



City of Cockburn
URBAN FOREST PLAN
2018-2028



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Executive Summary

During the past decade the City of Cockburn has experienced rapid clearing of vegetation due to urban development. In a recent national survey on the state of vegetation cover in metropolitan Australia ⁱ the City of Cockburn was ranked in the lowest quartile of the 140 local authorities studied for the degree to which it has lost its shade canopy.

By 2028 the population of Cockburn is expected to grow by 27% to over 150,000 residents. This urban expansion, coupled with the emerging challenges of climate change, is putting considerable pressure on the City's urban forest.

Recent modelling of Cockburn's total land area (142.40km²) indicates the current vegetation cover (including trees and shrubs) is 26%. The vegetation cover of land specifically under the City's control is as follows:

- Environmental Reserves - 59%
- Parks and Sports Ovals – 29%
- Streets and Roads – 11%

The trees and shrubs in our urban environment play an important role in making Cockburn an attractive place to live, work, visit and invest in. Research conducted by the University of Western Australia indicates that broad leafed street trees increase the value of residential homes by approximately \$17,000.

A thriving urban forest provides many social, economic and environmental benefits to the City including:

- Improving the health and wellbeing of residents
- Enhancing biodiversity and providing ecological corridors
- Lowering maximum summer temperatures in urban areas
- Reducing household energy costs (up to 8%) and
- Increasing amenity and property values (up to \$17,000).

To secure the above benefits the City must balance urban expansion with a comprehensive urban forest program that maintains and protects the existing tree canopy while expanding it in the future. This plan identifies 6 strategic objectives and targets, accompanied by 30 actions which map a clear pathway to achieving the City's aspirations for a thriving urban forest.

The City will achieve this by:

- Adequately resourcing and implementing the action plan
- Recognising the benefits and values of trees
- Engaging and educating the community
- Maintaining existing trees under the City's care and control
- Establishing a baseline that identifies the current canopy cover
- Establishing targets to increase the level of canopy cover in the City
- Increasing the City's tree planting program
- Monitoring and recording progress towards set goals
- Strengthening development controls to increase tree canopy levels
- Promoting resilience through increasing tree diversity.

This Urban Forest Plan provides a holistic method for improving the shade cover provided by trees throughout the City of Cockburn's public areas. The plan will direct the management of streetscapes and public open space over the next 10 years to improve liveability and wellbeing.

Summary of Cockburn's Urban Forest

• Number of Street Trees:	38,162
• Average Street Tree Value:	\$3,605
• Total Street Tree Value:	\$137.5 million
• Dominant Street Tree Species:	WA Peppermint
• Vegetation Cover Environmental Reserves	59%
• Vegetation Cover Parks and Reserves	29%
• Vegetation Cover Streets and Roads	11%
• Verge tree planting opportunities identified to date	24,390
• Proposed Annual Tree Planting Program	1,500 trees per annum



1 Vision

The vision of the Urban Forest Plan is to create a healthy, rich and diverse urban forest that:

- Reduces urban heat
- Improves air quality
- Enhances the walkability of the City's streets
- Promotes an active healthy lifestyle for residents
- Fosters investment in the City through improving public open space and streetscapes, and
- Increases biodiversity.



Image 1: Trees at Manning Park

2 Purpose

The purpose of the Urban Forest Plan is to set out a clear vision for the future management and expansion of Cockburn's urban forest. The plan provides a snapshot of the current state of our urban forest and maps a pathway to increasing canopy cover whilst protecting against future vulnerabilities. It builds upon existing policies and is strategically aligned to a suite of existing plans and strategies to support the delivery of its vision and targets.

The plan acknowledges complementary actions already set in place by existing policy mechanisms and identifies gaps which are addressed in the four year action plan. It provides a valuable tool to encourage collaboration across business units, specifically the Roads, Waste and Planning teams to achieve a fully integrated vision for the City.

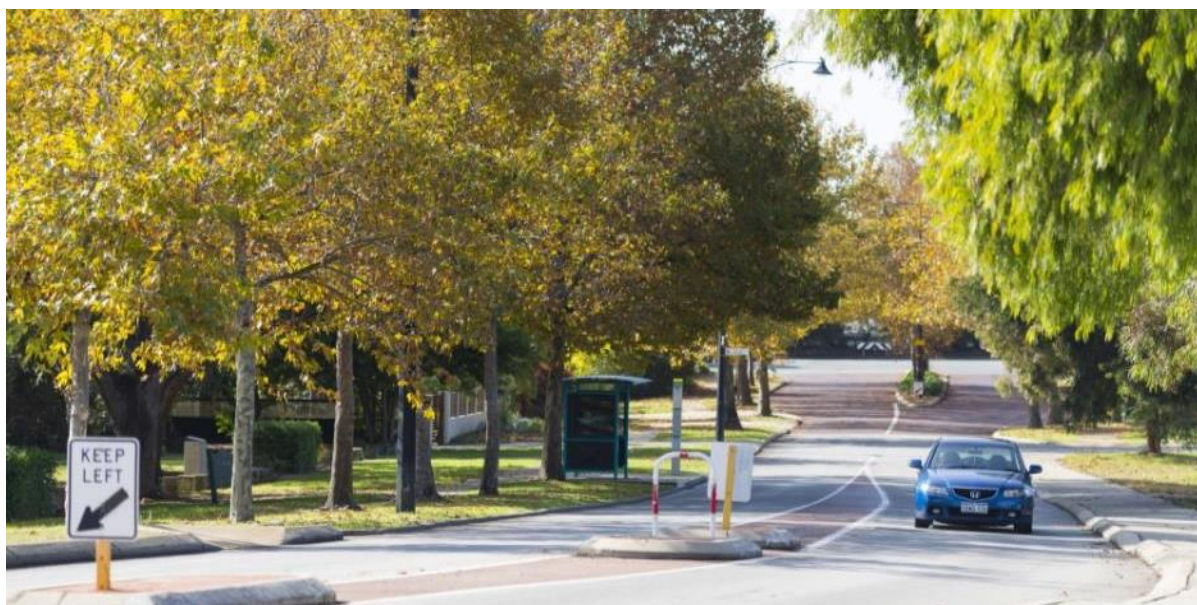


Image 2: Waverley Road in Coolbellup showcasing the significant role of trees in defining streetscape character.

3 Introduction

Council's vision for the City of Cockburn is:

“To build on the solid foundations that our history has provided to ensure that the Cockburn of the future will be the most attractive place to live, work, visit and invest in, within the Perth metropolitan area.”

Cockburn is one of the largest coastal cities in Western Australia. The 2018 population of about 118,000 people is expected to grow by 27% to more than 150,000 by the year 2028ⁱⁱ. This future growth will be accommodated by a combination of green field and infill development, with the latter presenting significant challenges to the green infrastructure of the City's established suburbs.

The Western Australian Department of Planning has responded to this need with planning policies that encourage higher density development in both existing and new suburbs. Targets set by the state government in their policy document ‘2031 and beyond...’ⁱⁱⁱ have enabled a framework whereby the City has initiated a number of revitalisation projects which aim to produce increased residential densities and rejuvenate the suburb and create vibrant community.

While infill housing will facilitate future patterns of urban growth, it is also likely to reduce the amount of vegetation on private land by 80% to 90% and place increased pressure on residual public open space for recreation^{iv}. This unavoidable loss of private gardens will be offset by tree plantings on other suitable land in order to maintain the quality of the environment in these suburbs.

The State Government's operational planning policy *Liveable Neighbourhoods (LN)*^v has been directing the City to facilitate higher residential densities in the City's green field suburbs (those planned from 2007 onwards). Approximately a third of the City's population is living in streets produced by LN. This is projected to rise to almost half the City's population in the next 20 years.

These new suburbs are characterised as consisting of smaller lots with narrower road verges and significantly reduced front-of-lot setbacks for buildings. Prior to the introduction of LN the width of a housing lot was typically two or three times the width of many contemporary lots and had space for large canopy trees. Consequently, there is an increase in competing uses for the residential road verge including:

- Refuse collection
- Bulk waste collection
- Public footpaths
- Utilities
- Crossovers (driveways)
- Residents car parking and
- Street trees.

