Urban Forest Strategy

Adopted 6 December 2022.

EDGE

CAMPBELLTOWN CITY COUNCIL

A safe, sustainable, vibrant Community

Acknowledgement of Country

We acknowledge the Kaurna People as the traditional custodians of the Campbelltown City Council region and respect their spiritual relationship with their Country. We also acknowledge that their cultural and heritage beliefs are still as important to the living Kaurna people today.

Term	Definition
10-20-30 Rule	Also known as Santamour's diversity rule, that posits urban forests should comprise no more than 10% of any one species, 20% of any one Genus, or 30% of any one family.(1999)
The City	Council land that covers approximately 29km2 and comprises eight suburbs: Athelstone, Campbelltown, Hectorville, Magill, Newton, Paradise, Rostrevor, and Tranmere
°C	Celsius
Council	Campbelltown City Council
Senescence	The late stage of a tree's life characterised by a decline in the active growth and canopy volume.
UFS	Urban Forest Strategy
Urban Forest	All trees and shrubs located across the City on public and private land but (for the purposes of this strategy) predominately relating to trees.
WSUD	Water Sensitive Urban Design
BMP	Best management practices best-available, industry-recognised courses of action, in consideration of the benefits and limitations, based on scientific research and current knowledge
Forestree	Tree Management Software that improves service and asset management
Impermeable sufaces	Surfaces that do not allow water and oxygen to pass through Common examples include concrete, steel and bitumen

Glossary

Contents

Executive Summary

The Urban Forest Strategy is the first document to collate data about the City of Campbelltown Urban Forest. **Our urban forest is defined as all trees located within the City on public, State, and private land.** It sets out a vision for protecting and expanding our existing leafy legacy for future generations. Campbelltown is an urbanised area with 24% canopy cover alongside the foothills with a considerable level of natural areas and creeklines important for the overall connectivity from the hills to the River Torrens.

The Strategy summarises the work undertaken to date and the framework to achieve the target of a 20% increase in canopy cover (from 2018 levels) by 2045, which is ultimately a canopy cover of 29% of the total Council area. The strategy sets out to continue to reverse the trend of 6% canopy cover decline observed between 2006 and 2016 and continue the more recent trend of a 1% increase observed in 2018.

It outlines the current data that has been collected on total numbers of trees, current species diversity, canopy cover levels across Council and by suburb and land type, significant tree information and heat mapping and how this can be used for forward planning and further improvements to current practices. It provides a summary of the challenges facing the urban forest including ongoing impacts of urban infill and climate change and loss of canopy cover on private land.

The evidence regarding the multiple benefits of the urban forest continues to grow and can be difficult to quantify as they are a appreciating asset. To aid this understanding, many of the values of urban forests have been quanitifed to provide an estimated overall financial value using the i-Tree Eco Tool. Using this tool our urban forest has a current functional benefit of $270,00 annually and a total value of $2.2 million.

The value of the urban forest to the community is much more than can be quantified financially through personal and historical connections including place and identity. This is demonstrated through various stories told by the community.

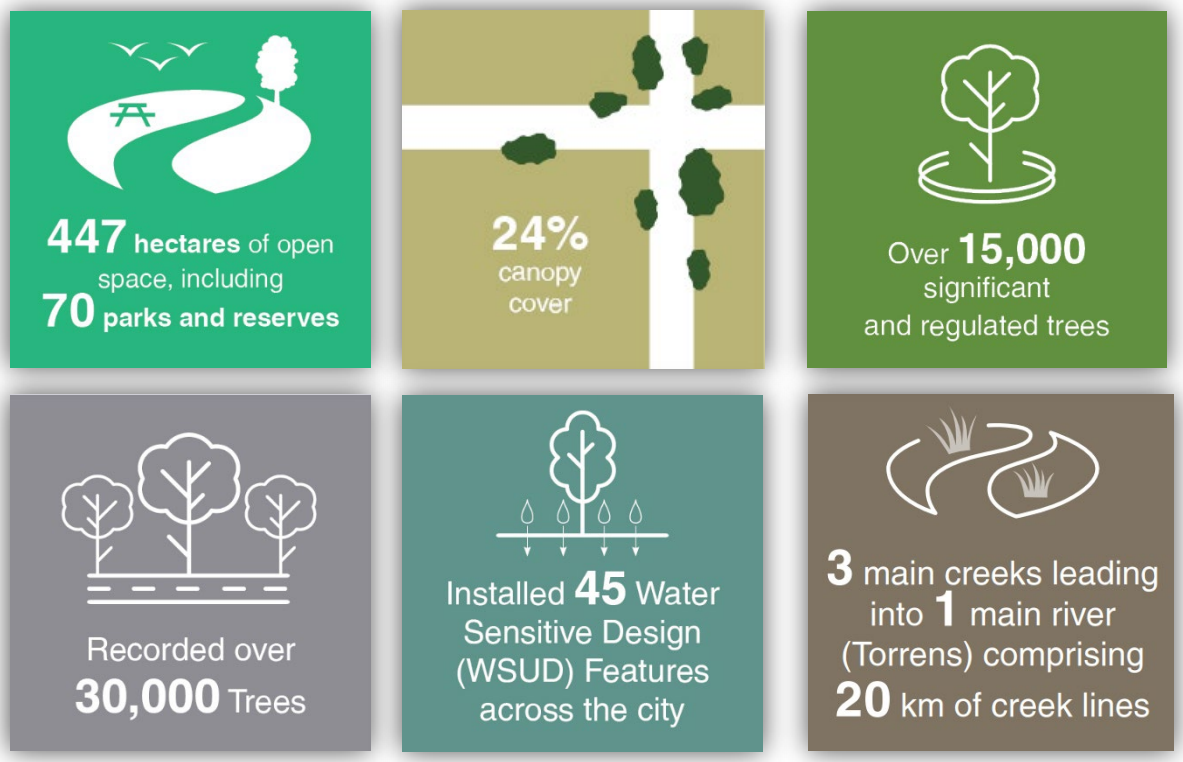
This Strategy provides the key principles for Growing, Managing, Protecting and Sustaining our Urban Forest and Engaging with the community to help achieve the overall vision and canopy target in a sustainable way.

It is supported by an Action Plan that details what is required to further the work undertaken to date to achieve the objectives of the Strategy and priorities and budget considerations.

It is anticipated that the Strategy will be reviewed every 5 years to align with evolving data on our trees and in keeping with current standards and practices.

Introduction

The City of Campbelltown is an urbanised area located adjacent to the foothills of the Mount Lofty Ranges. It is populated at just over 50,000 people with 24,871 households, and contains a considerable amount of natural open space consisting of biodiversity reserves, remnant vegetation and four creek lines. This is Councils first Urban Forest Strategy (UFS) and as such provides a collation of the information about trees in Campbeltown and work undertaken to date to improve our urban forest. There is now much evidence about the benefits of trees including to the environment, our community, and local economy. The UFS provides the framework for Growing, Managing, Protecting and Sustaining our urban forest network into the future.



Our Urban Forest

Our urban forest is defined as all trees located within the City on Public, State, and private land. This includes, but is not limited to trees growing in:

- street and road verges;
- parks and open spaces;
- community gardens;
- gardens on private properties.

