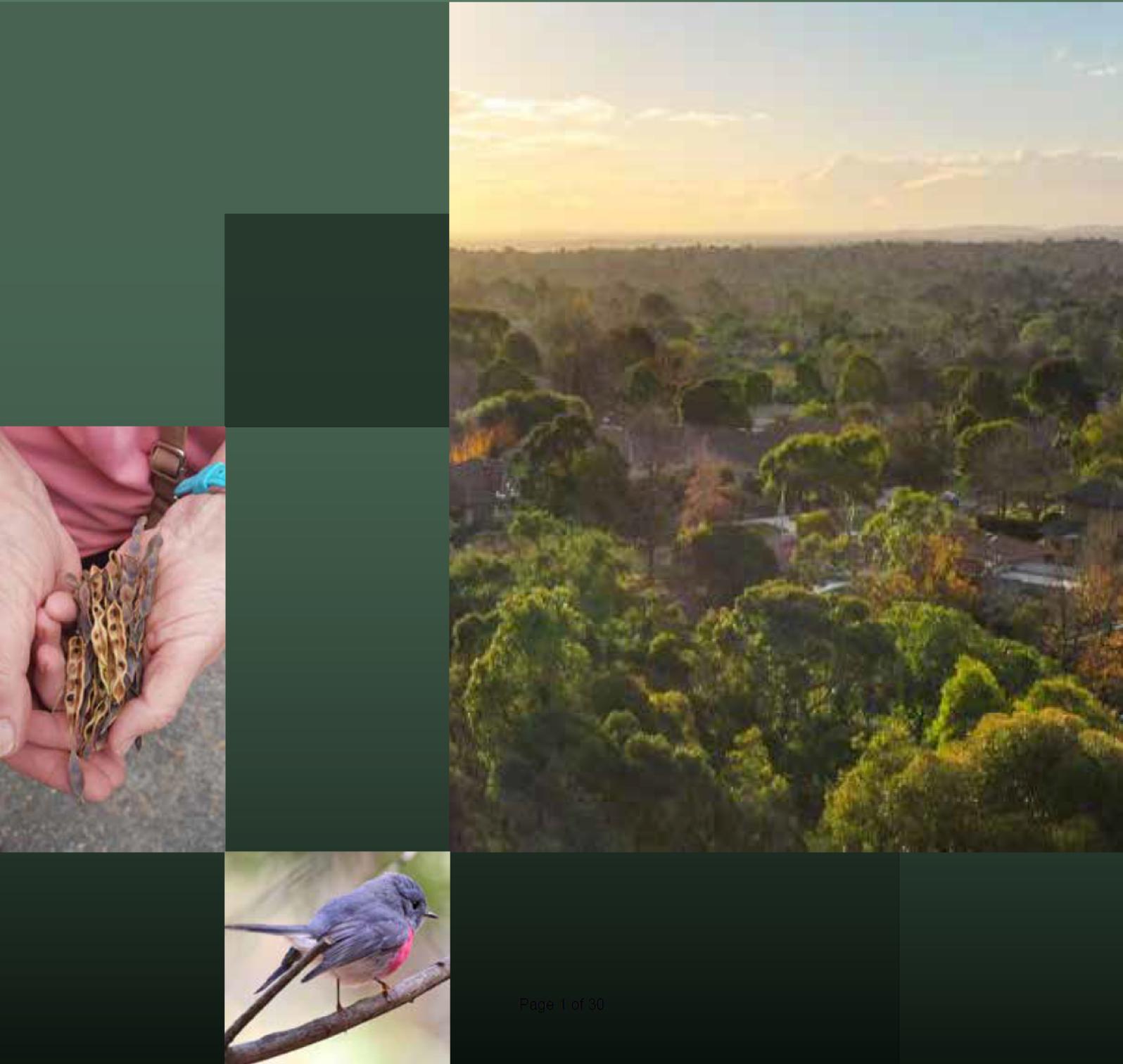




WHITEHORSE CITY COUNCIL

Urban Forest Strategy 2021-2031



Whitehorse Urban Forest Strategy 2021-2031

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Executive Summary

Whitehorse City Council values the important contribution of trees and vegetation in making the municipality a vibrant place to live, work and visit. Across both private and public land, the urban forest is an essential element within Whitehorse. The urban forest includes trees, shrubs and grasses along with the soil and water they depend on across the municipality.

Whitehorse faces a number of challenges resulting in a decline in canopy cover. Densified urbanisation, growing population and climate change place increasing pressure on the health and extent of the urban forest. The strategy seeks to maximise the health and vigour of our urban forest; build urban resilience, enhance biodiversity and adapt to and mitigate climate change.

This strategy sets an urban forest vision that melds community aspirations, existing policies and strategies to guide Council to better protect, enhance and connect Whitehorse’s natural assets.

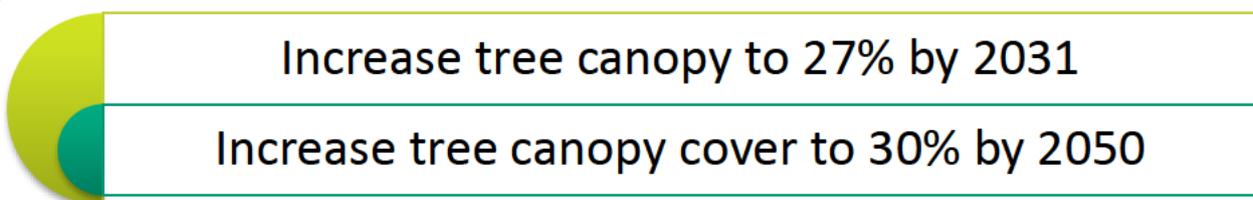
Vision

A diverse, healthy and resilient urban forest

Objectives

1	Protect the urban forest across private and public land Maximise the health, vigour and condition of Council managed vegetation, while managing risks. Strengthen the legislative framework to protect and renew canopy cover on private property.
2	Expand the urban forest and adapt to climate change Grow more trees and vegetation across both the public and private realm to build climate resilience.
3	Enhance biodiversity Protect native bushland, extend and connect habitat and improve connectivity.
4	Build community capacity to learn from each other, protect and enhance the urban forest. Provide opportunities and support people to connect with and care for nature.
5	Build on Council’s knowledge base Capture information to strengthen our understanding of the urban forest

Targets



*By 2031 this represents an overall increase of 9% total tree canopy cover (for trees taller than 3 metres).

1. Introduction

As we face a growing population, increasing urban development and a changing climate, the benefits of the urban forest have never been more important. The green leafy character of Whitehorse is one of the most valued aspects of the community (Whitehorse City Council, 2017). Not only do trees improve amenity but they bring a range of social and environmental benefits (Moore, 2009) that contribute to a more liveable city including:

- Improved health and wellbeing
- Cooling and shading in summer
- Cleaner air and water
- Improved biodiversity
- Reduced flooding
- Places to explore, rest, unwind and rejuvenate

What is an Urban Forest?

Our urban forest is all the trees, shrubs and other vegetation across public and private land. It incorporates all vegetation in streets, parks, gardens, campuses, alongside rivers and creeks, private gardens, balconies and rooftops. It includes the soil, the water and the wildlife that supports it.

While the urban forest encompasses all these elements, tree and vegetation management is the primary focus of this strategy.

Through the enhancement of our Urban Forest, Council can begin to work towards the Whitehorse 2040 Community Vision:

- Whitehorse is a resilient community where everyone belongs.
- We are active citizens who value our natural environment, history and diversity.
- We embrace sustainability and innovation.
- We are dynamic. We learn, grow and thrive.

Implementation of the strategy will contribute to Council's efforts to work towards the priorities of the Community Vision with an emphasis on Theme 5: Sustainable Climate and Environmental Care.

This strategy serves as a communication tool that describes the vision for our urban forest and sets five key urban forest objectives. The Whitehorse Urban Forest Background Document 2021 provides further evidence and is to be read in conjunction with this strategy. This strategy supersedes the Interim Whitehorse Urban Forest Strategy 2018-2021.

The implementation of this Strategy will support goals outlined in the Whitehorse Health and Wellbeing Plan 2017-2021, the Whitehorse Sustainability Strategy 2016–2022, and the Whitehorse Open Space Strategy 2007-2022 (Figure 1).

