urban Heat – Surface temperatures on a 42 degree day**

65.8°C

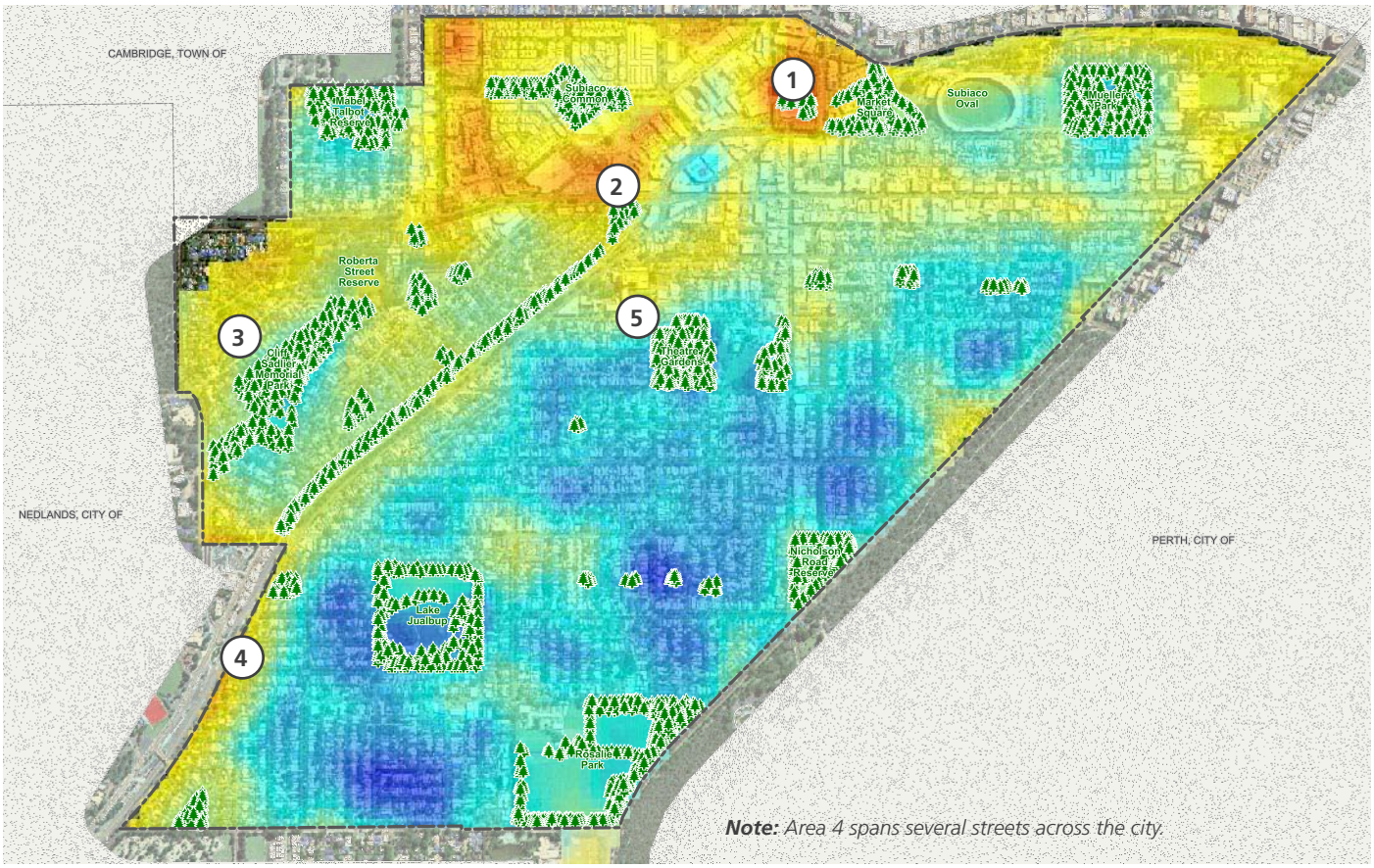
Bitumen in full sun

38.5°C

Bitumen under tree canopy (two metres away from full sun)

