A large, leafy tree in an urban setting, with a sidewalk and a building visible on the left and a bus on the right.

City of Lethbridge

Urban Forest Management Plan | 2021-2041

In 2041:

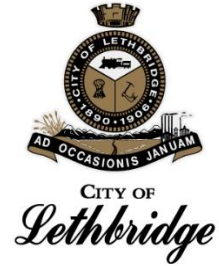
Lethbridge's urban forest is healthy, resilient, and growing.

Trees along streets, in parks and on private lands enhance the quality of life for all of the city's residents, and are an important part of the city's identity.

All community members support each other in caring for, preserving, and enhancing the urban forest and the many valuable services it provides for the enjoyment and benefit of all.

City of Lethbridge

Urban Forest Management Plan | 2021-2041



About this plan

This is a twenty-year strategy for the sustainable management of Lethbridge's urban forest.

Lethbridge's urban forest includes all trees located on both public and private lands in the city. The urban forest provides Lethbridge residents with many economic, community and environmental services—it is a vital community green infrastructure asset.

This Urban Forest Management Plan (UFMP) was developed to help the City respond to the many challenges facing the urban forest today and in the future—challenges such as difficult growing conditions, the need for better tree protection, pests, diseases, invasive species, limited community engagement, and climate change.

The strategies and actions outlined in this plan will ensure that the important services provided by Lethbridge's urban forest are sustained and enhanced over time.

This document is a summary of the comprehensive Lethbridge UFMP technical report, which is available upon request from the City of Lethbridge.

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Image credits

All images courtesy of the City of Lethbridge.

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*Mature American elms (*Ulmus americana*) form a closed canopy over 7 Street South in Lethbridge.*

Introduction



Downtown Lethbridge and its canopy of healthy City-managed street trees.

Introduction

Situated in the moist mixed grassland ecoregion of the Alberta prairie and atop the banks of the Oldman River, Lethbridge is a mid-size city of over 100,000 residents. Although the region is characterized by a prairie environment, the river valley is home to naturally occurring stands of cottonwoods (*Populus* sp.) and the developed tableland hosts an urban forest of ash, elm, poplar, spruce and various other native and introduced tree species.

The City of Lethbridge Integrated Community Sustainability Plan / Municipal Development Plan (ICSP/MDP), 2010, defines the urban forest as:

“All the trees and associated vegetative understory in the city, including trees and shrubs intentionally planted, naturally occurring or accidentally seeded within the city limits.”

Lethbridge's urban forest includes all trees located on both public lands, such as streets, parks and facilities, and private lands, such as residential or commercial properties. City-owned trees are primarily managed by the Urban Forest section of Parks Operations, Infrastructure Services Department, while trees on private lands are managed by a wide array of stakeholders. Regardless of ownership, the urban forest is part of the city's green infrastructure and provides valuable economic, health, and environmental services to the entire Lethbridge community.

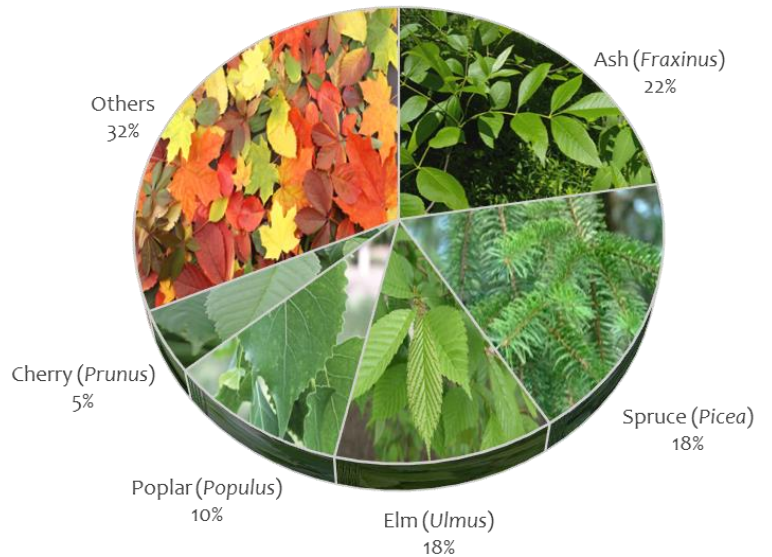
Like urban forests everywhere, Lethbridge's trees face significant challenges, ranging from difficult growing conditions, to a lack of awareness and stewardship, to pests, diseases, and climate change. This urban forest management plan (UFMP) has been developed to address these challenges and to put forward effective management strategies and actions to ensure that Lethbridge residents continue to benefit from the valuable services provided by a healthy, safe, diverse, and sustainably managed urban forest.

Lethbridge's urban forest

The City manages an inventory of some 45,000 trees along streets, in parks, and on other City-owned lands, along with many more trees in the Oldman River valley. Just two species—green ash (*Fraxinus americana*) and American elm (*Ulmus americana*) make up over one-third of the inventoried tree population, placing the urban forest at significant risk for emerald ash borer (EAB) infestation or Dutch elm disease (DED) infection. Overall, urban forest diversity in Lethbridge is low—just five genera make up nearly 70% of inventoried trees. This reflects the reality of the challenging growing conditions found in Lethbridge, which are inhospitable to many types of trees due to low rainfall, high winds, and often fluctuating temperatures.

Smaller-sized trees are over-represented in Lethbridge's urban forest inventory, highlighting the need to protect and maintain existing trees so that they can grow to their full genetic potential for size and function.

Urban forest spatial distribution in Lethbridge follows common patterns (see box, right), whereby older and established neighbourhoods, parks, cemeteries and natural areas have a greater proportion of large-statured trees and canopy cover compared to newer communities. This suggests that Lethbridge residents' ability to access urban forest services may be unequal and largely dependent upon their place of residence, employment, or recreation.



Above: Tree diversity in Lethbridge's urban forest is low—just 5 genera make up 68% of inventoried street and park trees.

Lethbridge's urban forest canopy cover—the area covered by trees—is approximately 7% (868 hectares). This level is comparable to or lower than in other Prairie cities. As shown in the images below, canopy cover is among the highest in established residential neighbourhoods, and lower in newer communities and in industrial and commercial areas. Considerable effort will be required to ensure that trees in newly developed communities grow to provide shade, energy savings, and many other urban forest services.



Lethbridge's urban forest



Above: Lethbridge's urban forest canopy is shown in green. Note the concentration of canopy cover in the river valley lands and the established residential neighbourhoods, such as London Road and Fleetwood (centre of map, east of the Oldman River).

The value of Lethbridge's urban forest

The urban forest is a major part of Lethbridge's green infrastructure. The city's trees provide valuable economic, health and community, and environmental services that help make Lethbridge a healthy, livable, and attractive community.

Many Lethbridge residents recognize the value of the urban forest: 96% of UFMP survey respondents said that the city's urban forest is "very important" to their quality of life.

The urban forest is a unique type of infrastructure in that, unlike other municipal assets, its value increases as it ages—older and larger trees provide exponentially more services to communities than smaller trees because they have more leaf area. This fact highlights the importance of planning for and supporting the growth of large-statured and long-lived trees across Lethbridge.



Above: The economic, health and community, and environmental services provided by the urban forest increase exponentially in quantity and value as tree size and leaf area increase, demonstrating the importance of establishing and growing large-statured trees in the urban forest.

Just some of the vital services provided by Lethbridge's urban forest are described below.

Economic



Increasing residential and commercial property values by making landscapes more desirable



Promoting local economic activity by making spaces more inviting



Reducing energy costs by reducing demand



Reducing healthcare costs by protecting physical health



Reducing infrastructure maintenance and replacement costs by shading

Health and community



Improving physical health by encouraging outdoor recreation, reducing UV exposure, and improving air quality



Improving mental health and cognitive functioning by reducing stress through nature connection



Increasing social cohesion and strengthening communities by encouraging people to come together in green and shaded spaces



Environmental



Reducing air pollution and improving air quality



Cooling the air and reducing the urban heat island effect



Protecting soils against erosion by wind and rain



Storing and sequestering atmospheric carbon



Reducing flooding and protecting water quality



Providing wildlife habitat and promoting ecosystem connectivity

A 2011 analysis of the tree inventory estimated that *public* trees in Lethbridge save as much electricity and natural gas per year as used by 695 and 1,200 average Alberta households, respectively.

A 2019 analysis of the tree inventory estimated that Lethbridge's *public* trees remove over 3.5 tonnes of pollutants per year, improving air quality and promoting health. These trees also produce over 515 tonnes of oxygen annually—as much as is breathed by 700 people per year.

The 2019 analysis also estimated that Lethbridge's *public* trees store over 11,500 tonnes of carbon. They also sequester an additional 195 tonnes of atmospheric carbon annually—as much as emitted by 42 cars driven 18,000 km per year.

Lethbridge's *public* trees intercept over 58,000 cubic feet, or about 14 average swimming pools' worth, of rainfall annually. This reduces stormwater runoff and protects water quality in the Oldman River.



Left: Lethbridge's tree-lined streets encourage healthy active transportation such as cycling or walking.

Next page: The "Benefits of Urban Trees" infographic from the City of Lethbridge urban forestry webpage.

Strengthen Community Connections

Increase Urban Biodiversity

Increase Property Values



Benefits of **URBAN TREES**



Filter Urban Pollutants



Improve Physical & Mental Health



Cools Summer Air Temperatures



CITY OF
Lethbridge



Challenges facing Lethbridge's urban forest

Like urban forests everywhere, trees in Lethbridge face a range of significant challenges to their health and sustainability. Some of the most pressing challenges are described below.