Reaching our targets requires collective effort, concise planning and adequate resourcing to establish many more trees and shrubs within our streetscapes, in private gardens and public spaces. This Urban Forest Strategy guides and coordinates this work across Council departments. It is aligned with Federal and State Government policies (Appendix 1) and the Living Melbourne Strategy 2019 (Figure 2).

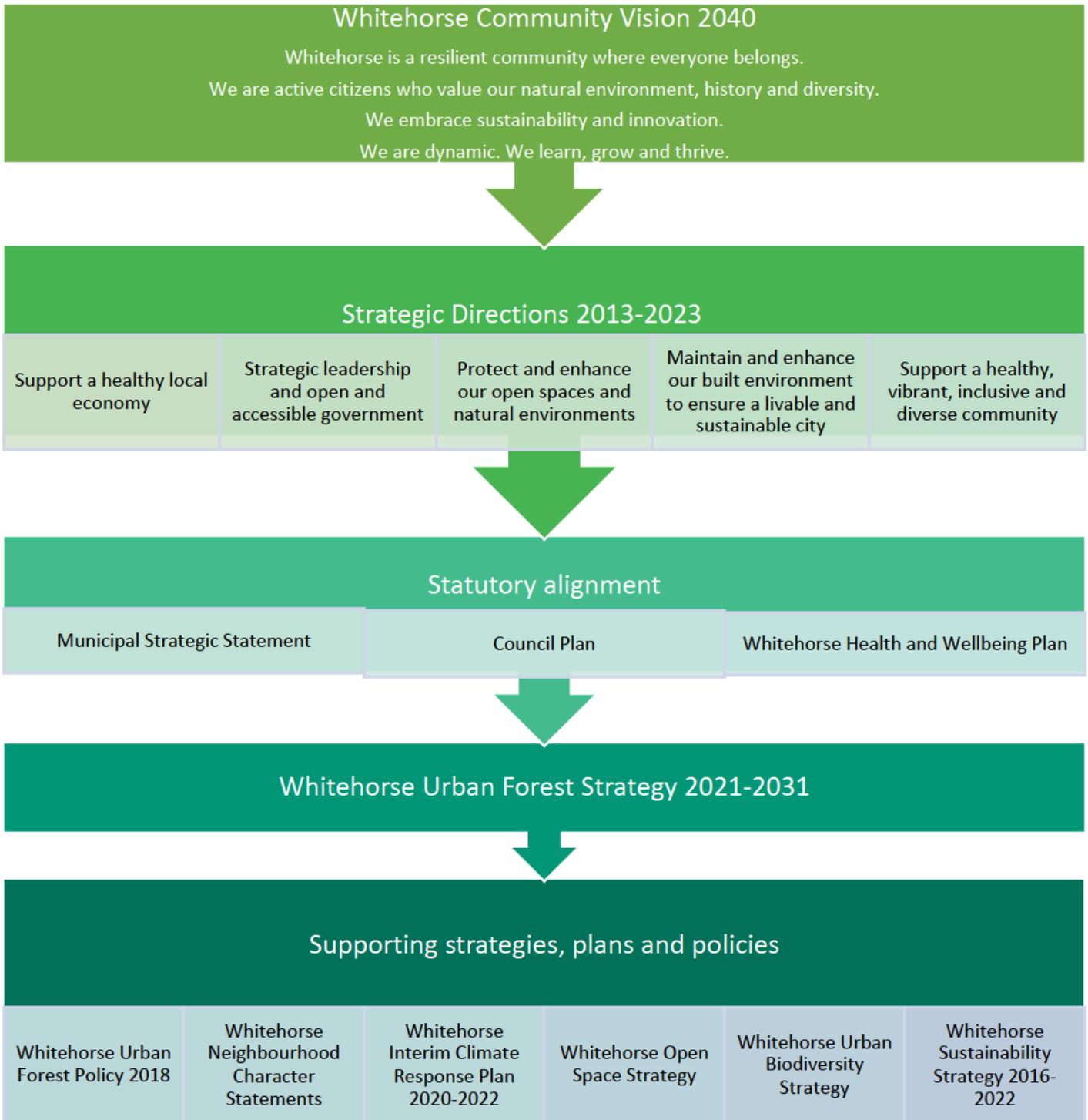


Figure 1. Strategic alignment within an integrated planning framework

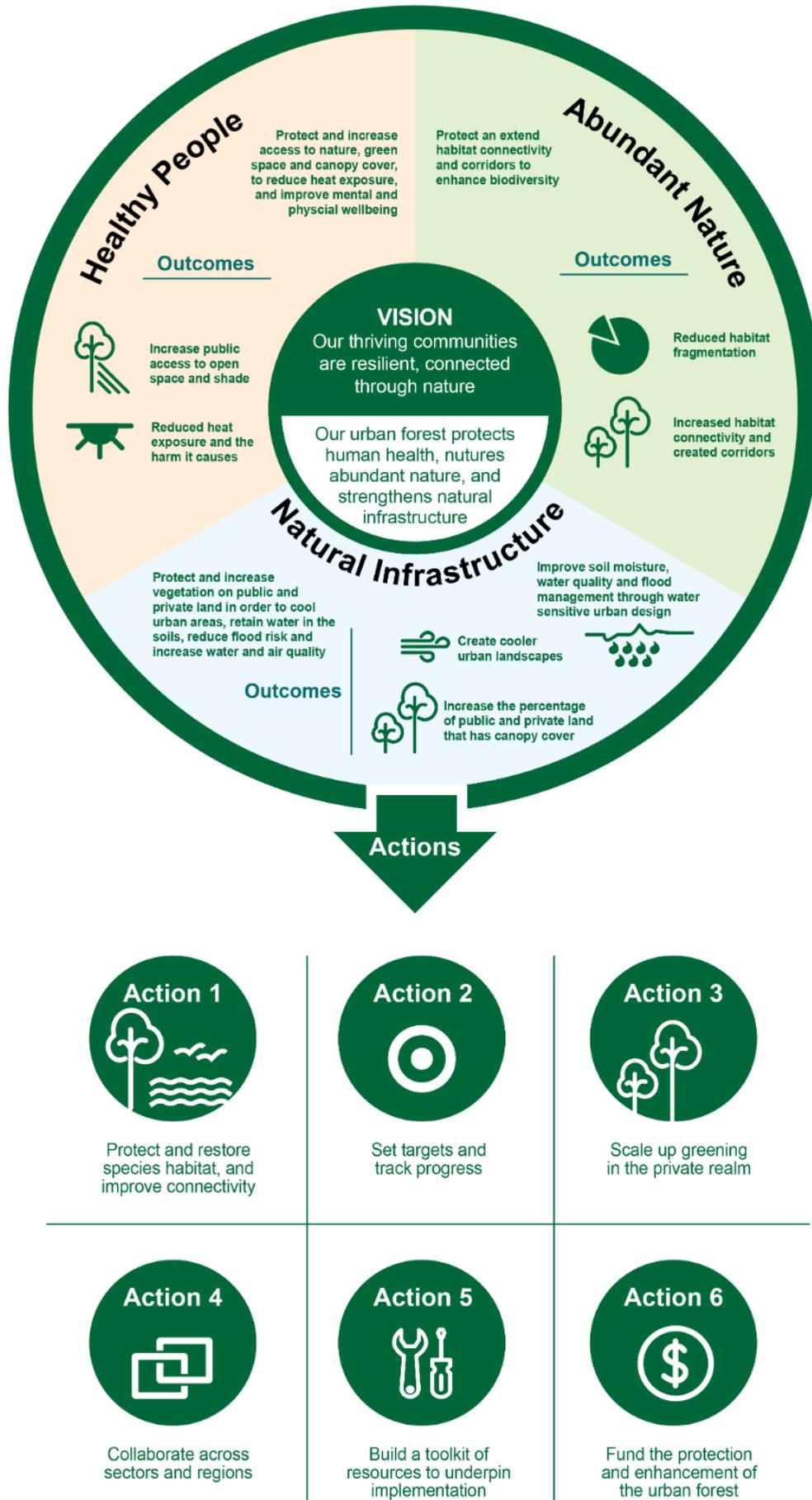


Figure 2: Living Melbourne: A metropolitan wide urban forest strategy; the vision, aims and actions. (The Nature Conservancy and Resilient Melbourne, 2019a, page 7)

2. Why do we need this strategy?

Urban trees and vegetation are challenged with harsher conditions than in a more natural environment. Competition for space, compacted soil, reduced water availability, altered microclimatic conditions, and limited root space threaten the health and extent of the urban forest. (Trees & Design Action Group, 2014). Many of these challenges are further impacted from increasing urbanisation, population growth and climate change resulting in a decline in canopy cover.