97.2°C

Playground rubber softfall in full sun




***Source:*** *Heat island map, 2015.*

The city has selected five main hot spots, identified the issues contributing to these hot spots and developed solutions to address these issues. The works identified for these areas will be prioritised to reduce the effect of the urban heat island effect.

| Area | Street Names | Location |
|---|---|---|
| **1** | Wexford Street, Station Square, Station Street (Hood to Roberts), Roberts Road (Station to Brigid) | Subiaco |
| **2** | Mouritzen Way, Wembley Court, Wunderlich Road, Atkinson Road, Price Street, Carter Lane public open space (POS) | Subiaco Centro |
| **3** | Wilsmore Street, Stevens Street, Northmore Street, Dakin Street, Woolnough Street | Daglish |
| **4** | Railway Road, Aberdare Road, Thomas Street, Onslow Road, Selby Street, Hay Street, Salvado Road | Shenton Park |
| **5** | Barker Road and Forrest Street | Subiaco |


Domain
Short Term
Ticket Parking
CAFE

# Objectives

## Introduction

Our city is known for its overall green appearance and its many public open spaces. The city recognises the social, environmental and economic contribution our urban forest makes and is committed to preserving and enhancing these benefits.

This sentiment is supported by our community who recognise the aesthetic, functional and environmental values of our parks and open spaces. Maintaining, preserving and protecting the city's parks and open spaces is a high priority for our community.

The city's *Strategic Community Plan* captures our community's vision for a sustainable environment that is green and leafy in Focus Area Two: Parks, Open Spaces and Places.

| **Objective one: A sustainable environment that is green and leafy.** | | | |
|---|---|---|---|
| No. | Strategy | Community outcomes | Who will contribute |
| 2.1.1 | Preserve and maintain valued street trees. | Streets that are linked with a variety of well maintained and appropriate tree species. | City of Subiaco<br>Community<br>Community organisations/groups |
| 2.1.2 | Continue to be at the forefront of supporting sustainable verges. | Verges that contribute to the sustainability of the city. | City of Subiaco<br>Community<br>Community organisations/groups |
| 2.1.3 | Manage the city's parks and greenery in a way that is waterwise. | Confidence that the city's water allocation is being used in a sustainable and future-focused way. | City of Subiaco<br>Community<br>State government agencies |

## Action Plan

Through strong policy and an unfaltering commitment, the city aims to implement, meet and exceed the action plan outlined below:

| **1. Preserve and protect the urban forest (public and private)** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| Promote tree retention on development sites through Local Planning Scheme No. 5 (LPS5) | Educate and build relationships with developers promoting benefits of urban forest | The urban forest does not decrease. This will be measured by undertaking aerial imagery surveys every two years | ✓ | | ✓ | ✓ | ✓ | ✓ |
| | Meet with developers onsite to determine tree value, significance and possible integration into building activities | | ✓ | | ✓ | ✓ | ✓ | ✓ |
| | Provide financial or other incentives to developers to retain trees. | | x | | ✓ | ✓ | ✓ | ✓ |
| | Prepare a local planning policy which requires adequate public open space contribution for significant developments and allows for the contribution to be to enhance the urban Canopy | | x | | | ✓ | ✓ | ✓ |
| Enforce tree protection adjacent development sites | Introduce policy that requires mandatory tree protection before development commences | | ✓ | ✓ | | | | |
| | Proactively enforce Activities in Thoroughfares and Public Places Local Law protecting trees | | x | | ✓ | ✓ | ✓ | ✓ |
| Strong endorsed policy, procedures and protocols | Council to endorse new Street Tree Policy | | ✓ | ✓ | | | | |
| | Executive Leadership Team to approve relevant protocols and procedures | | ✓ | ✓ | | | | |
| Ensure city assets are protected during capital projects | Introduce standard conditions within procurement process to protect city assets | | ✓ | ✓ | | | | |
| | Design to incorporate tree retention and protection | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ensure the city continues tree maintenance practices to reduce the city's liabilities | Continue the cyclical tree maintenance program | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Continue the quarterly visual tree audit | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Continue annual park tree audits | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Continue monitoring Significant Tree Register | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

