City of Windsor

Urban Forest Management Plan (UFMP)

Key Findings and Directions Report

Final Report
March 2024

Prepared by Urban Forest Innovations Inc.

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Executive summary

About this document

The City of Windsor Urban Forest Management Plan (UFMP) will establish a comprehensive strategy for the management of the city's urban forest over the coming twenty years and beyond.

This document—**the Key Findings and Directions Report**—represents the technical foundation and rationale underlying the themes, goals, targets, and actions to be outlined in the City of Windsor UFMP. However, this document is not the Urban Forest Management Plan itself.

This document reviews the current state of Windsor's urban forest and assesses the strengths and shortcomings of the City's approaches to urban forest management. This report also identifies the key challenges facing Windsor's urban forest today and in the future; provides strategic direction for Urban Forest Management Plan targets and actions; and reviews relevant best practices for consideration and adoption by the City of Windsor, its urban forest partners, and the broader community.

Windsor's urban forest

For the purposes of the UFMP, Windsor's urban forest is defined as **"a dynamic, human-influenced, ecological system that includes all trees within the municipal boundary."** Conceptually, this definition extends to include various other system components that support or accompany trees, including soils, infrastructure, other woody vegetation, and other elements.

Covering some 19% of the city, Windsor's urban forest contains a mix of planted and naturally regenerated trees, remnant forests, and savannahs, which may grow with or without municipal or community intervention.

While the primary focus of the UFMP is on the municipally owned and managed portion of the urban forest, such as street and park trees and trees in public natural areas, Windsor's urban forest also includes trees on private lands, such as residential, commercial, industrial, and institutional properties. As such, its management is a shared responsibility among a diverse range of actors who may have competing interests and varying levels of resource availability and interest.

Urban tree canopy (UTC)

In 2019, urban tree canopy in Windsor covered some 2,798 hectares, or 19% of the City's total area. An additional 4,010 hectares, or 28% of the land base, was found to be suitable for future urban forest expansion and classified as Potential Plantable Area (PPA). About 58% of Windsor's urban forest is privately-owned, and much of the tree canopy is found in low-density residential (46%) and green space (25%) areas.

Tree canopy cover in Windsor is generally lower than found in other benchmarked southern Ontario municipalities, where cover ranges between 20 and 30 percent.

The value of Windsor's urban forest

The 2020 Windsor tree canopy study estimated the value of four key urban forest services, including air quality improvement, stormwater reduction, carbon sequestration,

and carbon storage. According to this assessment, Windsor's urban forest provides some **$5 million in annual benefits**. This represents a benefit-cost ratio of approximately **$1.80 in services and benefits for every $1 spent** on the City's urban forest management program. The total benefit value (annual benefits plus the value of stored carbon) **exceeds $60 million.**

These figures do not include other tangible and intangible values, such as tree replacement cost, wildlife habitat, community beautification, improved resident health and wellbeing, and many others.

Challenges facing Windsor's urban forest

Like urban forests everywhere, Windsor's urban forest faces challenges that threaten the health, condition, and longevity of trees across the city. These challenges also threaten to reduce the value of benefits and services that the urban forest provides to the community by decreasing the extent and health of the tree canopy, reducing tree longevity, and increasing management costs. Among the most significant challenges are:

- **Program resourcing:** Urban forest program resource levels—currently about 1% of the City's capital budget—constrain the City's ability to deliver a wide range of urban forestry services.
- **Pests, diseases, and invasive species:** Established and emergent pests, diseases, and invasive species threaten trees across the city and in natural areas. Climate change and other stressors can exacerbate these threats, which require proactive and integrated management.
- **Urban growing conditions:** Urban growing environments in new and existing communities are challenging for trees. In new communities, growing environments have degraded and insufficient soils, altered moisture regimes, and infrastructure and utility conflicts. In intensification and infill areas, denser lot coverage removes space for existing and future trees. Urban hardscapes also pose challenges for tree growth and longevity.
- **Private ownership and limited engagement:** 58% of Windsor's urban forest canopy is found on private lands, which provide some of the best tree growing environments but are managed by individual owners, making education and engagement in urban forest stewardship challenging.
- **Need for guidance and regulation:** Windsor's urban forest management program lacks the support of comprehensive strategic, policy, or technical guidance. The absence of a private tree protection by-law leaves decisions about tree injury and removal to property owner discretion.
- **Climate change:** Windsor's urban forest is essential climate change adaptation infrastructure for the community. However, the impacts of climate change also pose significant potential risks as a result of higher temperatures, increased precipitation, and more extreme weather.

Urban forest baseline assessment

A baseline assessment of the current state of Windsor's urban forest and urban forest management program found an overall **Fair** level of performance. Windsor's performance score is 26 points relative to a target performance level of 54 points—a 28-point performance score gap. The baseline assessment provides target performance indicators that will be incorporated into the UFMP strategies and action items.

Directions for Windsor's UFMP

The Key Findings and Directions Report identifies 37 directions for Windsor's Urban Forest Management Plan. These directions are intended to guide the development of Plan goals, targets, and action items.

Windsor's urban forest

- Maintaining the tree inventory
- Integrating the inventory with the City's broader asset management system
- Facilitating information sharing and civic science
- Undertaking change analysis and monitoring
- Establishing and pursuing a tree canopy cover target
- Enhancing urban forest diversity

Maintaining Windsor's urban forest

- Strengthening divisional capacity and organizational structure
- Improving interdepartmental coordination
- Supporting and enhancing proactive tree maintenance programs
- Developing urban forest operating policies and Levels of Service targets
- Enhancing tree risk management
- Enhancing urban forest pest, disease, and invasive species management
- Enhancing natural areas management
- Providing opportunities for urban forest product use

Growing Windsor's urban forest

- Supporting and enhancing existing tree establishment programs
- Enhancing tree establishment through the development process
- Developing consolidated citywide tree growing environment and planting standards and specifications
- Developing a naturalization plan
- Developing a private land tree establishment engagement program

Protecting Windsor's urban forest

- Strengthening Official Plan tree protection policies
- Developing a tree protection policy and standards
- Increasing capacity for application review
- Ensuring consistent and effective tree-related securities and compensation
- Improving monitoring and enforcement
- Improving the Building Permit application process

- Developing a private tree protection by-law
- Updating the City tree by-law
- Addressing natural area encroachment
- Improving tree protection on capital projects
- Building community awareness about tree protection

Partnerships in Windsor's urban forest

- Expand the urban forest outreach and education program
- Enhance outreach and education materials
- Work with partners to develop shared goals and priorities
- Coordinate urban forest partner activities
- Developing a community engagement program around tree establishment care
- Seek additional partners and supports
- Engage partners in urban forest stewardship on public and private lands

Next steps

This Key Findings and Directions Report will inform the development of the **Strategy and Action Plan** component of Windsor's UFMP. The Strategy and Action Plan will be developed through an intensive Phase 2 consultation process with City of Windsor staff, external partners, and other members of the Windsor community.

The Strategy and Action Plan will establish a long-term vision for Windsor's urban forest and outline guiding principles to inform all aspects of urban forest management in the city. The Plan will also outline the goals and targets to be pursued during a 20-year planning horizon and beyond. Finally, the Plan will establish priority-based actions supported by detailed implementation guidance and a monitoring framework to ensure that program goals are met and Windsor's urban forest vision is realized.

Contents

City of Windsor land acknowledgement

The City of Windsor sits on land that is the traditional territory of the Three Fires Confederacy of First Nations, which includes the Ojibwa, the Odawa, and the Potawatomie. The City of Windsor honours all First Nations, Inuit and Métis peoples and their valuable past and present contributions to this land.

Project partner acknowledgement

The City of Windsor Urban Forest Management Plan (UFMP) Key Findings and Directions Report was prepared by Urban Forest Innovations Inc., with geospatial analysis technical support provided by PlanIT Geo LLC. The consulting team acknowledges the invaluable contributions of City of Windsor staff, external partner organizations, and members of the Windsor community throughout the UFMP development and engagement process.

City of Windsor

Yemi Adeyeye - City Forester; Manager, Forestry & Natural Areas

James Chacko - Executive Director, Parks & Facilities

Gaspar Horvath – Parks Operations Asset Analyst

... and the many City of Windsor staff who participated in the Phase 1 engagement sessions and follow-up interviews and took the time to complete the UFMP questionnaire.

External partners

Canadian Food Inspection Agency (CFIA)

Centre for Cities, Faculty of Law, University of Windsor

Citizens Environmental Alliance (CEA)

County of Essex

Essex Region Conservation Authority (ERCA)

The Essex Terminal Railway Company

The Friends of Ojibway Prairie

Tourism Windsor Essex Pelee Island

Unifor 444 Environment Committee

Windsor Essex County Environment Committee (WECEC), fmr.

Windsor/Essex County Humane Society

Windsor-Detroit Bridge Authority (WDBA)

... and all Windsor residents who participated in the UFMP development process.

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Section 1.
Introduction

The City of Windsor—Canada's southernmost city and an international gateway for people and commerce—is a vibrant community of well-defined neighbourhoods and home to nearly 230,000 residents.

Covering some 147 square kilometres of relatively flat topography across three watersheds, the city enjoys a mild climate that supports a natural environment of Carolinian forests and prairie ecosystems.

Windsor is the proud centre of Canada's automotive industry and an emerging green manufacturing centre. Other important industries include light, heavy, and advanced manufacturing; logistics; tourism; and hospitality.

Windsor's urban forest is composed of some 2,798 hectares of tree canopy, covering 19% of the city. Another 28% of the city, or some 4,010 hectares, is suitable as future potential plantable area to expand the urban forest.

Windsor's urban forest provides the entire community with invaluable environmental, economic, and societal benefits.

However, trees in the city face tremendous challenges from urban development, climate change, pests and diseases, and many other stressors.

To address these challenges and ensure that the urban forest is sustainably managed, protected, and enhanced, the City of Windsor is developing its first-ever **Urban Forest Management Plan (UFMP).** This long-term strategy will outline a vision and establish goals and targets for Windsor's urban forest, and propose prioritized action items to be pursued by the city and its partners.

This document is the **Key Findings and Directions Report**—the technical foundation for the UFMP. This report reviews the current status of Windsor's urban forest the City's urban forest management programs based on in-depth critical analysis and engagement with City staff, external partners, and the wider community. This report also identifies the challenges facing Windsor's urban forest today and in the future, and provides strategic directions for Urban Forest Management Plan goals, targets, and action items.

Urban forestry themes

The Key Findings and Direction Report is organized around five **urban forestry themes.** This structure will be carried forward into the UFMP to organize plan goals, targets, and actions items and ensure that all aspects of urban forest management are addressed in a comprehensive manner. The five urban forestry themes include:

- **Windsor's urban forest,** which considers the urban forest as a biological system and reviews the City's urban forest data management systems
- **Maintaining Windsor's urban forest,** which addresses urban forest program structure and tree maintenance operations
- **Growing Windsor's urban forest,** which addresses tree establishment and urban forest enhancement programs
- **Protecting Windsor's urban forest,** which concerns policies and practices in relation to protecting existing trees through the planning process, in capital projects, and on private lands
- **Partnerships in Windsor's urban forest,** which reviews existing and potential urban forest partnerships and programs to engage the community in urban forest stewardship on both City and private lands

Scope of the UFMP

Although the lead entity responsible for the implementation of most of the UFMP will be the City of Windsor, the strategies outlined in the plan will address both the City- and privately-owned portions of the urban forest to varying degrees. The plan will apply to both established communities and lands planned for future development.

Therefore, while both this report and the UFMP will primarily be intended for use by City of Windsor staff, they can also serve as resource and reference documents for Council members, external agencies, non-governmental organizations, private landowners, and any other members of the Windsor community who manage or make decisions related to the urban forest.

Best practices for urban forest management

Appendix 3 of this document presents a comprehensive **compendium of best management practices**, organized around the five key themes of urban forest management.

Windsor: A Tree City of the World

In 2023, Windsor was recognized by the Arbor Day Foundation and the Food and Agriculture Organization (FAO) of the United Nations as one of the Tree Cities of the World. To earn program recognition, the City met five program standards, including:

1. Establishing responsibility for the care of trees,
2. Setting rules to govern the management of trees and forests,
3. Maintaining an updated inventory or assessment of local tree resources,
4. Allocating resources for implementation of a tree management plan, and
5. Holding an annual celebration of trees to raise awareness among residents.

What is the urban forest?

Windsor's Official Plan—the highest-level municipal policy guiding land use decisions in the municipality—does not establish a definition for the city's urban forest. For the purposes of the UFMP, Windsor's urban forest is defined as **"a dynamic, human-influenced, ecological system that includes all trees within the municipal boundary."** Conceptually, this definition extends to include various other system components that support or accompany trees, including soils, infrastructure, other woody vegetation, and other elements.

While the primary focus of the UFMP is on the municipally owned and managed portion of the urban forest, such as street and park trees and trees in City-owned woodlands, Windsor's urban forest also includes trees on private lands, such as residential, commercial, industrial, and institutional properties. As such, its management is a responsibility shared among a diverse range of actors, who may have competing interests and varying degrees of resource availability and interests.

Windsor's urban forest

... covers about 19% (or 2,798 hectares) of the city

... includes some 4,010 hectares (28%) of potential plantable area (PPA) that may be suitable for future urban forest expansion

... is shared among private landowners (58%) and the City and other public agencies (42%)

... is largely found in low-density residential (46%) and green space (25%) land uses

Trees in Windsor's urban forest

Windsor's urban forest is composed of trees and their growing environments found throughout the entire city. These include trees on both private and City-owned lands, such as:

- **Park trees** increase thermal comfort and afford opportunities for shade, creative play, and wildlife habitat, among many other services. Trees located in actively used park areas, such as near playgrounds or sports fields, are more actively managed than those in wooded natural areas, which may not receive any management throughout their lifespan.
- **Street trees** along arterial and residential streets provide many valuable services, such as traffic calming, community beautification, and temperature regulation. Street trees face unique challenges such as compacted soils, pollution, vandalism, salt, high temperatures, and drought.
- **Trees on private property** provide some of the most readily accessible benefits and services, such as shading and cooling buildings, beautifying neighbourhoods, and encouraging connection to nature. Private trees require dedicated stewardship and care, and may face competition for growing space from buildings and infrastructure in intensifying and developing neighbourhoods.
- **Wooded natural areas** may be the remnants of original forests, naturalized farm fields, or reforested lands. Public and private woodlands provide many important services, such as wildlife corridors, biodiversity, carbon storage and sequestration, clean air and water, climate change resiliency, and recreation. Original ecosystems are the foundation for a healthy environment.

Whose urban forest is it?

As in most communities, the municipality may be considered the primary driver behind policies and practices that shape the urban forest. However, other participants, such as residents, advocacy and interest groups, businesses and institutions, and different government agencies, also manage and influence large parts of the urban forest. This highlights the importance of establishing a shared framework of urban forest policies, goals, and targets that reflects the values and priorities of a diverse range of partners.

In Windsor, about 58% (1,612 ha) of the urban forest, as measured by urban tree canopy (UTC) cover, is privately-owned. The remaining 42% (1,186 ha) is owned by the City or other public agencies.

About two-thirds (67% or 2,680 ha) of potential plantable area (PPA) is located on private property across the city. The large share of private ownership of both existing urban tree canopy and potential plantable area poses specific challenges and provides tremendous opportunities for urban forest management.

More detailed analysis and mapping of UTC and PPA distribution by ownership, land use (zoning), ward, and City Incident Management System (IMS) District, can be found in the detailed **Urban Tree Canopy Assessment report.**

Figure 1: Land cover mapping of the city of Windsor, 2020. Dark green areas show existing urban tree canopy cover (UTC), which covers approximately 19% or 2,798 hectares of the city.

Why manage the urban forest?

Windsor's urban forest is the largest part of the city's green infrastructure—a system of assets and natural processes that support the health, safety, prosperity, and livability of the entire community.

Trees and green spaces in the urban forest provide an array of services and benefits that can be grouped into three broad categories: **environmental, economic,** and **societal.** Examples of urban forest services and benefits in each of these categories are explored in more detail on the following page.

Unlike other municipal infrastructure, trees may be the only assets that increase in value and performance as they age. This is because larger and older trees have more leaf area than smaller trees, and leaves are the primary source of many urban forest benefits.

It is therefore important to manage the urban forest proactively from the earliest stages of a tree's life. Effective management can help to ensure successful establishment in the landscape and promote tree health through maturity, maximizing tree longevity and the amount and value of benefits while balancing maintenance costs. Reactive maintenance, on the other hand, simply defers maintenance costs to a future time, such as when costly emergencies arise, and may reduce a tree's overall lifespan and benefits (**Figure 2**).

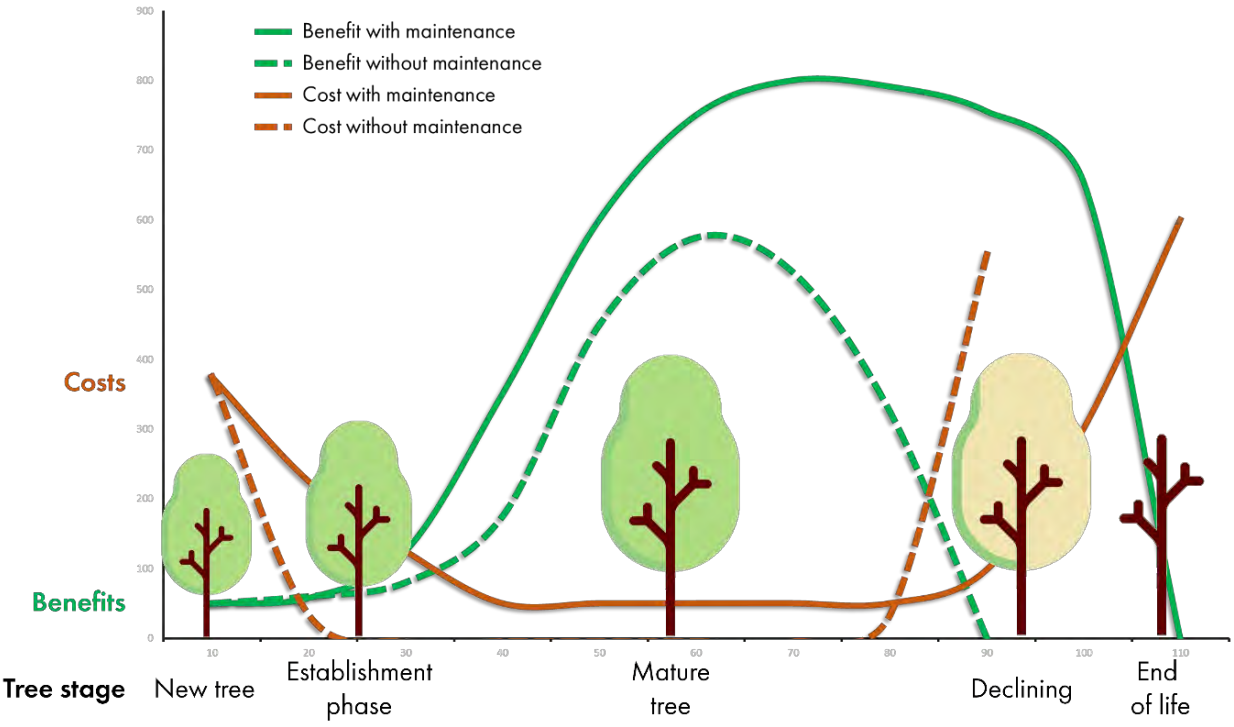


Figure 2: Hypothetical benefit-cost profiles over the life of an individual tree, based on adequate (solid line) and sub-optimal (dashed line) tree asset management and maintenance regimes (adapted from Vogt *et al.*, 2015). The profiles demonstrate that tree longevity and benefits value is increased with early establishment maintenance and periodic maintenance throughout the tree's lifespan; conversely, both tree lifespan and benefits are reduced without periodic maintenance.

The value of Windsor's urban forest

To date, the City has not undertaken a comprehensive urban forest structure or function study, such as an i-Tree Eco assessment, which would be necessary to quantify the amount and value of services provided by the urban forest in detail.

However, the 2020 tree canopy study estimated the value of four key urban forest services: air quality improvement, stormwater reduction, carbon sequestration, and carbon storage.

According to this assessment, Windsor's urban forest provides some **$5 million in annual benefits**. This represents a benefit-cost ratio of approximately **$1.80 in services and benefits for every $1 spent** on the City's urban forest management program. The total benefit value (annual benefits plus the value of stored carbon) **exceeds $60 million.**

These figures do not include other tangible and intangible values, such as tree replacement cost, wildlife habitat, beautification, improved health and wellbeing, and many others.

In addition to the tremendous value of these key services and benefits, Windsor's urban forest is remarkable for the great diversity of tree species that can and do flourish in the city. For example, the Devonwood Conservation Area, located in the Devonshire area just west of the airport and managed by the Essex Region Conservation Authority (ERCA), is home to eight species of oak trees—a level of oak species diversity found in few other locations in Ontario.

Across the city, parks, streetscapes, natural areas, and private properties are home to Carolinian species rarely found outside of Windsor and its neighbouring communities, further highlighting the city's unique position as a hotbed of biological diversity and illustrating the importance of protecting and enhancing Windsor's urban forest.

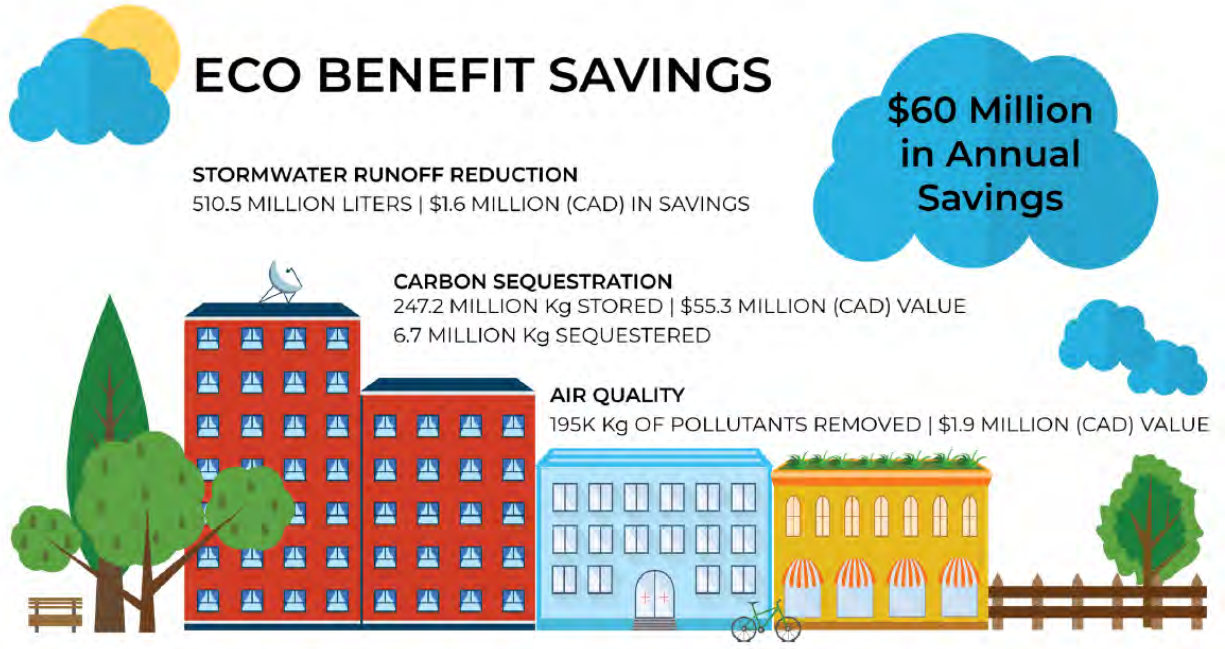


Figure 3: Estimated value of some services and benefits provided by Windsor's urban forest, 2019 data.

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 carbon—the primary driver of global climate change
- Capturing stormwater, reducing flooding and protecting water quality
- Providing wildlife habitat and ecosystem connectivity

Economic

- Increasing property values by making landscapes more functional and desirable
- Promoting economic activity by making spaces more inviting for shoppers and workers
- Reducing energy costs by reducing building heating and cooling demand
- Reducing healthcare costs by protecting physical health
- Reducing infrastructure maintenance and replacement costs by shading and cooling

Societal

- Improving physical health by encouraging outdoor recreation, reducing UV exposure, lowering stress, and improving air quality
- Improving mental health and cognitive functioning by reducing stress through nature exposure and connection
- Contributing to reduced crime rates, especially when large trees are situated on public property
- Increasing social cohesion and strengthening communities by encouraging people to come together in green spaces

Challenges facing Windsor's urban forest

Windsor's urban forest faces challenges that threaten the health, condition, and longevity of trees across the city and reduce the amount and value of services and benefits they provide. Strategic planning and proactive management will be required to respond effectively to these challenges and ensure that the urban forest remains safe, healthy, resilient, and growing.

Program resources

Urban forest management in Windsor is almost exclusively supported by the municipal budget and must compete with other programs and capital expenditures for a share of finite resources. Starting in 2020, significant capital budget allocations have been approved to support the ongoing implementation of a seven-year street tree pruning cycle—a major enhancement to the City's urban forest management program. Capital funding has also been allocated to tree planting and tree removal operations. The urban forestry capital budget of $1.9 million (2023) accounts for about 1% of the City's annual capital budget **(Figure 4)**. However, current program resource levels constrain the City's ability to deliver a wide range of other core urban forestry services. These range from pest and disease management to post-planting maintenance, development application review, by-law enforcement, and many others.

Realizing the UFMP's vision for Windsor's urban forest, achieving urban forest goals and targets, and meeting identified needs will require adequate and sustained resourcing for all aspects of the City's urban forest management programs.

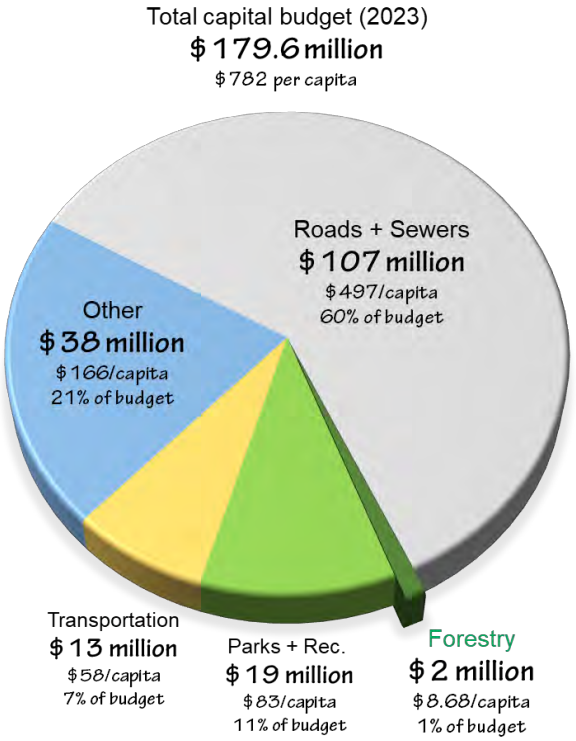


Figure 4: City of Windsor 2023 capital budget allocations by category.

A breakdown of Windsor's urban forestry budgets relative to comparator municipalities can be found in Table 12 in **Appendix 3**.

Pests, diseases, and invasive species

Insect pests can cause widespread urban forest devastation by weakening or killing large populations of trees. Emerald ash borer (EAB) infestation has already had a profound effect in Windsor, leading to the loss of perhaps 100,000 ash trees in affected streetscapes, parks, and natural areas since the early 2000s. Tree diseases (pathogens) can also have similar devastating effects. Invasive plant species can disrupt ecosystem integrity and function—particularly in woodlands—and can have detrimental effects on the environment, economy, and even human health.

Priority urban forest pests, diseases, and invasive species in Windsor are shown in **Table 1.**

Table 1: Potentially significant urban forest pest and disease threats in Windsor. Ranked in descending order of urgency and potential severity of impact. Number of trees threatened only includes inventoried City-owned street and park trees; more host trees may be threatened on other City lands and private properties, and in natural areas.

Pest or Disease		Preferred hosts	Trees threatened and threat level
	Oak wilt	Oak	*4,293 (5%)* Urgent and severe, pending
	Spongy moth	Oak, maple, birch, alder, hawthorn	*30,744 (36%)* 7-10 year cycle (peaked 2022/23). Multi-year infestation required for severe damage.
	Asian longhorned beetle	Maple, birch, poplar, willow	*27,512 (32%)* Not currently present, but possible. Causes severe damage.
	Dutch elm disease	Elm	*1,507 (2%)* Low level present
	Spotted lanternfly	Tree-of-heaven, walnut, apple	*2,517 (3%)* Limited, small host population (invasive species control of Tree-of-heaven)
	Emerald ash borer	Ash	*833 (1%)* Population levels currently low, but host species (ash) are regenerating in natural areas
	Beech bark disease	Beech	*442 (<1%)* Low, limited host population

Other invasive species of particular concern to wooded natural areas include dog-strangling vine, European buckthorn, Japanese knotweed, tree-of-heaven, black locust, honeysuckles, Manitoba maple, white mulberry, and autumn olive. Norway maple, a common introduced species, is also a concern near natural areas due to its invasive characteristics. This species alone makes up over 14.5% of Windsor's street tree population, and is likely common on private properties and in naturalized areas across the city.

In recent years, the City has undertaken limited targeted efforts to manage these urban forest threats. However, invasive species populations in City natural areas are not extensively mapped or inventoried, so the scale of the threat and management challenge is not well understood. These threats may be exacerbated by climate change, which can accelerate pest lifecycles and increase reproduction overwinter survival. Difficult urban growing conditions can increase tree stress and make trees more vulnerable.

Effectively responding to the threat posed by urban forest pests, diseases, and invasive species requires a strategic and integrated approach that combines proactive components, such as tree species diversity, monitoring and early detection, and overall urban forest health, with the necessary reactive measures such as active control and tree removal and replacement.

Failure to effectively manage urban forest pests, diseases, and invasive species may allow these threats to proliferate and result in in wide-scale loss of trees and benefits and considerable environmental, economic, and societal costs.

Urban growing conditions

Windsor has experienced considerable population growth in recent years, and further growth is anticipated in the coming years. Future growth will be accommodated in new communities developed on primarily vacant land (known as greenfield development) as well as through infill and intensification in established neighbourhoods and in and around the nodes and corridors identified in Section 3.3 of the Official Plan. Both forms of development, as well as capital works required to build and repair infrastructure in new communities and established areas of the city, can pose significant challenges to sustaining and expanding the urban forest.

Successfully integrating existing and new trees in greenfield developments requires supportive policies and guidelines that ensure adequate growing environments for trees. Otherwise, inadequate soil volumes, degraded or compacted soils, and utility and infrastructure conflicts may result. The mature tree canopy found in some of Windsor's more established neighbourhoods may never develop in some of the city's newer communities due to a lack of adequate soils and growing environments.

In established neighbourhoods, the greater lot coverages commonly afforded to infill or intensification development may place existing trees in conflict with proposed buildings or reduce available space for future tree growth. Even when existing trees are retained, they may be injured during site development. Trees must also compete for growing space with infrastructure and utilities, capital works such as road reconstruction, and maintenance activities such as snow removal, de-icing, or below-ground infrastructure repair.

Private ownership and limited engagement

Fifty-eight percent of Windsor's urban tree canopy and more than two-thirds (67%) of potential plantable area are found on private lands, which provide some of the most suitable growing environments for existing and future urban trees. However, these land holdings are often relatively small in size, resulting in many individual actors each exercising control over a small portion of the urban forest. As such, meaningfully protecting and expanding the urban forest requires effectively engaging a diverse population of landowners in sustained urban forest stewardship.

While many property owners or tenants may value and cherish their trees and natural landscapes, others may regard them with indifference, neglect, or even disdain. For example, trees may be perceived as messy nuisances, and fears and misperceptions about tree damage to foundations and sewers abound. Trees may be recognized for their multiple contributions, or may be regarded as obstacles to site development. Some tree owners may be even fearful of trees despite the statistically very low level of risk that trees pose.

Fragmented and private land ownership also poses a challenge to reaching and educating tree owners about the value of trees and the importance of tree maintenance and establishment. The large number of private landowners and tenants requires that education efforts be directed towards individuals, often requiring coordination with other partners as facilitators. It can also be difficult to engage residents, who may have competing priorities and limited resources, in tree stewardship on both community and private lands.

Need for guidance and regulation

At present, Windsor's urban forest management program lacks the support of comprehensive strategic, policy, or technical guidance.

For example, the City does not maintain a tree protection policy or detailed tree protection standards and specifications, leading to inconsistent and occasionally ineffective tree protection on development sites and capital projects.

Similarly, the absence of departmental and cross-departmental urban forest policies concerning important issues such as tree and natural areas protection, tree injury and removal compensation, and tree growing environment design and construction, occasionally creates tension between the Forestry division—charged with protecting and enhancing the urban forest—and other departments responsible for infrastructure design, installation, maintenance, and operation.

Finally, the absence of a private tree protection by-law leaves decisions about tree injury and removal to property owner discretion. Without tree planting and natural area compensation requirements, private tree removals and reduction or removal of natural areas will continue to partially offset the urban tree canopy cover gains made by growth of existing trees and City, partner, and resident tree establishment efforts, thereby working against the canopy cover target and goals to be established in the Urban Forest Management Plan.

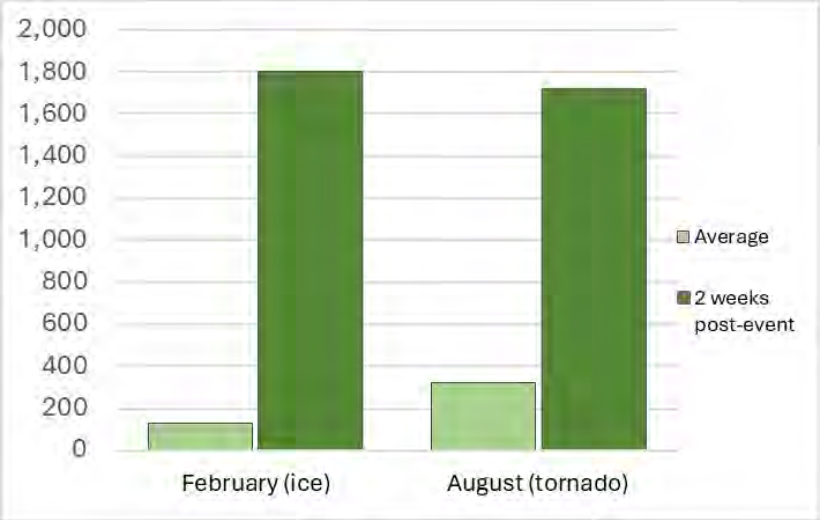


Figure 5 (left): Impacts of severe weather events on tree maintenance service requests in Windsor, 2023. Light green bars show 5-year average for two-week periods in February (127 requests) and August (320). Dark green bars show two-week service request volume following ice storm (1,806 requests) and tornado (1,722) events in 2023. Climate change is expected to increase the frequency and intensity of severe weather events.

Climate change

In November 2019, Windsor City Council approved the climate change emergency declaration prepared by the Windsor Essex County Environment Committee and, in 2020, the City updated its 2012 Climate Change Adaptation Plan. Through these actions, the City recognizes that climate change will have a profound impact on Windsor.

Windsor's urban forest is essential climate change adaptation infrastructure. By providing services such as shading, microclimate cooling, and stormwater and pollutant capture, the city's trees will make the city a safer and more comfortable place to live as global temperatures increase.

However, climate change also poses a significant potential risk to Windsor's urban forest. Various direct impacts to the urban forest are outlined in a comprehensive 2019 technical analysis report prepared by the City (see box, next page). Similarly, the 2023 Provincial Climate Change Impact Assessment indicates a high level of risk for southwestern Ontario's deciduous forests by the 2050s under a 'business-as-usual' emissions scenario. Windsor's urban forest has already experienced damaging and costly weather events that may be linked to climate change; for example, severe windstorms in 2023—potentially fuelled by a warmer and less stable climate—cost the City an additional $1.1 million in clean-up and restoration costs.

Managing the impacts of climate change on Windsor's urban forest will require resources to respond to emergency events, such as wind or ice storms, as well as a strategic approach to mitigate the impacts of higher temperatures, drought, and pest and disease infestations. Urban forest managers will need to be prepared to respond to unforeseen changes and ongoing challenges to tree species suitability, tree health, and other stressors caused by a changing climate.

Climate impacts on the urban forest

Under a high emissions scenario, anticipated climate change impacts between 2021-2050 will increase stress on trees in the urban forest. See *Climate Change Impacts in Windsor: A Technical Analysis (Degrees of Change, 2019)*.

Temperatures will increase, raising annual mean temperature by 2.1°C, leading to 28 more very hot days (+30°C) per year, milder winters, and more frequent and longer heat waves. Impacts on trees may include increased drought stress, higher pest and disease pressure, increased tree winter kill, and an increased need for shading, cooling, and other urban forest services and benefits.

Precipitation will increase by 74 mm annually and across all seasons, and will become more variable. This will raise the risk of tree waterlogging and uprooting in saturated soils and increase snow and ice loading on trees.

Weather will become more unstable, with more wild and destructive weather events and more chaotic weather patterns. This will increase the likelihood of tree uprooting, branch and tree failure, and less predictability for tree maintenance program budgets and operations.

Engagement in the UFMP

At the time of drafting of this report, the Windsor UFMP project included the completion of one of two planned phases of urban forest partner engagement. The first phase engaged partners including City of Windsor staff, representatives of external agencies and interest groups, and members of the broader Windsor community.

Engagement participants—collectively termed **urban forest partners** for the purposes of this project—were engaged via the project consultation webpage on the Let's Talk Windsor engagement platform (including a survey), in-person discussion workshops, a hybrid in-person/virtual (online) Public Information Centre (PIC), and a virtual PIC.

Engagement input

Phase 1 partner engagement was instrumental in developing an understanding of the challenges facing trees in Windsor, opportunities to protect and enhance the urban forest, community values related to trees, and key elements to be included in the UFMP vision statement.

Urban forest vision

113 respondents provided written input to support the development of the UFMP vision statement. Based on a count of urban forest-related keywords (excluding certain common words such as 'Windsor' and 'trees'), the most common sentiments included support for planting (68 instances), growing the canopy (43 instances) and canopy cover (29 instances), native species (29 instances), and value of green and natural spaces (25 instances each).

Table 2: Overview of Windsor UFMP Phase 1 engagement partners.

Partner category	Partners engaged
Internal (City)	· Asset Planning · Communications · Engineering · Environmental Sustainability and Climate Change · Financial Planning · Forestry & Natural Areas · Parks and Facilities · Parks Design and Development · Parks Horticulture · Planning · Public Works
Agencies and groups	· Canadian Food Inspection Agency (CFIA) · Centre for Cities, Faculty of Law, University of Windsor · Citizens Environmental Alliance · County of Essex · Essex Region Conservation Authority (ERCA) · Essex Terminal Railway Company · The Friends of Ojibway Prairie · Tourism Windsor Essex Pelee Island · Unifor 444 Environment Committee · Windsor Essex County Environment Committee (WECEC) · Windsor/Essex County Humane Society · Windsor-Detroit Bridge Authority (WDBA)
Community members	· 215 survey respondents · 670 unique project website visitors (Nov 2022-April 2023)

Examples of other important visioning elements expressed by survey respondents included protecting trees on private property, growing and protecting large-statured shade trees, recognition of the many services and benefits that trees provide, and reducing the impacts of development on the urban forest.

Other input

The Phase 1 engagement process with the urban forest partners listed in **Table 2** provided valuable input into Key Findings and Directions Report. Engagement participants provided important local context and technical information about City and partner programs and operations, shared diverse perspectives and values about trees and urban forest management, and highlighted strengths and critical opportunities for improvement to be supported through the UFMP.

Key examples of important input garnered through the Phase 1 urban forest partner engagement process include:

- Partners identified environmental services (e.g., clear air and water, soil conservation, etc.), ecological benefits (e.g., food and habitat for wildlife and pollinators, etc.), and climate change adaptation and mitigation (e.g., shade and cooling, energy use reduction, etc.) as the top three most important categories of services and benefits provided by Windsor's urban forest.
- Survey respondents identified insufficient tree planting; tree damage or removal during construction; climate change; and pests, diseases, and invasive species as the four most important challenges facing Windsor's urban forest.

Figure 6 (left): A word cloud presenting keywords provided by survey participants in response to the urban forest visioning question. Larger-sized words represent more frequent occurrence in survey responses.

- 79% of survey respondents strongly support or somewhat support enacting a by-law to regulate trees on private property. About 15% of respondents oppose or strongly oppose such a by-law.
- Partners identified new or recently built communities, parks and facility grounds, areas with generally low canopy, parks and facility grounds, low-income or economically disadvantaged neighbourhoods, and natural areas, as the top five most important areas to focus future tree planting efforts.
- Nearly 96% of survey respondents support the idea of providing incentives to encourage tree planting on private lands. Only 4% of respondents oppose or strongly oppose such an initiative.
- Over 91% of Phase 1 survey respondents support some level of increased funding for urban forest management. 51% support increasing funding by up to $50 per household per year. This could translate to between $2.95 and $4.7 million in increased urban forestry funding. Only 3% of survey respondents do not support any increase to urban forestry funding.
- By far the most significant barrier to participation in urban forest stewardship activities was identified as a lack of information about opportunities. Other significant barriers included a lack of tree-related knowledge and experience, a lack of free time, health or mobility limitations, and financial constraints. Only 2 respondents said they were not interested in participating.

- Survey respondents were asked to rate their level of concern with certain tree-related issues. The top three most concerning issues were tree roots clogging pipes (60% somewhat concerned or very concerned); trees blocking traffic signs, signals, sidewalks, or streetlights (59%), and falling branches or trees (47%). The three least concerning issues were tree roots exposed in lawns; fallen leaves, fruits, or twigs; and trees attracting wildlife, such as squirrels or raccoons.
- Several engagement session participants expressed the idea that urban forest management does not receive adequate consideration in the municipal budget planning process and that additional resources should be dedicated to urban forestry.
- Several engagement participants also noted the challenges of integrating existing and new trees in new developments due to competition for growing space with larger houses on small lots, sidewalks, utilities, and underground services. They suggested that trees should be given the same level of consideration as other types of infrastructure when designing and building new communities.

Complete results of the Windsor UFMP Phase 1 Engagement survey and a summary of City staff questionnaire responses can be found in **Appendix 2**. The survey and questionnaire results and input obtained through internal, external, and community partner engagement were instrumental in the development of this report and will inform the development of all aspects of the Windsor Urban Forest Management Plan.

Section 2. Regulatory and policy context

As in all Ontario municipalities, urban forest management in Windsor is primarily the responsibility of the municipality, albeit within a broader legislative and regulatory framework established by the Federal and Provincial governments. This section summarizes some of the key plans and policies that influence urban forest management in Windsor.

Higher-level plans

20-year Strategic Vision

The City's **20-year Strategic Vision** includes "promoting choices that support a healthy environment" as an element of its Quality of Life goal. The Windsor UFMP will support this vision by promoting urban forest sustainability across the city.

Windsor Official Plan

Perhaps the most important high-level policy direction for urban forest management is provided by the City of Windsor **Official Plan** (OP), which outlines objectives and policies to guide physical development of all lands within the city. By shaping the city's built form, the Official Plan directly influences the existing and future urban forest.

The Environment section of the OP outlines a range of "Urban Forestry Policies" (Sec. 5.3.6). These high-level policy statements address tree protection, urban forest diversity, native species, "treed corridors", enhancement, tree conservation and replacement plans for development, preventing damage during construction and maintenance, tree inventory, tree relocation, street trees, and the adoption of a tree by-law.

Section 10.2.14 of the OP outlines technical submission requirements for Tree Inventory and Preservation Studies for trees within and adjacent to proposed development sites.

Table 3: Required elements of a Tree Inventory and Preservation Study (TIPS) report, adapted from Official Plan Section 10.2.14.

Requirement
• Inventory of trees within and adjacent to the development site
• Proposed development impact evaluation
• Possible infrastructure modification and construction staging procedures
• Recommended trees to be preserved
• Proposed tree protection/impact mitigation measures
• Tree replacement provisions
• Post-development tree maintenance plan

In addition to specific urban forest policies, the Official Plan also establishes the Natural Heritage land use category, which permits nature reserves, wildland management, and limited ancillary uses.

The OP also establishes two categories of Environmental Policy Areas (EPA)—A and B. Environmental Policy Area A may be partially developed provided that the development conserves the significant natural features and/or functions, whereas Environmental Policy Area B may be developed provided the significant natural features are incorporated as a part of the development.

Finally, the Official Plan establishes policies for Candidate Natural Heritage Sites (CNHS), which may be redesignated as EPAs. An inventory of 45 CNHS is included in a 2008 joint City of Windsor and Essex Region Conservation Authority (ERCA) report.

Secondary Plans

Secondary Plans and Special Policy Areas (SPA) provide a finer degree of policy direction for selected planning districts or neighbourhoods, throughout Windsor. Tree-related policies with Secondary Plans and SPA policies address considerations such as tree species selection, tree protection and replacement, planting typologies, and natural areas conservation and management. Notably, pursuant to the area's secondary plan and unlike elsewhere in the city, removal of privately-owned trees greater than 10 cm DBH in the Sandwich Heritage Conservation District requires a heritage permit.

Other plans

Several other City of Windsor plans and studies influence and support urban forest management, as described in this section.

The City's 2012 **heat island assessment report** includes several tree-related recommendations, including to plant trees in priority heat vulnerability areas and to modify the Official Plan and development guidelines to "more stringently protect existing trees".

Urban forest-related objectives in the 2017 **Environmental Master Plan** include working with developers to maintain as many trees as possible and enhancing opportunities for tree plantings (C3), establishing a canopy cover goal (C7), protecting and enhancing the quality and condition of the urban forest canopy (C8), and increasing natural shade as a climate change adaptation measure (C13), among others. The City has periodically reported on urban forestry indicators related to Objective C8, such as annual tree plantings.

The **Asset Management Plan** (2018-2019) describes the City's urban forestry assets, but is based on outdated data and does not reflect the updated tree inventory. It supports a shift towards proactive maintenance of City right-of-way trees and integration of urban forestry assets into a broader asset management planning paradigm. This will be supported by the City's transition to the *PSD Citywide* asset management system.

The 2020 **Climate Change Adaptation Plan** recognizes the climate threats to the urban forest and the capacity of trees to support climate change adaptation and mitigation. It guides the City to promote the climate benefits of trees, enhance urban forest maintenance operations, encourage private tree stewardship, protect and restore natural areas, implement an invasive species program, and explore additional tree protection measures.

The 2012 **Sandwich Heritage Conservation District Plan** establishes guidelines for managing mature trees and new plantings in the public realm and trees on private lands in the district.

The 2019 **Black Oak Heritage Park Management Plan** establishes the ecological significance of this important natural heritage feature and guides future management activities to enhance or restore diminished tallgrass woodland, savannah, and prairie habitats. Five key recommendations are provided for protection and retention of significant habitats, invasive species management, wetland protection, restoration, and prescribed burning in selected Ecological Land Classification (ELC) communities.

Rediscover our Parks, Windsor's 2015 Parks and Outdoor Recreation Master Plan, recognizes that many of the City's parks lack adequate shade and tree cover and directs the City to ensure adequate program funding for sustainable urban forest management. It also directs the establishment of 'no mow' areas to encourage naturalization and guides the City to ensure a sustainable supply of nursery stock to support the ongoing establishment of Carolinian tree species in parks.

Guidelines and standards

A series of guidelines and standards governs various aspects of urban forest management throughout the City and influences the urban forest along streets, in parks, and in new or infill developments.

The **Landscaping Requirements for Development in Windsor (4th edition)** manual outlines tree compensation, protection, and planting requirements for various development scenarios (**Table 4**).

Table 4: Key tree compensation, protection, and planting requirements in the *Landscaping Requirements for Development in Windsor (4th edition)* manual.

Element	Requirement
Compensation	• Equivalent diameter replacement (e.g., removal of 30 cm DBH tree = 300 mm replacement caliper)
Protection (<30 cm DBH)	• Fencing 3.0 m from trunk, also subject to disturbance limitations
Protection (>30 cm DBH)	• Fencing 4.5 m from trunk, also subject to disturbance limitations
Planting (new subdivisions)	• 1x 50 mm or 70 mm caliper boulevard tree per lot • For corner lots, 1x tree per 15 m frontage
Planting (other)	• Min. 1x 70 mm tree per 10 m landscape frontage, 1 tree per 10 m of landscape island, or 1 tree per 250 m^2 of landscape area. • Other requirements for "Specific Development Categories" such as row houses, parkland, etc.

The 2015 **City of Windsor Development Manual** establishes municipal requirements for rights-of-way (roads) and servicing in new communities. Although tree protection and establishment are not addressed directly, by guiding the layout of streetscapes and other built form elements the manual greatly influences the structure of Windsor's urban forest.

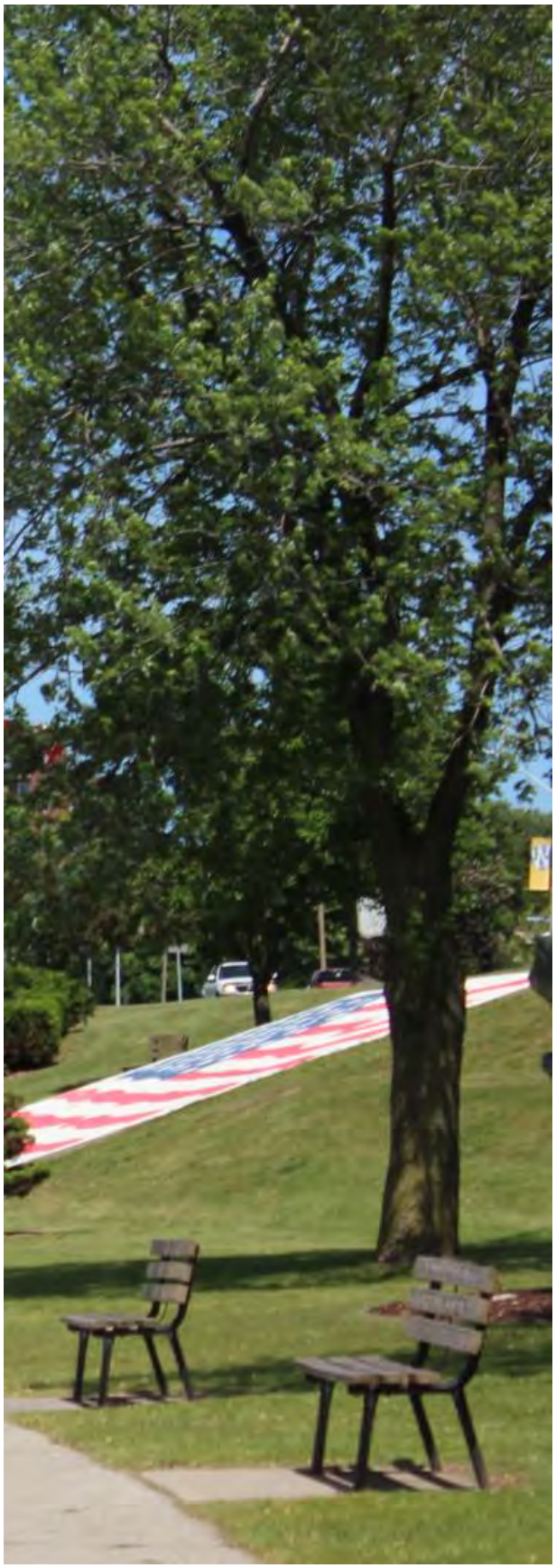
Changes to the planning paradigm

Recent amendments to the *Planning Act*, *Municipal Act*, and *Building Code Act* have significantly changed the land use planning framework in Ontario. Among other changes, these amendments have curtailed the application review role of Conservation Authorities, excluded some types of development from site plan control, reduced parkland and community benefits dedication requirements, and increased 'as-of-right' densities for some development types. The implications for urban forest management, particularly in the context of tree protection, remain unclear. Municipal planning staff will need to continue to evaluate the impacts of these changes in the context of urban forest management and must remain responsive as planning decisions are implemented and tested. These changes may necessitate the deployment of innovative planning tools within the new regulatory paradigm if municipal objectives for tree protection and urban forest enhancement are to be met in the future.