Whilst smaller shrubs and grasses are not the primary focus of this strategy, their importance is acknowledged in creating diversity and food and habitat for wildlife. It is intended this vegetation will be included in the Biodiversity Strategy to be developed and that these two strategies will be mutually complementary and provide a holistic approach for Council across these important elements of our environment.

Plate 1. Examples of trees in our urban forest

Our urban forest provides multiple benefits to the community, local environment, and economy (Figure 1). They are are one of the few public assets that appreciate in value over time, with larger and healthier trees providing greater benefits than small trees and those in average health and condition.

Figure 1. Some of the environmental (green), social (blue), economic (red) and cultural (purple) benefits provided by our urban trees.

The canopy of our current urban forest covers 24.2% of our Council area (Figure 2). Most of this canopy cover (37.89%) is located on private land, which covers approximately 64% of the Council area. Slightly less canopy cover is on Council owned and managed land (37.67%), and the remainder (24.44%) on State Government or other land tenure (Figure 3).

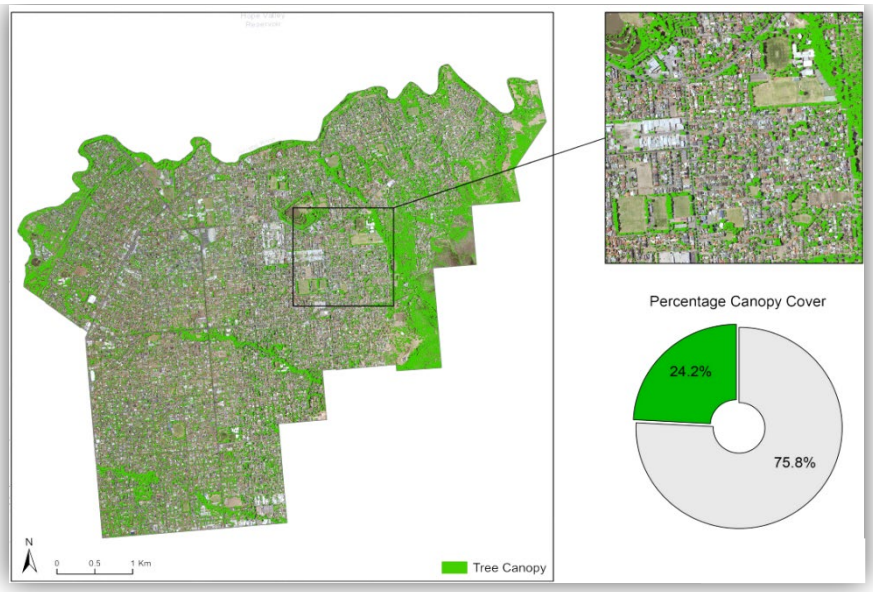


Figure 2. LiDAR derived canopy cover across the City of Campbelltown (green cover vs impervious) (Source: Aerometrix 2020)

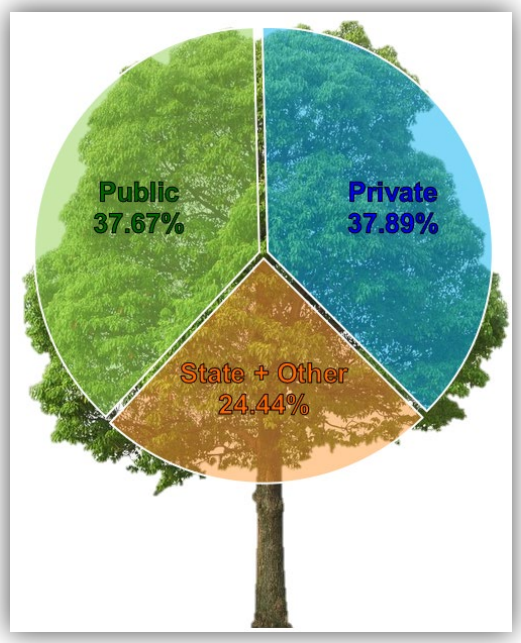


Figure 3. Proportion of the total canopy cover falling on public, private, and State/other land tenures.

Current canopy cover varies across Council suburbs and we aim to to preserve and enhance canopy in suburbs that have higher levels as well as build up areas that have lower levelsOur UFS also aligns with the the Resilient East goal to:

> *'Improve the resilience of communities, assets and infrastructure, local economies and natural environments so we can cope with the challenges and opportunities of climate change.'*

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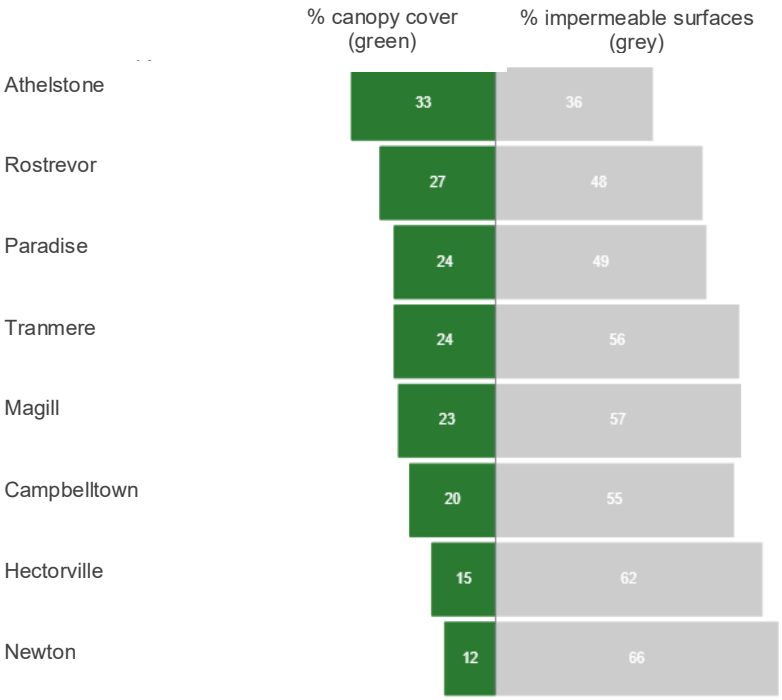


Figure 3a. Percentage of canopy cover and impermeable surfaces by suburb

Ensuring diversity in our urban forest is essential for increasing resilience to pests, diseases, and climatic changes. We assessed resilience in our urban forest against the 10/20/30 rule-of-thumb[1], a well known approach to guide urban forest plantings to help safe-guard against possible broad-scale devastation[2]. Of the 31,891 tree records captured in our evolving public tree inventory register, 29,833 were able to be analysed (93.5%).

The urban forest diversity analysis provides a current snapshot of our urban forest which is comprised of 40 families, 92 genera detailing 227 species. The species comprising our urban forest are diverse enough to fall below the recommended 10% threshold (Figure 4). However, our urban forest is dominated by one family (Myrtaceae) and one genus (Eucalyptus) both of which exceeded the recommended diversity thresholds.

