



Naturally Cooler Towns  
In the Goulburn Murray Region  
Summary Report  
February 2022

## Contents

Acknowledgment of Country .....	3
Project Scope .....	4
Project Methodology .....	5
Benefits of Regional Urban Forests .....	6
Integrating trees to deliver on local priorities .....	7
Cost benefit analysis of urban trees .....	8
Survey Results .....	9
Interview Results .....	15
Regional Opportunities .....	18
Local Case Studies .....	22
Tree Protection .....	22
Compliance .....	22
Proactive maintenance program .....	22
Strong Strategy, budgets and resources .....	22
Breaking down the silos .....	22
Tree Avenue Replacement programs .....	23
Collecting Data with no budget .....	23
Community Education/Engagement.....	23
Species List.....	24
Tree Selection Guidelines.....	24
Best Practice Tools and Guidelines.....	25
General Guides.....	25
Valuing Urban Trees.....	25
Subdivisions and Development.....	27
Design Guidelines.....	28
Regional Information and Groups.....	29
Appendix A: Framework of Best Practice Urban Forest Management.....	30
Appendix B Species List.....	33
Appendix C Tree Management Guidelines.....	34
References .....	35

### Disclaimer

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## Acknowledgment of Country

The Goulburn Murray Climate Alliance acknowledges the Traditional Owners of land including the Taungurung, Yorta Yorta and Wurundjeri nations and strongly respects the rich culture and intrinsic connection Traditional Owners have to these lands.

The GMCA pays respects to Elders, past, present and emerging and recognises the primacy of their obligations, responsibilities, and rights to care for their Country.

## Project Scope

Climate change is and will continue to be one of northern Victoria's greatest challenges, particularly for local governments in ensuring the ongoing liveability and health of the region's local communities.

The Goulburn Murray Climate Alliance (GMCA) is a network of 16 members as follows:

- Alpine Shire
- Benalla Rural City
- Campaspe Shire
- Indigo Shire
- Mansfield Shire
- Mitchell Shire
- Moira Shire
- Murrindindi Shire
- Greater Shepparton
- Strathbogie Shire
- Towong Shire
- Rural City of Wangaratta
- City of Wodonga
- North East Catchment Management Authority
- Goulburn Broken Catchment Management Authority
- Victorian Government Department of Environment, Land, Water and Planning

The GMCA helps to build capacity for local communities to actively respond to climate change in order to help build a positive future. In particular, the Alliance acknowledges the key role that urban forests and green infrastructure play in helping its communities adapt to climate change while improving health and wellbeing and biodiversity outcomes.

The GMCA is a part of a network of climate/greenhouse alliances across Victoria, who are also working with their members and communities to build resilience towards climate change, and in particular, focus on the capacity of urban forests to mitigate and adapt to the impacts.

As a result, GMCA instigated the Naturally Cooler Towns project to specifically identify the current gaps and opportunities of the regions' urban forest programs. ***Our urban forests are essentially all of the trees and vegetation in our urban centres such as our towns and cities such as street and park trees, those in backyards, or in commercial areas and along waterways.*** The project focused on the management of Council owned street and park trees as well as the regulation of privately owned trees, and aimed to meet the following outcomes:

- Understand the localised status, issues and opportunities facing the GMCA members regarding urban tree/urban forest management
- Showcase examples of best practice occurring in the region
- Develop an evidence-based, climate-adaptive tree species selection list to help guide urban tree planting programs within the region
- Provide access to industry tools, guidelines and information
- Share the results of the project in a regional forum that also provides opportunities for networking and peer to peer learning
- Encourage the establishment of a Goulburn Murray region Tree Managers advisory/work group or committee to aid in better information sharing, support and working collaboratively together to meet some of the common regional gaps.

## Project Methodology

This report has been informed by the following stages of work:

### **1. Assessing the status of GMCA's regional urban tree/urban forest management programs**

A survey was sent to each of the 13 member Councils with detailed questions relating to the perceived status of their tree management programs. Topics covered included governance (existence of policy, strategy, plans, asset protection etc), organisational support and understanding (from both officer and senior leadership levels), budgets and resources and community support and awareness. The questions were designed to informally benchmark each Council against a best practice framework to determine at a high level what the main gaps are. All 13 Councils completed the survey.

### **2. Individual Council video interviews**

Online Zoom interviews were conducted with all 13 Councils, as well as with the 2 CMA's and DELWP. These interviews aimed to clarify information provided in the surveys and seek more detail regarding specific answers. These interviews aimed to identify the key issues and opportunities facing each Council so as to understand what their next steps might be in filling the gaps towards a 'best-practice' tree management program.

### **3. Development of a regional climate-adapted urban tree species planting list**

Tree Logic, part of the consulting team, developed a climate adapted list of suitable urban tree species for planting within the GMCA region based on research and evidence. This list is not exhaustive and aims to guide and inform urban tree species selection for each LGA. This was informed by individual Council lists that had been provided prior to the interviews. Species were chosen based on 10 selection criteria:

1. Drought tolerance
2. Heat tolerance
3. Availability
4. Longevity
5. Ability to form a canopy (generally taller than 6 metres)
6. Low flammability, including fibrous or ribbony bark
7. Weediness (self-seeding)
8. Pathogen and pest susceptibility and manageability
9. Potential as allergen
10. Maintenance required and ability to be pruned
11. Tree litter (particularly fruit)
12. General urban tolerances, particularly soil conditions and appropriate space

In totality, the criteria support tree selections that will maximise long-term benefit for local ecosystems and communities, while balancing cost to council.

### **4. Peer to peer learning and knowledge sharing**

A regional online forum was held with representatives from all participating members as well as local service and utility service providers e.g. nursery owners, Ausgrid staff, and the Euroa Arboretum. The forum provided the opportunity to showcase the results of the project analysis and provide an opportunity for peer to peer sharing and learning. Another outcome from the forum was the establishment of a regional arborist/tree managers advisory group or committee that will seek to collaborate with members to solve some of the regional issues identified as part of this report.

## Benefits of Regional Urban Forests

### **ENVIRONMENTAL BENEFITS**

Urban forests:

- Provide cooling through shade and evapotranspiration. Street trees can reduce daytime surface temperatures by between 5 - 20°C (Mullaney, Lucke & Trueman, 2015)
- Improve air quality by capturing particulate matter and other air pollutants with large trees absorbing 60-70 times more pollution compared with small trees (McPherson, Nowak & Rowntree, 1994; Mullaney et al., 2015)
- Reduce volume of stormwater and pollution in stormwater run-off through root uptake and canopy interception (Livesley, McPherson & Calfapietra, 2016; Mullaney et al., 2015)
- Sequestering carbon (Mullaney et al., 2015)
- Provide wildlife habitat and corridors connecting biodiversity locations (Mullaney et al., 2015)

### **ECONOMIC BENEFITS**

Urban forests:

- Increase retail activity with studies showing street trees can increase business income by 20%, with consumers willing to spend more time, and up to 9% more on an item, in a treed retail area (Mullaney et al., 2015; Wolf, 2005)
- Well maintained street trees increase house prices (Mullaney et al., 2015; Plant, Rambaldi & Sipe, 2017)
- Reduce energy costs through reducing the need for heating and cooling via strategic shading and shelter provision. A 10% increase in deciduous tree cover can reduce energy costs by up to 5-10% (McPherson et al., 1994). Well-placed trees can reduce air-conditioning costs by 56% (US Forest Service, nd)
- Well maintained street and park trees improve the overall amenity and character of a town, thereby strengthening tourism outcomes

### **SOCIAL BENEFITS**

Urban forests:

- Improve health and wellbeing by providing attractive urban landscapes, encouraging pedestrian, and cycling activity, increasing community interaction, and reducing stress (van Dillen et al., 2012).
- Improve human thermal comfort on the hottest days through shade, lowering air and surface temperatures and intercepting UV radiation (Langenheim et al., 2020).
- Reduce traffic noise and air particulates such as dust (Mullaney et al., 2015).
- A number of studies have shown that urban areas with more street trees have lower crime rates and increased public safety (Mullaney et al., 2015)
- Provide natural screening and/or boundaries where privacy is needed

## Integrating trees to deliver on local priorities

Through their benefits, urban trees directly contribute towards a range of existing Local Government, CMA and State Government strategic priorities such as climate change adaptation, environmental sustainability, integrated urban water management, liveability and urban design, open space management, biodiversity conservation and management, community health and wellbeing, active transport and best practice asset management (Bush, 2017, Bush 2020, Parris et al 2020). Because of this, trees are worthy assets and should be treated as such in the planning and enhancement of our towns and cities. Integrating trees in the building and maintenance of streets, roads, footpaths and drainage as well as in the development of housing, commercial or industrial buildings, brings multiple benefits and good outcomes to communities.