The 2022 **Intensification Guidelines** provide a foundation for the design of intensification development projects in Windsor's Mixed Use Centres, Corridors, and Nodes, as well as in Stable and Mature Neighbourhoods. Tree-related guidelines outlined in this manual include protecting existing healthy and mature trees; providing "appropriate planting conditions such as soil depth, volume, and growing mediums…"; integrating new trees by providing adequate soft landscaping area in front yards in established neighbourhoods; and basing comprehensive planting strategies on year-round interest, hardiness, drought, salt and disease tolerance, and biodiversity.

The area-specific **Huron Church Road Urban Design Master Plan** includes guidelines to preserve existing mature trees and woodlots, install connected soil trenches to provide optimal growing conditions, use non-invasive and preferably native species tolerant of urban conditions, restrict soil compaction, and use adjustable tree grates to allow for tree growth.

The **City Centre Planning District Streetscaping Standards Manual** provides guidelines for street tree species selection, planting stock quality, and tree planting pits in the paved environment. Although they contain some progressive elements, the guidelines no longer reflect current best practices for hardscape tree growing environment design.



The **Site Plan Control – Application Support Manual – Terms of Reference** outlines technical submission requirements for applications subject to Site Plan Control. Tree-related requirements include a survey depicting tree locations, a site plan showing existing "landscaping features", a landscape plan showing proposed tree protection measures and new plantings, and a Lot Grading Plan depicting proposed grades adjacent to trees (including trees on adjacent properties and boulevards). Other tree protection information to be shown on the Lot Grading Plan includes the location of tree protection zones, tree protection notes, soil retention and/or replacement details, and sediment control measures to be implemented.

The **Supplementary Specifications and Mandatory Procedures and Practices** manual governs City contracts (e.g., capital projects) and includes a "Tree Protection and Fines" section. It requires that contractors "exercise utmost caution" to ensure tree protection and enables the City to assess appraised tree value in the event of tree injury or unauthorized removal. The manual requires tree protection fencing at the tree dripline and approval by the City Forester prior to project commencement.

Standard Specification S-36 – Preservation of Trees contains the same language as the *Supplementary Specifications* manual and is limited in scope and detail. Notably, the City does not currently maintain technical detail drawings (standards) for tree protection barriers, tree planting (except for contract operations), or tree growing environments. Only two tree-related details are included in the City's **Standard Engineering Drawings** package—AS-224 Tree Relocation (1976) and AS-507 Guidelines for Tunneling Lengths Near or at Trees (1998).

Several **Community Improvement Plans (CIP)** recognize street trees as important streetscape elements and provide guidance to integrate trees in CIP area projects.

Policies and by-laws

Several policies and by-laws regulate trees or otherwise influence urban forest management in Windsor.

The **Tree Canopy Protection and Enhancement Policy**, adopted in 2019 to fulfill Provincial requirements, outlines the City's commitment to "to protect and enhance the tree canopy and natural vegetation within the City of Windsor." The policy establishes responsibilities for policy implementation and outlines the various by-laws, policies, procedures, plans, and programs that inform urban forest management in Windsor.

The **Commemorative Bench and Tree Policy** provides a framework for the consideration of tree donations and outlines program responsibilities and procedures.

Several older **Council resolutions** require the planting of one tree per lot in new subdivision and the payment of a tree in-lieu fee for lot severance applications where there is no existing municipal tree in the abutting city right-of-way, or in the case of a lot severance where an existing tree must be removed for development purposes.

Zoning By-law (No. 8600) regulates land use by implementing the policies of the Official Plan. While the by-law does not directly address trees or the urban forest, it influences tree growing environments and tree protection

through provisions for lot coverage, minimum "landscaped open space yards", and building setbacks for various zoning categories.

The **Site Plan Control By-law (1-2004)** designates all lands in the City of Windsor as a site plan control area, giving the City authority to review and approve plans for various forms of development. The by-law exempts small scale low profile residential development and several other categories of development from site plan control and is further subject to constraints imposed by changes to the Provincial planning framework (see **page 28**)

By-law **No. 25-2010 – Protection of Highways**, prohibits various actions, including tree planting and installation of planters and pavers within the road right-of-way "unless the objects are placed in accordance with the City of Windsor's Engineering Best Practices."

By-law **No. 135-2004 – Trees on Highways** restricts the planting of certain tree species on City rights-of-way and protects trees on all City property.

By-law **No. 231-2005 – Natural Environment Areas** prohibits tree and vegetation injury and destruction in designated Natural Environment Areas, which include Environmental Policy Areas, Candidate Natural Heritage Sites, and areas assigned Natural Heritage Land Use classification, subject to certain exemptions.

The **Parks By-law (131-2019)** prohibits the destruction, injury, and planting of trees, shrubs, and other woody and non-woody plants in City of Windsor parks.

The City of Windsor has not enacted a **private tree protection by-law** to regulate injury and/or destruction of trees on privately owned lands.

The **Tree Replacement Protocol** applies to trees removed with authorization for driveways, construction, or development work. Trees removed illegally may also be subject to this process for the calculation of replacement trees. The protocol affirms the 'equivalent diameter' replacement method outlined in the *Landscaping Requirements for Development in Windsor* manual and establishes the City of Windsor User Fee Schedule as the source of per-tree compensation fees (currently $520 per tree). Under the protocol, tree health, function, form, or species do not influence the calculation for tree replacement requirements; all live trees to be removed must be replaced. Fully dead trees can be removed without replacement.

Table 5: Private tree protection by-laws in comparably-sized Ontario municipalities.

Municipality *(Pop¡28687)*	Private Tree By-law	Min. regulated tree size
Burlington *(186,948)*	✓	20 cm DBH
Kitchener *(256,885)*	✓	10 cm DBH, on lots >0.405 ha
London *(422,324)*	✓	50 cm DBH
Markham *(338,503)*	✓	20 cm DBH
Oakville *(213,759)*	✓	15 cm DBH
Richmond Hill *(202,022)*	✓	20 cm DBH
Vaughan *(323,103)*	✓	20 cm DBH
Windsor *(229,660)*	No private tree by-law* **(Sandwich HCD by-law regulates trees ≥10 cm DBH)*	

Section 3. Urban forest baseline assessment

This section of the Key Findings and Directions Report presents a 'scorecard'-based assessment of the current status of Windsor's urban forest and multiple aspects of the City's urban forest management program.

The assessment is adapted from the urban forest evaluation framework outlined in *The Sustainable Urban Forest: A Step-by-Step Guide* (Leff, 2016)—an updated version of the *Criteria and Indicators of Urban Forest Sustainability (C&I)* assessment and monitoring framework (Clark et al., 1997; Kenney, van Wassenaer, and Satel, 2011). The framework establishes 28 urban forest evaluation targets and four associated performance evaluation indicators, ranging from Low to Optimal. Each performance level is assigned an accompanying score, ranging from nil to three points, to enable an overall grade and quantify the gap between current and target performance levels. Performance levels are assessed on a 'best fit' basis with various indicator elements.

Pending the establishment of the urban forest vision, guiding principles, objectives, and targets (to be outlined in the final UFMP), this assessment assigns the Good performance indicator level as an interim performance target for each criterion. However, actual performance target levels in the UFMP may be higher or lower for some criteria. In this case, although the number of points awarded for the City's current status will not change, Windsor's performance score relative to the final target level may increase or decrease.

In addition to supporting a detailed understanding of the current status of urban forest management in Windsor, the assessment also provides a foundation for urban forest program monitoring and adaptive management. In addition to other monitoring actions to be established in the UFMP, Windsor's urban forest baseline assessment should be reassessed on a periodic basis—such as during the UFMP review and updating period—to track whether the urban forest and its management are trending in a favourable direction and towards established performance targets, and to identify if management focus, strategies or resources need to be adjusted accordingly.

Summary of findings

The current (baseline) performance score for Windsor's urban forest and its management is 26 points, representing a 28-point gap between current and interim target performance levels. Although overall performance is rated Fair and presents significant opportunities for improvement, it also represents a considerable improvement above a similar assessment conducted by City staff in 2018, which awarded the City only 14 points, or a Low performance level. The current assessment reflects significant improvements in urban forest management since that time, through Council directions, such as a comprehensive urban forest canopy cover study, tree and natural areas inventories, increased tree establishment, and implementation of a pruning cycle.

Key strengths highlighted by the assessment include the City's proactive tree pruning program, natural areas inventories, urban tree canopy assessment, tree planting programs, public tree inventory, and urban forest age class distribution.

Notable opportunities for improvement revealed by the assessment include cross-departmental coordination, landowner and community engagement, tree protection policy development and implementation, natural areas management planning, awareness-building, private tree inventory, tree risk management, urban forest product utilization, and invasive species management, among others. The assessment also highlights the vital need to increase urban forest program capacity and resource levels to deliver important urban forestry services beyond basic tree maintenance and planting.

City of Windsor
Urban Forestry Report Card

Current Score: 26
Target Score: 54
Score Gap: 28
Average Rating: Fair

Urban Forestry Theme	Performance	Score
The Urban Forest		
T1: Relative Canopy Cover	Fair	1
T2: Age diversity	Good	2
T3: Species diversity	Low	0
T4: Species suitability	Low	0
T5: Public owned trees	Optimal	3
T6: Publicly owned natural areas	Good	2
T7: Trees on private property	Low	0
R1: Tree inventory	Fair	1
R2: Canopy cover assessment and goals	Good	2
Maintaining the Urban Forest		
C1: Municipal agency cooperation	Fair	1
C2: Utilities cooperation	Low	0
R4: Municipality-wide urban forest management plan	Low	0
R5: Municipality-wide urban forestry funding	Fair	1
R6: Municipal urban forestry program capacity	Fair	1
R10: Maintenance of publicly owned trees	Good	2
R11: Management of publicly owned natural areas	Fair	1
R12: Tree risk management	Low	0
R13: Urban wood and green waste utilization	Fair	1
Growing the Urban Forest		
R3: Environmental justice and equity	Fair	1
R7: Tree establishment planning and implementation	Good	2
R8: Growing site suitability	Fair	1
R14: Native vegetation	Fair	1
Protecting the Urban Forest		
R9: Tree protection policy development and enforcement	Fair	1
Partnerships in the Urban Forest		
C3: Green industry cooperation	Low	0
C4: Involvement of large private and institutional landholders	Low	0
C5: Citizen involvement and neighbourhood action	Fair	1
C6: General appreciation of trees as a community resource	Fair	1
C7: Regional collaboration	Low	0

Section 4.
Windsor's urban forest

Windsor's urban forest includes all trees that grow in the city, whether on public or private lands. The definition conceptually extends to extends to include various other system components that support or accompany trees, including soils, infrastructure, other woody vegetation, and other elements.

This section of the Key Findings and Directions Report considers the tools and programs in place for developing and maintaining knowledge about Windsor's urban forest resources, and reviews important biophysical aspects of the urban forest system itself.

Urban forest data sources

Information about the structure (e.g., canopy cover, species diversity, etc.) of Windsor's urban forest is available from two primarily data sources, including the 2020 assessment of 2018 tree canopy cover mapping and the 2019/2020 GIS-based inventory of 68,433 street trees and 18,285 park trees **(Figure 7)**. To date, the City has not undertaken a citywide urban forest structure and function assessment, such as a field-based i-Tree Eco study.

The tree inventory provides detailed and accurate tree asset data, useful for long-term urban forest planning as well as day-to-day tree maintenance operations. Some key tree inventory attributes include species, location, size (DBH), structure and health, risk rating, and prioritized actions.

Figure 7: Snapshot of the City's GIS tree inventory mapping. Green points represent street trees; yellow points represent park trees.

Although many City-owned and managed trees are captured in the inventory, trees in natural areas and along trails and woodlot edges are currently not included, and tree inventory data are not routinely updated to reflect tree maintenance or new plantings.

Maintaining and enhancing Windsor's tree inventory as a valuable urban forest data source and management tool will require effectively integrating the tree inventory with the City's forthcoming rollout of the *PSD Citywide* enterprise asset management system (EAMS) software platform and procedures to ensure data are maintained up-to-date.

Tree canopy cover

Urban Tree Canopy (UTC)—or canopy cover—is a readily understood measure of how much land surface area is covered by trees when viewed from above. Many municipalities have established tree canopy cover targets as key objectives for urban forest management. While canopy cover can be an important performance indicator, especially if tracked over time using consistent methods, it remains just one metric among many of program effectiveness.

In 2019 (the latest available data), Windsor's urban forest covered about 19% (2,798 hectares) of the city—equivalent to almost 18,500 hockey rinks. Canopy change analysis found that UTC in Windsor increased by 7% between 2002 and 2019. However, the assessment cautioned that ongoing development, age of the tree population, and other factors may contribute to canopy decline without significant tree planting efforts over the next twenty years and beyond.

The tree canopy study also identified a further 4,010 hectares (28% of land area) as Potential Plantable Area (PPA)—land that is physically suitable for future urban forest growth. This establishes a maximum theoretical canopy cover in Windsor of 47% (UTC + PPA), assuming all existing canopy is maintained and all available planting areas are treed. Of course, achieving this level of canopy cover is not feasible, and any future canopy cover targets must reflect reasonable tree planting quantities on both private and public lands.

In addition to citywide metrics, the 2020 study also quantified UTC and PPA according to land ownership, zoning (land use), wards, and Incident Management System (IMS) District.

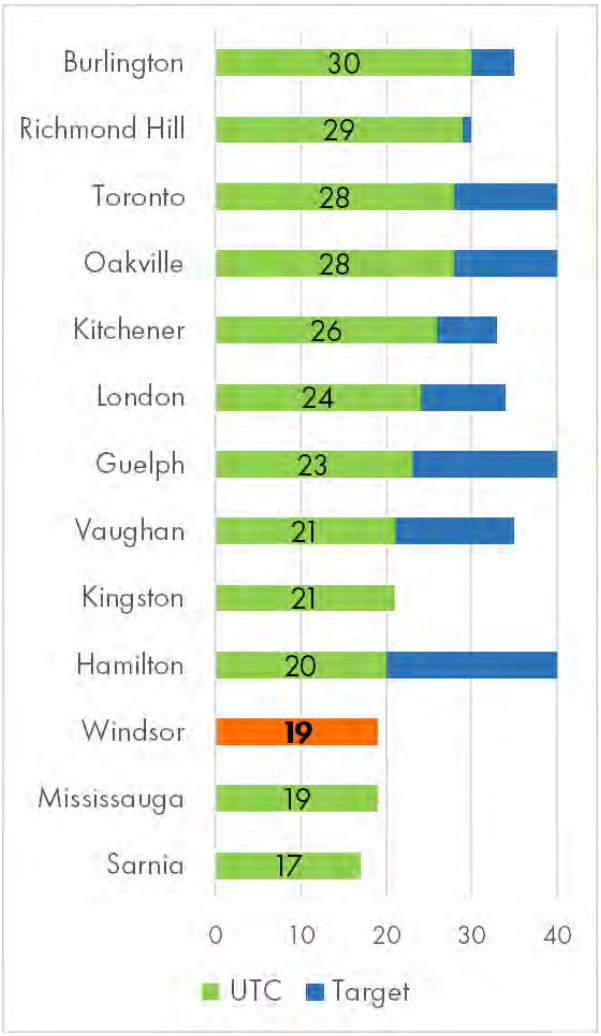


Figure 8: UTC metrics and targets in Windsor and other selected southern Ontario municipalities.

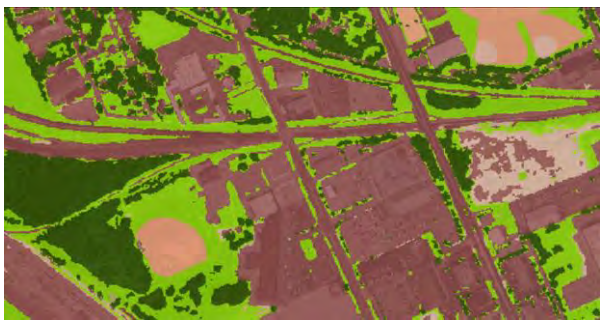


Figure 9: Detail of UTC/PPA mapping from the 2020 urban forest land cover analysis. Dark green shows existing urban tree canopy (UTC); light green shows suitable potential plantable area (PPA). Unsuitable areas, such as buildings, sports fields, and impervious surfaces, are shown in other colours.

Windsor's UTC is slightly lower than found in other benchmarked southern Ontario municipalities (**Figure 8**), where cover generally ranges between 20 and 30 percent. This is due in part to widespread development across much of the city, with a limited extent of natural and forested rural areas within the municipal boundary.

As shown in **Table 6,** both UTC and PPA are most abundant in the Low Density Residential land use category. This is largely because this zoning covers the greatest share of the city's land area (24%) and because residential properties provide some of the best opportunities for large and high-quality tree growing environments. These findings highlight the need to actively engage Windsor's residents to protect existing trees and help expand the city's urban forest. As shown in **Figure 10**, tree canopy is heavily concentrated in natural areas and woodlands, such as the Ojibway Prairie Complex (including Ojibway Park, Black Oak Heritage Park, and associated areas), the South Cameron woodlot, Peche Island, and Devonwood Conservation Area.

Growing Windsor's tree canopy

Analysis of various possible planting scenarios determined that increasing Windsor's UTC cover to 27% by 2049—and increase of 8% cover or 42% growth—would require an "aggressive" tree establishment program of some 5,000 trees per year to offset natural mortality and loss to development. Planting about 2,500 trees per year—the current level of the City's tree planting programs—is projected to increase canopy cover to 20%. However, meaningfully growing Windsor's urban forest canopy cover will require more than City tree planting efforts—protecting existing trees and private land tree establishment will also contribute to increasing urban forest cover across the city.

Table 6: UTC and PPA in Windsor by hectares (ha), percentage of area, and percent share (distribution) of total citywide area, per land use category (zoning).

Zoning	Land Area	UTC			PPA		
	ha	ha	%	% share	ha	%	% share
Agriculture	1,402	82	6%	3%	113	8%	3%
Commercial	912	65	7%	2%	169	19%	4%
Green Space	1,306	534	41%	19%	498	38%	12%
Low Density Housing	3,534	977	28%	35%	1,222	35%	30%
Medium Density Housing	652	100	15%	4%	218	33%	5%
High Density Housing	300	67	22%	2%	91	30%	2%
Institutional	1,228	86	7%	3%	191	16%	5%
Manufacturing	2,384	218	9%	8%	698	29%	17%
Right-of-Way	2,810	665	24%	24%	805	29%	20%
Vacant	7	2	28%	0%	5	64%	0%
Totals	**14,535**	**2,798**	**19%**	**100%**	**4,010**	**28%**	**100%**

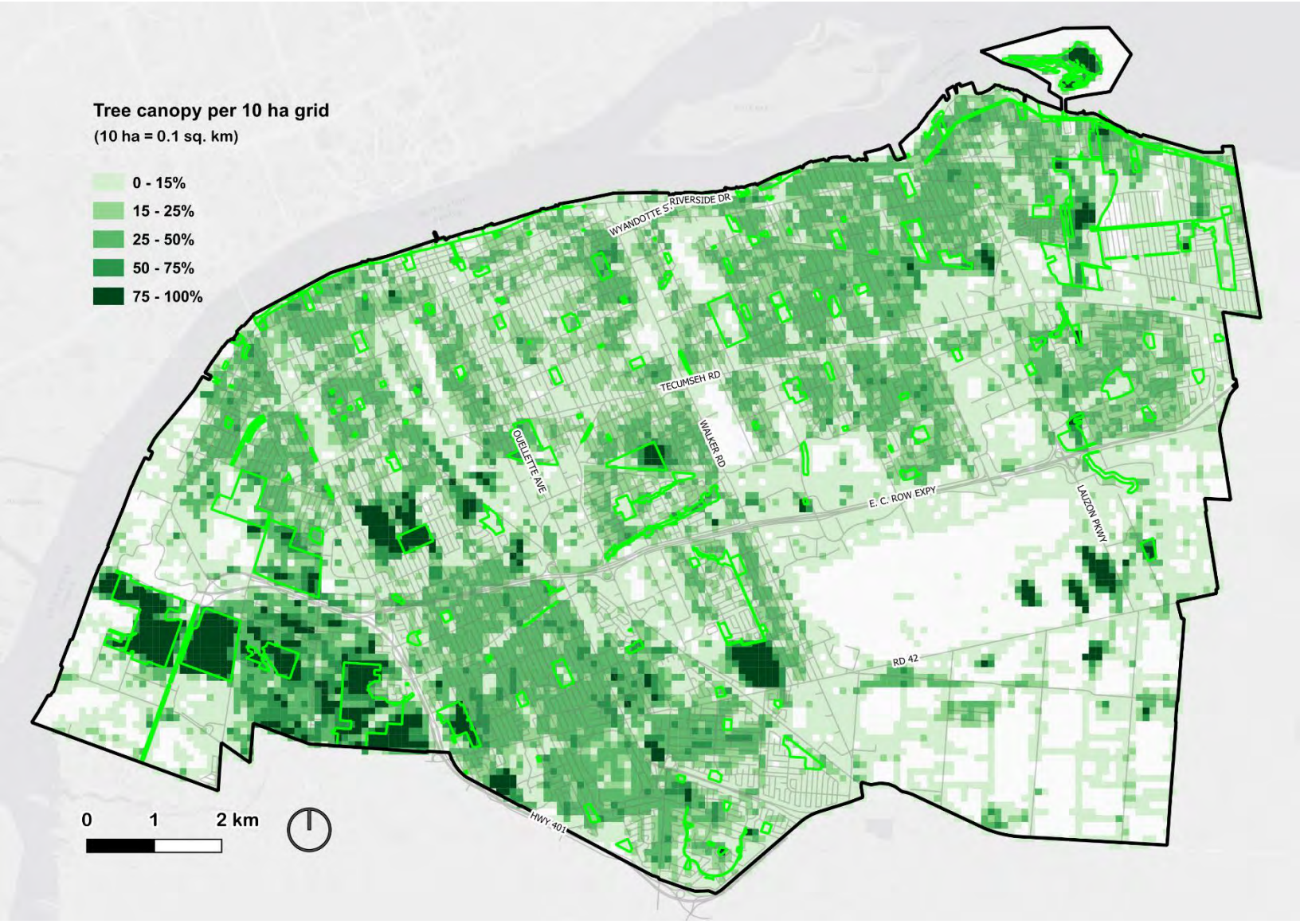


Figure 10: Windsor Urban Tree Canopy (UTC) by 10-hectare grid. City parks are outlined in bright green.

Residential areas in South Windsor, Riverside, and East Windsor also contain highest levels of canopy than the citywide average.

Complete findings of the Windsor urban forest land cover analysis are presented in the detailed **Urban Tree Canopy Assessment report.**

Urban forest structure

Urban forest structure refers to the physical characteristics of the urban forest. These may include factors such as tree density and quantity, spatial distribution, leaf area, and others. In the absence of a detailed, field-based urban forest structure and function analysis, such as an i-Tree Eco study, urban forest structure analysis in Windsor is limited

to metrics that can be derived from the City's tree inventory—namely, composition, size class distribution, and tree health and condition. Due to lack of regular data maintenance and updating, the accuracy of analyses based on the inventory is limited to the state of the urban forest at the time of data collection (2019-2020).

This section provides a summary of key findings. A more detailed analysis of urban forest structure in Windsor is presented in the detailed **Urban Tree Canopy Assessment report.**

Composition

The tree inventory includes 86,718 street and park trees of 161 different species and 76 genera (trees in natural areas were not included in the inventory). Species richness in Windsor's urban forest is relatively high, reflecting the area's climatic suitability for a broad range of tree species. However, several species—most notably Norway maple (*Acer platanoides*) and honey locust (*Gleditsia triacanthos*)—are highly abundant, as each represents more than 10% of the inventoried tree population citywide (see **Figure 11**). Similarly, maples (genus *Acer*) are highly over-represented, comprising nearly 30% of the population. As such, while a large number of species and genera can be found in Windsor, the urban forest does not meet several commonly-cited targets for diversity, such as the 5% genus limit (Ball, 2015) or the '10-20-30' rule (Santamour, 1990). The City continues efforts to increase street and park tree diversity through its tree establishment program and will need to work with partners to further enhance diversity.

The importance of diversity

Urban forest diversity is essential for promoting resilience against a wide range of stressors, ranging from pests and diseases, to difficult urban growing conditions, to climate change. Increasing diversity helps to buffer the entire system against stressors which target specific tree characteristics, such as genus or species, and promotes adaptative capacity among the remaining population. Lower levels of diversity increase urban forest susceptibility and the threat of catastrophic loss, as evidenced by the emerald ash borer infestation of the early 2000s or the devastation cause by Dutch elm disease in the latter half of the 20th century.

Size class

An urban forest dominated by younger and smaller trees provides fewer environmental, economic, and societal services and benefits than one with a more balanced size class distribution and with more large and mature trees. A predominantly young age class distribution may also suggest that newly planted trees are failing to grow towards full maturity. While every community's biophysical context is unique, making it is difficult to establish broadly applicable best practices for urban forest age/size class distribution, Millward and Sabir (2011) suggest an ideal tree size class distribution to maximize ecosystem services while maintaining urban forest population stability.

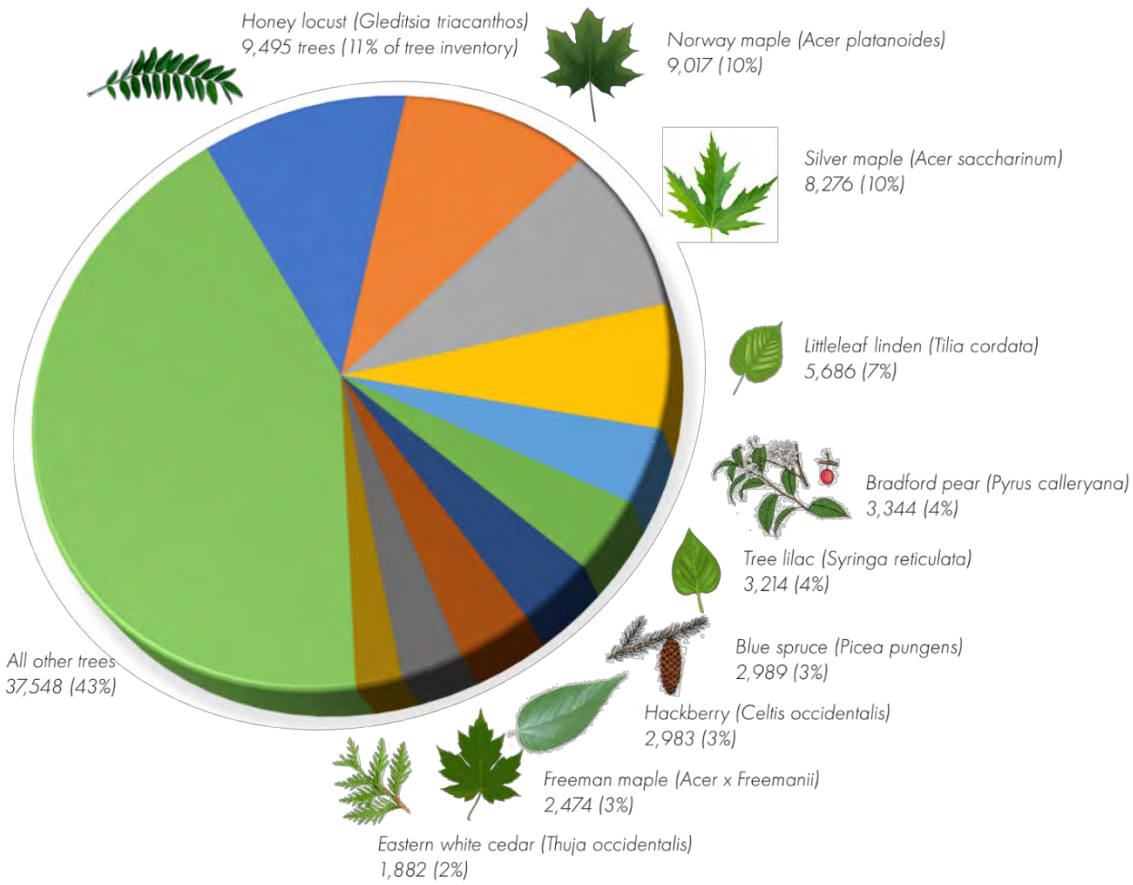


Figure 11: Species composition of the inventoried street and park tree population in Windsor's urban forest.

As shown in **Figure 12,** both young (small) and old (large) trees in Windsor's urban forest are underrepresented relative to the theoretical optimum distribution, while medium-aged and sized trees are overrepresented.

This size class distribution suggests that the City and its partners should increase efforts to plant, establish, and maintain new trees capable of reaching large stature at maturity, as well as improve tree maintenance practices to enable existing mid-sized and mature trees to reach larger size and older age. This will ensure that a sufficient population of young trees is available to support a stable urban forest population and canopy cover over time, while also optimizing the provision of benefits by larger, older trees with more leaf area.

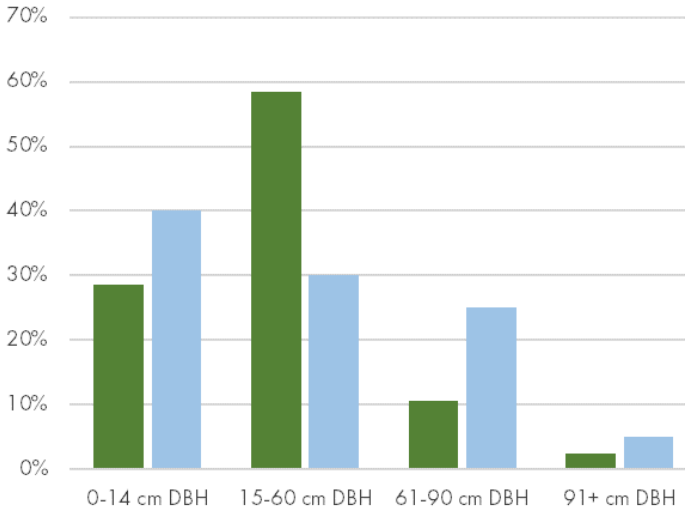


Figure 12: Existing tree size classes (green) relative to optimal distribution (blue), per Millward and Sabir, 2011.

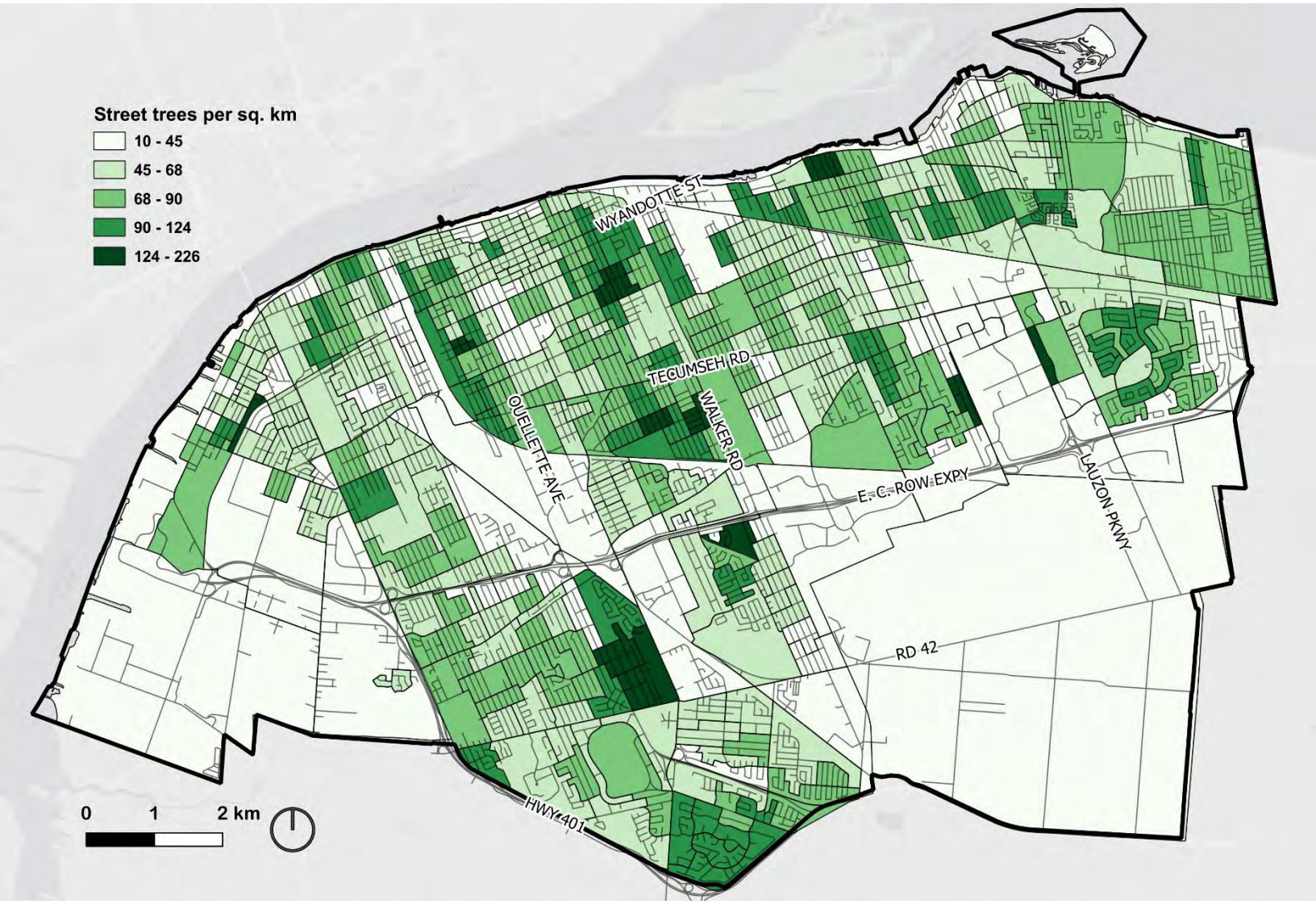


Figure 13: Inventoried street tree density in Windsor per kilometre of roadway, by census dissemination area.

Street tree density

The citywide average density of inventoried street trees is approximately 69 trees per linear road kilometre, and ranges from less than 10 to over 225 trees per km. Street tree density is highest in the city's residential neighbourhoods, including in newer communities with closely-spaced and densely-planted young trees. Conversely, industrial and commercial areas have considerably lower street tree densities.

Tree health and condition

Inventory data suggest that most of the City-managed tree population is in overall good health (57%) and structural condition (79%), and that most trees pose a low level of risk (94%) **(Figure 14)**.

Figure 14: Health, structure, and risk rating assessments of the inventoried tree population in Windsor's urban forest.

The assessments reveal that mature trees (15-60 cm and larger DBH classes) have a lower proportion of "good" health and structure assessment ratings, suggesting that a lack of proactive tree maintenance in the past has contributed to the development of minor or moderate structural issues, deadwood, or other indicators of suboptimal health and condition. The assessments also suggest that more effective structural pruning is required to improve the structural condition of existing newly planted and young trees.

UFMP directions for Windsor's urban forest

Directions for improving the City's understanding of its urban forest, incorporating that knowledge into planning and operations, and enhancing the urban forest resource itself, to be supported through Windsor's UFMP, include:

- **Maintaining the tree inventory:** The UFMP should direct the City to develop and implement procedures to ensure that the GIS-based tree inventory is continually updated as trees are maintained, removed, and planted. The UFMP should also guide the City to expand the inventory to other areas with publicly owned trees, such as woodlot edges and trails. Private trees of high-priority species may also be considered for inclusion in the tree inventory.
- **Integrating the inventory with the City's broader asset management system:** As the planned rollout of the PSD Citywide asset management system takes place, the UFMP should guide the City to effectively integrate tree inventory data with work order and other asset management capabilities of the system.
- **Facilitating information sharing and civic science:** The UFMP should direct the City to ensure that tree inventory data are accessed and used by staff in other

municipal departments to facilitate project planning more effectively protect trees during capital projects. The UFMP should also promote urban forest 'civic science' opportunities as a public awareness and engagement tool and to support tree management and urban forest planning.

- **Undertaking change analysis and monitoring:** To support progress towards UFMP goals and targets, the plan should direct the City to undertake periodic land cover analysis using repeatable methods and to track change in tree canopy, impervious surface cover, and other metrics over time. Urban forest health, condition, and diversity, among other indicators of urban forest structure and function, should also be regularly monitored as part of urban forest maintenance operations and inspections.
- **Establishing and pursuing a tree canopy cover target:** Although urban tree canopy cover is only one of many metrics of urban forest structure and program performance, it is recognized that many municipalities, partners, and residents support establishment of canopy cover targets. As such, the UFMP should establish an aspirational but reasonable and attainable long-term tree canopy cover target. The target must account for anticipated resource availability for City-led tree planting and post-planting care, and be supported by efforts to engage private landowners in tree establishment on their lands. The UFMP should also direct the City to explore creating requirements for site-level canopy targets for new and infill development as tools to protect existing trees and grow Windsor's urban forest through the development and planning process.
- **Enhancing urban forest diversity:** Although urban forest tree species diversity is fairly high in Windsor, the City and its partners should continue efforts to enhance diversity through establishment of a wider range of suitable tree varieties and should pursue diversity targets at other levels and scales beyond citywide species diversity. Management strategies should also include proactive management of the Norway maple population to remove underperforming and undesirable individual trees of that species, conservation-based arboricultural maintenance practices to preserve existing old and large-statured trees, and a general shift away from planting of small-statured ornamental trees wherever possible. The UFMP must recognize that tree diversity metrics are slow and challenging to meaningfully change on a citywide scale while supporting actions such as local tree performance trials, developing an expanded planting list, and educating members of the community about the importance of tree diversity, native and non-invasive species, and urban forest stewardship.

Section 5. Maintaining Windsor's urban forest

Urban forest maintenance operations undertaken by the City are intended to ensure that tree health and longevity are promoted, tree-related risk to persons and property is managed at a reasonable level, potentially harmful insect pests and diseases are managed within acceptable thresholds, and that the urban forest can continue to provide valuable services and benefits to the community.

This section of the Key Findings and Directions Report reviews urban forest maintenance programs in Windsor and identifies directions to enhance this critical component of urban forest management.

Program administration

The Forestry division of the Parks and Facilities Department, Community Services, is the lead civic division responsible for urban forest maintenance in Windsor. As such, the division is generally considered the *de facto* owner of the City's forestry assets. Programs and responsibilities of the Forestry division are outlined in **Table 7.**

Urban forestry services are delivered under a joint service delivery model utilizing both in-house City staff and external contractors.

Currently, Parks – Forestry and Natural Areas is composed of 20 staff positions, which includes four full-time staff (and additional occasional staff) on the Natural Areas team housed at the Ojibway Nature Centre, separately from the Forestry division.

Table 7: Programs and responsibilities of Windsor's Forestry division. Table does not the Natural Areas team.

Program administration	Tree maintenance	Urban forest enhancement
• Program budgeting and staffing • Council reporting and liaison • Interdepartmental coordination • Project management • Materials and equipment procurement and management • Contract administration • Tree inventory management • Asset management planning support • Strategic planning and policy initiation and support	• Tree inspection • Risk assessment • Pruning (reactive) • Tree and stump removal (20%) • Pesticide application • Pest, disease, and invasive species management **Contracted services** • Pruning (cyclical) • Tree and stump removal (80%) **Services not delivered** • Fertilization • Cabling/bracing (for risk mitigation)	• Planting site identification and assessment • Tree species list and selection • Planting tender and contract administration • Post-planting monitoring **Contracted services** • Replacement and infill planting • Planting in new developments • Post-planting watering
Urban forest protection	**Engagement / partnerships**	
• Public tree by-law administration and enforcement support • Development application technical review support • Capital project and development site inspection	• Service request response • Webpage maintenance • Social media content • Community stewardship coordination • Public and media communications	

The Forestry division includes 16 full-time staff and management positions, including the divisional manager (City Forester/Manager, Forestry and Natural Areas); two supervisors; nine arborists; one asset analyst; and two clerical and support staff. The current divisional structure is relatively 'flat' and, aside from a small number of specialized positions (e.g., asset analyst), is characterized by a lack of divisional specialization. As all Forestry staff have tree maintenance skills, City arborists are typically tasked with addressing the highest-priority tree maintenance service requests, leaving little capacity to deliver other important program elements and services. This can be exacerbated by emergency situations such as wind and ice storms, which may necessitate many days of post-storm cleanup and contribute to the tree maintenance backlog.

Advanced urban forestry departments typically include some level of staff specialization, ensuring that staff experience and skill sets are appropriately matched to departmental responsibilities and urban forest management needs. Moreover, specialization can help to ensure that capacity is not drawn away from important programs and operations in the event of emergencies or service requests.

Forestry staffing levels in Windsor relative to several other communities, based on the metric of full-time equivalent (FTE) tree maintenance staff (excludes management, supervisors, coordinators, support, etc.) are presented in **Table 8.** Windsor has fewer arborist FTEs than average among comparators relative to both the number of residents and its street tree population. However, it must be noted that many municipalities, including Windsor, rely on contractors to deliver a share of important urban forestry services such as tree pruning, removal, and planting. Given the lack of available data about contractor staffing levels, it is difficult to benchmark all aspects of urban forest program resourcing levels across municipalities.

Resourcing

For many years, operating and capital budget levels limited the Forestry division to entirely reactive tree maintenance. This contributed to a significant maintenance service request backlog and created unacceptable response times for even high-priority tree maintenance requests.

Beginning in 2020, Council approved a significant capital funding increase for the Forestry division and in 2023, the division's approved capital budget was $1.99 million. This funding has enabled a seven-year street tree pruning cycle and supports an increased level of tree planting. However, it still represents an average annual shortfall of approximately $0.8 million below levels identified in the 2018-2019 Asset Management Plan as necessary to fully fund a proactive tree maintenance program.

Current resourcing levels also do not support the delivery of a wide range of other important urban forestry services, ranging from effective by-law enforcement to comprehensive planning application review support, adequate post-planting tree establishment care, natural areas management, and others.

An analysis of existing staffing levels and gaps is presented in **Table 9**.

Table 8: Arborist staffing levels in Windsor relative to comparable municipalities. Figures may be rounded. Street trees only. Windsor figures based on 7 staffed FTE arborist/labourer positions.

Municipality *(Pop¡ª8687)*	FTE arborists/ labourers	FTEs per 100,000 residents	FTEs per 10,000 street trees	In-house vs. contracted street tree maintenance ratio
Brampton *(603,346)*	22	3.6	.9	Cyclical: 20:80 Reactive: 80:20
Burlington *(186,948)*	12	6.4	1.4	Cyclical: 100% contract Reactive: 60:40
Guelph *(143,740)*	11	7.7	2.4	Unknown
Markham *(338,503)*	6	1.8	0.5	Cyclical: 100% contract Reactive: 66:33
Richmond Hill *(202,022)*	8	4	1.4	Cyclical: 2:98 Reactive: 80:20
Sarnia (72,047)	7	9.7	3.2	100% in-house
Vaughan *(323,103)*	6	1.9	0.5	Cyclical: 100% contract Reactive: 60:40
Windsor (229,660)	9	3.9	1.3	Cyclical: 100% contract Reactive: 65:35
Average	*8.9*	*5.2*	*1.6*	-

Interdepartmental coordination

At present, Forestry division management and staff may collaborate with other divisions on an as-needed or project-specific basis and as specific issues arise, but there is currently no formalized structure in place to encourage regular and proactive interdepartmental coordination and collaboration around urban forestry issues.

This has contributed to the 'siloing' of City divisions, projects, policies, and operations, occasionally resulting in adverse outcomes for trees as departmental objectives potentially conflict with the needs of trees. For example, tree protection in not consistently planned or implemented on capital projects or during infrastructure maintenance works, occasionally resulting in avoidable tree injury and removal or inadequate replacement.

Table 9: City of Windsor Forestry division staff levels and gap analysis, FTE = Full Time Equivalent staff.

Position	Key Responsibilities	Existing staffing level (FTEs)	Ideal staffing level (FTEs)
Divisional manager/ urban forester **current position is titled City Forester/ Manager, Natural Areas*	Strategic planning, program development and oversight, Council/resident liaison, budget planning, policy development, human resources	1	2 (divide roles)
Asset mgmt. specialist **current position is titled Forest Operations Analyst*	Tree inventory management, geospatial analysis, asset management planning, work order management, budgeting support	1	1
Contract administrator/ Forestry inspector	Tender and specifications development; contract management; contractor supervision and performance auditing; service request response and prioritization; tree health, protection, and planting inspection; tree inventory; by-law enforcement support **currently filled by City Forester, Analyst, Supervisor, and Arborist positions*	0	5+
Forestry supervisor	Arborist crew management, tree inspection, work order prioritization and dispatch, resident liaison	2	3
Arborist	Reactive and proactive tree maintenance	9	10+
Technician	Tree protection plan review and site inspection; pest, disease, and invasive species management; planting site assessment and establishment planning **currently filled by City Forester, Analyst, Supervisor, and Arborist positions*	0	2
Coordinator	Community education and outreach program, partner coordination, resident liaison, other program support **currently filled by City Forester and Analyst positions*	0	1
Administrative	Administrative support, including for private tree by-law enforcement (if enacted)	2	3+
		15	**26+**

Tree maintenance

Tree pruning is the most common urban forest maintenance operation and accounts for the largest share of the City's urban forestry budget. Other tree maintenance operations include tree inspection and risk assessment/mitigation, tree and stump removal, and pest and disease management. In Windsor, tree maintenance operations are undertaken on both a reactive and proactive basis, by both City staff and contractors.

Reactive maintenance

Reactive maintenance is generally undertaken in response to service requests to address observed issues and typically results in arborists 'chasing trees'—in other words, moving throughout the municipality to address work orders in order of priority. Reactive maintenance is largely undertaken by City Forestry staff, although contractors may also be retained for reactive maintenance.

The City receives approximately 5,500 forestry service requests annually, although severe weather events increased the 2023 total to some 10,500 requests. While the City's proactive pruning cycle should help to reduce the need for reactive tree maintenance over time, the higher frequency and severity of weather events anticipated with climate change may in turn exacerbate this need. Current divisional staffing levels and organizational structure, including a lack of dedicated tree inspectors, have contributed to an *ad hoc* approach to service request inspection, prioritization, and resolution. The City continues to work to reduce the moderate backlog of outstanding tree service requests.

Proactive maintenance

In 2021, the City initiated a seven-year cyclical street tree pruning program. The program divides the city into 28 areas of approximately 2,500 street trees each, with trees in four areas pruned per year under separate contracts (**Figure 15**). The intent of the program is to continue in perpetuity and more effectively manage urban forest and tree health, structural condition, and risk.

While the program has not been thoroughly audited to date, staff report a high level of contractor work quality and successful outcomes for trees. Although proactive maintenance generally improves tree condition and reduces the incidence of whole-tree or branch failure, it also raises the profile of urban forest management and increases public awareness of trees. This could potentially, and paradoxically, lead to an increase in the number of service requests received.

Currently, the tree pruning program is not effectively integrated with the tree inventory or a broader computerized maintenance/asset management system. As the Forestry division adopts the tree asset management functionality of the *PSD Citywide* enterprise asset management system, functions such as inventory updating (e.g., tree size, condition, etc.) and maintenance history tracking should be implemented and supported with staff and contractor training, established procedures, adequate hardware, and performance auditing.

Resident maintenance

Recognizing that lower-priority tree maintenance, such as minor clearance pruning, is commonly deferred for periods of up to one year or longer, the City allows residents to retain an external tree service provider to carry out work on City-owned trees subject to a written agreement among the three parties and at the residents' sole expense. To date, there has been limited uptake of this program, but it affords residents the opportunity to have low-priority work completed in a timely manner at minimal expense to the City. Similar agreements are offered as an option in Oakville and Toronto, among other municipalities.

Young tree structural pruning

Newly established and younger trees require specialized and more frequent pruning to develop good long-term structure. This practice is commonly referred to as young tree structural pruning, or tree training, and focuses on preventing co-dominant or otherwise compromised branch unions, promoting appropriate branch spacing and, for most species, developing a single central leader.

Currently, the City does not implement a dedicated young tree structural pruning program or cycle. Instead, all street trees are integrated into the seven-year pruning cycle and contract specifications state that "all younger and smaller trees... are required to be trimmed to promote good form, structure and health". Young park trees are rarely structurally pruned.

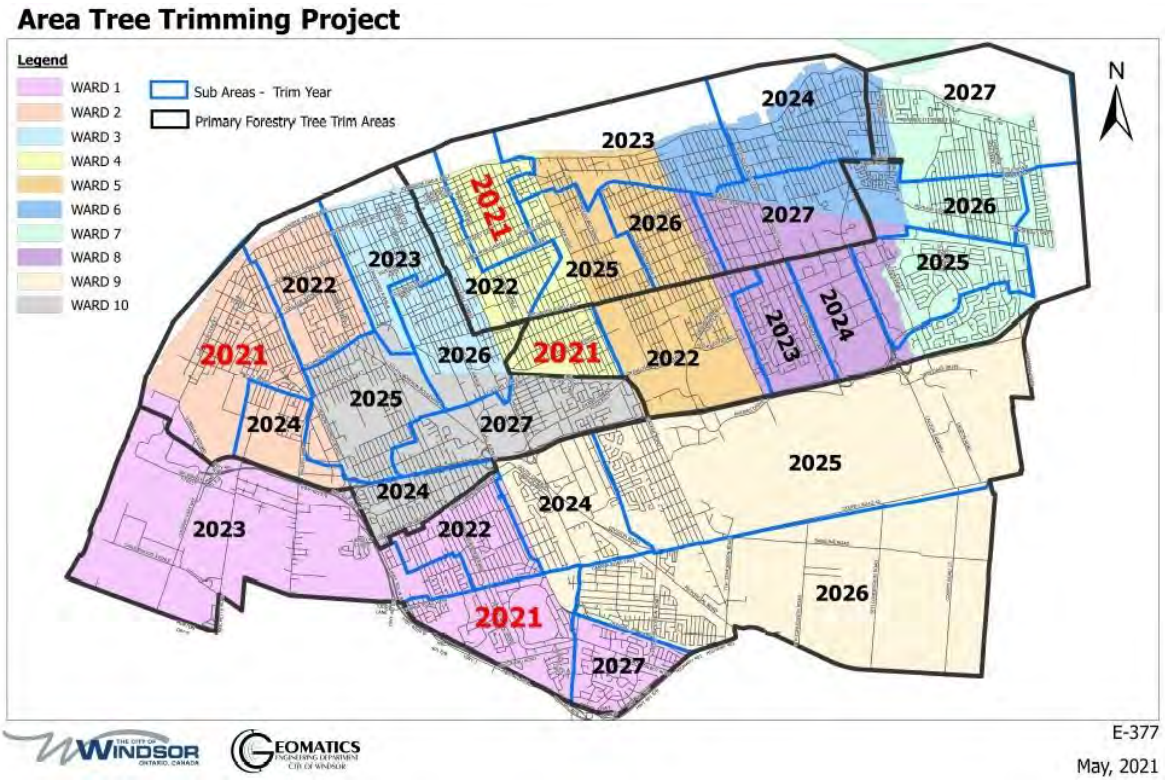


Figure 15 : Map of the City of Windsor proactive tree pruning program, 2021-2027.

Shared and boundary trees

At present, the Forestry division maintains trees that straddle the boundary between the municipal right-of-way and private property—termed "shared" or "boundary" trees. In the past, the City has also erred on the side of caution and maintained trees whose ownership has been uncertain. However, the high-resolution GIS-based tree inventory conducted in 2019-2020 identified that multiple trees previously assumed to be shared or City-owned are in fact wholly privately owned. The Forestry division has notified affected tree owners of this correction to the ownership status when service requests are received and advised that maintenance will no longer be undertaken by the City for trees that are privately owned but abutting the right-of-way. In instances where this correction to ownership status has been disputed, the City has required affected property owners to undertake a lot line survey to verify tree ownership.

Tree risk management

Tree risk management entails the identification, assessment, and, if necessary, mitigation of structural conditions that may increase the likelihood of whole-tree or tree part failure and associated adverse consequences.

The City's GIS-based tree inventory includes a risk rating for every tree, assigned in accordance with International Society of Arboriculture (ISA) Best Management Practices for tree risk management. Tree risk is also assessed by supervisors and arborist staff upon initial inspection of service requests, and management of higher-risk trees is prioritized.