The current planning regime is resulting in a need for smaller height tree species, which will result in a much smaller mature canopy area over time. Furthermore, the structure plan process prescribed by LN encourages, but does not require, streets designs to include trees as an integral utility.

Additionally, large tracts of banksia woodland have been cleared to accommodate development in newer suburbs. Little room is being left for shrubs and trees on private housing lots and so, these subdivisions are often devoid of trees with new homes relying solely on air conditioning for cooling. The lack of street trees not only exacerbates the build-up of heat but also degrades amenity and walkability of the City's streets.

The 2017 national survey report *Where should all the trees go?* provides a 'snapshot' of the health of the urban forest in 140 metropolitan local authorities across Australia. The report ranks the City of Cockburn in the lowest quartile nationwide for the degree to which it has lost shade canopy. Cockburn is also identified as one of the most vulnerable local governments to heat, poor health, economic disadvantage and access to green spaces (images 3 and 4).

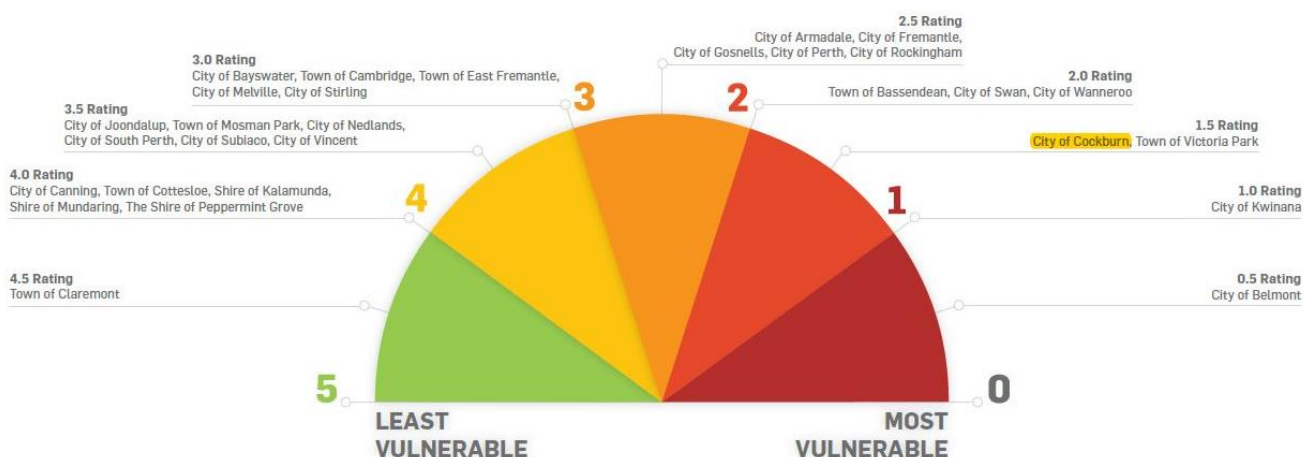


Image 3: State ranking of the most and least vulnerable local governments (2020 *Where will all the trees go? September 2017*).

In the coming decades the South West of WA will experience a changing climate. Annual rainfall totals will continue to decrease; whilst frequency and intensity of storms, heat waves and bushfires will increase^{vi}.

As the density of urban development escalates, the maximum summer temperatures in our suburbs will increase. This increase in temperatures is exacerbated where hard paved surfaces prevail and there is little vegetation to cool the area through shade and evapotranspiration. This increase in air temperature is known as the 'Urban Heat Island effect'^{vii} and can have adverse effects on the health of young children and the elderly.

One of the primary means of reducing the impacts of the Urban Heat Island effect and therefore increasing liveability in an area is to increase the tree canopy cover to provide shade, reduce surface temperatures, and mitigate heat stress. Trees also act as natural air-conditioners by transpiring water vapour into the surrounding air.

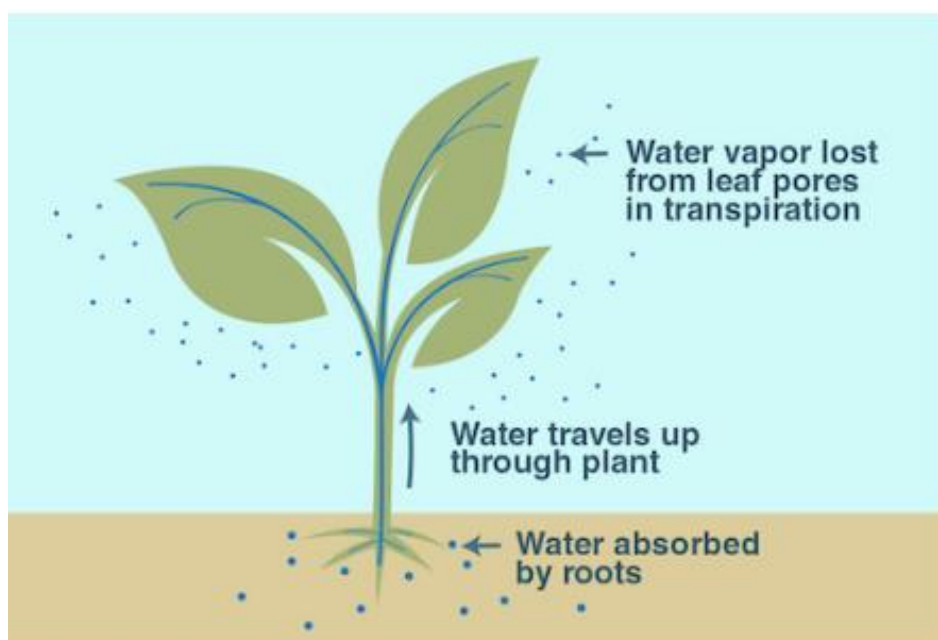
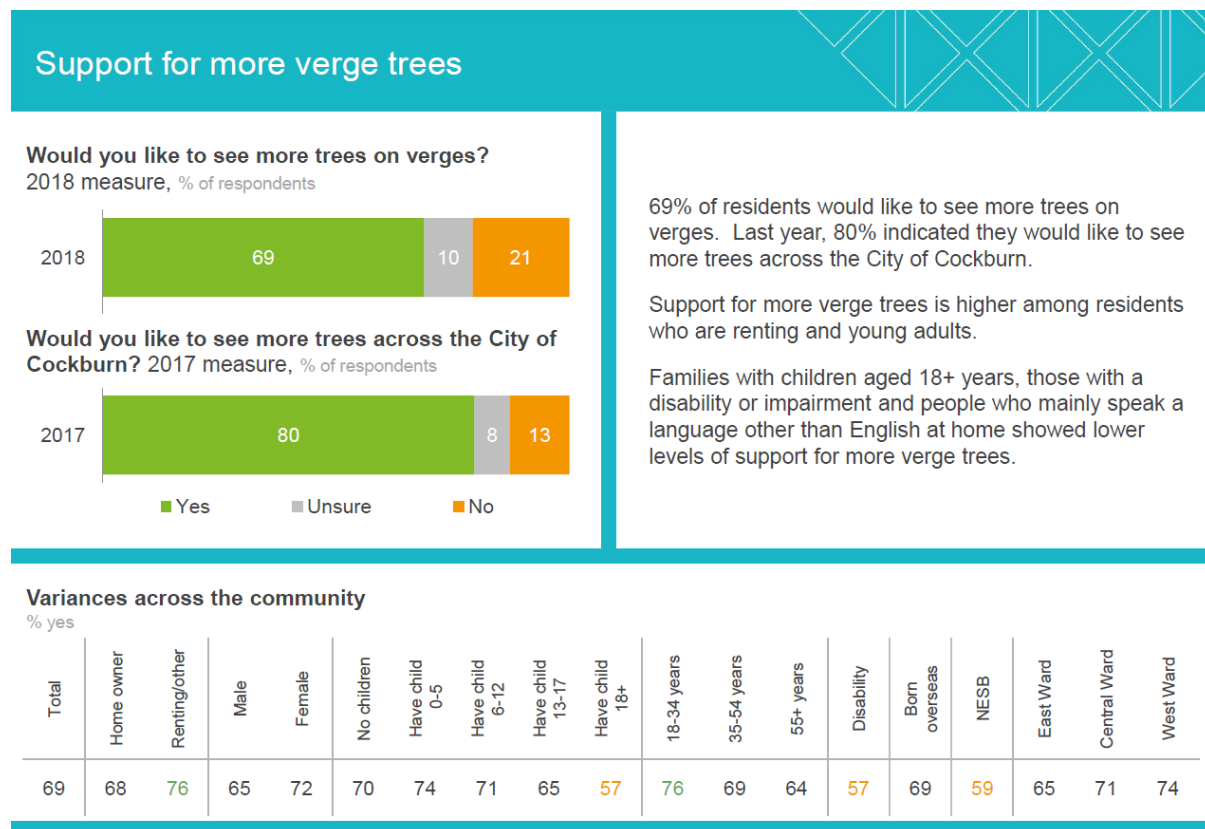