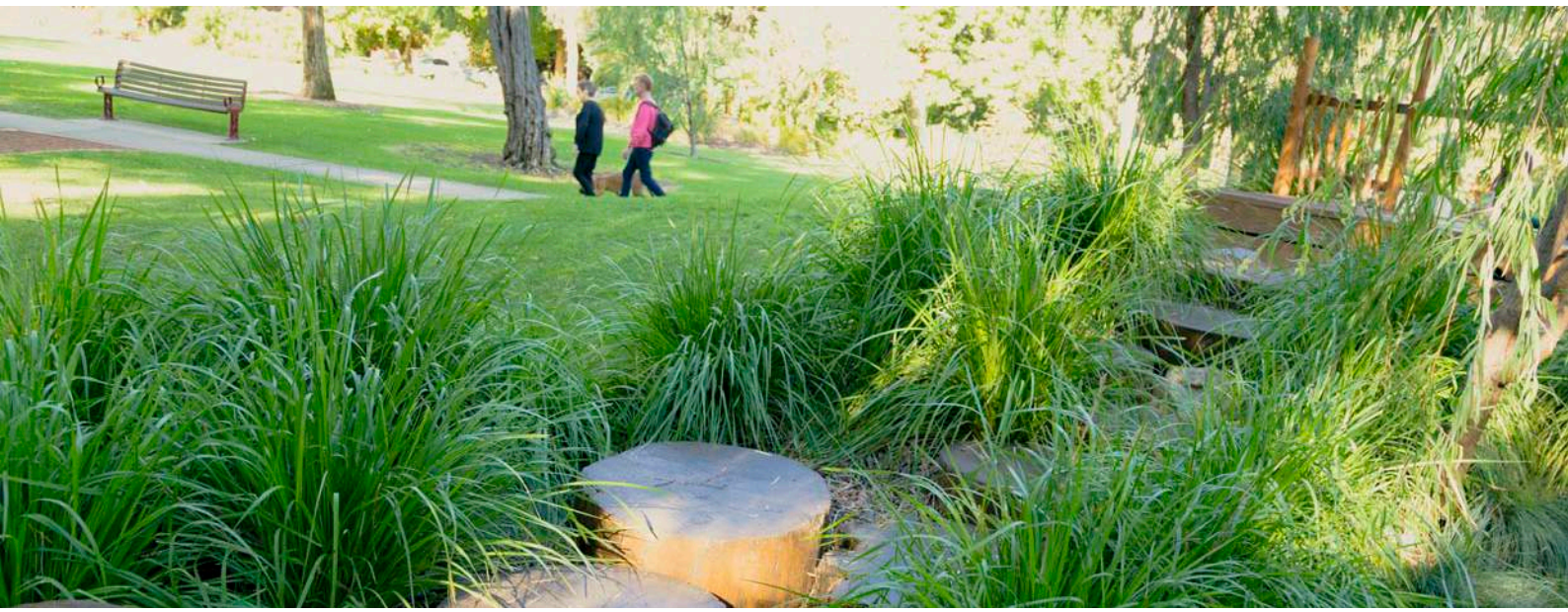
| 1. Preserve and protect the urban forest (public and private) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| Ensure the city continues tree maintenance practices to reduce the city's liabilities | Engage independent arborist as required | The urban forest does not decrease. This will be measured by undertaking aerial imagery surveys every two years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Invest in technology to assist in tree management | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Commit to ongoing canopy cover and thermal imagery surveys | | ✓ | ✓ | | ✓ | | ✓ |

| 2. Mitigate loss of canopy through urban infill | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| Work with Planning to resolve potential impacts of canopy loss as a result of LPS5 | Set a mandatory number of tree(s) on private property based on block size | The urban forest does not decrease. This will be measured by undertaking aerial imagery surveys every two years | ✓ | | ✓ | | | |
| | Set a mandatory deep soil zone | | ✓ | | ✓ | | | |
| | Adapt street tree master plan on streets with increasing density to provide larger verge tree options | | ✓ | | ✓ | | | |