Difficult growing conditions

Trees have evolved to grow in forest communities—much different environments than found in most of Lethbridge today. Growing conditions in Lethbridge are often characterized by compacted or otherwise suboptimal soils, insufficient soil moisture, temperature extremes, and high winds, which can all increase **drought stress**. This is especially true in non-irrigated landscapes across the city. Trees must also compete for limited above- and below-ground space with other municipal infrastructure, and may occasionally even be vandalised. These conditions are stressful for living trees and can make them more susceptible to pests, diseases, drought and other external stressors. This reduces their functional capacity to provide valuable urban forest services, shortens tree lifespans, and increases the costs of urban forest management. Trees in the Oldman River valley are also threatened— the Lethbridge River Valley Parks Master Plan (2017) notes, "In recent years, cottonwood communities have been declining in the River Valley due to flood control measures and water removal from the Oldman River".

A need for better tree protection

Land development and infrastructure maintenance are vital to a healthy economy and a sustainable community. However, **site disturbance** and land use change can present threats to existing trees and future growth of the urban forest as trees are injured or removed and soils are disturbed for development. Policies and practices should ensure that existing trees and tree growing environments are protected wherever possible as the city continues to grow and develop.

The London Road Area Redevelopment Plan (LRARP) includes policies that prohibit paving over boulevards and installing new curb cuts, thereby conserving growing space for Lethbridge's future urban forest. These policies can be a model for enhancing urban forest protection across Lethbridge.

Pests, diseases, and invasive species

Owing to the high abundance of ash and elm trees, Lethbridge's urban forest is especially vulnerable to emerald ash borer (EAB) and Dutch elm disease (DED). Other pests and diseases can also cause significant tree damage or mortality, while invasive plant species can permanently alter and degrade the ecological functioning of natural ecosystems.

Many Lethbridge residents understand the threat posed by pests and diseases. 47% of those surveyed listed these among the top four challenges facing the urban forest.

Limited community awareness and engagement

While most Lethbridge residents recognize the positive contributions that trees make to their quality of life, engagement in urban forest stewardship is limited. Half of survey respondents identified a lack of awareness about the need to manage trees as one of the top four challenges facing the urban forest. A further one-quarter of respondents feel that a lack of engagement in tree planting or other forms of stewardship and inadequate partner involvement are major challenges. Limited awareness and engagement may lead to adverse consequences for the urban forest and represents missed opportunities to achieve greater success in tree protection, establishment, and care.

Urban forests are a vital **climate change adaptation** tool for cities. By providing services such as shading, microclimate cooling, and stormwater and pollutant capture, urban forests make climate change-affected cities safer and more comfortable places to live. Preserving and expanding the urban forest will be an important part of Lethbridge's climate change adaptation efforts.

Climate change

According to the Environment Lethbridge State of the Environment Report (2017), the city can expect to experience warmer temperatures and increasing drought, and "ecological conditions of the local area will shift" as a result of the changing climate. These impacts, along with more frequent severe weather events and increased proliferation of urban forest pests and diseases, will directly and adversely affect Lethbridge's urban forest. This may result in increased tree mortality, structural failure, or susceptibility to pests or diseases.

Other challenges

Lethbridge residents also identified other challenges facing the city's urban forest.

- **Insufficient care for young trees:** newly planted trees require adequate watering, mulching, structural pruning and monitoring, which may occasionally be lacking.
- **Insufficient resources:** the urban forest may not be afforded adequate importance by decision makers, resulting in insufficient resources for management.
- **Inadequate partner involvement:** external partners such as businesses, agencies, NGOs and residents could be engaged more effectively in urban forest stewardship.
- **Aging tree population:** while many of the trees in Lethbridge's urban forest are relatively young and small, mature trees in older parts of the city may be reaching the ends of their lifespans. This poses particular management challenges related to risk management and replacement and succession planting.

About the Urban Forest Management Plan

Purpose

The Lethbridge Urban Forest Management Plan (UFMP) outlines a strategic vision, goals and objectives for Lethbridge's urban forest; establishes guiding principles for urban forest management; and proposes detailed actions for urban forest policy and program development and implementation. As a roadmap to guide resourcing and priority setting, the UFMP will help the City of Lethbridge and its partners work together to realize the community's vision for its urban forest and achieve important goals, objectives and targets.

The Lethbridge UFMP was developed with input from a range of stakeholders, including City of Lethbridge staff, community members, and external groups with an interest in the urban forest. Stakeholder input was obtained through questionnaires, a *Get Involved* Community Conversations event, and a public survey. The survey garnered over 275 responses and aided in the development of the UFMP vision, prioritization of challenges and strategies, and identification of opportunities for the urban forest.

Scope

Lethbridge's urban forest is composed of trees on both municipal and private lands. The City of Lethbridge is responsible for the management of the largest single share of the city's trees, so the strategies outlined in this plan primarily focus on the municipally managed portions of the urban forest. However, strategies and actions to enhance and support community engagement in urban forest stewardship on both public and private lands are also presented.

Adaptive management

The Lethbridge UFMP is based on a twenty-year planning horizon, meaning that the plan's goals, objectives, and actions are intended to guide the City and its partners towards realizing the urban forest vision by 2041. However, the urban forest is a complex and dynamic system, and management strategies that work today may need to be modified, or new strategies may need to be developed, to meet future challenges or take advantage of new opportunities. Therefore, the UFMP includes a built-in **adaptive management** framework (see page 39). Key components of the UFMP, such as the current status of the urban forest, Criteria and Indicators, goals and objectives, action items, and others will be reviewed on a regular and periodic basis while keeping the long-term urban forest vision in focus.

Monitoring successes and needs

Effective adaptive management requires robust and regular monitoring. The framework for monitoring the urban forest resource and its management is described on page 39 and in the Action Plan.

Criteria and Indicators (C&I) for urban forest management

An important part of the urban forest management monitoring framework is the use of Criteria and Indicators (C&I) of urban forest sustainability.

These 28 criteria consider various aspects of the urban forest and its management, including the vegetation resource (the urban forest itself), the community framework (how engaged is the community in stewardship?), and resource management approaches (how well is the urban forest managed?).

Each performance indicator is ranked on scale of low to optimal. At every plan review period, the City will reassess its status in relation to the criteria and establish actions for improvement, where necessary. A summary of the baseline C&I assessment of Lethbridge's urban forest and its management is shown on page 18.



Trees should be protected whenever possible during site development and infrastructure maintenance.

Preserving mature elm trees was a key consideration during the renovation and expansion of the concession and restroom facilities at Lakeview Park.

| | | TBD | Low | Moderate | Good | Optimal |
|-------------------------------------|--|-----|-----|----------|------|---------|
| Vegetation Resource | | | | | | |
| V1 | Relative Canopy Cover | ● | ○ | ○ | ○ | ○ |
| V2 | Age distribution | ○ | ○ | ○ | ● | ○ |
| V3 | Species suitability | ○ | ○ | ○ | ● | ○ |
| V4 | Species diversity | ○ | ● | ○ | ○ | ○ |
| V5 | Publicly-owned Trees | ○ | ○ | ○ | ● | ○ |
| V6 | Publicly-owned natural areas | ○ | ○ | ○ | ● | ○ |
| V7 | Trees on private property | ○ | ● | ○ | ○ | ○ |
| Community Resource | | | | | | |
| C1 | Municipal agency cooperation | ○ | ○ | ● | ○ | ○ |
| C2 | Large land holders | ○ | ● | ○ | ○ | ○ |
| C3 | Utilities cooperation | ○ | ○ | ● | ○ | ○ |
| C4 | Green industry cooperation | ○ | ○ | ● | ○ | ○ |
| C5 | Citizen involvement and neighbourhood action | ○ | ○ | ● | ○ | ○ |
| C6 | Trees as a community resource | ○ | ○ | ● | ○ | ○ |
| C7 | Regional collaboration | ○ | ○ | ● | ○ | ○ |
| Resource Management Approach | | | | | | |
| M1 | Tree Inventory | ○ | ○ | ● | ○ | ○ |
| M2 | Canopy cover assessment and goals | ○ | ○ | ● | ○ | ○ |
| M3 | Environmental justice and equity | ○ | ● | ○ | ○ | ○ |
| M4 | Municipality-wide urban forest plan | ○ | ○ | ● | ○ | ○ |
| M5 | Municipality-wide urban forestry funding | ○ | ○ | ○ | ● | ○ |
| M6 | Municipal urban forestry program capacity | ○ | ○ | ○ | ● | ○ |
| M7 | Tree establishment planning/implementation | ○ | ○ | ● | ○ | ○ |
| M8 | Growing site suitability | ○ | ○ | ● | ○ | ○ |
| M9 | Maintenance of publicly-owned trees | ○ | ○ | ○ | ● | ○ |
| M10 | Tree Risk Management | ○ | ○ | ○ | ● | ○ |
| M11 | Tree protection policy | ○ | ● | ○ | ○ | ○ |
| M12 | Publicly-owned natural areas mgmt. | ○ | ○ | ● | ○ | ○ |
| M13 | Native vegetation | ○ | ○ | ● | ○ | ○ |
| M14 | Urban forest product utilization | ○ | ○ | ● | ○ | ○ |

Summary of Criteria and Indicators-based urban forest sustainability framework baseline assessment for Lethbridge. Note: criteria titles have been shortened for formatting; full criteria titles and indicator details can be found in Sections 7.2.1 to 7.2.3 of the Comprehensive UFMP document. TBD denotes indicators which require additional information to be assessed.



Strategic Framework

A frosty morning accentuates a poplar tree's natural beauty in Henderson Park.

The strategic framework

The strategic framework of the Lethbridge UFMP includes a vision for the city's urban forest, eight guiding principles, five strategic goals, and 18 objectives for management.