Contrary to traditional asset management thinking, trees and hard assets do not need to be mutually exclusive. Inherited legacies of poor past decision making such as planting the wrong trees in the wrong locations and conditioning whole scale tree removal to make way for new “grey” infrastructure has meant too often that urban trees are an afterthought or treated as a liability to be managed out. However, through the advent of leading research, the development of best practice urban design, integrated asset management approaches and learning from leading LGA’s seeking to innovate and maximise the benefits of placemaking, we now know that integrating trees into the urban form can be done well.

There are two key elements of tree management that should showcase good integrated asset management:

### **Tree Protection**

Ensuring that trees are protected during any sort of construction, whether it be civil renewal, capital works or development is the responsibility of everyone, not just the arborist. Integrating tree protection into the planning of any works at the beginning of the planning phase ensures that we can retain the existing benefits of trees without having to start again. The GMCA region is home to many large indigenous and exotic trees. To replace these to the size they are, would take hundreds of years. Simple effective project planning that prioritises not only the outcomes desired of the project but designs the project around the protection of existing trees can have far reaching and long-term benefits.

### **Tree Planting**

It is recognised that in some instances not all trees can be protected. Again, this comes down to changing urban environments but also poor decision making in the past e.g. poor locations of infrastructure near to trees or poorly selected tree species. What is more important, however, is to articulate the responsibility of a project to mitigate the impact of the tree loss. Or if there is no loss, how the project can maximise the environmental, social and economic benefits by integrating tree planting into the project.

Local Government is increasingly needing to streamline budgets and resources across their service delivery. Every resident in the GMCA region has the right to access shade and cool streets during our increasingly hot summers. The most effective way of ensuring this across our townships is to integrate the urban forest into the way we plan for and manage our urban areas.

## Cost benefit analysis of urban trees

Urban trees are long-lived assets that provide benefits at multiple scales i.e. local and regional, so a full life cycle approach to costing and managing them well is prudent economic. Like houses, the costs and benefits of urban trees may not be evenly distributed across their full life span, and actually likely to appreciate over time. As trees mature and reach their full canopy size, both environment and community benefits exponentially increase. By applying a full life cycle cost i.e. the upfront cost of planting and establishing, the ongoing maintenance and pruning costs and then the costs associated with managing older, large trees, their decline and eventual removal, we can accurately compare these against a calculated dollar benefits to determine the overall cost benefit ratio.

While calculating the costs over a tree's life span can be a relatively simple exercise, calculating the benefits are not as straight forward. Benefits can include avoided costs as well as direct benefits. While underpinned by substantial research demonstrating their delivery, some of these benefits may themselves be difficult to attribute a dollar value to, including for example social and cultural benefits of trees in urban landscapes. In addition, avoided costs may include the benefits of avoided risks through climate adaptation, such as mitigating extreme heat and flooding; avoided costs associated with healthier people and communities; avoided costs associated with energy savings during heatwaves and the avoided costs associated with the switch to active transport such as walking and cycling in shaded streetscapes (VISES 2015).

*“Developing effective (urban) forestry strategies and policies involves an array of difficult choices. Some choices result in inefficient resource use because many essential benefits and services of street trees, such as aesthetic values, watershed protection, conservation, biological diversity, and climate regulation are not priced. Markets with corresponding prices just do not exist for many important street tree services and benefits” (Killicoat et al 2002).*

Likewise identifying who benefits from the establishment and maintenance of the urban forest can make the cost benefit ratio somewhat unclear. Local Governments pay for the trees and their ongoing maintenance but are not returned a dollar amount. Rather the benefits flow through to the local community and the environment.

Despite the complexities of accurately valuing urban tree benefits, there is a growing body of research which identifies that urban trees generally provide significantly more benefits compared to the costs of tree planting, establishment and ongoing maintenance of the urban forest (see selected references, highlighting a range of recent research papers (2011-2021) from Europe and UK, US, Scandinavia, Asia, and Oceania). For example, in a study of 5 US cities, McPherson et al. (2005) found that **“for every dollar invested in management, benefits returned annually ranged from \$1.37 to \$3.09” using the I-Tree Eco tool. A similar study in New York found that trees returned \$5.60 in benefits for every dollar invested.**

*“Trees provide economic and ecological services benefits to society. They are assets which warrant the expenditure of resources such as labour, energy, and water. Such expenditure is not wasted as trees and urban landscapes provide more economically and ecologically than they use. In any comprehensive and fair calculation urban trees and landscapes are worth more than they cost” (Moore, 2009).*

## Survey Results

All 13 of the GMCA Councils completed the online survey.

The survey asked a number of questions relating to the status of each Council’s tree management programs. The main aim of the survey was to determine how each Council compared to a best practice urban tree management framework (included in Appendix A).

The survey questions and their answers by Council are showcased below followed by a discussion of the answers.

### Section 1 Governance - Strategy

KEY: ● Yes ● Partially ● No ● In development	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindindi	Shepparton	Strathbogie	Towong	Wangaratta	Wodonga
We have a council endorsed Urban Forest or Tree Strategy/Plan outlining our vision for our trees/urban forest and how we will get there	●	●	●	●	●	●	●	●	●	●	●	●	●
We have set organisational targets for the urban forest/trees e.g. canopy cover, tree diversity, tree health. numbers of trees planted	●	●	●	●	●	●	●	●	●	●	●	●	●
We are actively monitoring and evaluating progress towards our targets and Strategy/Plan	●	●	●	●	●	●	●	●	●	●	●	●	●
Our Council Plan makes reference to our urban forest/urban tree Strategy/Plan/targets?	●	●	●	●	●	●	●	●	●	●	●	●	●

### Discussion

- Only four of the thirteen Councils have an endorsed tree management document (Plan/Strategy) that guides every day decision making. Promisingly though, another seven Councils either have a partial plan/strategy or are in the process of developing something.
- Five Councils have set urban forest/urban tree targets either within their tree documentation or within Council Plan or an Environmental Sustainability Strategy. Others are hoping to look at setting targets as they progress their strategic documentation.

## Section 1 Governance - Policy and Organisational Support

KEY:													
 Yes													
 No													
 Rely on planning scheme or Local Law													
SCALE:													
Ineffective/disagree      Effective/agree	Alpine	Benalla	Campospe	Indigo	Mansfield	Mitchell	Moira	Murrindindi	Shepparton	Strathbogie	Towong	Wangaratta	Wodonga
We have a council endorsed Tree Management/Urban Forest policy													
How effectively is policy implemented and enforced?				-		-	-	-		-			
We have a council endorsed Tree Removal Policy													
How effective is policy in minimising tree removal on public land?					-	-							
We have an endorsed process to protect our public trees, both native and exotic													
The protections over our public trees, both native and exotic, are properly enforced and therefore protect trees in the public realm													
We have additional planning controls to protect trees in the private realm													
Our controls are properly enforced and therefore protect trees in the private realm													
There is sufficient broad organisational support for protecting and planting trees on public land													
There is sufficient broad organisational support for protecting and planting trees on private property													
There is sufficient senior leadership (Executive and Councillor) support for protecting and planting trees on public land													
There is sufficient senior leadership (Executive and Councillor) support for protecting and planting trees on private property													

### Discussion

- Eight Councils already have some level of a tree management policy, though only four of these believe it is being implemented effectively
- Half of the Councils believe that tree protection in the public realm is being done well, but only two believe that protection controls are effectively implemented over trees in the private realm.
- The majority believe that there is broad organisational and senior leadership support for tree management over public trees but much less support for protecting trees in the private realm.
- This shows that there is a clear understanding and pathway for robust street and park tree management in most LGA's, but far less support for any planning control changes or local laws that might seek to protect trees on private land.