Image 5: An illustration of the process of transpiration^{viii}

There is strong support in the Cockburn community for trees in Cockburn. In the 2018 Community Scorecard, 69% of residents indicated they would like to see more trees on verges. In the previous survey (2017), 80% indicated they would like to see more trees across Cockburn.



Q. Would you like to see more trees on verges?
Base: All respondents, excludes no response (n = 422)

Image 6: Support for more verge trees. Community Scorecard 2018, Catalyse.

4 Urban Forest Benefits

Urban forests provide an opportunity to improve the liveability of our cities and protect against future vulnerability to an increasingly changing climate. Trees and shrubs provide many economic, environmental, social, physical and mental benefits. The City of Cockburn *Street Tree Master Plan* identifies a broad range of benefits, some of which are detailed below.

Lowering City temperatures and reducing urban-heat-island-effect.

Trees provide shade and cool the surrounding air helping to reduce maximum summer temperatures. Consequently trees can reduce energy costs by cooling buildings up to 8° from shade and evapotranspiration^{ix}.

Urban heat - Surface temperatures on a 42 degree day



Image 7: Urban heat – surface temperatures on a 42 degree day. City of Cockburn Street Tree Master Plan

Contributing to critical ecosystem services

Trees function as a key element in urban ecosystems by helping to capture and filter storm water, improve air quality by removing dust and particles, and sequester carbon from the atmosphere helping to mitigate the effects of climate change.

Improving health and wellbeing

Urban forests are essential to our health and improve our overall sense of wellbeing. Research from the University of Western Australia concluded that for every one percent increase in canopy cover over streets there is a four percent increase in the likelihood of people walking them^x. This study also indicates that leafy streets correlate with better mental health and an improved sense of safety.

People living in greener neighbourhoods are not only more likely to exercise, a thriving urban forest can also have psychological benefits by reducing stress through providing spaces for relaxation and opportunities to connect with nature.



*Image 8: Proximity to nature is beneficial for mental and psychological health.
Mortlock Street, Hamilton Hill*

Increasing amenity and property values

Well-designed spaces with tree canopies transform the urban environment and increase the value of social amenity. Mature trees improve aesthetics and foster a greater sense of connection to places by providing a sense of continuity and history.

Statistical analysis conducted by the University of Western Australia (UWA) shows that property values increase by about \$17,000 when an established street tree is located on the adjacent verge^{xi}. The UWA study assessed the value of urban trees in 23 suburbs of the Perth Metropolitan Area and found that trees on street verges provide a variety of benefits to urban residents that are reflected in the dollar value of residential properties. The study also quantifies the degree to which different tree species are more and less attractive to residents.

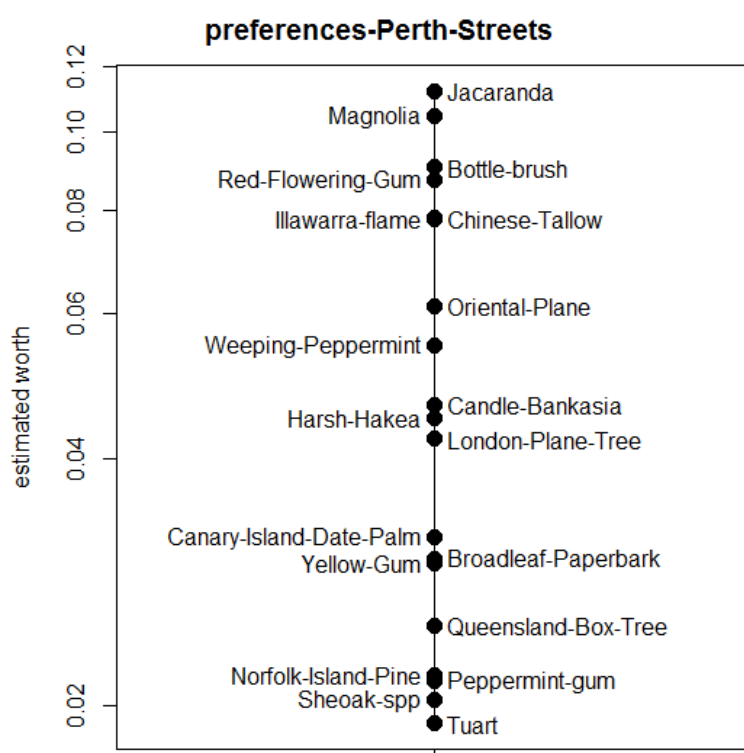


Image 9: Statistical analysis of the relative attractiveness by species of street trees adjacent to Perth homes (Pandit et al).

Enhancing biodiversity and ecological corridors

With urban development our environment has become increasingly fragmented resulting in loss of natural habitats and a decline in biodiversity. With over 320 parks and 61 bushland reserves, Cockburn has an opportunity to link these green spaces via a network of tree-lined streets to provide a route for fauna movement and improve amenity across the City.

These ecological corridors are important as they provide shelter and food for wildlife. The urban forest tree planting program can be designed to create important links between the City's open spaces which enhances the ability for birds, insects, reptiles and other wildlife to flourish. These links are vital for ensuring that genetic diversity and genetic viability is maintained across the City.