Tree-related risk is primarily mitigated through pruning or tree removal, as the City does not cable or brace trees for risk mitigation. The City does not actively undertake proactive or periodic tree risk assessment, such as drive-by or 'windshield' assessments of higher-priority tree populations, such as older street trees.

In natural areas, staff periodically conduct walk-through visual inspections of formal trails to identify potential tree risk, and refer required mitigation maintenance to the Forestry division. However, no risk assessment of trees along municipal woodlot edges abutting other land uses has been undertaken to date.

Pests and diseases

Tree pests and diseases in Windsor's urban forest are primarily managed on a reactive basis in response to observed infestations and associated effects, such as excessive tree damage or tree mortality. Management may be undertaken in response to service requests or observations by Forestry division staff or contractors, although there is no dedicated urban forest pest, disease, or invasive species management technician on staff. Management activities such as pesticide application may be undertaken by staff on an as-needed basis, although their use is minimal.

More recently, Forestry staff have developed informational videos to build public awareness of oak wilt, published to the City's social media channels in 2019. Staff have also conducted spongy moth egg mass surveys on City-owned oak trees. However, urban forest pest and disease management efforts in Windsor are not guided by an urban forest health management strategy, manual, or program. Instead, efforts are undertaken on a reactive and as-needed basis in response to emerging or observed issues, and no active public awareness-building or engagement appears to have been undertaken in some time.

Emerald ash borer in Windsor

Windsor was the first Canadian municipality to be heavily affected by the emerald ash borer (EAB) infestation. Beginning in the early 2000s, the City undertook a multi-year program to manage trees infested by EAB, ultimately resulting in the loss and removal of most Windsor's ash tree population. Unlike municipalities that were infested later, Windsor did not have the benefit of learning from other jurisdictions' experiences with EAB management or of using commercially available insecticides; therefore, the focus of the City's management approach was largely on ash tree removal and replacement.

Invasive species

The City regularly manages invasive species in natural areas including Ojibway Park, Black Oak Heritage Park, Spring Garden Natural Area, Optimist Memorial Park, and others, through targeted removal and herbicide application (in collaboration with the Horticulture division), as appropriate, and prescribed burns overseen by the City's Natural Areas staff.

In 2023, Windsor received an Invasive Species Action Fund grant to "implement control of dog strangling vine, Japanese knotweed, and autumn olive [in Ojibway], while increasing capacity to detect species on the watch list". In conjunction with ERCA and Provincial staff, the City has also undertaken some invasive species management efforts in the Spring Garden Natural Area.

Elsewhere in the city, invasive species management is undertaken on an *ad hoc* basis, such as in conjunction with other capital projects (e.g., proposed Siberian elm removal through the Little River Channel Improvement project) or when initiatives are spearheaded by external partners, such as local environmental interest or 'friends of' groups. There is currently no citywide invasive species inventory or management/action prioritization plan in place.

Natural areas

Aside from the Black Oak Heritage Park Management Plan (2019), there are currently no management plans in place for natural areas in the city, such as Ojibway Park, the Little River Corridor, the South Cameron woodlot, the Spring Garden Natural Area, or other natural areas listed in the CNHS Inventory report, identified as Environmental Policy Areas, or assigned Natural Heritage Land Use classification.

In addition to invasive species and tree-related risk, addressed previously, another significant issue facing natural areas, such as the South Cameron woodlot, Spring Garden Natural Area, Oakwood Park, and Seven Sisters Park, among others, is unpermitted encroachment. These encroachments onto municipally owned parcels and unopened rights-of-way may include dumping of yard waste, erection of fences and structures, and even vegetation removal and unauthorized planting. Such encroachments degrade the health and ecological function of sensitive edge habitats and increase tree risk exposure and municipal liability.

At present, there is no comprehensive assessment or inventory of the extent of unpermitted encroachments into natural areas and enforcement, if undertaken, is on a limited and reactive basis.

Figure 16: A prescribed burn to control invasive species and protect tallgrass prairie habitat at Ojibway Park.

Urban forest products

Urban trees are mainly valued for the economic, health and community, and environmental services that they provide as they live and grow, and less so for tangible products such as wood or fruit. However, municipalities and their residents are increasingly recognizing the value of urban forest products from both living and removed trees. Currently, the City does not operate a comprehensive urban wood utilization or recovery program. Wood waste is generally disposed of by chipping and wood chips are used to mulch newly planted City trees, for mulch beds in parks, and for refurbishment of formal wood chip trails. Similarly, the City has not established nor maintains any urban forest orchards for public harvesting.

UFMP directions for maintaining Windsor's urban forest

Directions for enhancing urban forest maintenance in Windsor, to be supported through the Urban Forest Management Plan, include:

- **Strengthening divisional capacity and organizational structure:** The UFMP should guide the City to enhance the capacity of the Forestry division to conduct both reactive and proactive urban forest maintenance and deliver a wider range of urban forest services in a timely and effective manner. Key actions may include establishing a more specialized division organizational structure with discrete work units (e.g., urban forest health, inspection, arboriculture, etc.), and increasing divisional resources over time.
- **Improving interdepartmental coordination:** The UFMP should guide the City in fostering a culture of cooperation among municipal departments on urban forestry issues, helping staff to find collaborative solutions to tree-related issues before and as they arise. Key actions may include development of jointly developed interdepartmental tree-related policies, establishment of new protocols to ensure early collaboration on capital projects and other initiatives that may affect (or be constrained by) trees, and formalization of the UFMP Project Steering Committee (PSC) into a staff urban forestry working group.
- **Supporting and enhancing proactive tree maintenance programs:** The UFMP should support the City's recently initiated seven-year street tree pruning cycle program and encourage the expansion of proactive maintenance to trees in actively used park areas. The UFMP should also direct the City to implement a young tree structural pruning program for all newly planted caliper trees.
- **Developing urban forest operating policies and Levels of Service targets:** To ensure adequate service delivery, the UFMP should direct the Forestry division to codify existing and target practices and procedures in departmental Levels of Service policies. Such policies may address boundary tree maintenance, risk assessment and mitigation, service request inspection and prioritization, and proactive tree maintenance, among others. Levels of Service should be made publicly available to provide accountability to residents and potentially reduce the volume of inquiries, complaints, and service requests.

- **Enhancing tree risk management:** The UFMP should guide the City to enhance its ongoing efforts to manage tree risk through support of strategies and actions such as the development of a tree risk policy, delineation of tree risk management zones, establishment of regular inspection protocols, conservation-focused mitigation, and more effective integration of risk assessment with work order systems and tree maintenance operations. Specific actions may also include undertaking a priority tree risk assessment of trees along woodlot edges abutting residential and other properties where tree failure may pose risk to people or property.

- **Enhancing urban forest pest, disease, and invasive species management:** The UFMP should direct the City to strengthen management through strategies and actions such as increased proactive monitoring and inspection, improving knowledge of invasive species populations in natural areas through priority invasive species surveys, developing natural areas management plans (see below), and building community partnerships and awareness.

- **Enhancing natural areas management:** Recognizing the growing threats to ecological integrity of City-owned natural areas, a legacy of limited management, and their significant ecological value, the UFMP should support the City in assessing the condition and management needs of its natural areas, developing adequately-resourced natural areas management plans for priority locations, and addressing management priorities such as invasive species, encroachment and other human impacts, risk, and ecological connectivity and function, among others. The UFMP should also support Environmental Master Plan Objectives C6 and C9, which support the acquisition of currently unprotected natural areas in the city. The UFMP will need to consider potential changes to natural areas ownership and management that may occur in conjunction with the ongoing National Urban Park study.

- **Providing opportunities for urban forest product use:** Recognizing the significant economic, environmental, and community value potential of urban forest products, the UFMP should encourage the City to provide opportunities to engage community members in urban forest product utilization through an urban wood reuse program, establishment of urban forest orchards, and mapping of existing City-owned food-bearing trees.

Section 6. Growing Windsor's urban forest

Windsor's urban forest grows through natural processes in forested areas and open spaces and through tree planting along streets, in parks, and on private properties across the city. Trees may be planted to replace removed trees, restore or naturalize open spaces, complete or enhance streetscapes and parks, or for many other reasons and functions.

However, growing the urban forest requires more than simply planting trees—successful and long-term tree establishment requires planning to ensure appropriate growing sites and tree species are selected or created, post-planting maintenance to ensure that trees thrive for the long-term, and monitoring to track tree and urban forest health and growth.

This section of the Key Findings and Directions Report reviews the current approaches to establishing and growing Windsor's urban forest on both City-owned and private lands.

Forestry operations

Guided by the findings of the urban tree canopy study, since 2019 the City has planted approximately 2,500 caliper trees per year in an effort to increase urban tree canopy cover citywide and aid in post-EAB recovery. Thousands of seedlings and saplings are also planted through community and partner planting events in parks and naturalized areas.

Figure 17: The City's 'Little River Tree Nursery'.

Along existing streets and in parks in Windsor, trees are planted by both City staff and contractors in the Spring and Fall planting seasons. Currently, the City plants approximately 2,500 caliper trees through Forestry operations per year—a significant increase above pre-2019 planting levels of approximately 750 trees. $250,000 of the 2023 approved Forestry capital budget is allocated to tree planting.

Tree procurement

Historically, trees have been obtained by the City through procurement contracts and from its own 'Little River Tree Nursery'—where seedlings and whip stock are 'grown-out' to caliper size—and . However, the City nursery will be subsumed by the future Little River Pollution Control Plant Expansion in the coming years. This will require long-term planning to phase out the operation and nursery stock will be dug from the nursery until depleted to supplement externally procured planting stock.

Tree procurement contract tenders require both 'highly preferred' underutilized and uncommon native Carolinian species, such as tupelo and tulip-tree, and more commonly available trees such as hackberry or honey locust. Bidders must be able to provide at least 14 different species per contract and must not exceed 10% of contract amount per species or 15% per family. Contract tenders are well-written and support the objective of increasing urban forest diversity.

Trees are delivered to Parks facilities and are inspected by Forestry staff prior to planting. Trees with unacceptable structure or health can be rejected at the contractor's expense.

Planting site assessment

Tree species are matched to individual planting sites by Forestry staff based on visual site assessment, knowledge of general soil and site conditions, and other important factors, prior to tree planting. Staff report that species are generally effectively matched to appropriate planting sites. The City does not currently have an inventory of vacant plantable sites.

Tree species list

The City currently maintains several disparate lists of trees considered acceptable or appropriate for planting in the municipal right-of-way or parks. Species lists are included in the *Guidelines for Tree Planting on the Right of Way,* the *Tree Guide* on the City's urban forestry webpage, tree planting operations contract tender, and the Parks and Facilities Department's internal "common tree species planting list".

The departmental species list promotes urban forest diversity and favours regionally native deciduous tree species. However, several overabundant and generally undesirable species (e.g., ivory silk lilac and ornamental pear) remain on the lists. The City's tree species lists should be revised, consolidated into a single point of reference applicable for all planting scenarios, and expanded to include information about tree size, form, site tolerances and requirements, and guidelines for use in appropriate planting typologies. Recognizing Windsor's favourable growing conditions, additional and previously unutilized tree species should be added to the lists for limited or trial application.

Planting standards

Most street and park trees are planted by contractors operating under a separate contract from the tree procurement process.

Operational specifications for contracted tree digging (from the City nursery), planting, and post-planting watering are outlined in contract tender documents. In accordance with urban forestry best practices, contract specifications require that planting holes are hand-dug and that mulch, tree irrigation bags, and mycorrhizal inoculant be installed.

Although a comprehensive audit of contractor tree planting practices has not been undertaken, Forestry staff report a high level of tree planting quality. Survival rates of newly planted trees are not tracked or monitored over time. However, anecdotal observation suggests a survival rate of approximately 95% within the two-year maintenance period for trees planted through Forestry division operations. This is comparable to new tree mortality rates found in other municipalities and in the literature.

Post-planting (establishment) care

Following planting, trees planted through Forestry division operations enter into a two-year maintenance program are watered by City contractors throughout the growing season, typically between June and September. As most planted caliper trees are provided with a tree irrigation bag, some 57 litres (15 gallons) of water are provided per watering round. Planting contractors also distribute informational leaflets to residences with newly planted trees, encouraging residents to water trees.

As noted in **Section 5**, newly planted trees are not routinely structurally pruned, nor is regular post-planting inspection undertaken by Forestry staff to track establishment performance and long-term survival. Survival rates are inferred from tree replacement work orders and the tree lost rate is estimated at 5%.

Trees planted in new developments and as part of capital projects are expected to be maintained through the project or landscape warranty period by project or development contractors prior to assumption as municipal assets. Post-planting maintenance of these trees is not routinely tracked or verified.

Capital projects

Trees may be planted as part of municipal capital projects, such as road reconstruction or sidewalk rehabilitations, particularly if existing trees were required to be removed to facilitate the works. However, tree planting and post-planting maintenance are not always adequately budgeted for in capital project plans. Additionally, the absence of City consolidated citywide engineering standards for tree planting may lead to inconsistent planting stock type and quality and inadequate

planting practices. For example, some City guidelines require 70 mm caliper planting stock, whereas Forestry division operations and development guidelines generally call for 50 mm caliper trees, which are generally considered more likely to successfully establish after transplanting in difficult growing conditions.

Trees planted through capital projects may also not be added to the Forestry division's tree inventory in a timely manner and therefore may not be effectively integrated into the proactive tree maintenance program or provided adequately post-planting maintenance and watering.

The City has designed and installed enhanced growing environments, including soil cells, in limited applications for some trees in urban streetscapes, and the use of soil cells and suspended pavements is supported in the recently adopted *Riverside Drive Streetscape Standards Manual*. However, the current absence of municipal requirements for minimum soil volumes or citywide guidelines for enhanced tree growing environments results in the continuation of 'business-as-usual' tree establishment practices and inadequate consideration and budgeting for tree growing environments in most capital projects.

Many trees in Windsor's downtown core are established in antiquated 'planting pits'—zones of limited and highly compacted soil suitable for only the hardiest tree species, as evidenced by the dominance of honey locust in this area. The high cost and low survival rate of tree replacements in these growing environments has created significant gaps in the tree canopy along downtown streets, illustrating the need to retrofit enhanced growing environments such as soil cells, continuous soil trenches, or open planters, as part of any future streetscape improvements.

Development

In new communities in Windsor, trees are planted by the City or by development contractors, according to the specifics of the development agreement.

Under City guidelines (see **Section 2**), developers are required to provide at minimum one street tree per lot or per 15 m frontage for corner lots in new residential subdivision. However, the *Landscape Requirements for Development in Windsor* manual (4th edition) contains internally conflicting guidance regarding minimum boulevard tree size, as Section 3.3 specifies 50 mm caliper trees for public boulevards in subdivisions, whereas Section 4.4 specifies 70 mm trees for the same areas. In parklands in new developments, one 70 mm caliper shade tree is required per 250 square metres of site area. In accordance with urban forestry best practices, 50 mm trees are generally preferred due to their higher transplant survival rates relative to larger-caliper trees.

In accordance with the *Landscape Requirements* manual, "In some instances the Department of Parks and Recreation may receive a fee from the developer, which is deposited in the Tree Planting Reserve Fund, to carry out the tree planting at the developers' expense." In this case, trees are planted Forestry division staff or contractors. Current planting fees collected by the City are not able to fully cover the overall cost of tree establishment, which includes nursery stock procurement, installation, and two years of maintenance.

Notably, the City does not maintain a set of standards or specifications for tree planting and establishment in new developments. This may result in inconsistent levels of nursery stock and planting quality and inadequate post-planting maintenance, particularly when trees are planted by developers instead of by the City.

Following planting, developers are required to maintain trees for a period of a minimum of two years prior to final acceptance by the City. However, due to divisional resource limitations, trees in new development are reportedly not adequately inspected to ensure initial planting stock quality, proper installation, and regular implementation of necessary maintenance. This occasionally results in acceptance of trees that are alive but may be unhealthy or poorly structured.

Naturalization and partnerships

Some 3,500-5,000 seedlings and saplings are planted annually through naturalization plantings on City lands. These plantings are undertaken in partnership with community organizations and external agencies such as Scouts Canada, Essex Region Conservation Authority (ERCA), local school boards, the Little River Enhancement Group, Essex County Field Naturalists Club, Detroit River Canadian Cleanup (DRCC), and others. These partners are generally the 'leads' of these plantings, with the City playing a supporting role by providing land, funding, and other supports. Trees may also be provided by external partners, such as Forests Ontario, ENWIN, and others.

Partner-initiated naturalization plantings are generally conducted on an *ad hoc* basis as opportunities arise, without guidance from an overarching naturalization plan or planting prioritization strategy. Moreover, the City is generally required to assume maintenance responsibility for new naturalization plantings, which are rarely supported by comprehensive monitoring or post-planting care such as watering, weeding, or mulching. As a result, some naturalization areas have experienced considerable new tree mortality and have required replacement planting.

Resident planting – right-of-way

The City allows residents to plant trees within the road right-of-way fronting their private properties—a practice that is prohibited or discouraged in many other municipalities. The City requests that residents confirm with the Forestry division before planting trees in the right-of-way. As trees become municipal property once planted on the right-of-way, this may result in trees being added to the City-managed tree population without the Forestry division's knowledge or inclusion in the tree inventory database.

To support resident-initiated tree planting on the right-of-way, the Forestry division has published *Guidelines for Tree Planting on the Right of Way*, available on the City's urban forestry webpage. However, the digital file appears to be corrupted, is technical in nature and not user-friendly or accessible, and should be thoroughly revised. The species list included in the *Guidelines* references several species that should not be acceptable except under specific limited circumstances, such as ivory silk lilac, Callery pear, or Norway maple.

Residents can also request City tree planting in the road right-of-way via 311. However, this program is not formalized or publicized, and resident participation is consequently limited.

Private land tree establishment

At present, the City does not provide any program or incentive support for residents or other property owners for tree establishment on privately-owned lands in Windsor. Examples of such support may include free or subsidized trees, rebates for plant material or installation, stormwater fee reductions, or other incentives.

Figure 18: The wide boulevard provides an enhanced tree growing environment in this rendering from the University Avenue and Wyandotte Street CIP.

Official Plan policies

Windsor's Official Plan provides high-level and specific policy direction for growing the urban forest (**Table 10**).

Table 10: Official Plan policies related to growing Windsor's urban forest.

Policy	Elements
5.3.6.3	· Encourages planting of trees on public and private property, in particular those species most tolerant of Windsor's climatic conditions and those less susceptible to disease
5.3.6.4	· Encourages planting native and Carolinian species
5.3.6.5	· Encourages planting trees along watercourses and linkages
5.3.6.6	· Encourages creation of treed spaces along infrastructure rights-of-way and in public open spaces
5.3.6.10	· Encourages relocation and transplanting of trees to municipal lands in situations where trees would have been lost to development activities
5.3.6.11	· Encourages street tree replacement with a new tree planted as close as practices to the location of the original tree

Other standards and specifications for tree establishment in Windsor are described throughout this section of the Key Findings and Directions Report.

A more comprehensive review of the policy context for tree establishment in Windsor is found in **Section 2** of this report.

Targets and prioritization

The post-2019 increase in the number of trees planted by the Forestry division was informed by the tree canopy study undertaken as part of the UFMP project. The study suggests that planting approximately 2,500 trees will increase Windsor's tree canopy cover to approximately 20% by 2049. However, to date, Windsor has not established any citywide or area-based tree canopy cover goals or other tree establishment targets.

Tree establishment is loosely guided by Potential Plantable Area (PPA) and tree establishment prioritization mapping developed as part of the canopy cover study, but site-level functional objectives are not directly considered when selecting tree planting locations or species.

UFMP directions for growing Windsor's urban forest

Directions for growing Windsor's urban forest to be supported through the Urban Forest Management Plan include:

- **Supporting and enhancing existing tree establishment programs:** The UFMP should strongly support certain elements of the City's existing tree establishment programs, including existing caliper and seedling planting levels. Recommended enhancements to tree establishment programs may include increasing post-planting monitoring, requiring GPS logging of watering trucks, increased mulching frequency, and implementing a young tree structural pruning cycle for newly planted trees. The UFMP should also direct relevant departments to departments to coordinate at all stages of capital project planning and implementation to ensure that tree growing environments are optimized, appropriate trees are selected, and adequate post-planting maintenance is budgeted for and provided. The UFMP should also direct the City to consider transitioning responsibility for all tree establishment for City capital projects to the Forestry division, provided adequate resourcing.
- **Enhancing tree establishment through the development process:** The UFMP should direct the City to improve policies and procedures related to tree establishment in new communities and infill development. This may include strengthening requirements for verification of post-planting maintenance through the warranty period; improving pre-planting, interim, and post-planting inspection, monitoring, and reporting; or even transitioning to solely City-led delivery of tree establishment in new developments.
- **Developing consolidated citywide tree growing environment and planting standards and specifications:** Recognizing the disparate and incomplete guidance for tree establishment through capital projects and development, the UFMP should guide the City to develop a consolidated and comprehensive series of design guidelines, standards, and specifications for all aspects of tree establishment. These guidelines should address tree growing environments (soil volume and quality, design and retrofit options, etc.), tree species selection and diversity, planting stock quality, installation, post-planting maintenance, and other elements.

- **Developing a naturalization strategy:** Given the absence of long-term guidance for partner-supported naturalization plantings in parks and on other City-owned lands, the UFMP should direct Windsor to develop a long-term naturalization strategy to identify suitable and community-supported planting locations, establish maintenance partnership agreements with interested parties, and identify sources of and allocate necessary resources to ensure adequate post-planting maintenance and monitoring. The naturalization strategy should support restoration of species at risk and their habitats and should consider climate change challenges and adaptation opportunities. Opportunities to develop pollinator gardens and wildflower meadows, among other vegetation communities, should also be explored.
- **Developing a private land tree establishment engagement program:** The UFMP should direct the City to develop and phase in a wide-ranging program to encourage and support tree establishment on residential, commercial, and institutional lands in Windsor. Key elements of this program may include, among others: awareness-building through outreach activities and educational materials; tree planting supports such as subsidized or free trees; incentives and recognition programs to encourage tree establishment; and partnerships on larger private lands, encompassing not only tree planting but also effective maintenance and long-term monitoring. While it is likely to be initiated through small-scale initiatives and pilot projects, the program should ultimately be guided by a comprehensive strategy that, among other considerations, identifies sustainable long-term resourcing necessary to significantly increase the level of tree establishment and stewardship on private lands across the city.

Section 7. Protecting Windsor's urban forest

Site disturbance during development, capital projects, or other site alterations, is among the most significant sources of impacts upon the urban forest. During site disturbance, trees can experience soil compaction or contamination, suffer root or trunk damage and injury, experience changes in grading and water availability, or even be removed. In the absence of adequate regulation, tree injury and removal decisions are made at the tree owner's discretion, with no requirements to replace and sustain the urban forest canopy.

Protecting the urban forest from the impacts of site disturbance and tree removal is a key component of an effective urban forest management program, and helps to sustain the provision of important services and benefits. Mechanisms for effective tree protection include, among others, supportive development guidelines and planning processes, tree by-laws, compensation and security mechanisms, effective site inspection and enforcement, and incentives.

This section of the Key Findings and Directions Report reviews current approaches to protecting Windsor's urban forest on both City-owned and private lands and identifies directions to improve tree protection both within and outside the development process.

As described in Section 2 of this report, recent amendments to the planning framework in Ontario may have significant implications for the ability of municipalities to regulate tree protection through the development process. Municipal planning staff will need to continue to evaluate the impacts of these changes in the context of tree protection.

Within the development process

The development process encompasses site activities or land use changes that require approval pursuant to the *Planning Act,* R.S.O. 1990, c. P.13. These include activities described in applications for Official Plan Amendment, Zoning By-law Amendment, Site Plan, Plan of Subdivision, Plan of Condominium, and Consent (lot severance). Within the development process, tree protection can be accomplished through the adoption of supportive higher-level (i.e., Official Plan) policies, application of tree protection guidelines and standards, an effective development application review process, retention of securities and compensation, site monitoring, and collaboration with applicants.

Tree protection policies and standards

As described in **Section 2** of this report, Windsor's Official Plan establishes several policies that lend support to planning decisions that favour tree protection and enable the City to require proponents to submit a Tree Inventory and Preservation Study (TIPS) and replacement/compensation plans for proposed developments.

Standards for tree protection are outlined in Section 3.1 – Existing Trees of the *Landscaping Requirements for Development in Windsor* (4th edition) manual. The manual states, "Significant or rare trees are generally required to be preserved" and enables the City to require compensation planting "above and beyond basic requirements" for approved removal of "good existing trees". The manual also includes standards for tree protection zone (TPZ) fencing (min. 4.5 m TPZ for trees >30 cm dbh, min. 3.0 m TPZ for trees <30 cm DBH) and limitations for grade change and other disturbances around existing trees. Tree removal is required on an aggregate caliper basis, whereby replacement trees are to be provided at a combined caliper equivalent to the DBH of the injured or removed tree.

Notwithstanding several standards that align with contemporary urban forestry best practices, the tree protection standards established in the *Landscape Requirements* manual are generally outdated and require comprehensive revisions. Moreover, the City does not currently maintain a consolidated set of tree protection guidelines, specifications, and standard technical detail drawings for measures such as Tree Protection Zones (TPZ), TPZ barriers and signage, root zone compaction protection, root-sensitive excavation, or others, that are applicable across all tree protection scenarios, both within and outside the development process. As such, Windsor should develop an updated and consolidated tree protection policy or standard that supersedes guidance in all other existing and disparate City standards.

Figure 19: Inadequate tree protection during capital road reconstruction works can impact tree roots and adversely effect long-term tree health.

Planning applications

Development applications made under the *Planning Act* are subject to the City's development approvals process, which entails plan review by Planning & Development division staff to ensure compliance with the Official Plan, Zoning By-law, and other legislation and regulations.

In response to changes to the Provincial planning framework, the City requires all planning applicants to engage in preconsultation with planning staff to review application requirements and potential constraints. Tree protection may be discussed at the preconsultation stage if City-owned or other significant trees may be impacted by the proposed development.

Lot Gradings Plans, which may be required as part of planning application submissions, are typically required to depict existing trees and proposed protection measured. Where possible, staff will work with applicants to identify alternative designs that support tree protection on a voluntary basis, but privately-owned trees outside of Natural Heritage lands, Environmental Policy Areas, or Candidate Natural Heritage Sites (CNHS) can generally be removed to facilitate proposed development provided plans comply with Official Plan and zoning provisions (i.e., if the development is considered 'as of right').

Forestry division staff are circulated on development applications to review potential impacts on City-owned trees. Recently, the division instituted a new tree replacement protocol for City trees removed *with* authorization for driveway widening, construction, and development works. This protocol requires compensation in accordance with the process outlined in the *Landscape Requirements* manual—namely, aggregate caliper compensation or payment of equivalent cash-in-lieu. Trees removed without authorization may also be subject to this process or to penalties imposed under relevant by-laws.

Despite the City's tree removal compensation requirements for privately-owned trees, also outlined in the *Landscape Requirements* manual, full compensation value or replanting is not consistently obtained for development sites. Moreover, in the absence of a private tree protection by-law, trees may be pre-emptively removed in advance of the submission of a development application, leaving the City with little recourse to require tree protection or compensation.

Exempt applications

Several types of site disturbance, building, and development applications are exempt from Site Plan control or other *Planning Act* requirements. Among others, these may include various forms of residential dwellings, small commercial buildings and additions, driveway widenings, and swimming pool installations. At present, application forms for these types of applications are not required to disclose potential impacts upon existing City-owned or private trees, and there are no tools in place to 'flag' such applications for more detailed review to assess impacts, protection measures, and compensation requirements.

Windsor's site alteration by-law **No. 6938**, as amended, authorizes the City to regulate placing or dumping of fill. However, this by-law does not require permit applicants to disclose tree locations and, despite the potential utility of site alteration by-laws as private tree protection tools (see **Appendix 3**), it has not been used effectively to regulate tree injury.

Securities

The City routinely collects financial securities (e.g., cash deposit, letter of credit) for the completion of development works, including landscaping. Similarly, the City collects fees for tree planting (see Section 6). However, development securities are not itemized and are not held separately for tree protection, including the protection of City trees. Collected fees may be insufficient to cover the cost of mitigation or the loss of asset value if City-owned trees are inadvertently injured during construction activities.

Site inspection and enforcement

The Planning department may occasionally require confirmation of the installation of approved tree protection fencing prior to providing sign-off on Building Permits associated with planning applications, but this requirement is applied inconsistently and without field verification by staff.

Development sites are not routinely monitored to verify compliance with tree protection measures outlined in development agreements, and interim inspections will only be undertaken on a complaint-driven basis. Final site inspections are undertaken by Planning staff prior to release of financial securities, but these inspections focus on completion of proposed site works and do not typically investigate tree protection. Moreover, there is currently no process in place to support withholding of securities even if tree protection violations are observed during interim or final inspections.

Outside the development process

Outside the development process, tree protection in municipalities is most commonly supported through the enactment and enforcement of tree protection by-laws or other supportive by-laws. Perhaps more importantly, however, fostering awareness of urban forest benefits and building a culture of tree protection, can help to promote voluntary tree protection and stewardship in the community.

Tree by-laws

Currently, there is no citywide private tree by-law in force in Windsor and the injury and removal of privately-owned trees on residential, commercial, and institutional private lands outside of the Sandwich Heritage Conservation District are unregulated. It is not currently known how many privately-owned trees are injured or removed in Windsor annually.

As described in **Section 2**, trees in municipal parks and within the road right-of-way are protected pursuant to the **Parks and Trees on Highways by-laws**, while injury and destruction of trees in designated Natural Environment Areas is regulated pursuant to by-law **No. 231-2005 – Natural Environment Areas**. By-law No. 135-2004 is considerably less detailed than similar by-laws in comparable municipalities and technically does not include provisions for authorization of *any* injury or removal of City-owned trees, even if necessary for operational reasons. Staff report that City tree by-law enforcement is solely complaint-driven, inconsistent, and generally ineffective, and that Forestry division staff with by-law enforcement powers are not adequately trained to support effective prosecution under the *Provincial Offences Act*.

Capital projects

Capital project works and infrastructure repairs are often highly intensive and entail significant site disturbance through excavation, paving, grading, and other impacts. As such, these works have the potential to injure or destroy existing trees in proximity to or conflict with project objectives. Basic tree protection standards were added to the City's *Supplementary Specifications and Mandatory Procedures and Practices* engineering manual in January 2022. Although these standards provide limited guidance for tree protection, they do not reflect arboricultural best practices, are inconsistent with tree protection

standards in other City documents, and place excessive onus on project contractors instead of City departments responsible for the capital project to ensure effective tree protection.

In practice, implementation of effective tree protection on City capital projects remains inconsistent, and existing mature trees are still frequently injured due to 'business as usual' construction practices; inadequate tree protection planning, budgeting, implementation, and oversight; and insufficient cooperation and coordination between responsible departments and the Forestry division.

There has been growing recognition among various City departments of the need to improve tree protection practices on capital projects. Success will require citywide buy-in on stronger tree protection standards, adequate project resourcing for tree-friendly design and construction practices, and more frequent monitoring and inspection of project sites at critical steps when trees may be most at risk of injury. If trees are injured or removed, project budgets must account for mitigation measures and adequate compensation, including high-quality nursery stock, proper planting, and post-planting care.

Figure 20: Tree root injury caused by sidewalk reconstruction, despite efforts to route the new sidewalk away from the base of the tree.

UFMP directions for protecting Windsor's urban forest

Directions for protecting Windsor's urban forest to be supported through the Urban Forest Management Plan include:

- **Strengthening Official Plan tree protection policies:** The UFMP should direct the City to strengthen Official Plan tree protection policies through future OP reviews and updates. Example enhancements may include including 'no net loss' or 'net gain' principles, recognizing the linkages between tree protection, human health, and climate change adaptation, and requiring detailed tree preservation reports for all planning applications that may affect private or City-owned trees.
- **Developing a tree protection policy and standards:** A consolidated tree protection policy supported by technically sound guidelines, standards, and specifications for a variety of tree protection measures, and applicable both within and outside the development process, will serve as a single point of reference for applicants, consultants, reviewers, and builders, helping to ensure consistent and effective tree protection planning and implementation across a wide range of site disturbance and development scenarios.
- **Enhancing engineering guidelines, standards, and specifications:** Specifications, detail drawings, and other engineering guidelines should reflect best practices for the design of tree growing environments and tree protection methods. New specifications and drawing

sets should be developed to reflect and integrate best practices such as belowground utility vertical zoning (i.e., 'stacking'), soil cells and continuous soil trenches, root-sensitive excavation and other tree protection measures, and others. The revised, updated, and enhanced tree protection and establishment guidelines, specifications, and standards should be consolidated in a comprehensive tree technical/policy manual that supersedes existing policies and serves as a single point of reference for applicants, contractors, and the public, ensuring that applications, designs, and implementation are consistently reviewed against clearly communicated, up-to-date, and effective standards.

- **Increasing capacity for application review:** The UFMP should support building internal staff capacity for review of tree-related components of planning and building applications. Options for enhancing capacity may include staffing an urban forest technician position in the Forestry division to support plan review or an ecologist/urban forest technician position in Planning & Development.
- **Ensuring consistent and effective tree-related securities and compensation:** The UFMP should direct the City to begin itemizing and retaining securities for the protection of, at minimum, City-owned trees that may be adversely affected by development. The UFMP should also direct the City to consistently require compensation for both approved and unauthorized tree injury and removal across all development scenarios. Tree compensation should also be written into capital project budgets to ensure adequate replacement of damaged or destroyed urban forest assets.
- **Improving monitoring and enforcement:** The UFMP should guide the City to enhance procedures for monitoring tree protection on development sites and capital projects, and to improve timeliness and effectiveness of tree by-law enforcement, including education, evidence collection and, where necessary, prosecution.
- **Developing a 'made-in-Windsor' private tree protection by-law:** Windsor is one of the only larger Ontario municipalities without a private tree protection by-law. With recent changes to the Provincial land use planning framework that reduce the City's oversight of development, growing recognition of the value of urban forest services and benefits—particularly for community climate change adaptation—and the need to support goals and targets to be established in the UFMP, the need for strengthened private tree protection is clear. The UFMP should direct the City to initiate the process of developing a locally appropriate private tree by-law. The process will need to entail extensive and targeted consultation with a broad cross-section of the community to build awareness and support, and should balance tree protection and tree owner discretion.
- **Updating the City tree by-law:** The UFMP should direct the City to update the municipal tree protection by-law to include a permitting or permission to system to authorize tree injury or removal when appropriate. The by-law should also provide an increased level of detail and

definition about specific prohibitions, address boundary or jointly owned trees, and include provisions for securities and compensation. The City's new tree replacement protocol, tree injury compensation requirements, and minimum qualifications for arborists assessing City trees should also be reflected in the by-law update.

- **Addressing natural area encroachment:** The UFMP should direct the City to address unpermitted encroachment into natural areas, particularly on municipally owned parcels and unopened rights-of-way, through increased enforcement of existing encroachment permitting processes and by-laws and, if necessary, creation of new regulatory tools to address encroachments that may degrade the health and ecological function of natural areas.
- **Improving the Building Permit application process:** The UFMP should direct the City to improve the Building Permit application and review process by adding a tree declaration component to relevant application forms, pre-screening applications for potential tree conflicts, and circulating the Forestry division for review and comment on applications involving potential injury to or removal of, at minimum, by-law regulated trees.
- **Improving tree protection on capital projects:** The UFMP should guide the City to ensure that all aspects of tree protection—from planning, to implementation, to inspection and mitigation—are fully budgeted for and effectively implemented on all capital projects and infrastructure maintenance operations where trees may be affected.
- **Building community awareness about tree protection:** The UFMP should direct the City to build public awareness about the importance of protecting trees. Key directions for awareness-building are outlined in Section 8.

Options for private tree by-laws

Private tree by-laws can range widely in their scope of regulation and can be tailored to reflect local needs and values. By-laws can range from basic notification requirements, whereby property owners must simply notify the municipality prior to undertaking tree injury or removal, to outright prohibition of certain actions against regulated trees.

Regulation thresholds are commonly based on tree size (DBH), but by-laws may also consider other factors such as important species, heritage significance, property zoning or lot size, or others.

To be effective, private tree by-laws must be supported by adequate resources for public education and communication, timely permit review, and effective enforcement. Conditions such as tree replacement requirements can help to ensure a balance between tree owner discretion and urban forest preservation. Detailed best practices for tree protection by-laws are outlined in **Appendix 3.**

Section 8. Partnerships in Windsor's urban forest

Community residents, commercial and institutional landowners, and other external partners can influence the health, structure, and function of Windsor's urban forest. It is therefore essential to build awareness and appreciation of the urban forest and engage these and other partners in urban forest stewardship—the establishment and maintenance of trees—on both public and private lands.

This section of the Key Findings and Directions Report reviews current urban forest outreach and education programs and engagement efforts and partnerships in Windsor's urban forest.

Outreach and education

In the context of Windsor's UFMP, outreach and education primarily entail the municipal and/or partner-led delivery of programs to inform community members about various aspects of the urban forest, such as urban forest services and benefits, threats to the urban forest, care and maintenance best practices, tree-related policies and regulations, and opportunities to grow the urban forest on private lands. The overall intent of urban forest outreach and education is to foster a culture of urban forest stewardship and appreciation, encouraging all community members to grow, support, and protect trees in Windsor's urban forest.

Program

The Natural Areas team of the Forestry division coordinates and provides educational programming at the Ojibway Nature Centre, situated in Ojibway Park. Example program offerings include the interpretive centre, guided nature tours, day camps, and curriculum-based school group programs. As such, the Ojibway Nature Centre serves as the centrepiece of the City's natural environment-related outreach and educational programming.

However, given the central role of the Ojibway Nature Centre, the Natural Areas team delivers educational programming largely independent of the rest of the Forestry division and with a strong focus on the natural environments of the Ojibway Prairie Complex. As such, outreach and education related to Windsor's urban forest more broadly is limited. These efforts are largely restricted to static and limited website content, occasional social media postings, and direct engagement with community residents as specific issues arise.

Website

The City maintains a basic "Urban Forest" webpage[1] under the "For Residents – Parks and Forestry" section of the corporate website. The Urban Forest page provides basic information related to emerald ash borer, tree benefits, tree care, and tree regulations, as well as a "Tree Guide" that provides comprehensive technical information about 17 different Carolinian tree species suitable for planting in Windsor. The webpage can be difficult to find and navigate to from the City's homepage, appears

[1] https://www.citywindsor.ca/residents/parksandforestry/urban-forest/pages/urban-forest.aspx

unmaintained, and is not highly engaging. It also provides limited information about current urban forestry programs or opportunities for engagement.

Social media

The City Communications team occasionally posts urban forest-related social media content on Windsor's Facebook, YouTube, and X (formerly Twitter) channels. Examples of postings include high-quality videos featuring Forestry division staff discussing topics such as tree planting, the tree inventory and tree pruning program, and oak wilt identification, as well as occasional informational updates about urban forestry programs and services.

However, these postings appear to be sporadic and social media has not been used as part of a more cohesive urban forest outreach and engagement strategy or campaign.

Other outreach and education tools

City-facilitated events such as the annual Earth Day celebration provide opportunities for environmentally focused outreach and engagement, although these opportunities have not been used to educate community members about the urban forest specifically.

Aside from programs offered at the Ojibway Nature Centre, the City does not currently provide urban forest-related school curriculum support or other outreach or educational programming.

Partnerships and engagement

In the context of the Windsor UFMP, urban forest engagement refers to a wide range of stewardship activities undertaken by various urban forest partners working in cooperation with the City. It also entails actions undertaken by the City to directly engage residents and other community members in urban forest stewardship on private lands.

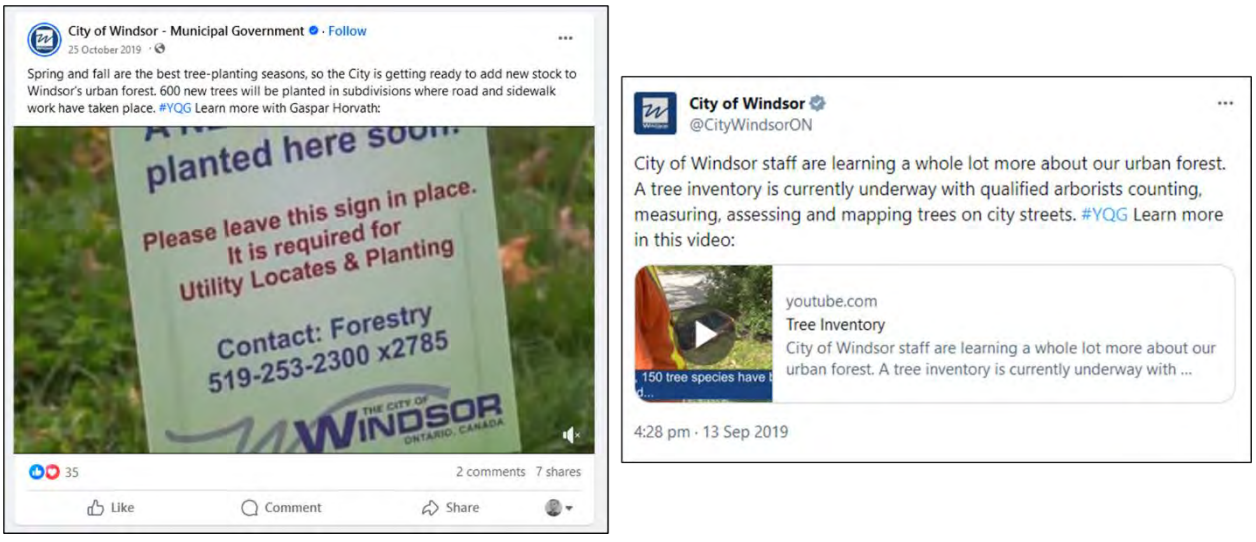


Figure 21: Examples of City of Windsor urban forest-related social media content.

Program

The City of Windsor does not presently implement a formalized urban forest engagement and partnership program. The City's approach to working with and engaging partners in urban forest stewardship is not guided by a strategy or plan, nor supported by clearly articulated goals, targets, or budgets. Most urban forest partnerships are informal, with the City supporting or receiving support from partners as needs and opportunities arise. Although many partnerships remain active, it appears that the City's level of engagement with external urban forest partners has declined in recent years.

City lands

Notwithstanding the absence of an urban forest engagement and partnership program, the City has successfully engaged with a variety of partners in tree planting on City lands. These partnerships, which have focused primarily on naturalization of small areas of parkland, are reviewed in **Section 6** of this report. As described, the stewardship (planting) activities undertaken with and by partners have been largely opportunistic, without the guidance of a strategy or planting prioritization analysis and without dedicated resources for post-planting tree monitoring and a comprehensive maintenance program.

It is unknown to what extent other groups or individuals have undertaken urban forest stewardship initiatives in Windsor without direct partnership with or support from the City. If identified, such groups could potentially be engaged as effective urban forest partners to support initiatives such as restoration and forest health monitoring, invasive species management, and other actions.

A notable partnership exists with Friends of Ojibway Prairie, which helps to support outreach and educational programming and restoration activities alongside members of the City's Natural Areas team. However, this partnership—like other programs delivered through the Ojibway Nature Centre—is largely focused on the Ojibway Prairie Complex and not on Windsor's urban forest more broadly.

At present, the City does not facilitate any programs to actively engage community members in public tree maintenance (e.g., tree watering), urban forest monitoring, or other forms of urban forest stewardship (except occasional tree planting) on City lands.

Advisory committee

Recently, Windsor City Council approved changes to the structure of various Council advisory committees. This included dissolution of the Windsor Essex County Environment Committee (WECEC) and replacement with the Environment and Climate Change Advisory Committee (ECC). The Committee's mandate and terms of reference do not explicitly mention trees or the urban forest, but provide discretion for the ECC to address a wide range of environmental issues and to develop subcommittees. Urban forest management aligns with the ECC's broad mandate and the Committee should be encouraged to advise on urban forest-related matters.

Private lands

To date, the City has not actively undertaken concerted efforts to support resident or business community engagement in urban forest stewardship on private lands.

Although the City runs an annual plant sale with a focus on ornamental plants, only a small number of trees and shrubs are offered for sale. There is currently no strategy or program in place to encourage private land tree establishment, and the City does not offer subsidies or incentives for private land urban forest stewardship, such as tree maintenance rebates, tree protection incentives, or a 'free/low-cost tree' program.

UFMP directions for partnerships in Windsor's urban forest

Directions for building partnerships in Windsor's urban forest to be supported through the Urban Forest Management Plan include:

- **Expand the urban forest outreach and education program:** The UFMP should direct the City to recognize and build on the successful outreach and education programming delivered through the Ojibway Nature Centre to develop and deliver similar programs for the urban forest more broadly. These efforts should be supported by program goals and targets, to be articulated in the UFMP and further refined through an urban forest outreach and education program strategy.
- **Enhance outreach and education materials:** In the short-term, the UFMP should direct the City to enhance all existing outreach and education materials, such as the Urban Forest webpage and social media content, and to develop new digital and written materials to support outreach and education efforts.
- **Work with partners to develop shared goals and priorities:** The UFMP should direct the City to engage with existing partners to determine shared long-term objectives that can be achieved through ongoing partnerships and activities on City-owned lands. Goals should be realistic, achievable, and supported by sustained resourcing provided both by the City and partners.
- **Coordinate urban forest partner activities:** The UFMP should direct the City to engage with partners to develop a long-range plan to identify locations for future engagement opportunities (e.g., planting sites, plantings requiring maintenance and monitoring, invasive species management, etc.) and coordinate action implementation and timing, resource needs, and follow-up maintenance and monitoring procedures. This can be supported through the cooperative and joint development of a partnership and engagement strategy.
- **Developing a community engagement program around tree establishment care:** The UFMP should direct the City to develop and implement a program to more effectively engage residents, organizations, and businesses in stewardship of City street and park trees, including monitoring, watering, and weeding. Opportunities may include an 'Adopt-a-Tree' program, public recognition for tree stewards, and incentives.

- **Seek additional partners and supports:** The UFMP should direct the City to identify other local partners who may be interested in engaging in Windsor's urban forest in novel and innovative ways, and who can provide additional support for sustained partnership and program delivery. Windsor and partners should work together to capitalize on external funding opportunities that may not be available directly to the municipality to support shared priority initiatives.

- **Engage partners in urban forest stewardship on public and private lands:** The UFMP should direct the City to encourage residents and landowners to engage in urban forest stewardship on their lands and to support basic but effective stewardship of trees along streets, in parks, and on other public lands.

Next steps

This Key Findings and Directions Report will inform the development of the **Strategy and Action Plan** component of Windsor's UFMP. The Strategy and Action Plan will be developed through an intensive Phase 2 consultation process with City of Windsor staff, external partners, and other members of the Windsor community.

The Strategy and Action Plan will establish a long-term vision for Windsor's urban forest and outline guiding principles to inform all aspects of urban forest management in the city. The Plan will also outline the goals and targets to be pursued during a 20-year planning horizon and beyond. Finally, the Plan will provide priority-based recommended actions supported by detailed implementation guidance and a monitoring framework to ensure that program goals are met and Windsor's urban forest vision is realized.

Glossary

Asset management (asset management planning)
An ongoing and long-term process that allows municipalities to make the best possible investment decisions for their infrastructure assets. This includes building, operation, maintenance, renewal, replacement, and disposal. In many parts of Ontario, existing infrastructure is degrading faster than it is being repaired or replaced, putting services at risk. To help address this issue, the Province implemented the *Asset Management Planning for Municipal Infrastructure Regulation, O. Reg. 588/17,* effective January 1, 2018.

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.

Climate change adaptation
Actions taken by communities to adjust to the impacts of a changing climate.

Equity
In an environmental context – protection from environmental risks as well as access to environmental benefits and services, irrespective of income, race, and other characteristics.

Function
The capacity of trees in the urban forest to provide a diverse range of environmental, economic, and societal and health benefits and services to community members.

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

Greenfield
Lands within settlement areas but outside of delineated built-up areas that have been designated in an Official Plan for development and are required to accommodate forecasted population growth. This term typically, but not always, refers to agricultural lands designated for future development.

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.

Integrated Pest Management (IPM)
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.

Inventory (tree)
A tabular and/or geospatial database containing attributes pertaining to the entirety or a subset of the tree population in a defined area. A tree inventory is typically used to inform urban forest maintenance operations and long-term planning.

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 (contained in carbon dioxide gas, CO_2) 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.

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).

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

Storage (carbon)
A measure of the carbon that is stored within woody vegetation. Trees and other plants sequester atmospheric carbon dioxide 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 good tree structure, typically characterized by a dominant central leader, adequately spaced and well-attached branches, and appropriate stem taper.

Tree
A woody perennial plant, typically having one dominant trunk and capable of attaining a considerable mature height.

Urban forest
The mix of the remnants of native forest cover and planted trees and vegetation on all private and public lands in and around the built-up areas. The urban forest includes municipally-owned street, park and facility trees, trees in valleys and woodlands, and privately-owned trees on residential properties or on commercial, industrial, and institutional lands, among others.

Urban forest (or tree) 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.

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Appendices

Appendix 1. Urban Forest Management Baseline Assessment

Urban Forest Baseline Assessment – City of Windsor, Ontario

Adapted from *The Sustainable Urban Forest: A Step-by-Step Approach* (Leff, 2016)

No.	Target	Key Objective	Performance Indicators			
			Low	Fair	Good	Optimal
T1	Relative Tree Canopy Cover	Achieve desired degree of tree cover, based on potential or according to goals set for entire municipality and for each neighborhood or land use.	The existing canopy cover for entire municipality is <50% of the desired canopy.	The existing canopy is 50%-75% of desired.	The existing canopy is >75%-100% of desired.	The existing canopy is >75%-100% of desired – at individual neighborhood level as well as overall municipality.
T2	Age Diversity (Size Class Distribution)	Provide for ideal uneven age distribution of all "intensively" (or individually) managed trees – municipality-wide as well as at neighborhood level.	Even-age distribution, or highly skewed toward a single age class (maturity stage) across entire population.	Some uneven distribution, but most of the tree population falls into a single age class.	Total tree population across municipality approaches an ideal age distribution of 40% juvenile, 30% semi-mature, 20% mature, and 10% senescent.	Total population approaches that ideal distribution municipality-wide as well as at the neighborhood level.
T3	Species Diversity	Establish a genetically diverse tree population across municipality as well as at the neighborhood level.	Five or fewer species dominate the entire tree population across municipality.	No single species represents more than 10% of total tree population; no genus more than 20%; and no family more than 30%.	No single species represents more than 5% of total tree population; no genus more than 10%; and no family more than 15%.	At least as diverse as "Good" rating (5/10/15) municipality-wide – ***and*** at least as diverse as "Fair" (10/20/30) at the neighborhood level.
T4	Species Suitability	Establish a tree population suited to the urban environment and adapted to the overall region.	Fewer than 50% of all trees are from species considered suitable for the area.	>50%-75% of trees are from species suitable for the area.	More than 75% of trees are suitable for the area.	Virtually all trees are suitable for the area.
T5	Publicly Owned Trees (trees managed "intensively")	Current and detailed understanding of the condition and risk potential of all publicly owned trees that are managed intensively (or individually).	Condition of urban forest is unknown.	Sample-based tree inventory indicating tree condition and risk level.	Complete tree inventory that includes detailed tree condition ratings.	Complete tree inventory that is GIS-based and includes detailed tree condition as well as risk ratings.
T6	Publicly Owned Natural Areas (trees managed "extensively")	Detailed understanding of the ecological structure and function of all publicly owned natural areas (such as woodlands, ravines, stream corridors, etc.), as well as usage patterns.	No information about publicly owned natural areas.	Publicly owned natural areas identified in a "natural areas survey" or similar document.	Survey document also tracks level and type of public use in publicly owned natural areas.	In addition to usage patterns, ecological structure and function of all publicly owned natural areas are also assessed and documented.
T7	Trees on Private Property	Understanding of extent, location, and general condition of privately owned trees across the urban forest.	No information about privately owned trees.	Aerial, point-based assessment of trees on private property, capturing overall extent and location.	Bottom-up, sample-based assessment of trees on private property, as well as basic aerial view (as described in "Fair" rating).	Bottom-up, sample-based assessment on private property, as well as detailed Urban Tree Canopy (UTC) analysis of entire urban forest, integrated into municipality-wide GIS system.