## Section 2 Resources – Council programs

KEY:	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindindi	Shepparton	Strathbogie	Towong	Wangaratta	Wodonga
● Yes ● No ● Rely on planning scheme or Local Law  SCALE: Disagree ■ ■ ■ ■ ■ Agree													
Our capital works and asset renewal programs prioritise the protection and planting of trees	■	■	■	■	■	■	■	■	■	■	■	■	■
We have a dedicated annual tree planting program	■	■	■	■	■	■	■	■	■	■	■	■	■
We have a dedicated tree inspection and proactive maintenance program that minimises known risks	■	■	■	■	■	■	■	■	■	■	■	■	■
We have a dedicated tree renewal program i.e. when trees reach the end of their useful lives or are removed, they are replaced	■	■	■	■	■	■	■	■	■	■	■	■	■
We have a program that encourages the community to plant trees on their own properties	■	■	■	■	■	■	■	■	■	■	■	■	■

### Discussion

- Twelve of the thirteen Councils already have a dedicated tree planting program (although budgets differ significantly)  
10 Councils have a program that ensures trees in high-risk locations are inspected regularly and risks are minimised
- Eight Councils have some level of tree renewal program, whereby trees are replaced when removed
- The biggest gap for trees in Council programs are centred around capital and civil works who don't prioritise tree protection and planting. Another identified gap is in community participation programs whereby Council encourages tree planting on private property. The latter is likely to be a result of the very low organisational support for considering trees on private property.

## Resources – Budgets

SCALE: Disagree <span style="color:red">■</span> <span style="color:grey">■</span> <span style="color:green">■</span> <span style="color:green">■</span> Agree	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindin	Shepparto	Strathbogi	Towong	Wangarat	Wodonga
Our budgets allow us to plant more public trees each year than we remove	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>				
Our budgets allow us to adequately identify and manage risks with our public tree population	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>						
Our budgets allow us to explore innovative urban design solutions when needed e.g. water sensitive urban design, structural soils, whole streetscape renewals	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:grey">■</span>	<span style="color:green">■</span>
Our tree management budgets are utilised cost-effectively and efficiently	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:grey">■</span>	<span style="color:grey">■</span>	<span style="color:green">■</span>				

## Discussion

- The majority of budgets ensure that more trees are planted each year than removed (apart from three Councils) and that risks are adequately managed
- However very few Councils have funding that allows for innovation and best practice solutions with only 3 councils able to explore the utilisation of water sensitive urban design with tree planting.
- Nine Councils believe their existing budgets are utilised cost effectively and are therefore maximising what limited budgets they do have available.

## Resources – Available skills

SCALE: Disagree <span style="color:red">■</span> <span style="color:grey">■</span> <span style="color:green">■</span> <span style="color:green">■</span> Agree	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindin	Shepparto	Strathbogi	Towong	Wangarat	Wodonga
We have enough qualified arborists either in house or as contractors to run a proactive inspections program	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:grey">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>
We have a dedicated planning arborist who can influence statutory planning decisions	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>
We have a dedicated enforcement officer/s who ensures tree protection measures are enforced on development sites	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>
We have access to additional training to refresh and upskill existing staff	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:grey">■</span>	<span style="color:red">■</span>	<span style="color:grey">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:green">■</span>	<span style="color:red">■</span>	<span style="color:green">■</span>	<span style="color:grey">■</span>	<span style="color:green">■</span>

## Discussion

- Nine Councils do not have enough qualified arborists to run a proactive inspections program. This is exacerbated by a nationwide arborist shortage.
- Not one Council has a dedicated planning arborist who can support development application assessments completed by statutory planners. Instead, planning relies on existing arborists/staff where possible to provide reviews of development applications and landscape plans. This is a large gap in some Councils.
- Enforcement of tree protection and planning conditions is another significant gap amongst Councils.
- Most staff have access to additional training where needed.

## Resources – Tools and information

SCALE: Disagree <span style="color:red">■</span> <span style="color:grey">■</span> <span style="color:green">■</span> Agree	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindin	Shepparto	Strathbogi	Towong	Wangarat	Wodonga
We have developed tools and information to increase community awareness and knowledge about the urban forest/urban trees	■	■	■	■	■	■	■	■	■	■	■	■	■

## Discussion

- Only 3 Councils have developed information and guides to increase community awareness about urban trees
- Many Councils also identify that poor community knowledge and awareness of urban trees as a main barrier to their programs

## Resources- Data

SCALE: Disagree <span style="color:red">■</span> <span style="color:grey">■</span> <span style="color:green">■</span> Agree	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindin	Shepparto	Strathbogi	Towong	Wangarat	Wodonga
We have a complete and up to date urban tree inventory	■	■	■	■	■	■	■	■	■	■	■	■	■
Our urban tree inventory is included in Council's asset management system	■	■	■	■	■	■	■	■	■	■	■	■	■
We monitor and evaluate trends in our canopy cover	■	■	■	■	■	■	■	■	■	■	■	■	■
We record the number of customer requests received and actioned in relation to urban trees	■	■	■	■	■	■	■	■	■	■	■	■	■
We record the number of planning referrals that relate to trees or the urban forest and whether they resulted in tree removals/tree plantings	■	■	■	■	■	■	■	■	■	■	■	■	■

## Discussion

- All but three Councils maintain a street and/or park tree inventory. This is a significant strength amongst the Councils. However, it should be noted that they are all at various stages of completeness and currency. Also, many of these inventories are not included in Council's asset management system and so are not technically treated as assets.

## Section 4 Community support/sentiment

KEY: ● Yes ● No ● Somewhat ? Unknown	Alpine	Benalla	Campaspe	Indigo	Mansfield	Mitchell	Moira	Murrindind	Shepparto	Strathbogi	Towong	Wangaratt	Wodonga
Generally speaking, we feel that our community recognises the importance of our urban trees	●	●	●	●	●	●	●	●	●	●	●	●	●
The number of customer requests received for tree removal are greater than those received for tree planting	●	●	●	●	●	?	●	●	●	?	●	●	●
Vandalism to public trees is a problem in our LGA	●	●	●	●	●	●	●	●	●	●	?	●	●
We find that some community members or groups prevent us from actioning our work	●	●	●	●	●	●	●	●	●	●	?	●	●
Generally speaking, we feel that our community supports council action to protect and enhance trees on public urban land (e.g. streets, parks and council managed land)	●	●	●	●	●	●	●	●	●	●	●	●	●
Generally speaking, our community supports council action to protect and enhance trees on private land (e.g. planting incentives, rules/actions to protect private trees)	●	?	?	?	●	?	●	?	?	?	●	?	?

### Discussion:

- The survey responses to the first question should be read with care. Given we are relying on the opinions of only one, two or three staff members, (some of whom are regularly dealing with negative commentary from the community through customer requests) may not reflect the actual level of community support for trees. No Council had undertaken a formal survey process with the community specifically asking about their support for trees. However, all Councils thought community generally or somewhat recognises the importance of urban trees.
- Seven of the thirteen Councils believe that requests for tree removal are greater than those for planting.
- Despite this, eight Councils believe that generally speaking, the community is supportive of tree management on **public land**. Five Councils feel that their communities are not supportive.
- The majority of Councils do not know whether the community supports council action to protect trees on **private property**. Greater regulation over the private realm is not generally very palatable in a community that has not historically had regulation over private trees. Whilst the evidence suggests that private trees are a very important and large contributor to the urban forest - and therefore warrant protection - few rural and regional communities are likely to support more regulation without an engagement and education process that helps people understand the critical importance of the urban forest and their role.

## Interview Results

Individual interviews were held with Councils over Zoom and delved into the details behind the answers within the survey and particularly sought to identify particular issues and opportunities relevant to each organisation.

Individual Council reports and policy briefing papers have been provided to each Council.

This section provides a summary of the most common issues and opportunities faced by the region.

### Issues

#### **Trees still not seen as valuable assets**

This is one of the main gaps within the GMCA Councils from which many other issues stem. Without a strong organisational recognition that urban trees are an asset, there is no requirement to implement better practice urban tree management, it is simply up to the individual tree managers, if they have time. There is no organisational impetus for stronger tree protections or to provide adequate resources to proactively manage and improve urban trees if they are not allocated asset status. In some cases, officers still believed that organisationally (and outside of the tree management team), trees were more often than not, thought of as a liability to be managed. Many of the interviewed Councils identified the specific issue of capital and civil works teams not including the protection and replanting of trees within their project planning or budgets. Again, this is exacerbated by the fact that trees are not awarded the same asset status as roads, footpaths, draining and buildings. This has the added flow on effect of inhibiting community understanding and knowledge as there is no clear leadership from Council about the importance and value of urban trees.