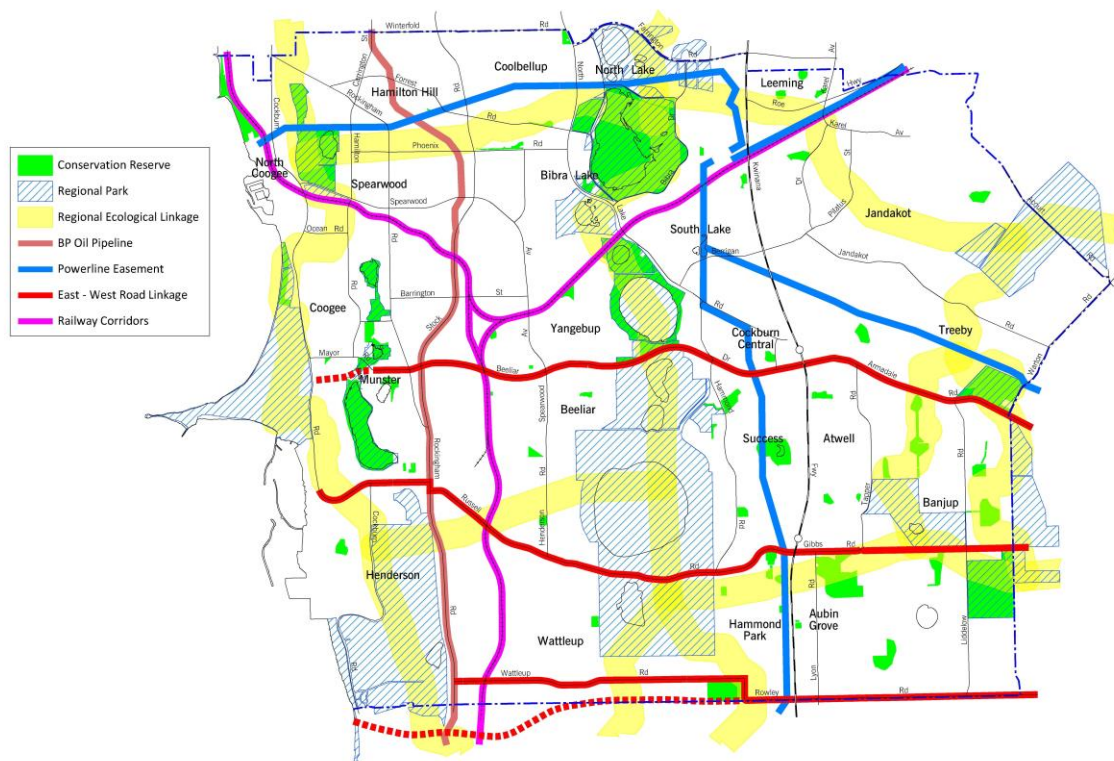


Image 10: Potential and existing ecological corridors in the City (Natural Areas Management Strategy 2012-2022 5 year review)

Native trees provide important habitat for native Australian wildlife. As trees mature, their branches begin to grow horizontally which not only provides more shade, but is attractive for birds to use as perches and nesting platforms. It is estimated that around 300 of Australia's vertebrate species^{xii} such as possums, owls and bats use the hollows in mature trees as places to roost and nest.

5 Scope

The Urban Forest Plan scope can be summarised as follows:

- **Includes**
Trees in streetscapes,
Trees in public open space (parks and around sports ovals)
- **Promotes**
Tree canopy cover to commercial, industrial and residential properties
- **Does not include**
Environmental reserves

Although environmental reserves contribute to 17% of the existing urban forest in Cockburn, these reserves are already vegetated to 58% of their surface area (refer section 7). The management of these areas is addressed in the City of Cockburn's *Natural Area Management Strategy 2012 – 2022*^{xiii}. Consequently Environmental reserves are excluded from the scope of this plan.

6 Strategic Alignment



Strategic Community Plan

Council 's overarching document. Identifies the community's aspiration for more trees, streetscape and public open space improvements.



Workforce Plan

The Workforce Plan informs both the Strategic Community Plan and Corporate Business Plan. Allows the City to set priorities within its resourcing capacity.



Public Health Plan

Supports a network of tree lined streets. Objective 5 seeks to provide functional, accessible and active Parks to encourage walking and physical activity.



Policies

Both State and Cockburn policies contain directions to increase and preserve the City's trees. Including PSEW 15, LPP 5.18 , LPP 1.2, AEW 1, LPP 5.15, Liveable Neighbourhoods and Directions 2031.



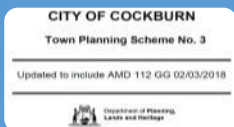
Long Term Financial Plan and Corporate Business Plan

Allocation of resources and establishment of annual budgets .



Public Open Space Strategy 2014 – 2024

Guiding document for the management and public open space and streetscapes.



City of Cockburn Town Planning Scheme 3.

Requires commercial and industrial developments to provide shade trees in car parks.



Street Tree Master Plan

Provides guidance on suitable tree species and creates the mechanism by which the City can ensure new developments leave a sustainable legacy of leafy streets.



Natural Area Management Strategy 2012 – 2022

Identifies ecological corridors. Commits to revegetate a minimum of 2.5ha bushland per annum which in turn increases the canopy cover of natural bushland



Sustainability Strategy 2017 - 2022

Provides a reporting mechanism (State of Sustainability report) to track progress against the Urban Forest Plan targets.

7 Current Vegetation and Canopy Cover

The urban forest encompasses all vegetation growing within the City. This includes shrubs (up to 3 metres) and the tree canopy (above 3 metres) on both private property and land managed by the City.

Vegetation Cover refers to vegetation in all height classes (trees and shrubs)

Canopy Cover refers to vegetation above 3m (trees)

7.1 Vegetation cover

In 2017 the City's GIS team used remote sensing information techniques to map the tree and shrub canopy within the City. Remote sensing is the acquisition of information from a distance such as data from satellites and aerial photography. This method of mapping the City's vegetation cover includes vegetation in all height classes (trees and shrubs).

The following table is a precis of the City's vegetation cover study (trees and shrubs).

Land Classification	Area (sq km)	Vegetation cover (sq km)	Vegetation cover by land class (%)
Environmental Reserves	6.89	4.05	59
Parks and Sporting Reserves	4.77	1.40	29
Road Reserves (Streetscapes)	17.02	1.86	11
Private, commercial, industrial and state government land	113.69	30.14	26
City of Cockburn Total	142.4	37.469	26

Table 1: Vegetation Cover in the City of Cockburn, 2017.

This analysis of the City's urban forest indicates that 59% of environmental reserves and 29% of Parks and Sporting Reserves are covered by trees and shrubs. Only 11% of the City's road reserves are shaded by vegetation, which appears to present an opportunity to improve streetscape with trees.

The entire local government area of Cockburn has a total vegetation cover of 26%. This means that 74% of Cockburn is without natural shade. Image 9 below illustrates the quantity of vegetation cover by land class. Currently, 20% of the City's urban forest is within land under the City's operational control (parks, sports ovals, environmental and road reserves). Eighty percent of the urban forest is on private and state land which highlights the vulnerability of the urban forest to future development.

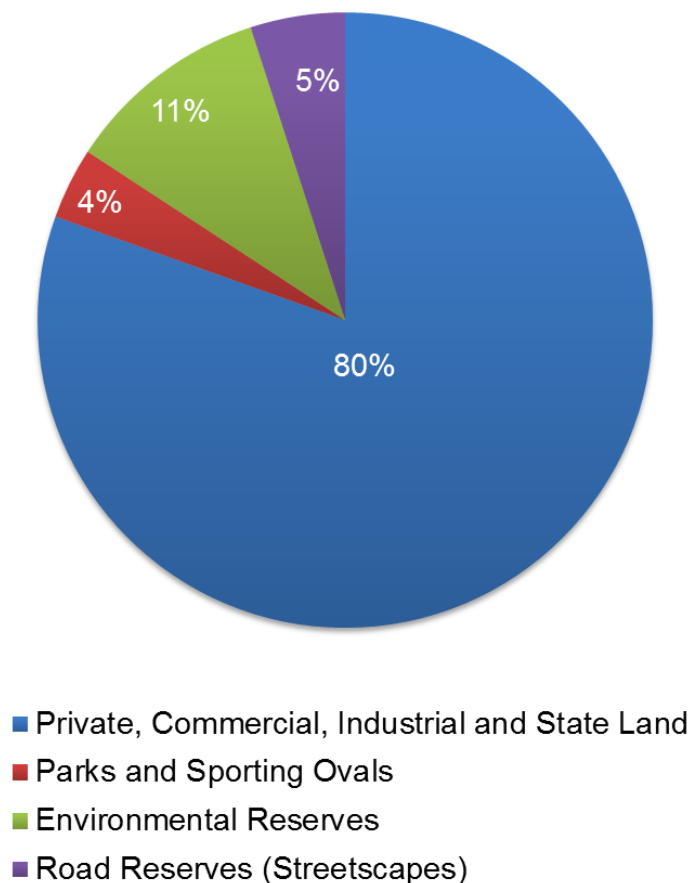


Image 11: City of Cockburn vegetation cover (%) by land classification.

7.2 Canopy Cover

CSIRO have developed a three dimension high resolution digital photography product called *Urban Monitor* which provides data on the canopy cover for vegetation above 3 meters.

	Area (sq km)	Vegetation cover (trees and shrubs)	Shrub Cover (0-3m)	Canopy cover (Trees 3m+)
City of Cockburn Total Area	147.42	26%	15%	11%

Table 2: Canopy Cover in the City of Cockburn, *Urban Monitor* CSIRO 2016.