No.	Target	Key Objective	Performance Indicators			
			Low	Fair	Good	Optimal
C1	Municipal Agency Cooperation	All municipal departments and agencies cooperate to advance goals related to urban forest issues and opportunities.	Municipal departments/agencies take actions impacting urban forest with no cross-departmental coordination or consideration of the urban forest resource.	Municipal departments/agencies recognize potential conflicts and reach out to urban forest managers on *an ad* hoc basis - and vice versa.	Informal teams among departments and agencies communicate regularly and collaborate on a project-specific basis.	Municipal policy implemented by formal interdepartmental/ interagency working teams on all municipal projects.
C2	Utilities Cooperation	All utilities - above and below ground - employ best management practices and cooperate with municipality to advance goals and objectives related to urban forest issues and opportunities.	Utilities take actions impacting urban forest with no municipal coordination or consideration of the urban forest resource.	Utilities employ best management practices, recognize potential municipal conflicts, and reach out to urban forest managers on an *ad hoc* basis - and vice versa.	Utilities are included in informal municipal teams that communicate regularly and collaborate on a project-specific basis.	Utilities help advance urban forestry goals and objectives by participating in formal interdepartmental/interagency working teams on all municipal projects.
C3	Green Industry Cooperation	Green industry works together to advance municipality-wide urban forest goals and objectives, and adheres to high professional standards.	Little or no cooperation among segments of green industry or awareness of municipality-wide urban forest goals and objectives.	Some cooperation among green industry as well as general awareness and acceptance of municipality-wide goals and objectives.	Specific collaborative arrangements across segments of green industry in support of municipality-wide goals and objectives.	Shared vision and goals and extensive committed partnerships in place. Solid adherence to high professional standards.
C4	Involvement of Large Private and Institutional Landholders	Large private landholders embrace and advance municipality-wide urban forest goals and objectives by implementing specific resource management plans.	Large private landholders are generally uninformed about urban forest issues and opportunities.	Municipality conducts outreach directly to landholders with educational materials and technical assistance, providing clear goals and incentives for managing their tree resource.	Landholders develop comprehensive tree management plans (including funding strategies) that advance municipality-wide urban forest goals.	As described in “Good” rating, plus active community engagement and access to the property’s forest resource.
C5	Citizen Involvement and Neighborhood Action	At the neighborhood level, citizens participate and groups collaborate with the municipality and/or its partnering NGOs in urban forest management activities to advance municipality-wide plans.	Little or no citizen involvement or neighborhood action.	Some neighborhood groups engaged in advancing urban forest goals, but with little or no overall coordination with or direction by municipality or its partnering NGOs.	Many active neighborhood groups engaged across the community, with actions coordinated or led by municipality and/or its partnering NGOs.	Proactive outreach and coordination efforts by municipality and NGO partners resulting in widespread citizen involvement and collaboration among active neighborhood groups engaged in urban forest management.
C6	General Appreciation of Trees as a Community Resource	Stakeholders from all sectors and constituencies within municipality - private and public, commercial and nonprofit, entrepreneurs and elected officials, community groups and individual citizens - understand, appreciate, and advocate for the role and importance of the urban forest as a resource.	General ambivalence or negative attitudes about trees, which are perceived as neutral at best or as the source of problems. Actions harmful to trees may be taken deliberately.	Trees generally recognized as important and beneficial.	Trees widely acknowledged as providing environmental, social, and economic services - resulting in some action or advocacy in support of the urban forest.	Urban forest recognized as vital to the community’s environmental, social, and economic well-being. Widespread public and political support and advocacy for trees, resulting in strong policies and plans that advance the viability and sustainability of the entire urban forest.
C7	Regional Collaboration	Cooperation and interaction on urban forest plans among neighboring municipalities within a region, and/or with regional agencies.	Municipalities have no interaction with each other or the broader region. No regional planning or coordination on urban forestry.	Some neighboring municipalities and regional agencies share similar policies and plans related to trees and urban forest.	Some urban forest planning and cooperation across municipalities and regional agencies.	Widespread regional cooperation resulting in development and implementation of regional urban forest strategy.

No.	Target	Key Objective	Performance Indicators			
			Low	Fair	Good	Optimal
R1	Tree Inventory	Current and comprehensive inventory of tree resource to guide its management, including data such as age distribution, species mix, tree condition, and risk assessment.	No inventory.	Complete or sample-based inventory of publicly owned trees.	Complete inventory of publicly owned trees and sample-based privately owned trees that is guiding management decisions.	Systematic comprehensive inventory system of entire urban forest - with information tailored to users and supported by mapping in municipality-wide GIS system.
R2	Canopy Cover Assessment and Goals	Urban forest policy and practice driven by accurate, high-resolution, and recent assessments of existing and potential canopy cover, with comprehensive goals municipality-wide and at neighborhood or smaller management level.	No assessment or goals.	Low-resolution and/or point-based sampling of canopy cover using aerial photographs or satellite imagery - and limited or no goal-setting.	Complete, detailed, and spatially explicit, high-resolution Urban Tree Canopy (UTC) assessment based on enhanced data (such as LiDAR) - accompanied by comprehensive set of goals by land use and other parameters.	As described for "Good" rating - and all utilized effectively to drive urban forest policy and practice municipality-wide and at neighborhood or smaller management level.
R3	Environment Justice and Equity	Ensure that the benefits of urban forests are made available to all, especially to those in greatest need of tree benefits.	Tree planting and outreach is not determined equitably by canopy cover or need for benefits.	Planting and outreach includes attention to low canopy neighborhoods or areas.	Planting and outreach targets neighborhoods with low canopy and a high need for tree benefits.	Equitable planting and outreach at the neighborhood level is guided by strong citizen engagement in those low-canopy/high-need areas.
R4	Municipality-wide Urban Forest Management Plan	Develop and implement a comprehensive urban forest management plan for public and private property.	No plan.	Existing plan limited in scope and implementation.	Recent comprehensive plan developed and implemented for publicly owned forest resources, including trees managed intensively (or individually) and those managed extensively, as a population (e.g., trees in natural areas).	Strategic, multi-tiered plan with built-in adaptive management mechanisms developed and implemented for public and private forest resources.
R5	Municipality-wide Urban Forestry Funding	Develop and maintain adequate funding to implement municipality-wide urban forest management plan.	Little or no dedicated funding.	Funding only for emergency, reactive management.	Funding sufficient for some proactive management based on urban forest management plan.	Sustained funding from public and private sources to fully implement comprehensive urban forest management plan.
R6	Municipal Urban Forestry Program Capacity	Maintain sufficient well-trained personnel and equipment - whether in-house or through contracted or volunteer services - to implement municipality-wide urban forest management plan.	Team severely limited by lack of personnel and/or access to adequate equipment. Unable to perform adequate maintenance, let alone implement new goals.	Team limited by lack of trained staff and/or access to adequate equipment.	Team able to implement many of the goals and objectives of the urban forest management plan.	Team able to implement all of the goals and objectives of the urban forest management plan.
R7	Tree Establishment Planning and Implementation	Comprehensive and effective tree planting and establishment program is driven by canopy cover goals and other considerations according to plan.	Little or no tree planting; tree establishment is *ad hoc*.	Some tree planting and establishment occurs, but with limited overall municipality-wide planning and post-planting care.	Tree planting plan is guided by municipality-wide goals, with some post-planting establishment care.	Comprehensive tree establishment plan is guided by needs derived from canopy and other assessments, maintains species and age diversity, includes both planting and young tree care, and is sufficient to make progress toward canopy cover objectives.

No.	Target	Key Objective	Performance Indicators			
			Low	Fair	Good	Optimal
R8	Growing Site Suitability	All publicly owned trees are selected for each site and planted in conditions that are modified as needed to ensure survival and maximize current and future tree benefits.	Trees selected and planted without consideration of site conditions.	Appropriate tree species are considered in site selection.	Municipality-wide guidelines in place for the improvement of planting site conditions and selection of suitable species.	All trees planted in sites with adequate soil quality and quantity, and with sufficient growing space and overall site conditions to achieve their genetic potential and thus provide maximum ecosystem services.
R9	Tree Protection Policy Development and Enforcement	The benefits derived from trees on public and private land are ensured by the enforcement of municipality-wide policies, including tree care “best management practices”.	No tree protection policy.	Policies in place to protect public trees and employ industry best management practices, but inconsistently enforced.	Policies and practices in place to protect public ***and*** private trees, generally enforced.	Integrated municipality-wide policies and practices to protect public and private trees, consistently enforced and supported by significant deterrents.
R10	Maintenance of Publicly Owned, “Intensively” Managed Trees	All publicly owned, intensively (or individually) managed trees are well maintained for optimal health and condition in order to extend longevity and maximize current and future benefits.	No maintenance of publicly owned trees, or on a reactive basis only.	Publicly owned trees receive only periodic inspection and maintenance.	Publicly owned trees are inspected and proactively maintained on a cyclical basis.	All publicly owned, intensively managed trees are routinely and thoroughly maintained on ongoing basis according to comprehensive management plan.
R11	Management of Publicly Owned Natural Areas	The ecological integrity of all publicly owned natural areas is protected and enhanced - while accommodating public use where appropriate.	No natural areas management plans or implementation in effect.	Only reactive management efforts to facilitate public use (e.g., hazard abatement, trail maintenance).	Management plan in place for each publicly owned natural area to facilitate appropriate public use.	Management plan for each publicly owned natural area focused on sustaining and, where possible, improving overall ecological integrity (i.e., structure and function) - while facilitating appropriate public use.
R12	Tree Risk Management	Comprehensive tree risk management program fully implemented, according to ANSI A300 (Part 9) “Tree Risk Assessment” standards, and supporting industry best management practices.	No tree risk assessment or risk management program. Response is on a reactive basis only.	Level I (limited visual assessment) inspection and follow-up conducted periodically.	Level II (basic assessment) conducted periodically, resulting in scheduled follow-ups.	Level II (basic assessment) conducted routinely, according to defined cycle and intensive follow-up (i.e., priorities and timelines for mitigation established based on the characterization of risk).
R13	Urban Wood and Green Waste Utilization	Create a closed system diverting all urban wood and green waste through reuse and recycling.	No utilization plan; wood and other green waste goes to landfill with little or no recycling and reuse.	While most green waste does not go to landfill, uses are limited to chips or mulch.	The majority of green waste is reused or recycled - for energy, products, and other purposes beyond chips or mulch.	Comprehensive plan and processes in place to utilize all green waste one way or another, to the fullest extent possible.
R14	Native Vegetation	Preservation and enhancement of local natural biodiversity.	No coordinated focus on native vegetation.	Voluntary use of native species on publicly and privately owned lands; invasive species are recognized.	Use of native species is encouraged on a project-appropriate basis in all areas; invasive species are recognized and discouraged on public and private lands.	Native species are widely used on a project-appropriate basis in all areas; invasive species are proactively managed for eradication to the full extent possible.

Appendix 2. Phase 1 Engagement Findings

City of Windsor
Urban Forest Management Plan (UFMP)

Compiled responses from Phase 1 City staff (internal) questionnaire

1) In your opinion, how important should the City of Windsor—in its role as urban forest manager—consider each of the following objectives in its day-to-day operations and long-term plans?
(1 – not important, 2 – low importance, 3 – neutral, 4 – important, 5 – very important, X – no opinion/I don't know)

	1	2	3	4	5	X
Minimizing tree-related risk to public and property	☐	☐	1	2	7	☐
Increasing urban forest cover across the entire city	☐	☐	1	2	7	☐
Ensuring cost-effectiveness and efficiency of all aspects of urban forest management	☐	☐	1	4	4	1
Providing optimal growing spaces for new trees through capital projects and development	☐	☐	☐	3	7	☐
Increasing the quantity and variety of economic, environmental, and social services provided by the urban forest	☐	☐	1	5	3	1
Protecting existing mature trees	☐	☐	1	3	6	☐
Climate change *adaptation* through urban forest management	☐	☐	1	3	6	☐
Enhancing equity of access to the urban forest and urban forest services	☐	☐	☐	4	3	3
Managing natural areas (e.g., enhancing ecological function, controlling invasive species, etc.)	☐	☐	1	3	6	☐
Increasing community awareness of / engagement in the urban forest	☐	☐	2	4	4	☐
Increasing urban forest cover in areas with below-average tree canopy	☐	☐	1	3	6	☐
Climate change *mitigation* through urban forest management	☐	☐	1	4	5	☐

2) What, if any, other urban forestry objectives should be important for the City of Windsor to pursue through day-to-day operations and long-term plans?

- Preventative maintenance of existing inventory.
- Plant more trees
- None.
- Improved Biodiversity
- Improving tree protection during road construction.
- Work with management to remove non-forestry related items like raising and removing flags to enhance the productivity of the forestry staff.
- More regular maintenance (tree trimming) of municipal boulevard trees to reduce residents from taking it in themselves.
- Managing storm water for flooding mitigation.

3) In your opinion, how significant are the following challenges to the sustainability, function, and effective management of Windsor's urban forest?
(1 – not a challenge, 2 – a minor challenge, 3 – a considerable challenge, 4 – a major challenge, X – no opinion/I don't know)

	1	**2**	**3**	**4**	**X**
'Greenfield' development practices and impacts	☐	2	2	2	4
Tree injury / removal on private lands (excl. development)	☐	☐	3	5	2
Lack of community engagement in urban forest stewardship on private or public lands	☐	☐	7	1	1
Insufficient capital / operating resources	☐	1	5	☐	4
Insufficient policy support for urban forest protection or enhancement (planting)	☐	☐	5	3	2
Pests, diseases, and invasive species	☐	3	3	3	1
Infill development practices and impacts	☐	1	4	1	4
Lack of community awareness of urban forest issues	☐	4	3	2	1
Inadequate management practices (for City trees)	☐	4	3	1	2
Insufficient knowledge of the urban forest resource	☐	4	4	☐	2
Climate change effects (e.g., drought, heat, etc.)	☐	2	4	2	2

4) What, if any, other challenges does Windsor's urban forest currently face?

- Not aware
- Misperceptions of tree risks on private development sites. Community aversion to planting trees whether from an aesthetic, visibility or cultural perspective.
- Lack of homeowner support. People will support it but not in front of their house.
- Being a border City, Windsor is very vulnerable to the influx of invasive pests and disease. It is thought that EAB first arrived to Windsor from infected pallets coming from Detroit. There is also an Oak Wilt outbreak on Belle Isle, only 500 metres away from the shores of Windsor. Lastly, since there is not a Private Tree Cutting By-Law in Windsor, privately owned trees will always be at risk of removal at any given time.
- New commercial and private development and construction road work.
- There is no private tree by law to help protect trees against new development
- "Hidden" removal of trees. Property owners/developers removing trees before development application so they can forgo tree surveys/replacement costs.
- There is widespread abuse of trees (and all plants) in parks and natural areas, for example climbing, breaking, swinging on branches, tearing bark, soil compaction, root destruction, etc.
- Lack of available lands, competition with the need for additional development projects, residential and industrial.
- Lack of Forestry Staff

5) Do you foresee any emerging challenges that may be significant in the future, but are not currently significant?

- Staffing.
- For climate change adaptation we may need to focus more attention on other natural systems such as wetlands and prairies.
- This is a current concern, but will be exacerbated in the future. The loss of native trees due to climate impacts - higher temperatures, expansion of invasive species.
- Adopt a tree programs and government grant funding for tree planting.
- As the City of Windsor ramps up its Sewer Master Plan, more and more mature trees will continue to be impacted by this development. Currently, we have difficulty properly maintaining these trees during these construction activities. Many mature trees are removed prior to the construction or that they go into decline 2 to 3 years post construction and then require removal.
- Species selection and sustainability due to climate change and rising average temperatures.

6) In your view, which City department(s)/division(s) is/are the “home” of urban forestry in Windsor?

- Parks - Forestry and Planning - Urban Design
- Parks
- Forestry or Urban planning
- The Parks Department consists of 4 Divisions; Parks Operations, Design and Development, Horticulture and Forestry/Natural Areas. Clearly Forestry & Natural Areas is the home to Urban Forestry
- Forestry division
- Parks and Recreation
- Forestry, Planning
- Forestry and Natural Areas
- Parks - Forestry/Natural Areas
- Forestry

7) How does your department/division interface with Windsor's urban forest? **Check all that apply.**

1. Tree-related operations (e.g., maintenance, removal, planting)	8
2. Incidental interfacing with existing trees or influencing future tree growing environments (e.g., tree removal for capital projects, infrastructure construction or maintenance)	7
3. Developing policies, guidelines or standards that affect existing trees or future tree-growing environments	8
4. Community engagement related to trees or natural areas	7
5. Other (please describe):	

- Private development applications for above.
- Feelling and tree roots damage
- Climate change considerations – both
- All forestry issues within natural areas

6. My department/division does not interface with Windsor's urban forest ☐

8) If you selected options 2 through 5 in Question 7, please choose the **one option** below that best reflects your department or division's approach to trees.

My department/division does not consider our potential impacts upon existing or future trees when making decisions or delivering services.	1
Trees may significantly affect my department/division's ability to deliver City services, but we will consider potential impacts when they may be significant or when absolutely necessary.	1
Trees may constrain my department/division's decision-making or service delivery, but we work to achieve positive outcomes for Windsor's urban forest whenever feasible.	8
Protecting existing trees and/or enhancing tree growing environments is a key consideration for my department/division, and we consider the urban forest in all aspects of our decision-making and service delivery.	☐
I do not know / no response / none of these options apply	☐

9) If none of the options in Question 8 adequately reflect your department/division's approach to trees, please describe how you interface with Windsor's urban forest in your decision-making processes and/or service delivery:

- I am responsible for the management and care of forest, woodland, and savannah habitats along with prairies and wetlands within the City of Windsor's natural areas. In addition, I am involved in species at risk concerns across the City.
- As the Forestry Division leader, we are often faced with the challenges that come with poor species selection from years past or dealing with post mature trees. We understand the importance of maintaining these large trees as they provide exponentially greater environmental goods and services than the younger trees. However, we have to manage for the risk that comes with these trees, as the safety of these trees along the right of way is paramount. While we would prefer to maintain these trees, had they not been surrounded by so many targets, they would be retained more readily.
- Provide comments for private development applications for the above selections. Require preservation of existing, installation of new and collect security and compensation for inadequate canopy additions or tree removals.

10) In your opinion, how effectively does the City manage the following elements of urban forestry?
(1 – very poorly, 2 – somewhat poorly, 3 – average, 4 – above average, 5 – excellent, X – no opinion/don't know)

	1	2	3	4	5	X
Urban forest inventory and asset management	☐	☐	4	4	2	☐
Tree pruning (mature trees)	☐	1	6	1	1	1
Tree pruning (young trees)	1	2	3	2	1	1
Pest and disease management	1	1	5	☐	1	2
Invasive species management	☐	4	4	☐	☐	2
Natural areas (regeneration, ecology, etc.)	☐	1	5	2	1	☐
Tree risk (assessment and mitigation)	☐	1	4	1	1	3
Tree planting (excl. maintenance)	☐	☐	5	3	2	☐
Post-planting maintenance (watering, mulching, etc.)	☐	☐	2	5	2	1
Tree protection (public trees)	☐	1	4	2	1	☐
Tree protection (private trees)	5	1	1	1	☐	2
Public engagement in stewardship	☐	2	5	1	☐	2
Public outreach and education	☐	3	4	1	☐	2

11) How would you rate the level of cooperation and coordination between relevant City departments on the following urban forestry-related issues?

(1 – non-existent, 2 – poor, 3 – fair, 4 – good, 5 – excellent, X – Not Applicable / no opinion / I don't know)

	1	**2**	**3**	**4**	**5**	**X**
Tree maintenance operations (pruning, etc.)	☐	☐	3	4	1	2
Natural areas management	☐	1	☐	6	3	☐
Policy and standards development	1	☐	4	4	☐	1
Development application review and permitting	☐	1	4	3	☐	2
Site inspection and enforcement	☐	1	3	3	☐	3
Tree protection (City trees on capital projects)	☐	1	6	2	☐	1
Community outreach/engagement	☐	2	6	☐	☐	2

12) In your opinion, how could interdepartmental cooperation on urban forestry issues be improved?

- Interdepartmentally we are doing well with the resources that we have. The real issue is politically based.
- We have a good relationship and any improvements are welcome.
- Frequent or regular meetings to discuss scenarios and outcomes between departments.
- Increase communication on damaged trees during Parks maintenance activities
- Create a job for an arborist to oversee construction projects
- I think the completion of the Urban Forestry Management Plan is the first step in bringing staff together to understand their roles in protecting the urban forest
- Regular interdepartmental meetings so that managers and supervisors understand what resources are available to them and what their responsibilities are as they relate to urban forestry. Widespread communication on projects where multiple departments are shown working together to provide an example.
- Has to be a greater focus.
- Any project that has trees involved Forestry should be consulted

13) In your opinion, does the City have enough resources (staffing, budget, etc.) to fulfill its existing responsibilities or objectives in…?

	Yes	No
…urban forest maintenance operations	1	6
…urban forest resource monitoring	1	6
…natural areas management	1	7
…planning (i.e., tree protection plan review)	2	5
…community outreach and engagement	☐	8

14) In your opinion, where are the most significant resource and/or knowledge gaps preventing the City from achieving its urban forestry responsibilities or objectives?

- Lack of Management support
- Financial resources, education of other departments and the public at large.
- The most significant resource gap is planning/development, lack of tree policies to protect trees during development
- Need to hire more tree inspectors and working arborists
- Internal resource restrictions with available staffing.
- While we have excellent forestry maintenance contracts in place (ie. Area trim, backlog trimming, removal, stump grinding, planting, watering etc.) we do not have enough city staff to keep up with the day to day operations.
- We have very knowledgeable staff. I think we are good in this area.
- Couldn't really answer Q13 as it should have been broken down between human, budget and materials. In general we have not enough staff but good capital in some areas, while in others it appears to be the opposite.

15) In your opinion, how important is it to engage each of the following types of potential partners in establishing and pursuing shared objectives for Windsor's urban forest?
(1 – not important, 2 – low importance, 3 – neutral, 4 – important, 5 – very important, X – no opinion/I don't know)

	1	2	3	4	5	X
Private residents (homeowners, tenants)	☐	1	1	3	5	☐
Institutional, Commercial, Industrial (ICI) sector	☐	☐	4	1	5	☐
Neighbouring or higher-tier municipalities/county	1	☐	3	4	2	☐
Conservation Authorities	☐	☐	2	4	4	☐
Provincial government ministries/agencies, *excl.* Conservation Authorities	☐	☐	4	3	3	☐
Federal government ministries/agencies	1	☐	3	3	3	☐
Environmental non-governmental organizations (ENGOs) / environment-focused civic organizations	☐	1	3	4	2	☐
Other local civic organizations (e.g., faith-based, Chamber of Commerce, unions, etc.)	1	☐	4	3	2	☐
Local school board(s)	☐	☐	3	3	4	☐

16) What, if any, other potential partners should the City of Windsor engage in establishing and pursuing shared objectives for the urban forest? Please provide specific examples if possible.

- Professional development organizations (i.e. OPPI, OALA, OAA, etc), Philanthropic Organizations (i.e. Rotary, Legions, Lions, etc.), developers
- Increased communications to residents and sharing success stories with City employees.
- Developers, Utilities, Community Housing,
- Foundations.

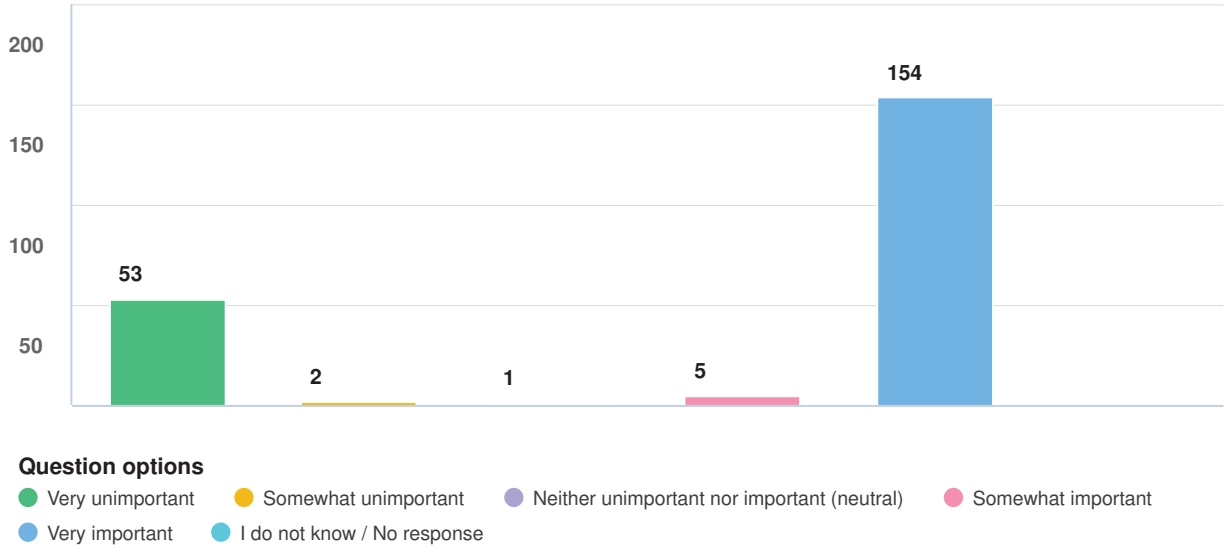
Windsor UFMP Phase 1 survey

SURVEY RESPONSE REPORT
09 November 2022 - 02 April 2023

PROJECT NAME:
Windsor Urban Forest Management Plan

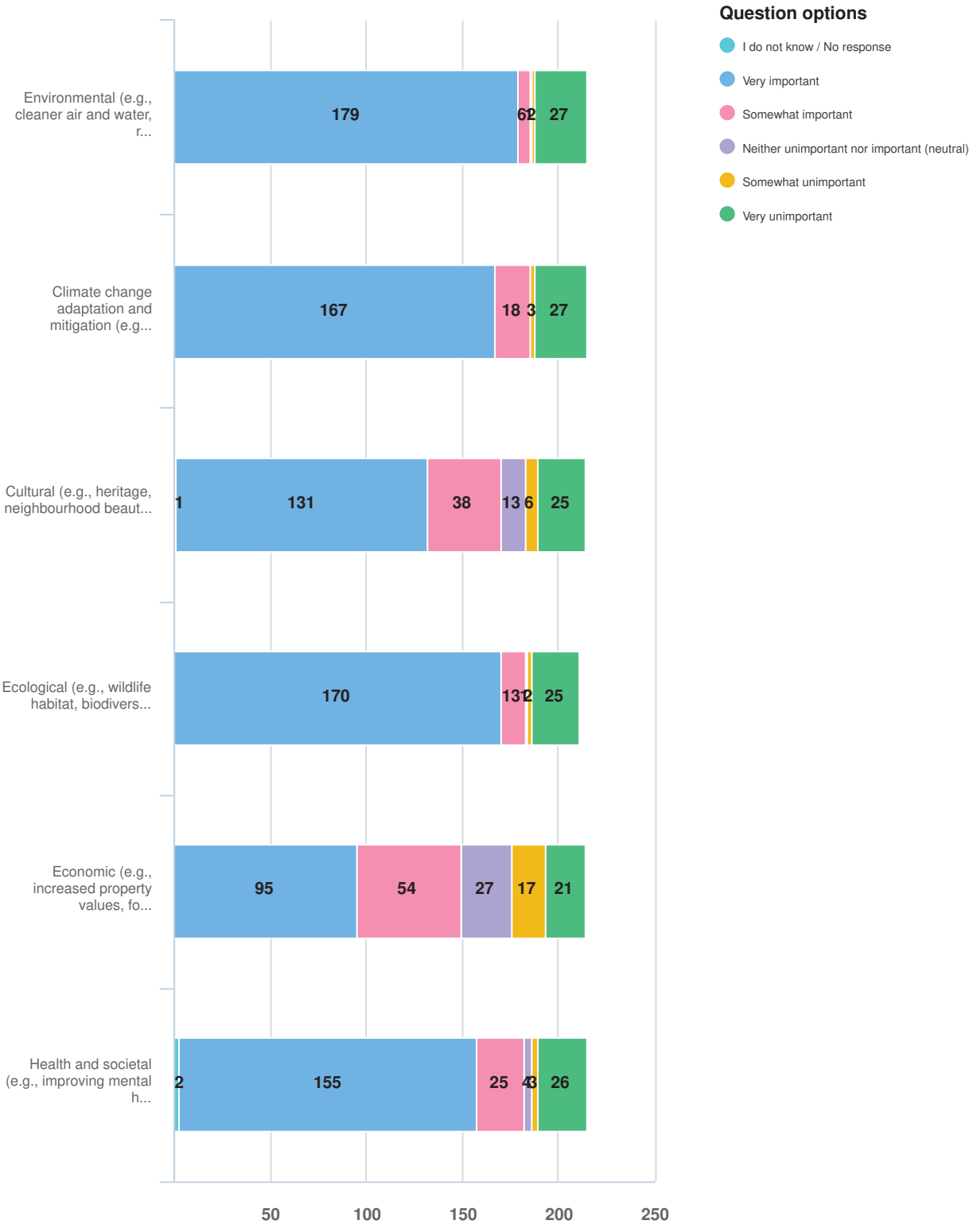
SURVEY QUESTIONS

Q1 How important are trees to your quality of life and enjoyment of Windsor as a place to live, work in, or visit?



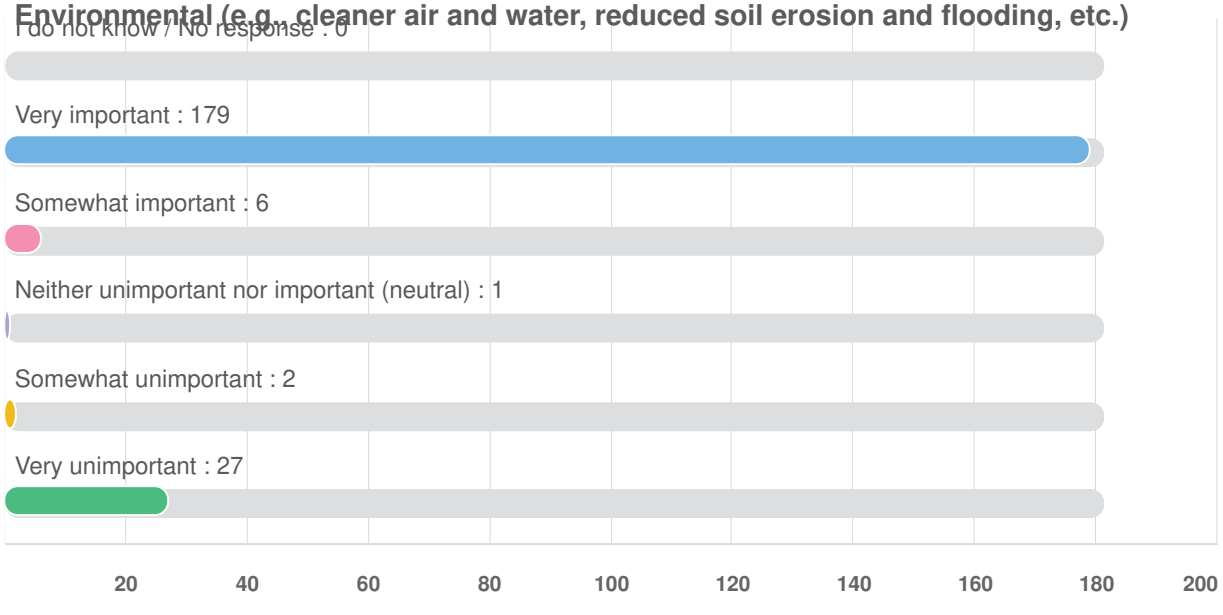
Optional question (215 response(s), 0 skipped)
Question type: Checkbox Question

Q2 Windsor's urban forest provides many valuable benefits and services to the community. Please indicate how important each of...

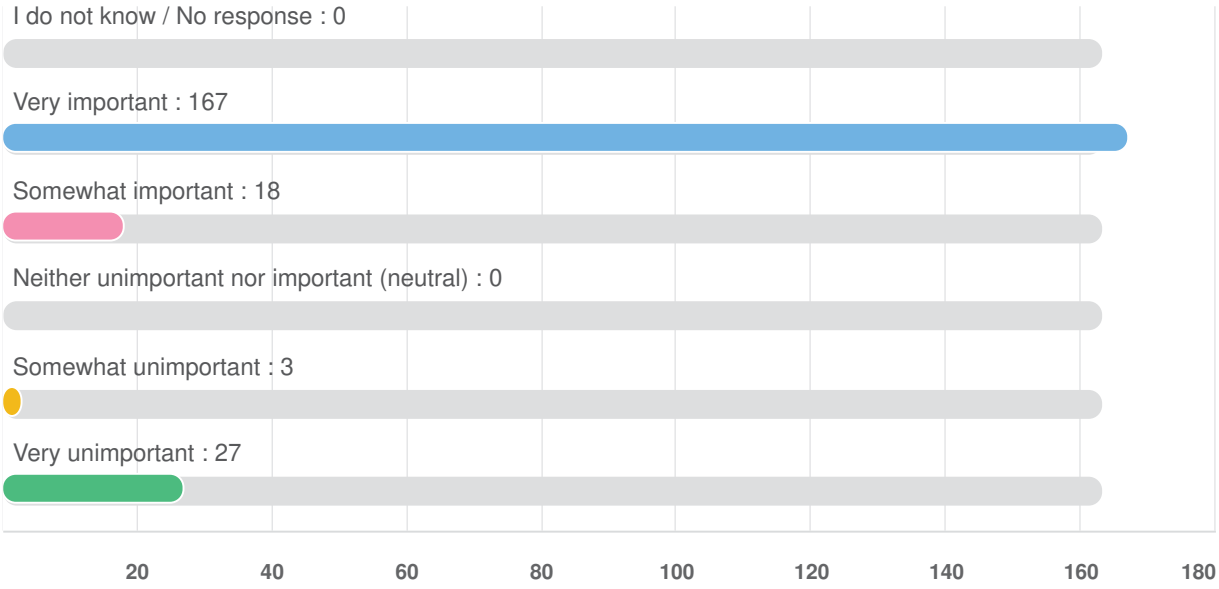


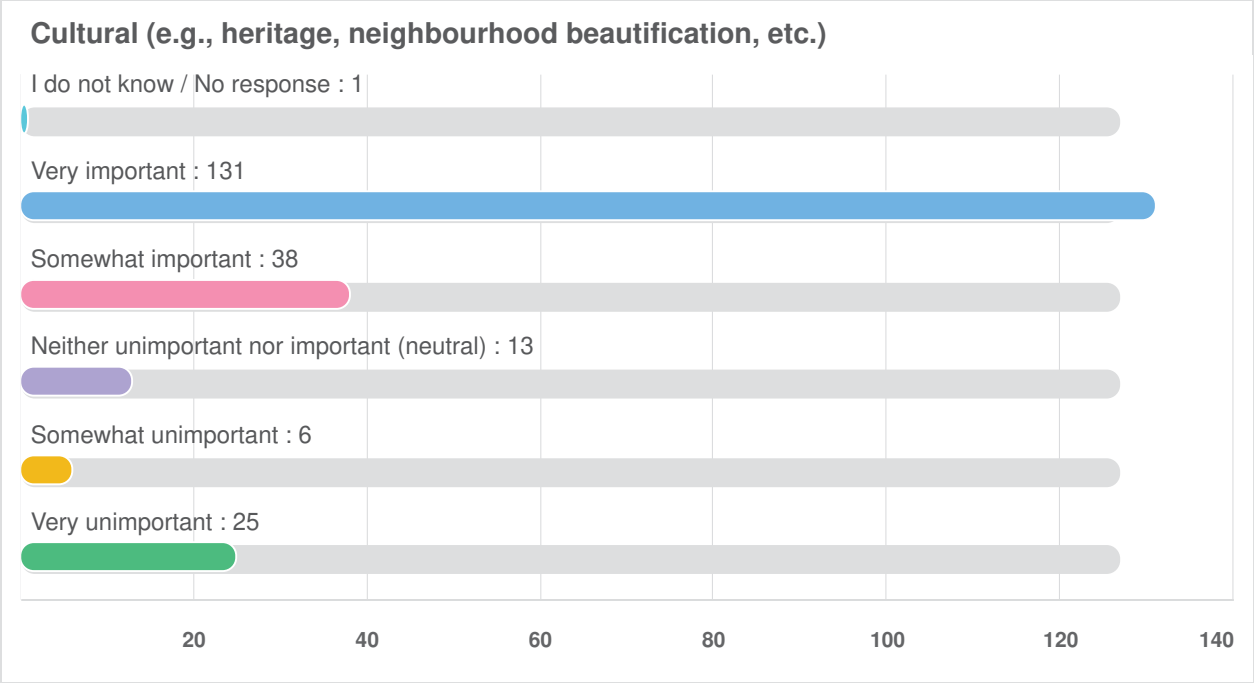
Optional question (215 response(s), 0 skipped)
Question type: Likert Question

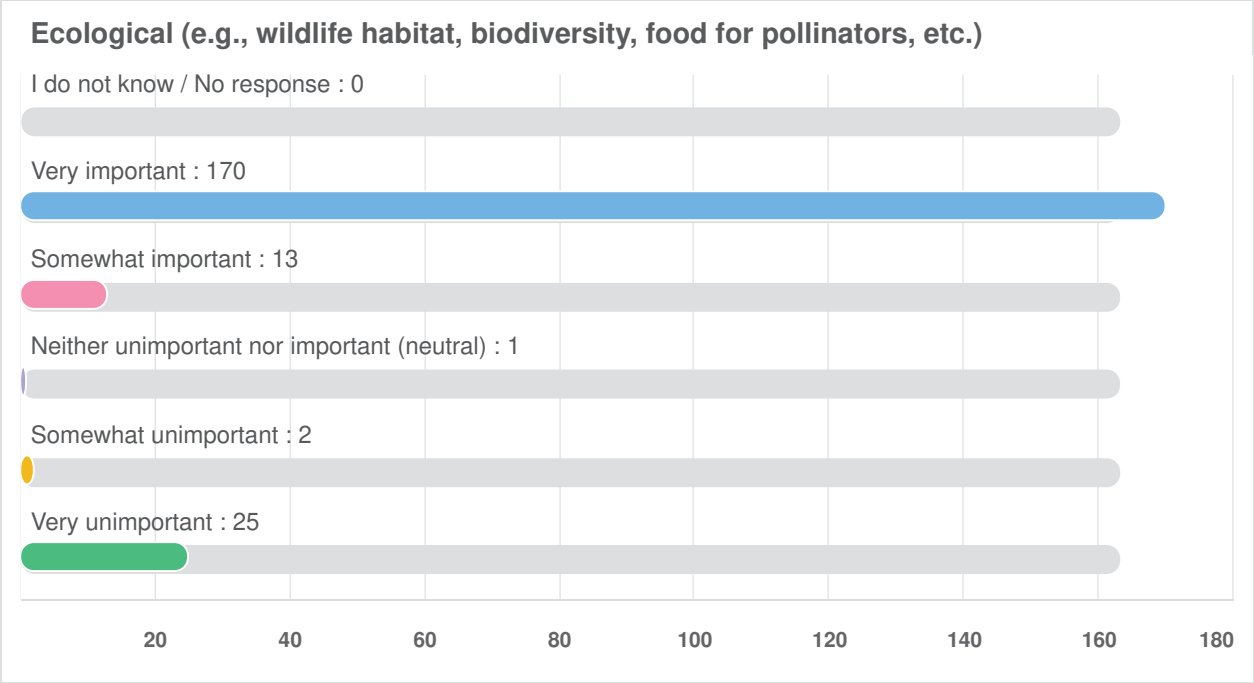
Q2 Windsor's urban forest provides many valuable benefits and services to the community. Please indicate how important each of...

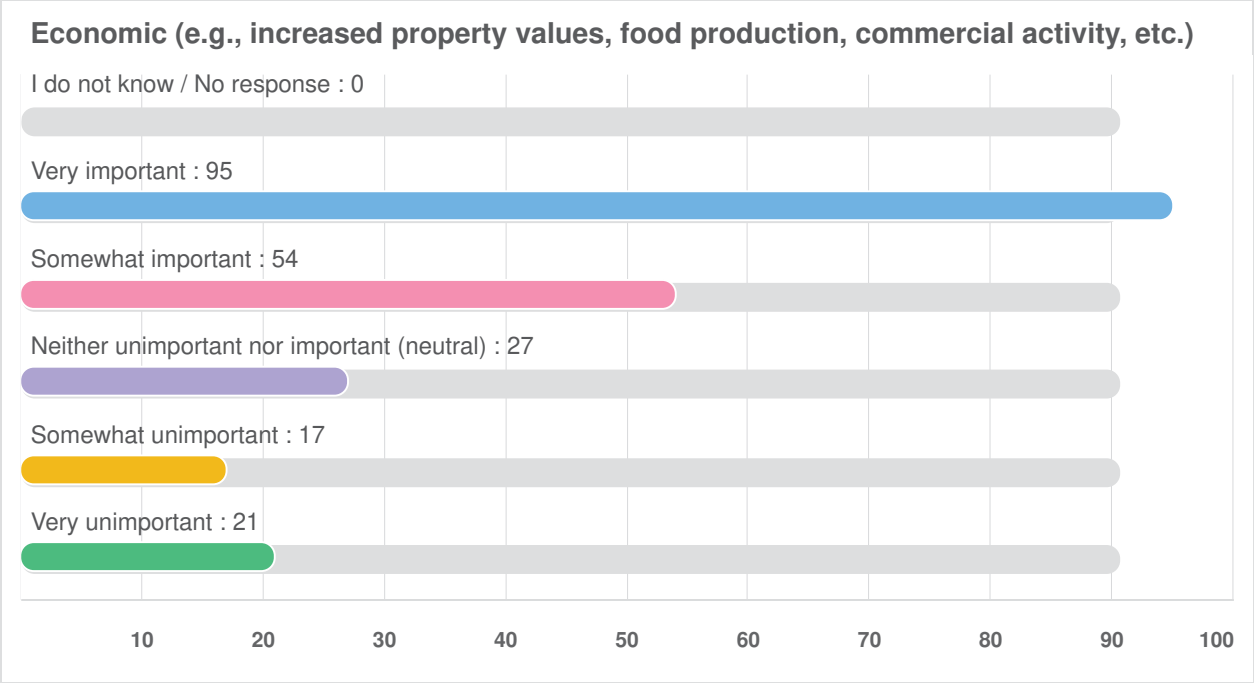


Climate change adaptation and mitigation (e.g., shade and cooling, energy use reduction, carbon capture and storage, etc.)

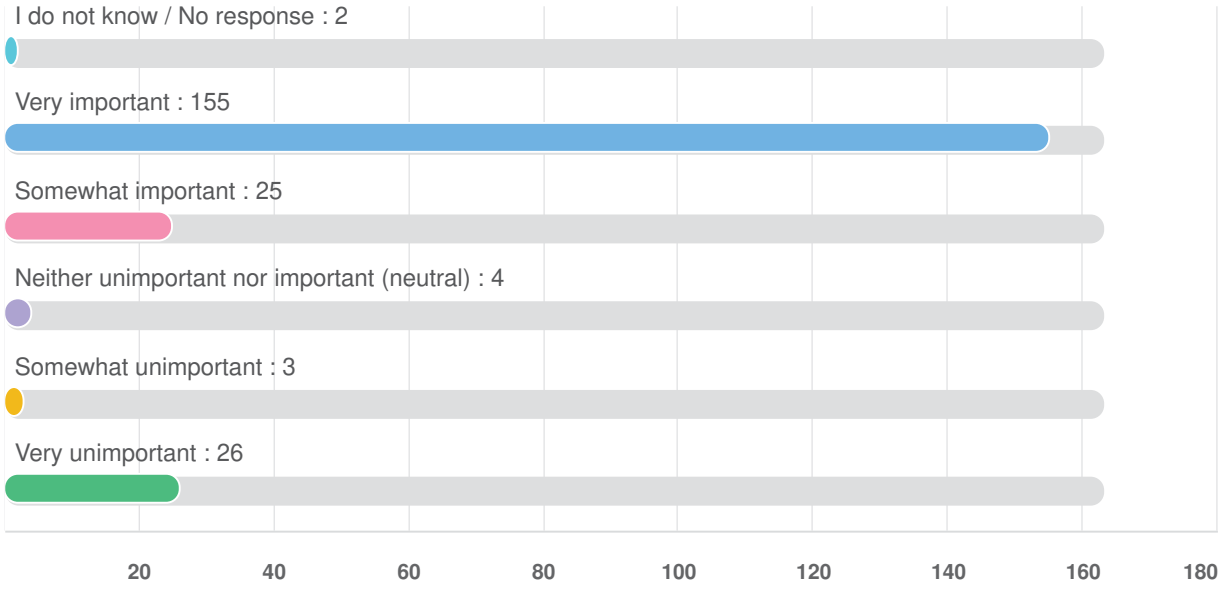



Cultural (e.g., heritage, neighbourhood beautification, etc.)
I do not know / No response : 1
Very important : 131
Somewhat important : 38
Neither unimportant nor important (neutral) : 13
Somewhat unimportant : 6
Very unimportant : 25
20
40
60
80
100
120
140


Ecological (e.g., wildlife habitat, biodiversity, food for pollinators, etc.)
I do not know / No response : 0
Very important : 170
Somewhat important : 13
Neither unimportant nor important (neutral) : 1
Somewhat unimportant : 2
Very unimportant : 25
20
40
60
80
100
120
140
160
180


Economic (e.g., increased property values, food production, commercial activity, etc.)
I do not know / No response : 0
Very important : 95
Somewhat important : 54
Neither unimportant nor important (neutral) : 27
Somewhat unimportant : 17
Very unimportant : 21
10
20
30
40
50
60
70
80
90
100

Health and societal (e.g., improving mental health, promoting physical activity, encouraging social activity, etc.)



Q3 **Are there any other services or benefits provided by trees and not listed in Question 2**

that you think are also important?

acts as a sound buffer for traffic

Better than living in a concrete jungle

Aesthetic

Education of kids, to the 'seeds and cycles' of life.

Trees are nice when planted properly with locates and properly maintained and tree type is a nice tree that does not damage cars with sap or other property. The forestry group does not properly maintain trees leaving ugly trees to lower property valu

Habitat for animals with housing development

noise abatement, dark sky

Wow trees really do a lot for us.

Need evergreen trees

Forest Bathing is proven scientifically to lower blood pressure and promote other health benefits for days after being exposed in a natural area.

the absence of trees is to our detriment in all facets

Mitgation of heat zone in urban areas

To feel connected to the community (e.g. remembering a specific tree that you used to climb).

noise mitigation

They are a connection to our past. the trees that are on my property were here before Windsor was a village.

Contribute to positive mental health

n/a

Colourful fall foliage

When planted near bus stops, mature trees provide some protection from wind, which is of particular importance in a city where you might have to wait for an hour or more between buses at stops with no bus shelters of any kind.

Creation of jobs -- having a park means we will need park staff, as well as people to maintain the trees so they don't get overgrown.

private property: compost material, firewood, winter wind blockage

Large trees should be protected

The scientific proof of urban forests and the effects on mental health and well being need to be addressed as well. The microbes and biomes being touched with bare skin have proven positive effects. More trees is better!

Species at risk trees are dwindling and should be used as centerpieces in parks.

Beautification. I think cities don’t stress enough that trees make the city look better.

Beauty of the City

They should make people feel good

No

Reducing erosion, soil loss.

Over emphasis on cleaner air

trees in densely populated areas such as south walkerville help with noise pollution

Firewood is also extremely important to me and many Windsor residents. Every time a tree is taken down, a new one at least should be planted. That wood taken down provides heat for comfort and cooking as well as wood working projects.

Beautify our yards, our personal space, our community space.

Trees are needed for oxygen production

Travel & Tourism; trees benefit municipal park beautification which ultimately encourages tourists to visit our parks.

Recreation! Going for a walk is hardly enjoyable if the only sights are concrete and buildings. Thats just depressing.

Trees speak to the over health of a community including the all

important mental health. without natural items such as trees, plants etc there is NO LIFE.

Not tat I can think of at the moment.

Trees make cities cooler

Sense of place and refuge

Trees help preserve good soil quality.

Improving Windsor's reputation in the view of visitor's and people considering relocating to Windsor

Connection to life and the earth

Feeling of shelter and privacy

Mental health- being in the forest benefits our mental health. It is my go to place when I need to think.

Distributed male-female tree plantings to encourage production for fruiting cultivars; which creates robust and crisis-secure food sources for foraging, wildlife and pollinators.

Trees are very important -stop creating concrete jungles and utilize the spaces we already have to build

.

Trees are important also for the mental health of communities, it has been proven that in areas with more vegetation people feel less level of stress

The City of Windsor needs a tree bylaw pertaining to trees on private property. We've seen far to many healthy trees removed from private property.

Shade

Visual diversity. Constant concrete and square corners with no movement is unappealing; trees offer a break in shape and colour.

Cities with more tree coverage tend to be significantly cooler during the summer, improving the experience for everyone. Also, having trees means more dirt/grass exposed to air which can greatly help absorb flood water(concrete/asphalt keeps itontop)

Producing Oxygen, filtering pollutants, providing shade, providing Fall leaf material for replenishing soil, green infrastructure benefits.

Historical. Old trees are part of our community and having them shows that our City values the benefits these old trees bring

Food production - Community gardens (Fruit, Nuts). There may be more, but I can't think of any at the moment

N/A

Trees should also be considered as part of asset management by the City.

Urban lumber - using trees that have history, community, a story in your life after they have come down.

First Nations/local history

NA

Reducing a/C usage by providing shade on hot days

General sense of wellbeing.

Trees are important part of nature and the ecosystem as humans are. They have a right to live and deserve respect and consideration.

The trees are important for our every day life. We need to keep our trees and add more. We need front back and side yard gardens that produce food and don’t use pesticides.

Trees are fundamental to our native ecosystem. Trees have the potential to offer a free food source for humans too.

educational (providing an opportunity to learn about all of the benefits listed, ability to identify species by branch and leaf patterns, flowers, nuts, fruits etc.)

Educational. We see trees everyday. Noticing the differences in appearance, watching new plantings grow, etc. makes us more conscious of the environment overall.

I think food forests will be important in future. I'd like to see Windsor get out ahead on this. Perhaps a demonstration plot could inspire people to create their own mini food forests.

Educational, learning about different species and indigenous trees

The pleasure of walking in the shade in my neighborhood and hearing the birds that nest there!