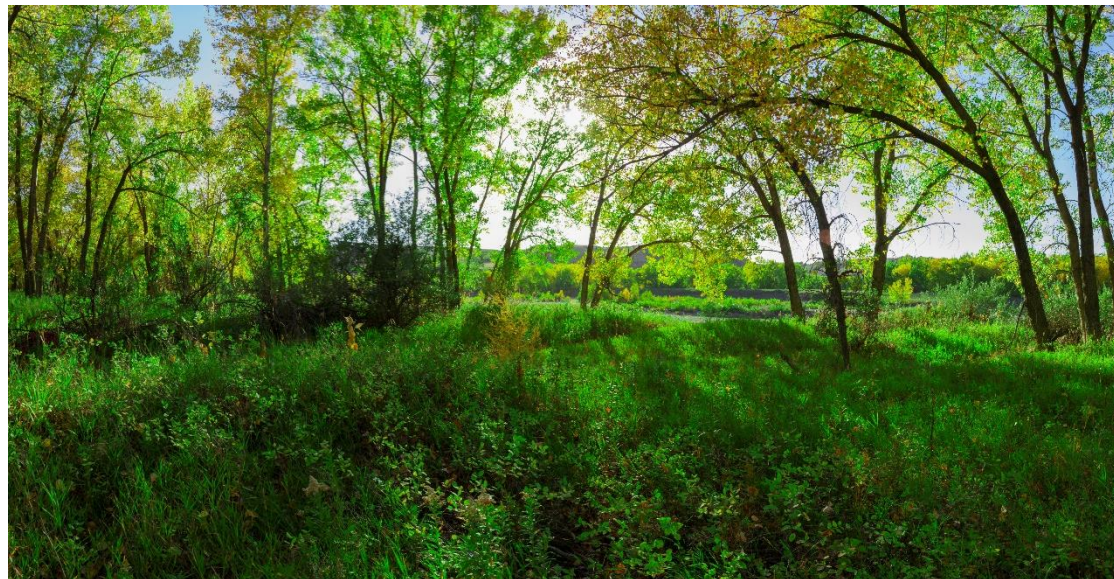
Vision

The UFMP vision is an aspirational statement that represents the desired state of Lethbridge's urban forest by the end of the UFMP planning horizon in 2041. The vision will be realized through adherence to the guiding principles, pursuit of the strategic goals and objectives, implementation of recommended actions, and application of the monitoring and adaptive management frameworks. The UFMP will be considered successful if, when read in 2041, the vision statement accurately reflects the state of the urban forest.

The vision for Lethbridge's urban forest in 2041

Lethbridge's urban forest is healthy, resilient, and growing. Trees along streets, in parks and on private lands enhance the quality of life for all of the city's residents and are an important part of the city's identity. All community members support each other in caring for, preserving and enhancing the urban forest and the many valuable services it provides for the enjoyment and benefit of all.

The cottonwood stands of the Oldman River valley provide a place of natural refuge for people and wildlife alike, and are a treasured urban forest asset in Lethbridge.



Defining urban forest sustainability

The core concept of sustainability is the ability to meet the needs of the present without compromising the ability of future generations to meet their needs. However, there is no universally agreed-upon definition of sustainability, and there are many views on how sustainability can be defined and achieved.

Similarly, urban forest sustainability can mean different things to different people. For the Lethbridge UFMP, urban forest sustainability will be achieved if all of the Criteria and Indicators of Urban Forest Sustainability (C&I) are assessed or maintained at a “Good” or “Optimal” indicator level within the 20-year planning horizon and the vision for the urban forest is realized.

Guiding principles

Eight guiding principles reflect the values of the City of Lethbridge and the community in relation to the urban forest and its management. These principles have shaped the development of the UFMP but, more importantly, will also guide the decisions and actions undertaken by the City and its partners in urban forest management throughout the twenty-year planning horizon.

Principle 1: Recognition:

The urban forest must be recognized in municipal policies and practices as an essential infrastructure asset, and should be considered as important to the livability of the city as any built infrastructure.

Principle 2: A comprehensive approach

Sustainable urban forest management encompasses a wide range of decisions and actions that require coordination between multiple stakeholders.

Principle 3: Adaptive management

Approaches to urban forest management should continually be monitored and, if necessary, revised to meet emerging needs and challenges while striving to realize the established vision and achieve strategic goals and objectives.

Principle 4: Local context

Urban forest management in Lethbridge should recognize the natural limitations to tree growth in the region.

Principle 5: Diversity

A diverse urban forest is more resilient to a wide range of stressors, and better able to continue providing important services, than an urban forest with low structural, species and functional diversity.

Principle 6: Preservation

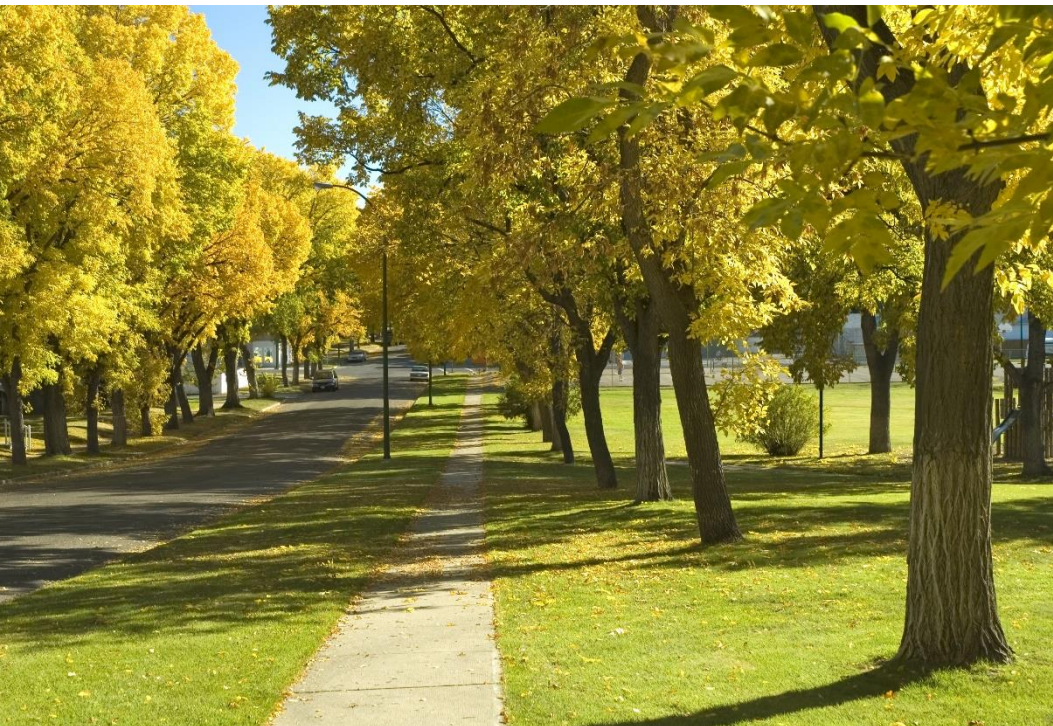
In most situations, preservation of existing trees is preferable to their removal and replacement or monetary compensation.

Principle 7: Access

All of Lethbridge's residents deserve equal opportunities to access and benefit from urban forest services.

Principle 8: Partnership

Realizing the UFMP vision requires engaging residents and other stakeholders as partners in urban forest management.



Mature trees along Lethbridge's roads and pathways promote traffic safety, encourage active transportation and recreation, and lend scenic beauty to streetscapes and parks.

Strategic goals

The City of Lethbridge and its partners will realize the vision for the urban forest through the pursuit and fulfillment of five strategic goals.

Strategic Goal 1: Understand

Develop a better understanding of all aspects of the urban forest and its management, and use this knowledge to make better urban forest management decisions.

Strategic Goal 2: Maintain

Improve the health, longevity, safety and functional capacity of the urban forest, and ensure that the future urban forest can reach its genetic potential to provide the full range of services in a safe and cost-effective way.

Strategic Goal 3: Grow

Expand the extent of the urban forest, strengthen its resilience against stressors, and enhance its capacity to provide functional services to the community.

Strategic Goal 4: Protect

Protect existing trees and their growing environments against injury and destruction wherever possible, particularly during land development and land use change, through a coordinated tree protection program.

Strategic Goal 5: Engage

Encourage all members of the community to engage in urban forest stewardship on both public and private lands, and build strong urban forest partnerships.



The current status of Lethbridge's urban forest and its management in relation to each of the five strategic goals is described in the following pages. Key objectives and strategies related to each strategic goal are also presented.

A large, leafy American elm tree (Ulmus americana) is the central focus, casting a wide, dappled shadow over a paved walkway. The tree's branches are thick and gnarled, with dense green foliage. The walkway is a light-colored concrete or stone path that curves through a lush green lawn. In the background, other trees and a clear blue sky with a few wispy clouds are visible. The overall scene is bright and sunny, suggesting a pleasant day in a park.

Goals and Objectives

*A graceful American elm (*Ulmus americana*) casts shade over a walkway in Gyro Park.*

Strategic Goal 1: Understand

Knowledge about all aspects of the urban forest is essential to understanding challenges and designing and implementing effective management strategies. Programs and practices to better gather, manage and use information about Lethbridge's urban forest will enhance strategic decision-making and support day-to-day urban forest management operations.

Through the implementation of the Urban Forest Management Plan, the City of Lethbridge and its urban forest partners will achieve the strategic goal to:

Develop a better understanding of all aspects of the urban forest and its management, and use this knowledge to make better urban forest management decisions.

Objective 1.1: Increase knowledge about the urban forest

The City and its partners will ensure that urban forest management is informed by a detailed understanding of the structure and function of the existing and potential urban forest.

Objective 1.2: Develop and implement an urban forest monitoring framework

The City and its partners will ensure that their understanding of the urban forest remains up-to-date, and that decisions are made based on the most current available information.

Objective 1.3: Enhance the utility of urban forest knowledge and data

The City and its partners will effectively integrate urban forest data with decision-making processes and management operations.

