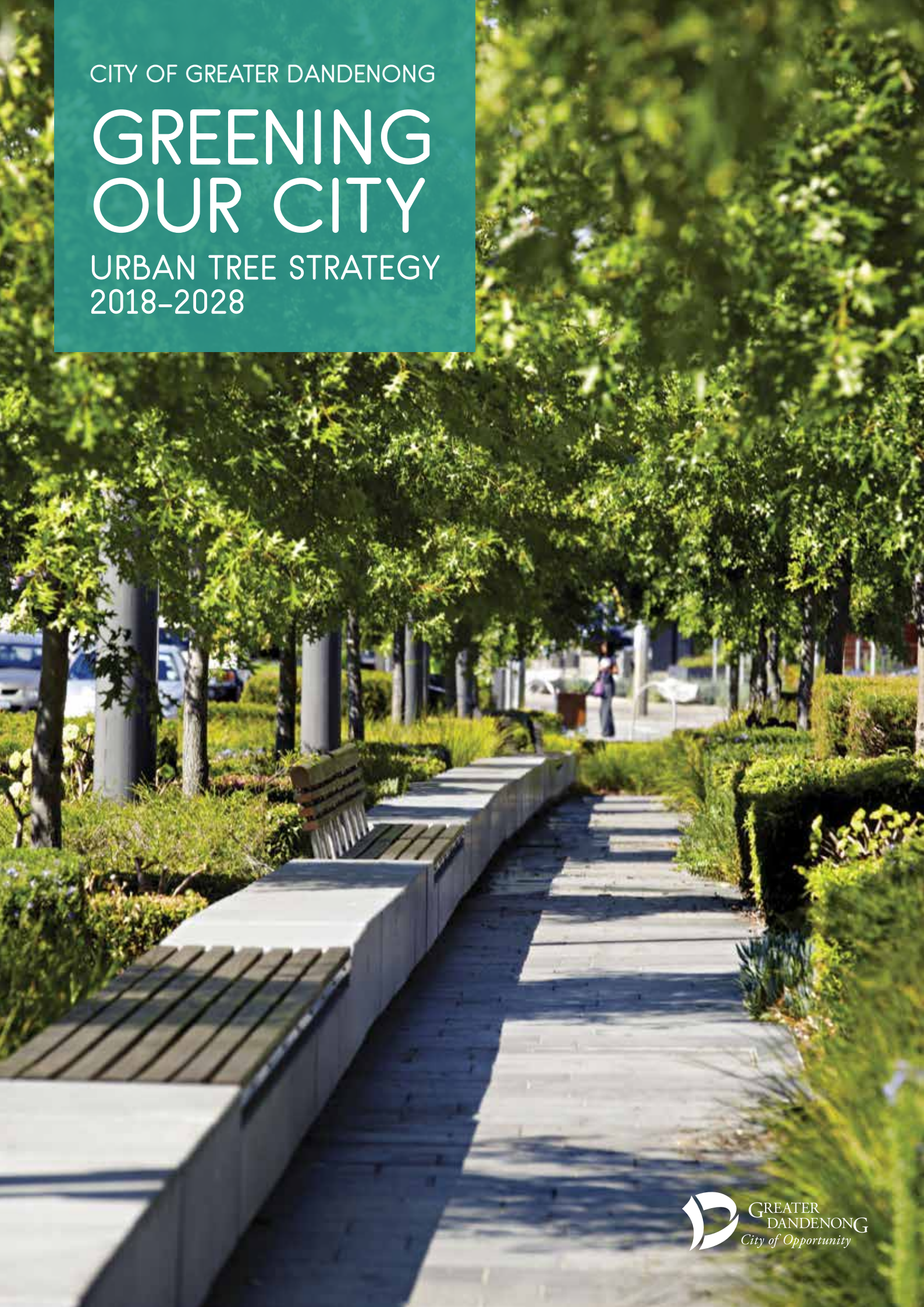
CITY OF GREATER DANDENONG

GREENING OUR CITY

URBAN TREE STRATEGY 2018–2028



GREATER DANDENONG
City of Opportunity


GREATER DAN
smoke
free
zone

CONTENTS

APPROXIMATELY

55,000

STREET TREES ARE MANAGED BY THE CITY OF GREATER DANDENONG

9.9%

IS THE OVERALL TREE CANOPY COVER FOR THE MUNICIPALITY

10,249

VACANT STREET TREE SITES ACROSS THE CITY THAT ARE READY TO BE PLANTED

EXECUTIVE SUMMARY

The City of Greater Dandenong manages 55,000 street trees and a significant number of park trees. These trees form part of Greater Dandenong's urban forest which is the sum of all urban trees in the municipality, private and public trees. The urban forest is a very valuable and influential asset for The City of Greater Dandenong as it provides a raft of interconnected environment, social and economic benefits to the community such as shade, streetscape amenity, air pollution reduction and habitat for wildlife. The street tree population alone is worth an estimated $182million.

Council's Urban Tree Strategy considers the current status, issues and opportunities for Council managed trees, namely the street and park trees of Greater Dandenong. The largest issue facing Council is that there are simply not enough street or park trees to provide the benefits needed by the community, in particular shade. Greater Dandenong's overall tree canopy is only 9.9 per cent which is the lowest of all metro Melbourne municipalities on the eastern side of Melbourne.

Planting more trees, whilst the primary objective for Council moving forward, is not as simple as digging a hole and planting a tree. Careful planning must ensure that our streetscapes contain adequate space to accommodate trees, that the right species is chosen and that ongoing maintenance and risk management is undertaken to create safe and amenable streetscapes. The existing tree population also needs careful management and planning, to ensure a healthy and attractive tree population.

The Urban Tree Strategy has set a vision for:

"A healthy, green and resilient urban forest that is well managed, protected and provides benefits to the community".

The key objectives that Council aims to work towards are:

1. Greening our City
2. Demonstrate best practice in urban tree management
3. Manage the interface between trees and infrastructure
4. Engage and educate the community about the importance of trees

A series of actions and targets have been set to lay the groundwork for Councils ongoing tree programs for the next ten years. By strategically planting more trees in locations of greatest need and following a set of best practice technical and management guidelines, Council aims to have increased canopy cover to 15 per cent by 2028.

INTRODUCTION

Urban trees are an important backdrop to the environment where people live, work and spend time. Each urban tree in Greater Dandenong is part of an urban forest population that helps to provide shade, absorb air pollution, filter stormwater, provide habitat to animals and improve the character and feel of Greater Dandenong's streetscapes. Natural shade from urban trees is very important in streets and parks to help cool the landscape during summer and to provide protection to people during periods of hot weather, especially to those people who are more vulnerable to heat than others.

Urban trees include those in streets, parks, along urban waterways, within front and backyards, in carparks and along transport corridors. Whilst they are all very important components of the urban forest, this Urban Tree Strategy will consider only those trees that are managed and maintained by the City of Greater Dandenong which are the urban street and park trees.

There are approximately 55,000 street trees currently managed by Council and a significant number of park trees. The 55,000 street trees are together worth approximately $182 million, making them a valuable Council asset. However, while they are healthy, well-structured and made up of a diverse array of species, there are simply not enough of them in Greater Dandenong to provide the benefits needed by the community. At just 9.9 per cent the City of Greater Dandenong's tree canopy cover is very low compared to other Victorian Local Government Authorities, indicating the deficiency in shade for protecting people. Added to this, there are currently over 10,000 vacant tree sites across urban Greater Dandenong streetscapes and a low number of large canopied trees that provide adequate shading across the entire city.

Council is facing a series of future challenges such as climate change, increasing populations and urban development. A well planned and managed urban tree population can help Greater Dandenong face these challenges by becoming healthier, more liveable and sustainable.

Council's Urban Tree Strategy sets the direction for managing Council's street and park trees so that maximum benefits can be derived whilst minimising risk. The Strategy will ensure that Council receives a positive return on its investment by making the street and park tree program more strategic, targeted and cost efficient.

VISION

A healthy, green and resilient urban forest that is well managed protected and provides benefits to the Community.

OBJECTIVES

Council has set four clear objectives to guide actions for urban trees.

1. Greening our City

Council will aim to increase existing tree canopy cover by filling all of the vacant street tree sites and renewing old or unsuitable trees across the municipality

2. Demonstrate best practice in urban tree management

Utilising the detailed tree inventory, Council will make evidence based decisions to ensure a proactive tree planting and maintenance program utilising the new set of technical guidelines

3. Manage the interface between trees and infrastructure

Council will proactively manage unsuitable tree species within streetscapes and transition towards more suitable species.

4. Engage and educate the community about the importance of trees

Council will aim to engage with a diverse array of the community in consultations, tree planting days and engagement.

CONTEXT AND SCOPE

The City of Greater Dandenong already acknowledges the key role that urban trees play in the region's overall liveability and in contributing to community health and wellbeing. The Urban Tree Strategy now fills the gap in determining how Council will increase canopy cover to benefit those in most need.

Council Plan 2017-21 prioritises a healthy, liveable and sustainable City with trees and the natural environment. Council hopes to achieve a city that *"delivers a clean and healthy environment for people to enjoy"* by planting street trees.

The Sustainability Strategy 2016-30 looks to provide a more liveable, well-planned, clean and healthy City. Council have set a clear target to '*Increase the quality and quantity of vegetation cover on Council land that contributes to a net gain throughout the municipality to increase canopy cover across the municipality*'.