Inner Spiritual, Uplifting renewal

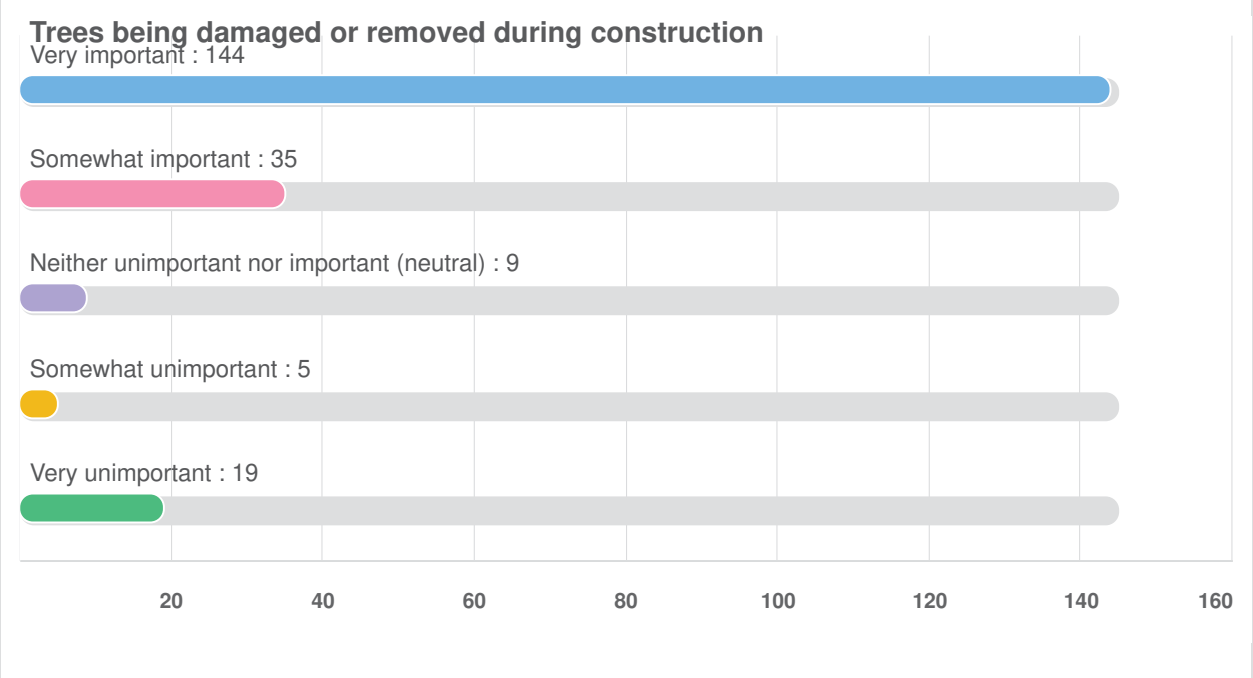
Optional question (72 response(s), 143 skipped)

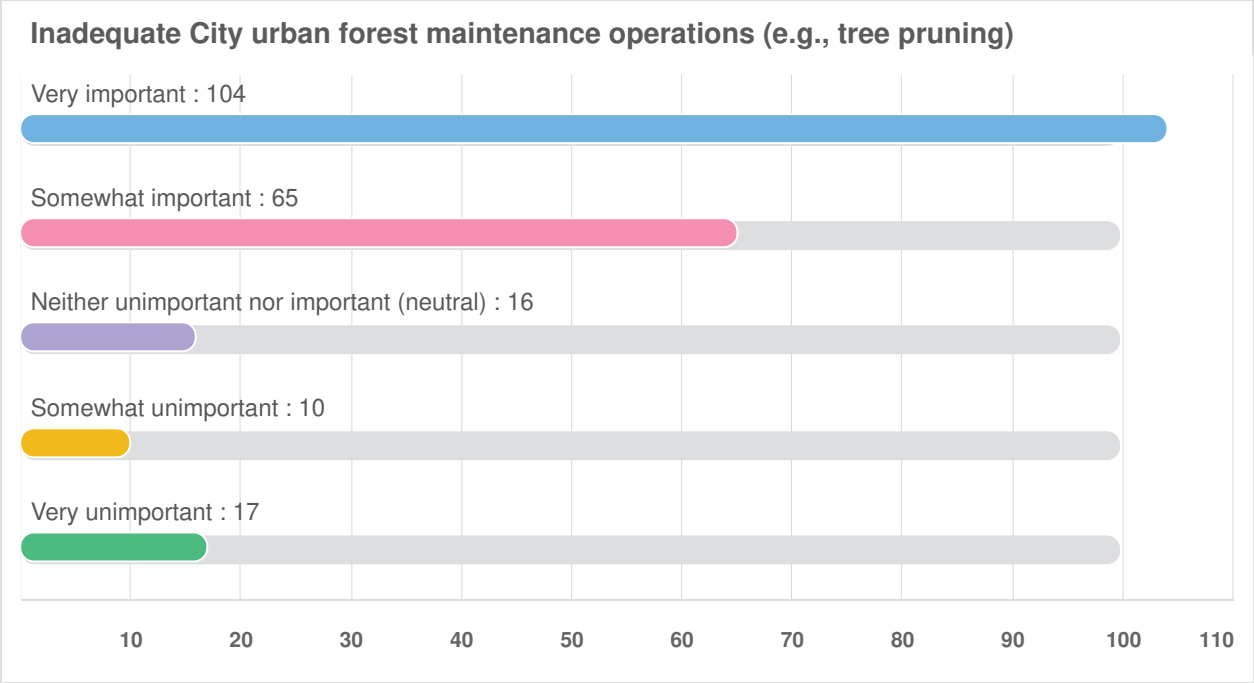
Question type: Single Line Question

Q4 Windsor's trees face many challenges that threaten their health and longevity. Please indicate how important you think it i...

Optional question (212 response(s), 3 skipped)
Question type: Likert Question

Q4 Windsor’s trees face many challenges that threaten their health and longevity. Please indicate how important you think it i...




Inadequate City urban forest maintenance operations (e.g., tree pruning)
Very important : 104
Somewhat important : 65
Neither unimportant nor important (neutral) : 16
Somewhat unimportant : 10
Very unimportant : 17
10
20
30
40
50
60
70
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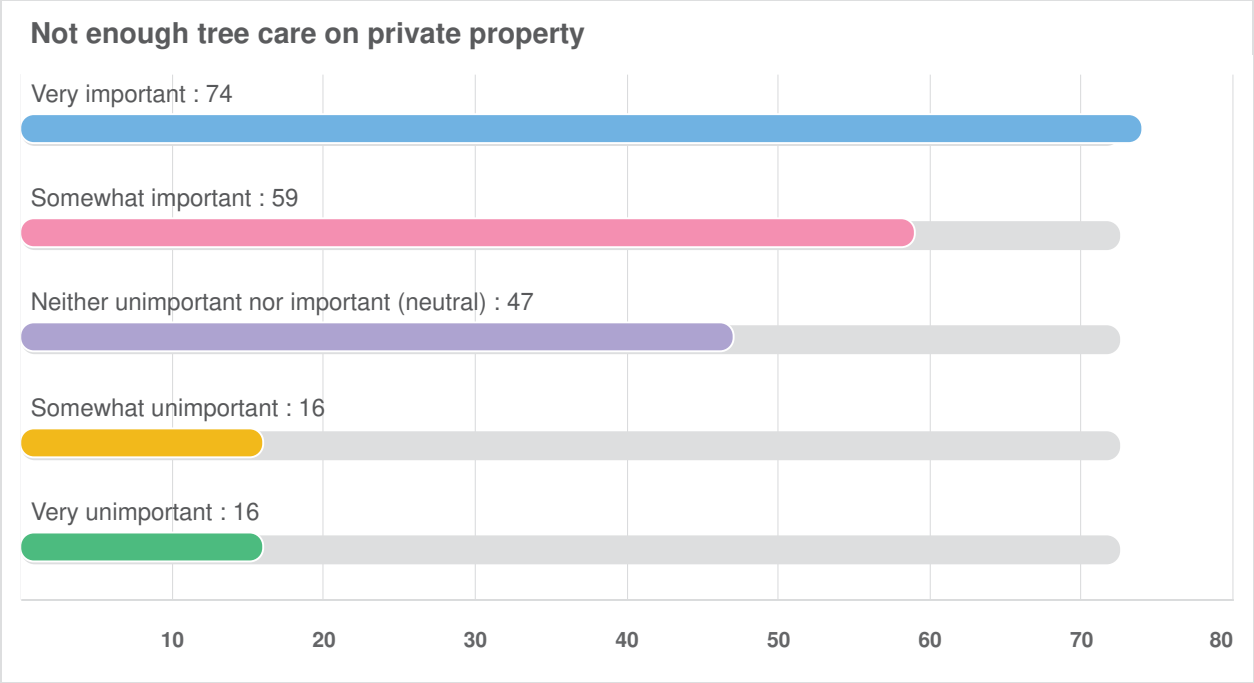
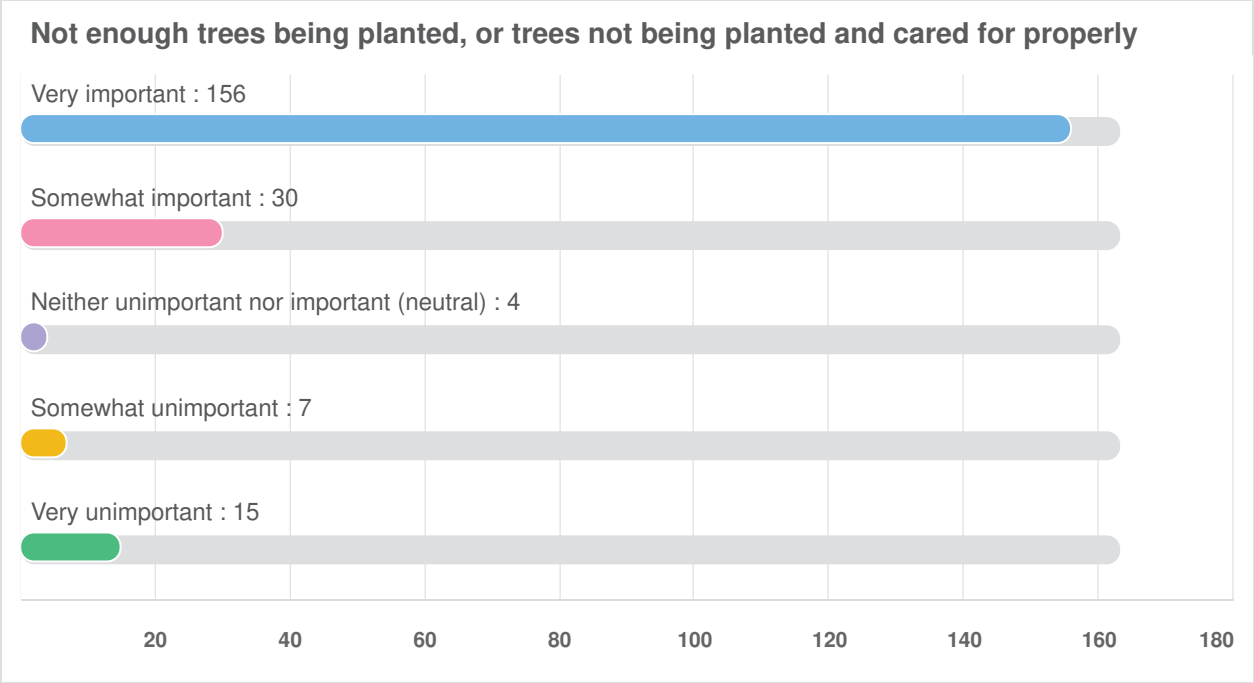
100
110


Not enough tree care on private property
Very important : 74
Somewhat important : 59
Neither unimportant nor important (neutral) : 47
Somewhat unimportant : 16
Very unimportant : 16
10
20
30
40
50
60
70
80


Not enough trees being planted, or trees not being planted and cared for properly
Very important : 156
Somewhat important : 30
Neither unimportant nor important (neutral) : 4
Somewhat unimportant : 7
Very unimportant : 15
20
40
60
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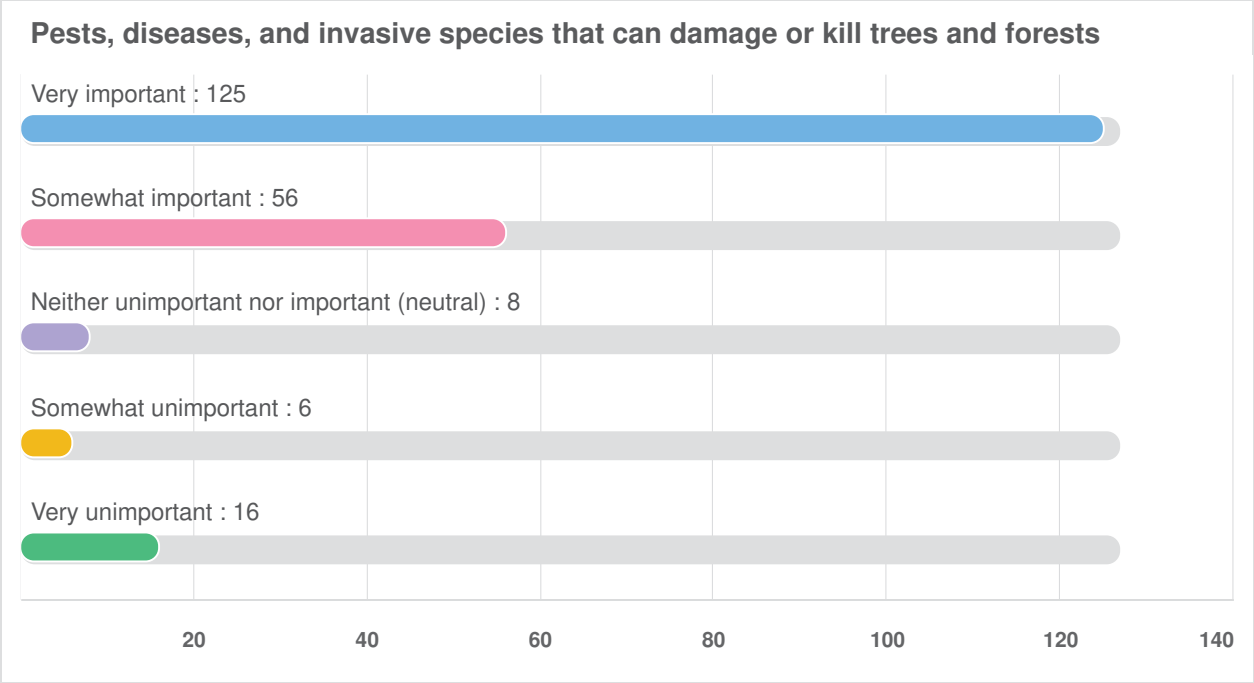
140
160
180


Pests, diseases, and invasive species that can damage or kill trees and forests
Very important : 125
Somewhat important : 56
Neither unimportant nor important (neutral) : 8
Somewhat unimportant : 6
Very unimportant : 16
20
40
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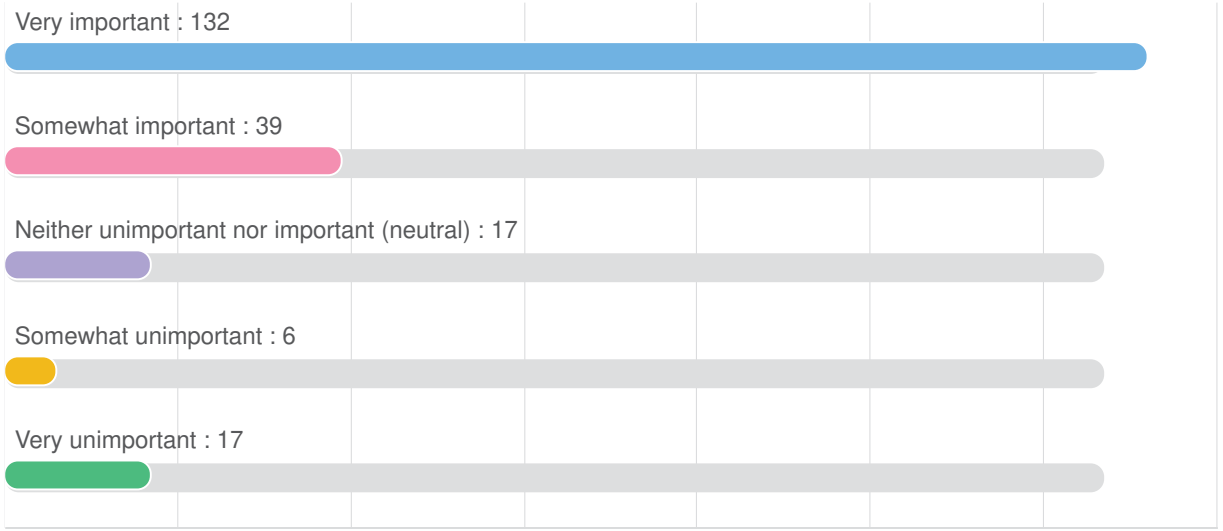
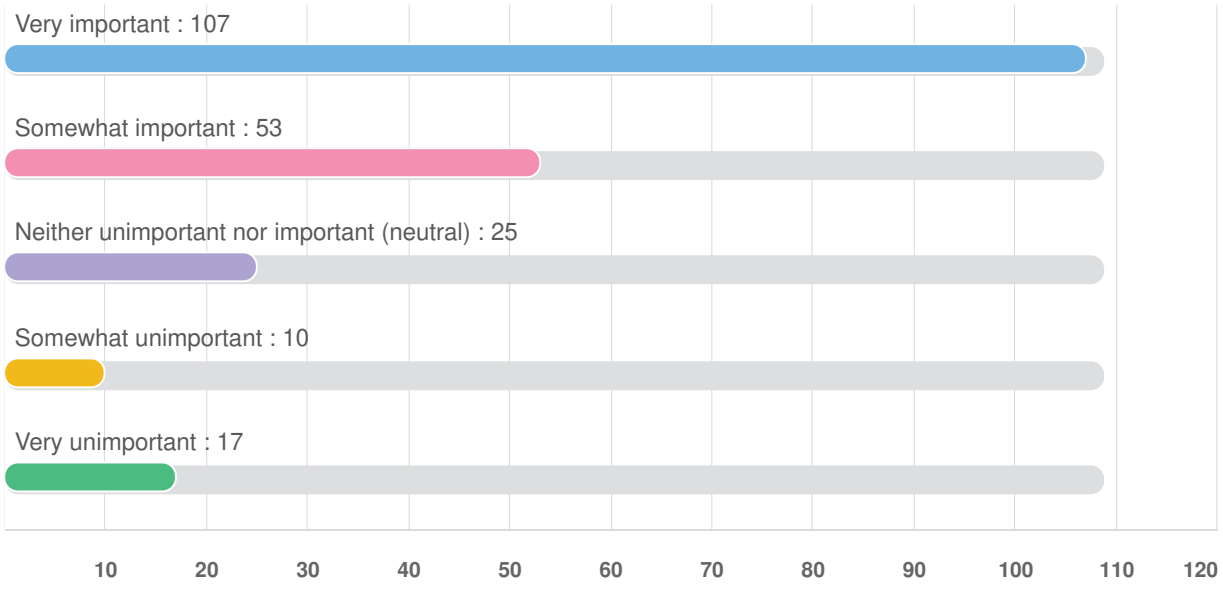
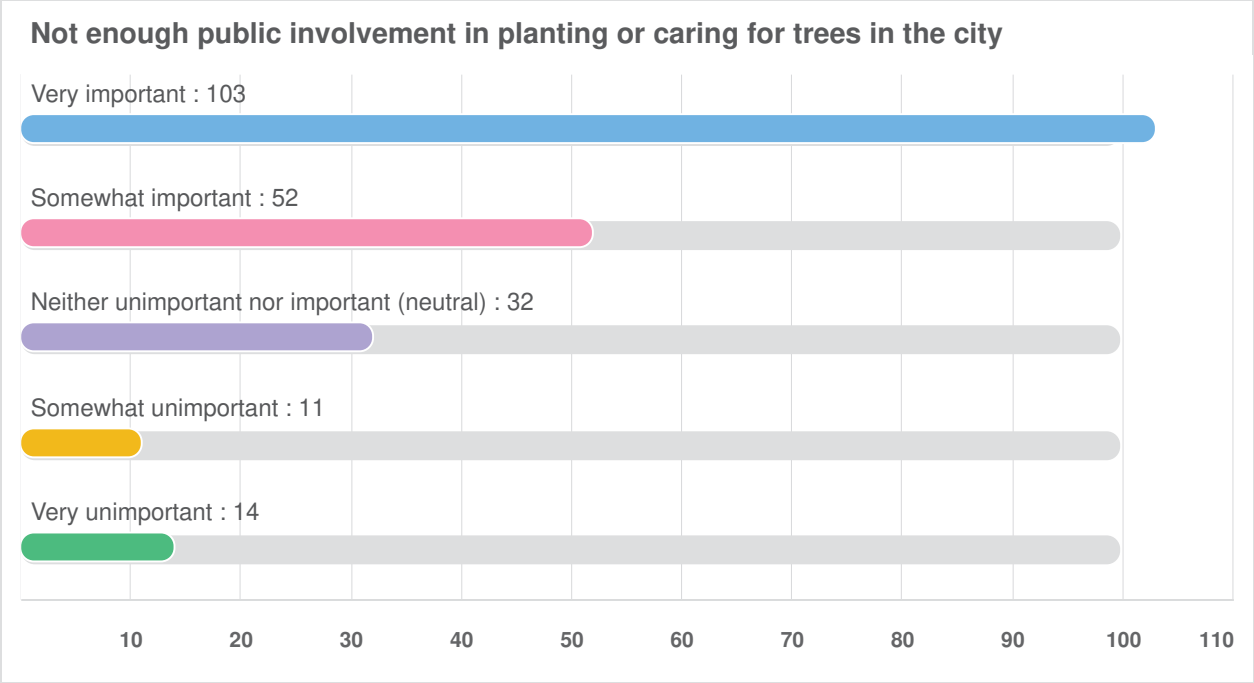
120
140

Climate change effects such as extreme weather, drought, and rising temperatures



Trees being removed from private property




Not enough public involvement in planting or caring for trees in the city
Very important : 103
Somewhat important : 52
Neither unimportant nor important (neutral) : 32
Somewhat unimportant : 11
Very unimportant : 14
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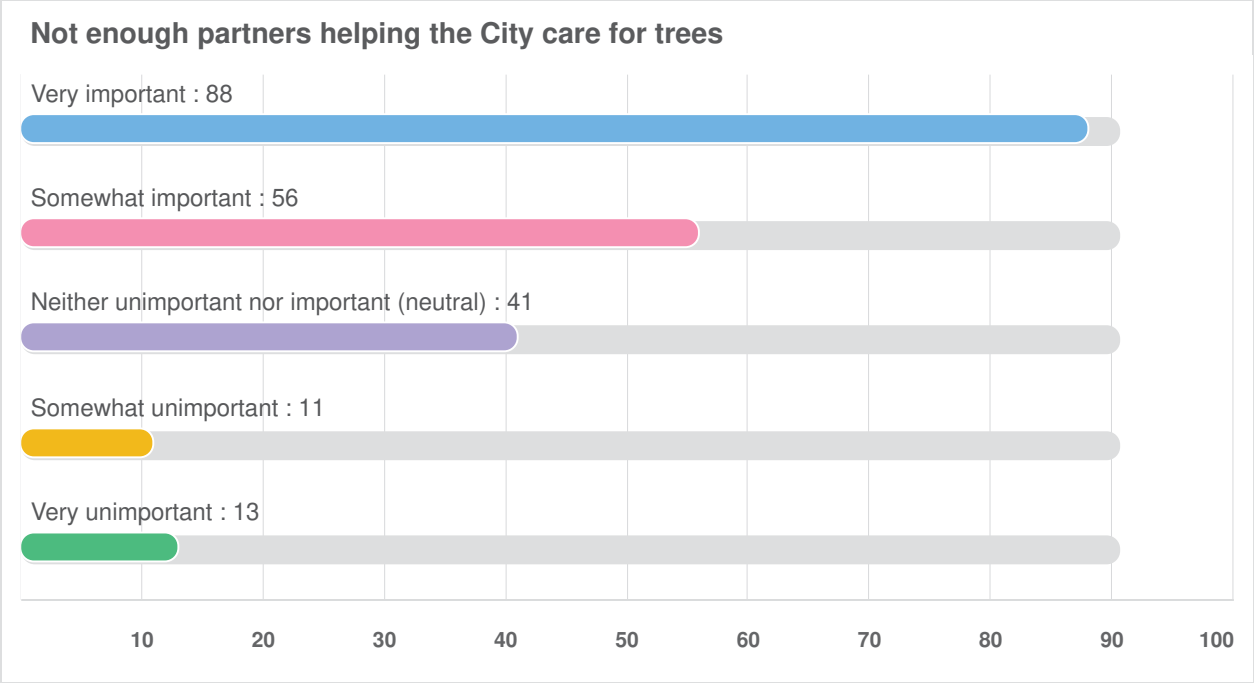


Q5 **Are there any other challenges not listed in Question 4 that you think should be addressed through the UFMP?**

No - but part of the reason I moved into my neighbourhood over others was that it had a very mature tree population. Within the last 5 years - 5 very large, very healthy trees have been removed from private homes because" they don't want to rake leaves"

It is quite shocking the amount of improperly planted trees (IE, no root flare, too deep, mulch volcano) that result in premature death and increased taxpayer expenses for future tree removal/replacement.

Pleased with new trees being planted, but they are not being pruned so they don't reach their potential. Just like the conservation authority you end up with a lot of scrub brush

The forestry department needs to get it together and remove unsafe trees and prioritize safety and damage prevention , and be more respectful of where they plant new trees. Also trees on private property, while nice, are not really the city's business.

I think there should be laws for removal of trees on private property

BC has this I think that we should have this as well

City policies for tree removal, requiring a permit to do so. Would like to see the city do more to ensure there is a process for removing trees, particularly as part of a greater initiative to prevent unreported destruction of critical habitat.

For and urban forest, I think it's important to discourage lawns and encourage native species. Especially in front yards which are seldom used for recreation anyway.

I'm really not sure how the public is involved in planting or caring for trees or the partners involved. When Ithink of tree pruning there probably aren't enough partners as this has been an area overlooked by the city for a long time.

Adequate budgets in order to effectively manage Urban Forest.

Owners of trees on private property responsible for cost to maintain tree eg.tree branching onto neighbours roof- not put cost& burden on home owner whose property is being damaged.

Needs to be better property standards, Windsor is dirty with garbage and unkept properties

Drought. Planting drought tolerant species. Education for homeowners on companion planting/water in soil etc.

Removal of diseased trees and larger trees that cause housing damage or affect other city plant life.

Very large houses on very small lots leave no room for trees and yards. Seems wrong to me.

Routine Public education regarding the importance of trees to the health of our communities

Matching the type of tree to the location. Such as trees that drop a lot of debris surrounding parking lots. Or trees with large surface root systems planted near driveways or pavement, which will cause damage later on.

Connected natural areas to promote biodiversity.

not enough dedicated city lands for urban forest.

No enough public education on the benefits of trees

clarification (education) of responsibility of folage extending over property lines (private-public) - i.e.; folage growing over or onto sidewalks

We need a by-law to protect large trees on private property

I don’t believe trees should be planted unless the City is prepared to care for them. I’ve observed too many trees being planted in City Parks by crews of 2 or 3 people plus several trucks - which means the cost per tree planted is high- so care for them

The Forester and his lack of knowledge in the urban forest field are fearful in Windsor. This city is barely hanging on with its canopy cover and deserves a certified arborist and a proper manager with relevant experience is needed , not a resume builder.

The private tree service industry is in need of a qualification or professional training before we are able to enforce anything against the private trees/properties

Not enough staff to manage City trees is a problem.

No

mandatorily forcing residents to have a tree on the city owned areas of their properties.

No further challenges, but although I am a huge advocate for more trees, more forestry, it is none of my business or anybody else's if someone wants to take a tree down on their own private property. Builders should not be allowed to "clear" all trees.

Healthy, mature trees should never be allowed to be cut down unless they are invasive.

We need weekly yard waste days to dispose the waste created by the trees and gardens that we have now. Adding new plantings to create a greater urban forest would mean increased waste. Other municipalities have weekly yard waste pickups so should we!

Planting the best species suitable to the area. Silver maples, Norway Maples and Callery Pears are some examples of species that should be discontinued in our planting efforts.

Much more emphasis needed on getting homeowners/residents to get trees planted on city urban rights-of-way fronting those properties. Perhaps reminders in tax and utility mailouts?

Locust and other invasives planted too much!

City tree maintenance contracted to private companies will little regard for the overall urban forest. For example, Twice over six years I had to defend my street tree from being cut down by a private contractor when all that was requested was a trim.

Proximity of parklands to major thoroughfares. The bridges over the Herb Gray Parkway are good an all, but there is a cacophony of noise and plumes if exhaust that disturb the attempts at reintroducing natural areas.

New builds MUST go on vacant land and by vacant I mean treeless

Not enough native trees being planted on city property.

Protection of wooded areas

City council continously choosing development over natural space protection

We should stop cutting down trees to build houses

Tree diversity

The subject of trees and forests in urban areas should be included in our elementary and high school curricula.

Trees in forest near hope hill area are in terrible shape. There are members of the public cutting trees down illegally. Or the city is cutting trees and leaving them in dangerous/path obstructing places.

Creating spaces that house and advance the ecology of wild bees and other native pollinators— such as providing elevated false tree hollows for hive-building, as advanced by experts like Torben Schiffer

my neighbour cut down her city owned tree, and did not replace, tells the city no when they want to plant. A tree there would shade my house in the summer.

.

Residential leaf removal/nutrient removal from residential trees. Only plant native tree, educate community about benefits native tree species. Ban English and Boston Ivy from landscaping.

Lack of education in general population regarding of the importance of trees for everyone. Is everyone responsibility to spread awareness

and knowledge about having more trees and vegetation in our community

Improper or reckless tree maintenance. We've lost several from utilities trimming too much from older trees.

planting of native trees

The city must assume responsibility of caring for, maintaining and building a tree canopy. This is a key piece of service that benefits everyone.

Someone to check on on the young trees, and help keep teenagers from breaking their branches

I am wondering if fall leaf collection at the curb (no bags, just sweep leaves to the curb)would encourage people to plant more deciduous trees.

City contractors and engineers not educated in the proper pruning of trees that get in the way of the contractors equipment.

We need more community events in the forests we have. When people go there and visit for themselves they make personal memories and connections.

The community not being consulted before trees are removed. Trees were removed at my local park that I grew up with. On day I noticed they were gone for development of a new playground. Protecting living trees should be prioritized over new planting

More appropriate and diverse Tree species selections, long term maintenance plans, less private contractors, more community engagement

Poor planting procedures and maintenance.

There are many citizens who take pride in their property, this includes the areas where the city owns the right of way. Citizens should be allowed to plant gardens on the boulevards or curb space in front of their homes. This makes our city better.

Improving connectivity of Windsor urban forest and natural areas. Strengthening protection of the natural areas we have as well as pursuing purchasing of private lands that have key natural areas existing on them.

1) Winter climate change - ice storms 2) Forest Fires 3) City should purchase more woodlots (EX: area along Little River by Hope Hill) 4) Nursery should grow more fruit & nut tress to plant in community

A forest isn't just about trees. The understory shrubs and plants as well as the density of trees is what makes a forest/trees happy. Trees grow without human intervention. The problem is that we replace forest with lawn and then hope the trees do ok.

Let the trees in the urban forests grow. All them to be wild like nature planned. It’s very disappointing how many trees Windsor and Lasalle cuts down to build new housing. I’m all about protecting nature and allowing flora and fauna to live their luves.

N/A

pubic education, why are trees important for all, people need more general education, also easy to read steps on how to get a city tree planted

Does the City intend to have a goal or target for the tree canopy? If so, how will this be accomplished without incentives and penalties for tree care on private property?

NA

NA

Education regarding the impact of trees on the value of neighbourhoods.

trees being removed from private property are not protected by by-laws and should be

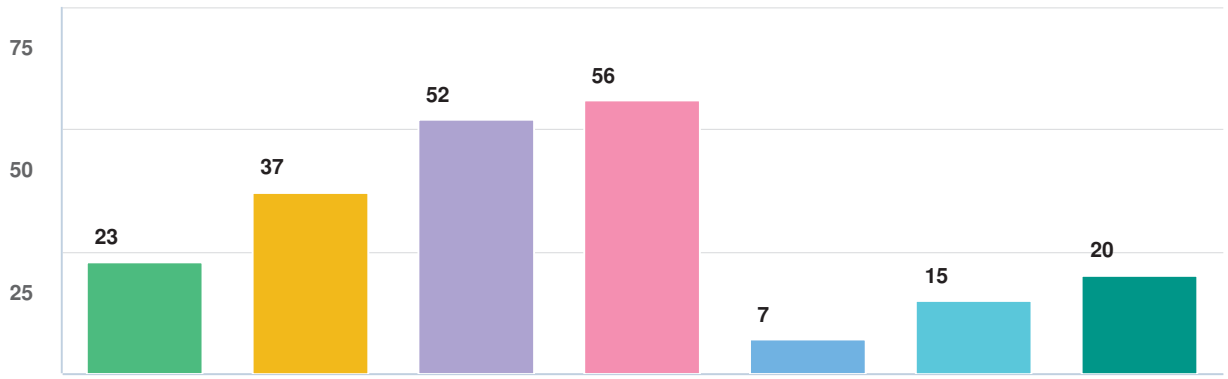
We need more education. Trees can be dangerous during storms and this can scare people and turn them off trees. Keeping our trees safe is vital.

By-laws to protect trees

Public Education around importance of tree planting and protection

Optional question (73 response(s), 142 skipped)
Question type: Single Line Question

Q6 Achieving important goals for Windsor's urban forest may require increasing resources for urban forestry, which usually com...

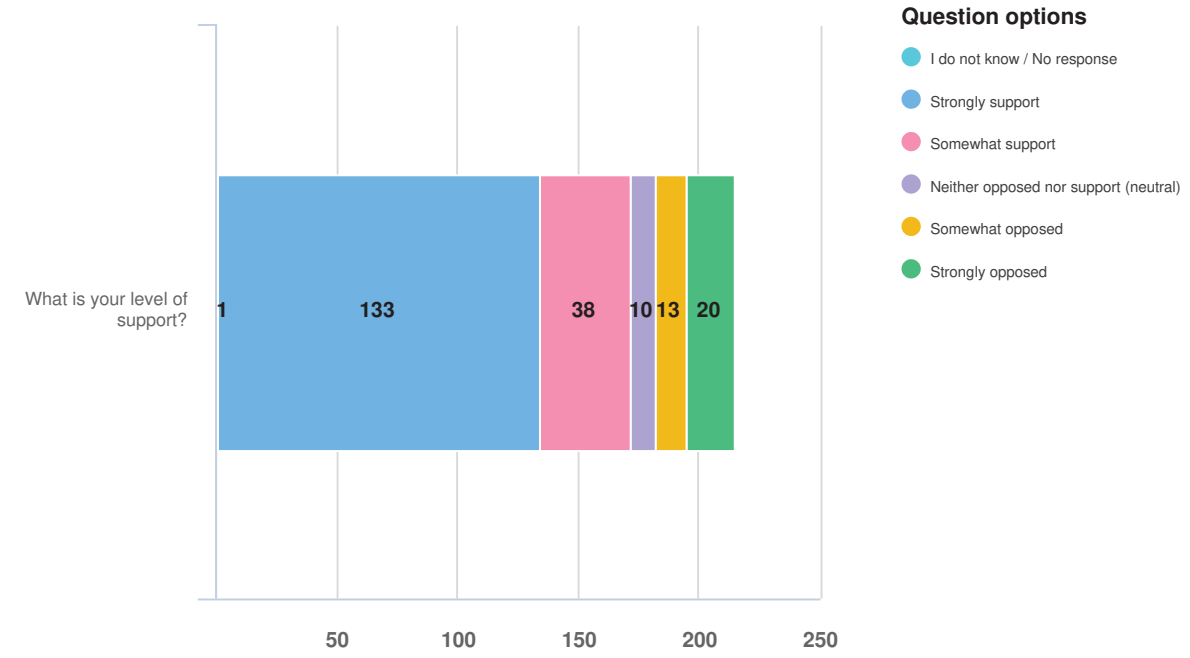


Question options

- Other (please specify)
- I do not know / No response
- No support for enhanced funding
- Up to $100 additional funding per year per household
- Up to $50 additional funding per year per household
- Up to $20 additional funding per year per household
- Up to $10 additional funding per year per household

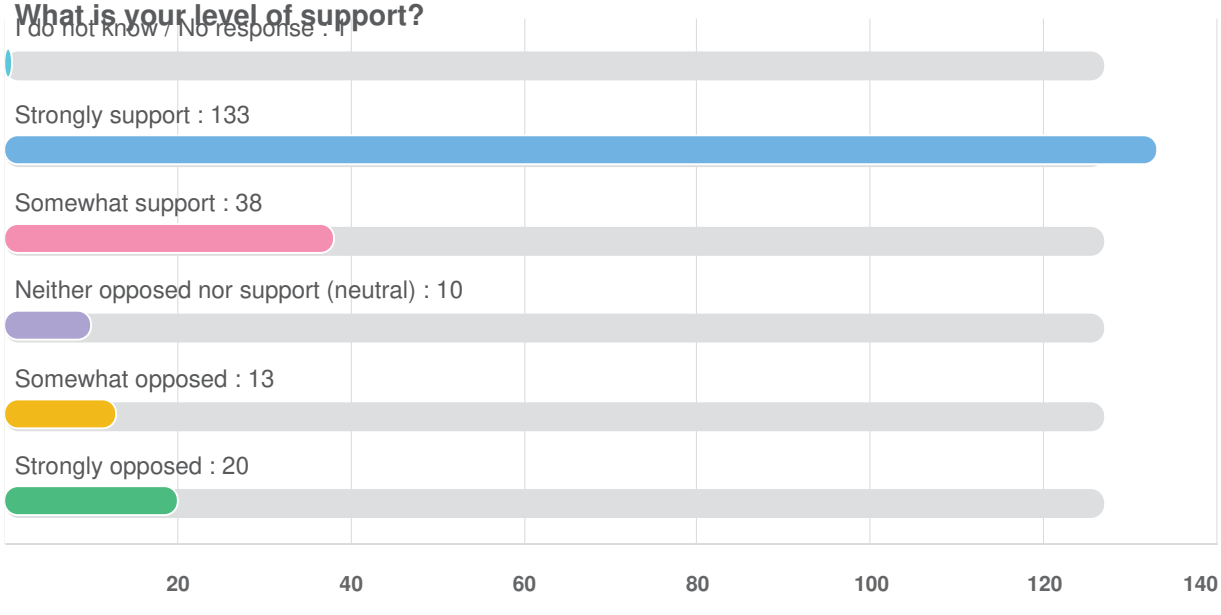
Optional question (210 response(s), 5 skipped)
Question type: Checkbox Question

Q7 Windsor is among the few Ontario communities of its size without a by-law requiring property owners to obtain a permit to r...

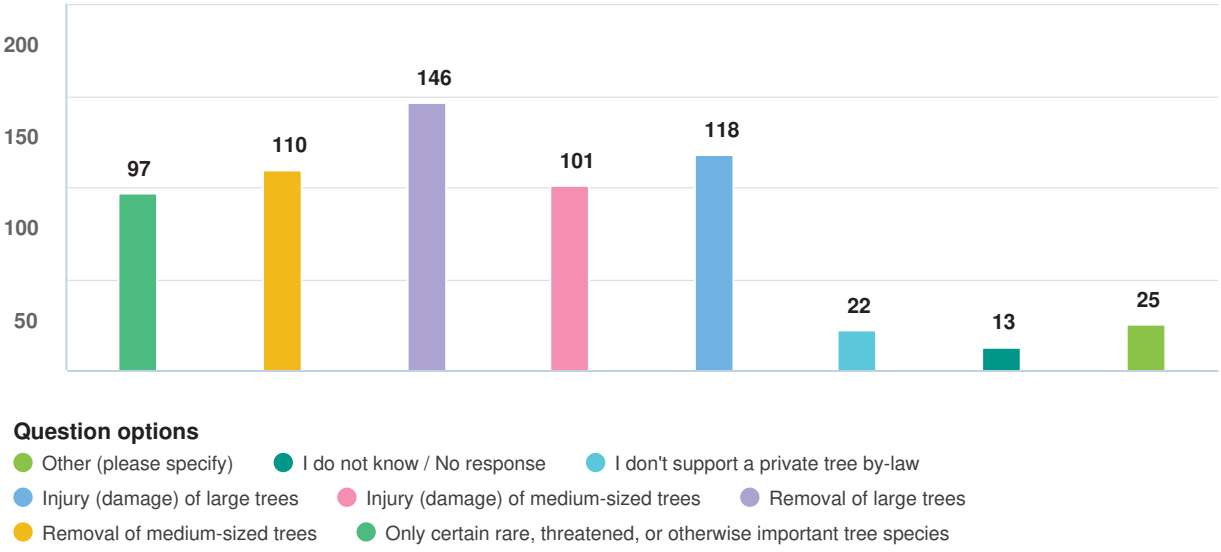


Optional question (215 response(s), 0 skipped)
Question type: Likert Question

Q7 Windsor is among the few Ontario communities of its size without a by-law requiring property owners to obtain a permit to r...

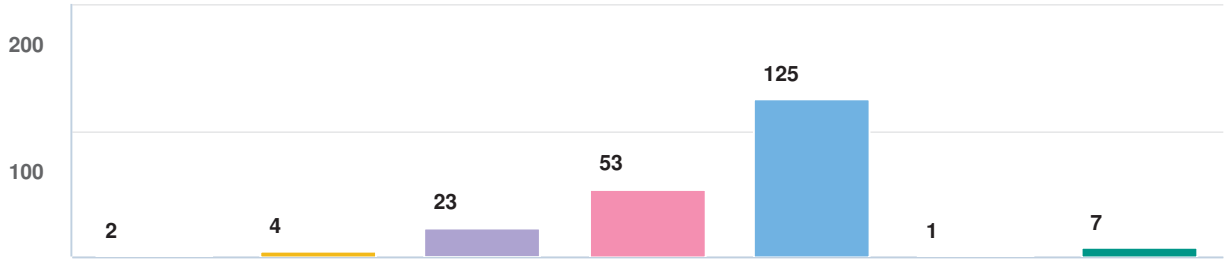


Q8 If the City were to enact a private tree by-law in the future, what do you think the by-law should regulate and include? (s...



Optional question (215 response(s), 0 skipped)
Question type: Checkbox Question

Q9 19%, or about one-fifth, of Windsor is covered by trees. This is called “tree canopy cover”. Tree canopy cover can be incre...



Question options

- Other (please specify)
- I do not know / No response
- The City should plant very aggressively to increase canopy cover to about 35% by 2050 (planting 7,250 trees per year).
- The City should plant aggressively to increase canopy cover to about 27% by 2050 (planting 5,000 trees per year).
- The City should increase canopy cover by a modest amount to about 20% by 2050 (planting 2,500 trees per year).
- The City should maintain the current canopy cover level of 19% by 2050 (planting about 2,200 trees per year).

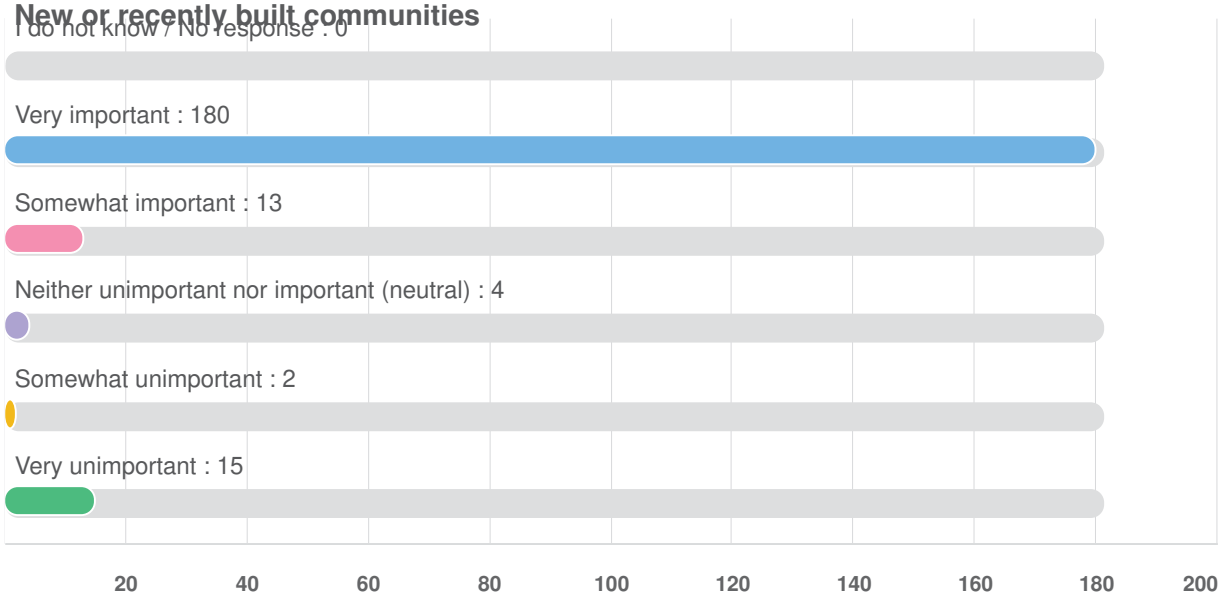
1/2

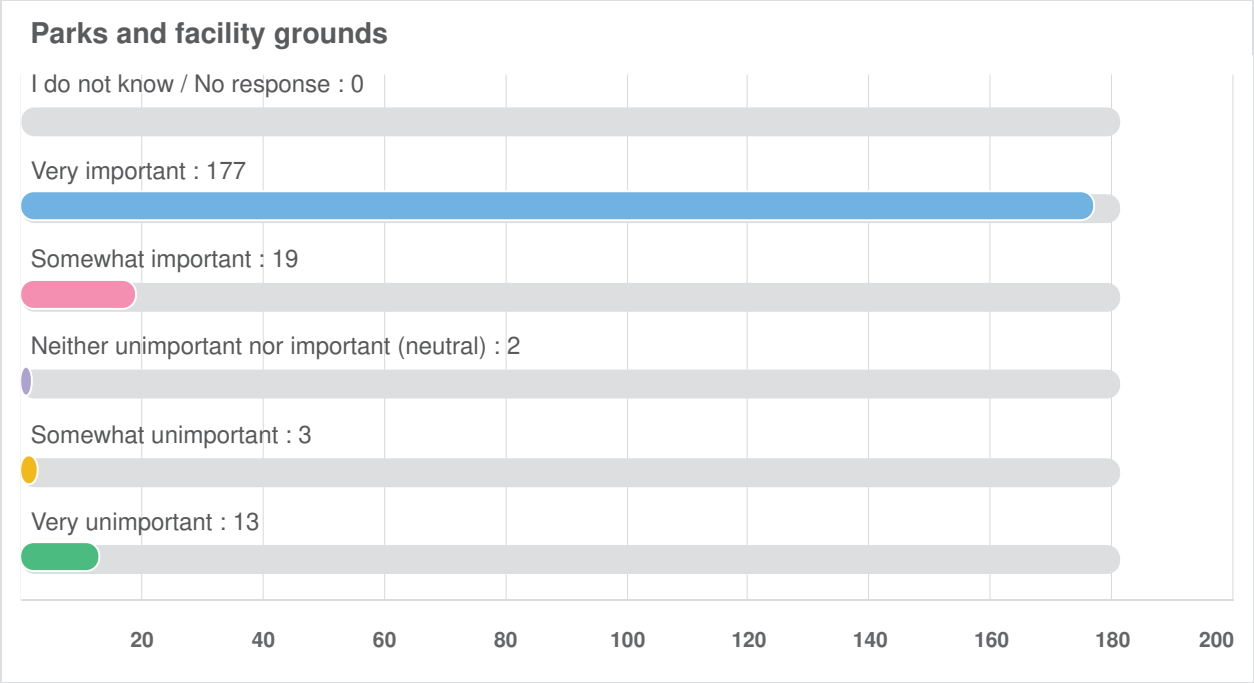
Optional question (215 response(s), 0 skipped)
Question type: Checkbox Question

Q10 How important do you think it is for the City of Windsor to plant trees in each of the following areas?

Optional question (215 response(s), 0 skipped)
Question type: Likert Question

Q10 How important do you think it is for the City of Windsor to plant trees in each of the following areas?