Current status - Understand

This strategic goal relates, in part, to Lethbridge's urban forest as a physical resource. The structural characteristics, functional capacity and value, and challenges to Lethbridge's urban forest are described in the Introduction section of this Urban Forest Management Plan. This strategic goal also addresses urban forest assessment and data management practices in Lethbridge, such as the tree inventory, canopy cover mapping, and ecological site assessments.

As described previously, several metrics of urban forest diversity are low on a citywide basis, and a high proportion of Lethbridge's urban forest is vulnerable to stressors such as pests and diseases (e.g., EAB, DED), climate change, and others.

The municipal tree inventory affords City staff a basic understanding of this part of the urban forest, but information about tree condition and maintenance needs is currently lacking. There is also limited knowledge about privately-owned trees and no citywide urban forest assessment, so much about the structural characteristics, functional capacity, and value of the city's urban forest as a whole remains largely unknown.

Strategies - Understand

Strategies for enhancing understanding about the urban forest and integrating this knowledge into management decisions should capitalize on existing and emerging opportunities. For example, the City should **enhance the tree inventory** by collecting additional data attributes, to be kept up-to-date through regular inventory maintenance and expanded to include high-priority species (e.g., ash, elm) on non-municipal lands.

Enhancing knowledge about the structure and function of the city's entire urban forest through a comprehensive urban forest study will enhance urban forest management by identifying areas with the greatest need for urban forest services, informing tree establishment planning and other actions, and engaging residents and other stakeholders in urban forest stewardship. Such a study should include, at minimum, plot-based field data collection, geospatial analysis of urban forest canopy cover and **potential plantable area (PPA)**, and function/value analysis (e.g., i-Tree Eco modeling).

As informed by components of a comprehensive urban forest analysis study, the City should **establish and pursue appropriate urban forest canopy cover targets**. Targets should be area-specific and based on appropriate scales and geographies, and efforts to grow the urban forest should be focused on areas where doing so will provide the greatest functional value, such as in heat islands or populated areas with low tree cover. It should be noted that appropriate canopy cover targets will likely be lower than those in many other municipalities due to Lethbridge's biogeographic and climatic conditions, which make the establishment and maintenance of an expansive tree canopy challenging in many locations.

Lethbridge should also work to **enhance multiple metrics of urban forest diversity**. Strategies will include reducing previous reliance on overabundant species, undertaking trials of novel and underutilized species, ensuring that trees are able to reach mature size/age classes, and promoting private land urban forest stewardship.

Strategic Goal 2: Maintain

Lethbridge's urban forest requires ongoing maintenance to sustain and enhance its health, condition, functional capacity, and safety. Urban forest maintenance programs encompass a wide range of operations such as tree pruning, pest and disease management, and tree risk assessment and mitigation.

Through the implementation of the Urban Forest Management Plan, the City of Lethbridge and its urban forest partners will achieve the strategic goal to:

Improve the health, longevity, safety and functional capacity of the urban forest, and ensure that the future urban forest can reach its genetic potential to provide the full range of services in a safe and cost-effective way.

Objective 2.1: Maintain and enhance the functional capacity of existing trees through improved tree maintenance practices

The City and its partners will ensure that tree maintenance practices contribute to enhancing the provision of valuable economic, health and community, and environmental services by the urban forest.

Objective 2.2: Reduce tree-related risk

The City and its partners will ensure that risk posed by trees is managed at an appropriate level while enabling the conservation of mature trees.

Objective 2.3: Enhance the City's ability to respond to existing and emergent pests, pathogens, and invasive species

The City and its partners will be better positioned to effectively address various biotic stressors that threaten the urban forest.

Objective 2.4: Encourage community engagement in urban forest maintenance

The City and its partners will engage community members in caring for existing trees, fostering a sense of community ownership of the urban forest and promoting better outcomes for tree survival and urban forest health and function.

Objective 2.5: Obtain supplemental resources to support urban forest management

The City and its partners will investigate and capitalize on new resource opportunities to support and enhance urban forest management.

Current status - Maintain

The Urban Forest section of Parks Operations (Parks business unit, Infrastructure Services Department) undertakes a full range of urban forest maintenance operations, such as tree inspection, pruning, removal, stump grinding, watering, mulching, risk management, and pest and disease control. These operations are carried out by both City staff, including 15 ISA Certified Arborists, and contractors.

Lethbridge residents can initiate tree inspection and service requests by calling **3-1-1** or by using the **311.lethbridge.ca** online portal.

Many City-managed trees are maintained on a cyclical and proactive basis. In keeping with urban forest management **best practices**, maintenance frequency varies based on a range of factors such as tree species, size, age, or location. Trees are also maintained in response to service requests initiated by residents or staff. However, the City's tree inventory and **work order management systems** are currently not integrated, which may impede tree maintenance efficiency. Some established tree maintenance targets, such as young tree structural pruning and the park tree pruning cycle, are not currently being met.

Several Urban Forestry staff maintain ISA Tree Risk Assessment Qualification (TRAQ) to ensure that industry standards are applied to tree risk assessment and mitigation. However, tree risk assessments are not generally documented or integrated with the tree inventory, so a complete picture of tree-related risk in the urban forest is not currently available. There is no tree risk management policy in place, and conservation-based approaches to risk mitigation, such as cabling and bracing, are generally not implemented.

There are some 16,000 ash and elm trees on public lands in Lethbridge, and many others on private lands. This major part of the urban forest is susceptible to emerald ash borer and Dutch elm disease, among other pests and diseases. A recently approved \$2 million urban forest pest and disease management reserve fund will help the City continue to monitor and proactively manage these significant threats.

Urban forest pest, disease and **invasive species** management is guided by the City's **Integrated Pest Management (IPM)** manual, and the City works to control these threats while minimizing risks to people and the environment through the application of a variety of monitoring and control strategies. The application of chemical controls is minimized wherever possible, although the 2016 infestation of European elm scale required the use of insecticides to protect the city's elm trees. The likely arrival of emerald ash borer (EAB) in the near future will also necessitate the use of stem-injectable insecticides as part of an effective management strategy.

In an effort to promote engagement in the urban forest, the City has established an "Edible Orchard" and supported Environment Lethbridge in publishing a map of public fruit-bearing trees. Residents are permitted to sustainably harvest fruit, such as cherries, pears, walnuts, crabapples and others, from City trees. City staff monitor and prune the trees in these orchards, although the level of public participation in harvesting is not known or tracked.

Residents are encouraged to water young trees in front of their properties, but there is no 'Adopt-a-Tree' or similar program and opportunities for community members to engage in a wider range of urban forest stewardship actions on public lands are limited.

Strategies - Maintain

The City of Lethbridge should **continue its existing proactive urban forest maintenance programs**, such as the pruning cycle, to ensure that tree health and function are protected and that tree-related risk is managed effectively. Some **levels of service should be enhanced**; for example, the frequency of young tree structural pruning should be increased and the City should consider undertaking proactive maintenance of trees on combination boulevards instead of relying on adjacent property owners.

The City should also **enhance tree risk management** through the adoption of a tree risk management policy, broader application of arboricultural standards and best practices, consideration of conservation-based approaches where appropriate, and integration of standardized tree risk assessment ratings with the tree inventory.

In recognition of the urban forest's major vulnerability to both emerald ash borer (EAB) and Dutch elm disease (DED), the City must **develop and begin implementing EAB and DED management plans**. These plans will support the effective practices, such as pre-emptive monitoring, that are already in place. Perhaps more importantly, they will also identify and help secure the required resources should rapid response actions and strategic long-term management be necessary in the near future.

In conjunction with these issue-specific plans, the City should **enhance its overall approach to urban forest pest, disease, and invasive species management** through developing detailed management guidance for other urban forest pests, diseases, and invasive species; promoting community awareness and stewardship; leveraging existing partnerships and support networks; and increasing program resources.

Community members, such as residents and businesses, can play an important role in caring for the urban forest. The City should work to **enhance community engagement** in urban forest stewardship. Even simple actions such as tree watering, weeding or mulching can provide significant benefits for trees, and opportunities for even greater involvement can be facilitated by the City.

Establishing a small-scale urban forest product utilization program may serve to divert higher-value resources from the waste stream, supporting the City's broader waste reduction and conservation efforts and policies. Such a program would also build urban forest awareness, promote engagement, and support local small businesses.

Strategic Goal 3: Grow

Growing the urban forest involves much more than simply planting trees. Instead of tree planting, the term tree establishment is preferred and encompasses actions such as planning to ensure that appropriate planting sites and tree species are selected, design and construction of high-quality tree growing environments, proper tree planting, and the post-planting maintenance necessary to ensure that trees thrive for the long-term.

Through the implementation of the Urban Forest Management Plan, the City of Lethbridge and its urban forest partners will achieve the strategic goal to:

Expand the extent of the urban forest, strengthen its resilience against stressors, and enhance its capacity to provide functional services to the community.

Objective 3.1: Establish and pursue urban forest targets

The City and its partners will pursue aspirational yet achievable metrics for urban forest structure and function, to be realized at various scales.

Objective 3.2: Establish more trees through development and capital projects

The City and its partners will ensure that development and capital projects become important mechanisms for growing the urban forest, enhancing urban forest function, and achieving other urban forest targets.

Objective 3.3: Ensure all new trees are provided with adequate post-planting maintenance

The City and its partners will ensure that all newly planted trees survive and thrive.

Objective 3.4: Encourage community engagement in growing the urban forest

The City and its partners will engage community members in establishing new trees, contributing to the realization of urban forest targets and promoting community pride in the urban forest.

An Evans cherry (Prunus cerasus), with its slightly tart fruit ready for harvest in one of Lethbridge's "Edible Orchards".