This is further complicated by the significant tension between State Government priorities and policies such as bushfire risk management in declared and high bushfire risk areas (which allows the clearing of blocks), urban development and meeting the demand for housing, as well as a push for residential homes to put solar panels on roofs which all conflict directly with the priority for urban greening, liveability and health and wellbeing outcomes. A good example of this was mentioned by a few Councils whereby streets and roads in new subdivisions are not wide enough to support canopy tree planting. The drive to supply maximum housing lots to meet housing demand overrides the future liveability of these subdivisions.

#### **Tree Protection**

Overwhelmingly, despite some Councils having a tree protection policy/protocol in place, many Councils still feel that tree protection is not effective enough. As above, many raised the specific issue of capital and civil works teams not prioritising tree protection, and developers not protecting existing public trees in their project planning, leading to unnecessary tree removal. Often, this is a result of trees not being recognised as assets but also because of resourcing shortages, both in the planning and tree management departments. There is simply not enough time to audit and enforce tree protection requirements on new development or construction.

The majority of Councils also feel that the lack of tree protection over private trees, particularly large old river red gums to make way for new development, is far from adequate. This is further complicated by the fact that respondents both in the survey and the interview revealed that there is very little organisational interest or support for increasing regulations on private land to protect these trees, despite the issue being raised at officer level.

#### **Lack of Effective Compliance**

In line with the issue of tree protection, many Councils felt that the lack of a dedicated planning arborist or enforcement officer, made it difficult to properly audit planning conditions, construction works or illegal tree removals. Often, if tree protection requirements are placed over construction or development works, there is little ability to audit the tree protection and enforce any non-compliant

prosecutions. Added to this, some Councils have no financial penalty for non-compliance or for others it is minimal.

It is worth noting that some Councils, such as Wodonga and Moira, have recognised this issue and have employed dedicated compliance officers, primarily for subdivision handovers, and they are able to check compliance against any planning conditions and approved landscape plans. Others have ensured they have the ability to reject substandard trees as part of developer subdivision handovers.

### **Resourcing**

Another very common issue amongst almost all GMCA Councils is the shortage of adequate resourcing to run an effective tree management program. Many Councils have only one or two dedicated tree manager/s who are constantly juggling the demands of customer requests, risk assessments, and planning referrals, while also trying to run a tree planting program. This means that often, tasks such as proactive tree maintenance, formative pruning, tree renewals, and community engagement and education programs are left behind. It also places increasing time pressures on tree managers communicating with the capital and civil works engineers to improve outcomes for trees in construction projects.

This is further compounded by the major nationwide arborist shortage that have been acknowledged by the industry, which has meant it has been challenging to find suitably qualified arborists to employ. Many also raised the issue of plant and equipment shortages such as in house trucks, chippers and towers due to budget constraints. However, many Councils did point to the ability to contract work out to suitably qualified consultants or contractors when needed.

### **Reactive Maintenance**

Almost all Councils are currently maintaining their urban trees on a reactive basis only i.e. when customer requests are received or when storms bring trees and branches down. Shepparton is the only Council already running a proactive tree maintenance program. For the others, the biggest hurdle is the fact that tree management budgets only allow for reactive tree maintenance. The problem with reactive maintenance is that is not efficient and often creates a greater workload and is continual. There is never the ability to “catch up”. One Council indicated that they receive 1,600 customer requests per year. One officer must deal with this which is overly time consuming and a highly ineffective use of his qualified time. Proactive maintenance leads to a reduction in reactive works, and in the medium to long term reduces the amount of money needing to be spent on maintenance works. Every Council indicated that a proactive maintenance or cyclical pruning program is necessary and those who don't have one, expressed a strong desire to work towards proactive works. Two Councils, Wodonga and Mitchell, have completed the background work and received an increased budget to instigate their own proactive programs.

### **Community Awareness/Education**

The general community is perceived to still be a significant barrier to tree management activities, mostly due to low levels of understanding and interest. While some Council officers have raised the issue of poor tree protection, especially for older, larger trees in urban areas, community members instead see these trees as major liabilities. Issues of bushfire risk, limb drop, animal and leaf debris, and root conflicts all raise the risk profile of the community towards trees, and when coupled with a poor level of awareness about the importance and value of trees and best practice urban tree management, Council officers must contend with negative attitudes towards trees on a regular basis.

This is not helped by an inherited legacy of poor plantings or species selection in some locations which are causing issues e.g. inappropriate species under powerlines or tree roots impacting infrastructure. These further trigger negative attitudes amongst the community.

All Councils also acknowledge that due to resourcing issues, the level of community engagement, education and advocacy conducted by Councils around urban trees is not where it should be. All acknowledge that more engagement and education with the community is necessary.

### **Tree establishment**

While almost all of the GMCA Councils have a dedicated tree planting program, not all implement a tree establishment program of works e.g. 2-3 years of watering and/or formative pruning. Alternatively, some feel theirs are inadequate i.e. too short or only water in trees and don't conduct formative pruning. Others have raised the issue of developers not properly establishing their own trees before handover, leading to poor specimens being handed over to Council. Formative pruning is a form of proactive maintenance that all Councils recognise as a very important component of a tree management program and again, many have a strong desire to incorporate the practice into their program.

### **Inherited legacy of past plantings**

Almost every Council mentioned the inherited legacy of poor past decision making around trees, whether it be poor species choice, poor tree stock that was planted, incorrect locations etc which are now resulting in maintenance issues or in conflicts with infrastructure such as drainage, powerlines or roads. Many raised the need for a tree renewal program to seek to replace these inappropriate trees but resourcing and budget constraints make this almost impossible in many Councils. Others mentioned the possibility of partnering with SP Ausnet to look at co-funding options of tree renewal under powerlines.

### **Electrical Line Clearance**

Almost all Councils acknowledged that electrical line clearance done by Utility contractors is leading to very poor outcomes for trees. Wodonga, which has a very young tree population overall compared to some others, has taken the ELC pruning in-house and away from utility contractors to create better and longer lasting outcomes for their trees.

### **Developments**

There were a range of issues identified by Councils in relation to development, particularly subdivisions, and trees. Common issues include:

- Developers overplanting with one species e.g. Pyrus (Ornamental Pears) which will be a significant management issue in years to come
- The Landscape Plan Guidelines 2017, which are already developed still aren't always achieving the best outcomes
- Older development approvals which are only being constructed now had no condition to protect trees so there is nothing Council can do
- Streets and roads in some subdivisions are not wide enough to plant trees
- Developers are not properly maintaining or watering trees before handover
- Planning schemes are not effective enough to protect trees or mandate the planting of new ones on development sites
- There is significant pressure from the State Government to approve DAs in short timeframes which means often there is not enough time to seek input and write appropriate conditions from Council's tree managers
- Many Councils are not adequately resourced to properly assess every DA, this includes their inability to trial and report against the new Sustainable Subdivisions Framework of which 9 of the GMCA Councils signed onto as a trial, yet not one has the capacity to undertake the trial

## Regional Opportunities

Council specific recommendations have been included within the individual Council reports. The following are opportunities recognised at a regional level that would benefit from collaboration, information sharing, and possibly the establishment of a regional tree managers advisory/working group to work together on.

### 1. Consistent Tree Protection and Removal Policy

For those who don't have a tree protection or removal policy, there is an opportunity to develop a standard policy document that can be easily adapted and endorsed by individual Councils without each having to spend time creating their own. This could also include a tree valuation methodology and bond protocol for use by interested Councils as well as enforcement protocols for non-compliance.

### 2. Shared compliance/enforcement officer

There is significant opportunity for some Councils to partner together to share the cost of a shared compliance resource to check subdivisions landscape plans and tree plantings, conditions relating to trees on development approvals, tree protection zones etc.