Whilst 26% of Cockburn is covered with vegetation, only 11% of the canopy is above 3 meters. This represents a significant absence of mature trees across the City.

The *Urban Monitor* data set has been useful to establish baseline information on canopy cover; however the City doesn't have assurance as to when the next data set will become available as *Urban Monitor* is subject to funding. The data set is also defined differently as it incorporates some of the City's lakes and water bodies which affect the total area monitored.

Therefore, it is recommended that the City acquire LiDAR data every 5 years and Near Infrared Imagery annually, to monitor canopy cover and measure change in the urban forest canopy.

8 Street Trees

There are 38,162 City-owned street trees in Cockburn. These valuable assets are estimated to be worth over \$137.5 million, with this value increasing annually as the trees grow in size.

The City's street tree value is calculated using the Helliwell tree valuation system^{xiv} which is used worldwide for assessing the amenity value of a tree. This system assesses the visual contribution each tree makes by evaluating each trees

- Size
- Health and condition
- Species, and
- Suitability for the location.

The Helliwell system enables the City to attach a monetary value to each tree which can be used to receive compensation for the loss of amenity due to construction activities within the road reserve, vandalism by third parties and development projects on City managed land. The Helliwell system values the average street tree in Cockburn at \$3,605 with some trees exceeding \$35,000 in asset value

Additionally street trees generate an enhanced economic value to adjacent homes, and contribute to wellness with a return of about \$117,000 in benefits over its lifespan^{xv}, providing a high return on investment.

8.1 Tree Inventory

The location and a description of all the City's street trees are displayed on the City's Intramaps system under the Urban Forest module. The City's GIS system records the following information on all the City's street trees:

- Location
- Species
- Canopy size
- Height
- Photographic appearance
- Valuation
- Health, and
- Condition.

As new trees are planted, the corresponding information is uploaded to the City's tree database. This information is used to calculate the following information pertaining to the City's urban forest:

- Tree population
- Species diversity
- Tree health target, and
- Future street tree planting opportunities.

8.2 Street Tree Planting Opportunities

In 2014 an audit of the City's street trees was undertaken with the information displayed on the City's GIS Module. The survey recorded 24,390 residential lots which had no adjacent street tree providing the opportunity for planting following analysis of the road reserve constraints.



Image 12: Coolbellup Entry Statement, Waverly road



Image 13: Snapshot of the City's Street Tree Inventory on Intramaps (select Urban Forest' module). Each 'palm' symbol represents a tree on the database.

STREET_TREES	
Botanical Name	Angophora costata
Genus	Angophora
Common Name	Smooth Bark Apple Myrtle
Species	Costata
Type	Aunative
Power Lines	STREET
Approx Height m	8
Canopy Spread m	4
Canopy Height m	5
Diameter mm	300
Tree Age	MATURE
Tree Health	GOOD
Tree Structure	FAIR
Tree Status	Existing
Verge Cover	TURF
Problems	1
Comments	
Poss Significant	0
Alignment	Alignment
New Tree Value	0.00
Works Required	No
Works Completed	No
Works Compl comments	
Valuation of Asset	7239.24
Size of Tree	2


STREET_TREES	
	
<p>▶ TREE_PROBLEMS ◀ 1 OF 1 ▶</p> <p>▼ WORKS_REQUIRED ◀ 1 OF 1 ▶</p>	
Tree Number	849
Comments	
Work Required 1	No Work Required is recorded.

Image 14: Corresponding information displayed for each tree on the Street Tree Inventory on the City's Intramaps system.

8.3 Street Tree Species Diversity

The City's urban forest is varied and diverse with over 250 different species from a broad range of genus. While this species mix contributes to a resilient urban forest, it has been noted that the older streets in Cockburn were planted without a common theme. Avenue planting themes are popular in newer developments with species such as the London Plane Tree and WA Peppermint, which add character to the streets and create more pedestrian friendly neighbourhoods.

The most prevalent tree species in Cockburn's streetscapes are the WA Weeping Peppermint (*Agonis flexuosa*), and Kings Park Special Bottlebrush (*Callistemon spp.*). Four out of the five most prominent species are West Australian native trees, representing 17% of the total street tree population together.

Top 5 most prominent trees in Cockburn streets:

WA Peppermint	5.5%
Weeping Bottlebrush	5%
European Olive Tree	4.9%
Eucalyptus Tree	3.6%
Broad Leaf Paperbark	2.9%



Image 15: WA Peppermint Trees along The Grange, Beeliar

Currently 45% of street trees in Cockburn are from the botanical Family Myrtaceae (the myrtle family) as illustrated in image 14 below.

The Myrtle Family includes all Eucalyptus, Melaleuca, Callistemon, Agonis species and many more. Species from this Family have been traditionally planted within streetscape environments due to their availability and robustness compared to other tree species.

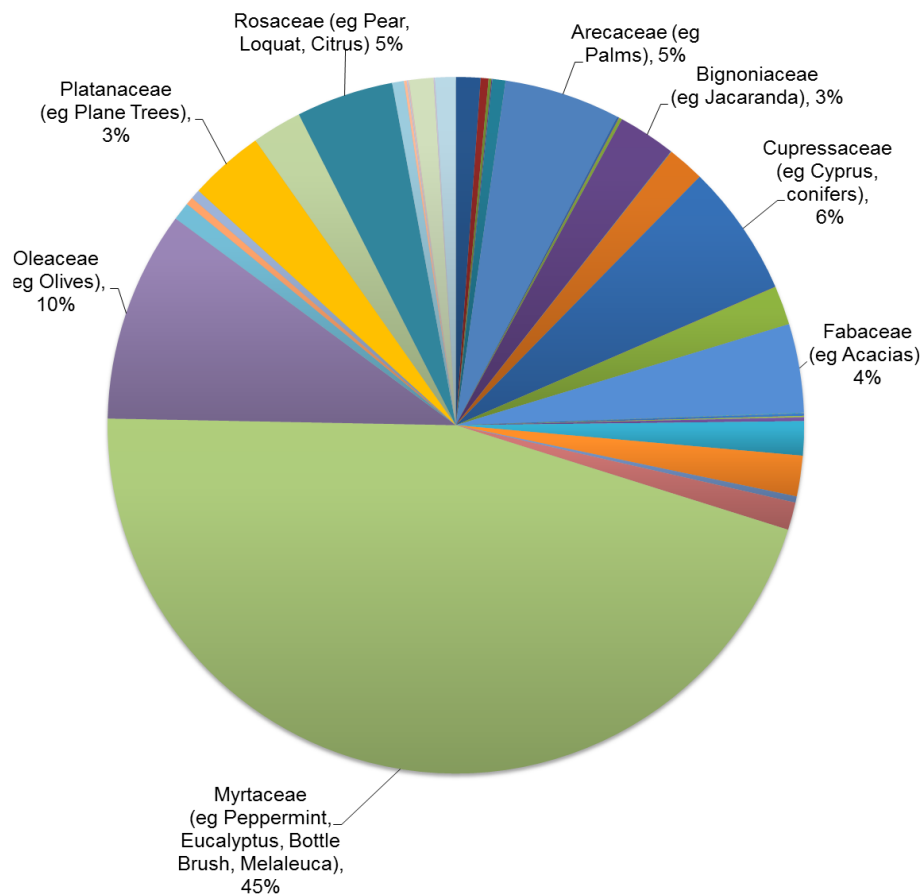


Image 16: Diversity of Street Tree Species in Cockburn, by Family classification

Trees from the Myrtaceae family have recently become prone to Myrtle Rust disease (*Puccinia psidii*). This is a fungal infection which leads to decline or even sudden death of mature trees in this family. Reliance on this family of trees for street trees will leave the urban forest vulnerable to widespread loss of trees should Myrtle Rust establish a presence in the City's streets and parklands.