Current status - Grow

Tree establishment in Lethbridge takes place as part of City urban forestry operations and capital projects, through land development, and through private land stewardship and landscaping.

The 2010 City of Lethbridge Integrated Community Sustainability Plan/Municipal Development Plan (ICSP/MDP) recognizes trees as “a key element to good quality urban design” and states that “every opportunity available should be taken to increase” the urban forest. Policy support for growing the urban forest is notably absent from other **statutory plans**, with the notable exception of the London Road Area Redevelopment Plan (LRARP) (*see box, right*).

The LRARP states that “space should ... be retained in the boulevard for the future phased replanting of street trees” and provides guidance for compensation planting if trees cannot be accommodated on development parcels.

The City's Land Use Bylaw No. 6300 (LUB) requires that all Development Permit applications include a planting plan developed in accordance with municipal guidelines; however, many common forms of development are exempt from this permitting process and from associated planting requirements unless required by an area-specific plan. Overall, the LUB is insufficiently prescriptive in requiring tree establishment through most forms of new and infill development in Lethbridge.

Research studies and urban forestry best practices suggest that healthy large-statured urban trees require at least 30 m³ of high-quality soil to thrive—the approximate equivalent of a standard 20' shipping container.

City tree establishment programs are not currently guided by established goals or targets, and a limited palette of tree species is used due to the city's difficult growing conditions. This may result in missed opportunities to strengthen resilience and address area-based needs for urban forest services, such as air quality improvement, shading, stormwater control, or others. The City recently increased its capacity to water newly planted trees and will now provide watering for five years following planting, which represents a significant improvement over previous practices and will

improve outcomes for tree health and growth. Increased watering is facilitated by a new approach to tree planting, which will see annual tree plantings concentrated in quadrants of the city on a rotating basis.

While the City's tree-related standards and specifications are generally of good quality, some roadway construction standards do not provide adequate growing space for trees and there are no minimum requirements for soil volumes for new tree growing sites (*see box, above*). In new developments, challenges in development sequencing and staging may see trees planted before other infrastructure is completed, occasionally resulting in tree injury, soil compaction, and other problems.

Strategies - Grow

The City and its partners should **establish and pursue realistic urban forest targets** and **strengthen policy and statutory plan support** for tree establishment and green infrastructure. Strengthening these policies would support planning decisions at various levels that require the provision of high-quality growing environments and long-lived and functional trees through the development process, and would further encourage the protection of existing trees (see Strategic Goal 4).

Based on neighbourhood-level analyses of tree species composition and age classes, the City should **develop area-based tree establishment and succession plans**, especially in neighbourhoods with an abundance of vulnerable species (e.g., elm or ash) or older trees.

Tree monitoring, watering, mulching, structural pruning and other **post-planting tree maintenance should be enhanced** for trees planted through both land development and municipal operations. In new developments, this could be accomplished by requiring developers to track and report on the level of care provided to newly planted trees, or by transferring the responsibility for tree establishment and care directly to the City on a cost recovery or similar basis.

Growing site-related challenges to tree health, longevity and functional capacity can be mitigated through improved site assessment; matching of species tolerances, requirements and other characteristics to their growing sites; and the **design and provision of enhanced tree growing environments**—particularly with adequate soil volumes. The City should adopt practices to enhance growing site assessment and species selection and develop policies, standards and specifications for improved tree growing environments through development and capital projects.

Perhaps second only to invasive weed pulls in the Oldman River valley, community-involved tree planting is the most popular form of community engagement in urban forest stewardship on public lands in Lethbridge. While community tree planting events are limited, opportunities for engagement in other aspects of tree establishment should be made available, and may include post-planting survival monitoring, watering, mulching, and weeding. The City should **increase opportunities for community engagement** in establishment and stewardship on public lands.

*Parks Operations staff
plant new trees in parks
throughout Lethbridge.*



Strategic Goal 4: Protect

Site disturbance related to development, infrastructure works, or other land use changes and site alterations is among the most significant stressors upon existing trees in Lethbridge. Moreover, even in optimal growing conditions, trees planted today will take decades to mature, and many trees may never achieve their full genetic potential to deliver important economic, health and community, and environmental services. Therefore, protecting existing trees is the least costly and most effective way to sustain valuable urban forest services. Development and other site alterations may also provide opportunities for urban forest enhancement and renewal on both private and public lands.

Through the implementation of the Urban Forest Management Plan, the City of Lethbridge and its urban forest partners will achieve the strategic goal to:

Protect existing trees and their growing environments against injury and destruction wherever possible, particularly during land development and land use change, through a coordinated tree protection program.

Objective 4.1: Strengthen policies to better protect the urban forest

The City and its partners will ensure that efforts to protect the urban forest are more strongly supported by high-level policies, standards and specifications.

Objective 4.2: Implement a comprehensive tree protection program

The City and its partners will ensure the implementation of a broad range of practices that contribute to the enhanced protection of existing trees.

Objective 4.3: Deploy non-regulatory tools to encourage urban forest protection

The City and its partners will encourage community members to protect trees for their intrinsic values and benefits.

Current status - Protect

The ICSP/MDP's policy recognition of trees as an element of good urban design provides some support for protecting the urban forest, but policy guidance in Lethbridge's highest-level statutory plan is otherwise limited to direction to "maintain and expand the urban forest". More detailed guidance for protecting the urban forest, such as outlining specific policy tools or procedures, is absent from the ICSP/MDP.

The LRARP notes that, “the preservation of the existing mature street trees were [sic] one of the biggest priorities identified by residents” and provides built form regulations for tree protection, including guidance to retain existing healthy vegetation on-site where possible and to replace or otherwise compensate for the removal of healthy trees.

Land Use Bylaw No. 6300 includes several clauses pertaining to tree protection during site disturbance, but plan submission requirements are generally limited to mature trees. Effectively, the LUB can be interpreted as encouraging but not actually requiring tree protection, and many types of development are exempt from various bylaw provisions. Three other City ordinances—the Cemeteries, Parks and Streets bylaws—confer protection to City-owned trees, but are rarely enforced, are not supported by a tree protection policy, and carry inadequate fines to discourage unauthorized tree injury. Provisions for tree identification or protection planning are also notably absent from the Lot Grading bylaw. There is no private tree protection bylaw in Lethbridge, and the Alberta *Municipal Government Act* does not currently allow municipalities in the province to enact such bylaws.

In 2016, the City of Edmonton requested that the Province grant it powers to enact a private tree bylaw. This has not occurred to date, but all Alberta municipalities should continue to monitor developments on this issue.

In the absence of a tree protection bylaw, Edmonton encourages private tree protection through incentives such as reduced landscaping requirements when mature trees are preserved during development and construction.

The City’s Design Standards and Construction Specifications manuals do not include standards or specifications for common tree protection measures such as tree protection zones (TPZs), protective barriers, root-sensitive excavation, or others. The absence of such standards contributes to ineffective tree protection under various site disturbance scenarios, including land development, infrastructure works, capital projects, and routine operations. Several City guidelines for works in the road right-of-way include requirements for tree protection, but despite frequent compliance do not always succeed in effectively protecting City trees.

City departments and divisions engaged in development application review generally enjoy a collaborative working relationship. However, the absence of a formal process or clear policy for resolution of tree-related issues leads to inconsistent tree protection. Site inspection and compliance enforcement of approved tree protection measures are limited.

When City-owned trees are approved for removal to accommodate development or other interests, the Urban Forestry section typically requires compensation in the form of tree planting. A 3:1 tree planting to removal compensation ratio is usually requested, although this level of compensation is occasionally not obtained by the City.

Strategies - Protect

There is a need to **enhance all aspects of the City's approach to tree protection.**

Key actions will include:

- enacting a public tree protection bylaw to update and consolidate protections for City-owned trees
- establishing a tree protection policy to define responsibilities, procedures, and standards for tree protection and compensation
- developing standards and specifications for tree protection measures such as tree protection zones (TPZs), protective barriers, compaction protection, root-sensitive excavation, tree-sensitive grading, and others
- enhancing development application and application review processes to improve the identification, communication and resolution of tree-related issues
- enhancing site inspection and compliance enforcement, and
- improving public education and awareness about the importance of tree protection

Beyond these improvements, future revision or development of **higher-level statutory plans, strategies, policies, and standards** should reflect the community's commitment to more effective tree protection. For example, the City's anticipated implementation of new infill infrastructure standards will provide an opportunity to adopt a stronger approach to tree protection, while future statutory plans (such as a new Area Redevelopment Plans) should build on the tree protection policies established in the LRARP.



A golden autumn canopy over downtown Lethbridge.

Strategic Goal 5: Engage

A significant proportion of Lethbridge's urban forest is found on private, commercial and institutional lands, where the City has limited influence over urban forest management. Lethbridge's residents, businesses and other community members may positively or adversely affect the urban forest through their decisions and actions, so it is important to engage them as partners in effective urban forest stewardship.

Through the implementation of the Urban Forest Management Plan, the City of Lethbridge and its urban forest partners will achieve the strategic goal to:

Encourage all members of the community to engage in urban forest stewardship on both public and private lands, and build strong urban forest partnerships.

Objective 5.1: Develop an urban forest engagement program

The City and its partners will implement a broad set of approaches to encourage community awareness of the urban forest and engagement in urban forest stewardship on private and public lands.

Objective 5.2: Strengthen existing, and develop new, urban forestry partnerships

The City and its partners will ensure that various stakeholders' urban forest-related activities are coordinated and that partners' unique strengths are leveraged towards achieving shared goals and objectives for the urban forest.

Current status – Engage

The City's website and social media channels are important points of contact between the City and community residents. These outlets are regularly updated and provide information about City initiatives, events, and engagement opportunities, including some related to urban forest stewardship. The City's urban forestry web portal has recently been updated and enhanced, and provides information about urban forest benefits and the City's urban forest management program. However, community and stakeholder engagement in urban forest stewardship has largely been undertaken on an *ad hoc* and opportunistic basis and with limited coordination by the City.