Parks and facility grounds
I do not know / No response : 0
Very important : 177
Somewhat important : 19
Neither unimportant nor important (neutral) : 2
Somewhat unimportant : 3
Very unimportant : 13
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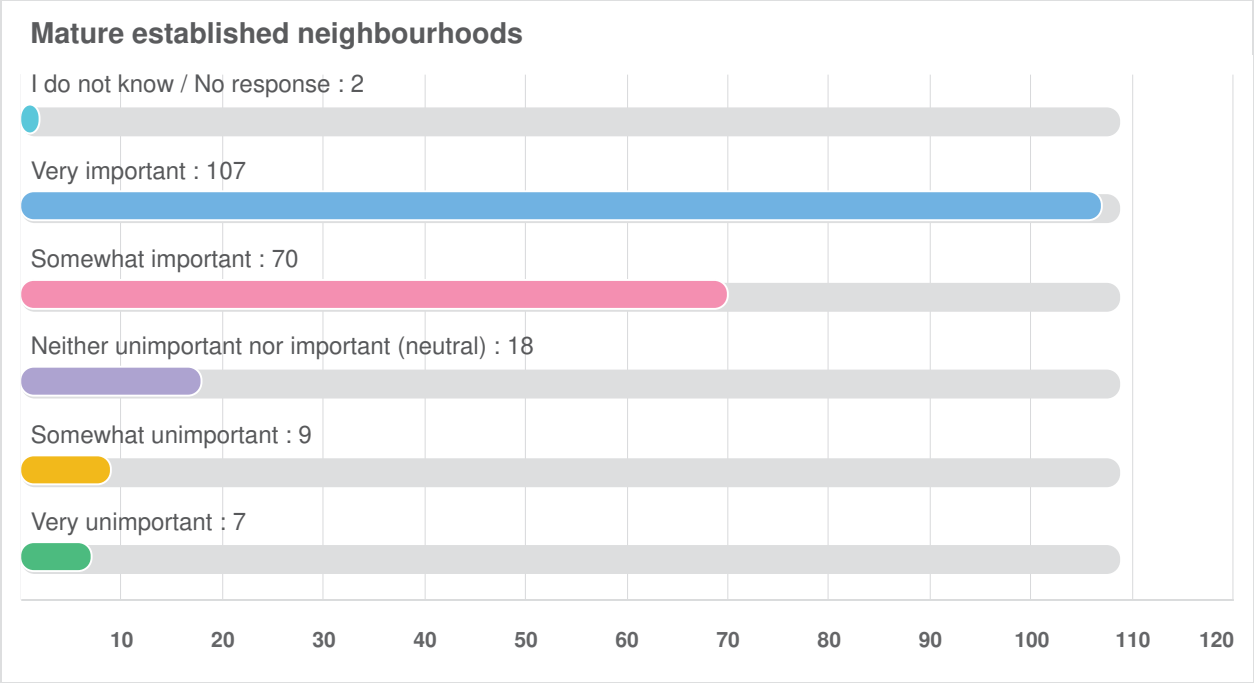
Mature established neighbourhoods
I do not know / No response : 2
Very important : 107
Somewhat important : 70
Neither unimportant nor important (neutral) : 18
Somewhat unimportant : 9
Very unimportant : 7
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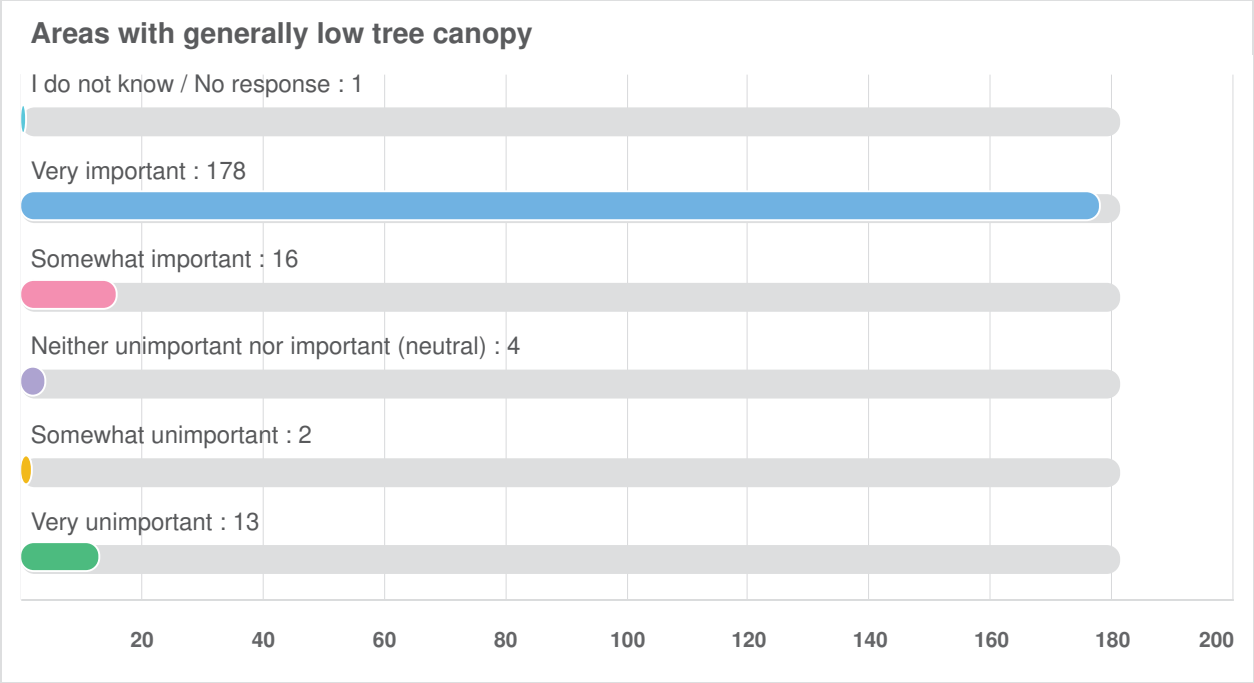
Areas with generally low tree canopy
I do not know / No response : 1
Very important : 178
Somewhat important : 16
Neither unimportant nor important (neutral) : 4
Somewhat unimportant : 2
Very unimportant : 13
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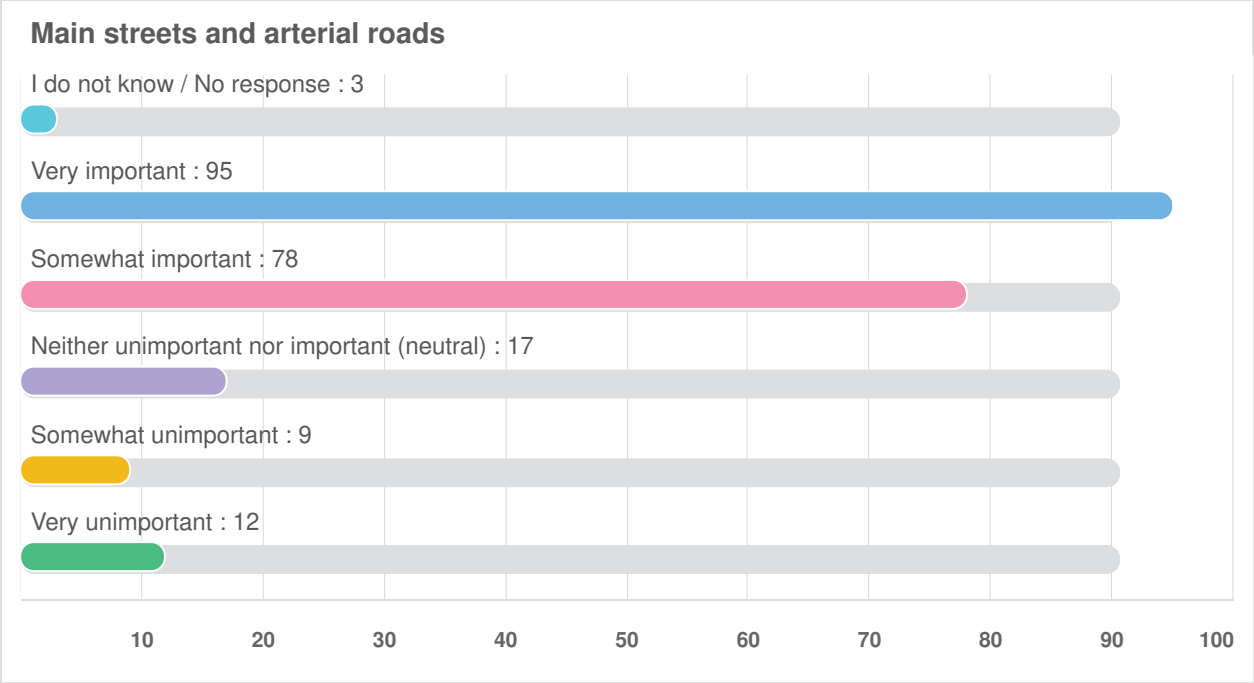
Main streets and arterial roads
I do not know / No response : 3
Very important : 95
Somewhat important : 78
Neither unimportant nor important (neutral) : 17
Somewhat unimportant : 9
Very unimportant : 12
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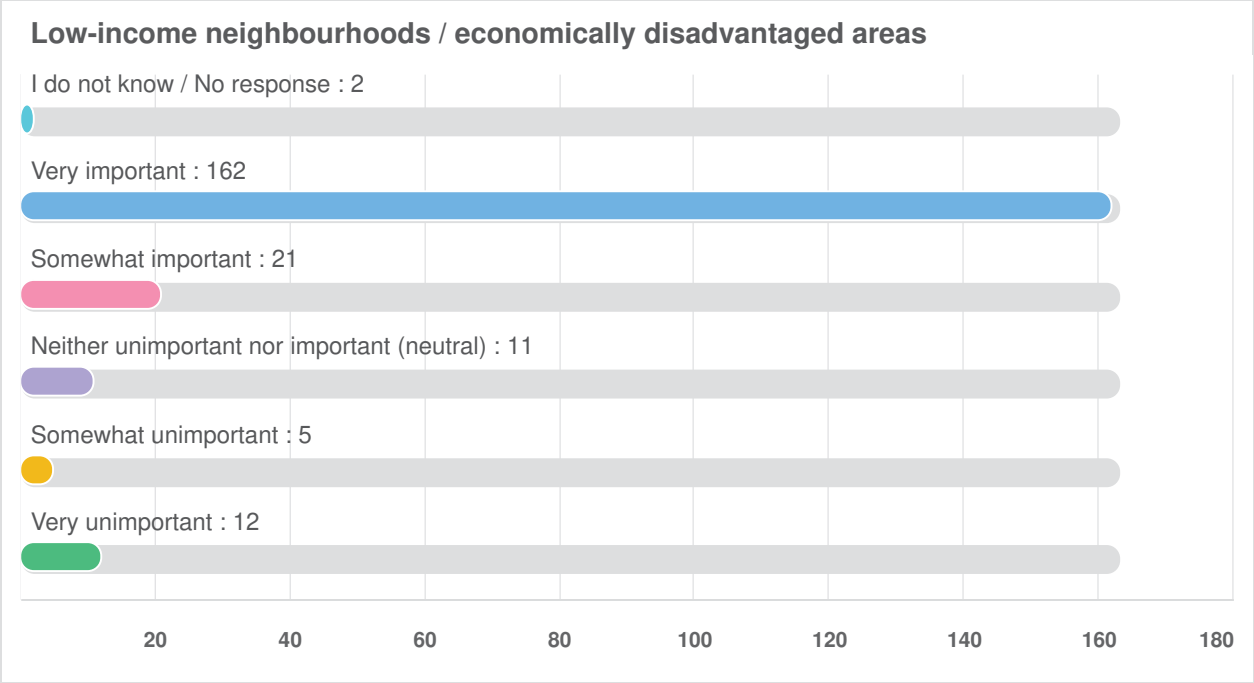
Low-income neighbourhoods / economically disadvantaged areas
I do not know / No response : 2
Very important : 162
Somewhat important : 21
Neither unimportant nor important (neutral) : 11
Somewhat unimportant : 5
Very unimportant : 12
20
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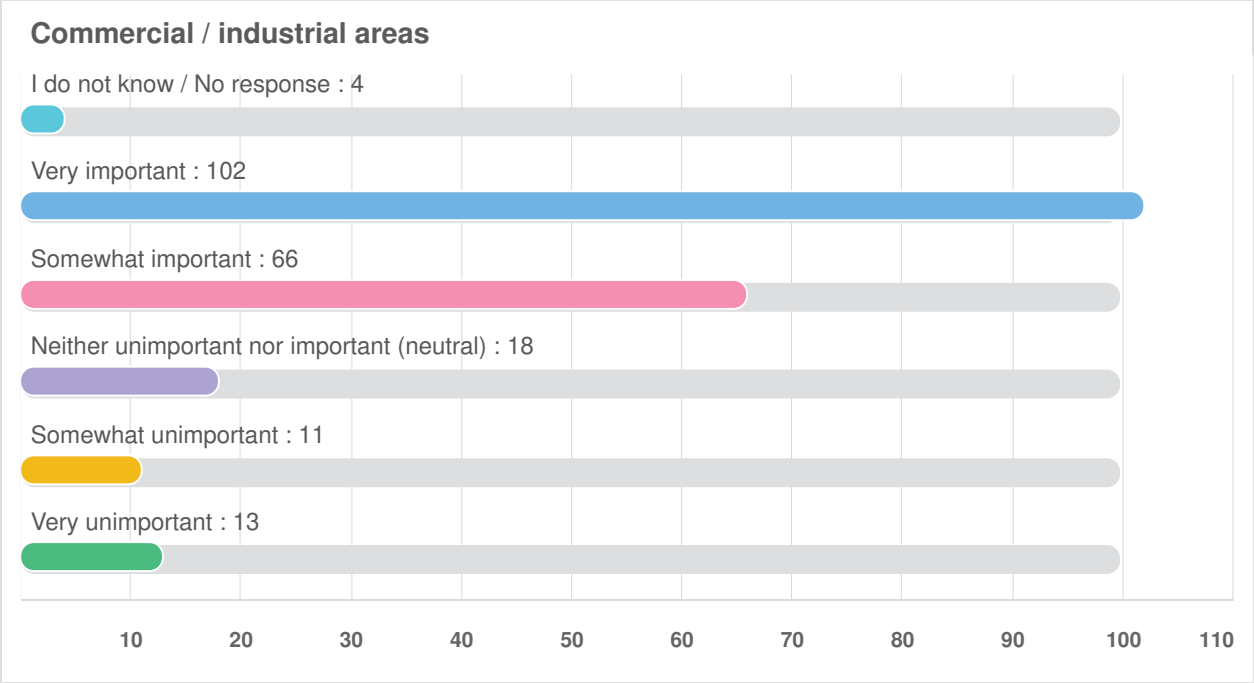
Commercial / industrial areas
I do not know / No response : 4
Very important : 102
Somewhat important : 66
Neither unimportant nor important (neutral) : 18
Somewhat unimportant : 11
Very unimportant : 13
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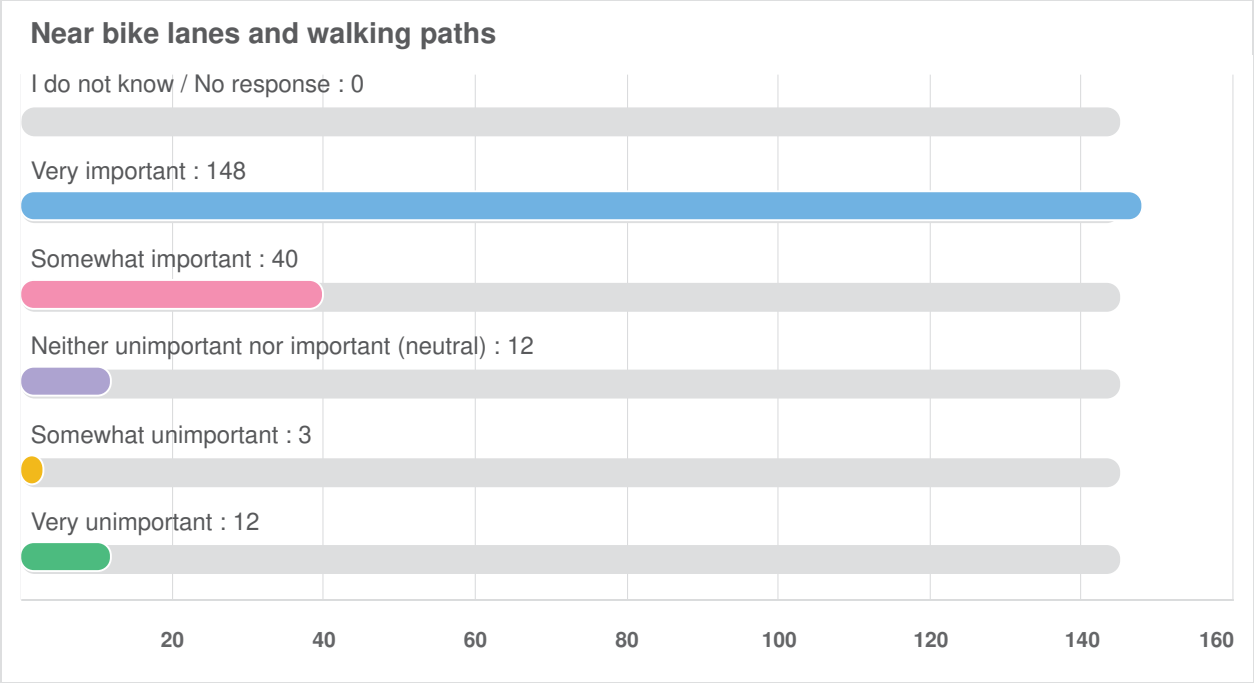
Near bike lanes and walking paths
I do not know / No response : 0
Very important : 148
Somewhat important : 40
Neither unimportant nor important (neutral) : 12
Somewhat unimportant : 3
Very unimportant : 12
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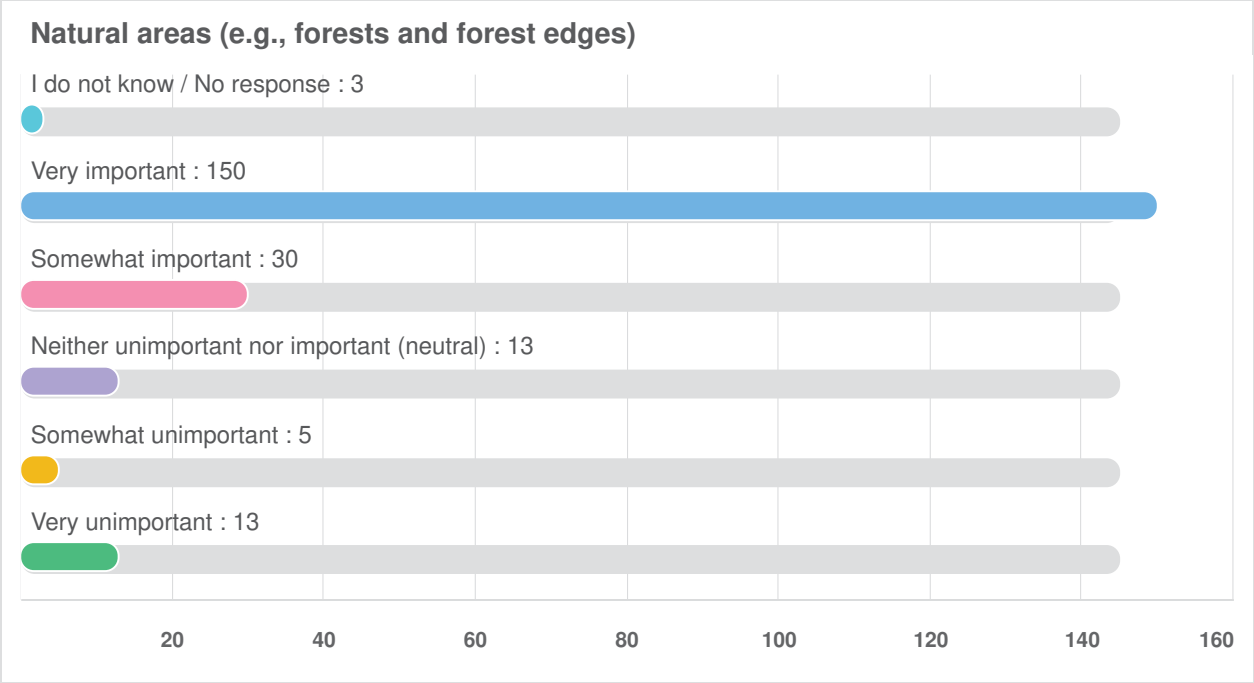
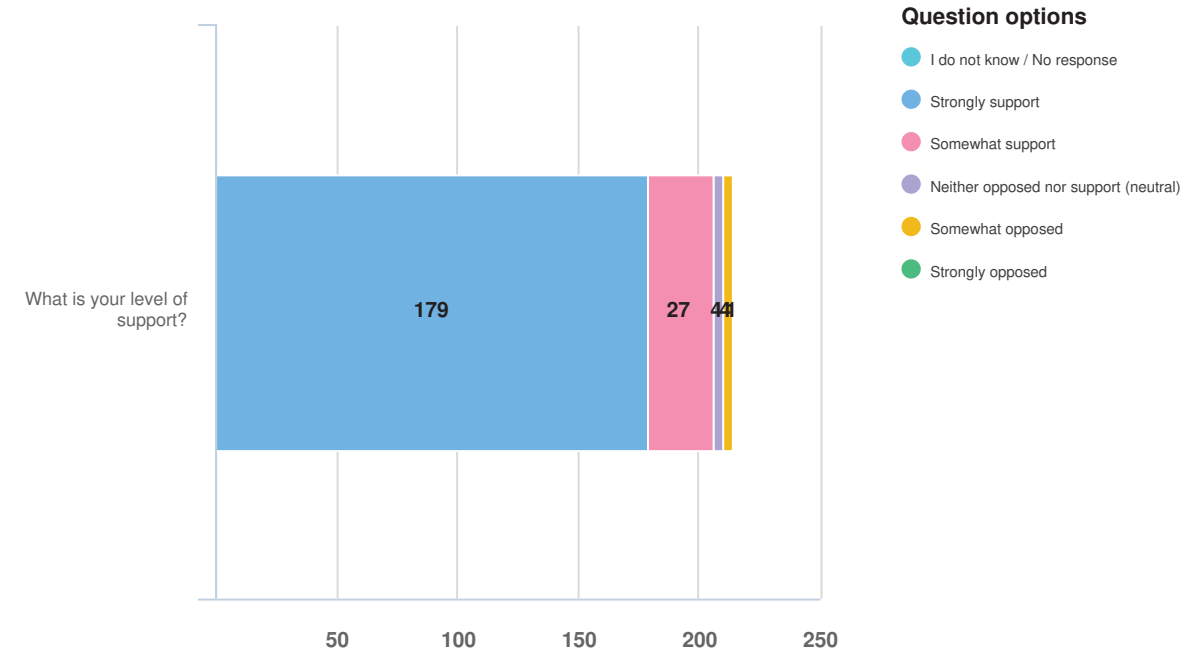
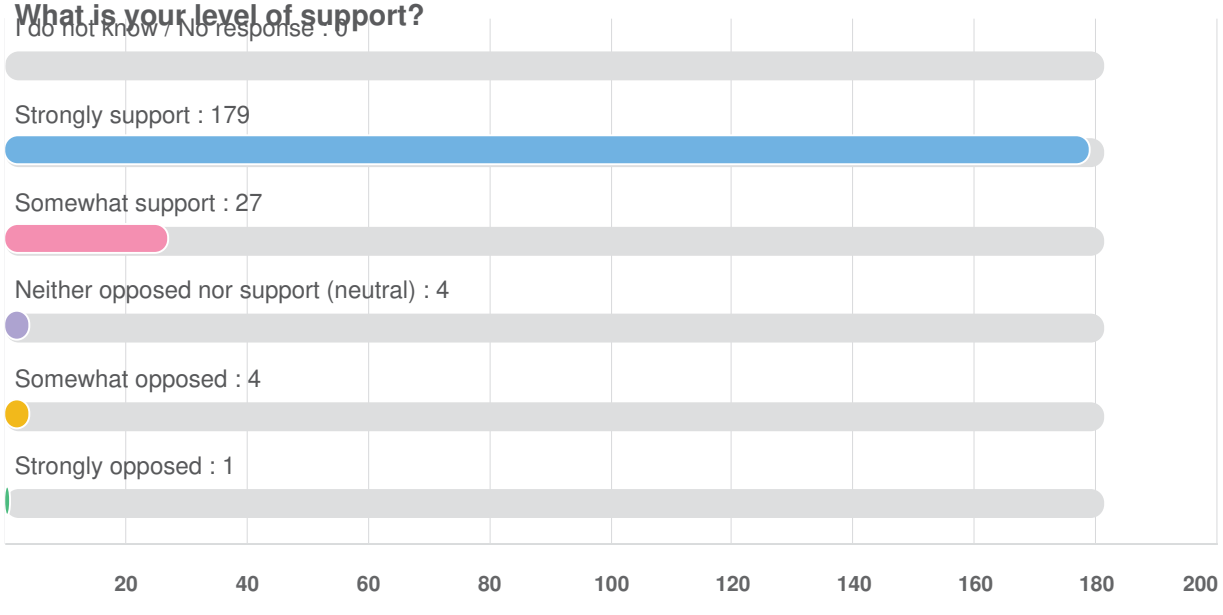


Q11 Many opportunities exist for planting trees on lands not owned or managed by the City (e.g., homes, businesses, and institu...

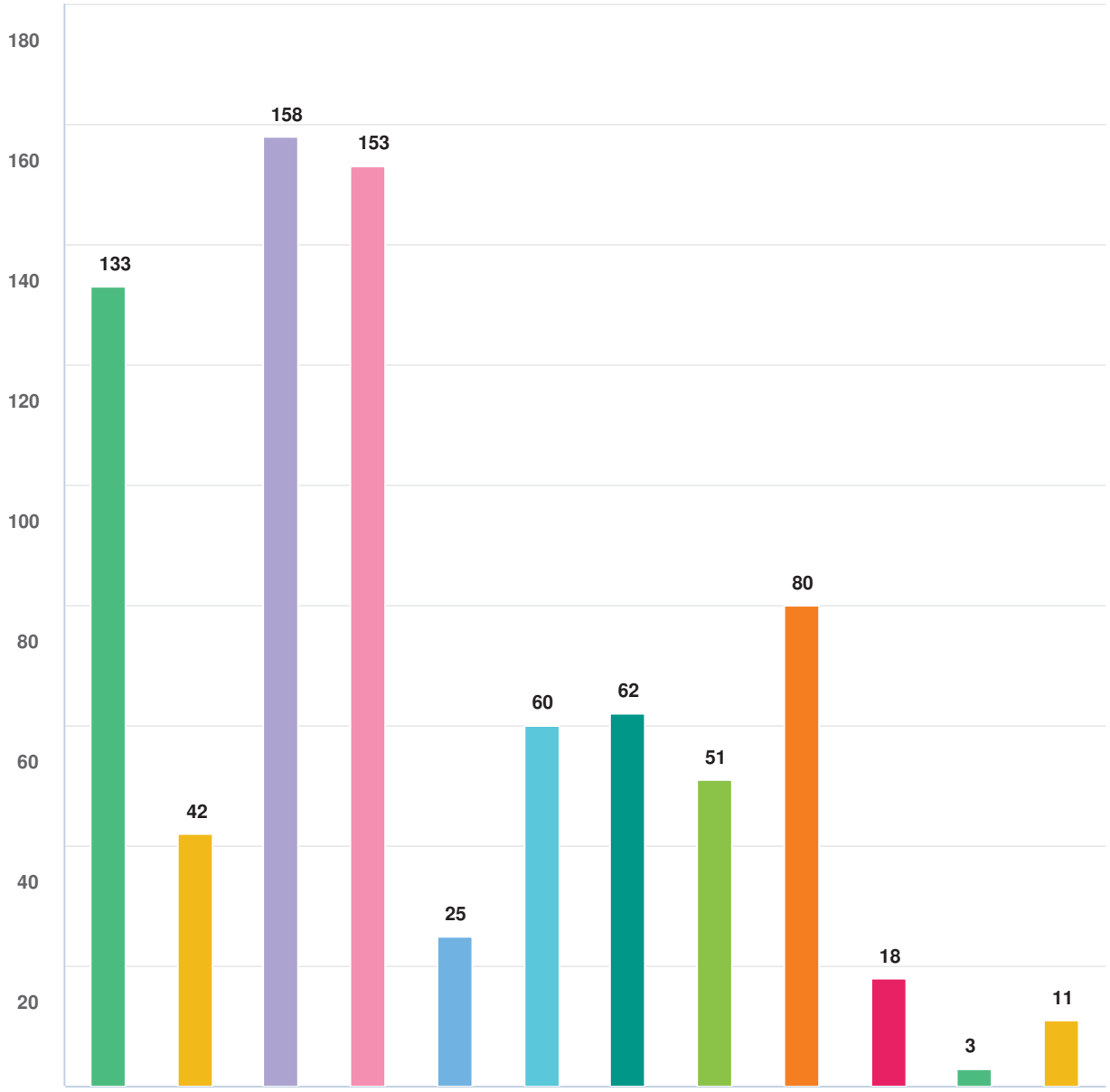


Optional question (215 response(s), 0 skipped)
Question type: Likert Question

Q11 Many opportunities exist for planting trees on lands not owned or managed by the City (e.g., homes, businesses, and institu...



Q12 Urban forest stewardship includes the planting and care of trees and forests on public or private property. In the last fiv...

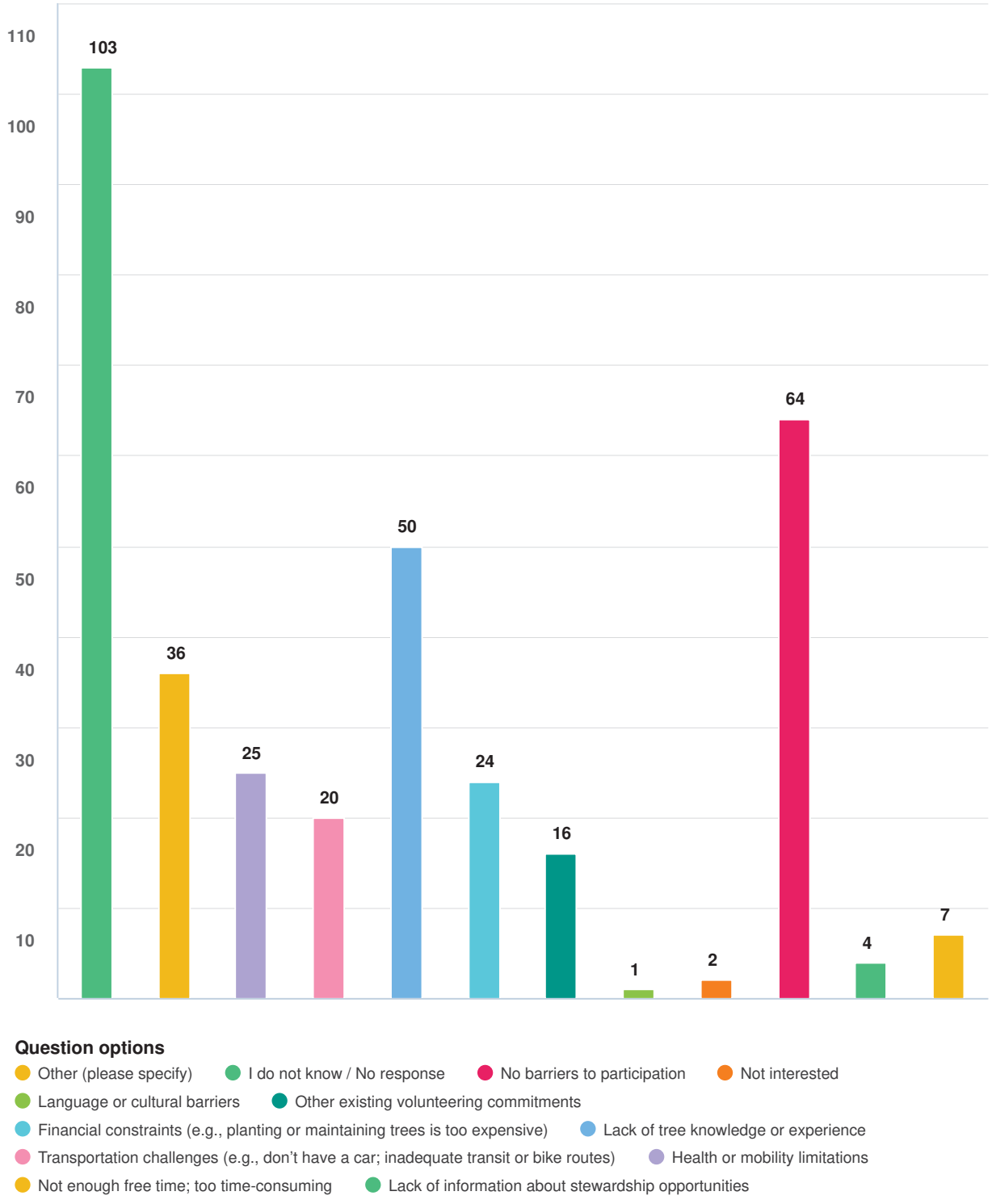


Question options

- Other (please specify)
- I do not know / No response
- None - no stewardship in the past 5 years
- Educated my neighbours or other community members about trees
- Pulled weeds or invasive species in a natural areas
- Filed a City tree service request (e.g., through 311)
- Watered, mulched, or weeded a tree on City property
- Treated a tree for a pest and/or disease
- Pruned a tree on private property
- Watered, mulched, or weeded a tree on private property
- Participated in a tree planting program in a city park or natural areas
- Planted a tree on private property

Optional question (215 response(s), 0 skipped)
Question type: Checkbox Question

Q13 Do you identify or experience any barriers to your participation in urban forest stewardship activities such as those liste...

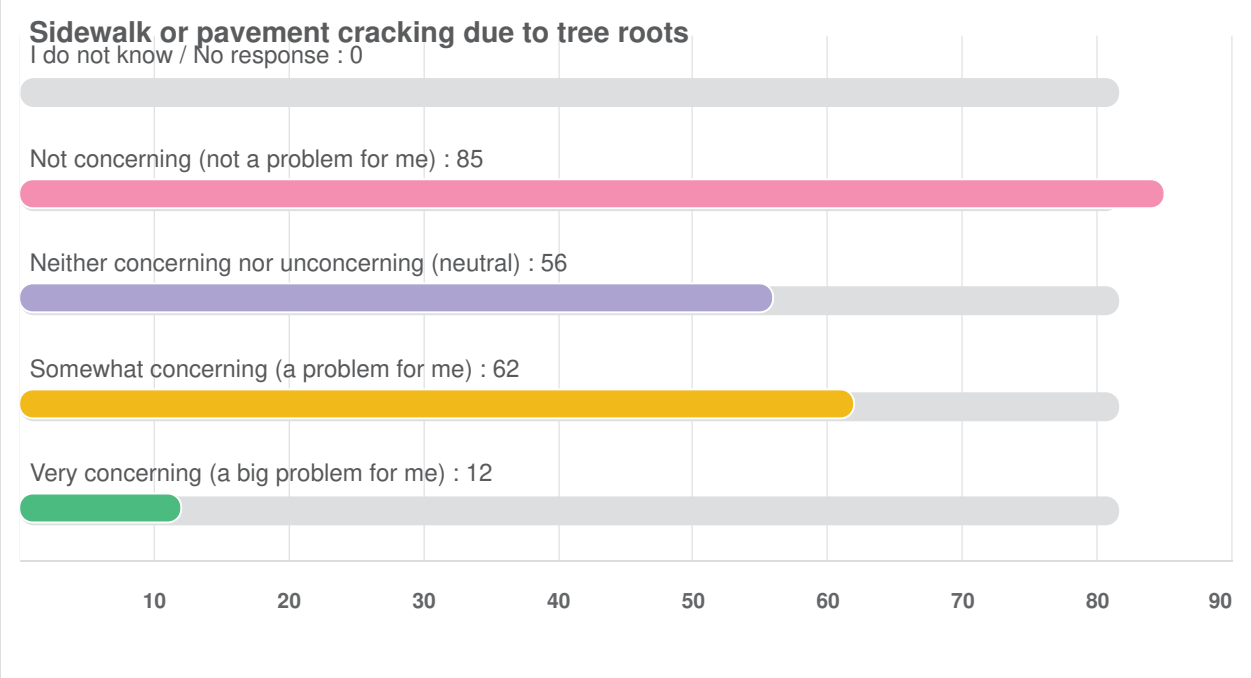


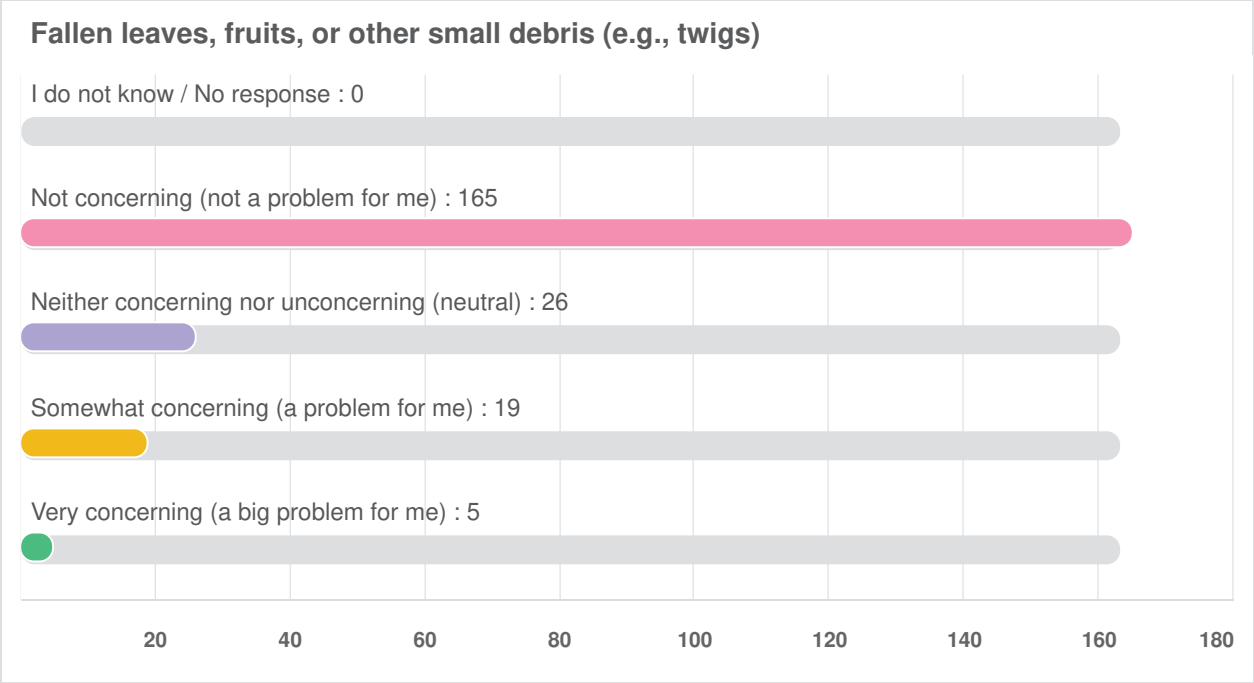
Optional question (212 response(s), 3 skipped)
Question type: Checkbox Question

Q14 People sometimes see trees as problems or nuisances. Please indicate how concerning you personally consider the issues list...

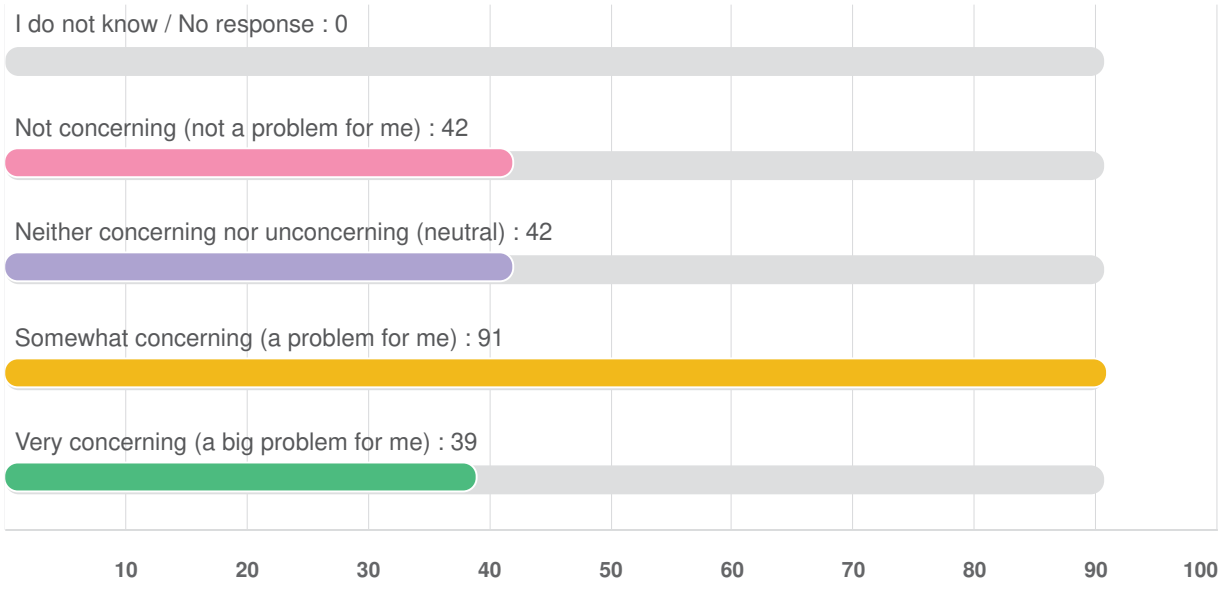
Optional question (215 response(s), 0 skipped)
Question type: Likert Question

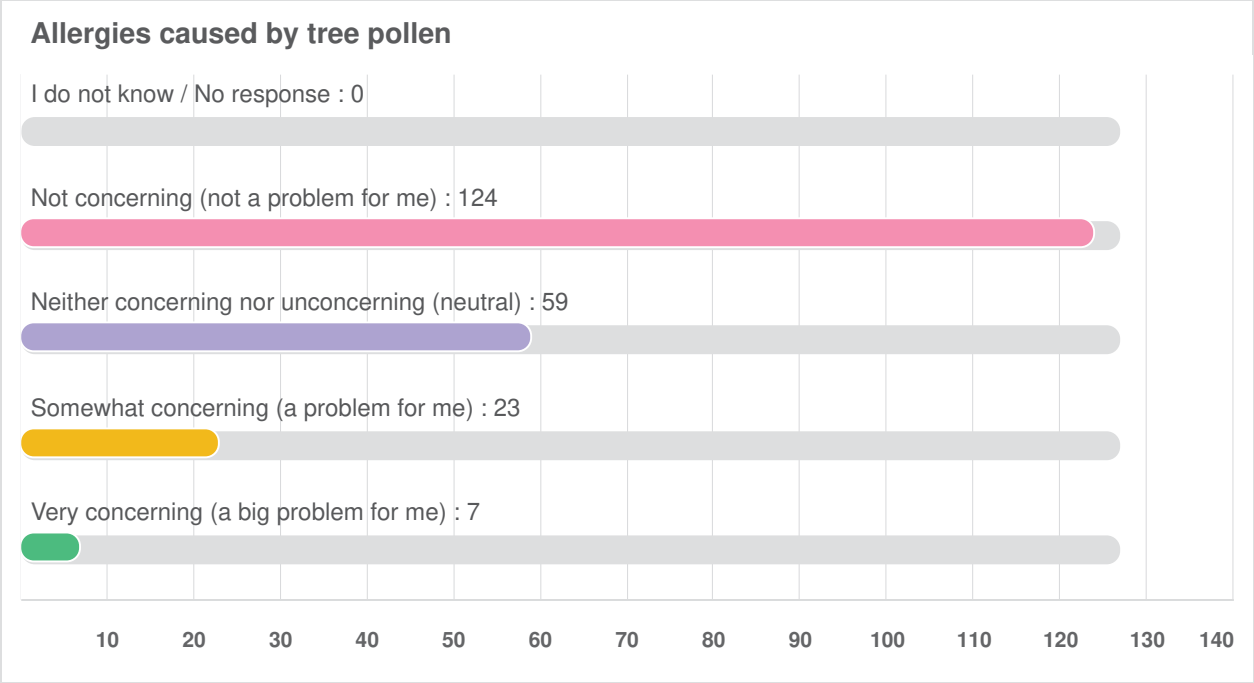
Q14 **People sometimes see trees as problems or nuisances. Please indicate how concerning you personally consider the issues list...**




Fallen leaves, fruits, or other small debris (e.g., twigs)
I do not know / No response : 0
Not concerning (not a problem for me) : 165
Neither concerning nor unconcerning (neutral) : 26
Somewhat concerning (a problem for me) : 19
Very concerning (a big problem for me) : 5
20
40
60
80
100
120
140
160
180

Tree roots clogging pipes




Allergies caused by tree pollen
I do not know / No response : 0
Not concerning (not a problem for me) : 124
Neither concerning nor unconcerning (neutral) : 59
Somewhat concerning (a problem for me) : 23
Very concerning (a big problem for me) : 7
10
20
30
40
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60
70
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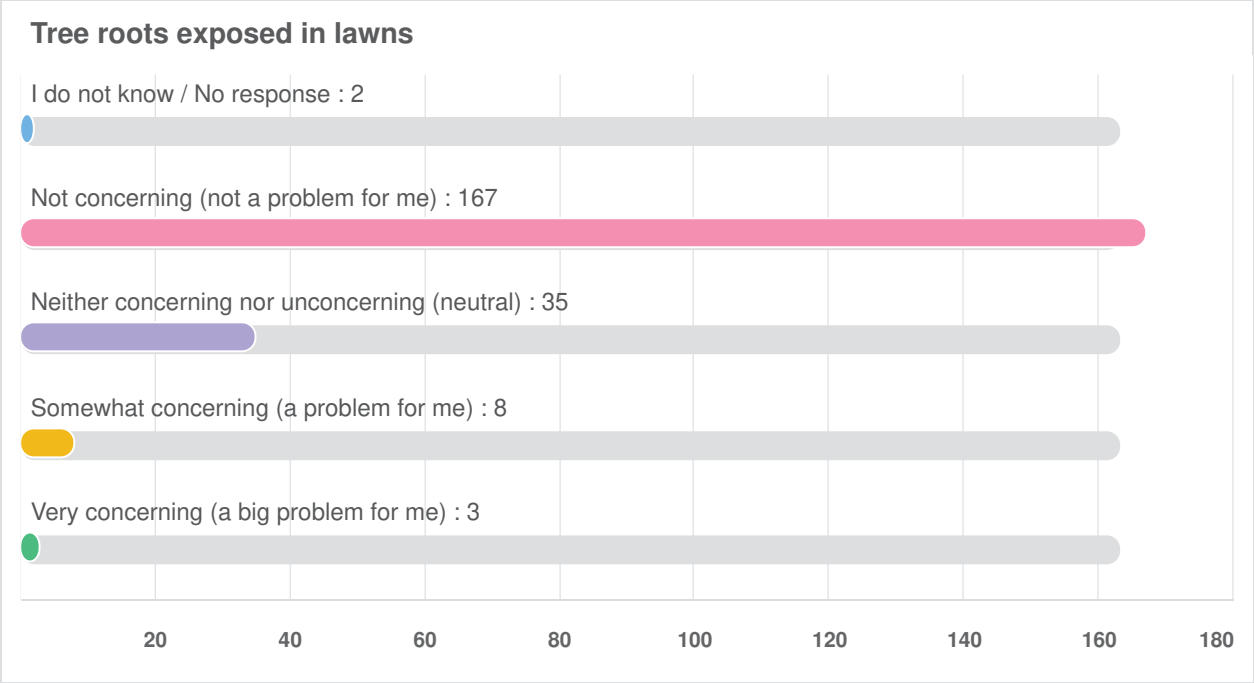
90
100
110
120
130
140


Tree roots exposed in lawns
I do not know / No response : 2
Not concerning (not a problem for me) : 167
Neither concerning nor unconcerning (neutral) : 35
Somewhat concerning (a problem for me) : 8
Very concerning (a big problem for me) : 3
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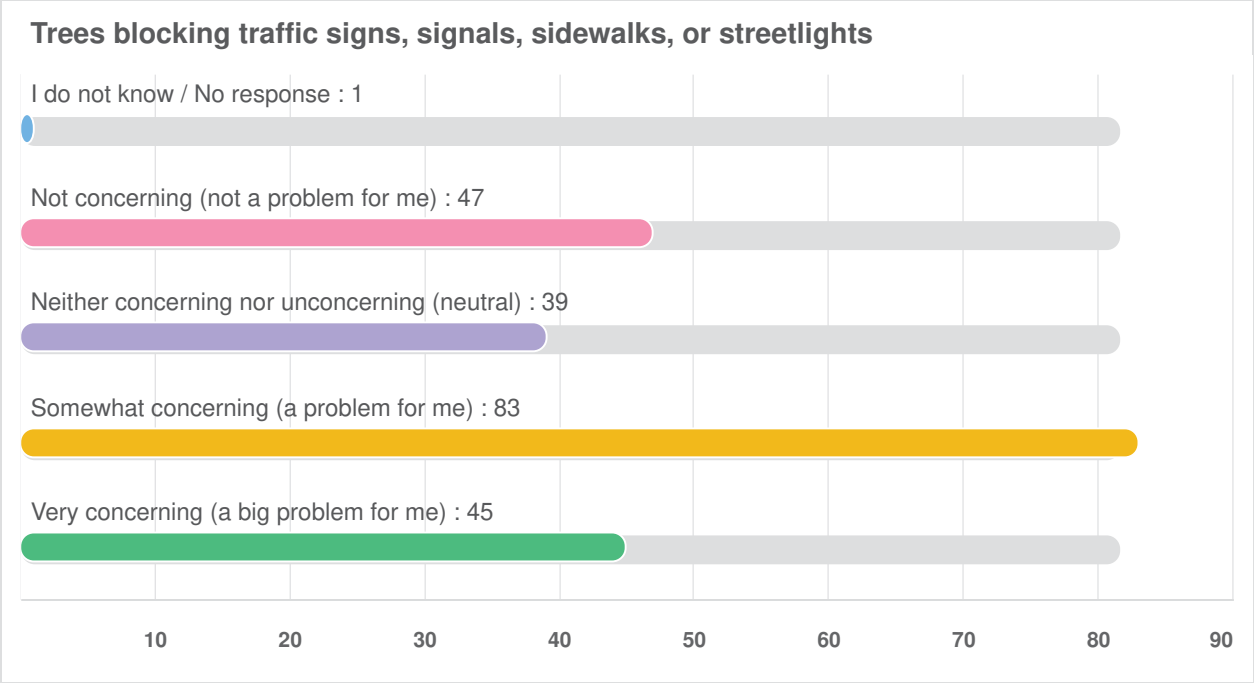
40
60
80
100
120
140
160
180


Trees blocking traffic signs, signals, sidewalks, or streetlights
I do not know / No response : 1
Not concerning (not a problem for me) : 47
Neither concerning nor unconcerning (neutral) : 39
Somewhat concerning (a problem for me) : 83
Very concerning (a big problem for me) : 45
10
20
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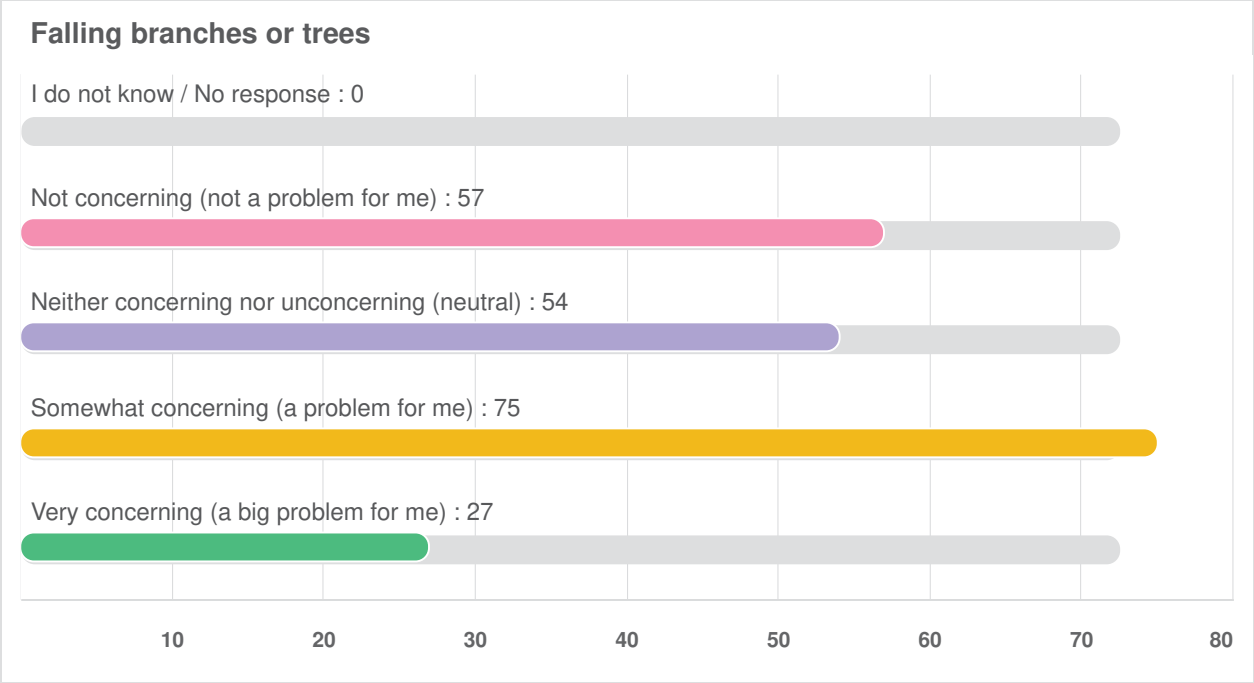
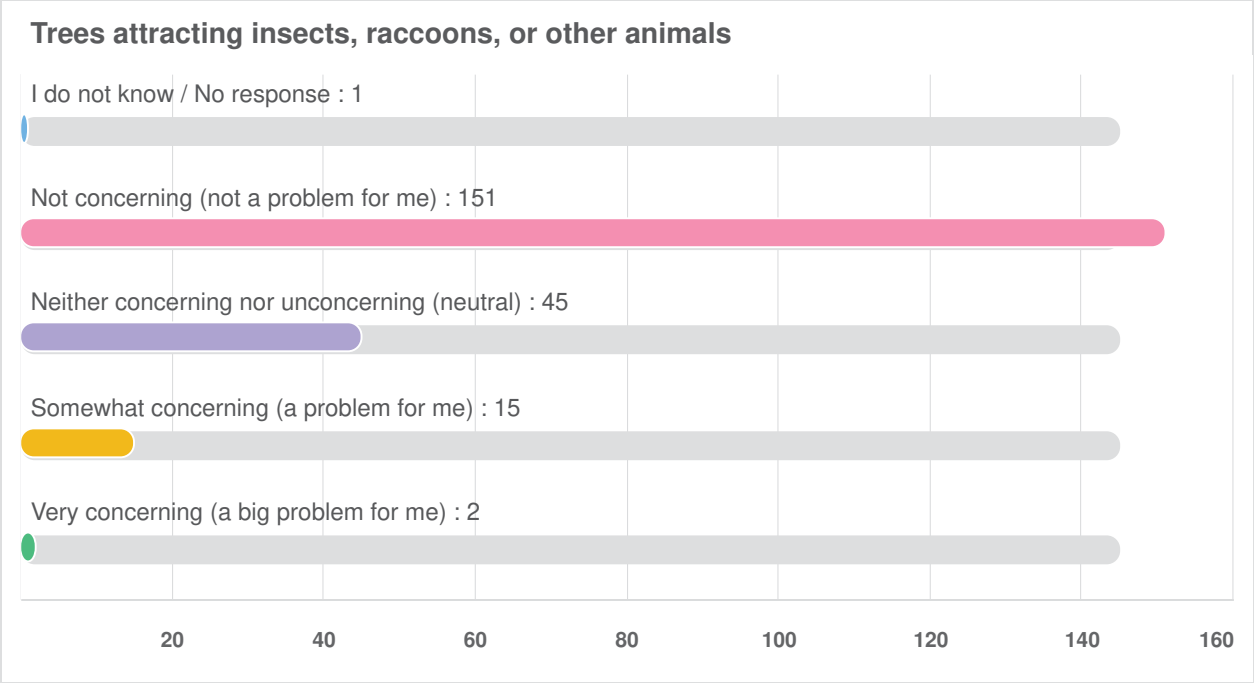
70
80
90


Falling branches or trees
I do not know / No response : 0
Not concerning (not a problem for me) : 57
Neither concerning nor unconcerning (neutral) : 54
Somewhat concerning (a problem for me) : 75
Very concerning (a big problem for me) : 27
10
20
30
40
50
60
70
80



Q15 Are there any other tree-related problems or nuisances that are important to you and are not listed in Question 14?

I would love more trees and shade in my backyard but I worry about my inground pool and the roots damaging that. If there are certain trees that are better to plant around a pool I would love to know!

The City (or contractors) have improperly planted the vast majority of trees I have seen in my neighborhood, increasing the likelihood of future health problems resulting in higher costs to tax payers and increased chances of dangerous tree failure.

Trees planted on natural gas pipeline right in my front yard, please let me remove this unsafe tree! Also planting under powerlines, anywhere within falling distance of a house, sap from trees damaging cars parked on street and in driveways.