Declining canopy cover

Most recent data collected by Department of Environment Land Water and Planning (DELWP) in 2018, shows that canopy cover across Whitehorse was measured at 18% (DELWP, 2019a). Comparing data from 2014, there has been a point change in 2.28% canopy cover over those 4 years across. (DELWP, 2019b). This translates to a net loss of 10% of the canopy that was present.

Ideally, a canopy cover of 30% is desired in the urban context (The Nature Conservancy and Resilient Melbourne, 2019). For the next 10 years of this strategy, first the aim is to halt the decline in canopy cover and then work towards achieving a target of 27% canopy cover, in view to reach 30% by 2050.

Our target can be achieved by not only protecting and planting more trees, but by improving the health and maximising the canopy of existing trees. New trees will need to be provided with the best planting conditions possible to ensure maximum canopy potential for the long term. A collective effort across private and public land is needed to convert a decline in canopy cover into a net gain.

Climate change

Scientific modelling predicts climatic conditions will continue to become more extreme, creating harsher conditions for trees to survive and thrive (Kendal Dave et al., 2017, page 1).

These weather patterns are likely to impact on our urban forest in many ways including:

- Increased susceptibility to pests and diseases
- Increased periods of drought
- Reduced average rainfall but more frequent and intense storms
- Increase tree losses during increased storm events
- Increased fire risk
- Uncertainty of species survival in a warmer climate
- Desynchronisation of pollinators and flowering times

MEASURING CANOPY COVER

Canopy cover, rather than number of trees, can be used to evaluate our urban forest. When viewed from above we can estimate the total area of tree canopy cover across the municipality.

Research shows that we can begin to reap social and environmental benefits from our urban forest when tree canopy cover exceeds 30% (The Nature Conservancy and Resilient Melbourne 2019). Anything less, and there is generally not enough canopy cover to achieve the full benefits of the urban forest.

People

By 2030, Whitehorse is forecast to have a population that will reach 207,844 people (ABS 2020). This is an increase of 17% from a population of 182,171 in 2020 (ABS, 2020). People need access to nature and green environments for their own health and wellbeing. The COVID-19 pandemic highlighted the importance of urban greenspaces as an essential quality-of-life element (Kleinschroth and Kowarik, 2020). As population increases, there is a need to ensure there is ample opportunities for people to access nature within the municipality.

Ageing demographic

The urban heat island effect disproportionately affects the elderly and other vulnerable people, including young children, people who are unwell or socially isolated, and often those who are financially disadvantaged. Whitehorse has an ageing population. The area with the greatest increase in persons aged 60 to 85+ years between 2020 and 2041 in the City of Whitehorse is forecast to be Box Hill (ABS, 2019).

Health and wellbeing outcomes can be achieved through increasing canopy cover by strategically targeting hot spots in areas where significant populations of people who are especially vulnerable to extreme heat and heatwaves (The Nature Conservancy and Resilient Melbourne, 2019, page 13). Appendix 2 shows hot spots in Whitehorse. Appendix 3 shows the heat vulnerability index as distributed across Whitehorse.

Diverse attitudes to trees and vegetation

Much of our community appreciate and respect the multitude of benefits that the urban forest provides. However, some do not share this view. Vegetation is not always prioritised to be retained, particularly on new development sites. Council officers are often required to manage community feedback and requests that arise from both real and perceived risks about trees. Understanding community perceptions of the urban forest is a critical step to developing behaviour-change programs. A strategic and informed community engagement and capacity building approach is important for building appreciation and understanding of our urban forest to protect the urban forest across all sections of the community.

Urbanisation

With increasing population comes tremendous opportunities for innovation and economic development. However, population growth leads to denser urban forms bringing many challenges for vegetation:

- Taller buildings reduce sunlight, and building mass limits access to soil moisture and root capacity.
- Often soil is compacted or even non-existent.
- Higher demand for car parking and clearway times limits in-road tree planting opportunities.
- More services (stormwater, gas, sewerage and water) underneath the nature strip restricts planting locations.
- Shop awnings, tram wires, powerlines, lighting and road signage restrict the space for tree canopies.
- Sight lines to bus and tram stops can reduce space for tree planting.

Without space, suitable soil and water the urban forest will be at risk and difficult to expand.

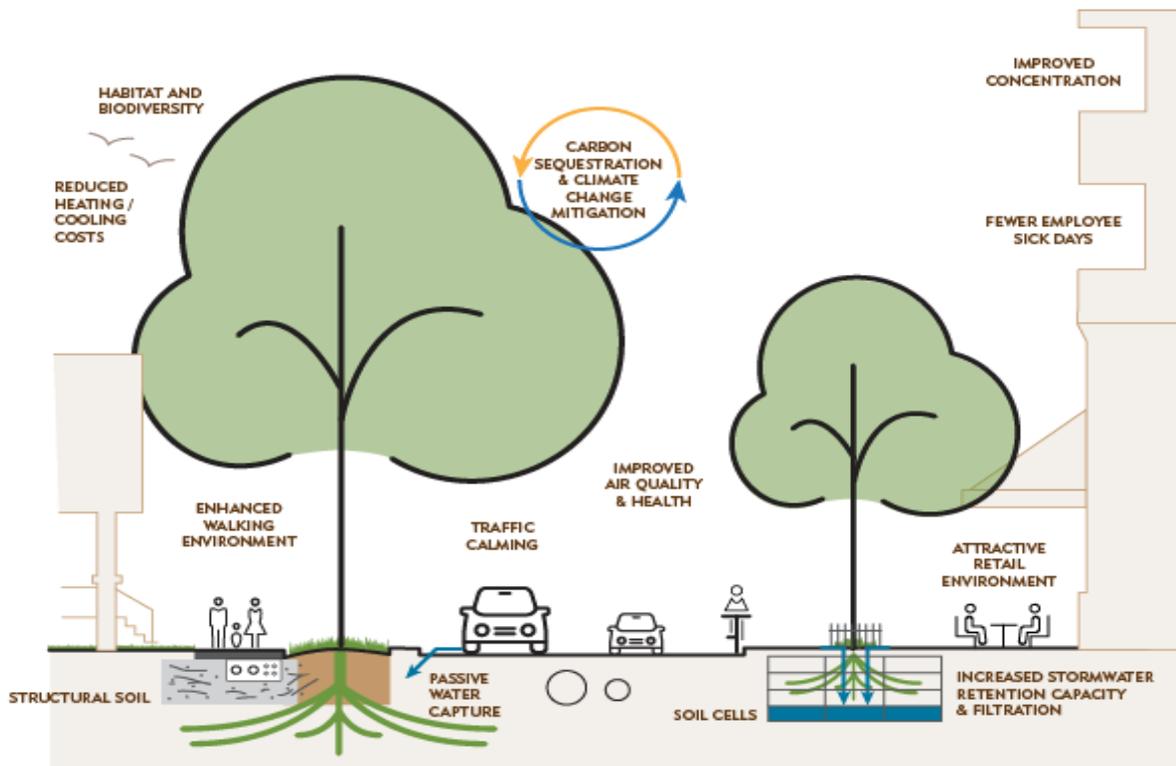


Figure 3: Successful integration of trees and vegetation into the urban landscape brings many benefits to society.