To date, few opportunities for active community engagement in urban forest stewardship on public lands have been available, and their promotion has been limited. For example, the ability for residents to request tree planting on public lands, such as the road right-of-way fronting residential properties, is not publicized. There is no 'Adopt-a-Tree' or similar program to encourage more active community involvement in basic tree care or urban

forest monitoring. Opportunities for community-involved tree establishment have been limited, although this is due in part to a limited number of suitable locations for large-scale naturalization plantings on the developed tablelands, which are the most suitable type of planting event for community member involvement in Lethbridge. A notable success in community-involved stewardship is the Conservation Volunteers program—led by the Helen Schuler Nature Centre—which has engaged over 1,800 volunteers in environmental clean-ups and invasive weed pulls in the coulees and river valley.

The City of Lethbridge highly values civic engagement in decision-making processes that shape the community. A key engagement initiative has been the *Get Involved Lethbridge* campaign, which has provided engagement opportunities such as community chalkboards and the 'kitchen table conversations toolkit', and was used to engage residents in providing input into this UFMP through a series of "Community Conversations" days. The City has also engaged with several community groups in the development of Area Redevelopment Plans—including the London Road ARP, which includes a number of urban forest policies.

There are multiple community-involved standing and special purpose committees of Council in Lethbridge, but there is currently no environmentally-focused committee and urban forest management does not fit the mandate of any existing committee.

Urban Forestry section staff routinely and effectively cooperate with external agencies and groups such as the Society to Prevent Dutch Elm Disease (STOPDED), the Canadian Food Inspection Agency (CFIA), the Provincial government, and Lethbridge County on urban forest management actions such as Dutch elm disease management, elm bark beetle trapping, emerald ash borer monitoring, and others. City staff have worked with Environment Lethbridge to promote the city's "Edible Orchards", but engagement of other stakeholders and local groups in urban forestry issues has otherwise been limited.



Lethbridge College students engaged in stewardship, including native species planting, in the Oldman River valley.

Strategies - Engage

The Urban Forest Management Plan survey conducted as part of the UFMP development process shows that many Lethbridge residents recognize the value of the urban forest. However, many others may remain unaware of the wide-ranging and valuable economic, health and community, and environmental services provided by the city's trees. **Building awareness of the urban forest** and its value, vulnerabilities and opportunities will encourage stewardship on private lands and promote community participation in caring for, protecting, and growing Lethbridge's urban forest.

While some effective and valuable outcomes have already been achieved through the City's efforts to engage the community in the urban forest, opportunities for broader engagement should be identified, prioritized and implemented by a **dedicated and appropriately resourced urban forest engagement program**. These opportunities may include, among others:

- park and street tree watering, mulching, and monitoring through an 'Adopt-a-Tree'-program
- a heritage tree hunt or tree tours
- tree planting and stewardship events, particularly in the city's natural areas
- community-involved awareness building, such as an urban forest ambassador program
- partnership with Lethbridge School District No. 51 and Holy Spirit Catholic School Division to plant trees and deliver urban forestry education, and
- establishment of an urban forestry or environmental committee to Council

While City staff have effective working partnerships with several external agencies, opportunities to **enhance the effectiveness of partnerships** should be sought. Moreover, the City should seek to **expand the range and diversity of partnerships** to support broader urban forest management objectives.

Adaptive management and monitoring

Effective resource management requires that issues be assessed and understood before solutions are designed and implemented. Adjustments can then be made based upon experience gained and new information collected. Adjusted approaches are implemented and the evaluation cycle continues for as long as necessary to accomplish the desired goals or to accommodate changing environmental, social or policy directions. This approach is known as adaptive management and is directly applicable to urban forest management.

Objective for Adaptive Management and Monitoring

Adopt an active adaptive management approach for all aspects of urban forest management

The City and its partners will ensure that active adaptive management, whereby approaches are adjusted in response to observed outcomes and new information, is implemented for all aspects of urban forest management.

Adaptive management

Adaptive management of Lethbridge's urban forest will be implemented through regular and periodic review of the status of the UFMP. Periodic plan review will entail consolidation of monitoring data and analyses, updating the Criteria and Indicators (C&I) assessment, tracking the implementation status of UFMP actions, and assessing progress towards achieving UFMP goals and objectives. Periodic plan review will be undertaken every five years, near the conclusion of each of four **UFMP management periods**, and may result in the development of new goals, objectives, targets or urban forest management actions.

In Regina, the Forestry & Pest Control Operations unit publishes an annual State of the Urban Forest report. The report includes urban forest status updates and outlines directions for urban forest management, facilitating adaptive management.

Monitoring

Adaptive management will be informed by regular and comprehensive monitoring. Monitoring will track changes and trends in indicators such as canopy cover, diversity, tree health and risk, and provision of services, among others. Other monitoring steps will include periodic benchmarking; 'check-ins' with urban forest stakeholders; and maintaining ongoing situational awareness to proactively identify emerging threats, challenges, and opportunities. Monitoring tools to be deployed will include maintaining the urban forest inventory, various technical assessments and data analyses (e.g., i-Tree Eco, aerial imagery analysis), stakeholder consultation, and the Criteria and Indicators (C&I) framework (see page 17).



Action Plan

The autumn colours of American elms cast a golden glow on 7th Street South in Lethbridge.

UFMP actions

The Action Plan section of the Lethbridge UFMP presents a summary of 48 actions to be implemented within the 20-year planning horizon. Action summaries include:

- Action item description
- Action priority (*see box, right*)
- Implementation partners
- Estimated resource requirements

More detailed action guidance can be found in the Urban Forest Action Plan section of the comprehensive Lethbridge UFMP technical report, available for viewing from the City of Lethbridge.

Prioritizing UFMP Actions

Action priority ranking considers three elements: **Impact**, **Challenge**, and **Resources**.

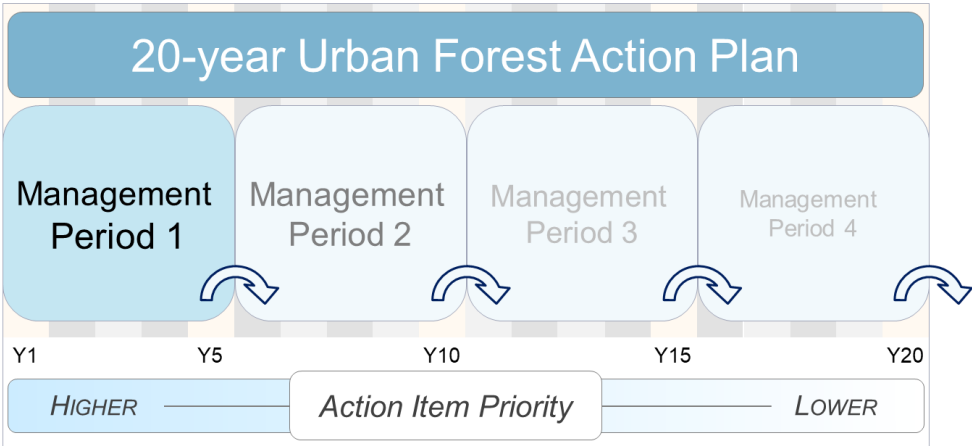
Actions which contribute more to achieving UFMP goals and objectives have a higher Impact score. An action's Impact score is weighted to account for one-half of the total.

Actions that are more complex to implement, necessitate significant changes to policies or processes, or require the coordinated involvement of multiple stakeholders, have a lower Challenge score.

Actions requiring relatively more time or human or financial resources have a lower Resources score.

Actions and UFMP management periods

To permit flexibility and facilitate adaptive management, recommended actions are not assigned to be completed in a specific five-year UFMP management period, although higher-priority actions should generally be implemented in the earlier management periods. However, if opportunities to implement lower-priority actions arise earlier than reflected in their priority ranking they should be utilized to the fullest extent possible. The relationship between UFMP management periods and action item priority is depicted below.



The relationship between UFMP management periods and action priority.

Implementation leads and partners

The Urban Forestry section of Parks is generally considered the 'home' of urban forest management in Lethbridge and will be the lead City division responsible for UFMP action implementation. However, Parks will require the support of diverse partners to implement many of the recommended actions outlined in the UFMP.