I'd very much like to see Jackson Park turned into a proper forest with native trees, grasses and flowers.

OAK TREE SPECIES SHOULD NEVER BE PLANTED IN FRONT YARDS OF PEOPLE'S HOMES. The amount of acorns produced in

mast years is astounding. It is difficult to keep up with clearing them from grass. eavestroughs, city curb areas, driveways etc.

People don't like raking leaves

I think people get irritated with maple keys in the spring. City could sweep the streets with their truck after the keys have fallen so that people don't get irritated. It doesn't bother me since they can be mulched easily, but may bother others.

We've learned that trees like Siberian elms grew fast, but are messy. The roots affect land grades and compromise water leakage into homes. Discretion on types of trees planted would be wise. I want assurances that problematic trees can be removed.

I don't like how aggressively trees have to be trimmed to make room for electric wires. I understand the necessity, and appreciate that our power only rarely goes out, but I would think there are safer solutions for the trees e.g. less aggressive pruning

Salt damage

Advise owners on when it’s safe to remove the oak trees that the city promised it would

Many of the city planted trees in my area are infected badly with black knot. When they remove a dying tree they grind the branches right on the street, spreading spores and more infection.

Lack of pruning for City owned trees including those in front of private property and in parks.

Tree branches encroaching on overhead power lines, and city workers damaging root systems when repairing sidewalks and roads, leaving mature trees more vulnerable to falling completely during high wind events.

Cost to remove dead/dying trees on private property.

Trees on roads make it more peaceful and it is nice to slow down and enjoy the ride - apparently tree lined streets do slow traffic, which is VERY important on residential streets.

Can we check the health of a tree whose large branches are overhanging an existing road?

Trees should not be planted if they would obscure viewscapes - especially along the water side of Riverside Drive

Please address the managers lack of knowledge of the trees in the area and his disinterest to further his education in the urban forest.

No

Sidewalk cracking isn't a problem for me but I recognize people with limited mobility require high quality sidewalks.

I can just say whatI've done. I planted a $500.00 Royal Red Maple on my boulivard years ago. I dug Maple trees from my alley & planted them by the River, Our Dogs died & We bought a Royal Red Maple & the neighbour said we could plant it on his Boulivard t

No

I'm happy the City now only plants native trees. (Not a problem, simply an observation. More trees and protect what we already have.

Private trees planted too close to homes or foundations

No, there are only benefits from more trees. Period.

none

Type of tree, sycamores have a mess every season, you have to clean up after it Spring, Summer, Fall & Winter. Other kinds may have only 1 messy season through out the year. We need more yard waste pickup days in Windsor. Too many Scymores

Pavement put in by city sponsored contractors cutting into roots at ground level!; build/ pot concrete around the trees, please

Trees shading out open meadows and tallgrass prairies, which are important habitats for species at risk reptiles. This is a geographically restricted concern and applies mainly to parks and natural areas.

Ive seen many more trees planted than growing into maturity. This goes both for private plantings and also for trees that the city ostensibly takes care of.

Trees are trees-some are big some are small, they have roots which will damage sidewalks or lawns ,they drop leaves at certain times of the year. --so what. Compared to the damage humans cause I have little or no issues with trees..

No

If roots are showing or sidewalks are cracking due to roots then tree was not planted properly or at the correct location.

Lack of commitment to forestry stewardship near hope hill, trees near Banwell, I cannot stand the fairy forest because the city does not regularly keep it looking good. City clearly doesn’t check bc there was a huge wasp nest in a fairy house! Huge

Trees are not a nuisance

Trees that are properly maintained are less likely to have issues such

as falling branches or disease. These ‘nuisances’ can be easily mitigated.

it's concerning to me that the city still plants non-native trees in residential areas despite the city website stating that native trees are a priority. Also, a ban on artificial grass in the city would make areas more suitable for healthy trees.

Many of our parks along the river are so bare. It's easier to enjoy a place like that with nice shade to sit in.

the benefits outweigh minor nuisances

In past City hired inexperienced private contractors to plant City Trees. Often planting wrong species ordered and in wrong location specified. Causing City arborist to attend and have corrected. In past wait for City Trees 2 years too long

none

No

People planting non-native/invasive trees and those trees spreading (tree of heaven for example)

NA

With increasing frequency of high winds, I worry about going for walks in areas with large old trees. I will avoid going out for walks in my neighbourhood on windy days.

Invasive trees sold by nurseries and planted on private property

Optional question (47 response(s), 168 skipped)
Question type: Single Line Question

Q16 **Please describe your ideal vision of Windsor’s urban forest in the future What would you want it to look or feel like in 20 years? You can write in complete sentences or use key words.**

30% tree canopy, tree in every front yard within the ROW.

I love communities with older mature trees. Seeing people cut them down because they don't want to rake leaves in the fall is heartbreaking. With lots housing turnover lately, people are cutting down trees for renovations and it is taking away the look and feel of older areas. I would love to see lots of neighbourhoods and communities with mature trees in 20 years.

The best time to plant a tree was 20 years ago. Trees being planted today are being improperly planted, or homeowners aren't educated on upkeep (ie tree rings, turf grass, no mulch etc) which will result in a plethora of trees with poor health requiring a great deal of attention (manpower, money etc). Also, substandard trees are being planted (pear trees etc) that historically have poor structure and plenty of problems down the road. We should be planting (properly/professionally) as many native, long lived species as possible to increase the chances of an ever increasing canopy cover, reduce the likelihood of diseases, and create a more sustainable environment for humans and wildlife.

The existing canopy is woefully insufficient and behind many other municipalities. I would like to see a significant investment towards increasing tree canopy. This is particularly important to windsor which will is already extra vulnerable to heat impacts, air pollution and flooding from a warming climate. Additional trees are a very cost effective way to mitigate these impacts

Windsor's urban forest should be significant, well-maintained and envied. No more City of Roses... we should be the City of Old Growth Carolinian Forest.

We need more heavily treed areas like Ojibway, even like Ganatchio Trail.

Support future generations, mitigate negative effects from industrial pollution. I'd like to see natural areas protected and more trees being planted. Preservation of rare and endangered species. Less building in endangered areas such as ojibway Park. Without nature, we cannot exist.

Definitely more tree cover. Maybe planting trees that are more common to the south since we are in global warming

Just an overall increase in canopy. We can't create entire forests in 20 years but we can try and increase the general canopy

More trees in new communities

New developments, etc with a % of green space forest management built in. Plant native plants (trees and other) to support. Support and promotion of biodiversity in private yards Increase of access for public to benefits of the above

A city full of diverse, mature trees that are considered assets and not an afterthought.

SAFE, pretty where possible and appropriate, well-maintained.

Maintain the tree canopy that already exists and increase the tree canopy hire people with disabilities to tend to urban forestry including flower beds and trees and city areas

all streets look like a green tunnel in summer.

Plenty of trees and natural areas. Good for the environment, lots of shade, good for mental health and getting out. Excellent biodiversity and habitat for species.

Different types of trees, a pavilion near the river, seats along the river.

a closer resemblance to the Carolinian Forest

More trees

Windsor - The City of Blossoms. Giles Avenue use to be much more beautiful with the types of blossoming trees that grew there. Plant trees that have beautiful blossoms on city property and in parks. Encourage residents to plant secondary trees on their properties that blossom. Start a blossom festival to encourage tourism with part of it supported by city residents to beautify the city through the planting of trees and blossoming types of trees. Windsor is the largest city in Canada with the most southern latitude. Trees grow much larger here than other parts of Canada and we also enjoy a larger diversity of trees because of the climate. We have a beautiful and expansive riverpark system enhanced by the skyline of Detroit. Encouage the city of Detroit to plant more trees/blossoming types and have an international tree festival that could bring even more people to the area. Once you have a blossoming canopy of trees, people will come and city residents will take ownership in keeping up the blocanapy of trees. (My term for a blossoming canopy of trees.)

Although there has been no appetite for a private tree protection bylaw I think it is a key tool in managing the Urban Forest.

Tree planting done in a thoughtful manner - size of tree, upkeep of tree, balance shade, sun and light- maintain the trees promptly

Lots of evergreens, we need these trees for better air quality

Tree coverage along all the paths eg riverfront, Gnatcho etc. Park areas with clusters of trees for shade eg kids jungle gyms, picnic areas. More trees near senior homes/hospitals/schools, all vulnerable populations. Should be a requirement with new builds to have a certain quota of trees.

I am seeing a lot of Windsor's green space being developed or has already been developed. Urban sprawl is a problem since it infringes on animal habitats, farm land and decreases our amount of green space. The city should be doing more to create pollinator pathways in

parks, school playgrounds, business areas and encourage residents to plant these gardens in their own backyards. Incentives may help to encourage people to do this.

much of the city would be hard to see on google earth due to tree canopy/forested swaths with a cycle/walkway connecting the city(see Denmark). a cooler city.healthier people. trees that are cared for. educated tree services who will not kill trees by trimming inappropriately. cooler air, moister soil. more trees along riverfront . planners in each dept need to collaborate to green the city.

Commercial BIA areas would be covered in trees - greenery so when walking - shopping there is cool shade. Tree planted in every available city property - particularly in industrial areas which are often left barron

Nicer air.

I live near Curry Park in South Windsor. I would love to see that park transform into more of a forest rather than suck a big, open space. Also, lots more dog parks!

Many more trees than present

Green & Shady. Park-like. Fresh air, natural beauty.

Significantly increased urban canopy accompanied by a sizable increase in publicly accessible greenspace, with a particular focus on reclaiming former industrial land in an effort to increase the quality of life for the lower-income population as well as promoting the rehabilitation of heritage and/or older buildings/infrastructure in the city. To the latter point, I can point to older, formerly majestic buildings along Ouellette Avenue, which can be rehabilitated through greening practices, adjusted to cater to lower-income households, and trees planted on the property to contribute to the city's canopy and greenspace.

Residential areas within the city blend in with the city's existing natural areas. People are living in harmony with nature, not separated

and disassociated from it.

well-maintained mature trees; continued focus on planting of diverse, native next-generation canopy; wide availability of shade trees in public parks and active transportation routes; use of tree cover for mitigation of climate change impacts (ground water absorption, shading of buildings, etc.)

A robust tree tree canopy with at least one city owned tree per property. An aggressive program to mandate tree planting as part of any new or renovated commercial parking areas. A quota for tree plantings for medium and large density residential buildings, with an option to purchase planting in lieu within public street and parks for residential sites. An outreach program that educates and and forms partnerships with the NGO's, non-profits and community members to promote and offer incentives of tree plantings. Provide grants and incentives for increased tree plantings and maintenance for all business BIA's. Educate homeowners on the importance of tree function and the legality of removing city owned trees from residential properties.

Ideally, I would like to see a city full of mature trees, because we have valued them, nurtured them, and encouraged them. this is the path forward to combat climate change that is relatively easy and the results are immediate.

Not sure I will be alive to see tye changes in tye city with regards to trees but I would like to see less concrete and more trees as they are calming and reduce heat in cities. Properly managed it would be a haven for birds, animals and people. Once upon a time Windsor had it's own foresters team, would love to see that come back

That Windsor will have aggressively planted (and maintained current trees) to increase our urban forest up to an over 30% level in the next five years and continue to improve that coverage well into the future. That homeowners cannot simply cut down trees without approval and that we will require a minimum number of medium caliper trees to be planted with every new construction or major renovation (perhaps based on the size of the lot so commercial/industrial or multi-tenant developments must plant a pre-determined number of medium caliper trees).

Tree covered residential streets. Trees in city centres. Making nature the priority everywhere. The most desirable cities make nature a priority. Hard scapes are ugly. Riverfront should be covered with trees get rid of all that concrete. Have a look at Central Park NY for inspiration. It’s always busy in Central Park. Walking/bike path only. No venues. Nature is calming. If you review top 10 desirable cities they are usually covered with trees not tired concrete. Get planting and care for the trees that have just been planted before they die.

I would like to see black oak forest reopened to walkers and bicycles. There are almost no trees in Windsor compared to a lot of cities I have been to or forest you can have a nice walk into. People don't exercise enough. A forest walk or run is a great habit to have. We need to beautify our city and trees are the best way to.

Increase canopy cover, especially in new developments. Encourage developers to maintain trees on properties as opposed to knocking them down.

All the streets should be starting to look something like the tree lined streets in most of South Walkerville, for example.

Preserve the green space in the east end.less houses in green spaces for quality of life. Urban sprawl is for urban areas . You can’t grow food in concrete, endangered animals thrive in natural habitat

Canopy cover to ~40% Trees planted on everyone's property. If an old tree NEEDS to be removed a new tree is planted in it's place. Only old damaged or diseased trees to be removed from property. Not just because of landscaping.

More trees and better cared for trees.

I would like to see Windsor have a very good reputation for its natural areas and urban fores.

- More connectedness between forested areas with the city and the county in general, instead of "tree islands" spotted randomly. - Bringing back more natural species that native wildlife has adapted to. - Create an designated area where an "old growth forest" can be

created (or built upon, not sure if the trees in Ojibway are considered old growth). - Not sure if our local climate can handle it, but I would love to see giants like Sequoias and Redwoods in this area, as well as more Cedar.

I want to see more protected areas in the city. I want Windsor to be known and feel like a Windsor Wonderland because of all the greenery and beautiful trees in the city. We owe it to our future generations!

the city massively increasing the amount of publically owned tree-covered property.

A sufficent heat sink to counter high temperatures.

I would like a heavy tree canopy across the residential neighborhoods and some of the more central commercial areas. Mature trees have a certain charm that gives an otherwise unattractive cityscape some character.

Way more trees, more parks, more trails. New subdivisions where the builders who make huge amounts of money must provide 10 trees for every house built.

I would like to see more flowering trees and trees that are colourful in the fall as part of the mix.

Dramatically increased canopy, including as many native species as possible (both evergreen and deciduous), on residential streets, all parks and natural spaces, in industrial areas and alongside major thoroughfares. Strategically planted trees in places where shade and/or wind protection would be beneficial to pedestrians or nearby infrastructure (eg, a treeline of evergreens beside a lengthy stretch of road where wind typically causes drifting snow or sideways rain, or shade trees at regular intervals along walking or multi-use sidewalks and pathways to provide relief from the sun during hot weather). Timely response to tree trimming requests where large branches extend over homes or parking areas (private or public), and a recognition that even healthy branches, when large enough, pose an unacceptable risk to life and/or property in such circumstances, especially given the more extreme weather events we'll continue to

see due to climate change. Permits required to remove trees more than 10 years old from any private property, with clear limits on the number of healthy trees that can be removed from any property (either a percentage or a fixed number per half-acre, for example).

Encouragement of new growth and maintenance of native species. When the magnolia trees bloom with their beautiful flowers it always puts a smile on my face, as I had one in my front yard as a child. It would be nice to see more blossoming trees around town which would create a buzz during that short special time. Similar to the cherry blossoms in the parks of Toronto.

Shady sidewalks and paths for recreational activities. Trees that withstand severe storms. Biodiversity in trees depending on area, but nothing invasive. Native species are priority.

I would like to see Windsor put the same or similar level of care into their forests and parks as they do in London. A lot of their parks are well maintained for municipal parks, have lots of trees, and preserve the nature in the area.

Nothing makes a neighborhood more appealing to me than tall old growth making a canopy over the road. Some areas in walkerville accomplish this. I would like to see more of this. Especially in areas that have been developed in the last 10ish years. Just driving around I noticed a severe lack of trees around all the McMansions

Expansive tree coverage through all neighbour hoods.

- more trees planted in new subdivisions - frequent check-ins on newly planted trees - many times have seen new trees planted and they die that same year from lack of water and care and no room to grow - Making sure business plant trees on property

As many trees planted as possible, and areas that are left naturalized as at Memorial park. Connected naturalized areas- many spots along the river can be wildflower fields especially the hillsides. We need to get used to the aesthetic of the unmanicured lawn and appreciate fields full of pollinators, insects and wildlife.

I'd like to see developers required to plant trees of better quality in new subdivisions (larger, healthier) and prioritize their survival beyond a year. I'd like to see commercial and industrial landowners plant more trees on their properties. I'd like to see a shift in attitude away from "perfect" lawns (and the chemicals they seem to require) in favour of a treed landscape by the average homeowner.

We would like to see a Team effort (stakeholders, and community groups) that is enthusiastically directed (lead, educating, informing).

I'd like to see a more significant tree canopy.

woodlots protected on private land / planting large number of trees every year /

I believe the City should focus its forestry efforts in natural areas like parks, green spaces and wetlands. Trees along city streets cause many problems especially when they get very large. The City needs to be mindful of the cost of caring for trees - planting them and then not having the budget to care for them is not acceptable. Raising taxes is not an acceptable solution, there are far too many important social issues competing for dollars, so work within existing budgets!

More canopy cover. Reduced pavement temperatures. Cleaner air. Improved mental health.

Buildings with green walls, green roofs, balcony parks with trees. Not limiting the green space to certain areas, make it throughout the city.

more canopy..better maintainace on public and private spa es

I would love to see the urban forest canopy increase to 27% - 35 %. I wouldlike to see the larger trees in parks and urban areas to be researched and protected under a heritage clause. Planting of SAR species in the urban parks and natural areas where they can thrive and reproduce should be something of a priority as well.

I would like to see more trees as an easy way to combat global

warming. I also feel that trees are helpful to people in terms of their metal health.

a steady increase of canopy cover over the next 20 years would be ideal. Planting of street and park/natural area trees is important.

Maintaining and growing our tree canopy contributes to citizens overall health, wellbeing, enjoyment and pride in their community.

Green neighborhoods with mature trees that reduce the temperature in municipal heat islands.

I want people to stop taking down large, aged trees for construction purposes or otherwise. I do not have children yet, but when I do, I would like them to breathe fresh air.

Extensive tree cover. Support for native species and species at-risk.

I would want to see walker road replaced with new sidewalks and lined with trees and flowers. I'd also like to see more trees planted in unused areas like the space at Devonshire mall.

I have travelled to places like Connecticut where trees are everywhere, even on highway medians. It is very attractive. If Windsor had a plan and budget to plant more trees in public spaces, the city would look significantly better in 20 years. All new subdivisions and construction should mandate the planting of trees.

I want a strong urban environment with lots of trees and greenery, less of a concrete jungle.

Neighborhoods with old, large trees providing coverage are gorgeous and I wish that would spread everywhere. The new neighborhoods look bleak and hot.

I want every street to look like Victoria 30-35 years ago a complete canapy of shade by large established trees. "Continued". I found a tree inmy alley a neighbour pullen & was letting die. It's now

accross the street.

I'd like to see more variety in the various trees planted but also a focus on the Carolinian forest species

A large increase in tree cover moderating heat island effects and helping to absorb rain and prevent flooding. It offers habitat to more wildlife while improving the mental health of residents and making them healthier.

Street with shade tress that reduce the god awful temperature we have in the summers. Bare asphalt, car exhaust and not shade do not make a walkable, liveable city.

Preservation and expansion of native trees and the tall grass prairie. Expansion of the NUP wherever possible by acquiring properties that could be included. Best example, Bruce Peninsula National Park

I've lived in south Walkerville for 45 years. I've steadily witnessed the destruction of either disease, age, storms, personal property removal, and lack of initiative by city mgmt in losing trees in this neighborhood. Lincoln in the woods use to be tree lined. Most city owned areas on personal property are without a tree. I would love for Windsor's urban future to ensure every property has a front tree planted. I would want every boulevard or city street to have trees or large planters. Every city intersection instead of cement surrounding everything could have cut outs around the sidewalks for trees.

tree lined streets

It would be amazing to be able to walk on trails, sidewalks, etc..surrounded by beautiful trees with gorgeous autumn foliage like other areas of Ontario. With the dreadfully hot summers we have now, more trees are needed for shelter, to increase air quality, and to provide a natural beauty.

urban woods similar to Devonwood Conservation area in various areas of what is now the 'city'. ie. remove the outdated commercial sites and turn into small forests.. NOT PARKS with a tree here or there.. Natural places for trees and small wild animals (squirrels,

deer) that EXCLUDES humans except for a path to STAY ON.

A large variaty of healty trees, and natural woodland.

I would like to see every single property in Windsor have a minimum of 1-2 trees. Including commercial property. I think it would help cool down the city during the summer months. By having trees line streets, traffic will also be calmed.

Want to see the urban canopy grow significantly over the next decade

I would like to see a green future. More trees, more gardens. I would like the City of Windsor to plant and care for vegetables in vacant area through out the city to help feed everyone. Remove cemented and asphalted areas where possible to allow for more green spaces. These changes would also create more City of Windsor jobs for the people who would move here to be in a more beautiful, friendly, healthy, happy environment!

- full large tree everywhere - increase in native species

My ideal vision is that the municipality uses our resources to educate the public effectively about the importance of forestry, native trees, invasive species, etc. Education of all ages should be managements highest priority, without it the public will feel less obligated to protect our environment.

I am upset about the lack of concern for the impending oak wilt disease that is just on the other side of the border. Being a forester for the city of Windsor, I am worried about the lack of further education that is offered to us. Windsor has a tiny forestry department for a city of 220 000 people. We have lost employees and they have not been replaced. I am concerned about the lack of time and Maintenace put towards city parks. Every park I go to I see broken, hanging branches in large trees above picnic areas. I am from the city of Hamilton. When a homeowner requests a tree there, a booklet is provided with several species of trees to select from. I would like to see that implemented here. In Hamilton there are also several forestry by-law officers. This is a good revenue stream for the city as well as better protection of trees. I also feel like locating and protecting very

special trees, 'heritage trees' is not only a good way to protect unique and special trees, but encourage and excite young people to learn and appreciate our urban forests.

Shaded residential streets due to boulevard tree planting. Shade trees in urban public spaces and along sidewalks.

I would love to see more trees throughout Windsor, especially in city parks, particularly the riverfront trail, as well as downtown and newer subdivisions being built. The one tree that I don't see as much here as in other Southwestern Ontario municipalities or Canada for that matter are pine trees. It's a bit surprising considering that not only are they one of the main trees of Canada after the maple tree but also because they keep their shape year round, not to mention the aroma they emit is very pleasant and therapeutic.

Like the early written observations of our peninsula: that a squirrel could get from one side to the other within the canopy of the forest.

A well forested city with lots of trees in every neighbourhood

In 2045 the established neighbourhoods of Windsor are lined with beautiful mature trees providing much needed shade and respite from the hot summer sun, cooling our homes, reducing our energy bills, and quickly pumping excess rain water into the atmosphere. The residents know of and are proud of the benefits of trees in their neighbourhoods because the City's Tree Team is always active on the ground to care for our urban canopy (green infrastructure), and to quickly mitigate and reduce the few negative side-effects of large street trees (fallen branches, clogged sewers).

Ideally, we would have more tree cover than concrete cover. I recognize this is idealistic, and herculean if possible, but the closer we can move towards more green than grey, the better.

I want there to be natural spaces, I want Little River and the floodplain left alone. I want to see birds flying and squirrels climbing trees. We don't need more parks we have enough parks We need more natural spaces. Leave what we have alone.

native trees and plants should be encouraged more.

I would like to see a variety of evergreen and deciduous trees wherever trees are planted.

Would love to see much of the forested areas we have now being maintained and expanded. It would also be nice for the city to buy private land that is heavily wooded to develop more community green space that isn't just open land.

I would love for every residential street to be a tree tunnel.

I think it's concerning the the city thinks 35% tree canopy cover is considered "aggressive". Windsor has always been dead last or close to in Ontario cities tree cover. We're behind Toronto is embarrassing. If their goal is 40% coverage by 2050, we can't even make that a goal for ourselves? Our region sits at only 8.5% tree cover, the lowest in Ontario. Windsor needs to account for that.

I would love to see Windsor covered in trees more natural areas and trails with trees

Windsor is known for having the worst tree coverage levels in Ontario. Wouldn't it be wonderful if in twenty years we were known for our come-from-behind success story instead?

Would love to see a big change to the number of trees that grow in our community (please plant as many as possible) to mitigate the influx of traffic for new border crossings, etc. Trees will actually help with flooding issues, and higher temperatures in the summer (humans require shade and oxygen), and they beautify areas and make them more liveable. Doing this now is more than advisable, it's absolutely necessary.

I want every yard to have at least one tree. So many old trees have died in South Walkerville and not been replaced. I want a substantial increase in our tree cover to help reduce the temperature. It's always a few degrees cooler by Optimist/Memorial Park. I want lots of trees everywhere.

We do not have an acceptable amount of trees!

Shaded walkways - trees on either side of the road that meet in the middle

I would like to see way more treed green spaces throughout the City of Windsor, from one end of town to the other. If you want people to come here (to live or visit), you're more likely to attract them with beautiful green spaces than with concrete and pavement covered roadways and boring buildings in sprawling industrial parks and commercial subdivisions.

I want to see a city that invests in its urban forest to build climate resiliency, improve our air quality, build a strong native ecosystem, and create a place that brings joy to its inhabitants. Trees can help us mitigate damage from flooding, keep temperatures cooler, and create many positive health impacts. They are crucial species in a thriving ecosystem. I love living near the naturalized area at Memorial Park and walking through the beautiful forest with my daughter. Just planting more street trees will not be sufficient to create the resilient city that we need: planting and naturalizing forested areas is vital to creating this vision of a beautiful, healthy, and thriving ecosystem for the benefit of all of Windsor.

I chose to live in the Walkerville area of Windsor partly because of the degree of tree cover here. My street, like most nearby, is mostly tree-lined and I requested a tree through 311 as there was a gap in the line of trees in front of my house . I think it would greatly improve the appearance of Windsor's neighbourhoods and improve the quality of Life for all in Windsor if more streets were tree-lined.

Protected, expanded, trail improvements, washroom facilities in Little River, invasive species mitigation

40% or more of tree canopy cover

Windsor had a unique ecological environment but the city has urbanized rapidly in the last 2 years. There are many new housing projects. Ideally these new projects do not impact the natural

environment. I'd like to see more nature reserves like Ojibway.

Like a permaculture food forest.

A variety of tree native tree species planted in hope hill to ensure there is canopy cover for future generations. This applies to ALL forests without the city!

I would be happy to see the implementation of a forward-thinking permaculture model that focusses on biodiversity, as well as encouraging/enhancing local native ecological systems and wildlife

More trees down by the river -Blvd trees on university when it gets replaced -sandwich town replacement needs trees as well

I have heard that Windsor has the least amount of canopy cover of any city in Ontario. I would love lots more trees, and canopy to push closer to 40%

Using Memorial Park as my Vision, I would like to see the plan management executed, the removal of fallen trees or tree species that invade on the trees that the UFMP sees as part of the reforestation. There only seems to be attention given when incidents or issues arise within the forest, to put the fire out. An increase in the oak tree density within the forested areas

Native tree lined streets, educated citizens, improved watering schedule for newly planted trees, stop private tree removal unless disease or damaged. Leave dead trees where able for insects etc. Dense tree planting on all Municipal/Provincial property. Involve businesses to do the same, compliment with native ground covers to eliminate grass. Educate our children to be stewards of their home. Stand up as a municipality to Provincial and Federal government to stop removing existing Environmental protections and demand that current use of Herbicide in Forestry industry stops immediately. Any small gains in Urban Canopy cover can be quickly cancelled out by these 2 machines of destruction.

Trees add to the charm of a city. When I think of a city that I admire, the areas that are impressive balance nature and infrastructure in a

complimentary way - there is thought and care put into that planning process. We should look into cities like Guelph or London and learn from them.

Verdant. Shady. Pretty. Many more areas looking like key areas of Walkerville.

Increase the amount of trees and vegetation in all Windsor area and Essex, and more awareness and support of care towards all trees just planted by the city

Invest in the green spaces we already have. So many trees in Optimist Memorial Park have fallen and/or were very poorly cared for.

Significantly more trees, particularly in and along parks/walking and cycling facilities as well as along all municipal roads where there are “gaps” (trees removed and not replaced).

More trees and better maintenance of old growth trees. A tree bylaw that protects removal of trees on private property (particularly old growth trees).

Many large White Birch, Red & Sugar Maples, variety of Oak & Walnut trees

A massively increased tree canopy across the city over the next 20 years is ideal.

I want the air to smell fresh, to be cooled by the canopy of trees. I want all neighbourhoods to be mandated to plant trees. I want children to be able to play on them. I want the decision to cut down healthy trees to be more translucent, with the community involved. .

Listening to climate and urban planning experts, and considering data on the importance of exposure to nature for both mental and physical health, the city ensures an urban forest that will sustain seven generations.

I would like to see all residential streets lined with tall trees, particularly in low income areas. Current parkland areas should be expanded where possible. The riverfront park area between Hiram Walker and the Ambassador Bridge should have an increase in tree cover of at least 200%.

N/a

larger green canopy with more trees everywhere

continue to improve

Maintenance of existing tree cover and increasing on private land where possible. For developers that remove existing trees for their developments, they are required to replant new trees equal to what there was originally. If they are unable to accommodate the number of new trees in their developments, they should be a higher fee than what they are required to the city to plant somewhere else close by, i.e. in the public right of way.

Many forested areas for people to walk, bike, cross country ski; tree-lined streets

larger parks with healthy mature tree to sit under in the summer heat.

I would like to see mature, native trees lining city streets and growing in parks.

I'd like to be anywhere in windsor and be within a 15 minute walk of a park with large trees. I also think we should do our best to create new conservation areas, especially if we can work with neighboring townships.

I would like to see a more trees being planted along with more diversity in the trees that are planted. Something that would encourage people to commute using something other than cars by making the city feel more beautiful and safe.

I would like Windsor to feel like a dense urban area with plenty of trees and green and natural space. I would like everyone, especially neighbourhoods with less tree cover and that are lower income, to have strong tree cover to protect from climate change-induced extreme heat. I would like trees and nature to have rights and protection of their own, independent of human needs and uses.

We desperately need to increase our tree canopy across the city in all types of areas, including even industrial areas. We cannot be satisfied with keeping trees to parks where they are convenient and easily maintained. In twenty years, every street and industrial park in Windsor should be lined with trees. Our riverfront should be a shaded oasis. For every tree a developer cuts down, they should plant 100 within a 5km radius. We cannot be looking for every opportunity to get around environmental protections and petitioning the premier to cut these protections. We can make this city beautiful if that's the vision we have, but we need to stop pretending that development comes at the cost of sacrificing our natural landscape. Windsor has a reputation as an over industrialized city. The air we breathe in this city makes us sick. Let's fix it. We need to not only maintain our wetlands and other natural habitats, but we need to revitalize natural landscapes across the city. It's time to plant, plant, plant.

More species diversity where appropriate. Bring back Elms, Chestnuts, even some fruit bearing trees in appropriate areas. Innovate with condensed Forest 'Grove' areas , linear allees, new combination storm water collection areas and climate mediations with u/g Silva Cells and above ground filtering swales containing appropriate plantings. Do not let ENWIN+ services dictate or destroy existing trees by hacking them away. Plan for u/g services ahead of time and work together with other agencies and Public Works. Bring Tall Grass back to the Ouellette overpass median. Roses to our Parks. More tree priority on street revitalization projects with built in protections entailing new design concepts. Utilize Permeable Paving and protected raised edge planters. Less street signage and wiring. Instil new public stewardship and education programs and allow for private plantings on City property when proven safe, appropriate and maintained. Increase urban canopy with aggressive City plan and ideals. More street bulb outs with filtering Green Infrastructure, that also serve as traffic calming mitigation, increasing aesthetic value and provide natural shade.

More trees planted on public property where appropriate.

More trees…. along the south side of Riverside dr & the south portion of park area on Riverside dr. … in new subdivisions … along ouellette and Wyandotte and other main roads

A network of urban street trees, park trees and natural areas that are well connected, protected, and still being acquired. A private tree by law would be in place. Large trees would cover most public spaces. Incentives would be provided for planting trees on private property.

I just want as many properly maintained trees as possible - They are needed for air & water quality. They are needed for flood, erosion, wind and pollution protection. Climate change mitigation (shade).

I'd like to see the alleyways become home to more native understory plant species. I feel like they are underutilized and could make for favourable bike/walking paths if maintained as such. I'd like to see the bylaws involving property management revisited in favour of people growing native plants versus lawns on their properties. Understory shade-loving plants would do better than grass in areas of higher tree canopy anyway. I'd like to see more rotting logs allowed to exist in the city/parks. I'd like to see patches of land re-naturalized with native plant diversity to better support species other than humans, and I'd like to see people excited about the diversity that shows up when the environment suits it.

Better than it is now. I see more harm than good today. I really hope you leave Ojibway and surrounding areas alone to grow naturally. Those private lands surrounding need to stop destroying before bills are passed.

Ideally, the ability to change private landscapes for food security purposes. We need to remove by-laws that prohibit anything but grass. We should allow people to landscape with local, biodivergent greenery. We need to also support other oxygen-rich, carbon-capturing species like algae and moss. If our urban forest isn't biodivergent, can we truly call it a forest?

More trees everywhere. We can’t go wrong with trees

would like to see more consideration before cutting trees. for people to think twice before cutting well established/healthy trees and be encouraged to re-plant and request new trees from the city.

A forest that has increased tree cover in every neighbourhood in the city with species that are native and resilient to the expected climate variability due to the climate crisis.

I would love to see trees integrated into all city planning, including food-producing trees in public spaces. I would like to have native species primarily represented, although non-invasive foreign species can be added where appropriate. I would love the culture of Windsor/Essex to be "tree proud", and for our green spaces to be the thing that communities care about most.

I have seen lush vegetation in major cities in South America, no reason why it can’t be done in Ontario.

More tree cover/canopy, native tree species planted, fruit trees/ “mini” orchards planted in parks/green space. Special consideration given to pollinators, as flowering trees/shrubs are some of their first source of pollen/nectar. Public education campaigns - ie) leave the leaves, letting twigs/small sticks stay in parks/yards/gardens for hibernating area wildlife/pollinators. Letting natural areas stay natural (unmanicured), public education surrounding naturalization of areas in city parks, as well as private property, not all “weeds” are weeds, stopping use of pesticides.

A forest city

Higher percentage of canopy

Well forested, mature trees, tall trees not short subdivisiion trees. Would like Windsor to have a Provincial Park feel.

Full tree canopies on the streets in my neighbourhood, enlarged urban forest in our community parks.

let's at least strive to get to numbers as good as Ottawa and Toronto 46% and 28% canopy coverage.

I live in an older neighbourhood (South Walkerville) where we have lost many mature trees in the past 10 years; would love to see the tree cover improve. The school my children attended is lacking in shaded areas, which contributes to rising inner city temperatures; would be great to see more trees near schools.

Every street has a variety of mature trees, mainly native trees. Every tree is deemed precious and should not be removed unless absolutely necessary

Private food forest, cooler temps due to a lot more trees, educational programs etc

A significant increase in forested areas rather than grass parks and parking lots throughout our city including native species, diversity and layers. Forest spaces that residents will pass by or can pass through while walking in the city whether for leisure or in carrying out their day walking to work and school. Windsor holds a Bird Friendly City designation now. Improving our urban forests will increase habitat and opportunities for residents to experience and support the bird populations living in and migrating through the city.

I would love to see an expanded canopy that would make Windsor a more habitable city - trees provide shade and cooling making living spaces better, making city more walkable / bike-able; trees will mitigate flooding, trees will support birds and other wildlife - biodiversity matters. I could go on....

I would like to see Windsor become a canopied city with over 30% tree cover that includes the majority of them as native species. As a certified Bird Friendly City, Windsor should be a place where there is plenty of habitat for birds, which includes large and smaller trees, native shrubs and bushes and plants.

an increased urban forest of primarily Carolinian or other indigenous species, required to be planted in newly developed areas, protected by law from removal

I am desperately concerned about our low tree cover in Windsor. This is even more concerning because of our poor are quality. We need more trees everywhere! I would like to see educational efforts that help people to appreciate the critical importance of trees (e.g., they provide oxygen as well as shade and beauty). Too many of my neighbours see trees as problems and not as assets that are worth any hassles or efforts.

Lots of diversity in the trees; a focus on native trees and trees that provide food for wildlife (and humans, where possible); public education about the value of trees, especially in schools

More trees, indigenous. Trees around parking lots

Greener, cooler. Residents know more about trees through city information, especially trees thee city plants on our properties and in public areas.

We would exceed what other cities do in increasing our tree canopy. The health of the city and the community and the individual is enhanced by closeness to trees.

Optional question (180 response(s), 35 skipped)
Question type: Essay Question

Q17 Do you have any other comments or information about Windsor's urban forest that you think might help inform the Urban Forest Management Plan (UFMP)?

Highly supportive!

Public education about what to do and what not to do with newly planted trees/maintenance of existing trees (watering schedule, root flare visible, mulch and no turf grass surrounding drip line) as well as possible incentives to planting native trees on private property (ie free mulch from dump, watering bag, etc)

See above

Tree planting incentives - include them as part of community improvement plans. Build and maintain a public/private property tree census, link tree maintenance to tax breaks or incentive for storm water maintenance.

Please stat prioritizing safety and damage prevention, rather than hanging onto any tree for dear life even when they pose a threat. Plant more trees in parks and whatnot, not so much in residential neighbourhoods crushing houses and cars, and losing street parking to sappy trees. Let private property owners do what they want, like remove a big unsafe tree if they feel the need. Trees can improve property values but can also diminish them and cause damage if we're not careful, and the forestry department and the city of Windsor need to be mindful of this when planning new urban forest initiatives.

I strongly agree with the city passing a bylaw that makes trees on private property need to have approval before removal

New subdivisions should be made to plant many trees or leave existing trees.

Will keep a good eye on this worthy process. Am interested in participating more and learning about stewardship opportunities the city has or will have. Thanks!

I would like to see several areas to enter the park so that those of us who have trouble walking can enjoy the different areas of the park

As I have stressed earlier in this survey - DO NOT PLANT OAK TREE SPECIES IN FRONT YARDS. My family has been dealing with the messy and dirty problem of an oak tree in our front yard for 40 years. Grass does not grow properly, the amount of yard waste in mast years is astounding. I clean up the mudlike waste in front of the curb of my home, most people on my street do not. Where does all that acorn waste go to? My guess is it helps to clog up the city sewage system. White larvae pop out of the acorns and then the paper bags if I leave them in the garage. I ended up with thousands of these larvae crawling around the floor of my garage. Now I have to bring them to the yard waste area of the city dump so I don't have to deal with the larvae. Yard waste bags full of acorns get pretty heavy when they're left outside in the rain. Plant oak trees and other like

trees in city parks. some boulevard areas, near the expressway, school and industrial properties where squirrels can benefit from this abundant food source. Squirrels do a good job of eating and burying many of them but I don't want to have the mess in my small front yard for over a month. A park or forested area is a much more viable place to plant such trees. I do understand we need to have a diversity of trees in the city's ecosystem. Just in the right areas.

Plant more evergreen trees

I am happy to see the city sending out this survey. I hope that our city counsellors and mayor have a vision for the future particularly with the threat of global warming and take action now to create more green space, and not continue to build on existing habitats. We want Windsor to be thought of as a green city to attract this kind of investment. The city also needs to put pressure on the Solid Waste Authority to start composting in the city. It would be nice to reach this goal prior to 2024 if possible.

Pleased to see this survey. Step in right direction. Windsor is too far behind. DOn't just make a plan and shelve it. Give attention to road/sewer projects ongoing and tree death that follows in susequent years. Talk to Parks they are still weed wacking so many trees to death. Citizens need information on preventing drought damage. Homeowners need education or companies need licensing/education to trim large trees. Designate heritage trees and legislate their care.

Will keep eye on this initiative - excellent for city and residents. Let citizens know How they can be involved

We had a city tree that was diseased and was quite an eyesore. The city refused to remove it. I'm not sure how harmful it needed to get for the city to respond. That's a concern for me. We had to pay to remove the city tree. Fortunately it wasn't large. I also think some of the older trees like the Siberian elms need to be replaced with trees that are less messy/damaging when needed.

I visit Ojibway park often. I would love to see much more aggressive protections for the habitat and wildlife there (e.g. slower speed limits and closing part of Matchette road to reduce traffic). Thank you!

Do not plant just any tree

The UFMP should inform development planning and approvals and force the recognition and protection of ALL existing forested (as well as tallgrass prairie) natural areas within the city. Significant compensation should be imposed for the removal of trees/natural areas.

Make it happen as soon as possible,

A tree-planting requirement for any new construction/major renovations. A number of medium to large caliper trees based on a predetermined formula dictated by property size. Perhaps a tree care media blitz with supports (water bags, etc) to encourage care for trees on private property as well. We pay to have our large trees trimmed in our backyard but the costs are so high and well out of budget for most households. Maybe the City could develop a partnership with local tree service experts that could help reduce the costs to homeowners for private tree care/upkeep so we can maintain our older, large trees for far longer. If we can't afford to trim them properly, they will become damaged and risk removal, impacting our overall tree coverage in the city. Invest in the care of the current larger trees on public and private property.

Provide or sell trees/shrubs/vegetation to citizens at reduced rates to encourage plantings. Educate public on planting and maintaining vegetation.

Definitely new and newer subdivisions need a heck of a lot more trees. That's an easy one. Why aren't developers required to plant more, or any at all? And then care for them for awhile too, at the very least. They can't just build homes, dump some trees in there, and take off forever. Residential backyards in general could use a lot more trees. Getting over the tree maintenance hurdle might be a big one though. This despite the fact that mowing leaves is a lot easier than raking/gathering them to be bagged, yet the vast majority of people spend hours doing so (other than the people that leave them as they lay and do nothing). Perhaps some kind of carrot or stick approach would be needed for that too? Should the city even be picking up leaves? Perhaps it should be stopped or minimized and some of that money instead directed to encouraging leaving leaves on the ground in some form. Regular yard pickup could still continue.

Stop clearcutting the environment around me, I don’t want my neighbors looking down from a high rise.a fence is sufficient

Program for planting trees on private property. Cost could be more reasonable than buying through a nursery. Continue to plant trees on city property at the request of resident. Many people do not know they can request a tree. Advertising, education so more people are aware of this program.

Is the City working with the provincial and federal governments to incorporate this UFMP into the larger plan for the local National Urban Park that was announced for Windsor? Has there been any progress with the National Urban Park planning?

The greener the better for everyone. Even the little critters need tree homes. Plant, plant, and plant more trees so Windsor citizens reap all the positive benefits of beautiful trees. Remember, trees are our friends!

the city needs to put marketing money into this. "The Lungs of Windsor" would garner huge support.

Please increase the tree coverage in this city, and protect the parks and greenspaces we still have. This is an important quality of life issue.

Make the people who make the money plant trees. Offer incentives to more businesses and schools to have tree planting and invasive species removal events.

I'm happy to live in an older neighbourhood with many mature trees. While several have been removed in recent years, I was thrilled to see new trees planted along our residential streets in the last year. However, I'd have preferred to see a variety of native species rather than a line of the same species, and wherever possible, the replacement trees should be of the same species as recently removed trees (especially when the removed tree was very mature, indicating that the species is hardy and long-lived in that location). It would be nice if residents/businesses could be given options when new trees will be planted on the City's right of way on their properties.

A notice delivered to the address advising that a tree will be planted on the right of way, giving them three choices of species (with basic information about their appearance, speed of growth, and potential height/size of canopy at 10 and 25 years post-planting), and advising that a particular species will be planted unless they respond with an alternative choice by a certain deadline. This could lead residents to feel more involved in our urban forest management, and more invested in the health and benefits of public trees on private property (on City's right of way). They'll also recognize the same species elsewhere in the city, leading to them feeling better informed and educated about our urban canopy.

I believe new build homes/new construction should be responsible for the financial aspects of planting new trees. They are clearing zones and are profiting from this, the majority of tax payers in this city cannot afford to buy into these areas and may never see the benefit of their taxes being diverted to this.

Maintain shore line access and erosion control at existing forested areas. Consider creating new forested areas at shore line.

Doing a good job. Excited about the prospects.

Within the last 2-3 years, I requested trees be planted on city owned property near my home and was informed that the same request had been made in the past. At that time, a neighbour voiced their opinion that a tree or trees would block their (indirect) view to a (city owned) pond. I was disappointed that my request was denied based on this past history and there seemed to be little interest in pursuing it further despite a push to plant more trees on city property in other neighbourhoods.

It might be useful to provide financial (budget) information to maintain the public forest - eg cost to maintain the urban forest. Personally, we have spent thousands to maintain (planting, consultants, trimming, professional spraying) the trees on our small property. How much will the city budget (annually) need to increase to go to a 35% coverage in public areas? What would it cost to incentives to partners. In summary, this survey appears to be one sided by not providing the potential cost side.

We had 4 to 5 large trees cut down on Dominion Street across from

the Mosque. Did they all have to be cut down? Did the City try to save some of them?

Property owners don't need subsidies or "information sessions" to do the right thing, most people already love to plant trees on their own property. Supplying information at the annual Open Streets will more than suffice. Huge trees cause too many problems, damage homes and infrastructure, and are messy. Plant medium-sized native trees that will fit into neighbourhood streets and neighbourhood parks over the long term and won't require much care. Save planting the huge trees for forested areas, wild lands, and wet lands. Don't impede viewscapes and road sight lines with trees.

Start improvements ASAP

Look at Amsterdam and Singapore, bring in experts from cities that excel in this front and follow their lead.

Its not to be taken lightly. The creation of a UFMP is serious and a great step in the right direction and future of the urban forest in Windsor.

increased protection of established city parks trees. proper staffing back to the numbers we are allowed would be nice for productivity and morale as well. we are still waiting for a forestry II to be replaced.

PASS THE BYLAW!!!!! Why are we so far behind the rest of the province in this? It is extremely distressing to see people cut down mature, healthy trees - especially to make way for housing that the average income earner can't afford. The City needs to be more aggressive in what they agree to for acceptable levels in landscaping new subdivisions or commercial sites. Consult with ERCA.

I think that when new subdivisions are built there should be more than one tree planted on each lot. I would like to see a requirement for new developments to have X trees planted for every hectare. This plan is very important to me. Thank you for reviewing my input.

I would like to see more native trees planted in the city. Some invasive species like the black locust and Norway maple should not be sold or

planted.

I contacted the City Forestry Dept many years ago when the new Ouellette Avenue reconstruction was completed just south of Wyandotte (that stretch of Ouellette looks great). There is a planter on the northeast corner of Ouellette Ave. and Elliott St. in which the City planted 6 oak trees. I suggested that the area was too small for those 6 trees. They could each grow to be trophy trees because they are long-lived. I received a call back from someone in the dept who said that the area is a "heat island" and those trees weren't expected to live very long. They were planted to provide short-term greenery. What a waste. Each of those trees could have been planted in many other places and enjoyed for decades. I live in Southwood Lakes. I am disturbed by the apparent reckless cutting of trees on the southeast corner of Southwood Lakes Blvd where it meets 6th Concession and North Talbot Road. I realize it's private property, but they are cutting at will. They shouldn't be allowed to do this as it's a neighbourhood woodlot. Trees could really improve the appearance of many areas throughout the city. Lauzon "Parkway" is an example. There is little to no greenery. EC Row Expressway could also be greatly improved if more trees were planted on the shoulders and in the median (with guard rails).

I'm just glad It's being looked at

No

Be strong enough to stand up against Mayor and the majority of our Council who care not a whit about this as it doesn't bring in dollars or garner them votes. (Remember... Phil Roberts!)

Let's move forward to establish the ONUP ASAP

I find it really frustrating and sad that as a 46 year resident of Windsor, I now have to "search" for hidden forestry-like areas to escape the city feel. I walk my dog twice every single day and I have to drive to places like Hope Hill or Ojibway just to have a feel of forestry for 20 minutes. I envy so many other areas of Ontario that have walking trails all over with acres of forestry. With all the new housing and condo developments, the city has destroyed the natural beauty of greenspace. We need more trails for hiking, walking, biking,

dog walking. More hills, more greenspace in general.

The city of LONDON, ON.. gives trees to home owner. If Windsor gave away trees I would have many more in my back yard. I want some sugar maples (not the silver maples that are invasive) and an oak to name a couple. Do this quickly while I can personally enjoy caring for them and feeling a contribution to our environment. And finally don't let anyone touch what we already have in the way of real nature.. ie.. don't lay concrete on a natural path!!!!!!!!!

Please do not cut down mature trees to save prairie grass. Please let the grass grow where there are currently no trees. there is plenty of these areas where the grass should not be cut. The motto “we don't mow, we grow”!

hoping that this goes forward as these programs are important despite them not directly bringing in money

I love my job, I love educating people and maintaining their trees. Usually people are very grateful for our hard work and special skills. There is a lot of gossip and rumors circling around the parks department about the forestry department being contracted out and skeletonized. All of the foresters for the city of Windsor are very passionate, and caring about our trees and provide, in my opinion, an essential service to the people of Windsor. The value of trees is being recognized more and more as climate change continues. I do not need a pat on the back, but I also don't want to feel as my job, my vocation is being threatened

Windsor needs to be much more aggressive in getting the word out, and trees planted, along city rights-of-way in residential neighbourhoods. Show reluctant homeowners how property values climb with boulevard trees. Show how road asphalt temperatures drop in the summer due to planted trees casting shade. At minimum, when a tree is taken down (disease, rot, age etc), another needs to go in.

Thank you!! It’s about time Windsor had a tree-protection bylaw and a plan to aggressively increase tree cover! Bring on the native trees!

There should be timely direct communication with property owners in

the course of city pruning program so they can participate and and advocate for the health and condition of trees in their direct vicinity

The UFMP should focus on the proactive infilling of trees in city right of ways where canopy cover is lacking, as opposed to waiting for a request from adjacent property owners. The UFMP should incorporate measure for the proactive advocacy, care and maintenance of street trees in residential areas to mitigate some of the perceived negative impacts of large trees such as fallen branches inuring people or damaging parked cars or other property, and tree roots clogging older clay sewer lines.

Where there are fields grass that the city pays to have mowed, there could be more trees. The short term costs would of course be higher, but after a certain point, a forested area needs FAR less maintenance than lawncare.

Let nature be

I feel that the city should be planting trees everywhere there is space to do so rather than waiting for homeowners to put in a request.

More trees!

If funding is a problem, why not take it from that idiotic streetcar monument and actually do something useful with that money?

Please add more green space in our community!

Let's make an effort to plant native trees that may be endangered or threatened, such as the Kentucky Coffeetree - and others.

Yesterday, as I walked through the Black Oaks Heritage Park, I was alarmed to see entire swaths of the area where all the trees have been recently cut down to the point of that area being now totally denuded. I wondered why this was being done in an area that is supposedly a forested area. It takes a long time for trees to grow to maturity, so, cutting down mature trees, particularly en masse, is very

concerning to me. Why are people allowed to remove trees from so-called natural areas?

We keep developing our urban greenspaces. It is so wrong. I saw an advertisement for the sale of a portion of Little River Park. A group of friends and I will chain ourselves to the trees to prevent its development.

More trees!

Just do it. It’s so important… it’s almost existential.

Walk the “old pump track” I’m heartbroken at the state of that forest. Why doesn’t the city build a genuinely good bike track for teens that has canopy cover. The new one has no shade and is designed for children under 12. Do better Windsor.

Implementing systems that support wild bees and native pollinators, such as the use of "Schiffer Hives" as promoted by beekeeper & biology researcher Torben Schiffer (University of Würzberg) Permaculture Food Forest Models such as biologist Stefan Sobkowiak's efforts in Cazaville, QC.

The city should provide trees to home owners for free if they don't have a tree

Active policing and protection of the parkland and forest areas from dumping and vandalism.

I think baseless 311 complaints should be recognized as such and the complainant should be re-educated. There are a handful of people in South Walkerville who would like to the Naturalized area of Memorial Park removed! Some subjective aesthetic ideal overpowers the factual benefits of Naturalized Area. Rewild/Naturalize/Indigenize!

I'm excited by the initiative - hopefully more comes from it.

Make more easy and accessible, share more information of how we can support Windsor on planting more trees

Partnering with schools: having tree plantings during school hours so they can participate.

Please add more green space. Stop city council from selling off our greatest resource: land. We need to respect the soil we live on, and plant native everything to help keep the ecosystem healthy.

Listen to the experts. Omit capitalistic goals and complaints that hinder a better environment for people.

N/a

Please implement a private tree bylaw ASAP. This would prevent developers clear cutting their properties PRIOR to making a formal application for Site Plan Control (SPC). it's only at that stage, does the city planning department requires a Tree Survey.

look to europe and the efforts in industrial parks to provide green space. large city parks to escape the summer heat. Windsor is so far behind the curve by allowing industrial areas to be just parking lots and buildings and developers not being required to plant at least one tree for every one they cut down.