Urban ecology

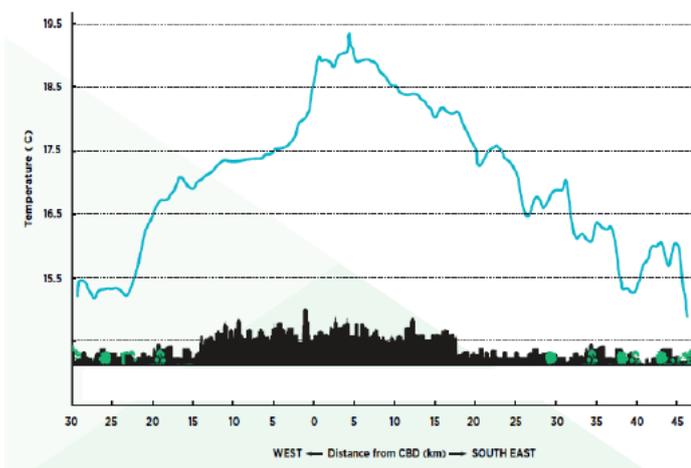
Increased urbanisation could lead to further loss of biodiversity, threatening the health of our urban ecosystems. Losses of even just a few populations can result in the destabilisation of natural ecological processes rendering a degraded environment for nature and humans (Nilon et al., 2017). Generally, as biodiversity declines so does the potential of ecosystem services. In contrast, rich biodiversity leads to a healthier, more resilient and functioning urban ecosystems.

The urban heat island effect

The urban heat island is an internationally recognised effect, where higher temperatures are recorded in areas with dense concentrations of buildings, pavements and other surfaces that absorb and retain heat. Data and mapping produced by the DELWP indicates that on average, Melbourne’s urban areas are over 8°C hotter than non-urban areas (DELWP, 2019a). DELWP has identified that there is an increasing amount of thermal hotspots across Whitehorse due to urban densification (Sun et al., 2018). Appendix 2 identifies the “hot spots” in Whitehorse from data collected in 2018. (DELWP, 2019b). Generally, these areas consist of either shopping centres, carparks or industrial areas. As densification occurs it is expected that Whitehorse will face an increase in these types of hot spots.

Trees are one of the most effective providers of shading and localised cooling (DELWP, 2019a). Hotspots can be ameliorated by increased vegetation and water in the landscape. Particularly in suburbs with low-rise buildings, mature trees provide thermal comfort by reducing the urban heat island effect in the height of summer (DELWP, 2017).

Figure 4: Illustration of the impacts of urban heat from densified development. Adapted from City of Melbourne Urban Forest Startegy (2014)

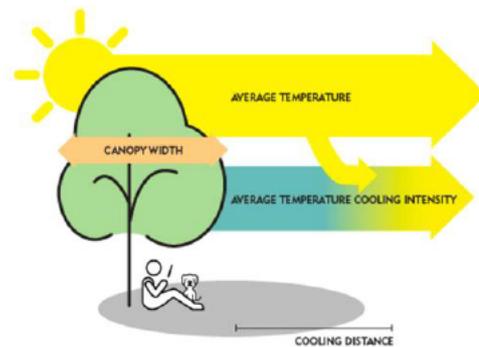


Why trees are so cool

Trees and other plants help cool the environment, making vegetation a simple and effective way to reduce urban heat. It does this in two ways:

1. Trees shade buildings and pavement, which prevents surfaces and surrounding air from heating up.
2. Vegetation undergoes evapotranspiration, which provides an additional cooling effect. Transpiration is typically greater with trees than other vegetation as their extensive root systems allow for greater uptake of water.

It’s no surprise that, in the height of summer, people seek out the delicious coolness of a shade tree in one of our beautiful parks.



3. Benefits of nature and the urban forest

Our community values the trees and vegetation in Whitehorse for many reasons (Planisphere, 2016). Research highlights the connections between healthy urban forests and enhanced liveability (The Nature Conservancy and Resilient Melbourne, 2019). A well planned and managed urban forest results in important environmental, community and economic benefits (Moore, 2009). Trees provide essential services such as water and air purification, carbon sequestration, stormwater management and shading and cooling.

Urban forests are a significant element of the character of Whitehorse (Planisphere, 2016). Trees and vegetation provide a visual relief from the built form. They provide habitat for wildlife, a sense of seasonality and the opportunity to connect with nature in our suburbs.

Access to a treed environment brings improvements to the mental and physical well-being of our community. There is an abundance of scientific research that highlights the mental-health benefits derived from trees and vegetation (Townsend and Weerasuriya, 2010). People typically feel more relaxed, calmer and optimistic after a walk in a park or reserve. People have greater peace of mind and are reinvigorated (Hartig and Kahn, 2016; The Heart Foundation, 2019).

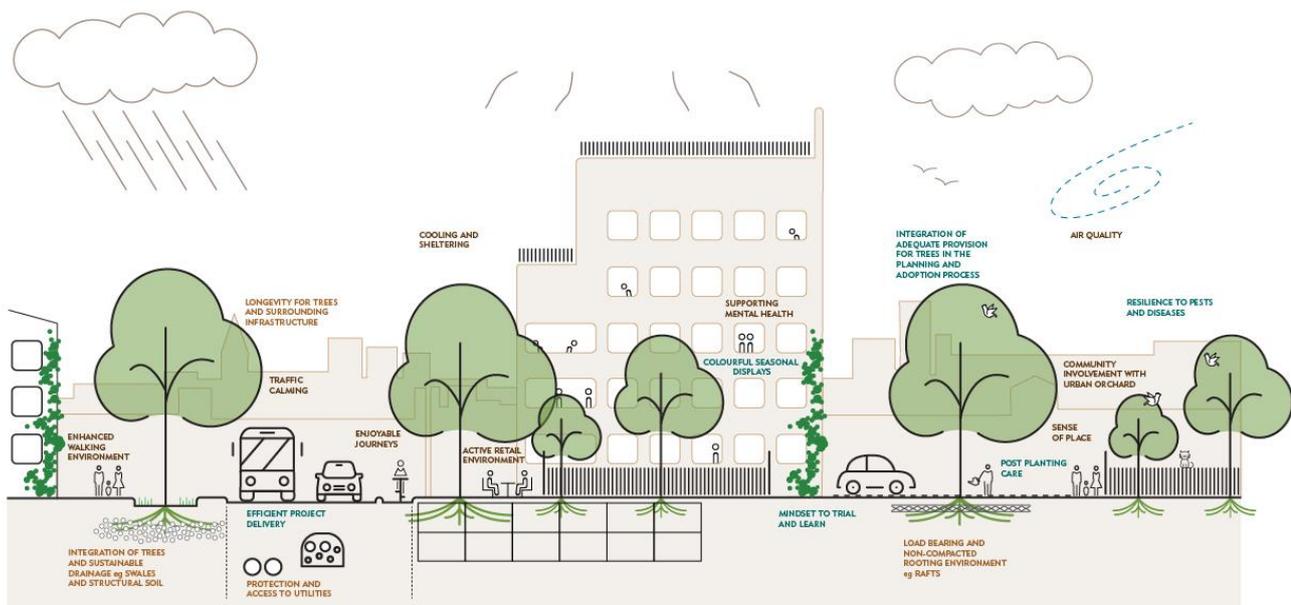


Figure 5: With good design trees can thrive in the urban environment bringing many benefits to the community



Figure 6: Key urban forest benefits grouped into three categories: environmental, health and wellbeing and economic

Many of these benefits are intimately linked to the liveability of a city and urban resilience (Trees & Design Action Group, 2014). With good design, trees can be strategically included into the urban fabric to achieve a diverse range of benefits to our community.

4. Our Past

Whitehorse was first inhabited by the Indigenous people of the Kulin Nation. They are the direct descendants of the men and women who have lived on Country for many thousands of years. Their knowledge has been shared over thousands of generations which guides their practice on Country to this day (Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation 2021). The Traditional Owners continue to have a special interest in caring for this land as it is central to their culture, their identity and wellbeing (Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation 2021).