Action plan partners

- AM – Asset Management, Infrastructure Services
- CC – Corporate Communications, City Manager's Office
- CM – City Manager and Senior Management Team
- CS – City Solicitor
- EU – Electric Utility, Infrastructure Services
- Ext. – other external stakeholders
- FS – Facility Services, Community Services
- HS – Helen Schuler Nature Centre, Community Services
- IRM – Integrated Risk Management, Corporate Services
- LL – Lethbridge Land
- PDS – Planning and Development Services, Infrastructure Services
- Res. – residents, including individuals and groups
- RS – Regulatory Services, Community Services
- T – Transportation, Infrastructure Services
- UC – Urban Construction, Infrastructure Services
- WWU – Water and Wastewater Utilities, Infrastructure Services

Funding the UFMP action plan

In addition to the City's tax- and fee-supported General Fund and Capital Improvement Program (CIP), several other tools and approaches to finance urban forest management initiatives in Lethbridge may be available and should be investigated. These may include:

- **Community Revitalization Levy (CRL):** borrowing against future property tax revenues to support new infrastructure and spur development in a defined area
- **Density bonusing:** permitting increased development density in exchange for amenities or other community benefits
- **Local improvement and special taxes:** levies to support enhanced infrastructure or levels of service in a defined area of the municipality
- **Grants:** external funding opportunities from agencies and organizations
- **Reserve funds:** dedicated accounts to support defined initiatives, funded by general allocations, interest accrual and growth, and deposits of urban forestry-related fees
- **Cost recovery:** assessing fees to support some municipal programs and services
- **Fundraising and philanthropy:** in-kind or financial support from citizens, groups, foundations or corporations to support projects and initiatives

UFMP action summary and priority

The Lethbridge UFMP Action Plan outlines 48 recommended actions to be implemented within the 20-year planning horizon. These actions are summarized by priority, below.

| Priority | Action |
|---------------|--|
| Highest | Develop a tree risk management policy |
| | Pursue additional program resourcing opportunities |
| | Support and monitor the enhanced tree watering program |
| | Promote post-planting tree care by residents |
| | Establish an interdepartmental urban forestry working group |
| | Prepare annual urban forest management reports |
| High | Enhance tree inventory data quality |
| | Develop an emerald ash borer (EAB) response/management plan |
| | Enhance MDP policies to support urban forest protection |
| | Require a 'tree questionnaire' for building permit and development applications |
| | Ensure circulation of Urban Forestry section on all applications with potential tree conflicts |
| | Collect full compensation for discretionary removal or injury of City-owned trees |
| Moderate-High | Inventory high-priority tree species on private lands |
| | Update Criteria and Indicators on a periodic basis |
| | Update the urban forest inventory on a periodic basis |
| | Maintain and enhance existing proactive urban forest maintenance operations |
| | Assess, prioritize and maintain trees in natural areas |
| | Enhance the young tree maintenance program |
| | Enhance tree risk assessment and management capabilities |
| | Enhance urban forest diversity |
| | Increase tree/shrub establishment requirements for new development |
| | Undertake tree protection inspection and enforcement |

| Priority | Action |
|--|---|
| High | Provide other incentives for tree protection |
| | Enhance urban forestry programs and educational content |
| | Undertake periodic UFMP review |
| Moderate | Undertake stakeholder consultation on a periodic basis |
| | Integrate urban forestry assets with broader City asset management systems |
| | Review and enhance tree-related guidelines, standards and specifications |
| | Enhance tree inspection and final acceptance process |
| | Identify partners and sites for community-involved urban forest enhancement |
| | Provide resource support for community-involved urban forest enhancement |
| | Develop a tree protection policy, standards and specifications |
| | Retain securities for protection of City-owned trees |
| | Enhance awareness of tree protection benefits and approaches |
| | Establish environmental or urban forestry standing committee |
| | Create an urban forest education/stewardship coordinator staff position |
| | Engage with local stakeholders on urban forestry issues |
| | Undertake a Potential Plantable Area (PPA) assessment |
| | Develop a tree establishment prioritization tool |
| | Assess feasibility of City-led tree planting in new developments |
| Assess the feasibility of a private tree bylaw | |
| Low-Moderate | Develop a pest, disease and invasive species management strategy |
| | Develop an 'Adopt-a-Tree' program |
| | Use tree planting prioritization tool to develop strategic tree establishment plans |
| | Establish, and assess requirements to achieve, land use-based canopy cover targets |
| | Enact a public tree protection bylaw |
| Low | Undertake a sample-based urban forest study |
| | Facilitate external user access to urban forest inventory |

UFMP action implementation summary

Summary guidance for UFMP action implementation is presented in this section. Actions are grouped according to their related UFMP strategic goal and objectives. Unless otherwise noted, estimated resources are capital budget items.

Strategic Goal 1: Understand

Objective 1.1 – Increase knowledge about the urban forest

| # | Action | Priority (Impact, Challenge, Resources) | Partners | Resources |
|-------|---|--|----------------|-----------|
| 1.1.1 | Undertake a Potential Plantable Area (PPA) assessment | Moderate (M, M, M) | PDS | \$50,000 |
| 1.1.2 | Inventory high-priority tree species on private lands | Moderate-High (H, M, M) | CC | \$12,000 |
| 1.1.3 | Undertake a sample-based urban forest study | Low (M, H, H) | CC, Ext., Res. | \$75,000 |

Objective 1.2 -Develop and implement an urban forest monitoring framework

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|-------------------------|----------------|--------------------|
| 1.2.1 | Update Criteria and Indicators on a periodic basis | Moderate-High (M, L, L) | None assigned | Existing resources |
| 1.2.2 | Update the urban forest inventory on a periodic basis | Moderate-High (H, M, M) | AM | \$10,000 |
| 1.2.3 | Undertake stakeholder consultation on a periodic basis | Moderate (M, M, L) | CC, Ext., Res. | Existing resources |

Objective 1.3 - Enhance the utility of urban forest data for decision-making and operations

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|--------------------|----------|--------------------|
| 1.3.1 | Integrate urban forestry assets with broader City asset management systems | Moderate (M, M, L) | AM, IT | Existing resources |
| 1.3.2 | Enhance tree inventory data quality | High (H, M, L) | AM | Existing resources |
| 1.3.3 | Facilitate external user access to urban forest inventory | Low (L, L, M) | AM, IT | Existing resources |

Strategic Goal 2: Maintain

Objective 2.1 - Maintain and enhance the functional capacity of existing trees through improved tree maintenance practices

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|---|-------------------------|---------------|-----------|
| 2.1.1 | Maintain and enhance existing proactive urban forest maintenance operations | Moderate-High (H, M, M) | None assigned | TBD |
| 2.1.2 | Assess, prioritize and maintain trees in natural areas | Moderate-High (H, M, M) | None assigned | TBD |
| 2.1.3 | Enhance the young tree maintenance program | Moderate-High (H, M, M) | None assigned | TBD |

Objective 2.2 - Reduce tree-related risk

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|-------------------------|----------|--------------------|
| 2.2.1 | Develop a tree risk management policy | Highest (H, L, L) | IRM | Existing resources |
| 2.2.2 | Enhance tree risk assessment and management capabilities | Moderate-High (M, L, L) | IRM | TBD |

Objective 2.3 - Enhance the City's ability to respond to existing and emergent pests, pathogens and invasive species

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|------------------------|----------------|-----------|
| 2.3.1 | Develop an emerald ash borer (EAB) response/management plan | High (H, M, L) | None assigned | \$10,000 |
| 2.3.2 | Develop a pest, disease and invasive species management strategy | Low-Moderate (M, H, M) | HS, Ext., Res. | \$20,000 |

Objective 2.4 - Encourage community engagement in urban forest maintenance

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|-----------------------------------|------------------------|----------------|--------------------|
| 2.4.1 | Develop an 'Adopt-a-Tree' program | Low-Moderate (M, H, M) | CC, Res., Ext. | Existing resources |

Objective 2.5 - Supplement regular resources for urban forest management

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|--------------------|--|--------------------|
| 2.5.1 | Pursue additional program resourcing opportunities | Highest (H, L, L) | City Manager's Office (City Treasurer, Grant Administrator) | Existing resources |

Strategic Goal 3: Grow

Objective 3.1 - Establish and pursue urban forest targets

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|---|-------------------------|---------------|--------------------------|
| 3.1.1 | Enhance urban forest diversity | Moderate-High (H, M, M) | LL, UC | Existing resources |
| 3.1.2 | Develop a tree establishment prioritization tool | Moderate (M, M, M) | None assigned | Included in Action 1.1.1 |
| 3.1.3 | Use tree planting prioritization tool to develop strategic tree establishment plans | Low-Moderate (M, H, M) | Res., Ext. | Existing resources |
| 3.1.4 | Establish, and assess requirements to achieve, land use-based canopy cover targets | Low-Moderate (L, M, L) | None assigned | Existing resources |

Objective 3.2 - Establish more trees through development and capital projects

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|-------------------------|---|--------------------|
| 3.2.1 | Review and enhance tree-related guidelines, standards and specifications | Moderate (H, H, M) | UC, PDS, EU, WWU, LL, T | Existing resources |
| 3.2.2 | Increase tree/shrub establishment requirements for new development | Moderate-High (H, H, L) | PDS, UC | Existing resources |
| 3.2.3 | Assess feasibility of City-led tree planting in new developments | Moderate (L, L, L) | PDS, UC, LL, Ext. (development community) | Existing resources |

Objective 3.3 - Ensure all new trees are provided with adequate post-planting maintenance

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|--------------------|---|--------------------|
| 3.3.1 | Enhance tree inspection and final acceptance process | Moderate (M, L, M) | PDS, UC, LL, Ext. (development community) | Existing resources |
| 3.3.2 | Support and monitor the enhanced tree watering program | Highest (H, L, L) | None assigned | Existing resources |
| 3.3.3 | Promote post-planting tree care by residents | Highest (H, L, L) | CC, WWU, EU | \$5,000 |

Objective 3.4 - Encourage community engagement in growing the urban forest

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|---|--------------------|----------|--------------------|
| 3.4.1 | Identify partners and sites for community-involved urban forest enhancement | Moderate (M, M, L) | CC, Ext. | Existing resources |
| 3.4.2 | Provide resource support for community-involved urban forest enhancement | Moderate (M, L, M) | Ext. | \$20,000 |



Strategic Goal 4: Protect

Objective 4.1 - Strengthen policies to better protect the urban forest

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|------------------------|------------------|--------------------|
| 4.1.1 | Enhance MDP policies to support urban forest protection | High (H, M, L) | PDS | Existing resources |
| 4.1.2 | Develop a tree protection policy, standards and specifications | Moderate (H, H, M) | PDS, UC, EU, WWU | \$20,000 |
| 4.1.3 | Enact a public tree protection bylaw | Low-Moderate (M, M, H) | RS, PDS, UC | Existing resources |
| 4.1.4 | Assess the feasibility of a private tree bylaw | Moderate (L, L, L) | CS, RS | Existing resources |