The existing levels of family and genus present in Campbelltown is to be expected in this locality. Eucalyptus (current levels) are predominantly found along of creeklines, major parks and are more prone to disease as a result of stress and not conducive to the street tree environment. Whilst exotic species are a larger proportion of street tree plantings currently, native species are still a larger proportion of parks/reserves so whilst this should maintain required levels it should be reviewed as part of an overall species planting strategy.

It is important to be aware of and understand the urban forest statistics, however there is no intention to reduce the level of Eucalyptus or Myrtaceae due to the important role they play in local food and habitat provision. Council will ensure an appropriate diversity in future plantings to maximise resilience of our urban forest and protect Council against significant impacts from disease, pests or emerging impacts such as climate change.

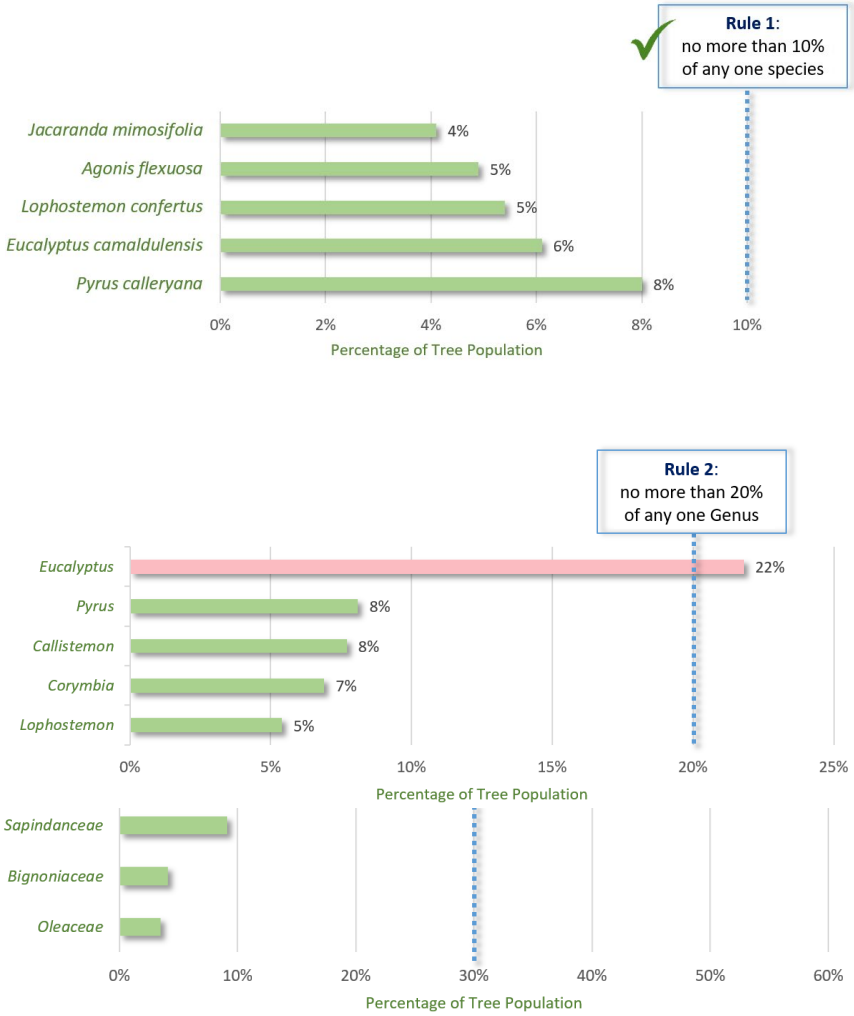


Figure 4. Current top 5 species, genus and family diversity represented within our Urban Forest, relative to the 10/20/30 rule thresholds.

[1] This rule posits that, as a minimum, urban forests should be comprised of no more than 10% of any one species, 20% of any one Genus, and 30% of any one family.

[2] Santamour FS (1999) Tree for urban planting: Diversity, uniformity, and common sense. *Metria 7: Proceedings*, pp 57-65. URL: http://new.www.tree-care.info/mhattachments/pdficol0kyRZI.pdf

Our urban forest also comprises approximately 15,000 Significant and Regulated trees growing on public and private land. About a third of these are on private land.

Council has strong stance for advocating the retention of Significant and Regulated trees which are regulatd under the State's *Planning, Development and Infrastructure Act 2016*, Regulations and the Planning and Design Code (v2022.11). Under these instruments, Significant and Regulated tree provisions may be applied to native or exotic species and to a single tree or a stand/group of trees.

Significance is defined as a tree or stand of trees that:

(i) makes a significant contribution to the character or visual amenity of the local area; or

(ii) is indigenous to the local area, it is a rare or endangered species taking into account any criteria prescribed by the regulations, or it forms part of a remnant area of native vegetation; or

(iii) is an important habitat for native fauna taking into account any criteria prescribed by the regulations; or

(iv) satisfies any criteria prescribed by the regulations.

Criteria prescribed by the regulations are as follows:

A regulated tree has:

- *a single trunk with a circumference of 2 metres or more - when measured 1 metre above natural ground level*
- *multiple trunks with a total circumference of 2 metres or more and an average circumference of 625 millimetres or more – when measured at 1 metre above natural ground level.*

A significant tree has:

- *a single trunk with a circumference of 3 metres or more measured at a point 1 metre above natural ground level*
- *multiple trunks with a total circumference of 3 metres or more and an average circumference of 625 millimetres or more when measured 1 metre above natural ground level.*

Specific retention of these Significant and Regulated trees are further outlined within the Planning and Design Code (V2022.11).

Within our City, we have identified and mapped potentially 15,000 Significant and Regulated trees (Figure 5) on both public and private land. By mapping out where the Significant and Regulated trees are, we can better identify trends and programs to support the retention and protection of these trees on both public and private land.

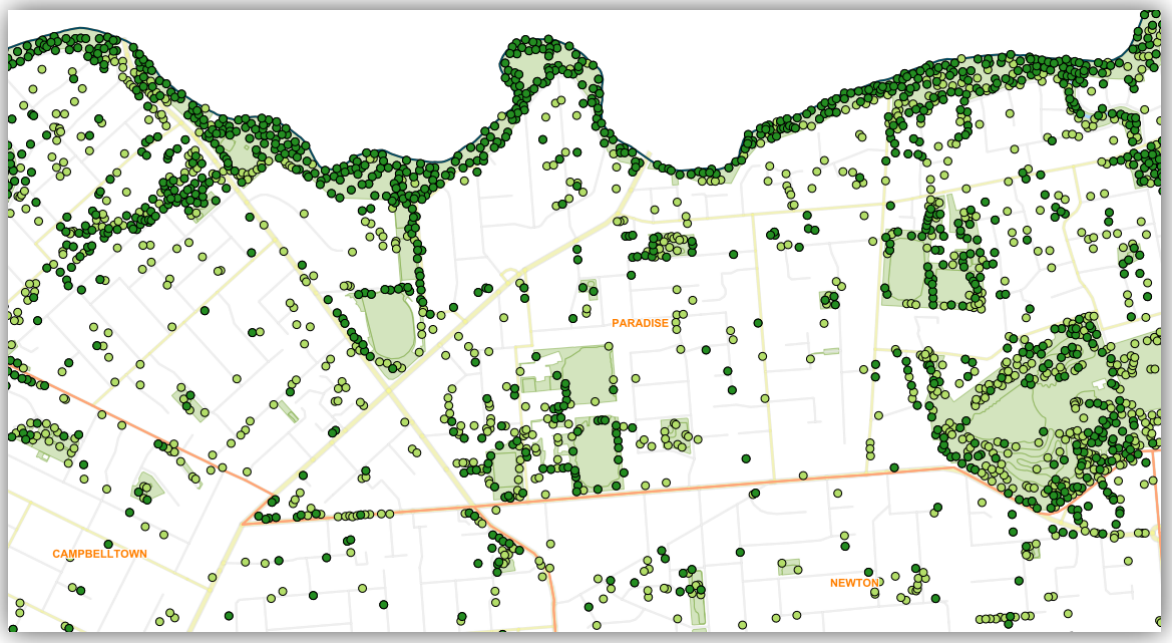


Figure 5. Example of our spatial information on potential Significant and Regulated trees across the Council area. Significant trees (dark green) and Regulated trees (light green).