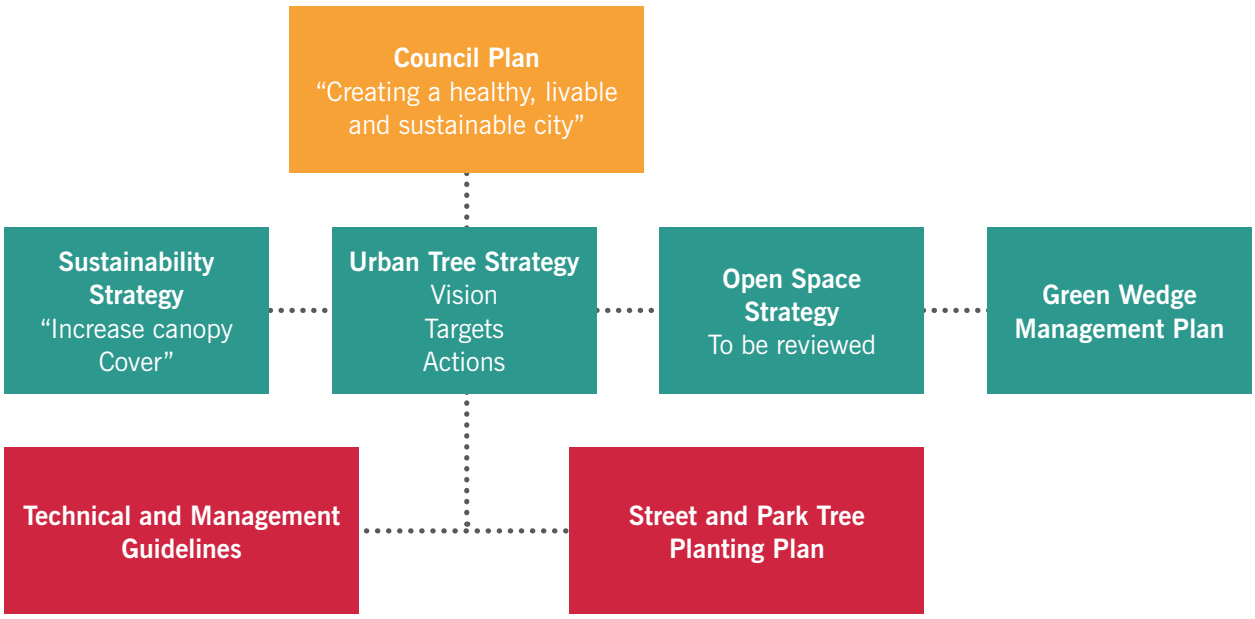
Open Space Strategy 2009 aims to provide a comprehensive network of open space that delivers environmental, social and economic benefits to the community. Park trees are identified as a key component determining quality of open space. This Strategy is now under review.

The Urban Tree Strategy analyses the benefits, issues and opportunities for Greater Dandenong's public street and park tree population.

The Green Wedge Management Plan (GWMP) is the City of Greater Dandenong's strategy to manage the identified values of its portion of the South East Green Wedge over the next 15-20 years. Two of the five priority objectives outlined in this strategy compliment some of the targets set out in this document. These include the objectives to; Protect existing ecological values & Maintain open, landscape-dominated vistas throughout the Greater Dandenong Green Wedge.

Private trees, whilst an important component of the overall urban forest, are covered through separate processes using planning and local laws. Council does not have the ability to determine species planted on private land, nor administer their removal or renewal. A different set of planning decisions are required for trees on private land as well as significant community education and engagement. Hence, they are not included as part of this Strategy.

Trees in conservation reserves, bushland and regional parks, whilst managed by Council are managed through Bushland Management Plans, Masterplans or a Parks Asset Management program with a primary focus of enhancing environmental benefits. They already have their own detailed management framework and are also therefore not covered by this Urban Tree Strategy.



15%

INCREASED CANOPY COVER BY 2028

TREES HELP FILTER UP TO

60%

AIRBORNE POLLUTANTS IN STREET LEVEL PARTICULATES

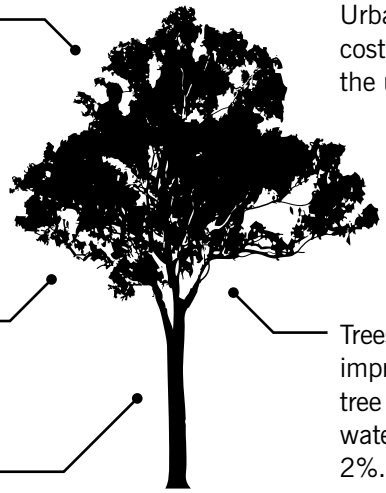
RESIDENTIAL PROPERTY VALUES CAN INCREASE

5–15%

BENEFITS OF URBAN TREES

Urban trees provide many benefits and are one of the most cost effective means for local government to maximise social, environmental and economic benefits collectively from operational and capital programs.

ENVIRONMENTAL BENEFITS



Shade trees reduce daytime surface temperatures by between 5-20ºC. Urban canopy trees are one of the most cost effective mechanisms for reducing the urban heat island effect.

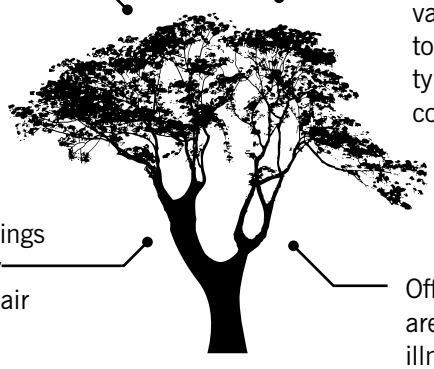
Trees help filter airborne pollutants and there is up to a 60 per cent reduction in street level particulates where trees are present.

Through photosynthesis a tree can absorb up to 150 kg of CO2 per annum, some of which is sequestered within the wood of the tree.

Trees provide wildlife habitats for many species.

Trees can regulate stormwater flow and improve water quality. For every 5% of tree cover added to a landscape, storm water runoff is reduced by approximately 2%. This reduces localised flooding and pressure on the existing drainage systems.

ECONOMIC BENEFITS



Residential property values can increase 5-15% in streets with street trees compared to nearby streets with no street trees Appraised property values of homes that are adjacent to parks and open spaces are typically 8-20% higher than those of comparable properties elsewhere.

Trees incorporated into commercial and retail precincts can increase business income by 20 per cent.

Appropriately placed trees in the residential landscape can realise savings up to 58 per cent and businesses by as much as 50 per cent on daytime air conditioning.

Office workers with a view of nature are more productive, report fewer illnesses, and have higher job satisfaction.

AMENITY

Trees enhance urban areas, and large, mature street trees are found to be the most important indicator of attractiveness in a community.

Trees help frame and screen views, and provide integration of landscape and scale to the built environment.

Trees can provide landscape amenity through their variation in shape, texture and colour.

Trees can absorb sound waves to reduce urban noise.

SOCIAL

Spending time near trees improves physical and mental health by increasing energy level and speed of recovery, while decreasing blood pressure and stress.

Reduced air pollution from the presence of trees helps to ameliorate respiratory problems, such as asthma, the leading serious chronic illness among children.

Children function better than usual after activities in green settings and that the “greener” a child’s play area, the less severe their attention deficit symptoms. Exposure to nature while young can influence a person’s lifelong attitudes to environmental protection.

Trees can create a 1-2°C reduction in an extreme heat event, which can significantly reduce heat mortality rates for old and frail people.

Trees can provide protection against skin cancer by reducing UV-B exposure (the most damaging type of solar radiation) by about half.

Trees help build community by promoting contact, encouraging physical activity, reducing stress and stimulating social cohesion, with reduced crime and increased public safety.

GREATER DANDENONG'S TREE ANALYSIS

CANOPY COVER

Tree canopy cover is the measure of the area of tree canopy when viewed from above, and is recorded as a percentage of total land area. A study of Australia's urban tree canopy coverage was undertaken in 2014 using a point sampling tool called i-Tree canopy (www.canopy.itreetools.org).

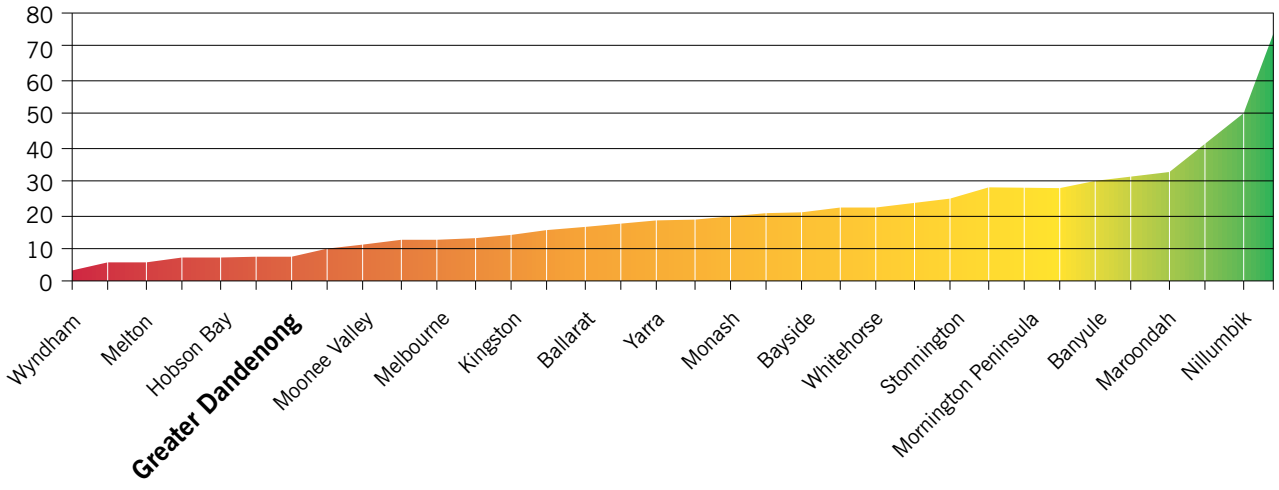
Canopy cover for the whole municipality of Greater Dandenong was measured at approximately 9.9 per cent. This figure includes all trees across the municipality: private and public, along waterways and road reserves, carparks etc. A breakdown between public and private canopy cover was not included within this study. When compared to other municipalities across Metropolitan Melbourne, City of Greater Dandenong's tree canopy cover is very low. In fact, Greater Dandenong has the lowest canopy cover on the whole eastern side of Melbourne.