### 3. Tree Stock procurement

While not an identified issue per se, many Councils were keen to work with local nursery suppliers to secure and potentially contract grow good quality tree stock that meets AS 2303 – Australian Standard for Tree Stock for Landscape Use stock of species. Many discussed the opportunity of partnering with other Councils to contract grow stock ready for planting, particularly looking at species that are climate adapted to the region, while transitioning away from over used species such as *Pyrus calleryana*. Given the presence of some high-quality wholesale tree nurseries in the region, there is a great opportunity to work together to grow and plant the next generation of urban forests across northeast Victoria.

### 4. Transitioning towards proactive maintenance programs

Given the desire to attain proactive maintenance status was so strong amongst respondents there is a clear opportunity to learn from Shepparton, Wodonga, Mitchell and others about building a business case for a cyclical and/or formative pruning program. The ongoing benefits of proactive maintenance, particularly formative and cyclical pruning and, are significant both from a tree health perspective but also from a cost point of view. It can also dramatically decrease the number of customer requests received. There may even be opportunities to share resources amongst some of the smaller councils. A regional tree managers group could provide guidance and support to encourage all Councils within the region to work towards some form of formative and cyclical pruning program.

### 5. Consistent regional messaging and education

A couple of Councils, as well as the CMAs were interested in developing some consistent regional messaging around the benefits of trees and the importance of looking after them. Ideally, this is to address the gap in community knowledge and understanding but is also an opportunity to bring the decision makers, CEO's and Executives along for the journey too/

Strong consistent messaging could also help to celebrate the diversity of the region's urban trees and the contribution they make to individual townships. There is an opportunity for the GMCA to lead this type of advocacy/awareness campaign.

This messaging should be simple enough to be adopted by Councils, communities, and leading developers. It could be utilised at community events, in news items that involve urban trees, within internal tree discussions and across social media. To build engagement

with people who may not consider themselves tree advocates, any campaign should consider how the benefits of trees can be inserted into other topics. As highlighted earlier in this report, trees have health and wellbeing, economic and range of other benefits that can provide a hook to talk about trees well beyond the realm of environment, ecology, and the urban forest.

The messages should draw a line between local community priorities and the benefits trees deliver. To develop a communications campaign some analysis of existing community priority data (e.g. drawing on the community vision set for each Council) could be cross referenced with the benefits of trees to form the backbone of the campaign. Traditional Custodians could also be consulted to ensure the cultural value is considered as part of the campaign.

While we should not jump to solutions without having done this work, suggestions for future consideration include:

- Continuing to use Naturally Cooler Towns as a catch phrase. This language is positive and playful, and could draw on the duality of the term 'cooler' (meaning thermally cooler as well as the informal meanings of fashionable or excellent)
- A simple "Trees are..." campaign could also provide a flexible framework where specific examples of services trees are providing in each township could be rolled out across the region. The phrase could be used to give small personal examples "Trees are giving me shade while I watch my daughter's soccer game" and larger town or place-based examples "trees are keen <insert town name> cooler this summer". An approach like this has the ability for community members to contribute their favourite tree/tree service, encouraging people to notice when they are receiving a benefit from a specific tree or the broader urban forest

An example of messaging approach can be found in the [City of Seattle Urban Forestry Communication Toolkit](#).

## **6. Tree, tree canopy and urban heat data**

Some, but not all Councils, showed interest in pursuing the procurement of tree canopy/vegetation cover mapping and/or thermal heat mapping. Those who do not have a tree inventory are keen to develop one to help inform works programs. In 2021, DELWP delivered a tree density dataset that spatially locates urban trees as a dot point. This data is primarily for Metro Melbourne but also covers some regional towns including Wangaratta and Shepparton. Wodonga, Campaspe and Shepparton have already measured baseline tree canopy cover for their main townships using either LiDAR or I-Tree Canopy (a point sampling method using aerial imagery) to support existing strategic work.

There is merit in a regional advocacy approach with the State Government to provide much higher resolution urban tree canopy cover for all regional urban areas as they have done for Metro Melbourne, especially with the advent of using Artificial Intelligence to derive vegetation cover from aerial imagery. However, given the significant cost required, it is not recommended that individual Councils invest in these sorts of datasets without a strong understanding of the need for the data.

## **7. Trees under powerlines**

Given the widespread issue of poor pruning techniques of trees under powerlines, there is again an opportunity to collaborate as a region to negotiate better outcomes with Ausnet. For some Councils this could be bringing the electrical line clearance work in-house or seeking to renew some trees under powerlines with appropriate species. A consistent regional position and response to electrical line clearing could also have community education and awareness benefits too.



## **8. Leading tree renewal**

Some, but not all Councils are facing significant levels of tree renewal as grand avenues of trees planted decades ago are reaching their end of life. In Australia, we are yet to trial large scale avenue tree renewal and land on an “industry best practice” method of doing so. There are many options to consider such as whole scale removal and replacement to ensure consistency of avenue plantings or gradual removal and replacement so as to minimise the amenity impacts or even planting a secondary avenue in line with the original to completely mitigate the impact. These sorts of projects are very sensitive with the community and so also require nuanced community engagement processes.

Mansfield, Indigo and Alpine in particular, are facing the task of needing to develop strategies to renew these avenues as they start to senesce. These Councils have already started their strategic planning for these types of tree projects and so are well placed to become nationwide leaders in this space. Processes, decisions, outcomes etc should all be documented so to be showcased during peer-to-peer tree manager learnings and information sharing.

## **9. Shared support to trial and adopt the Sustainable Subdivisions Framework**

The Sustainable Subdivisions Framework (see Best Practice Tools and Guidelines on p27) is being trialled in a number of Councils across Victoria, to essentially improve outcomes in subdivisions across a range of criteria, one being ecology and another streets and public realm. This voluntary framework is on offer for uptake by developers, however Council’s need to report back to CASBE on the successful (or not) uptake. 9 of the GMCA Councils signed up to take part in the trial, however due to resourcing shortages, the ability for Councils to document statistics and report back has been very limited.

All agree that, with the right level of resourcing, the Framework could have significant value and assist statutory planners in their assessments. As a result, there is a sizeable opportunity to seek a shared resource who could work across a number of Councils to provide expert feedback on applications, data collection and reporting. There is also an opportunity to educate statutory planners about how to use the framework so they can encourage developers to take it up.

It will be very important for regional Councils to provide input and feedback into the Framework so that it remains relevant and useful beyond metropolitan areas.

## Local Case Studies

All the Councils interviewed are in different stages of their tree management journey and all are achieving various small and big wins despite resource and budget constraints. Below is a showcase of high quality, local urban forest work that we can all start to learn.

### Tree Protection

**Moira Shire** have identified Significant Trees within their landscapes and have included these in a Significant Landscape Overlay to protect them. Council has also ensured that there is adequate compliance in place to prosecute illegal damage or removal.

**Mitchell Shire** have also identified their significant trees and are currently looking at the most appropriate protection mechanism. They have also recently adopted a tree amenity valuation formula which they have used to inform bonds that are placed over significant trees in development sites. It has been used twice with great success and the developers have protected these trees.

### Compliance

**Wodonga's** Parks and Gardens team have now employed two dedicated compliance officers who assess subdivision works against approvals and conditions, including tree planting and landscape plans. They are able to fine developers for non-compliance, which essentially self-funds the officers' roles while leading to much better outcomes for trees in subdivisions.

**Campaspe** has started to mandate that developers stop planting Pyrus trees in Echuca subdivisions due to having already been overplanted.

### Proactive maintenance program

**Wodonga** pitched for a budget increase of \$200k to develop a proactive juvenile tree pruning program. Existing budgets were streamlined, and existing plant and equipment was consolidated to make way for a streamlined proactive budget allocated for another works crew and new truck and chipper. It was determined that more work could be done in-house than if contracted out, with plant and equipment utilised to full efficiency. The program will begin in 2022 with the main aims of reducing the number of customer requests received each year and improving the overall health and structure of existing and new tree assets.

**Mitchell Shire** is also instigating a new proactive maintenance program in 2022 and the **Alpine Shire** report that they run an effective proactive maintenance program based on good tree data.

### Strong Strategy, budgets and resources

**Greater Shepparton** are the only Council to have a fully endorsed Urban Forest Strategy inclusive of tree canopy cover targets and supported by a raft of good data and evidence. The Strategy directly informs their operational programs to ensure that day-to-day they are working towards bigger goals and outcomes. The Strategy has been a powerful reference point for decision making and harnessing Councillor support, particularly in ensuring budgets and resources are adequate to effectively manage the tree asset using best practice.