In recent years, our public planting efforts have been helping to reverse the loss of canopy cover on public land. A 6% decline in canopy cover was measured across the city between 2006 and 2016, with most of this loss occurring on private land. Analyses of canopy cover change between 2018 and 2020 showed an almost 1% increase in canopy cover[3], indicating that Council's planting efforts in recent years on public land are helping to reverse the trend of canopy loss.

[3] DPTI internal LiDAR document on infill

We have committed to increasing our total canopy cover by 20% (from 2018 levels) by 2045[4].

To help achieve this target, we will be planting a minimum of 1,200 trees each year, as well as additional planting in reserves and at community held planting events. Over the last two years (2020-2022), we have planted on average a total of 1,832 trees each year on public land. We undertook recent modelling using the Tree Planting Predictor™ (TPP)[5] tool to examine if this planting rate would be adequate to achieve our goal.

The TPP forecasts future tree canopy cover based on inputs including tree growth parameters, types of trees planted, establishment success and the current rate of change in canopy cover (including canopy loss). The TPP also forecasts of the cost requirements of future planting programs based on the average cost to plant and establish a tree.

Based on the modelling we believe that our current planting rate and level of species diversity should be on track to achieving our goal, at an estimated cost of $824,400 per year. Across 17 years, this equates to a financial commitment of $14 million. However, this cost and capacity to reach this target will be improved by sharing planting efforts with State and private land owners.

Further, it should be noted that achieving our goal is heavily dependent on maintaining not only the current planting rate and species mix, but also our recent gains in canopy cover. Should losses of canopy cover again accelerate and therefore exceed planting gains, we will be at risk of failing to achieve our goal. Ultimately, protecting and increasing our canopy cover across the city is a shared responsibility between Council, State and private land owners.

[4] Aligns with the target established in the State's 30 Year Plan.

[5] TPP developed by Edge Environment https://edgeenvironment.com/tree-planting-predictor/

Our public trees are managed using the Forestree[7] tree management software.

We have been using this tool since 2018 as it allows us to interactively map and monitor all of our public trees so that we have a good set of records that help in identifying not only what trees we have and where, but the current health and condition of our trees, including a likely life expectancy, and a record of management actions applied to maintain them. In addition, we record where vacant planting sites exist and any maintenance actions performed such as watering, pruning, and planting (Figure 6).

Having a detailed tree asset inventory allows us to plan and manage our urban forest proactively and efficiently. At the time of developing this UFS, we have captured within Forestree more than 90% of our street trees and about 20% of our park/reserve trees. Work is ongoing to refine the inventory of all of our public trees and identify vacant planting spaces.

Figure 6. Example of Forestree software interface.

We know that our trees help to cool our urban area.

In 2018, we undertook detailed heat mapping across our Council area. This mapping demonstrated the cooling effects of trees, particularly over streets (Figure 7). To maximise the benefits provided by our tree plantings, we will combine our understanding of urban heat, together with other factors such as social vulnerability and priorities from our Biodiversity Strategy (to be developed), to help prioritise where we will plant trees.

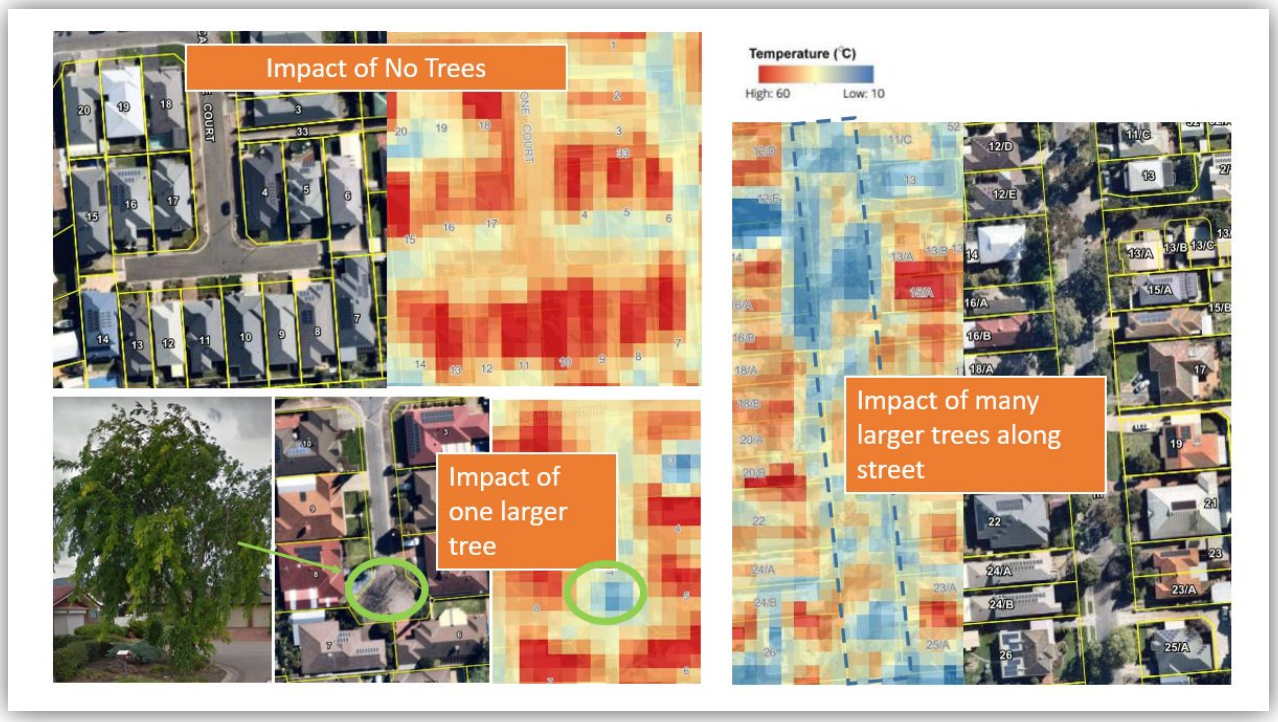


Figure 7. Example of heat mapping showing the cooling influence of tree lined streets versus no strets with trees. Image shown is a street in Newton with the comparison in Rostrevor

Valuing Our Urban Forest

The trees comprising our urban forest are one of our only urban assets that appreciate in value over time. Many benefits provided by trees are widely valued intrinsically, yet from a planning and management perspective, it is important to also understand the economic value of these benefits so that the business-case can be made for protecting and growing our urban forest. Quantifying the range of benefits provided by urban trees is complex and the economic quantification of tree benefits is especially so.