Canopy cover was also measured in a more recent analysis for each suburb. Noble Park and Springvale had the highest canopy covers at over 15 per cent, whilst to the South, Bangholme and Lyndhurst had the lowest recording only 4.5 per cent and 6.4 per cent respectively.

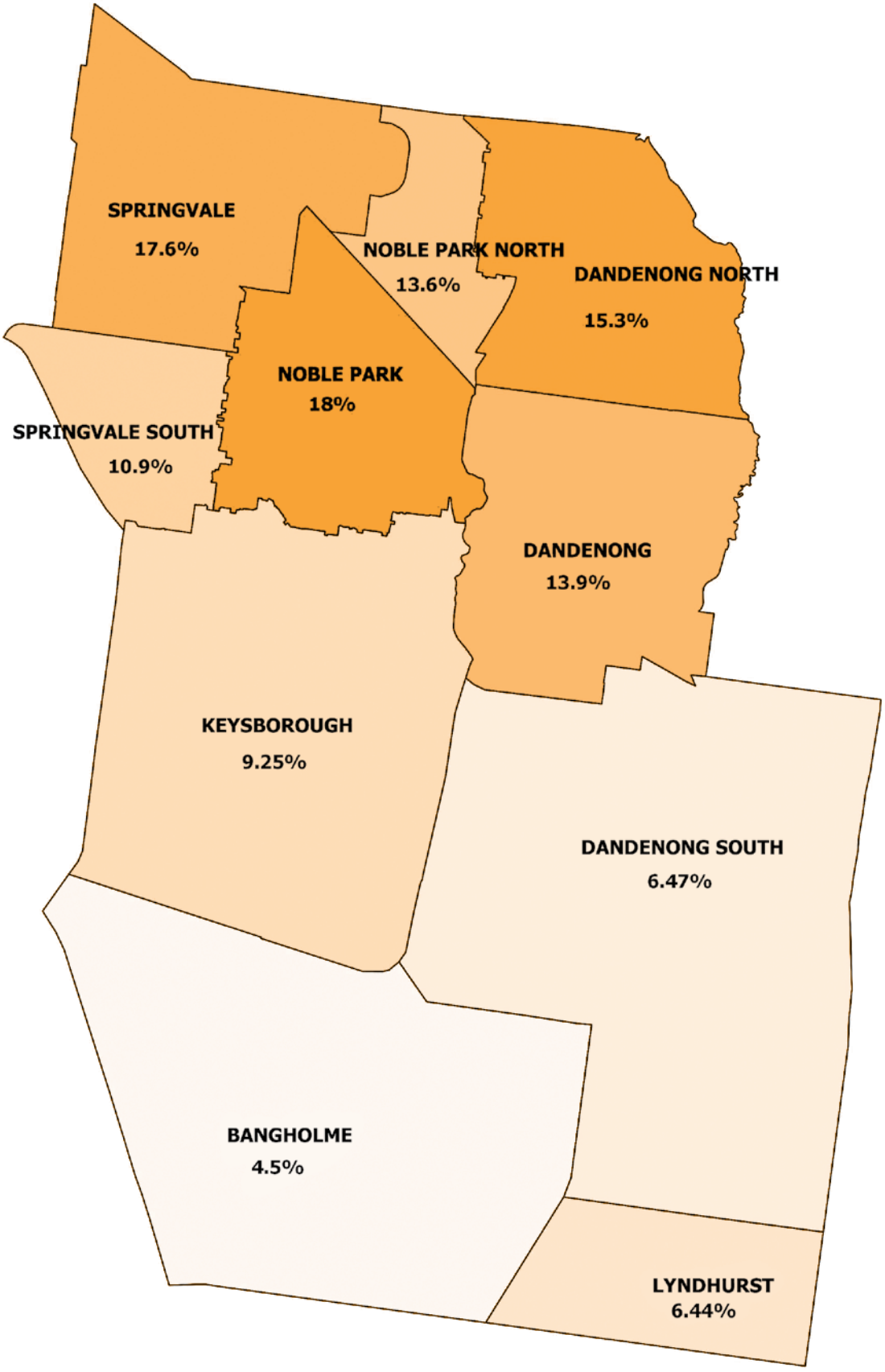
The reasons for the lower canopy coverage particularly in the south of the city can be attributed to a variety of contributing factors including:

- Forestry of River Red Gum woodlands which provided timber for the building of Melbourne's docks.
- The southern section of the municipality being drained swampland.
- Past and present agricultural and industrial land use.

Canopy cover %'s for Local Government Authorities across Victoria (Jacobs et al, 2014)



TREE CANOPY COVER FOR GREATER DANDENONG



CITY OF GREATER DANDENONG HAS A TOTAL NUMBER OF

55,276

STREET TREES

76%

OF STREET TREES ARE IN GOOD HEALTH

THE PERCENTAGE OF TREES WITH A DIAMETER LESS THEN 15 CENTIMETRES IS

50.7%

INDICATING THE MAJORITY OF TREES ARE SMALL OR YOUNG

CURRENT STREET TREE POPULATION ANALYSIS

In 2016, data was collected for every street tree in Greater Dandenong and compiled into a tree inventory. This data is now available within Council's asset management and GIS systems. As mentioned, there is currently limited data collected for public trees located in parks and reserves or other Council managed facilities, however Council recognises that these trees are equally as important for providing benefits to the community.

Summary of street tree analysis:

- City of Greater Dandenong has a total number of 55,276 street trees
- Together they are worth approximately $182 million, with an annual return of $122,800 in environmental benefits
- There are approximately 240 different species and cultivars
- 76 per cent of street trees are in good health
- 90 per cent of street trees have good structure
- There are 10,249 identified vacant tree planting sites within streets

VALUE OF GREATER DANDENONG'S STREET TREES

Data held for each of Dandenong's street trees was inputted into an urban tree valuation model called i-Tree Eco, to provide a dollar value of the population of 55,276 street trees.

The i-Tree analysis provides data about the environmental services that trees provide and attributes provides a structural value to each tree. Structural value is the the value of the tree based on the cost of having to replace the tree and grow it to a similar size and function.

Gateway Plantings - Ornamental Pears, Princes Highway, Noble Park

Consistent functional planting along major arterials add immense aesthetic value to the City of Greater Dandenong.

SUMMARY OF THE I-TREE ASSESSMENT RESULTS

GREATER DANDENONG'S

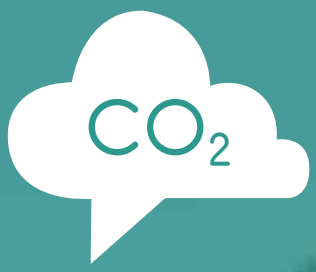
55,276

STREET TREES ARE WORTH $182 MILLION

THE TREE CANOPIES AND ROOT SYSTEMS HELP AVOIDED

19,108

CUBIC METRES OF STORM WATER RUNOFF – WORTH $43,200 PER ANNUM. THIS IS THE EQUIVALENT OF AROUND 9 OLYMPIC SWIMMING POOLS EACH YEAR



THE TREES TOGETHER SEQUESTER 510 OF CARBON EACH YEAR WORTH

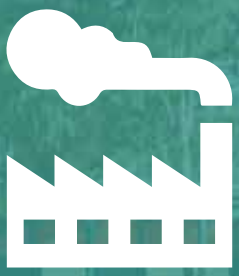
$11,600

PER ANNUM

AND PRODUCE

1,361

TONNES OF OXYGEN EACH YEAR



THE TREES REMOVE

11

TONNES OF AIR POLLUTION EACH YEAR WORTH $68,000 PER ANNUM

THERE IS

16,000

TONNES OF CARBON IN THEM STORED WORTH $364,000

GREATER DANDENONG'S STREET TREES PROVIDE

$122,800

OF ENVIRONMENT BENEFITS TO THE COMMUNITY EACH YEAR. THIS FIGURE INCLUDES AVOIDED STORMWATER RUNOFF, AIR POLLUTION REMOVAL AND CARBON SEQUESTRATION.

SPECIES DIVERSITY

A street tree population is healthier and more resilient the more diverse it is. This includes the diversity of species within it. Best practice suggests that no one species within a population should exceed between 5-10% of the total number. The table below suggests that Greater Dandenong's street tree population sits within these guidelines and is considered diverse. It is also worth noting that Greater Dandenong's street tree population would be considered typical across municipal Melbourne.

Of the most common species listed above, 11 are native to Australia and five are exotic.

The two most common species are both paperbarks and together make up nearly 11 per cent of the population. It should be noted that Council has not been planting either of these species for a number of years now, however Snow-in-summer has proven itself as an adaptable urban tree specimen, well suited to pruning under powerlines.

The Lagerstroemia's together make up 4.8% of the population and are likely to increase as they are regularly planted in streetscapes.