### Breaking down the silos

**Murrindindi's** one tree manager has recognised the vital need to communicate more thoroughly with both engineers and the statutory planners to get better outcomes for trees in subdivisions/developments and in capital/civil works. As a result, the one dedicated resource spends one day a week sitting with the engineers and then with planners to facilitate positive decisions regarding trees but also to build capacity and knowledge within these teams.

**Towong's** Streetscapes Projects in townships program has included trees in the planning, protection and planting of new trees and they are even budgeted for. This is one of the most effective mechanisms for tree planting in an LGA which has very few resources and budget.

**Benalla's** tree manager also works well with capital and civil teams to negotiate better outcomes for trees, especially tree replacement and tree renewal opportunities.

### Tree Avenue Replacement programs

**Alpine Shire** has developed a tree avenue replacement program to deal with ageing avenues. This program will utilise evidence, climate change considerations such as species, drought and heat tolerance) and will involve significant community consultation. Tree renewal outside of the major avenues will be picked up in tree planting plans for each township which will be developed over time.

In anticipation of ageing Elms in the main thoroughfare of **Mansfield**, Council has interspersed Pin Oaks in between poplars into entrance of Mansfield and in the median in main street. The idea is to get them established as semi mature trees before any of the Elms need to be removed and replaced to ensure a level of amenity is retained in the avenue.

**Benalla** has also developed a tree renewal program targeting ageing tree avenues with low ULE's that are dying or decaying.

### Collecting Data with no budget

**Strathbogie Shire** has painstakingly collected data on 15,000 street trees over a number of years when the one tree manager has had time to do so. The ULE data from this inventory has directly informed maintenance works on trees with a ULE less than 10 years (ageing or dying trees). As trees are removed, the dataset is updated to then reflect the site as a vacant site.

### Community Education/Engagement

**Wangaratta** has developed three tree walks around town to showcase various significant trees and important species that contribute to the townships character. The Wangaratta Landcare and Sustainability Inc group are very active and passionate within the community and are very important champions for Council's tree planting program.

**Greater Shepparton** have developed [an informative and engaging video for their website](#) to educate the community about their urban forest.

Wodonga, Wangaratta and Benalla amongst others, also indicated that urban Landcare groups are proving a strong source of community engagement and championing for urban trees.

<https://wodongalandcare.org.au/>

<https://www.facebook.com/Wangaratta-Urban-Landcare-Group-124121397769881/>

## Species List

Tree Logic has developed an extensive list of species suitable for planting across the region. The list includes a range of criteria for each species that allows for a quick and effective search of correct species for particular locations.

This list is not exhaustive but has been developed to support and guide urban tree species selection for Councils and developers in the Goulburn Murray region

The list is provided in Appendix B, however, is designed to also be a standalone document for use as Council's see fit.

50 species fact sheets have also been produced to be used alongside the species selection for informing community, staff and senior leadership.

## Tree Selection Guidelines

An accompanying document which outlines considerations for street planting includes topics such as:

- Design principals
- Mitigating the urban heat island effect
- Climate change and the effects on plant growth
- Native versus exotic
- Fire retardant trees
- Tree size matters
- Diversity
- Providing adequate space for trees, including soil volumes
- Passive irrigation of street trees
- Planting in nature strips
- After care maintenance

This document is designed to inform Council's existing tree management guidelines, technical specifications or processes. This is included in Appendix C.

## Best Practice Tools and Guidelines

A range of tools and guidelines are freely available for use by Councils. Example streetscape designs and solutions that support healthy, viable urban forests in the GMCA region at various price points to suit the range of resourcing within member organisations

### General Guides

#### **Greener Spaces Better Places**

This one stop shop website provides a raft of information and guides for urban greening practitioners in Australia.

<https://www.greenspacesbetterplaces.com.au/guides/>

#### **Urban Greeners' Resource Hub**

Greener Spaces Better Places collaborated with Living Melbourne and a range of industry experts to develop a consolidated list of available tools and guidelines for practitioners. This list is adaptive and will be updated with new tools and guides. It provides examples of leading works such as City of Melbourne's Urban Forest Strategy and the Cool Streets Program, as well as resources from other leading organisations such as CAV, Council Arborists of Victoria, Greening the West and CASBE, the Council Alliance for a Sustainable Built Environment.

<https://www.greenspacesbetterplaces.com.au/resources-hub/>

#### **Policy Success Factors**

Highlights the factors across 4 dimensions – strategic, tactical, operational and reflexive that contribute to LGA urban greening policy success

<https://www.sciencedirect.com/science/article/pii/S2210422420300253?via%3Dihub>

### Valuing Urban Trees

#### **I tree Eco**

I tree Eco, a tool developed by the US Forestry Service, has been adapted for use in Australia. Just by plugging in at a minimum, a tree's species and its diameter at breast height (dbh), iTree Eco will model the tree's ability to sequester carbon, absorb air pollution, intercept stormwater and place a dollar value on both the tree's structure and environmental benefits. The tool can also calculate the value of a tree in reducing heating and cooling needs of surrounding buildings.

<https://www.itreetools.org/tools/i-tree-eco>

#### **TreeNet – Revised Burnley Method of Tree Valuation**

<https://treenet.org/resources/urban-tree-valuation/>

The most commonly used methodology for measuring the amenity value of urban trees, though others are available. This value is then used to provide an indication of the tree's dollar worth in the event that there is a request to remove or potentially impact the tree due to construction.

Commonly, this value is used in setting an asset bond over the tree, to ensure its protection during construction works.

#### **Tree Costing Tool**

Developed with funding from Hort Innovation Australia, this tool aims to help practitioners understand the true life cycle cost of urban tree projects.

<https://www.horticulture.com.au/growers/help-your-business-grow/research-reports-publications-fact-sheets-and-more/tree-costing-tool-and-instruction-manual/>

## Subdivisions and Development

### **Landscape Plan Guide 2017 for Development Proposals (Campaspe, Shepparton and Moira)**

This Plan establishes common requirements for sustainable and appropriate landscape developments across the three municipalities. It assists private developers and permit applicants in the preparation of informed and sustainable landscape plans that meet the expectations and standards of the councils and the GBCMA when landscape plans are required. It also contains a species list for use by developers across the three Shires.

[https://greater-shepparton.com.au/assets/files/documents/planning/Landscape\\_Plan\\_Guide\\_for\\_Council\\_Adoption\\_-\\_Web.pdf](https://greater-shepparton.com.au/assets/files/documents/planning/Landscape_Plan_Guide_for_Council_Adoption_-_Web.pdf)

### **Sustainable Subdivisions Framework (CASBE)**

The SSF focuses on improving the long-term community benefits delivered by a subdivision through the planning process. The Framework is currently being trialled across Victoria by a number of councils, initially on residential subdivisions but is also able to be applied to commercial and industrial subdivisions. In partnership with Victorian Planning Authority and 16 partner councils. GMCA Councils who are participating in the trial:

- Alpine
- Greater Shepparton
- Indigo
- Mitchell Shire
- Murrindindi
- Strathbogie Shire
- Towong
- Wangaratta
- Wodonga

<https://www.casbe.org.au/what-we-do/sustainable-subdivisions/>

## Design Guidelines

### **Designing for a Cool City (CRC for Water Sensitive Cities)**

Design standards for installing passive stormwater infiltration in conjunction with street trees.

[https://watersensitivecities.org.au/wp-content/uploads/2020/04/200427\\_V13\\_CRC-DesigningForACoolCity.pdf](https://watersensitivecities.org.au/wp-content/uploads/2020/04/200427_V13_CRC-DesigningForACoolCity.pdf)

### **Infill Typologies Catalogue (CRC for Water Sensitive Cities)**

Design typologies that showcase how better infill residential development designs can improve liveability outcomes.

[https://watersensitivecities.org.au/wp-content/uploads/2019/06/201208\\_REV4\\_Typologies-Catalogue.pdf](https://watersensitivecities.org.au/wp-content/uploads/2019/06/201208_REV4_Typologies-Catalogue.pdf)

### **Improving the ecological function of urban waterways (CRC for Water Sensitive Cities)**

Design and construction guidelines for improving overall health and function of urban waterways.