As the Urban Forest Plan seeks to increase the number of street trees, it is important that the City maintains a diverse mix of tree species, whilst creating more tree avenues to achieve the greatest environmental and health benefits for the community. Having a diverse palette of tree families and species will ensure resilience from pests and disease and provide an enhanced robustness to withstand future threats.

8.4 Concerns Regarding Street Trees

The urban forest is vulnerable to a range of threats including loss of trees due to pests and diseases, vandalism, during building construction, extreme weather events arising from climate change, and natural attrition due to ageing of trees.

Trees also have the potential to create a number of issues. Some key concerns include:

- Tree roots lifting and breaking paths, driveways, fences, and roads
- Potential tree or branch failure which may cause damage or injury
- Leaf, seed capsules and bark litter can create the perception of mess, and can block gutters on buildings.

Another issue that impacts the location and management of trees within streetscapes is overhead power lines. The alignment agreed with utility providers for street trees is 2.7m from the front of the adjacent private property boundary^{xvi} which is also the alignment for overhead powerlines. This limits trees planted under powerlines to smaller species with less effective shade canopies.

A *Street Tree Master Plan* has been developed to identify strategies to help manage the above challenges. These strategies include the following:

- Selection of the appropriate species for the site
- Undertaking an initial street design to locate trees at correct distances from infrastructure or provide alternative design infrastructure to suit the tree
- Ensuring trees are watered for the first three years during their establishment period

- Auditing street trees on a scheduled basis to check for potential limb failure and structural damage
- Educating residents regarding the benefits of street trees and how to contribute to the care of the street tree
- Undertaking plantings in accordance with the Street Tree Master Plan tree palette for identified zones to achieve appropriate species mix and spatial definition.

Streetscapes

Challenges | identified by the community

- Overgrown trees.
- Certain tree species dropping leaves and damaging properties.
- Rubbish and broken glass on verges and footpaths.
- Poor streetscape maintenance at shopping areas.

Actions | suggested by the community

1. Regular tree maintenance.
2. Greater consideration of street tree species.
3. Plant more native trees.
4. Improve rubbish removal on streets and footpaths.
5. Community initiatives to reduce littering.
6. Encourage better verge and shop front maintenance in commercial areas.

Community Voices

"Regular maintenance of parks and verges. Although they do maintain them, the frequency isn't enough and at times they are well overgrown and very untidy."

"Need to trim trees, shrubs (for health and safety of ratepayers)."

"The street verges and middle islands on main streets with more plants/trees."

"Planting more appropriate street trees that can exist with residents and not make life a living hell for several months of the year."

"Flame Tree leaves and roots destroying yards, gutters, reticulation systems, driveways, etc. Pull them down and replace with natural smaller trees."

"Verge street tree species selection. Northern hemisphere deciduous species have, and will continue, to cause frustration to households due to the tree's messy leaf drop and invasive root habits. More consideration should be given to the use of medium size local native trees that flower, so attracting birdlife into our suburbs."

"More street trees on verges, encourage people to ask for a tree. Especially shady ones, provides relief in summer, encourage bird life, and improves a streets appeal 100%, cools houses, shades garden (less water used in long run)."

"Rubbish everywhere. When I go for my Saturday morning walk to collect the paper I take a large bag. By the time I get to the shop it is absolutely full of garbage... Now I don't know the solution, teach it in school, educate the parents, promote clean living."

"Cleanliness of the streets and footpaths. Everyday I walk past broken bottles and glass in the middle of footpaths."

"Improving with shop keepers efforts to keep clean and tidy the streetscape in front of outside shops, we see cigarette butts, food and drink containers lying around - no civic pride by shop owners to promote a clean access."

Image 17: Challenges and actions for streetscapes suggested by the Cockburn community. Community Scorecard 2018, Catalyst

9 Development Controls

Property developers are currently required to introduce trees and shrubs on road reserves, parkland and sports ovals through three existing regulatory controls:

- **State Planning Policy 2.9 *Water Resources* (SPP2.9)**
Concept designs must indicate integration of storm water within public open space
- **State Operation Planning Policy *Liveable Neighbourhoods* (LN)**
The ‘placement’ of street trees must be ‘considered’ in the structure planning stage of new neighbourhoods
- **City of Cockburn Local Planning Policy 5.18 “*Subdivision and Development – Street Trees*” (LPP5.18)**
Requires the provision of street trees at the rate of one tree per lot, in new developments and subdivisions.

These existing three controls have been applied with mixed success. Apart from the one tree per lot required of LPP 5.18 there is little indication what a suitable level of canopy cover is required on a street, park or sports facility. The canopy established by LPP5.18 is constrained by the crowded nature of the modern road:

- Reduced building set backs are used
- Narrow lot widths encourage paving by residents to reduce maintenance and increase car parking provisions, and
- Median strips are often required to be heavily fragmented to provide right hand turns onto the street from resident’s crossovers.

For the above reasons, it is important that an agreed minimum level of canopy cover be established early in the planning process. Streets must be planned so that the lot width, verge width and carriageway are properly considered.

9.1 Structure Plans

Structure plans endorsed by the City, and the Western Australian Planning Commission are used as briefing documents for the designs of future subdivisions in the structure plan area. The placement of street trees must be considered in the structure plan, however it is not mandatory. Structure plans tend to illustrate future street layouts in a singular cross section of one part of a street, which often results in an unrealistic impression of the number of street trees that the entire street can accommodate.

To enable adequate street tree provision, modifications to existing planning policies and the development of new policies is required to ensure that the coordination of elements in a street be demonstrated in plan-view as well as cross-section. The plan view must be for the length of a typical street to demonstrate how proposed road elements will function in context. Plan-view will also indicate the total canopy size that each proposed street profile can ‘theoretically’ provide.

Where applications submitted to the City contain designs with less than adequate shade tree provision, City officers will be in a position to require justification for non-compliance with these policies. This will encourage subdivision developers to comply with the structure plan, and assist the officers with improving the structure plan design process.



Image 18: Eucalyptus Street, Hammond Park. Opportunities for planting shade trees in this road are limited by constraints not readily appreciated in plans submitted at structure planning stage.

9.2 Town Planning Scheme

The City of Cockburn's Town Planning Scheme requires commercial and industrial development applications to include shade trees, grass and shrub planting in the design of these developments. Clause 4.9.2 implies that landscaped (planted) areas will be subject to shade over at least 50% of their area as the trees mature. Conversely, car parks are only required to be shaded by shade trees to 11.9% of the car park area. It does not specify where the trees should be planted on the lot (over the parking bays) or how they should be arranged within the car park.

Clause 4.9.2 allows a 50% reduction in the amount of the lot that should be given over to planting (from 10% down to 5%) if the adjacent verge is planted. This clause is of little value as the verges are routinely planted to improve the marketability of the lot meaning there is little reason for developers to provide the 10% on lot planting.

The absence of design performance targets in TPS3 and a general lack of appreciation of its importance in the design of streets and car parks for the City's health and wellbeing are leading to very poor outcomes. It is recommended that TPS3 is amended to identify performance indicators and require the City's statutory planners to assess the performance of the car park designs to ensure they provide adequate shade canopy.

A *Good Design Guide* for commercial development has been developed by the City in order to provide direction in terms of shade and pedestrian amenity in these environments.

9.3 Local Law 2000

The City's approval for modifications to the street verge by the adjacent property owners (including the removal of street trees) is required by section 9.4 and 9.5 of the City of Cockburn (Local Government Act) Local Law 2000 (LL2000). The local laws require that a record is kept of the nature of all consents given (plans and correspondence).

9.4 PSEW22 Streetscape Bonds

PSEW22 *Streetscape Bonds* provides a framework to protect and finance the repair of damage to the road reserve by developers of private lots, primarily in the commercial precincts. The policy enables street trees to be protected during construction in order to mitigate potential damage and avoid replacement. Amendments to this policy and increase in resources are required in order to increase the protection of street trees during development of adjacent private and commercial lots.