Table 1. Most common species – greater than 1000 in number

SPECIES	NUMBER	% OF TOTAL POPULATION
Melaleuca linariifolia (Snow-in-summer)	3138	5.7%
Melaleuca styphelioides (Prickly-leaved Paperbark)	2822	5.1%
Lophostemon confertus (Queensland Brush Box)	2606	4.7%
Prunus cerasifera 'Nigra' (Purple-leaved Cherry Plum)	2363	4.3%
Corymbia maculata (Spotted Gum)	2097	3.8%
Eucalyptus camaldulensis (River Red Gum)	2014	3.6%
Lagunaria patersonii (Norfolk Island Hibiscus)	1743	3.1%
Lagerstroemia indica (Crepe Myrtle)	1645	3.0%
Callistemon viminalis (Bottle Brush)	1546	2.8%
Pyrus calleryana (Callery's Pear)	1336	2.4%
Eucalyptus leucoxylon (Yellow Gum)	1335	2.4%
Tristaniopsis laurina (Kanooka)	1321	2.4%
Angophora costata (Smooth-barked Apple)	1243	2.2%
Melaleuca quinquenervia (Flat-leaved Paperbark)	1119	2.0%
Acer campestre 'Evelyn' Hedge Maple cultivar)	1060	1.9%
Lagerstroemia indica X L. fauriei 'Biloxi' (Biloxi Crepe Myrtle)	1012	1.8%

UNSUITABLE SPECIES

There are two species in the most common list that have proven themselves unsuitable for Greater Dandenong's streetscapes and have been excluded from the preferred species list.

Melaleuca styphelioides are very fast growing and cause significant problems when planted under powerlines. They can grow to twice the size of the *Melaleuca linariifolia* and as a result, they are frequently involved in lifted footpaths and kerb in smaller nature strips. Added to this, their stature and form make them an undesirable species for streetscape amenity and character. Given they are the second most populous street tree species, reducing their numbers will need to be done with careful planning and management so as to not reduce overall canopy cover or streetscape amenity.

Lagunaria patersonia have also been categorized as problematic in the public realm, not least for the irritating fibres in their seed pods and their low aesthetic value. They are also unsuitable for planting under powerlines and have also been involved in a number of infrastructure conflicts in smaller nature strips.

These species will be gradually transitioned out of the tree population. This means removing them over an extended period of time and replacing them with more suitable species. Trees under powerlines will be prioritised. Given the large number of both species it is not anticipated to remove all of these trees. Additional budget allocation will assist with significant reduction in the number of these trees and a reduction in damage to public infrastructure.

Existing infrastructure and physical constraints are to be considered when planting the right tree.

Melaleuca stypheliodes

Lagunaria pattersonia

MOST COMMONLY PLANTED SPECIES

88 different tree species and/or cultivars have been planted in Greater Dandenong over the last 11 years (2004-2015). Table 2 lists the most commonly planted trees during this 11-year period.

In general, the list in Table 2 comprises medium to smaller statured trees.

Table 2: Most commonly planted species since 2004.

SPECIES	NUMBER
Brachychiton populneus (Kurrajong)	1134
Eucalyptus leucoxylon 'Euky Dwarf' (Dwarf Yellow Gum)	1098
Eucalyptus pauciflora 'Little Snowman' (Dwarf Snow Gum)	1074
Pyrus calleryana 'Capital' (Capital Callery Pear)	1025
Lagerstroemia indica x L. fauriei 'Zuni' (Crepe Myrtle cultivar)	1014
Acer campestre 'Evelyn' (Queen Elizabeth Hedge Maple)	1003
Malus ioensis 'Plena' (Bechtel's Crabapple)	879
Syzygium floribundum (Weeping Lilly Pilly)	866
Lagerstroemia indica x L. fauriei 'Biloxi' (Crepe Myrtle cultivar)	805
Lagerstroemia indica x L. fauriei 'Sioux' (Crepe Myrtle cultivar)	788

The collective number of *Crepe Myrtles* planted during this period is 2,954 which is approximately 14.5 per cent of all new trees planted making it the most commonly planted tree type within the City. Council will need to monitor its use of Crepe Myrtles into the future to ensure that they do not become over dominant within the overall population.

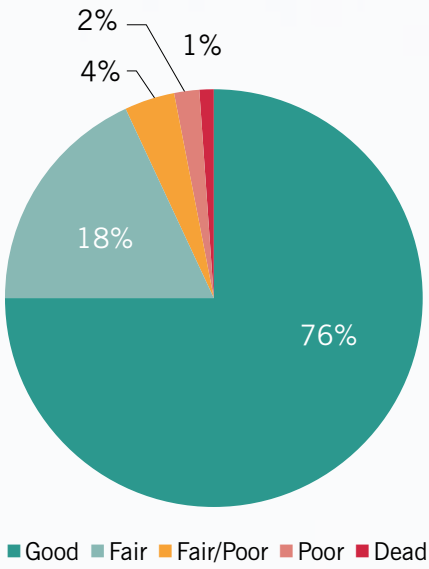
SPECIES SELECTION

When considering species to be planted within a particular location, Council select species that are listed on the preferred Species list and consider the following:

- Availability of above and below ground space for tree roots and canopy
- Existing infrastructure and any physical constraints e.g. powerlines
- Quality of soil
- Ability to thrive in the location
- Water requirements
- Potential for infrastructure damage

Lagerstroemia indica (Crepe Myrtle) in flower

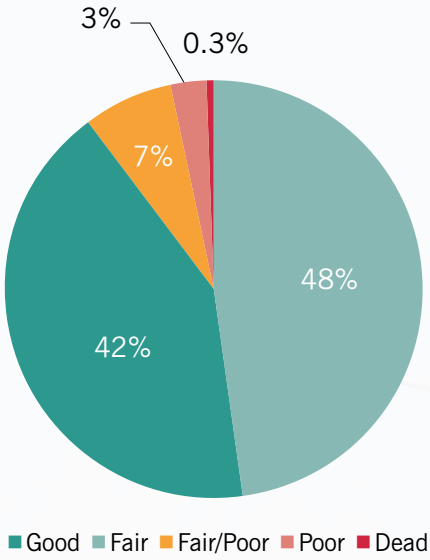
Health



TREE HEALTH

The majority of street trees are in good (76%) or fair (18%) health. A management objective will be to remove and replace the 7% fair to poor, poor and/or dead trees.

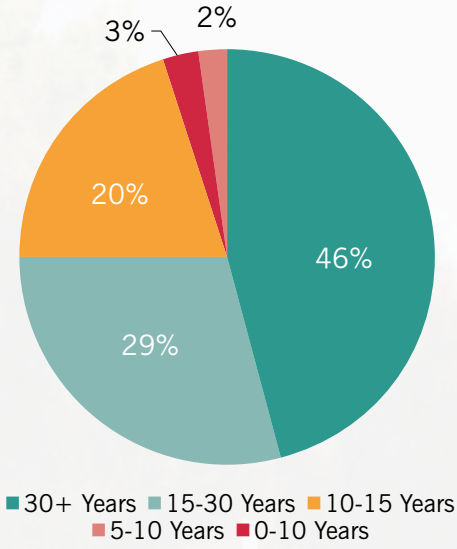
Structure



TREE STRUCTURE

The majority of trees have Fair (48%) or Good (42%) tree structure. A management objective will be to remove the 3.3% trees with poor or imminent structural defects.

ULE

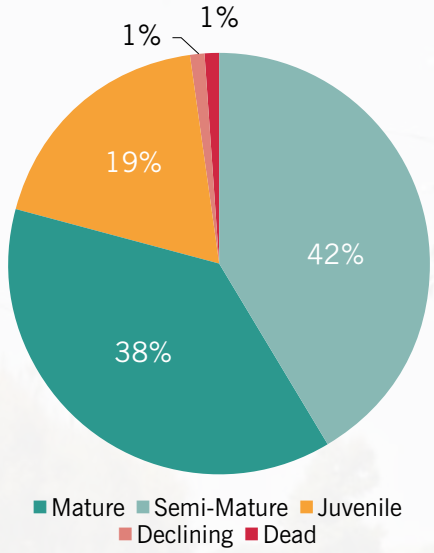


USEFUL LIFE EXPECTANCY (ULE)

Useful life expectancy is the amount of time a tree is estimated to remain in the landscape before it needs to be removed and replaced. Tree health, age, structure and site appropriateness are all considered when allocating a tree its ULE.

75% of street trees have a long (30+ years) to moderate (15-30 years) ULE. Again, as with health and structure, a management objective would be to carefully manage the 5% of trees with a low ULE (0-5 years and 5-10 years) for eventual removal and replacement.

Age



TREE AGE

Tree age analysis aligns closely with the ULE results. 18% of street trees are juvenile, which are newly planted and 42% are semi-mature which are still actively growing and yet to achieve their expected size in the location. Best practice stipulates that juvenile trees should represent around 40% of the population, semi-mature 30%, mature 20% and over mature 10% of the population.

VACANT STREET TREE SITES

Based on the existing street tree inventory data, 10,249 vacant tree site planting opportunities have been identified across the City. Each year Council removes around 935 trees per year and plants around 1,700 trees, resulting in a current net gain each year of approximately 765 trees.

Council's 15 year street tree planting program will aim to reach a full street tree stocking rate as well as replacing undesirable tree species, as identified within the Action plan, with more appropriate trees. This program may be accelerated if other streams of funding are secured to undertake the works.

It is understood that there are likely to be large opportunities for planting more trees in parks and reserves as well.