Eucalyptus trees were a major part of the landscape. Silver stringybark (*Eucalyptus cephalocarpa*), narrow-leaved peppermint (*Eucalyptus radiata*), messmate (*Eucalyptus obliqua*) long-leaved box (*Eucalyptus goniocalyx*), red stringybark (*Eucalyptus macroryncha*, and yellow box (*Eucalyptus melliodora*)) formed much of the upper canopy forming a tall open woodland (Bull 2014). The smaller trees and shrubs included a range of Wattles (*acacia species*), Cherry Ballart (*Exocarpos cupressiformis*) and Sweet Bursaria (*Bursaria spinosa*). Native grasses interspersed with plants such as Chocolate Lilies (*Arthropodium strictum*), Flax Lilies (*Dianella species*) and Blue Pincushions (*Brunonia australis*). A variety of orchids and fungi came and went with the seasons (Practical Ecology, 2014).

Orchards and farms were established by early settlers in the 1850s. Soon after, land sales began. Much of the landscape was cleared and turned into intensive farms, mostly for orchards and exotic flowers. Demand for new housing in the 1950s and 1960s led to the subdivision of farms. Since then the land has become more and more urbanised.

Today Whitehorse has over 330 open space reserves covering more than 690 hectares of land area which equates to 10.7% of the municipality (Whitehorse City Council 2007). Of the total open space, approximately 590 hectares is Council owned and managed, comprising approximately 324 reserves. The remaining open space is owned and managed by other agencies such as Melbourne Water and Parks Victoria. There is a wide diversity of open space reserves throughout Whitehorse ranging from bushland reserves through to formal gardens.

5. Our Present

It is estimated that Whitehorse has a canopy cover of 18% (DELWP, 2019a). Figure 7 compares surrounding municipalities, showing that canopy cover ranges from 14.2–27.8% in Melbourne’s East (DELWP, 2019b).

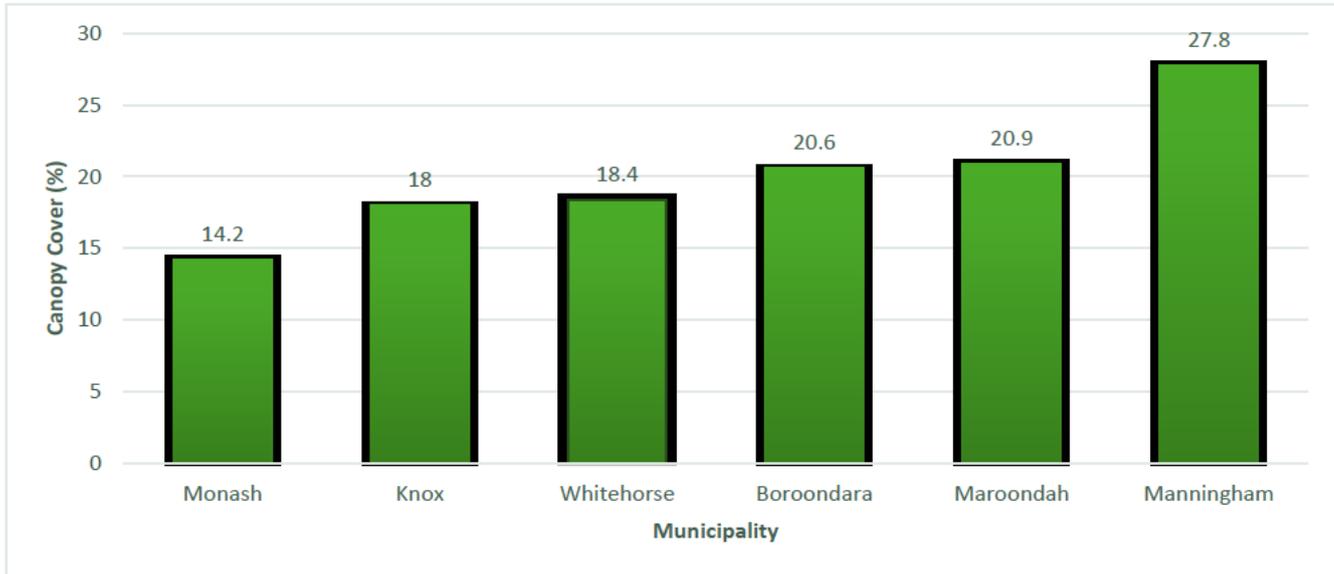


Figure 7: Canopy cover in Whitehorse and surrounding municipalities

Where are all the trees?

A study has used statistical analysis to show where existing trees are located in Whitehorse (DELWP, 2019b). Residential land accounts for the highest proportion of total tree canopy, followed by parkland and then street trees. A small amount of canopy is found within industrial and commercial land; with an even smaller amount on land managed by other government agencies.

The following map (Figure 9) shows the distribution of canopy cover across Whitehorse. Some areas including parts of Blackburn, Surrey Hills, Mitcham, Mont Albert, Mont Albert North and Vermont already have canopy cover higher than 30%. Canopy cover should be preserved in these areas. Tracts of land with even higher canopy cover exists where trees are established within parks and reserves. Areas with little to no canopy cover are within high density or industrial areas.



Figure 8: Where are all the trees? The 18% canopy cover (all trees over 3m in height) is distributed across different land use in Whitehorse. Most of the canopy cover is across private residential land. (Analysis based on data from Vegetation Cover 2018, Spatial DELWP 2019a)



Figure 9: Distribution of tree canopy cover in Whitehorse for trees over 3 metres - Modified Mesh Block (Hurley et al., 2019)

Trees on Council land

Whitehorse is known for its leafy green streets. Council currently manages approximately 75,000 street trees throughout the municipality and thousands more within parkland. There are more than 370 parks within the municipality. Some opportunities to increase canopy and enhance the urban forest exist within streetscapes, parks and other public open space.

Trees on private property

Private land and trees within the municipality make up the largest proportion of the urban forest. Land use planning can help to protect and grow the urban forest, by providing a strong legislative framework for tree protection, tree replacement requirements and ensuring sufficient space is allocated to grow large trees within new developments. As the majority of the land area within Whitehorse is privately owned, private land owners play a significant role in the growth of the urban forest.

The tree canopy targets set out in the Strategy rely on increasing canopy on private property. Whitehorse has interim tree protection controls in place for land in the Significant Landscape Overlay Schedule 9 (SLO9) of the Victorian Planning Scheme. The State Government is currently reviewing SLO9. Changes to SLO9 or a revised approach implemented by the State Government may limit the ability to attain the targets.

Urban biodiversity – nature in our neighbourhoods

We share our neighbourhoods with a wide range of wildlife. Whitehorse has more than 50 bushland reserves which contain important remnant vegetation and ecosystems which support local fauna. These are identified in the Whitehorse Biodiversity Inventory as biodiversity hot spots (Practical Ecology, 2014). These reserves contain pockets of remnant vegetation and revegetated land for conservation.

Providing native habitat and improving biodiversity is key to a healthy functioning natural environment. Urban areas can be challenging places for wildlife and vegetation. Council is already protecting and enhancing existing bushland mostly through vegetation management. Further opportunities include:

- Extending existing habitat with revegetation plantings.
- Enhancing green corridors to improve connectivity.
- Include biodiversity objectives on other Council owned land.
- Support land owners to enhance biodiversity on their own land and protect trees on private property.
- Manage pest animals and environmental weeds.

WHAT IS BIODIVERSITY?

Generally the term biodiversity refers to the variety of plants and animals but it also applies to genetic diversity and ecosystem diversity. Biodiversity can be understood at different scales locally, regionally, nationally and globally.

6. Planning for the future – our vision and objectives

Our urban forest is an essential element of the urban environment that improves liveability and health and well-being. The objectives to meet our vision have been set to ensure the expansion of canopy cover and to maximise social, environmental and economic benefits to our community. Over the next 10 years, Council will set out to achieve the vision and its 5 objectives. An urban forest action plan will be put together in collaboration with departments across Council to establish actions to be implemented between 2021 and 2031.