9.5 Policy Opportunity

As the City continues to mature and transitions to infill development there is an increasing need protect our street trees from potential damage through the construction process. It is recommended that the City develop or amend existing policies that requires a Tree Protection Plan (TPP) to be submitted by the developer before construction commences.

The policy will need to be accompanied by Tree Protection Zone (TPZ) approval processes/guidelines in conjunction with a tree bond.

10 Parks and Sports Ovals

The City of Cockburn manages over 320 parks, covering 361 hectares. The City's public open space feature great diversity, from grassed sports fields to the paved town square at Cockburn Central. In the 2018 community perceptions survey, Cockburn residents identified parks, playgrounds and open spaces as one of the most valued aspects of their local area.

At present the City does not have a complete inventory of all trees in its parks and sporting ovals. One of the recommendations of this plan is to undertake regular audits on a rotating basis of all of Cockburn parks and sporting ovals to help the City manage measure and increase its urban forest.

Once an understanding of the existing health and species of trees in the City's parks and sporting ovals has been established, a desk top exercise in nominating locations suitable for infill tree planting can be undertaken. From this the number and species of trees and their location within parks can be established and used to chart progress towards establishing the ideal tree canopy target achievable in the City's parks and sports ovals.



Image 19: Trees help create a sense of place. Lake Berrigan, South Lake

13 Objectives and Targets

The vision of the Urban Forest Plan is to create a healthy, diverse and thriving urban forest that contributes to the health and wellbeing of the Cockburn community. The objectives and targets to achieve this vision are outlined below:

Objective 1: Implement the Urban Forest Plan

To successfully implement the Urban Forest Plan the City must develop a comprehensive urban forest program that maintains and protects the existing tree canopy while expanding it in the future. This plan identifies 6 strategic objectives and targets, accompanied by 30 actions which map a clear pathway to achieving the City's aspirations for a thriving urban forest.

The plan will direct the management of streetscapes and public open space over the next 10 years to improve liveability and wellbeing.

An Urban Forest Officer will be required to deliver the City's aspirations for an enhanced shade canopy across road reserves, parks and sporting ovals. The Officer will review, amend and create new policies that drive tree establishment within new and existing suburban environments.

The Officer will be responsible for engaging with residents, community groups, sporting clubs and corporate entities to deliver an education program and articulate the importance of trees as a highly valued asset.

Additionally the Officer will be responsible for the following tasks:

- Establishment of the baseline data, monitoring and reporting on progress towards the targets
- Update the tree inventory database
- Oversee the audit of trees in streetscapes, parks and sporting ovals
- Establish theoretical canopy size
- Undertake thermal imaging and report on outcomes
- Integrate tree planting schedules with development proposals
- Liaise with internal stakeholders to engender tree retention
- Establish a community street tree and park planting program in addition to existing community planting events
- Establish promotional literature and videos to support community education.

Target

Appoint an Urban Forest Officer to implement the Urban Forest Plan.



Image 20: Community engagement will raise awareness on the importance of trees as highly valued assets.

Objective 2: Maintain and protect the City's existing Urban Forest

Cockburn's urban forest is a valuable asset, estimated to be worth over \$137 million in street trees alone. The maintenance and protection of these existing trees is critical to the success of this plan.

This plan sanctions changes to tree management practices including an increase in the watering regime of new trees (three times per week) to improve soil moisture and promote healthy growth during the first three years of establishment.

To ensure a thriving tree canopy the following maintenance will be undertaken as required during each watering application:

- Reshape and re-mulch bowls around trees
- Re-tie/replace stakes
- Prune trees to retain shape and remove dead foliage
- Apply slow release fertilisers every 3 months
- Record and replace trees in a deteriorating condition.

Regular health checks will also be undertaken for all trees as part of the tree audit scheduled every 5 years. A health rating of Good, Fair, Poor, Very Poor or Dead is used to describe the health condition of each tree.

Further actions to protect the City's existing tree population include a trial of root directing barriers, a replacement program for trees that are aging, inappropriate or vandalised, as well as the development of policies to strengthen the protection of trees and establish tree protection plans and zones in new developments. Additionally an investigation will be undertaken as to whether a compulsory street tree plantings can be implemented.

In summary, the City will maintain and protect its existing Urban Forest by:

- Engaging an arborist to examine, record, and rate the health of all street streets on a five year cycle (street tree audit)
- Commence an audit of all trees in City of Cockburn POS and sports ovals.
- Improving the health of trees in streetscapes and POS by increasing maintenance and watering regimes.
- Reviewing *PSEW15 Removal and Pruning of Street Trees* to strengthen the protection of existing trees.
- Developing a policy for the application of a Tree Protection Plan for street trees adjacent to a development site
- Developing approval processes and bond amounts for Tree Protection Zones.

Target

70% of trees in the City's streets, parks and public open space to be rated as in 'Good' condition.



Image 21: A Jacaranda tree in excellent health condition.

Objective 3: Establish baseline, monitor and evaluate success

Establishing baseline data is critical to delivering the vision of the plan. The current canopy cover baseline is constrained as it includes combined data on both trees and shrubs. In order to establish a more accurate baseline of tree canopy cover (excluding shrubs) the City must acquire LiDAR data.

This plan commits to tree audits of the City's streetscapes every 5 years with the next audit due to be completed 2018/19. In 2020 the City will commence audits of trees in Cockburn's parks and sporting ovals. The information obtained from these audits will provide key information that is currently missing from the City's inventory. Once an understanding of the health, location and condition of existing tree species is established, infill tree planting programs can be developed and implemented.

In addition, the City will undertake thermal image mapping every 3 years to map the effect of urban heat across all Cockburn suburbs, and to monitor the ongoing efficacy of the Urban Forest Plan and identify future areas of need. This information can enable the City to identify localised hotspots to inform the City's urban forest planting schedule and prioritisation of tree plantings.

The City will track progress against the urban forest targets annually. A summary of performance, whether positive or negative, will be included in the *State of Sustainability* report. This annual reporting process allows the City to identify and assess any resourcing or other issues. The Urban Forest Plan is a long-term plan which is intended to be a 'living' document. The plan will be reviewed every four years in alignment with the City's *Sustainability Strategy* and *Strategic Community Plan*.

Target

Measure tree canopy cover and undertake regular monitoring with progress reported each year via the State of Sustainability report.

Objective 4: Increase canopy cover

Canopy cover contributes to the over-arching vision of the Urban Forest Plan. An increase in tree canopy cover will provide cooler suburbs, protect infrastructure and contribute to liveability^{xvii}.

To establish the ideal tree canopy target, the City must first understand what is achievable based on the planting opportunities available and the maximum canopy size of trees when they mature.

The best method to understand this is to develop a *theoretical* future canopy size based upon the number and the species of trees planted (using the City's tree inventory database).

The calculation of a 'theoretical maximum canopy size' will be used to establish an ideal canopy target and assess the adequacy of the planting regime in producing adequate shade. This will identify shortcomings in the proposed planting regime across the City well in advance of the trees reaching maturity and establish where additional steps will be needed to bring parity to the City's various street styles.

Classifying each species used in the City's tree database with an estimated canopy size at maturity will assist with identifying future shortfalls in canopy distribution across the City. This will complement future LiDAR aerial survey and mapping exercises.

Once the City has established a tree canopy target, the rate of planting (number of trees per annum) can be reviewed and increased if required to ensure the City achieves its goals for a thriving urban forest.

The City will increase canopy cover by:

- Establishing a theoretical maximum canopy size (based on the tree inventory)
- Establish the ideal tree canopy target for the City's streetscape, parks and sporting ovals
- Identify the rate of planting (number of trees per annum) and investment (\$) required to achieve the tree canopy target.

Target

Establish a theoretical maximum canopy size, total canopy target and implement an annual tree planting programme.

Objective 5: Link development controls to canopy targets

By engaging with the property development process at the structure planning stage the positioning, distribution and performance of trees planted in the coming decades can be assured. Linking principles and ideas for achieving a minimum canopy cover adopted at Structure Plan stage with the designs produced at the later subdivision stage will help ensure that the design of streets places trees at the centre of the design process.