60%

OF TREE POPULATION IS JUVENILE OR SEMI MATURE

1,700

NUMBER OF TREES PLANTED EACH YEAR BY COUNCIL

88

NUMBER OF SPECIES AND/OR CULTIVATORS PLANTED FROM 2004–2015

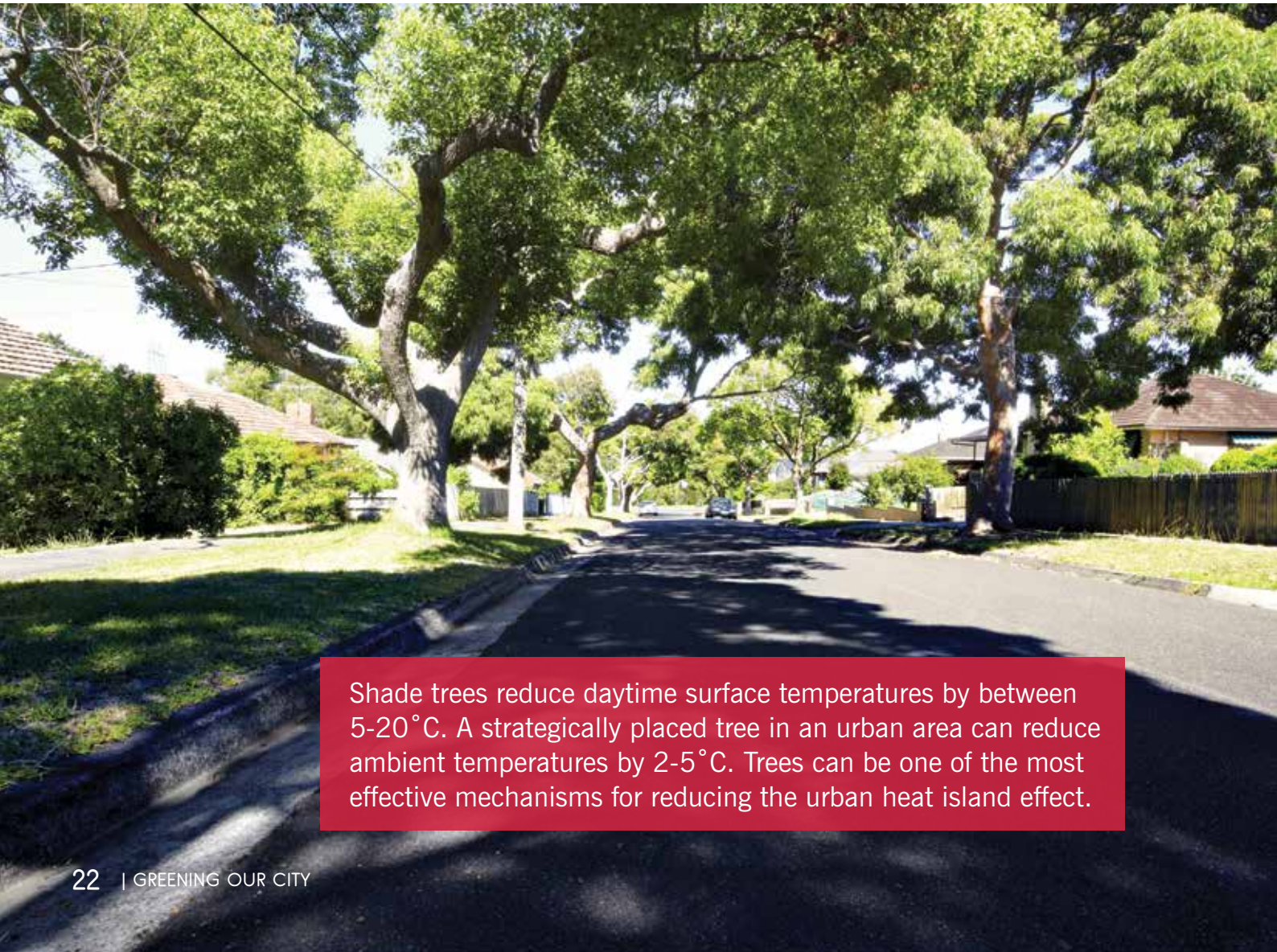
OPPORTUNITIES AND ISSUES FOR GREATER DANDENONG'S TREES

THE URBAN HEAT ISLAND EFFECT

An emerging issue facing all Australian cities, in particular Melbourne and Greater Dandenong, is the Urban Heat Island Effect, whereby the built-up urban area becomes warmer than the surrounding countryside, particularly at night. There is ample evidence now demonstrating that this artificial heat build-up is impacting on human health and compromising the quality of the environments that people live in. Evidence also now demonstrates the ability of trees and irrigated vegetation in mitigating this heat. By shading hard surfaces, trees can stop the absorption of heat into the landscape and they can cool the air through their function of evapotranspiration, particularly at night.

The Satellite image shown in Figure 1 demonstrates the various areas across the City that are displaying hotter surface temperatures than others. Of note are the heat islands over the activity centres and the Dandenong South industrial area. The Activity Centres are important to note because they also contain the highest levels of pedestrian activity across the municipality. As mentioned, urban trees are an efficient and cost effective solution for mitigating urban heat. Providing shade and thermal comfort for pedestrians, especially in areas of high pedestrian activity will need to be considered for improving the overall liveability of the municipality.

Opportunity: Planting large canopied trees in suitable locations to mitigate urban heat.



Shade trees reduce daytime surface temperatures by between 5-20˚C. A strategically placed tree in an urban area can reduce ambient temperatures by 2-5˚C. Trees can be one of the most effective mechanisms for reducing the urban heat island effect.

SATELLITE THERMAL IMAGE

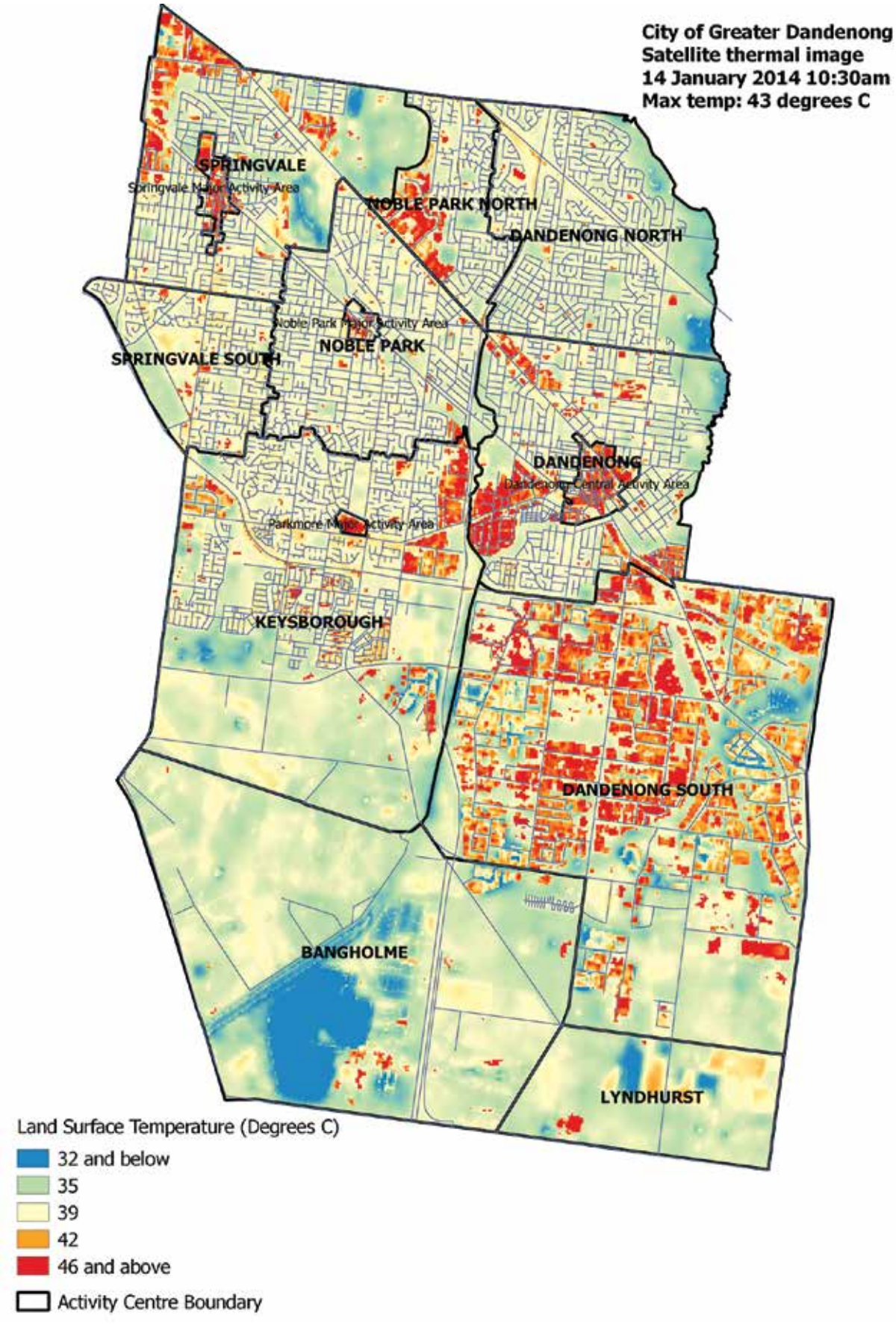


Figure 1: Satellite thermal image of Greater Dandenong showing hotspots

BENEFITS OF TREES IN THE ACTIVITY CENTRE

EXISTING TREE NUMBERS IN ACTIVITY CENTRES		PERCENTAGE CANOPY COVER
Dandenong	892 Street trees	13.2%
Springvale	257 Street trees	11.9%
Noble Park	116 Street trees	13.6%
Overall	1265 Street trees	13.6%

Council will implement increased planting in the following locations:

- Feeder streets that link residential populations with the core of the activity centres
- Public spaces (urban and parks) that support day to day formal and informal social gathering
- Pedestrian corridors and priority routes between key destinations in activity centres
- Main streets, boulevards and gateways to activity centres

ACTIVITY CENTRES

Activity Centres in Greater Dandenong are demonstrated hotspots, they are a place of high pedestrian activity and are major public transport hubs. As a result, urban design and renewal in these centres must prioritise the planting of natural shade, but also the use of materials that reflect, not absorb heat. These areas will be a challenge for Council as they are predominantly made up of hard surfaces and contain many pieces of hard infrastructure such as buildings, awnings, overhead powerlines, underground surfaces etc. Finding adequate space to plant trees so that they will thrive and grow to their maximum potential will be important as will the use of special design technologies like structural cells and permeable paving to improve growing conditions for trees.