| 3. Increase the urban forest canopy | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| Grow the city's urban forest | Continue capital street tree planting | The urban forest increases. This will be measured by undertaking aerial imagery surveys every two years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Continue capital park tree planting | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Develop a senescent tree replacement program | | x | | | ✓ | | |
| | Continue implementing greening strategy | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Measure deaths of new trees | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Continue hand selecting tree stock | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Ensure continuity of capital funding | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Continue new tree watering program | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Review and update the street tree master plan to promote species diversity and climate resilience | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Improve soil health and reduce soil compaction | | x | | | ✓ | ✓ | ✓ |

| 4. Improve local aquifer recharge | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| Improve onsite infiltration of water | Reduce use of hard surfaces on verges | Storm water drainage output decreases | x | | | ✓ | ✓ | ✓ |
| | Reduce use of hard surfaces in parks | | x | | | ✓ | ✓ | ✓ |
| | Investigate options for water harvesting in public open space (POS) | | x | | | ✓ | ✓ | ✓ |
| | Consider water harvesting in streetscape upgrades | | x | | | ✓ | ✓ | ✓ |
| | Continue using tree watering system for all new trees | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Adapt verge policy to support the use of water harvesting | | ✓ | | | ✓ | ✓ | ✓ |

| 5. Reduce heat island effects/hot spots | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| Reduce surface temperature | Evaluate hot spots and prioritise improvements | Hot spots decrease. This will be measured by undertaking aerial imagery surveys every two years | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Select resilient tree species | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Implement capital planting program based on priorities | | x | | ✓ | ✓ | ✓ | ✓ |



| 6. Educate our people | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Goal | Action | KPI | Funded | 2018 -19 | 2019-20 | 2020 -21 | 2021-22 | 2022-23 |
| Residents, businesses and visitors value and appreciate the benefits provided by the city's urban forest | Promote the benefits of an urban forest | Positive feedback received about the urban forest in community surveys | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Promote verge planting by residents | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Promote tree planting on private property | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Promote benefits of onsite infiltration to residents | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Promote benefits of onsite infiltration to developers | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Inform residents of trees and plants planted annually | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Involve community in tree planting events | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Promote the city's urban forest through the city's communication channels | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | Promote our proud history | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Challenges

We understand that in maintaining, preserving and protecting our urban forest while striving to meet these objectives we will face many challenges. Some of these will include:

- pathogen management
- public perception and perceived risks
- limited influence on private land
- competing priorities with utility providers
- changing urban environmental conditions
- ongoing budget constraints
- climate change including temperature changes and water availability
- available space to plant
- requirement to increase urban density

The city is committed to not only meet our goals but to measure our progress. Moving forward, measuring our progress is a vital tool in comparing and realising our goals. The city commits to collect and measure data every two years with the strategy reviewed every five years. This review will determine if we are achieving our goals and allow the action plan to remain current and respond to evolving challenges while still achieving our strategic objectives.

# Definitions

**Biomass** the amount of living matter in a given habitat

**Canopy cover** refers to all living vegetation above 3m

**City tree** is any tree which has a majority (> 50%) of its trunk growing from Council managed land

**Non-living material** includes all substrates other than photosynthesizing vegetation

**Reserve tree** is a tree that is located within a park, reserve or natural area

**Street tree** is a tree that is located within the road reserve

**Tree** is defined city as a woody perennial plant generally having a single stem or trunk which will grow to a height of approximately 4 metres or more

**Tree Protection Zone (TPZ)** is an area above and below ground that is set aside for protection of tree roots, trunk and crown in order to provide for the viability and stability of a tree that is to be retained at a development site

**Urban forest** is a population of trees and vegetation growing within an urban setting for the purpose of improving the liveability of that urban setting whilst providing social, economic and environmental benefits to the community as a whole

**Vegetation cover** refers to vegetation in all height classes.

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CITY OF SUBIACO

241 Rokeby Road SUBIACO WA 6008
PO Box 270 SUBIACO WA 6904

Phone: 08 9237 9222 Fax: 08 9237 9200
Email: city@subiaco.wa.gov.au Website: www.subiaco.wa.gov.au


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