Some benefits are relatively easy to quantify, such as the amount of shade provided, carbon stored or absorbed annually, and air pollution removed. Other benefits are much more difficult to quantify, such as cultural, historic, or spiritual values. Further, establishing a market value for the benefits that are able to be quantified, adds yet another level of complexity. For instance, it is relatively easy to value the carbon stored or absorbed as there are globally recognised carbon markets. The benefits of cleaner air can be valued based on savings to the national health system due to people having improved health outcomes where there is good air quality. It is more difficult to put a price on the cultural/historical connection provided by trees or on a threatened flora or fauna species.

The i-Tree Eco[6] tool is a globally leading approach for quantifying some of the benefits provided by trees, including providing market valuations for avoided runoff savings, carbon stored and sequestered and air pollution removed. Using the information collected to date in Forestree on our public trees we undertook an i-Tree Eco valuation of the benefits provided by our public trees. For ease of communication, we also converted some of the i-Tree Eco outputs into more meaningful and relatable comparisons (Figure 8). It is important to note that the following valuations are considered highly conservative for the following reasons:

- not all trees comprising the urban forest were eligible to be included in the analysis
- not all benefits provided by trees are able to be valued
- detailed measurements have not been taken of each tree and so analyses contain estimates.

Based on this modelling, our trees provide **annual functional benefits valued at more than $270,000, stored carbon value of $248,294 and a like-for-like replacement value of more than $2.2M**. Further details of each benefit modelled is available in Annex A.

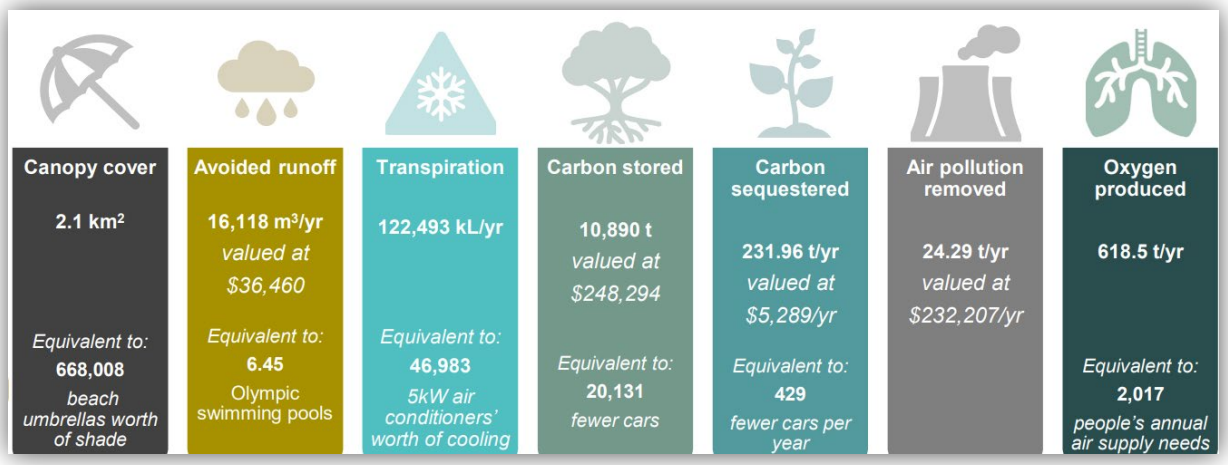


Figure 8. Quanitifcation of some of the benefits provided by a portion of our urban forest.

[6] https://www.itreetools.org/tools/i-tree-eco

What The Urban Forest Means To Our Community

Our residents are strong supporters of our urban forest and advocates for increasing greening across our City. Elements particularly valued by our community are: open spaces with trees, access to Linear Park walking trails, nature and wildlife and public parks. The following are examples from our recent 'favourite tree' competition of specific trees valued by members of our community.

Our tree is affectionately named 'Steve'. At 7.45m circumference at 1m above ground and approximately 35m tall, this River Red Gum is one of the largest and oldest trees in the Council area with an estimated age of 300 years. We enjoy the abundant birdlife (e.g. owls, lorikeets, cockatoos, galahs, ducks) and other animals (e.g. geckos) that call it home

1) It gives me oxygen to breathe.

2) I love the colours of the leaves.

3) I want to climb it

Located on Ghost tree Gully track is has an eerie presence with branches like arms, providing shelter and comfort for those underneath. It has helped me through some hard times, sitting underneath brings calmness and connection to the local community.

Challenges Facing Our Urban Forest

Our urban forest will face a number of challenges over the coming years (Figure 9). These challenges will vary in their level and extent of impact, drivers and ease of mitigation, and will present significant barriers for growing and protecting our urban forest.

Climate change is creating more extreme weather conditions within our region[7]. These changing conditions may benefit some species but negatively impact others. Understanding which of our trees will be the most and least resilient to these changes is critical for helping to ensure resilience within our urban forest. The Which Plant Where Tool[8] will be used to review our urban tree species to identify suitable species for our current and future climate.

Hotter and drier conditions will increase the number of extreme fire risk days, increased heat waves will increase stress conditions to existing trees and higher energy storms will potentially damage our urban forest. We will therefore need to consider not only what species to plant but also where to plant them to ensure they are resilient to future climate conditions and can minimise potential fire spread.

Due to our location bordering the foothills, there is a potential increased risk of fires affecting the urban forest in this area. Specific areas such as Wadmore Park have fire risk incorporated into a separate Management Plan due to the nature of the area. To mitigate fire risk in other areas, will require a focus on careful vegetation planning and management in consultation with relevant authorities.