Objective 4.2 - Implement a comprehensive tree protection program

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|-------------------------|-------------|--------------------|
| 4.2.1 | Require a 'tree questionnaire' for building permit and development applications | High (H, M, L) | PDS | Existing resources |
| 4.2.2 | Ensure circulation of Urban Forestry section on all applications with potential tree conflicts | High (H, M, L) | PDS | Existing resources |
| 4.2.3 | Collect full compensation for discretionary removal or injury of City-owned trees | High (H, M, L) | PDS, RS, CS | Existing resources |
| 4.2.4 | Retain securities for protection of City-owned trees | Moderate (M, M, L) | PDS, RS, CS | Existing resources |
| 4.2.5 | Undertake tree protection inspection and enforcement | Moderate-High (H, M, M) | PDS, RS, CS | Existing resources |

Objective 4.3 -Deploy non-regulatory tools to encourage urban forest protection

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|-------------------------|-----------------------------|--------------------|
| 4.3.1 | Enhance awareness of tree protection benefits and approaches | Moderate (M, M, L) | CC, Ext., Res. | Existing resources |
| 4.3.2 | Provide other incentives for tree protection | Moderate-High (H, M, M) | PDS, Ext. (BILD Lethbridge) | Existing resources |

Strategic Goal 5: Engage

Objective 5.1 -Develop an urban forest engagement program

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|---|-------------------------|-------------|--|
| 5.1.1 | Establish environmental or urban forestry standing committee | Moderate (M, M, L) | Ext., Res. | \$95,000 (operating) \$10,000 (capital) |
| 5.1.2 | Create an urban forest education/stewardship coordinator staff position | Moderate (H, M, H) | CC, PDS, UC | Existing resources |
| 5.1.3 | Enhance urban forestry programs and educational content | Moderate-High (H, M, M) | CC | Existing resources |



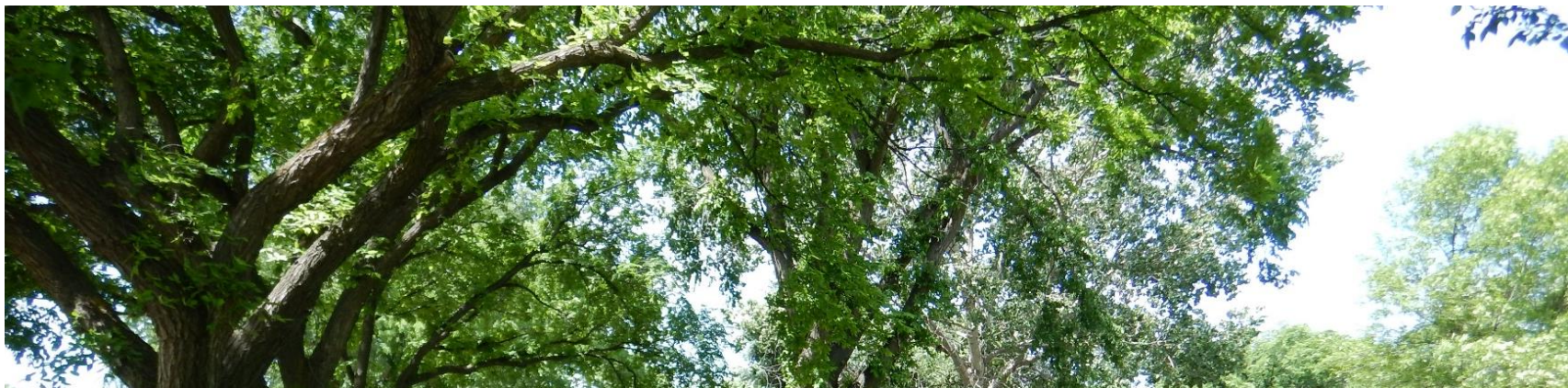
Objective 5.2 -Strengthen existing, and develop new, urban forestry partnerships

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|---|--------------------|---|--------------------|
| 5.2.1 | Establish an interdepartmental urban forestry working group | Highest (H, L, L) | AM, CC, CS, EU, FS, HS, LL, PDS, RS, T, UC, WWU | Existing resources |
| 5.2.2 | Engage with local stakeholders on urban forestry issues | Moderate (M, M, L) | Ext. | Existing resources |

Adaptive management

Objective: Adopt an active adaptive management approach to all aspects of urban forest management

| # | Action | Priority (I, C, R) | Partners | Resources |
|-------|--|-------------------------|---------------|--------------------|
| 6.1.1 | Prepare annual urban forest management reports | Highest (H, L, L) | None assigned | Existing resources |
| 6.1.2 | Undertake periodic UFMP review | Moderate-High (H, M, M) | None assigned | \$25,000 |



Glossary

Adaptation (climate change)

Actions taken to help communities and ecosystems cope with changing climate conditions. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate harm or exploit beneficial opportunities.

Adaptive management

A systematic process for continuously improving management policies and practices by learning from the outcomes of previously employed policies and practices. In active adaptive management, management is treated as a deliberate experiment for the purpose of learning.

Best practices (best management practices)

Procedures accepted, prescribed or demonstrated by scientific and technical research or industry peers, as producing optimal results and proposed as standards suitable for widespread adoption.

Drought stress

The interruption of normal plant biological processes (e.g., growth, photosynthesis, transpiration, etc.) due to excessively low water content in plant tissues and cells.

Ecoregion

A subdivision of an ecoprovince, characterized by distinctive regional ecological factors, including climate, physiography, vegetation, soil, water, and fauna.

Genus (genera)

A principal taxonomic category of organisms that ranks above species and below family, and is denoted by a capitalized Latin name, e.g., *Acer* (maple).

Green infrastructure

The natural vegetative systems and green technologies that provide society with a multitude of economic, environmental and social benefits. These may include urban forests and woodlands; bioswales, engineered wetlands and stormwater ponds; wetlands, ravines, waterways and riparian zones; meadows and agricultural lands; green roofs and green walls; urban agriculture; parks, gardens and grassed areas; soils in volumes and qualities adequate to sustain green infrastructure and absorb water; technologies such as porous pavements, rain barrels and cisterns; and others.

Infrastructure

The physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions and maintain the surrounding environment. Examples of infrastructure include roads, bridges, water supply and sewage systems, and electrical and communications networks.

Integrated Pest Management

The maintenance of detrimental insects, weeds and other organisms at tolerable levels utilizing a combination of cultural, physical/mechanical, biological, and microbial/chemical pesticide control methods to keep environmental impacts to a minimum.

Invasive species

A plant, animal or pathogen that has been introduced to an environment where it is not native and where it may become a nuisance through rapid spread and/or population growth, often to the detriment of indigenous species or ecosystem functions.

ISA Certified Arborist®

An arborist who has passed an exam administered by the International Society of Arboriculture (ISA) and maintains the certification credential through continuing education.

Leaf area

The surface area of a leaf or leaves. Most urban forest services increase directly or indirectly with an increase in the leaf area of the urban forest.

Potential Plantable Area (PPA)

Land that is suitable for indefinite use as tree habitat and not constrained by competing existing or projected site uses or land use values.

Sequestration (carbon)

The process of removal of atmospheric carbon dioxide gas (CO₂) by plant tissues. In the context of urban forestry, carbon sequestration is typically expressed on an annual basis as the difference in estimated carbon storage between year x and year x+1.

Site disturbance

Any anthropogenic change to existing land surface condition, including but not limited to removal of vegetation, excavation, fill, grading, demolition or construction.

Species

A group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding. The principal natural taxonomic unit, ranking below a genus and denoted by a binomial, e.g., *Acer platanoides* (Norway maple).

Stakeholders

A person, corporation or group with an interest or concern in something.

Statutory plan

A plan developed by a municipality for the purposes of identifying future plans for development within municipal boundaries and the immediately surrounding area. Subdivision and development decisions are required to be consistent with any approved statutory plan; however, municipal councils are not obligated to undertake any of the projects identified within a statutory plan. The *Alberta Municipal Government Act* identifies the following as statutory plans: intermunicipal development plan (IDP), municipal development plan (MDP), area structure plan (ASP), and area redevelopment plan (ARP).

Stewardship

The careful and responsible management of something entrusted to one's care.

Storage (carbon)

A measure of the carbon that is stored within above-ground and below-ground woody vegetation. Trees and other plants sequester atmospheric carbon dioxide gas through photosynthesis and store carbon in stems and roots. Stored carbon can be released back into the atmosphere as plants die and decompose, when it can reform into carbon dioxide gas and contribute to climate change. Carbon sequestered by trees can be permanently stored in wood products.

Structural pruning

Tree pruning with a primary objective of developing solid tree structure, typically characterized by strongly dominant central leader, adequately spaced and well-attached branches, and appropriate stem taper.

Sustainability

The ability to meet the needs of existing organisms without compromising the ability of future generations of organisms to meet their needs.

Urban forest

All the trees and associated vegetative understory in the city, including trees and shrubs intentionally planted, naturally occurring or accidentally seeded within the city limits, as defined in the City of Lethbridge Integrated Community Sustainability Plan / Municipal Development Plan (ICSP/MDP), 2010.

Urban forest canopy cover

The spatial extent or coverage of vegetation (generally trees), commonly expressed as a simple area or as a percentage of total land area.

Urban Heat Island

A significant and observable increase in ground level temperatures in urban areas relative to surrounding rural areas due to the presence of structures and paved areas with greater thermal mass and different surface reflective properties. The temperature differential is typically most apparent and greatest at night, when winds are weak, and during summer and winter. Urban heat islands have the potential to directly and adversely influence the health and welfare of urban populations through direct and indirect causes. Also known as the heat island effect.

Work order management system

The timely processing of work orders, including intake, prioritization, dispatch, tracking, logging, and follow-up inspection. Typically facilitated by computerized maintenance management software (CMMS) and enterprise asset management (EAM) systems. In the context of urban forestry, effective work order management is enabled by integration of tree inventory data with other software systems.