Opportunity: Prioritise planting of shade trees with Greater Dandenong's Activity Centres

SOCIAL VULNERABILITY TO HEAT

Considerable work has been conducted in Melbourne by researchers at Monash University to determine which members of the population are more vulnerable to urban heat. Knowing where these vulnerable people are located helps Council to prioritise certain locations for heat reduction strategies such as street and park tree planting. Members of the community who are most at risk of heat related illness are:

- Older people who live alone
- Young children
- The most socio-economically disadvantaged

Using 2011 Census based data, areas of social vulnerability have been mapped.

Areas of concentrated social vulnerability have been mapped alongside hotspots demonstrating areas of overlap. Both Springvale and Dandenong are clear opportunities for increasing natural shade to help protect vulnerable community members from heat. Kindergartens have been mapped as the most commonly used facility for young children. Streets linking socially vulnerable communities to services such as kindergartens, schools and activity centres are also clear opportunities for a street tree planting program.

Opportunity: Prioritising the planting of trees where hotspots intersect with areas of high pedestrian activity and social vulnerability

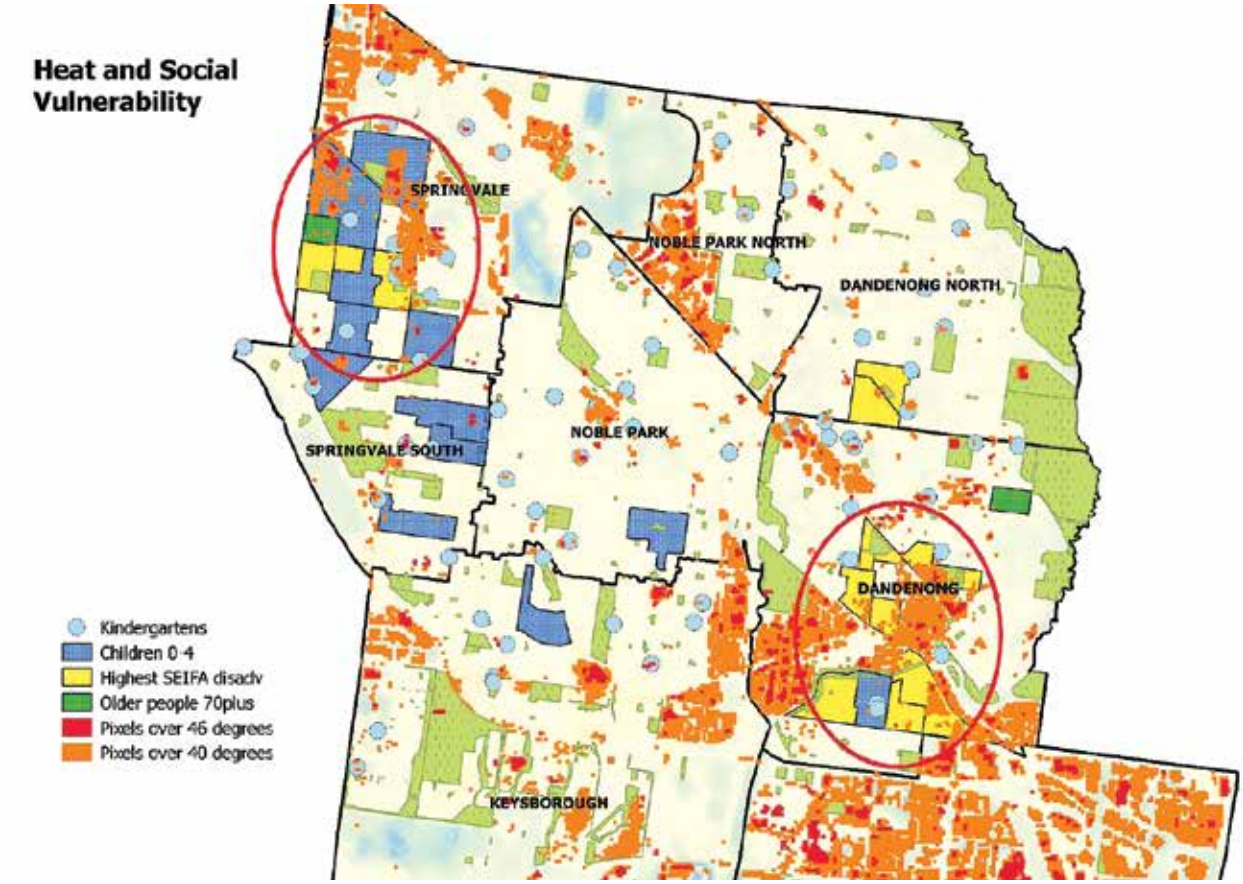


Figure 2: Social vulnerability across Greater Dandenong mapped with hotspots

CLIMATE CHANGE

Climate change is expected to bring warmer temperatures, wetter winters, drier summers and increasing rates of bushfire and insect infestations. Three predicted changes to climatic conditions that could impact on trees within the City directly are:

1. Reduction in average surface water availability. In Melbourne the average long-term stream flow into water supply catchments could be reduced by up to 11 per cent by 2020, and as much as 35 per cent by 2050.
2. The average annual number of days above 35 degrees Celsius is likely to increase from 9 days currently experienced in Melbourne to up to 26 days by 2070 without global action to reduce emissions.
3. Changes to the frequency of extreme weather:

   Increased frequencies of occurrence of extreme weather events. For example, a 5 per cent increase in rainfall intensity will see the current one-in-130-year event become a one-in-100 year event

   Droughts are likely to increase in relative frequency, intensity and duration. Dry conditions that currently occur on average one in every four years might occur up to one in three years by 2030

   More intense rainfall events – Annual average increases in the intensity of heavy rainfall events are expected to be about 0.9 per cent with the strongest increases in winter and summer.

It is expected that these effects will interact with existing urban stresses such as air pollution, soil compaction and heat island effects. Managing for tree health will become increasingly important, and selection of tree species tolerant of extended drought, increased heat and insect infestation will become a necessity.

Opportunity: Continue to update Greater Dandenong's street and park tree species lists ensuring that Greater Dandenong is planting trees that are able to adapt to changing climates whilst continuing to provide maximum benefits.

WATER MANAGEMENT

Water is a critical component of healthy urban landscapes, including trees and yet drainage systems have been expertly designed to divert all stormwater away from urban areas as quickly as possible. Trees planted in concrete pavements will use their root systems to seek water and nutrients wherever possible if they are not irrigated. Without water, landscapes and certain tree species become vulnerable and are not able to maximise their environmental, social and economic benefits. Further to this, climate change modelling would suggest that annual rainfall is likely to reduce, further decreasing the availability of water for tree health.

In order to overcome this, Council has the opportunity to consider the following when planting street and park trees:

Using water sensitive urban design, including passive stormwater capture, to retain as much stormwater in the urban landscape as possible for the benefit of trees and to help mitigate the urban heat island effect (www.greaterdandenong.com/document/25978/water-sensitive-urban-design)

Select resilient, heat tolerant and drought tolerant species where possible

Providing adequate underground growing space for tree roots and soil moisture retention

Opportunity: integrate smarter growing conditions for newly planted trees including better soil volumes and stormwater infiltration capacity

INFRASTRUCTURE AND TREES

As trees grow towards full maturity, their growing space requirements increase. If adequate space has not been allocated for tree roots or crowns, then conflicts between trees and surrounding infrastructure such as roads, drains and footpaths can arise. Inappropriately selected and planted tree species from the past are currently increasing the risk of conflict with infrastructure. There are two particular species in Greater Dandenong that are deemed unsuitable for planting in streetscapes, namely *Lagunaria patersonni* and *Melaleuca styphelioides*. In recent years, as these trees reach maturity, they have been involved in a number of infrastructure conflicts.

Opportunity: Develop budget allocation for a program to remove and replace undesirable tree species to avoid further damage to infrastructure.

URBAN DEVELOPMENT

The urban population for Greater Dandenong is predicted to increase by 22 per cent by 2040 (greaterdandenong.com). Urban development, renewal and infill will occur across the urbanised area of Greater Dandenong to house these new residents and also the expected increase in workers. Unfortunately, with development can come conflict between established trees and infrastructure. These conflicts can incur maintenance and infrastructure damage costs and may also compromise the health and vitality of the tree. Development has also anecdotally been a cause for street tree removals.