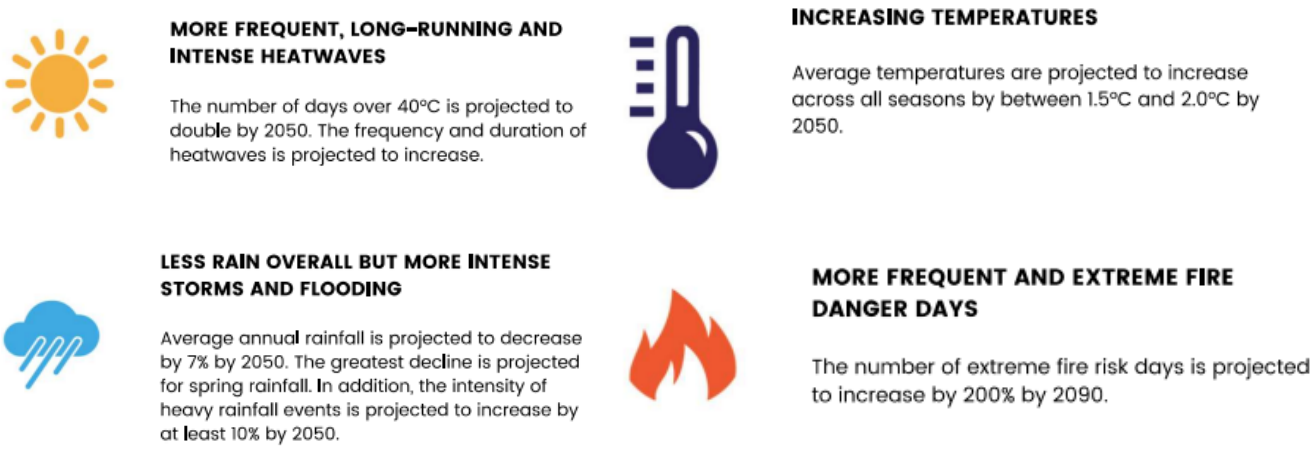


Figure 9. Impacts of Climate Change on Eastern Adelaide

[7] https://www.resilienteast.com/impacts

[8] https://www.whichplantwhere.com.au/

Water is essential to the health of the local environment and trees, yet it is becoming an increasingly precious resource due to a combination of climate change impacts (i.e. less rainfall overall) and traditional design methods of the built environment that direct water away from the soil into drains. This makes it challenging to ensure an adequate water supply is available for our trees.

To help alleviate these risks, we have numerous projects in place, or underway, to increase access to a sustainable water supply as well as improve ways for rainfall to infiltrate into the ground for our trees. For example, our stormwater harvesting facility at Max Amber Reserve is used to fill our water trucks and replenish our bores, and we have implemented over 45 Water Sensitive Urban Design (WSUD) projects across the City.

WSUD involves designing systems that help capture water where it falls and as runoff, and return it to the ground. Examples include: rain gardens and biofiltration, street tree inlets, permeable paving and porous stone set (Plate 2). In addition to helping to capture rain where it falls, WSUD provides a number of further benefits, including:

- Cooler environments –mitigates the Urban Heat Island Effect
- Helping our trees survive and adapt through climate-resilience;
- Reducing runoff and flows of stormwater which can potentially overload infrastructure;
- Reducing water pollution of creeks, rivers and the ocean
- Reducing the need for expensive infrastructure projects to reduce flooding.

In addition to this we have revised our water truck routes, increased resourcing and are integrating WSUD into new projects and road reconstructions as standard practice.

Plate 2. Examples of WSUD elements: stree tree inlet, biofiltration and porous stoneset

Aging trees present a complex challenge in managing and growing our urban forest. Whilst we recognise that larger trees generally provide greater benefits, this is conditional on active healthy growth, which starts to diminish as trees naturally enter senescence. Whilst benefits gradually decrease with age, trees will still have value in the significant amounts of carbon they store, even after they have died. Additionally, many native trees develop hollows as they age which create significant habitat opportunities for many of our native wildlife species. Aging and senescent trees in the urban area may present a level of risk to people and property from limb drop or whole tree failure. The challenge at hand is how to balance these risks and benefits.

Dead trees that are managed are important for habitat purposes and these are currently managed and identified through Forestree. We have been progressively adding man-made habitats into existing dead tree limbs throughout our parks and reserves.

This iconic tree in Lochiel Park, Campbelltown, is commonly known as the "Tree of Life' due to the variety of native wildlife it provides a home for

Forestree plays an integral part in addressing the challenges of our urban tree management, helping us to understand, plan and act on the information collected to coordinate our planting programs effectively. A range of key strategies may be implemented, depending on the context and tree species in question, including: risk reduction pruning, retaining standing dead trees for their carbon storage and habitat value, removing trees for replacement purposes, and intergenerational planting programs that aim to plant new trees before existing trees senesce to minimise the loss of canopy cover over time.

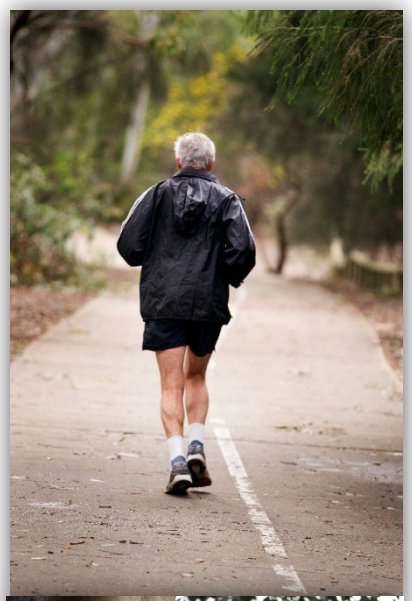
Urban infill development is the biggest threat to trees and canopy cover on private land within our Council area. Urban infill is the process by which land is subdivided and the existing house/s are removed, along with (in most cases) any trees and vegetation, and replaced by more houses. In this sense urban infill is often informally referred to as a process of a "1-into-2" or "2-into-3". Plate 3 illustrates this occurrence in Campbelltown over a nine year period.

Over the next 20 years (to 2041), the City's resident population is forecast to grow by 29.13%, from 55,014 to 71,039[9], with most of this growth projected to occur in Rostrevor, Paradise, and Tranmere. These suburbs also contain some of the highest canopy cover on private land within the Council and so urban infill presents a significant risk to our urban forest.

As much of Campbelltown's existing Urban Forest is currently on private land, the key challenge will be to try to retain this canopy where possible, particularly in those suburbs with existing low canopy or projected population growth. We require strategies to retain canopy on private land and also increase planting of new vegetation and trees on new developments. In addition, community action to protect and plant trees on private land will be important in helping to mitigate the impacts of urban infill on our canopy cover goal.

Plate 3. Example of infill development in Hectorville

[9] https://forecast.id.com.au/campbelltown-sa/population-summary



Ensuring equal access to treed green spaces is a growing area of focus globally, particularly since the COVID-19 pandemic highlighted the importance of urban designs that ensure ready access to green spaces within local "bubbles". The mental and physical benefits of being able to connect with nature (e.g. being able to see trees from a building or walk within a park) has long been known. It is also recognised that more affluent communities often have more opportunities to connect with nature, with such areas tending to have better treed streets, larger and higher quality public green spaces and improved connecting infrastructure (e.g. footpaths and bikeways). This means that community sectors that tend to be at higher risk of mental and physical illnesses also are less able to access treed and green spaces that could improve their wellbeing.

The 3-30-300[10] rule is a newly posited framework to establish targets for urban greening and to guide the design of equitable green spaces to help ensure equitable access city-wide, and is quickly becoming global leading best-practice. The rule states that 3 decent sized trees should be able to be seen from every household, neighbourhoods should have a minimum of 30% canopy cover, and every resident should be no more than 300m walking distance from high quality green space area of at least 1ha in size. As part of our commitment to increasing our urban canopy cover, and improving the liveability of our city, the rule provides an aspirational target and will guide planning by applying these criteria to our Council area and prioritisation of tree planting programs.

[10] Konijnendijk van den Bosch, C (2021),

Community perceptions about trees have the power to significantly bolster or impede our urban canopy goal. Whilst many in our community place a high value on our urban forest, negative perceptions about trees (e.g. fear of limb fall and fire risk, mess created by seasonal leaf and fruit drop) may greatly undermine and derail planting efforts, not only on private land but also on public land. Vandalism of newly planted street trees is one of the main contributing factors to the loss of new plantings. Further, increased expectations of tree retention and plantings on private land, as a means to help achieve the city-wide canopy cover goal, may be negatively received by some community members.