[https://watersensitivecities.org.au/wp-content/uploads/2018/11/Improving-ecological-function-of-urban-waterways\\_compressed.pdf](https://watersensitivecities.org.au/wp-content/uploads/2018/11/Improving-ecological-function-of-urban-waterways_compressed.pdf)

### **Trees for a Cool City (CRC for Water Sensitive Cities)**

Principles and guidelines for optimising tree placement and maintenance to reduce urban heat and improve thermal comfort.

[https://watersensitivecities.org.au/wp-content/uploads/2017/11/Trees-for-a-cool-city\\_Guidelines-for-optimised-tree-placement.pdf](https://watersensitivecities.org.au/wp-content/uploads/2017/11/Trees-for-a-cool-city_Guidelines-for-optimised-tree-placement.pdf)

### **Planning a Blue Green City (DELWP, 2017)**

Assists cities and towns in Victoria in planning for increased presence and effectiveness of green-blue infrastructure in their urban areas. It is designed to assist councils and their partners in:

- Developing a robust and locally tailored evidence base for green-blue infrastructure opportunities
- Identifying green-blue infrastructure opportunities at all scales
- Reviewing opportunities for greatest benefit and value
- Allocating priority projects and key actions
- Identifying delivery pathways and funding mechanisms

[https://www.water.vic.gov.au/\\_data/assets/pdf\\_file/0029/89606/Green-blue-Infrastructure-Guidelines-Feb17.pdf](https://www.water.vic.gov.au/_data/assets/pdf_file/0029/89606/Green-blue-Infrastructure-Guidelines-Feb17.pdf)

## Regional Information and Groups

### **Hume Region Climate Change Adaptation Plan 2021**

Details how climate change will affect Goulburn Broken and the North East and how you can be climate ready: <https://engage.vic.gov.au/hume-regional-climate-change-adaptation-strategy>

### **DELWP Grants**

Given that 2022 is an election year, there is very little detail on upcoming State Government grants that eligible Councils might apply for to assist with urban greening or climate change adaptation projects.

The Hume Region's DELWP representative will continue to liaise with the GMCA when details for funding rounds are made available. In the meantime, DELWP advise all Councils to have a business case for climate change adaptation projects ready.

### **Goulburn Broken Regional Catchment Strategy 2019-2023**

Still in draft form and not yet published.

### **North East Catchment Management Authority Regional Catchment Strategy**

Still in draft form and not yet published.

### **Climate Partnerships Advisory Group**

A collaboration between the region's water authorities, LGA's (at Executive level) and CMA's around how the region will adapt and mitigate to climate change.

### **Local Biodiversity Reference Groups**

Convened by the GBCMA and includes 8 Councils, DELWP and the CFA, the group looks to share information around regional biodiversity issues. However, there is currently limited scope for advocacy due to resource limitations.

## Appendix A: Framework of Best Practice Urban Forest Management

In assessing the current status of tree management programs across the GMCA region, it is first important to understand what best practise looks like. This allows a direct comparison to be made with regard to existing programs to determine where the gaps might be, what’s working well, and the highest priority opportunities to take advantage of.

Adapted from the “Model for Urban Forest Sustainability” (Matheny and Clark, 1998).

<b>Urban Forest Management Component</b>	<b>Key Objective</b>	<b>Best Practice</b>
<b>Urban Forest Asset</b>		
Urban Tree Canopy cover (UTC)	Achieve climate appropriate level of UTC	For GMCA region – between 20-30% UTC over public land depending on rainfall
Asset Diversity	Diversity of tree species, age classes and useful life expectancy	No more than 5-10% of any one species Even distribution of tree ages Even distribution of ULE (no more than 10% of a tree population should reach end of life per decade)
Native vegetation	Preserve and manage regional biodiversity Maintain wildlife corridors Maintain integrity of remnant vegetation	Urban forest supports indigenous tree species in key locations Corridors and connections are spatially mapped out and managed Remnant vegetation protected
Data	Adequate information to inform asset performance	Full street and park Tree Inventory – recording species, age, ULE, condition, structure etc Tree canopy/vegetation cover data Corridors/biodiversity connections Significant tree register(cultural/social/environmental)
<b>Urban Forest Management</b>		
Policy/Strategy/Management Plan	Council endorsed position on the management of urban forests Ensure the ongoing protection, care, and renewal of the urban forest	Tree Removal Policy Tree Protection policy Tree Management Plan Tree renewal/planting Plan Tree/Urban Forest Strategy Species list and site selection guidelines Technical guidelines/manual WSUD typologies Australian standards
Strategic integration	Council acknowledges the benefits of multi-	Council considers climate change, urban heat, community health and wellbeing, biodiversity, integrated

	functional design and asset management	water management, active transport and Traditional Owner's custodianship and aspirations within its everyday decision making
Funding	Adequate funding to achieve objectives articulated in policy/strategy	Tree planting and establishment budget Tree renewal budget Tree maintenance budget (proactive and reactive) Community engagement and participation activities Incentives for private tree management/planting
Staffing	Adequate staff to deliver policy/strategy outcomes and best practice tree care	Cert qualified arborists for high value tasks Skilled, interdisciplinary staff Tree maintenance/removal crew or contract Tree planting and establishment crew/contract Planning referrals Tree program planning
Public Safety/Risk	Minimising known risks to both enhance the urban forest and protect the general public	Proactive tree inspections Service delivery on customer requests
Recycling	Closing the loop on waste to ensure highest and best use for removed timber and green waste	Timber reuse program Green waste program Mulching program
<b>Community Framework</b>		
Organisational cooperation	Council is operating with common urban forest goals and objectives	Supportive Executive and Councillor
Involvement of large landholders	Other landholders are actively managing their component of the urban forest	State agencies (e.g. DELWP, CMA, VicRoads, Dept of Education), large urban landholders are contributing towards regional urban forest objectives e.g. planting trees, maintaining trees, revegetating for biodiversity, protecting trees
General awareness of trees as a community resource	Community is actively aware of the benefits of the urban forest	Residents notify Council of illegal tree removals/damage General understanding and support for urban forest management Tree celebration programs e.g. national tree day, tree of the year, significant tree register

Neighbourhood action	Residents participate in urban forest management	Strong participation in community planting days High number of customer requests for tree planting Active participation in tree giveaways Demand for regional species lists/garden for wildlife programs
Regional cooperation	Regional agencies, businesses, and community working together to deliver regional sized projects	E.g. Landscape Plan Guide 2017 (Shepparton, Campaspe, Moira and GBCMA).