Planning policy shall be developed to ensure that the asset value of the City's street trees is recognised in the development of individual lots. Developers who choose to remove street trees will be required to compensate the City with both the asset value of the tree, cost of planting a replacement trees and the Helliwell valuation of the lost asset.

The design of large commercial and industrial car parks in accordance with a modified TPS3, and improvements to planning policies such as LPP 5.15 and LPP5.18 will enable the City to demonstrate how these large scale open areas can benefit from an improved design brief. Incorporation of Good Design Guides into the City's TPS3 and into planning policy will ensure that developers are compelled to consider these issues as part of the development application process.

Existing planning policies and processes will require modification to ensure minimum canopy rates are integrated into earliest planning stages and that these feed through to final product.

Target

Policy and development controls are implemented to increase tree shade cover in new subdivisions, private and commercial lots.

Objective 6: Increase robustness of the City's tree population

A resilient urban forest features diversity in both the age and species mix of its trees. Cities that feature one prominent species are more vulnerable to threats from pests and disease. Diversification is a key strategy in reducing risk and the same rule applies to the urban forest.

Species Diversity

Whilst the City of Cockburn aspires to achieve strong avenue plantings, it must strategically plan its planting programs to ensure it maintains a healthy and diverse tree population.

Currently, 45% of street trees are from the family Myrtaceae, 16% are from the genus Eucalyptus species, 5.5% are *Agonis flexuosa* species, and 5.2% are Callistemon Kings Park species. It is noted that these current species mix are close to the diversity thresholds and will need to be monitored closely.

Myrtle rust has become a serious pathogen of trees in the Myrtaceae family which is caused by the exotic fungus *Puccinia psidii*. The disease can cause damage to branches and foliage, stunted growth, and death of the trees affected.

The red flowering gum (*Corymbia ficifolia*) has been known to develop Marri canker in the urban environment. There is no current cure for Marri canker and once infected it is extremely hard to eradicate. Pruning is very selective and tools need to be sterilized before and during the process. As a result the City is restricting the planting of this tree species to reduce our vulnerability and protect the urban forest.

Species Robustness

Many species used in the City's streets have been proven to be less than robust when considering the increased mean annual temperatures predicted by climate change studies. Trials shall be undertaken to identify likely suitable replacement species for the City's vulnerable species.

Target

The urban forest will be composed of:

- No more than 50 percent of trees from the same family
- No more than 20 percent of trees from the same genus
- No more than 10 percent from the same tree species

14 Action Plan

This action plan sets out 30 key performance indicators that will enable the City to work toward the objectives and targets set out in the Urban Forest Plan. Actions have been identified for the next 5 years, and will be reviewed in 2022 in line with the next Strategic Community Plan review.

Objective 1: Resourcing & Education

	Action	Measure of Success	Funded	2018/19	2019/20	2020/21	2021/22	2022/23
1.1	Appoint an Urban Forest Officer (UFO)	Workforce plan amendment.	x		✓	✓	✓	✓
1.2	Prepare a suite of educational tools to promote the value and benefits of the Urban Forest Plan	Information tools developed	x			✓	✓	✓
1.3	Develop and implement a community street planting program which engenders ownership of street trees	Community planting programs commenced	x			✓	✓	✓
1.4	Develop and implement a program that encourages private property owners to plant and maintain trees to increase canopy cover	Program implemented and targets set	x			✓	✓	✓

Objective 2: Maintain and Protect the City's existing Urban Forest

	Action	Measure of Success	Funded	2018/19	2019/20	2020/21	2021/22	2022/23
2.1	Review <i>PSEW15 Removal and Pruning of Street Trees</i> to strengthen the protection of existing trees	Revised Policy adopted by Council	✓	✓	✓	✓	✓	✓
2.2	Investigate the implementation and enforcement of compulsory street trees.	Investigation completed	✓	✓				
2.3	Develop policy requiring the application of a Tree Protection Plan (TPP) to street trees adjacent to a development site	Revised Policy adopted by Council	✓	✓	✓	✓	✓	✓
2.4	Develop approval process and bond amounts for Tree Protection Zones (TPZ)	Revised Policy adopted by Council	✓	✓	✓	✓	✓	✓
2.5	Develop program for pruning of street trees under powerlines and disseminate information	Program developed and marketed	✓		✓			
2.6	Review and update street tree watering tender to incorporate maintenance of each street tree over a 3 year period. Implement upon existing tenders cessation	Tender reviewed and adopted by Council.	✓	✓				
2.7	Increase current tree watering schedule to 3 times per week over 3 year period per tree.	Increased watering regime commenced.	x		✓	✓	✓	✓

Objective 3: Establish baseline, monitor and evaluate success

Action		Measure of Success	Funded	2018/19	2019/20	2020/21	2021/22	2022/23
3.1	Identify locations/species for additional trees when carrying out tree audits (streets and parks).	Completion of new street and parks and sports ovals tree audit.	✓		✓		✓	
3.2	Conduct LiDAR survey of tree canopy every five years to ground truth 'theoretical' canopy sizes and establish private and public canopy sizes over time.	Tree canopy cover baseline updated.	✓	✓				
3.3	Undertake street tree audits (every 5 years) to identify the health condition of trees.	Audits completed and tree inventory updated.	✓	✓	✓			
3.4	Undertake parks and sports ovals tree audits (every 5 years) to identify the health condition of trees.	Audits completed and tree inventory updated.	x			✓	✓	
3.5	Conduct analysis of thermal image mapping to identify hot spots and monitor efficacy of the Urban Forest plan.	Mapping to show no net increase in urban heat island effect. Data explained in sustainability report.	✓			✓		
3.6	Report on the progress of the Urban Forrest Plan in the annual State of Sustainability Report.	Reporting complete	✓	✓	✓	✓	✓	✓

Objective 4: Increase canopy cover

Action	Measure of Success	Funded	2018/19	2019/20	2020/21	2021/22	2022/23
4.1	Establish 'theoretical maximum canopy size' from base line data. Set target for achieving maximum canopy over time.	x		✓			
4.2	Develop a City wide tree planting schedule. Identify and prioritise locations in response to thermal imaging, ecological corridors, LiDAR, tree audit, and town planning policy settings.	x			✓		
4.3	Implement the urban forest Street Tree planting schedule (to be adjusted following compilation of base line data)	x		✓	✓	✓	✓
4.4	Commence Parks and Ovals planting program (to be adjusted following compilation of base line data)	x		✓	✓	✓	✓
4.5	Continue to facilitate individual requests for street trees	✓	✓	✓	✓	✓	✓
4.6	Revise current 'theoretical' canopy size. Graphically illustrate progress to targets in annual Sustainability report.	x					✓

Objective 5: Link development control to canopy targets

Action		Measure of Success	Funded	2018/19	2019/20	2020/21	2021/22	2022/23
5.1	Facilitate Town Planning Scheme and R-Code amendments and other car park standards.	Scheme or R-Code amended and carpark standards altered	✓	✓	✓			
5.2	Local Planning Policies to be amended to require plan view design drawings that demonstrate compliance with canopy targets.	Update achieved	✓	✓	✓			
5.3	Develop guidelines that facilitate tree pit locations with permeable pavement, crossovers, paths, street lighting and services.	Guidelines developed	✓	✓	✓			

Objective 6: Increase robustness of the City's tree population.

	Action	Measure of Success	Funded	2018/19	2019/20	2020/21	2021/22	2022/23
7.1	Identify shortfalls in diversity targets and advocate use of species to counter lack of diversity.	Diversity increased year on year.	x		✓	✓	✓	✓
7.2	Record diversity of new tree plantings each year in sustainability report.	Diversity increased year on year.	x		✓	✓	✓	✓
7.3	Identify and trial new, more robust tree species.	New species identified and trialled	x		✓	✓	✓	✓
7.4	Identify replacement species for the <u>most vulnerable</u> 25% of street tree species predicted to fail because of climate change	Conduct trial plantings	x			✓		

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