To help mitigate any negative perceptions of trees and manage community expectations, we are undertaking numerous community engagement approaches on the benefits of trees and will implement an ongoing range of engagement activities designed to:

- understand community concerns, perceptions and expectations
- improve awareness and understanding of tree benefits
- gauge support for different tree planting programs
- encourage tree planting and retention on private land.

Why Do We Need An Urban Forest Strategy?

The purpose of this UFS is to provide the framework for the long-term planning and management of our urban forest so that we are able to achieve our increased canopy cover goal and improve liveability within our City under a changing climate.

The UFS aligns with State government and Council strategies and plans including:

- The 30-year plan for Greater Adelaide;
- Green Adelaide Urban Greening Strategy
- SA Power Networks Powerline Friendly Tree Guide 11 September 2018)
- SA Water Tree Planting Guide (2021)
- Campbelltown Environment Plan
- Campbelltown Open Space Directions and Strategies Report
- Council's Tree Management Policy (adopted 21 September 2004 and reviewed 23 February 2021)
- Wadmore Park/Pulyonna Wirra Management Plan (3rd August 2021)
- Biodiversity Strategy (to be developed).

The City of Campbelltown is part of Resilient East, a partnership between eight eastern Adelaide Councils and the State Government. It has identified a range of five-year priority actions set out in the Sector Agreement for the Resilient East Regional Climate Change Adaptation Plan, many of which have a focus on greening. Where relevant, we will work with Resilient East to further the objectives of this UFS.

Our UFS also aligns with the the Resilient East goal to *'improve the resilience of communities, assets and infrastructure, local economies and natural environments so we can cope with the challenges and opportunities of climate change.'*

The strategic framework for Council is outlined in Figure 10.

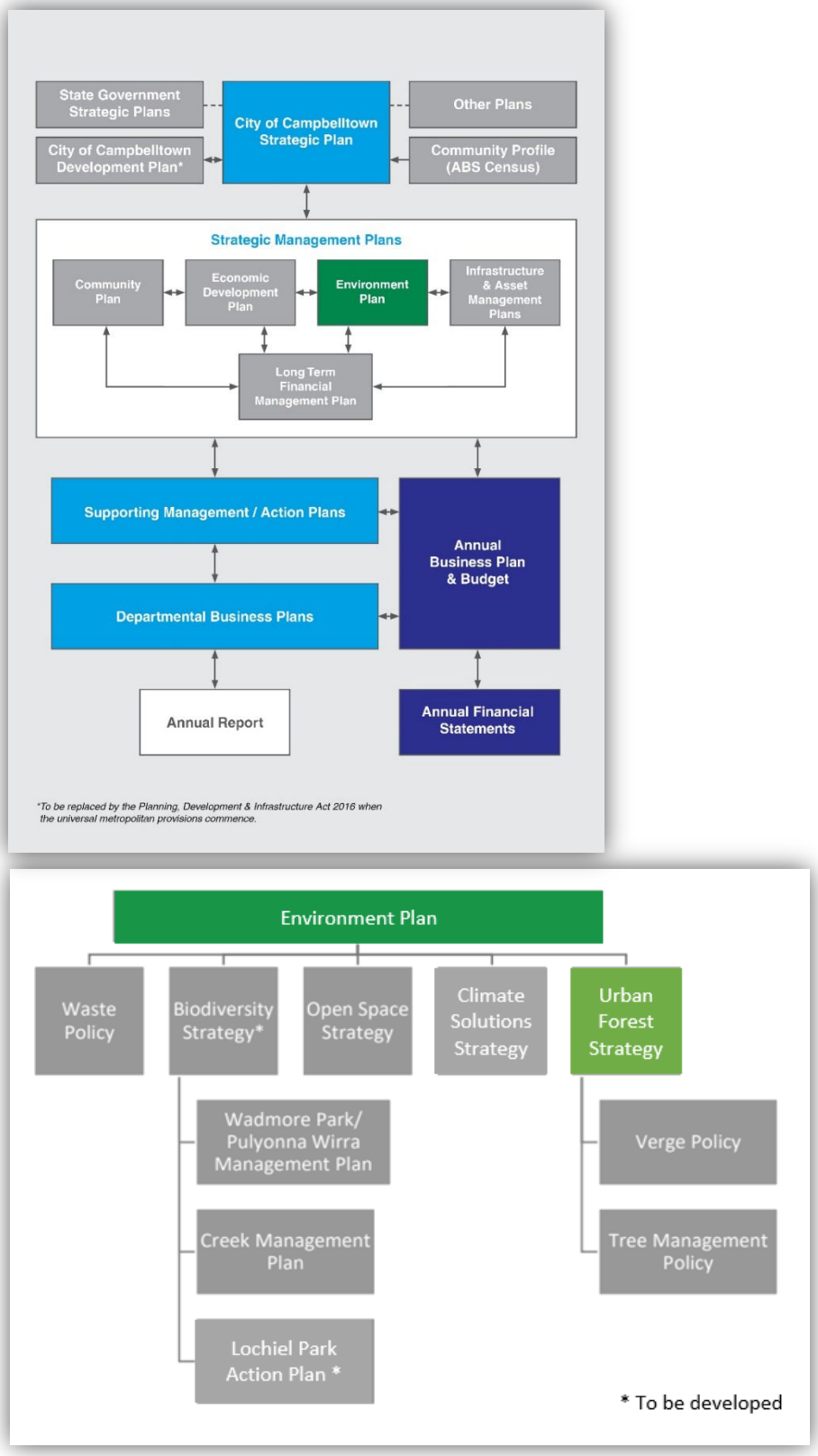


Figure 10. City of Campbelltown Strategic Framework

Principles & First Steps to Success

Our vision for the UFS is: Growing our leafy legacy, moving from grey to green

Our target is to increase canopy cover by 20% (from 2018 levels) by 2045

Currently:
24% total canopy

2045:
29% total canopy

Our vision and target will be achieved through the following five themes:

1. **Grow**
2. **Manage**
3. **Protect**
4. **Sustain**
5. **Engage**

For each theme, the key principles are noted together with the first steps to achieving success. The associated City of Campbelltown Urban Forest Strategy Action Plan 2022-2027 provides more detailed information about the actions required to achieve the outcomes of the Strategy. The Action Plan also details the monitoring and reporting requirements to ensure success.

Grow

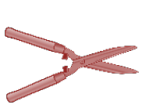
We want to help and support our Urban Forest to grow in a sustainable way across both public and private land to help Council increase the canopy cover to achieve our target of 20% increase by 2045. The target is a shared responsibility so collaboration with our community will be vital to get the best result.

Focus Areas:

- Expand and Establish
- Right Tree, Right Place, Right Way!

First steps

1.1Develop 5-10 year planting plan for Council land including prioritising planting in low canopy, high heat and high social vulnerability areas
1.2 Identify and plant species that contribute to increased diversity and resilience with a focus on native species
1.3 Explore opportunities for establishing canopy cover on private and State government land
1.4 Use the 3-30-300 rule as a guide when developing and planning planting programs
1.5 Identify locations for planting larger and legacy trees (>15m)



Manage

To support our Urban Forest, we need to manage what we have as well as make new plantings. This includes refining our data collection and management and monitoring health and ongoing risks.