Potential impacts can come from:

- Increasing the size and number of vehicle crossovers and other hard surfaces
- Reduction of available space and quality soil volume for existing and new trees.
- Installation of underground services with subsequent tree root impacts.
- Altering existing soil properties such as compaction, lowering or raising soil levels and nutrient status.

There are new technologies and design features that can be used in streetscape and urban design to help reduce the conflicts between hard infrastructure and trees. Such technologies include porous pavements, structural cells, structural soils as well as trenching. Soil Profile Rebuilding (SPR) is also a technique that can be used to improve the structure of soils following development that can allow better tree growth.

Council will also need to continue to ensure that the most suitable species are chosen for individual locations to minimise infrastructure conflicts.

Opportunity: Ensure appropriate growing conditions are created for new trees, plant the right tree in the right place and ensure protection mechanisms are in place for all street trees to prevent damage or removal for development.

11–35%

REDUCTION IN AVERAGE LONGTERM STREAM-FLOW INTO WAYER SUPPLY CATCHMENT BT 2050

35°C

AVERAGE NUMBER OF DAYS ABOVE 35°C WILL INCREASE FROM 9 DAYS TO 26 DAYS BY 2017

0.9%

EXPECTED ANNUAL AVERAGE INCREASES IN THE INTENSITY OF HEAVY RAINFALL

COMMUNITY PERCEPTIONS OF TREES

In general, the community values the role that street and park trees play in a healthy, liveable, urban environment. Many would acknowledge that their benefits far outweigh their annoyances.

However, there still exist some very real and perceived fears of urban trees. Some community members fear dropping limbs, trees being 'messy' or doing damage to adjacent infrastructure and that resources would be better spent on other community assets. There is also a strong association of native trees with bushfires.

In order to see the general community perception of public trees improve Council will need to engage in the following:

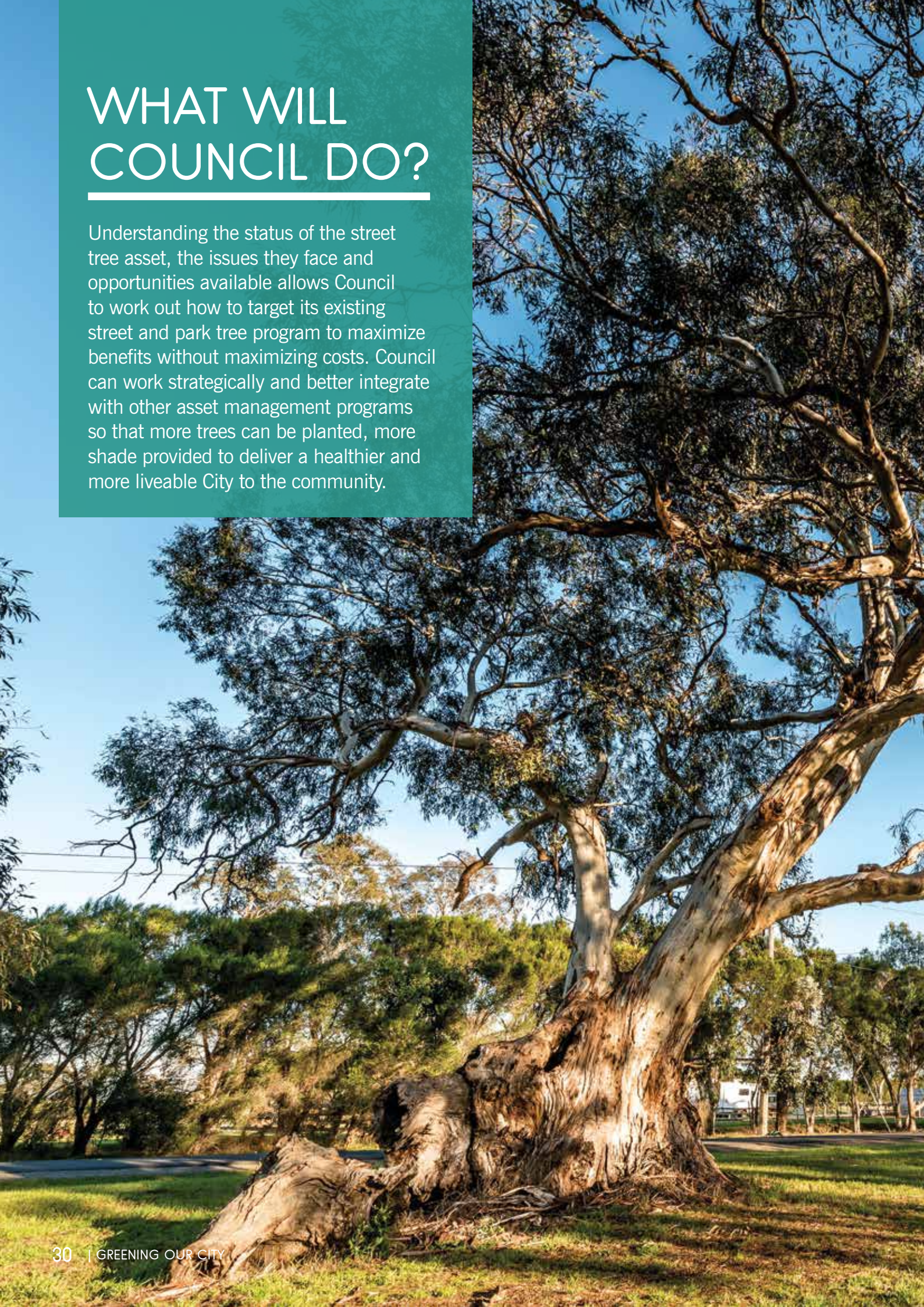
- Greater community consultation and education to a more diverse range of the community
- Improved access to web based information on Greater Dandenong's trees in various languages
- Develop a community tree planting program that encourages a diverse array of Greater Dandenong residents to be involved, participating together in outdoor activities
- Strong Council leadership on tree planting within the media
- Strengthening relationships with developers and enforcing guidelines on street tree planting in new developments

Opportunity: Develop and implement a plan to engage, consult, involve and educate the Greater Dandenong community to further understand the importance of a healthy tree population and to be involved in helping to plant it.

Studies show consumers spent 9 per cent more on items at retail outlet with trees due to a more relaxed lingering mood. Trees incorporated into a commercial area can increase business income by 20 per cent.

WHAT WILL COUNCIL DO?

Understanding the status of the street tree asset, the issues they face and opportunities available allows Council to work out how to target its existing street and park tree program to maximize benefits without maximizing costs. Council can work strategically and better integrate with other asset management programs so that more trees can be planted, more shade provided to deliver a healthier and more liveable City to the community.



ACTION PLAN

Objective 1:

Greening our City

Targets:

- Increase tree canopy cover for the Municipality to 15 per cent by 2028
- Reduce vacant street tree sites down to 0 by 2033

ACTION	MEASURE	RESPONSIBILITY	TIME FRAME
Implement the 15 year Tree Planting Program	• Audit of tree data	• **Parks Unit**	Year 15 (30/06/2033)
Ensure recognition of the Urban Tree Strategy in key strategic and policy documents, such as Council Plan, Sustainability Strategy, Health and Wellbeing Strategy.	• All relevant Council documents to reference Urban Tree Strategy vision and objectives	• Infrastructure Services • Planning • Statutory planning • Corporate Planning	Year 10 (30/06/2028)
Seek additional Government funding opportunities for tree planting programs and monitoring e.g. Smart Cities or 20 Million Trees programs	• Additional funding granted each year for tree planting programs • Number of grants applied for	• **Parks Unit** • Grants Officer	Year One – ongoing annually (30/06/2019-30/06/2028)
Develop Tree Planting and Protection Guidelines for developers	• Guidelines completed and in operation	• **Parks Unit** • Statutory Planning • Civil Development	Year One (30/06/2019)
Ensure that sufficient space is maintained for existing trees and for new tree planting. Providing appropriate space (rooting volume) for trees	• Guidelines for species selection and tree planting completed and in operation	• **Parks Unit** • Statutory Planning • Civil Development	Year One (30/06/2019)
Investigate opportunities for establishing wildlife corridor links where appropriate.	• Completion of two Wildlife corridor links tree plantings	• **Parks Unit** • Sustainable Planning and Environment	Year Five (30/06/2023)
Establish an urban forest/tree working group to regularly meet to discuss tree management issues and opportunities for urban trees.	• At least two meetings are conducted each year	• **Parks Unit** • Planning & Design • Statutory Planning • Activity Centre Revitalisation • Civil Development • Roads and Drains • City Improvement	Year Two – ongoing annually (30/06/2020-30/06/2028)

** Program may be accelerated pending funding from external sources and the annual budget allocation.*

ACTION PLAN

Objective 2:

Demonstrate Best Practice Urban Tree Management

Targets:

- Reduce the number of trees with low useful life expectancy from 5 per cent to 2 per cent by 2028
- Reduce percentage of trees with poor and imminent structure from 3 per cent to 1 per cent by 2028