Vision

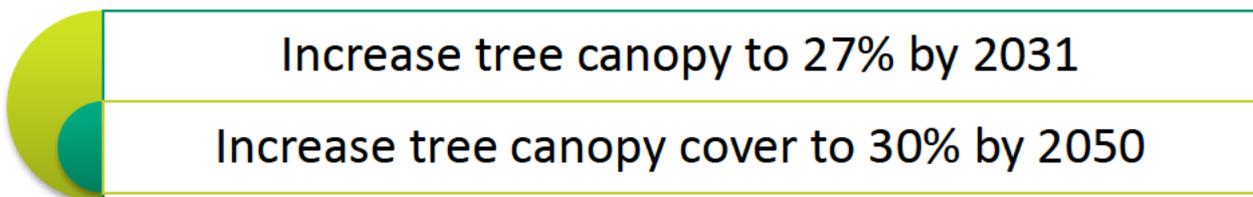
A diverse, healthy and resilient urban forest

Objectives

1	Protect the urban forest Maximise the health, vigour and condition of Council managed vegetation, while managing risks. Protect trees on private property.
2	Expand the urban forest and adapt to climate change Grow more trees and vegetation across both public and private realms and adapt to climate change.
3	Enhance biodiversity Protect native bushland, extend and connect habitat and improve connectivity.
4	Build community capacity to learn from each other, protect and enhance the urban forest. Provide opportunities and support people to connect with and care for nature.
5	Build on Council’s knowledge base Capture information to strengthen our understanding of the urban forest

Targets

The objectives will be measured with these targets.



*By 2031 this represents an overall increase of 9% total tree canopy cover (for trees taller than 3 metres).

Objective 1: Protect the urban forest

Council's highest priority is to preserve existing trees and vegetation across both private and public land. Removal of public trees is a last resort. As trees age they require additional maintenance and eventually removal and replacement. In an urbanised environment, diseased or structurally compromised trees will likely need to be removed to ensure public safety. Council will ensure that any trees removed will be replaced as appropriate. The management of existing street and park tree population is aimed to minimise the risk and maximise the health, vigour and structural condition of the urban forest.

On private land, Council aims to preserve and enhance the urban forest by retaining existing trees and allowing adequate space for the regeneration and replanting of trees. Through the Council Planning Scheme, a strong legislative framework will support the protection of trees through planning and development processes.

What needs to be done?

- Strengthen the Whitehorse Tree Management Plan and tree policies to better protect and enhance vegetation.
- Prioritise trees to be retained and/or replaced in Council capital works program.
- Adopt a purpose built tree and urban forest asset management system.
- Advocate for changes at State Government level to strengthen planning controls for vegetation protection on private land.
- Improve accessibility of information about tree removal, retention and replanting through the planning process whilst ensuring compliance with the requirements of the *Planning and Environment Act 1987* and the Privacy legislation.
- Extend the Council tree inventory to include individual park trees to monitor and manage risk and strategically plan for the renewal of senescent trees.
- Develop an approach that preferences asymmetrical planting street design where overhead powerlines exist while recognising the historic nature of 'avenue' planting.
- Develop plans for select street trees that would otherwise require significant pruning for powerline clearance.

Indicators

- Council's vegetation management standards and technical guidelines have been revised and are in place for Council managed trees.
- Full data set for street and park tree inventory acquired.
- Digital tree and vegetation management system in place and maintained in real time.
- Strong tree protection overlays are applied within the Municipal Planning Scheme.

Objective 2: Expand the urban forest and adapt to climate change

Expanding the urban forest means growing more trees and vegetation across both the public and private realm. Equally important is improving the health and maximising the canopy of each individual tree. New trees need to be provided with the best planting conditions possible. This means establishing reliable water sources for irrigation and selecting species that are more likely to adapt to climate change.

What needs to be done?

- Identify and quantify plantable opportunities across the municipality on public land.
- Develop a 10 year planting program with precinct plans that strategically fill the gaps and extend canopy targeting areas of low canopy areas, hot spots, social vulnerability, biodiversity and green corridors.
- Review maintenance programs to ensure an increase in trees can be resourced and managed.
- Identify and test innovative opportunities for increased canopy cover within streetscapes.
- Adopt canopy cover targets for each Council capital works project to increase canopy cover in the area.
- Develop guidelines for new carparks to incorporate trees, shrubs and water sensitive urban design.
- Develop an integrated water management plan that incorporates the use of stormwater for passive irrigation in streets and open spaces wherever possible.
- Set thresholds for street tree diversity.
- Bolster capital street tree renewal and expansion program to extend canopy health and cover.

Indicators

- 10 year planting plan in place with annual tree planting targets.
- Integrated Water Management Plan endorsed.
- Green infrastructure assessment tool to help with designing and constructing new buildings in place.
- Increase in operational budget allocated to Councils tree management program.

Objective 3: Enhance biodiversity

Council protects remnant vegetation within Council managed bushland reserves with an ecological restoration program mostly through weeding and planting. Council will extend revegetation areas and improve connectivity between habitat throughout and beyond the municipality.

What needs to be done?

- Develop a green corridors enhancement program which identifies and prioritises a network of existing and potentially new environmental connections throughout the urban landscape.
- Adopt a Biodiversity Management System approach to allocate appropriate resources for long term planning.
- Develop an animal pest management action plan to protect bushland reserves.
- Build capacity within the community to improve connectivity on private land.
- Strengthen nature strip planting guidelines and permit process to facilitate greening within the streetscape and improve connectivity.
- Develop a significant species management plan.
- Strengthen the Whitehorse Tree Management Plan to preserve the treed character of classified streets cited by the National Trust.

Indicators

- Green corridors mapped against guild species.
- Biodiversity Asset Management System in place.
- Net gain of land area managed for biodiversity.
- Animal pest management action plan in place.
- A targeted engagement program to encourage the uptake of indigenous plantings on nature strips within green corridors.

Objective 4: Build community capacity to share knowledge, protect and enhance the urban forest

Council plays a role in education to engage and involve the Whitehorse community to protect and enhance the urban forest on both private and public land. Through capacity building, Council can support the community to share knowledge and provide opportunities for people to connect with and care for nature. By providing up to date information, education and support to community groups, Council can ensure residents are well informed to make good decision for managing vegetation and biodiversity on private land.

What needs to be done?

- Offer a range of public talks, workshops, incursions and excursions to pre-schools, schools, tertiary groups and other community groups to raise awareness and encourage the interaction between people and their local natural environment.
- Ensure Culturally and Linguistically Diverse (CALD) groups are reached by utilising CALD networks to distribute information and by translating material and resources into other languages.
- Encourage the planting and care of healthy vegetation and trees in the home garden through programs such as the Tree Education and Gardens for Wildlife programs.
- Improve online resources and utilise social media channels to raise awareness of the importance of indigenous flora and fauna of Whitehorse.
- Deliver a citizen science program in partnership with other agencies such as iNaturalist, Melbourne Water, Birds and Backyards to the community to extend their awareness of biodiversity in Whitehorse.
- Facilitate a series of community events to enable residents to actively care for nature.
- Provide technical and logistical support to 'Friends of' groups to care for bushland.
- Develop online interactive mapping platform that provides information about mapped and assessed Council trees to raise awareness of value and contribution of each tree.
- Continue to expand the Gardens for Wildlife program to increase biodiversity, permeability, canopy and shrub cover on private land.
- Provide opportunities for all generations to connect and learn about local biodiversity.

Indicators

- An online interactive map of our urban forest.
- Increase in the uptake of citizen science projects.
- An increase in volunteers and environmental events.
- Environmental education and tree education program in place.
- An increase in Gardens for Wildlife members.

Objective 5: Build on Council's knowledge base

Expand Council's knowledge base through monitoring, evaluation and analysis to ensure that the actions being taken are effective and continual improvements occurs. Up to date information will better inform decisions enabling ability to adapt to changing urban conditions.

What needs to be done?

- Carry out an analysis of canopy targets per land use and tenure.
- Extend the street tree inventory to include all Council managed trees within public open space including the identification of vacant sites.
- Repeat biodiversity inventory surveys every 5 years to gain a better insight into trends of changes to biodiversity.
- Record notable flora and fauna sightings.
- Draw on citizen science programs within the community to gain a better understanding of biodiversity in Whitehorse.
- Record the number of trees removed and replaced through the planning permit process to better understand canopy changes within private property.
- Collaborate across sectors and regions to achieve better monitoring outcomes through Living Melbourne to better understand changes in vegetation, urban heat island effect and permeability.

Indicators

- Concise tree inventory in place.
- Vegetation data is mapped that includes tree species identification and connectivity mapping.
- Citizen science program in place.
- Canopy targets are set for different land uses and tenures.