## Appendix B Species List

Currently as a separate attachment

## Appendix C Tree Management Guidelines

Currently as a separate attachment

## References

- Burley H, Beaumont L, Ossola A, Baumgartner J, Gallagher R, Laffan S, Esperon-Rodriguez M, Manea A, Leishman M. 2019. "Substantial declines in urban tree habitat predicted under climate change". *Science of The Total Environment*, Volume 685, Pages 451-462, ISSN 0048-9697
- Bush, J. (2017). *Cooling cities with green space: policy perspectives*. (PhD Thesis). The University of Melbourne, Melbourne.
- Bush, J. (2020). The role of local government greening policies in the transition towards nature-based cities. *Environmental Innovation and Societal Transitions*, 35, 35-44. doi:10.1016/j.eist.2020.01.015
- Campbell, L. K., Svendsen, E. S., & Roman, L. A. (2016). Knowledge co-production at the research–practice interface: embedded case studies from urban forestry. *Environmental Management*, 57(6), 1262-1280. doi:10.1007/s00267-016-0680-8
- CFA, 2011. Landscape for Bushfire: Garden Design and Plant Selection, [https://www.cfa.vic.gov.au/documents/20143/72271/landscaping\\_for\\_bushfire.pdf/1c6084e1-159e-a820-b0b3-6dc077e661c0](https://www.cfa.vic.gov.au/documents/20143/72271/landscaping_for_bushfire.pdf/1c6084e1-159e-a820-b0b3-6dc077e661c0)
- Clark J.R., N.P. Matheny, G. Cross and V. Wake, 1997. A model of urban forest sustainability. *Journal of Arboriculture*. 23(1):17-30.
- Dunn, J. (2016) Improved neighbourhoods generate higher property prices. *Australian Financial Review*, 5 Feb. <http://www.afr.com/news/special-reports/202020-vision/generating-higher-property-prices-through-improved-neighbourhoods-20160204-gmlsx>
- Endrey, T. A. (2018). Strategically growing the urban forest will improve our world. *Nature Communications*, 9(1). doi:10.1038/s41467-018-03622-0
- Escobedo, F. J., Giannico, V., Jim, C. Y., Sanesi, G., & Laforteza, R. (2018). Urban forests, ecosystem services, green infrastructure, and nature-based solutions: nexus or evolving metaphors? *Urban Forestry and Urban Greening*. doi:10.1016/j.ufug.2018.02.011
- Gulsrud, N. M., Hertzog, K., & Shears, I. (2018). Innovative urban forestry governance in Melbourne? Investigating "green placemaking" as a nature-based solution. *Environmental Research*, 161, 158-167. doi:10.1016/j.envres.2017.11.005
- Jim, C. Y., Konijnendijk van den Bosch, C., & Chen, W. Y. (2018). Acute challenges and solutions for urban forestry in compact and densifying cities. *Journal of Urban Planning and Development*, 144(3). doi:10.1061/(ASCE)UP.1943-5444.0000466
- Kenney, W.A. & Wassenaer, Phillip & Satel, A.L. (2011). Criteria and indicators for strategic urban forest planning and management. *Arboriculture and Urban Forestry*. 37. 108-117.
- Killicoat, P, Puzio, E, and Stringer, R (2002), *The Economic Value of Trees in Urban Areas: Estimating the Benefits of Adelaide's Street Trees*. Proc. Treenet Symposium, Uni Adelaide
- Krajter Ostoić, S., & Konijnendijk van den Bosch, C. C. (2015). Exploring global scientific discourses on urban forestry. *Urban Forestry and Urban Greening*, 14(1), 129-138. doi:10.1016/j.ufug.2015.01.001
- Langenheim, N., White, M., Tapper, N., Livesley, S. J. & Ramirez-Lovering, D., (2020). Right tree, right place, right time: A visual-functional design approach to select and place trees for optimal shade benefit to commuting pedestrians. *Sustainable Cities and Society*, 52, 1-11.
- Lawrence, A., De Vreese, R., Johnston, M., Konijnendijk van den Bosch, C. C., & Sanesi, G. (2013). Urban forest governance: towards a framework for comparing approaches. *Urban Forestry and Urban Greening*, 12(4), 464-473. doi:10.1016/j.ufug.2013.05.002
- Livesley, S. J., Escobedo, F. J., & Morgenroth, J. (2016). The biodiversity of urban and peri-urban forests and the diverse ecosystem services they provide as socio-ecological systems. *Forests*, 7 doi:10.3390/f7120291
- Livesley, S. J., McPherson, G. M., & Calfapietra, C. (2016). The urban forest and ecosystem services: impacts on urban water, heat, and pollution cycles at the tree, street, and city scale. *Journal of Environmental Quality*, 45(1), 119-124. doi:10.2134/jeq2015.11.0567
- McDonnell, M. J., & Kendal, D. (2015). The ecology of urban forests. In K. S.-H. Peh, R. T. Corlett, & Y. Bergeron (Eds.), *The Routledge Handbook of Forest Ecology* (pp. 623-632). London: Routledge.
- McPherson, G., Simpson, J. R., Peper, P. J., Maco, S. E., & Xiao, Q. (2005). Municipal forest benefits and costs in five US cities. *Journal of Forestry*, 103(8), 411-416.
- Maron M, Griffin A, Reside A, Laurance B, Driscoll D, Ritchie E, Turton S, 2019. **To reduce fire risk and meet climate targets, over 300 scientists call for stronger land clearing laws. The Conversation, March 11.** <https://theconversation.com/to-reduce-fire-risk-and-meet-climate-targets-over-300-scientists-call-for-stronger-land-clearing-laws-113172>

- Moore G M (2009) Urban Trees: Worth More Than They Cost Lawry in D, J Gardner, and S Smith (Eds), *Proceedings of the Tenth National Street Tree Symposium*, Uni Adelaide, ISBN 978-0-9805572-2-0
- Mullaney J, Lucke T, Trueman SJ (2015). A review of benefits and challenges in growing street trees in paved urban environments. *Landscape and Urban Planning* 134, 157-166.
- Naderi JR, Kweon BS, Maghelal P. 2008. The Street Tree Effect and Driver Safety. *The Journal on the Web*, <https://www.naturewithin.info/Roadside/Tree&Driver ITE.pdf>
- Nitoslawski, S. A., Galle, N. J., van den Bosch, C. K., & Steenberg, J. W. N. (2019). Smarter ecosystems for smarter cities? A review of trends, technologies, and turning points for smart urban forestry. *Sustainable Cities and Society*, 101770. doi:10.1016/j.scs.2019.101770
- Norton B, Coutts A, Livesley S, Williams N, (2013). Decision Principles for the selection and placement of green infrastructure to mitigate urban hotspots and heatwaves, Victorian Centre for Climate Change Adaptation Research
- Nyelele, C., & Krull, C. N. (2020). The equity of urban forest ecosystem services and benefits in the Bronx, NY. *Urban Forestry & Urban Greening*, 126723. doi:10.1016/j.ufug.2020.126723
- Ordóñez-Barona, C. (2017). How different ethno-cultural groups value urban forests and its implications for managing urban nature in a multicultural landscape: a systematic review of the literature. *Urban Forestry and Urban Greening*, 26, 65-77. doi:10.1016/j.ufug.2017.06.006
- Pandit, R, Polyakov, M., Tapsuwan, S., Moran, T. (2013) The effect of street trees on property value in Perth, Western Australia. *Landscape and Urban Planning*. Volume 110, February 2013, Pages 134–142
- Parris, K. M., Barrett, B. S., Stanley, H. M., & Hurley, J. (Eds.). (2020). *Cities for people and nature*. Melbourne: Clean Air and Urban Landscapes Hub.
- Plant, L., Rambaldi, A. & Sipe, N., (2017). Evaluating revealed preferences for street tree cover targets: A business case for collaborative investment in leafier streetscapes in Brisbane, Australia. *Ecological Economics*, 134, 238-249.
- Sheppard, S. R. J., Konijnendijk van den Bosch, C., Croy, O., Macias, A., & Barron, S. (2017). Urban forest governance and community engagement. In F. Ferrini, C. C. Konijnendijk van den Bosch, & A. Fini (Eds.), *Routledge Handbook of Urban Forestry* (pp. 205-221). Milton, UK: Taylor and Francis.
- Steenberg, J. W. N., Duinker, P. N., & Nitoslawski, S. A. (2019). Ecosystem-based management revisited: updating the concepts for urban forests. *Landscape and Urban Planning*, 186, 24-35. doi:10.1016/j.landurbplan.2019.02.006
- Ugolini, F., Massetti, L., Sanesi, G., & Pearlmutter, D. (2015). Knowledge transfer between stakeholders in the field of urban forestry and green infrastructure: results of a European survey. *Land Use Policy*, 49, 365-381. doi:10.1016/j.landusepol.2015.08.019
- van der Jagt, A. P. N., & Lawrence, A. (2019). Local government and urban forest governance: insights from Scotland. *Scandinavian Journal of Forest Research*, 34(1), 53-66. doi:10.1080/02827581.2018.1532018
- VISES. (2015). *Green infrastructure economic framework*. Vic University, Melb, ISBN 978-1-86272-705-2
- van Wassenaer, P. J. E., Satel, A. L., Kenney, W. A., & Ursic, M. (2011). A framework for strategic urban forest management planning and monitoring. *Trees, people and the built environment*. Proceedings of the Urban Trees Research Conference 13–14 April 2011
- Wolf, K. L., (2005). Trees in the small city retail business district: Comparing resident and visitor perceptions. *Journal of Forestry*, 103, 390-395.
- Wolf, K. L. (2017). Social aspects of urban forestry and metro nature. In F. Ferrini, C. C. Konijnendijk van den Bosch, & A. Fini (Eds.), *Routledge Handbook of Urban Forestry* (pp. 65-81). Abingdon: Routledge.