ACTION	MEASURE	RESPONSIBILITY	TIME FRAME
Implement the 2018 Arboriculture Operations Manual	• Guidelines in place	• **Parks Unit**	Year One (30/06/2019)
Implement the 2018 species list for street and park tree planting	• Species list in place	• **Parks Unit**	Year One (30/06/2019)
Collect full park tree inventory	• Audit of park trees data	• **Parks Unit** • Asset Management	Year Five (30/06/2023)
Integrate and communicate with internal departments to streamline all asset works including trees to minimise future program conflicts	• Two asset meetings with other asset managers per year to integrate programs	• Engineering Services	Year One – ongoing annually (30/06/2019-30/06/2028)
Maintain proactive tree management programming and provide adequate resources to minimise risk and ensure best practice is maintained	• Quantified reduction in storm damaged tree removals	• **Parks Unit**	Year One – ongoing annually (30/06/2019-30/06/2028)
Systematically assess all street and park trees to mitigate tree risk for residents and visitors to the City.	• Tree inspections completed as per cyclic pruning contract 1516-03A	• **Parks Unit** • Arboricultural Contractors	Year Two – ongoing biannually (30/11/2019-30/06/2028)
Use passive storm water irrigation in new tree planting areas where possible. Introduce water sensitive urban design (WSUD) initiatives where possible. Establish irrigation water requirements and water budgets for urban trees and landscapes.	• Establishment of two passive stormwater infiltration systems	• **Parks Unit** • City Improvement • Activity Centre Revitalisation	Year Five (30/06/2023)
Maintain accurate and current data and documentation for the management of Council's tree assets.	• Audit tree data	• **Parks Unit** • Asset Management	Year 10 (30/06/2028)

Objective 3:

Manage the interface between trees and infrastructure

Targets:

- Reduce percentage of *Melaleuca styphelioides* from 5.1 per cent to 3 per cent by 2033
- Reduce percentage of *Lagunaria patersonia* from 3.1 per cent to 2 per cent by 2033

ACTION	MEASURE	RESPONSIBILITY	TIME FRAME
Reduce the percentages of Melaleuca styphelioides and Lagunaria patersonia within the street tree population	• Audit of tree data	• **Parks Unit**	Year 10 (30/06/2028)
Suitable species to be planted in suitable locations every time to mitigate potential conflicts with infrastructure and to reduce long-term risk.	• Quantified reduction of tree related lifted footpaths measured through cyclic footpath inspections • Benchmark to established after year five	• **Parks Unit** • Roads and Drains Unit • City improvement	Year Five – ongoing (30/6/2023-30/06/2028)
Implement a range of strategies including infrastructure re-design solutions, selective root pruning and the removal of trees where damage cannot be rectified through other Arboricultural techniques.	• Quantified reduction of tree related lifted footpaths measured through cyclic footpath inspections • Benchmark to be established after year five	• **Parks Unit** • Roads and Drains Unit • City improvement	Year Five – ongoing (30/06/2023-30/06/2028)
In areas of high density e.g. activity centres, investigate the use of structural cells and soils to create healthier growing conditions for trees	• Audit of tree population in Activity Centres	• **Parks Unit** • Activity Centres Revitalisation	Year 10 (30/06/2028)
Continue to build relationships with utility service providers and other landholders, such as LXRA, United Energy and VicRoads to minimise the impacts of works on the urban tree population. Co-ordinate with service providers and other Council departments to ensure sustainable management of public managed trees.	• Meetings attended, noted and documented • Audit of declared high bush fire risk area trees completed by October each year	• **Parks Unit**	Year One – ongoing annually (30/06/2019-30/06/2028)
Protect Council trees from development and other activities that threaten their health and viability and minimise the conflict between trees and infrastructure where possible.	• Guidelines in place	• **Parks Unit** • Planning & Design • Civil Development	Year One (30/06/2019)

** Program may be accelerated pending funding from external sources and the annual budget allocation.*

ACTION PLAN

Objective 4:

Engage and educate the community about the importance of trees

Targets:

- Run 6 annual planting days within reserves each year
- Run 5 indigenous planting days in schools each year
- Run 6 "Adopt a Park" programs with local schools each year

ACTION	MEASURE	RESPONSIBILITY	TIME FRAME
Consult with the community about all major projects involving tree removal and tree planting.	• Five positive media releases and articles published in 'The City' • Notification signs established in parks before major tree planting programs	• **Parks Unit** • Media and Communications • City Improvements • Activity Centres Revitalisation	Year One – ongoing annually (30/06/2019-30/06/2028)
Notify residents of upcoming tree planting projects in their street.	• Tree planting notification cards completed and in operation • Notification documented by planting contractor through monthly contract reports	• **Parks Unit** • Planting contractor • Open Space Projects	Year One – ongoing annually (30/06/2019-30/06/2028)
Update the information content of Council's webpage for trees to reflect updated knowledge and practices adopted within this Strategy and the guidelines	• Website to contain Urban tree strategy, and electrical lines clearance plan	• **Parks Unit** • Media and Communications	Year One – ongoing annually (30/06/2019-30/06/2028)
Hold tree planting days in line with National Tree Day	• Planting days completed	• **Parks Unit**	Year One – ongoing annually (30/06/2019-30/06/2028)

IMPLEMENTATION

15 YEAR TREE PLANTING PROGRAM

The primary delivery tool for implementing Council's Urban Tree Strategy vision will be the 15-year planting plan. The objectives of this plan are to:

- fill prioritised vacant street tree sites
- renew poor quality streetscapes
- plant shade trees in parks of most need and
- develop significant avenues throughout the municipality.

A number of streets, parks and opportunity sites have been identified for tree planting within the 15 Year Planting Plan which were prioritised by:

- those streets with high street tree vacancy rates, trees with low ULE and number of inappropriate or declining trees
- those parks with no to low existing tree canopy cover
- those areas across the municipality that were more socially vulnerable than others and therefore required more shade to protect people and to provide greater amenity
- those areas that provided opportunities for biodiversity and habitat links or mitigation of localised flooding.

The 15-year planting plan effectively supersedes Council's current street and park tree planting program. It is targeted, strategic and evidence based. Each year, the relevant residents will be notified and consulted regarding the locations and species selected for their street or park.

CITY OF GREATER DANDENONG ARBORICULTURE OPERATIONS MANUAL

Technical Guidelines have been developed to support this Strategy and outline current best arboricultural practice for tree management, including all relevant Australian Standards. The guidelines include a Species Planting List that has been recently been updated to remove non performing species and include other species that are new and to be trialed.

Areas of management covered include:

- Tree risk management
- Managing and decision making for conflicts with infrastructure
- Species selection and tree planting
- Tree pruning
- Plant health care and integrated pest management
- Tree root management
- Tree protection of Council managed trees
- Tree removal and retention guideline

PERFORMANCE MONITORING AND REVIEW

Performance monitoring and ongoing review will be important to ensure that best practice guidelines remain current and that programs are on track to deliver the visions and objectives as set out in this Strategy.

Changes to climate, technologies, resource allocations and community expectations will all necessitate regular reviews of the way that Council manage its urban tree population.

The following review points will occur:

Every 2 years: Strategy actions, progress towards targets and technical guidelines are to be reviewed.

In 10 years (2028): The Strategy itself will be reviewed and updated. At this 10-year marker point, Council will also remeasure the canopy cover, reaudit its tree inventory and measure the achievement of its targets in readiness for an updated Strategy.

FUTURE CONSIDERATIONS

Whilst the scope of this Strategy was limited to park and street trees, there are some considerations for Council to consider in the future. These considerations would strengthen Council's ability to plan for and manage the whole urban tree population, namely the urban forest. This could extend to trees in private realm, within carparks and on other government owned land. Considerations as follows:

1. Investigate tree regulations for the protection of private trees:
    - Undertake further landscape and/or canopy analysis to identify where and what may need protection.
    - Identify canopy coverage over private land compared to public land.
    - Investigate the feasibility of a significant tree register in protecting private trees
    - Incorporate tree protection regulations within the Planning Scheme.
    - Initiate education programs to strengthen the importance of protecting trees; located on both private and public land.
2. Investigate the planning scheme's ability to provide adequate space for future trees in private developments, especially sub-divisions.
3. Investigate canopy coverage within Council managed car parks and investigate planting systems that could see trees successfully incorporated.
4. Develop an urban forest strategy, which aligns planting programs such as the 15-year planting program with other potential planting programs for Activity Centres, major parks and reserves, other Council facilities as well as strengthening Council's planning and local laws framework for protecting private trees.

GLOSSARY

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

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

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

Ecosystem: A community of organisms interacting with each other in their environment

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

I-Tree Eco: A model built by the United States Forestry Service that analyses certain tree parameters in conjunction with air quality measures to determine an environmental value of a tree. The value includes air pollution, carbon sequestration and storage, energy saving benefits, stormwater flow reductions and a structural value, allocating an overall figure of worth on a population of urban trees.

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

Particulates: microscopic solid or liquid matter that are suspended in the air. PM10 and PM 2.5 are found in urban air and are known to be harmful to human health.

Photosynthesis: the process by which plants use sunlight, water and carbon dioxide to produce nutrients including oxygen.

SEIFA: Socio-Economic Index for Areas which categorises census parcels based on socio-economic advantage or disadvantage.

Soil nutrient cycling: The process of storing and transforming nutrients such as carbon, nitrogen, phosphorus, and other *nutrients* via exchanges with tree roots.

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

Urban density: the number of people inhabiting a given urbanised area

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

Urban Forest: the sum of all urban trees including those on public and private land

Urban Heat Island Effect: when urban areas are warmer than surrounding rural areas due to heat retention in hard surfaces. This build-up of heat is re-radiated at night time, increasing air temperatures which can have serious human health consequences particularly during heatwaves. The UHI effect can be mitigated by a range of factors. The most cost effective and efficient mitigation tool is an increase in tree canopy cover.

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

Vacant tree sites: sites within streets that could house a street tree but are currently vacant due to tree removal, vandalism or because a tree had never been planted.

Water sensitive urban design: is the integration of the water cycle into urban planning and design by recognising all water streams in the urban environment as a potential resource e.g. rainwater, stormwater, grey water and blackwater. WSUD is often used to describe the infrastructure built to capture and reuse stormwater

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