7. Implementation

An action plan will demonstrate the implementation of this strategy which will include a set of actions under each objective. Each action will be prioritised based on the response from the community consultation process for this strategy. Timeframes will be allocated to each action as short (0-2 years), medium (2 –5 years), long term (beyond 5 years). These will be determined in collaboration with council departments. An estimation of funding requirements will be indicated to support departments to plan budgets accordingly and Council will be able to allocate funding on a prioritised basis.

Resourcing

Budget allocation for the management of street trees, park trees and bushland has not increased significantly in the last decade. Historically, within the sector the cost of establishing vegetation in the urban environment has been underestimated (The Nature Conservancy and Resilient Melbourne, 2019). Funding may not have taken into account the full lifecycle costings. The 2021/22 Budget has recognised a need to address this and additional funding has been allocated to manage Council's trees.

True success in maintaining and extending our urban forest depends on continuing financial support. A long-term funding commitment is required over the next decade. Costings need to consider the planning and design, preparing the site (e.g. weed control, soil preparation), establishment of vegetation (e.g. formative pruning, ongoing weed control, watering, mulching), ongoing maintenance as well as end of life tree removal and renewal.

Each department will need to seek their own funding through the annual Council budget either through operational, new business initiatives or capital funds as appropriate to the actions. Grant money should be sought where opportunities arise.

Collaboration and delivery partners

Although work is under way to protect and expand our urban forest, the fragmentation of these efforts within and between municipalities could be a significant barrier to reaching our urban forest goals (The Nature Conservancy and Resilient Melbourne, 2019). Strong delivery partnerships between Council's departments including, ParksWide, Engineering and Environmental Services and Planning and Building are required to implement the strategy.

Collaborative partnerships with surrounding municipalities and other land agencies such as Parks Victoria, Vic Roads, Melbourne Water and Parks Victoria will strengthen Council's ability to reach the objectives. Living Melbourne, metropolitan wide urban forest strategy, sets a collaborative framework with a series of distinct, yet connected, urban forest actions.

Review and reporting process

The action plan will be reviewed after 2 years in 2023, then 3 years in 2026 and after 5 years in 2031 to track progress, identify issues and further opportunities to reach the target. A report will be presented to the Executive Management Team after each review period by ParksWide. The report will include an evaluation on the progress of the action plan. The urban forest strategy should be reviewed to reflect the priorities of the new community vision.

8. Development process

This draft of the Whitehorse Urban Forest Strategy 2021-2031 has been developed by the ParksWide Department in consultation with internal departments including Community Development, Corporate Performance, Engineering and Environmental Services, Planning and Building, Leisure and Recreation Services, and Strategic Planning.

A desk top study was carried out of latest research along with a review of existing internal and external documents to create the Whitehorse Urban Forest Background Paper which provides the evidence that underpins this strategy.

Two rounds of community consultation have been carried out. The first phase was to gain an understanding of the top priorities for the community and to share insights from local residents. The second phase was to check that the strategy accurately captured what the community said and that it is prioritised according to community expectations.

Glossary

Adaptation: Human actions designed to minimise the negative effects of anticipated climate change and capitalise on positive opportunities associated with impacts, as well as the changes that will occur in natural systems as climatic conditions change.

Biodiversity: All components of the living world: the number and variety of plants, animals and other living things (including fungi and micro-organisms) across our land, rivers, coast, and ocean. It includes the diversity of their genetic information, the habitats and ecosystems within which they live, and their connections with other life forms and the natural world.

Bioregions: Biogeographic areas that capture the patterns of ecological characteristics in the landscape or seascape, providing a natural framework for recognising and responding to biodiversity values.

Climate change: A long-term change of the earth's temperature and weather patterns, generally attributed directly or indirectly to human activities such as fossil fuel combustion and vegetation clearing and burning.

Connectivity corridors: Elements of the landscape which, by linking otherwise isolated areas, permit movement of organisms or genetic flows across the landscape. This is a more general term than wildlife corridors, which are strips of habitat that permit movement of animals between otherwise isolated patches of habitat.

Conservation: In relation to biodiversity, conservation is the protection, maintenance, management, sustainable use, restoration and improvement of the natural environment; in relation to natural and cultural heritage, conservation is, generally, keeping in safety or preserving the existing state of a heritage resource from destruction or change.

Degradation: In the context of environmental values, degradation refers to a loss of quality or functionality. It is used in various ways, e.g. forms of land degradation include salinity, wind erosion, water erosion, soil acidity; degradation of vegetation may refer to loss of extent, condition or capacity to self-regenerate.

Evapotranspiration: Movement of water from the soil to the atmosphere by plants via their roots, vascular tissue and stomatal pores resulting in a reduction of temperature in the immediate surrounds.

Ecological Vegetation Class (EVC): A type of native vegetation classification that is described through a combination of its floristic, life form, and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC includes a collection of floristic communities (i.e. a lower level in the classification that is based solely on groups of the same species) that occur across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.

Ecological sustainability: A state in which biological systems will remain diverse and productive over time, even though change will occur. The idea of ecological sustainability recognises that human use or development of biological systems must be consistent with protection of biological diversity and maintenance of essential ecological processes and life-support systems.

Ecosystem services: The benefits people obtain from healthy ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on earth.

Fragmentation: The result of removal (usually by clearing) of large parts of a natural area, resulting in the retention of only small parts (fragments or remnants) of habitat. Fragmentation is an issue for marine and other aquatic environments as well as terrestrial environments.

Green Economy: An economy in which economic growth and the health of our natural resources sustain each other, and market, business and government better reflect the value of nature.

Greenhouse gas emissions: Atmospheric gas that absorbs and emits infrared or heat radiation, giving rise to the greenhouse effect. Typical greenhouse gases include carbon dioxide, methane, nitrous oxide and refrigerants.

Habitat: All the physical and biological things that collectively make up the place where a plant or animal lives.

Hot spot: Areas that are greater than 10°C warmer than their estimated non-urban baseline temperature. This may include areas of concentrated heat retention, such as major roads, commercial and industrial centres, and new residential subdivisions.

Integrated water management: Collaborative planning that brings together organisations that influence all elements of the water cycle, including waterways and bays, wastewater management, alternative and

potable water supply, stormwater management and water treatment.

Landscape: All the natural features of land or territory encompassed in a single view (e.g. fields, hills, forests and water), which distinguish one part of the Earth's surface from another.

Liveability: A measure of a city's residents' quality of life, used to benchmark cities around the world. It includes socioeconomic, environmental, transport and recreational measures.

Metropolitan Melbourne: The 31 municipalities that make up metropolitan Melbourne, plus part of Mitchell Shire within the urban growth boundary.

Natural infrastructure: Strategically planned and managed network of natural lands, such as forests and wetlands, working landscapes, and other open spaces that conserves or enhances ecosystem values and functions and provides associated benefits to human populations.

Net gain: Where losses of native vegetation and habitat over a specified area and period of time, as measured by a combined quality-quantity measure (habitat hectare), are reduced, minimised and more than offset by commensurate gains.

Open space: Includes land reserved for natural landscape, parklands, recreation and active sports, as well as waterways and bays.

Permeability: The readiness with which a surface, whether man-made (such as a paved road) or natural (such as soil or rock) allows water, air or plant roots to penetrate or pass through.

Public urban realm: Any part of the built or natural environment that is available to the public. It forms a complex system of social, cultural, recreational and economic exchanges that may be planned, spontaneous or accidental.

Riparian: The interface between land and a river or stream; land alongside creeks, streams, gullies, rivers and wetlands.

Resilience: The capacity of individuals, communities, institutions, businesses, systems and infrastructure to survive, adapt and grow, no matter what chronic stresses or shocks they encounter.

Shrub: A woody plant growing smaller than a tree. Usually has several stems arising at or near the ground.

Species: A level of biological classification comprising one or more populations of individuals capable of interbreeding to produce fertile offspring.

Threatened species: Species of plants, animals or other life forms that are considered either vulnerable, endangered, or critically endangered.

Tree: A woody plant that grows 3 metres or higher. Typically having a trunk and bearing lateral branches at some distance from the ground.