Focus Areas:

- Upkeep and Maintenance
- Tree Assessment and Monitoring

First steps

2.1 Improve and maintain data collection for the management of trees
2.2 Establish a regular review of full public tree register to ensure information is maintained up-to-date
2.3 Review and update tree management procedures
2.4 Identify future resourcing requirements, including staffing, training and best management practices
2.5 Develop guidelines for effective planting in parks

Protect

We want to protect what we already have in our Urban Forest. We are fortunate to have a diverse range of trees, many of which are significant or larger in size. Our existing trees ultimately provide a number of important benefits and value to the community, many of which are not fully appreciated or understood.

Focus Ares:

- Urban Infill and Lifestyle
- Biodiversity and Habitat
- Advocate and Champion

First steps

3.1 Provide information and develop activities that promote the protection of trees on private land
3.2 Encourage programs that support the planting and retention of trees and other greening on private land
3.3 Ensure appropriate tree species planting to enhance biodiversity corridors and zones, providing adequate proportion of local native species planted
3.4 Investigate options to deter removal and advocate for improved measures to protect and retain existing trees
3.5 Advocate for improvements to legislation and policy to increase protection of existing trees

Sustain

We want our Urban Forest to thrive, not just survive. We need to make sure the local environment conditions are right and support our Urban Forest so it can thrive in the urban environment. This includes ensuring healthy soil, getting more water into the ground and creating space for trees.

Focus Areas:

- Encourage and Innovate
- Embed Best Practice

First steps

4.1 Develop a plan for aging trees and replacement trees for tree management
4.2 Develop and implement measures to increase water and integrate water sensitive urban design and improve the sustainability of the Urban Forest
4.3 Partner with local research institutions to investigate and trial activities in tree protection and support
4.4 Encourage the City's trees to thrive

Engage

One of the biggest challenges moving forward is negative Community perceptions of trees and misinformation. We want our community to continue to value the different benefits of the Urban Forest and connect with it in their own way. From a fruit tree to a 300 year old Red Gum, they all have their place and purpose as part of our Urban Forest and engaging people to the benefits of trees is critical in achieving our ultimate success.

Focus Areas:

- Living with Trees
- Culture and Heritage

First steps

5.1 Develop ways to promote the positive benefits of trees
5.2 Explore ways to engage and educate the community in caring and valuing street and reserve trees
5.3 Encourage and support programs and initiatives that support trees within the private realm
5.4 Develop partnerships with State Government and other agencies to collaborate on education and awareness about the benefits of trees
5.5 Investigate historical and current perspectives in relation to Kaurna connection to country and Significant trees

Annex A. Tree Benefits Quantification and Valuation

Shade

Shade provided by a tree canopy is highly important for providing cooling by shading surfaces as well as for providing protection from harmful UV rays. Based on the assumed canopy spread of each tree, the trees assessed were estimated to provide **a total of 2.1km^2 of shade, which is equivalent to 668,008 beach umbrella's worth**. This shade is further estimated to provide **UV protection equivalent to 2 SPF**, or a reduction in UV index of 3. This is important for encouraging outdoor activites and improving the walkability of our city.

Avoided rainfall runnoff

Surface runoff can be a cause for concern in many urban areas as it can contribute pollution to streams, wetlands, rivers, lakes, and oceans, and during intensive rainfall events can overburden stormwater systems and create localised flooding. During rainfall events, some portion of the rainfall is intercepted by vegetation (trees and shrubs) while the other portion reaches the ground. The portion of rainfall that reaches the ground and does not infiltrate into the soil becomes surface runoff, which is increased in urban areas due to the large extent of impervious surfaces.

Urban trees, however, are beneficial in reducing surface runoff as their leaves and branches intercept rainfall before it reaches the ground, while their root systems promote infiltration and storage in the soil. Retaining rainfall where it falls is important for the health of our soils and plants, but also for minimising the load and wear on our stormwater drains. It is this decreased wear on our stormwater system that can be valued relative to avoided maintenance costs. Our trees **intercept approximately 16,118m^3 of rainfall each year, equivalent to 6.45 Olympic swimming pools, and with a value of $36,460**.

Transpiration

Tree canopy is the key mechanism by which trees help to cool urban areas, either through direct shading of surfaces or cooling of the air via evapotranspiration through leaves. Our trees transpire 122,493kL of water each year, producing a **cooling effect equivalent to that provided by 46,983 small (5kW) airconditioners**.

Carbon storage and sequestration

Urban trees can help mitigate climate change by sequestering atmospheric carbon (from carbon dioxide) in tissue and by altering energy use in buildings, and consequently altering carbon dioxide emissions from fossil-fuel based power sources. Our trees reduce the amount of carbon in the atmosphere by sequestering carbon in new growth every year, with the amount of carbon annually sequestered increasing with the size and health of trees. The **total carbon sequestered by our public trees is about 232 metric tons per year, equivalent to 429 fewer cars on our roads, and with an associated annual value of $5,289.**

Carbon storage is another way trees can influence global climate change. As a tree grows, it stores more carbon by holding it in its accumulated tissue. As a tree dies and decays, it releases much of the stored carbon back into the atmosphere. Thus, carbon storage is an indication of the amount of carbon that can be released if trees are allowed to die and decompose. Maintaining healthy trees will keep the carbon stored in trees, but tree maintenance can contribute to carbon emissions. When a tree is required to be removed, using the wood in long-term wood products (e.g. wood carvings or furniture) is one way to reduce emissions from wood decomposition. **Our public trees are estimated to store 10,890 metric tons of carbon, equivalent to removing 20,131 cars from the our roads, and valued at $248,294**.

Air pollution

Poor air quality is a common problem in many urban areas. It can lead to decreased human health, damage to landscape materials and ecosystem processes, and reduced visibility. The urban forest can help improve air quality by reducing air temperature, directly removing pollutants from the air, and reducing energy consumption in buildings, which consequently reduces air pollutant emissions from the power sources. Pollution modelled by i-Tree Eco are: ozone, carbon monoxide, nitrogen dioxide, particulate matter less than 2.5 microns, particulate matter less than 10 microns and greater than 2.5 microns, and sulfer dioxide. Our public trees were estimated to **remove 24.29 metric tonnes of air pollution each year, valued at $232,207**.

Oxygen

Oxygen production is one of the most commonly cited benefits of urban trees. The annual oxygen production of a tree is directly related to the amount of carbon sequestered by the tree, which is tied to the accumulation of tree biomass. Our public trees are estimated to **produce 618.5 metric tonnes of oxygen each year, equivalent to 2,017 people's annual air supply needs.**

Replacement value

Urban forests have a replacement value based on the trees themselves (i.e. the cost of having to replace a tree with a similar tree), with the replacement value of an urban forest increasing with a rise in the number and size of healthy trees. Through proper management, urban forest values can be increased, though the values and benefits also can decrease as the amount of healthy tree cover declines. Our public trees are **estimated to have a replacement value of $223,927,941.**