Tree canopy: The uppermost trees or branches of trees in a forest, forming an almost continuous layer of foliage. The topmost layer of bioactivity in a forest setting.

Urban design: A collaborative and multi-disciplinary process of shaping physical space across a range of urban and suburban environments.

Urban forest: All of the trees and other vegetation – and the soil and water that support them. Urban forest incorporates vegetation in streets, parks, gardens, plazas, campuses, river and creek embankments, wetlands, railway corridors, community gardens, green walls, balconies and roofs.

Urban greening: Growing plants wherever possible in cities to contribute to urban vegetation coverage and providing a connection to nature.

Urban Heat Island Effect: The phenomenon of dense urban areas having significantly warmer air and land surface temperatures than surrounding rural areas.

Water-sensitive city: Resilient, liveable, productive and sustainable cities that interact with the urban water cycle to provide water security, healthy watercourses and wetlands, mitigate flood risk, create healthy spaces and contribute to biodiversity, urban heat-island reduction and carbon sequestration.

These definitions have been extracted from Living Melbourne (2019), Australia's Strategy for Nature 2019-2030 (Commonwealth, 2019) and Victoria's Native Vegetation Management Framework (Victorian State Government, 2011).

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Appendix 1: Alignment with national, state, regional and local

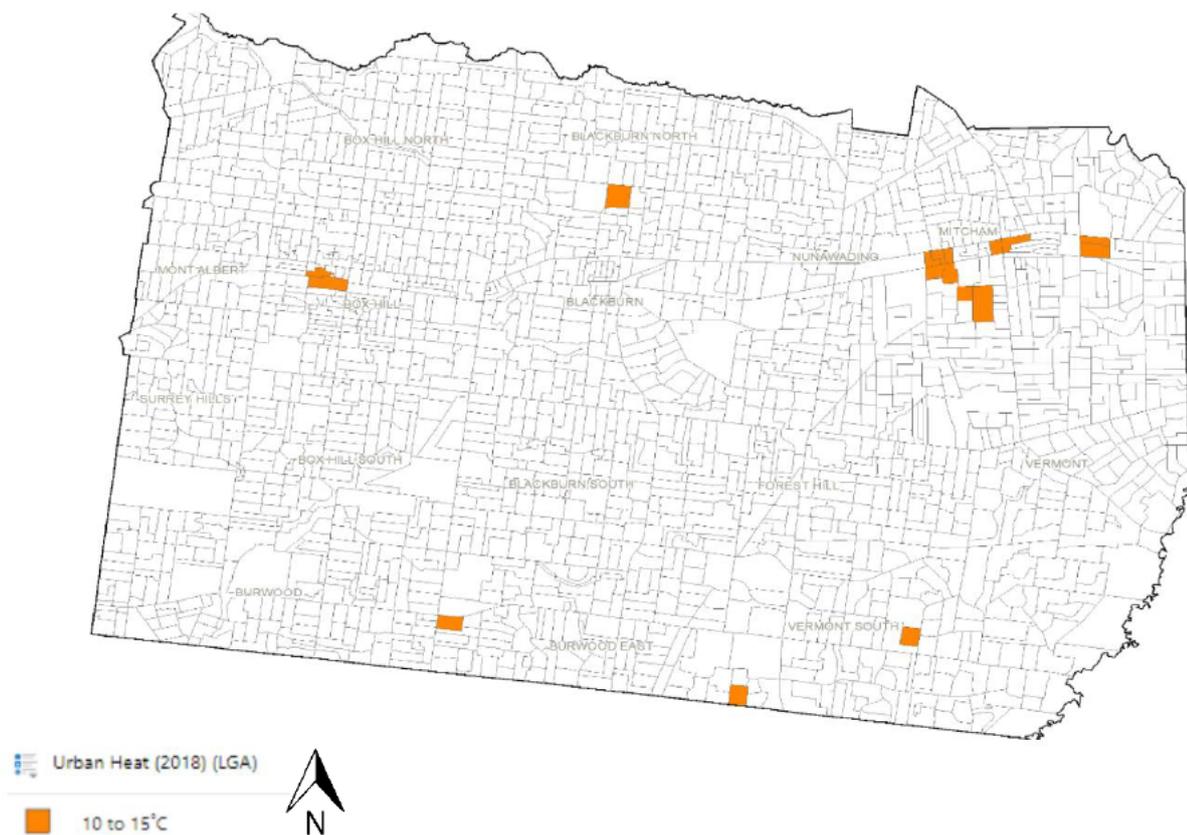
A range of Victorian Government documents provide support and guidance relating to Whitehorse’s urban forest. These include Plan Melbourne 2017–2050, the Victorian Climate Change Adaptation Plan 2017–2020, Protecting Victoria’s Environment – Biodiversity 2037, and the Victorian Public Health and Wellbeing Plan, among others. The table below shows major policies and strategies across levels of government that relate to the management of the urban forest.

Table adapted from Living Melbourne: Major government policies and strategies relevant to Melbourne's urban forest.

	Cities, Urban Design & Planning	Urban green Space	Climate change: mitigation; adaptation	Waterways, integrated water management	Ecology & Biodiversity	Culture
Federal	Smart Cities Plan 2015		Climate Change Act 2017 National Climate and Resilience and Adaptation Strategy 2015	National Urban Water Planning Principles 2008: and Review 2013-14	Australia’s Biodiversity Conservation Strategy 2010-2030 Environment Protection and Biodiversity Conservation Act 1999	
State	Plan Melbourne 2017-2050 20-minute Neighbourhood Principle Victoria Planning Provisions 2019 Infrastructure Victoria Strategy 2016 Electricity Safety Regulations 2015	Linking People and Spaces 2002 (New Metropolitan Open Space Strategy in development)	Victoria’s Climate Change Adaptation Plan 2017-2020 Climate Change Framework 2017 Victorian Public Health and Wellbeing Plan 2015-2019	Water for Victoria 2016 Yarra River Action Plan Healthy Waterways Strategy 2018-2028 Integrated Water Management Framework for Victoria 2017	Protecting Victoria’s Environment – Biodiversity 2037 Victoria’s Native Vegetation Management – A Framework for Action	Korin Korin BalitDjak: Aboriginal Health, Wellbeing and Safety Strategic Plan 2017-2027
Regional	Living Melbourne: our metropolitan urban forest Integrated Water Management Forums, Greenhouse alliances action plans (EAGA), Council Arboriculture Vic, LGPro Biodiversity Planners Network, Port Phillip and Westernport Regional Catchment Strategy, Eastern Region Animal Pest Management Strategy					
Local statutory	Whitehorse Council Plan 2017-2021 The Whitehorse Planning Scheme Whitehorse Electric Line Clearance Management Plan 2018-19	Whitehorse Open Space Strategy	Whitehorse Municipal Public Health and Wellbeing Plan 2017-2021			
Local	Neighbourhood Character Statements The Whitehorse Urban Realm Vision Whitehorse Landscape Guidelines The Whitehorse Tree Study	Whitehorse Bushland Reserves Fire Management Strategy 2010 Whitehorse Urban Forest Policy and Tree Management Plan	The Whitehorse Sustainability Strategy and Action Plan 2016-2022		Whitehorse Urban Biodiversity Strategy	Whitehorse Reconciliation Action Plan

Appendix 2: Hot spots in Whitehorse

Data and mapping produced by the Department of Environment, Land, Water and Planning (DELWP) indicates that on average, Melbourne's urban areas are over 8°C hotter than non-urban areas (DELWP 2019a). This map identifies areas that are particularly hot, 10 degrees or higher known as hot spots. For more detail visit <http://mapshare.maps.vic.gov.au/coolinggreening/>



Appendix 3: Heat Vulnerability Index

The heat vulnerability index (HVI) indicates how vulnerable specific populations are to extreme heat events. The HVI consists of three indicators: heat exposure, sensitivity to heat, and adaptive capability of the population within that area. Vulnerability ratings are determined by the sum of the aggregated indicators and are scaled from 1 to 5 (1 = low vulnerability, 5 = high vulnerability). The map below has been adapted from the Cooling and Greening Melbourne Interactive Map showing the distribution of HVI across Whitehorse as recorded in 2018 (DELWP 2019a).