We should really start focusing on zoning for more a more liveable city. I'd like to see more zoning for high-density residential, so we can use our valuable land more efficiently. Liveable cities have huge property values, and even non-property owners can benefit.

I think the city should take more leadership than hope for private leadership. When working on private leadership, the city should actively go to communities and knock on doors and get into community spaces in outreach and engagement efforts. Resources published by the city online are not accessed by the general public. In private leadership, focusing on initiatives for youth and schools feels like it could be the most impactful.

Create new and ongoing means for more consistent public engagement, allowing interested Citizens to participate directly with the City on design work for the UFMP. Consider successes and innovative ideas from other Cities. Ensure City workers are trained in protecting trees when weeding and giving proper maintenance, particularly in first few years of a new planting. Ensure that all urban sidewalk trees utilize proper silva cell technology, aerated soil, maintenance schedules and built in protections to withstand urban road and climate rigour by design.

More training for people involved in planting trees as to the best practices for planting. Mulch should never be placed against the base of a tree. Protection should be provided for the base of a tree to prevent weed whacking damage.

I see numerous large old trees along the south side of Riverside Dr east between Jefferson and Pillette marked with red dots. Are they to be cut down ? Why? For a bike lane ? Cutting these healthy beautiful old mature trees goes against this plan. Please do not cut these trees down!!

I'm concerned that we are losing to many tree cavities. Cavities provide habitat for insect eating birds and pollinating insects. The 7 year tree trimming program should gather these cavities and reuse them (install them in the areas where they were removed). That way they would continue to provide habitat without POTENTIALLY distributing insects or disease throughout the City.

I think a balance of tree planting and native plant seeding is the better strategy to take. This video illustrates how exciting the process can be (https://youtu.be/mjUsobGWhs8). I'd be excited if the city decided to pilot something like this in areas around the city. I think it's sad how degraded we've allowed our environment to become. It's so sterile and the general public lacks much knowledge of the species that we're losing.

Nature first. They don’t have a voice.

The City should strongly consider tree equity issues as well as the 3-30-300 rule: everybody should be able to see 3 trees from their home, live in a neighborhood with at least 30% tree canopy (or vegetation) cover, and be no more than 300 meters from the nearest green space

that allows for multiple recreational activities

Changing culture is hard, but I believe that that is one of the prongs of a sustainable approach to change. Incentivizing tree stewardship can help!

NA

In cities I have travelled too, the most enjoyable have been well forested and have also included beautiful planter boxes not just in tourist spots, but on neighbourhood thoroughfares - like the bridge on Forest Glade Drive etc. When things are beautiful and well tended, it encourages home owners to do the same.

The benefits of trees go beyond the environmental services they provide for us; there are numerous psychological benefits to having more greenspace in urban areas. When looking at living conditions and their proximity to nature, there is a direct correlation between general happiness and satisfaction with natural landscapes.

Tree variety planted should emphosize native trees as these attract and are needed by the birds. Management should educated the public on the value of trees to our environment and indeed to our very existance as a species.

I would love to see a tree policy that would inform, restrict as needed, and include private property owners in expanding and maintaining our canopy. I believe Ottawa and London both have such policies in place.

Work with other ENGOs and citizen groups to promote and enact the UFMP.

site plan control plans should require planting of more trees rather than just green space that typically becomes a patch of weeds due to lack of care. Let's plant more trees and forget about grass and shrubs. Establish an arboretum where citizens can learn about the trees native to the area

With all of the development that is going on it should be required that developers are required to spare whatever trees they possibly can and to pay for reforestation on the lands they develop. This won't happen but it's criminal that financial gain for developers is more important that our overall survival.

I'm glad you are doing this. There are so many positive reasons to build a healthy urban forest throughout the city.

The commemorative tree program should be more widely promoted. If there is not, there should be a charitable trust established so those who want to plant a commemorative tree can receive a tax deduction.

The sooner the better to proceed with the initiatives. Thank you!

Personally I consider this a top priority for the city and would welcome and support with friends tax dollars going to achieve this.

Optional question (104 response(s), 111 skipped)
Question type: Essay Question

Appendix 3. Compendium of Urban Forestry Best Practices

This appendix outlines a compendium of urban forestry best practices, organized according to the five urban forestry themes outlined in Section 1 of the Key Findings and Directions Report for Windsor's Urban Forest Management Plan (UFMP). This compendium is intended to inform the implementation of UFMP action items by illustrating relevant best practices and applicable case studies related to municipal urban forestry policies, practices, and programs. It is recognized that not all best practices will be directly applicable to or practicable in Windsor; however, elements of these practices may be instructive and informative for efforts to enhance urban forest management in the city.

Best practices for understanding the urban forest

Data sources

Tree inventory

A GIS-based urban forest inventory is an essential tool for effective urban forest management. While some municipalities maintain basic inventories with little more information than tree species, size (DBH), and location, an inventory with management utility should include more comprehensive data attributes, such as priority-based tree maintenance recommendations. Other relevant examples of best practices for GIS-based urban forest inventories include:

- **Detailed inventory attributes:** Many municipalities have collected comprehensive inventories of their actively managed trees with detailed attributes including multi-factor tree health and condition assessments, standardized Level 2 tree risk assessment ratings, and standardized, coded, and priority-based tree maintenance recommendations. Examples include Charlottetown, PEI; Mississauga, ON; New Tecumseth, ON; and Windsor, ON, among many others.

- **Wide range:** Most municipalities with a GIS-based tree inventory include street trees at a minimum. However, management utility is increased by including other actively managed or priority trees, such as park and facility trees, trees along actively-used formal trails, and others.

- **Enterprise asset management system (EAMS) integration:** A 'one stop' Geographic Information System (GIS)-integrated urban forest asset management platform to manage (i.e., receive, dispatch, map, and track) tree service requests and work is a best management practice increasingly being adopted by municipalities. Asset management is further enhanced through integration with the tree inventory, which can enable maintenance tracking and reporting for individual trees and real-time updating of tree inventory data as trees are inspected or maintained. With such integration, tree maintenance staff and contractors can also update the tree inventory with basic data (e.g., DBH, health) that do not require specialized assessment expertise, thereby keeping the inventory up to date.

Mississauga's Parks and Forestry department is working in conjunction with the City's Information Technology service area to expand the capabilities of its Infor Public Sector 8 (IPS) system to hold and manage inventory, condition, and replacement data for all Community Services assets—including trees. Many other corporate enterprise asset management (EAM) platforms, such as Cityworks, also have urban forestry-specific functionality that enables enable tree inventory integration into the broader corporate asset management framework.

- **Civic science:** There is increasing recognition of the potential value of public participation in urban forest inventory data collection. This is known as civic science or, if integrated with mapping, public participatory GIS (PPGIS) or volunteered geographic information (VGI). Potential civic science opportunities include inventory of privately-owned trees, invasive species mapping, pest and disease identification, and others. Data can be submitted directly through municipality's web mapping applications or through third-party hosts such as ArcGIS Survey123, OpenTreeMap, Tree Plotter, or EDDMapS (for invasive species). Due to potential data quality issues, a volunteer-based urban forest inventory should be seen primarily as an engagement tool and its management utility should be a secondary function, subject to field verification by trained staff or contractors. It should not be used as a substitute for an appropriate tree risk management program.

The small Ontario towns of Elora and Mitchell have successfully used the *NeighbourWoods* volunteer tree training and inventory protocol to collect their municipal tree inventories. In Edmonton, residents can contribute urban forest data through the yegTreeMap database.

- **Cross-departmental information sharing:** Sharing tree inventory data across municipal departments can facilitate capital project planning by allowing engineering staff and consultants to map existing trees and associated constraints early in the design process. This can allow for alternative tree-friendly design considerations and ensure effective tree protection planning and adequate tree injury or removal compensation.

- **Private tree inventory:** A basic inventory of high-priority private trees visible from the sidewalk can be an effective and low-cost method to inform a more comprehensive urban forest vulnerability assessment and support rapid response to emerging urban forest threats.

Red Deer, AB has an inventory of over 4,600 privately-owned trees of high priority species, including ash, elm, and birch. The inventory is used to distribute information to tree owners about species-specific tree pests and diseases and build awareness of urban forest threats, monitoring practices, and effective rapid response protocols.

Land cover analysis

Urban tree canopy (UTC) and other land cover mapping is a common, readily understood method of quantifying the extent of a community's urban forest (or other land cover types). Municipalities may use land cover data to establish baseline metrics, track change over time, and identify opportunities and locations to expand tree canopy cover through planting and naturalization efforts. While Windsor's land cover analysis project was undertaken using rigorous and industry standard methods, additional relevant best practices for urban tree canopy and land cover mapping include:

- **LiDAR integration:** Utilizing airborne laser scanning, or LiDAR, can increase the accuracy and repeatability of land and tree cover assessments. It can also provide additional useful data, such as tree height, canopy diameter and volume, and potentially even species composition. Computing innovations will continue to decrease the cost and increase the management and planning utility of LiDAR-integrated canopy cover assessments.

- **Mapping as monitoring:** Ongoing innovations in artificial intelligence and machine learning continue to decrease the cost and increase the speed, accuracy, and utility of object-based image analysis. Land cover mapping and analysis can now be obtained at a low cost on a regular (e.g., annual) basis, facilitating frequent and accurate urban forest change assessment. This inform management by tracking growth or decline in urban tree canopy cover on a year-over-year basis, increasing accountability to canopy cover metrics and other program targets.

Other data sources

Tree inventories and land cover assessments provide valuable information for urban forest management planning. However, additional data sources are also available to inform a broader understanding of the structure, function, and needs of the urban forest. Relevant best practices for other urban forest data sources include:

- **'Ground-up' urban forest assessments:** These assessments typically entail establishing multiple sample plots to measure the physical structure of the urban forest. Findings are input into computer models to quantify structural metrics (e.g., species composition, age class distribution, tree count, etc.) and the functional value of the urban forest. Such assessments can have limited management utility and may be time- and resource-intensive and subject to statistical errors. However, they can be useful to inform high-level strategic planning or support urban forest advocacy by connecting forest structure, function, and value with management costs, risks, and needs assessments. The most well-known of method for 'bottom-up' urban forest assessment is the i-Tree Eco model.

- **Desktop assessments:** In the absence of a comprehensive field-based urban forest assessment, software tools are available to support low-cost, high-speed, desktop-based canopy cover and urban forest function assessments. For example, random point-based aerial imagery interpretation using i-Tree Canopy can be used quantify land and tree cover, track

change over time, and estimate urban forest ecosystem service value. However, these 'low-tech' tools do not produce detailed canopy cover maps, may be prone to user error and interpretation difficulties, may rely on geographic proxies for ecosystem values, and cannot produce data at multiple user-defined scales.

- **Other urban forest assessment tools** may provide interesting insights into urban forest structure, function, and management needs. Examples include the Tree Equity Score Analysis (TESA), a model to quantify disparities in access to urban forest canopy cover across the landscape, and the MIT GreenView Index, a Google Streetview-integrated tool to quantify the to quantify the amount of 'green' perceived by walking down city streets. Hyperspectral aerial imagery analysis may be a useful tool for monitoring urban forest health and pest or disease infestation.

Urban tree canopy

Setting canopy cover targets

While urban tree canopy cover is a readily understood and widely adopted metric, it is limited in its utility as an indicator of urban forest sustainability or management program performance as it does not provide information about important aspects such as structural diversity, function, tree health and condition, maintenance practices, community engagement, and others. Moreover, urban tree canopy targets are commonly set without an adequate understanding of the community's capacity to sustain and maintain increased levels of canopy and many municipalities' targets are overly ambitious and may ultimately prove unattainable. Finally, undue focus on pursuing canopy cover targets can distract urban forest managers and partners from other important considerations for urban forest management, leading to adverse outcomes for the urban forest and the community.

Urban tree cover – A cautionary perspective

The City of Philadelphia is considered to have among the most sophisticated and well-resourced urban forest management programs in the United States. However, the City discovered that after a decade of setting a canopy cover target of 30% in every neighbourhood, canopy cover had actually declined by 6% between 2008-2018. More canopy was lost on residential lands than any other land use type. While no single factor was determined to be the primary cause of canopy loss, the City acknowledged that focusing on canopy cover as the primary metric of success obscured the many other necessary actions and steps needed to sustain and grow the city's urban forest.

Historically, a canopy cover target of 40% was considered appropriate for municipalities in eastern North America. However, research no longer supports such a lofty target and it is recognized that opportunities to grow and sustain canopy cover are highly variable and dependent upon numerous factors. As such, relevant best practices for establishing municipal urban tree canopy cover targets include:

- **Reasonableness and attainability:** Canopy cover targets should account for the community's total capacity for tree cover (i.e., maximum canopy cover) and an understanding of viable opportunities for tree planting to grow canopy. Moreover, targets should be attainable given existing or reasonably anticipated increases to tree planting resources. In other words, targets that require significant increases to tree planting budgets which cannot be accommodated by foreseeable municipal budgets and partnerships stand little change of attainability.

- **Function-based targets:** Setting function-based canopy cover targets entails identifying locally specific needs to be addressed through increased tree canopy cover and addressing those needs through targeted and sustained tree planting over time. Potential considerations for function-based canopy cover targets include heat island mitigation, promoting active transportation and walkability through increased cycling route or sidewalk shading, protecting water quality, or promoting energy conservation, among others. Tools such as TreePlotter Canopy or i-Tree Landscape allow users to weigh the importance of different urban forest services and identify areas most suitable for strategic tree establishment to achieve desired functional outcomes.

The HealthyPlan.City tool, developed by partners including the University of Toronto, the Public Health Agency of Canada, the Canadian Urban Environmental Health Research Consortium, and the Canadian Institutes of Health Research, provides environmental equity mapping for Canadian cities including Windsor. Users can identify priority areas for tree planting based on tree canopy cover distribution and a wide range of vulnerable population demographic data.

- **Site-level canopy cover targets:** While municipalities tend to set community-wide canopy cover targets, establishing site-level or neighbourhood- or land use-based targets ensures that urban forest services are targeted where they may be most necessary while allowing land use flexibility and supporting the overall municipal canopy target. Site-level canopy cover targets can be enshrined in municipal Official Plans, urban design guidelines, or even zoning by-laws.

The Town of Oakville has established land use-based canopy cover targets (e.g., 15% commercial, 20% residential, 34% arterial roads, etc.) The Town requires a Canopy Cover Plan to be prepared for all proposed new and infill developments to demonstrate compliance with these requirements. The Canopy Cover Plan must project future canopy for trees to be planted in accordance with Town guidelines, and can incorporate a canopy cover bonus of 1.5 for existing trees to be preserved.

- **Monitoring and re-evaluation:** To measure progress towards achieving established urban tree canopy cover targets, municipalities must undertake periodic monitoring of current canopy cover, analyse variances between projected and actual cover levels, and re-evaluate both targets and the resources dedicated towards tree planting and post-planting maintenance and monitoring.

Urban forest structure

Tree diversity

Multiple tree genus and species diversity targets have been historically cited as best practices for urban forest management. Among the most commonly cited and pursued guidelines is Santamour's '30-20-10 rule' whereby no tree species represents more than 10% of the population, no genus represents more than 20% of the population, and no family represents more than 30% (in terms of tree count), as well as a more recent reformulation that focuses on basal area instead of stem count. However, both guidelines are now generally considered impracticable and unattainable in most municipalities due to biophysical limitations and historical overreliance on a limited palette of tree species and genera. Increasing consideration is being given to a 5% genus limit as both an attainable target and one that adequately considers the threat of multi-host tree pests and diseases.

Other cited targets for urban forest taxonomic diversity include:

- Barker (1975): maximum 5% of total tree population per species
- Smiley *et al.* (1986) and Miller and Miller (1991): maximum 10% per species
- Grey and Deneke (1986): maximum 10-15% per species
- Moll (1989): maximum 5% per species and maximum 10% per genus
- Kenney, van Wassenaer, and Satel (2011): maximum 10% per species at the neighbourhood level; all species are locally suitable (optimal performance level)

Ultimately, rather than focusing on rigid strictures, urban forest management programs should seek to increase tree genus and species diversity at various scales (e.g., citywide, neighbourhood, block level) by planting a larger variety of appropriate species and managing existing trees with consideration of diversity levels.

Size/age class

Tree size, expressed as DBH (diameter at breast height) in centimetres, can be used as a proxy for tree age class if adjusted for different species' mature size characteristics. In an optimally structured urban forest, natural attrition of trees in the largest and oldest size/age classes, followed up by growth of trees in smaller and younger classes, provides for continuity of tree cover over time as trees are planted, grow, mature, die, and are ultimately removed and replaced. Therefore, a tree population with a diverse age class structure but with a sizeable population of younger and smaller trees is considered sustainable and suggests that older trees will be adequately replaced over time.

Tree health and condition

Tree health and condition targets

There is currently no widely accepted guidance in the technical or scientific literature base for the establishment of firm targets for tree health or structural condition in the urban forest. Moreover, few municipalities have formally established targets for urban forest health or tree structural condition. However, healthier trees are generally known to provide a wider range and greater

quantity of urban forest services to due their larger size and higher leaf area (i.e., healthier trees have more and larger leaves), which is a key determinant of trees' functional capacity. Similarly, structurally sound trees are less prone to failure, thereby reducing management costs, risk, and liability, and promoting the sustained provision of urban forest services. As such, it is reasonable to pursue the highest possible proportion of healthy and structurally sound trees in the urban forest. However, targets should consider existing baseline conditions, should be reasonable and achievable, and should be supported by an assessment of the resources necessary to attain them. Finally, it may not be necessary to establish 'hard targets' for tree health and condition provided that best practices for tree maintenance (e.g., young tree structural pruning, pruning cycles) are consistently and effectively implemented.

In its 2017 Green Infrastructure Asset Management Plan, York Region established a target of 90% of street trees in Good or better condition.

However, an urban forest dominated by younger and smaller trees provides fewer economic, health and community, and environmental services than one with a more balanced size class distribution and with more large and mature trees. A predominantly young age class distribution may also suggest that newly planted trees are failing to grow towards full maturity. As every community's biophysical context is unique, it is difficult to establish broadly applicable best practices for urban forest age/size class distribution. However, Richards (1983) proposed that an approximate '40-30-20-10' percentage distribution of the four tree size (DBH) classes shown in **Table 11** represents an optimal urban forest size class structure. Millward and Sabir (2011) suggest an alternative ideal distribution, with 40% of trees below 15 cm DBH, 30% between 15 and 60 cm, 25% between 60 and 90 cm, and 5% larger than 90 cm DBH. The latter distribution guideline is thought to better maximize ecosystem services while maintaining population stability, but neither guideline necessarily considers priority management objectives or other factors that may influence optimal distribution.

Table 11: Comparison of 'optimal' tree size (DBH) classes from Richards (1983) and Millward and Sabir (2011).

Richards (1983)		Millward and Sabir (2011)	
DBH classes	%	DBH classes	%
0-20 cm	40	0-14 cm	40
21-40 cm	30	15-60 cm	30
41-60 cm	20	61-90 cm	25
61+ cm	10	90+ cm	5

Best practices for maintaining the urban forest

Urban forest program administration

Service delivery

Due to significant differences in governing legislation, corporate organizational structures, available resources, adopted service levels, resident needs and values, and many other characteristics between municipalities, there are no definitive best practices for urban forest management program organizational structure and administration. In most mid-sized and larger Canadian municipalities, urban forest management is provided under a joint service delivery model, whereby urban forestry operations are undertaken by both in-house (municipal) staff and contractors, and few if any municipalities are known to provide services solely on an in-house or contracted basis.

There are some exceptions to the joint service delivery model for urban forestry. In Red Deer, AB, and Sarnia, ON almost all urban forest maintenance operations are undertaken by in-house staff, and only highly technical tree removals are undertaken by contractors. Conversely, in Brantford, ON, all urban forest operations are undertaken by contractors under staff contract administration.

Advanced urban forestry departments typically include some level of staff specialization, ensuring that staff experience levels and skill sets are appropriately matched to departmental responsibilities. Moreover, specialization ensures that capacity is not drawn away from important programs and operations in the event of emergencies or service requests.

Mississauga's urban forestry department includes specialized divisions for forestry maintenance operations, woodland and natural areas management, tree protection, inspection, contract administration, data management, interdepartmental coordination, and others.

It is commonly reported that operating costs tend to be lower with contracted service provision, but work quality and efficiency are typically higher with in-house service provision. However, these reports are largely anecdotal and few municipalities have undertaken comparative audits of in-house and contractor cost and performance.

In 2019, Toronto's Auditor General estimated an annual productivity loss of $2.6 million due to certain contractor practices, such as inaccurate or falsified logging, unauthorized breaks, and failure to perform assigned work. In addition to reducing cost efficiency, such practices could have adverse long-term effects upon the urban forest as trees may not receive maintenance until the next scheduled pruning cycle. To ensure efficient service delivery, the Auditor General recommended that contractor and in-house crew vehicles and operations be GPS-logged and verified through routine inspections.

Resourcing

Urban forest management program resourcing (i.e., budget allocation) is challenging to benchmark due in part to the absence of a standardized budgeting and reporting methodology. However, a survey of selected southern Ontario municipalities suggests an average per capita Forestry budget of approximately $10.35, and a range between just over $4 to nearly $28 per capita.

Table 12, below, presents the urban forestry budgets of selected Ontario municipalities as a share of operating and total municipal budgets.

Table 12: Urban forestry budgets of selected Ontario municipalities as a share of operating and total municipal budget. Some figures may not total due to rounding. [a] – Unlike in most other municipalities, Windsor's urban forestry program is primarily funded by the Capital budget; Forestry share (%) is therefore calculated as a percentage of Capital budget, not Operating (Ops.) budget. Per capita average Forestry share is $10.35.

	2023 Budget ($ Million)				Forestry share (%)		
Municipality	**Forestry**	**Operating**	**Capital**	**Total**	**of Ops.[a]**	**of Total**	**Per capita**
Brampton	3.3	845.0	496.0	1,341.0	0.39%	0.25%	$5.03
Burlington	5.2	314.3	72.6	386.9	1.64%	1.33%	$27.55
Cambridge	1.7	149.0	74.0	223.0	1.14%	0.76%	$12.27
Guelph	1.1	509.2	123.2	632.3	0.21%	0.17%	$7.57
Markham	1.4	444.7	223.9	668.6	0.32%	0.22%	$4.26
Vaughan	2.3	545.8	444.2	990.0	0.43%	0.24%	$7.26
Richmond Hill	2.1	310.3	84.5	394.8	0.66%	0.52%	$10.15
Windsor	2.0	460.4	178.5	638.9	1.12%[a]	0.31%	$8.68

Interdepartmental cooperation

To improve inter- (between) and intra- (within) departmental cooperation on urban forestry issues, some municipalities have established urban forest working groups or teams to bring together staff from various departments on a scheduled or project-specific basis. While the topics and issues addressed by such working groups will be determined by local needs they commonly include:

- capital project planning to enhance tree protection and tree growing environment design,
- increasing the 'tree-friendliness' of other municipal operations (e.g., snow clearing, utility pruning, road construction), and
- understanding and implanting of existing urban forest policies, standards, and innovative best practices.

Mississauga established an urban forest working team of staff from the City's planning, parks, engineering, and transportation departments. The team meets every two months to discuss and resolve urban forest-related issues.

Brampton established the 'Green City Working Team' to facilitate the implementation of its One Million Trees Program and UFMP. The team includes staff from urban forestry, environmental planning, and other departments who meet regularly to review tree-related aspects of planning applications and develop effective urban forest policies, programs, and standards.

Similar external (interagency) working groups can promote and enhance collaboration between the municipality, local environmental groups, community and industry associations, the development industry, and others. Local utility representatives should also be invited to coordinate practices and exchange information about projects that may affect the urban forest.

Tree maintenance and risk management

Reactive tree maintenance

Reactive tree maintenance generally considered less efficient than proactive maintenance. However, even with the implementation of an effective proactive maintenance regime, some trees will always require reactive maintenance in response to emergent conditions. Reactive tree maintenance needs are typically greatest following severe weather events such as wind or ice storms.

Reactive tree maintenance is supported by the following best practices:

- An **urban forest emergency response plan,** which should clearly outline emergency response procedures including safety protocols, communications and the incident command system, emergency work contracts, debris management, funding, and other elements. Where possible, the urban forest emergency response plan should integrate the community's broader emergency preparedness framework and plans.

Smart Trees Pacific, an urban forest advocacy organization, has developed an *Urban Forestry Emergency Operations Planning Guide for Storm Response*. This guide provides a helpful framework for the development and implementation of emergency storm response plans.

- **A 'single-window' system** whereby service requests are received, screened for priority, and dispatched through a centralized 'hub' (such as a municipal 311 system). Such a system reduces complexity for residents and facilitates pre-screening of service requests and work orders. Online and mobile-friendly forms or third-party tools such as the SeeClickFix app may be suitable alternatives in the absence of a 311 system.

Oakville's "Report a Problem" online function allows users to enter a tree location address, zoom in to select the tree marked by a green dot, and link their service request to a tree ID number to facilitate service request tracking. The map also displays the nature and status of existing tree service requests.

Orangeville uses the ArcGIS Survey123 "form-centric data gathering solution" to receive resident-initiated service requests, which are directly linked to the Town's tree inventory database.

- **Prioritization criteria:** Internal policies should clearly outline criteria for prioritization of externally generated tree service requests. Staff responsible for receiving and dispatching service requests should be trained to ask detailed questions to facilitate communications with urban forest managers and improve service request prioritization. Similarly, online forms or service request portals should request detailed information and enable uploading of photographs and tree location data.

- **Levels of Service:** Establishing and publicly communicating approved levels of service for common urban forestry operations can help manage customer service expectations, reduce public complaints, and improve operational efficiency by reducing the time spent responding to inquiries and providing work order status updates.

Markham, ON has developed a comprehensive Urban Forestry Operations Manual that outlines Level of Service standards for 16 urban forest maintenance operations. These standards can be readily communicated to residents in response to inquiries.

London, ON and Halifax, NS, have published their service standards for typical urban forestry operations online. Halifax outlines its standards response times for both tree assessment and follow-up action.

Among multiple surveyed municipalities, typical response times for street tree inspection in response to externally initiated service requests range from as few as 5 days to as long as 30 days, with an average target response time of 19 days. Target response times for park trees appear to be the same as for street trees among most municipalities. Initial response times will vary depending upon the assessed priority of the service request and municipalities will hasten response times for high-priority requests. Target action times vary depending upon the assessed priority of required maintenance and can range from immediate action to deferral to the tree maintenance cycle program.

- **Form letters:** Template or form letter responses for more common resident inquiries (e.g., tree establishment, tree pruning, common pests and diseases, etc.) can reduce the time spent responding to individual inquiries. Such letters are typically sent via email in response to direct contact.

Proactive tree maintenance

Optimally, established trees in the urban forest should be maintained on a proactive basis, whereby tree inspection and/or pruning is undertaken in a planned, systematic, and repeated manner, typically within a defined geographic unit (e.g., neighbourhood, street). This approach is commonly referred to a cyclical, block, or grid pruning.

In most municipalities, proactive tree pruning cycles are restricted to street trees due to resource availability constraints and the increased visibility and potential for target impact of this tree population. Where possible, proactive maintenance should also be extended to trees in active-use park zones and other municipally managed lands.

Miller and Sylvester (1981) identified 4 to 5 years as the optimal pruning cycle for temperate climates to balance operating costs and tree benefits. However, this cycle frequency may be untenable for most municipalities due to resource allocation constraints. Sisinni *et al.* (1995) recommend a 5-to-10-year cycle based on comparison of ice storm damage for trees in various pruning cycle programs. A selection of municipal pruning cycles is presented in **Table 13**.

A shorter tree pruning cycle does not necessarily imply better urban forest management; for example, a longer cycle combined with young tree structural pruning, higher-quality nursery stock in good habitat, more frequent tree inspection, and application of other best practices, can allow for longer cycles without a reduction in tree health or condition.

Some trees may require more frequent pruning depending upon species growth characteristics or other factors. Pruning cycles should also account for pest- and disease-related 'pruning windows' and pruning bans (e.g., no oak pruning between April 1 and October 31, no elm pruning between April 1 and September 30) and pruning should be undertaken during the dormant season wherever possible. Additional considerations for pruning cycles may include site use frequency, proximity to overhead power or other utilities and infrastructure, storm/emergency response, or other factors.

The City of Lethbridge, AB considers multiple factors in its tree pruning cycles. Powerline, ornamental, and downtown trees are pruned on a 2- or 3-year cycle. Birch trees are pruned on an 8-year cycle. Young trees are pruned 3 and 6 years following planting. Other street trees are pruned on a 7-year cycle, while park trees are pruned on a 10-year cycle.

Safe work procedures, standards, and qualifications

Tree pruning should be undertaken in general accordance with the *ANSI A300 (Part 1) – 2017 Pruning* standard and associated International Society of Arboriculture *Best Management Practices* (BMP) publications. This guidance recognizes that pruning must have an objective and must be implemented using recognized and acceptable arboricultural techniques and procedures. The Standard and BMPs are not pruning specifications—each pruning assignment or contract should be guided by written specifications that conform to ANSI/ISA guidance but reflect local conditions and requirements.

York Region developed its own comprehensive tree pruning specifications based on the ANSI A300 standard. These specifications form part of the Region's tree pruning contracts and contractor performance and compliance with the specifications is audited by staff foresters.

Arboricultural staff and contractors can demonstrate competence through voluntary qualifications. Recommended qualifications include International Society of Arboriculture (ISA) Certified Arborist or Skilled Trades Ontario (formerly Ontario College of Trades) Arborist/Utility Arborist 444A. Additional certifications and qualifications, such as ISA Certified Tree Worker Climber Specialist, Certified Tree Worker Aerial Lift Specialist, Certified Arborist Utility Specialist, and Municipal Specialist, are considered program capacity assets. Arborists undertaking in tree risk assessment should hold the ISA Tree Risk Assessment Qualification (TRAQ).

Table 13: Pruning cycle frequencies from selected Canadian municipalities. Note: cycles include street trees only except where otherwise noted.

Municipality	Pruning Cycle Frequency
Barrie, ON	9 years
Burlington, ON	7 years (target) 8-9 years (actual)
Guelph, ON	5 years
Halifax, NS	7 years
Moncton, NB	5 years
Oakville, ON	10 years
Saskatoon, SK	7 years (street) 13 years (park)
Surrey, BC	At 4, 8, 12, and 19 years, and every 10 years thereafter (incl. park trees)
Toronto, ON	7 years (target) 10 years (actual)
York Region, ON	3 years (juvenile, 1-12 cm DBH) 7 years (intermediate, 13-50 cm DBH) 4 years inspect, pruning as-needed (mature, >51 cm DBH)
Windsor, ON	7 years (street)
Winnipeg, MB	12 years

Work order management systems

To provide maximum management utility, a municipality's tree inventory should be digitally integrated with a work order management system (occasionally referred to as a computerized maintenance management system—CMMS, or enterprise asset management system—EAMS). This level of integration promotes efficient resource allocation (e.g., work crews, equipment), reduces service request response times, facilitates lifecycle cost analysis, supports maintenance tracking and reporting, and improves budget forecasting based on historical data.

The latest generation of specialized tree inventory and work order management software is web- and cloud-based, allowing users to manage tree inventory data and work orders without specialized hardware and in near real-time. Broader corporate-wide EAM platforms, such as Cityworks or Infor, can also be equipped with urban forest asset and work order management capability.

Asset management planning

Ontario Asset Management Regulations

The *Ontario Infrastructure for Jobs and Prosperity Act, 2015; Building together – Guide for municipal asset management plans, 2016* and *O. Reg. 588/17: Asset Management Planning for Municipal Infrastructure* require municipalities to develop and adopt asset management plans. Asset management plans for non-core assets, which include green infrastructure assets such as street trees and urban forests, are required to be in place by July 1, 2024. Plans identifying levels of service and establishing asset management activities and funding strategies are required by July 1, 2025.

Asset management planning is the process of making the data-driven decisions regarding the installation, operation, maintenance, renewal, replacement, and disposal of infrastructure assets. A key objective of urban forest asset management planning is to support urban forest program budgets and implement a framework to ensure that assets are valued and managed effectively for the services they provide to communities. Municipal green infrastructure asset management is supported by the development and implementation of asset management plans (AMPs).

AMPs typically differentiate between various asset classes and categories. While asset categorization may be dictated by applicable legislation or regulation, a proposed structure for green infrastructure includes three asset categories: living, mixed living and engineered, and engineered. Examples of urban forest assets in each category are shown in **Table 14**. Additional assets not included in the table may also be considered.

A comprehensive asset management plan (AMP) should contain the following four key components:

- A **'State of the infrastructure'** analysis that defines responsibilities for asset maintenance and describes the condition and replacement value of relevant assets.
- **Levels of Service (LoS):** This part of the AMP should define the existing and expected or desired LoS through performance measures, targets, and proposed timeframes to achieve the targets if they are not already being met.
- **Asset management strategy:** An asset management strategy outlines the management approaches necessary to achieve or maintain desired LoS and should include an analysis of various management options and associated costs.
- **Financial strategy:** This component of the AMP outlines a 'lifecycle cost' analysis for urban forest assets. Full-cost accounting will support adequate long-term resource allocation for capital reinvestment and operations and maintenance (O&M) necessary to implement the asset management strategy and achieve desired Levels of Service.

Table 14: Proposed green infrastructure asset categorization framework for use in Asset Management Plans. Adapted from Green Infrastructure Ontario Coalition. Not all asset categories will be relevant to all AMPs.

	Urban Forest Assets
Asset Category	Assets
Living	• Trees (street, park, facility, other) • Soils • Forests/woodlands
Mixed	• Soil cells • Engineered soils
Engineered	• Irrigation systems • Surface coverings (tree grates, guards, etc.)

York Region has included street trees and other urban forest assets (e.g., growing media) in its Green Infrastructure Asset Management Plan. The plan reports on the state and value of the infrastructure assets, outlines levels of service, asset management and financing strategies, and establishes measures for continuous improvement. It establishes a standard street tree life expectancy of 35 to 53 years (depending on location) and sets targets of 95% street tree stocking, satisfactory or better health for 90% of street trees, and increasing ecosystem benefits provided by the urban forest on an annual basis. It also identifies the need to establish a funding reserve for long-term urban forest maintenance. The plan has resulted in securing an addition $0.5 million in annual capital funding and improvements in data collection and management processes

Natural areas, edges, and trails

Unless guided by site-specific management plans, tree maintenance in natural areas is typically undertaken on a reactive or as-needed basis. However, periodic visual tree risk assessment and mitigation within 1.5x potential tip-out distance of wooded edges (where forests abut other land uses, including potentially 'high-target' areas such as private residential properties or roadways) and along sanctioned trails has been established as a best practice by some municipalities. A three- to four-year Level 1 'walk-by' inspection cycle is considered optimal for such sites.

The City of Mississauga has undertaken a visual assessment and inventory of trees within potential tip-out distance of all City-managed woodlands abutting prioritized land uses, such as roads and residential and commercial properties.

Ottawa has developed a Forested Areas Maintenance Strategy (FAMS) for over 2,100 ha of City-managed woodlands. It identifies woodland areas requiring management (especially following ash tree removal) to promote regeneration of desirable indigenous vegetation and control invasive species. Key elements of the strategy include risk assessment and management protocols for formal trails, stand tending and monitoring, stewardship partnerships, monitoring, and resourcing.

Risk management

The potential for risk must be accepted to experience the benefits that trees provide, and risk cannot be entirely eliminated from the urban forest due to the proximity between trees, property, and people. As tree owners, municipalities have a responsibility to maintain their trees and take reasonable measures to avoid their trees causing personal injury or property damage. This responsibility is known as the Duty of Care.

The American National Standard *ANSI A300 (Part 9)-2017 Tree Risk Assessment a. Tree Failure* standard is a voluntary industry-developed standard for the practice of tree risk assessment. Application of this standard is further guided the International Society of Arboriculture (ISA) *Best Management Practices – Tree Risk Assessment, Second Edition (2017)*.

Key elements of an effective municipal tree risk management program include:

- A **tree risk management plan or policy** that frames the scope of tree risk management; outlines responsibilities and required qualifications; sets thresholds for acceptable levels of risk for subsets of the tree population; establishes assessment frequencies, record-keeping protocols, and acceptable mitigation strategies; identifies program funding requirements and partnerships; and outlines program improvement processes.

- **Periodic inspection** of trees in appropriately designated areas, such as trails, woodlot edges, areas with higher use/occupancy levels, or areas with a large population of large and mature trees. Such areas should be subjected to more frequent Level 1Limited Visual Assessment ‘walk-by’ or ‘windshield’ inspections to identify trees for more in-depth (Level 2 – Basic or Level 3 – Advanced) assessment or priority mitigation.

- An up to date **tree inventory** with appropriate attributes, including tree health, structural condition, and risk ratings.

- **Proactive tree maintenance** at an appropriate frequency (e.g., 5 to 7 years) to reduce the likelihood of predisposing risk factors, such as poorly-attached branches, decay, crown imbalance, or others.

- **Young tree structural pruning** to develop appropriate tree structure over time.
- **Integrated Pest Management (IPM) and Plant Health Care (PHC)**, or a systematic program to promote tree health and vitality through adequate watering, mulching, pest and disease control, growing site improvement, and other measures, thereby enhancing trees' natural ability to compartmentalize decay, fend off insect infestation, and compensate for structural weakness through reaction wood development.

In the event of significant whole-tree or component part failure, procedures should be in place to dispatch appropriate response personnel to secure the area, prevent further failure, mitigate the highest risks, and determine and triage further response (e.g., corrective pruning, supplemental support, tree removal, etc.)

Figure 22: Example heatmap of trees >65 cm DBH in Windsor. Darker reds indicate higher concentration of large trees. Because larger mature trees may require more frequent visual risk assessment than smaller trees, this type of mapping can inform tree risk management zones and identify areas that should be subject to increased frequency of Level 1 – Limited Visual 'walk-by' or 'windshield' assessments. Additional factors (e.g., species, condition, etc.) can be included to refine priority tree risk management zone mapping.

In many cases, tree risk can be managed and mitigated to an acceptable level without necessitating tree removal. Appropriate tree risk mitigation actions and methods will depend upon tree- and site-specific factors and it is beyond the scope of this document to describe arboricultural mitigation measures in technical detail. However, common conservation-oriented tree risk mitigation options include:

- **Pruning:** Limb or canopy reduction pruning can reduce the forces and effects of wind or snow loading acting on the canopy, stem, and root system of the tree.
- **Cabling:** Cabling systems can limit range of motion and reduce the likelihood of branch failure.
- **Bracing (bolting):** Bracing rods can be installed close to or through weak or split unions.
- **Target relocation, exclusion, or restriction:** It may be preferable to relocate targets (persons or property) away from the potential zone of impact in the event of branch or whole-tree failure, or to exclude people from the impact zone by installing signage or fencing. People can also be temporarily restricted from entering potential impact zones during periods of high wind or snow loading.

Young tree structural pruning

Proactive young tree structural pruning is among the most effective arboricultural interventions to promote tree health, condition, growth, and performance. The objective of young tree structural pruning is the development of good long-term tree structure, including a single central leader, well-spaced and well-attached branches, and the appropriate distribution of temporary and permanent branches. A “3-in-10” young tree structural pruning program, whereby young trees are inspected and, if necessary, structurally pruned a minimum of 3 times within 10 years after planting, is commonly considered a best practice for structural pruning. Tree pruning crews/contractors should obtain and/or demonstrate specific training for young tree pruning as young tree pruning tools and methods differ from those for mature trees. Optimally, structural pruning should continue until the tree reaches mature stature, albeit at a lower frequency than in the earlier years of a young tree structural pruning program.

Saskatoon, SK enhanced service delivery efficiency by including young tree structural pruning in its tree maintenance contracts, eliminating the need for staff to 'follow' contractors to prune young trees after mature trees are pruned.

In Red Deer, AB, staff undertake the Structural Tree Pruning Program for young trees, which involves pruning every 2 to 5 years until good structure is developed. The STPP is informed by previous years' planting lists and prioritizes trees in high-traffic and occupancy areas due to program resource constraints.

York Region, ON implements its Juvenile Tree Maintenance Program (JTMP) for young street tree pruning, which includes a 3-year cycle for trees up to 10 years old or 13 cm DBH. Other municipalities that implement dedicated young tree structural pruning programs include Centre Wellington, ON (3-year cycle until trees are 3 m tall), St. Albert, AB (two pruning rounds in 5 years), and Winnipeg, MB (3- to 5-year cycle), among many others.

Utilities coordination

Utility clearance management can, on occasion, lead to excessive and damaging pruning, resulting in decay, crown imbalance, sprouting, and other undesirable or detrimental conditions. Urban forestry departments should coordinate with local utility providers' vegetation management division staff to reduce pruning frequency and impacts, improve pruning practices, and reduce duplication of efforts. Municipal and utility tree-related standards, including pruning and planting, should be reviewed and coordinated and utility representatives should be invited to participate in regular urban forestry working group sessions to coordinate programs and service delivery.

In Oakville, ON, the local hydroelectric utility (Oakville Hydro) contracts the Town's Urban Forestry Services division (and its subcontractors) to conduct tree maintenance, including pruning in proximity to overhead utilities, on three-year pruning cycle. This eliminates duplication of pruning effort as trees are not pruned under two separate cycles, and reduces overall pruning dose and impact. Although it involves two public agencies, the contract is administered on a fee-for-service basis.

Public tree stewardship

Best practices for public stewardship of City-owned trees are outlined in the 'Best practices for partnerships in the urban forest' section of this appendix.

Pest, disease, and invasive species management

It should be noted that management approaches for individual urban forest pests, pathogens, and invasive species are often specific to the target species and infestation/outbreak characteristics. It is therefore beyond the scope of the Key Findings and Directions Report to outline specific management protocols and treatment responses.

Pests and pathogens (diseases)

Integrated Pest Management (IPM) is a commonly used term to describe a variety of complementary methods and materials to prevent and mitigate the effects of pests and diseases.

Red Deer, AB has developed a comprehensive Integrated Pest Management (IPM) manual for use by City staff and the public to guide urban forest pest management. The manual and accompanying informational webpage outline the key elements of IPM and specifically target the most significant pest and disease issues found in Red Deer. The manual outlines key IPM procedures including monitoring, control, reporting and education, and provides detailed guidance on management approaches for specific pests and pathogens.

Key elements of an affective urban forest IPM program include:

- **Maintaining and enhancing knowledge:** Municipal IPM managers should maintain current knowledge about existing and potential pest threats, including monitoring the status and location of Canadian Food Inspection Agency (CFIA) regulated pest species and relevant Federal and Provincial legislation and regulations. Staff should also maintain awareness and knowledge of the structure (i.e., taxonomic composition) of the urban forest and its susceptibility to key threats. Routine monitoring (discussed below) should be undertaken to maintain awareness of the local presence and distribution of known and potential pests.

- **Prevention:** Preventing the arrival and establishment of target pest organisms in a local area is a key first step in effective IPM. Prevention through exclusion may be effectively impossible for many urban forest pests, but efforts can be supported through public awareness campaigns, communication and coordination with neighbouring jurisdictions, and routine monitoring followed by a rapid containment/eradication response.

- **Enhancing urban forest taxonomic diversity:** Tree species should be suitable to the planting site, should be resistant or of low susceptibility to a variety of pests, and should not be overabundant in the urban forest. Monocultures (i.e., plantings of a single species), while at times aesthetically pleasing, create favourable conditions for the rapid dispersal of pests and pathogens and potentially widespread tree damage and mortality.

- **Maintaining tree vitality:** Maintaining vigorous and healthy trees through effective irrigation, pruning, soil and site management, mulching, and (when required) fertilization can enable trees to resist infestation or infection more effectively and without other interventions.

- **Containment and eradication:** Containment and eradication entails emergency measures to be applied in the event of a novel infestation of a priority pest. It is beyond the scope of this document to review potential containment and eradication measures as these vary widely for different urban forest pests. It should be noted, however, that experience suggests that few urban forest pests have been effectively contained and eradicated, as populations are often established once discovered.

- **Establishing thresholds**: Municipal IPM programs should establish an understanding of, and delineate, acceptable levels of pest infestation. These levels are known as 'thresholds' and represent the upper limit of pest populations and/or observed damage to trees or tree populations, beyond which implementation of control measures is required. Threshold levels may be established based upon local experience and/or guidance available in the technical and scientific literature.

- **Monitoring:** Forestry staff and/or contractors should be trained in the identification of priority pests and diseases, should look for signs and symptoms during routine urban forest maintenance, and regularly undertake pest surveillance monitoring. Monitoring entails surveying of sites and/or features (i.e., trees) to inform pest management (e.g., necessity, timing, dosage, likely effectiveness, etc.). Monitoring information should include, at minimum, pest location, type, life stage, population density, observed damage, and proximal non-target organisms or vegetation. Monitoring information is used to assess the current status of a pest infestation relative to established target levels and inform appropriate management responses.

- **Replacement planting:** Planting of replacement trees should be undertaken whenever trees are removed for IPM purposes. Replacement trees should not be susceptible to any pathogens that may have necessitated the previous tree removal, as inoculum may still be present in the soil at the time of planting. If removed due to insect pest problems, replacement trees should not be susceptible to the original pest.

- **Inspection of nursery stock:** Planting stock must be inspected and verified to be free of transmissible pests and pathogens. Municipalities should reject any and all nursery stock which is diseased or shows signs or symptoms of a pest or pathogen.

- **Mechanical control:** Should pest and pathogen levels reach unacceptable levels, mechanical controls such as pruning, trapping, barrier installation, and the like should be investigated and, if viable, implemented before resorting to other methods. Regular and timely removal of dead or diseased tree parts and dead and dying trees will reduce the number of weakened trees in the urban forest, thereby reducing population-wide vulnerability and the likelihood of rapid pest or pathogen dispersal. Timely and targeted inspection and pruning should be implemented to remove diseased trees or tree parts, such as those flagging from Dutch elm disease, and may potentially result in saving otherwise vulnerable trees. All equipment used for maintaining a potentially diseased or disease-susceptible trees must be properly sanitized between trees and all diseased plant material must be properly disposed of in accordance with technical best practices or regulation/legislation (e.g., burying, burning, de-barking, etc.). Trees infected with transmissible diseases should be removed as soon as possible and properly disposed of. Pruning windows for various susceptible species (e.g., oak and oak wilt, elm and Dutch elm disease) must be communicated, observed, and strictly enforced. Municipalities should consider enacting by-laws prohibiting the pruning of particular species at specific times.

- **Encouragement of beneficial species and alternative pest control methods:** It must be recognized that not all urban forest insects are pests, and most do not require any active control or even monitoring. Furthermore, some species of insects and animals may in fact be beneficial by promoting flowering, seed formation, tree health, or tree pest control. As such, alternative pest control methods such as promoting beneficial insect and animal habitat or releasing beneficial insects (when required) should be undertaken as part of a comprehensive integrated pest management program. Baited and scented traps may be another effective means of pest control but are often better suited to presence/absence and delimitation surveys. Tree banding can be an effective method for surveying and controlling crawling pests such as spongy moth.

- **Chemical control:** Although mechanical and biological control options should be the 'first line of defence' wherever possible, judicious use of chemicals methods (i.e., pesticides) to control pests and pathogens with the potential to cause significant environmental, economic, or aesthetic harm and to preserve significant trees should be considered if and when necessary. Pesticide use should focus on targeting specific pests at the appropriate life stage, and broad-spectrum pesticides should be avoided if at all possible. Furthermore, efforts should be made to reduce environmental exposure to pesticides (e.g., by use of stem-injectable systemic insecticides) and the likelihood of pests developing resistance to the active ingredients used in the control program. Pesticides must only be applied in the minimum quantities required and in accordance with relevant Federal and Provincial legislation, regulation, and product label requirements.

- **Communication and engagement:** Municipal IPM efforts and approaches should be communicated by managers to municipal governments, the public, and other urban forest partners (e.g., external agencies, neighbouring municipalities, industry groups, nongovernmental organizations) to build awareness, encourage regional and private-land pest management, and alleviate potential anxieties concerning pest control methods—particularly pesticides. Where feasible and safe, community members and other partners should be engaged in IPM activities on public and private lands.

Oak.wilt.management

The Texas A&M University extension service has developed an eight-step program for oak wilt management. The key steps include:

1. Identify the problem: Making an accurate diagnosis of oak wilt infection.
2. Create a buffer zone: Excavating a 1.2 m deep trench at least 30 m from the last symptomatic tree to prevent root transmission.
3. Sanitation: Removing dead and diseased trees, preferably with on-site burning to dispose infected material.
4. Pruning: Undertaking pruning during the dormant season if possible.
5. Protecting wounds: Protecting fresh wounds with pruning paint, especially during the active beetle season.
6. Firewood: Covering oak firewood if it cannot be burned, and avoiding storage if possible.
7. Tree injection: Trees with less than 30% canopy loss can be treated with an injectable fungicide. However, no fungicides for oak wilt are currently registered in Canada.
8. Replanting: Non-susceptible trees should be planted to replace lost trees.

Additional oak wilt management guidance is available under the Canadian Food Inspection Agency's *Oak wilt response framework for Canada*.

Invasive species

Invasive plant species are a primary threat to ecological integrity and biodiversity in wooded natural areas. This threat is exacerbated in urban areas, where natural areas are regularly exposed to direct human activity (such as hiking and cycling) and indirect human activities (such as landscaping in adjacent lands) that introduce invasive species. Some municipalities undertake selected invasive species management if opportunities arise through the development process, in high profile public natural areas and/or natural areas with local volunteers willing to assist, or with the support of local conservation authorities. However, invasive plant species are notoriously difficult to manage and few municipalities have developed or undertaken comprehensive invasive management strategies. The cities of Mississauga and Toronto, in cooperation with local conservation authorities, are among the few to develop and undertake more extensive and targeted invasive species management strategies.

Because invasive species can be widespread and difficult to control, best practices generally advocate a targeted and strategic approach that focuses on "high value" natural areas and/or natural areas that are not highly infested and where opportunities for success are available. A strategic approach can also include wooded areas that are so heavily infested or dominated by aggressive invasive species that broad scale vegetation removal and replacement is warranted.

Effective invasive species management must also consider a wide range of factors, including but not limited to prevention of re-invasions or new invasions, identification and mapping of invasive populations, cost-effective control measures, community partnerships, funding, and public education and awareness. Specific best practices include:

- Continued dialogue and development of cooperative initiatives for invasive species management with the regional and adjacent municipalities and other local partners.
- Adoption of the general principle of prioritizing management by addressing the invasive species that pose the greatest potential for impact to native vegetation, and which occur in the most valued natural areas.
- Developing a landowner contact program to educate landowners about the potential threat posed by non-native species and encourage private land stewardship.
- Identification of safe and easily understood management techniques that can be implemented by volunteers.
- Implementation of invasive species control for the priority species and areas identified.

In 2022 Credit Valley Conservation (CVC) launched the Nature Invaders Scavenger Hunt program to encourage landowners to look for invasive plants and submit findings through the iNaturalist app. The goal of the program is to raise awareness of invasive species, help landowners identify common invasive plants on their property, and provide landowners with resources to control and remove invasive plants.

Richmond Hill engages residents in invasive species pulls through its Community Stewardship Program (CSP). Waterloo's volunteer Pollinator Working Group, established under the City's support of the Bee City Canada initiative, undertakes invasive species removal projects such as buckthorn pulls. Engagement opportunities are posted on the Citywide online events calendar, where interested volunteers can register to participate.

Other program elements

Urban forest foods

Communities are increasingly recognizing the role of community or urban food forests in promoting food security, community cohesiveness, resilience, and economic activity. Supporting community access to urban forest foods may include establishing purpose-made orchards or 'food forests', sharing inventory and location information about safe and accessible trees with local groups and the public, or providing in-kind or financial support to such groups, including to promote access to trees on private lands.

Successful 'food forests' or urban forest orchards should incorporate low-maintenance species and designs, provide adequate spacing between trees to allow for access, include multiple plant

types (e.g., trees, shrubs, vines), and engage community members in maintenance such as weeding, mulching, watering, and monitoring.

Several municipalities have shared tree inventory data with local groups to harvest, use, distribute or promote urban forest foods. Examples of such groups include Hidden Harvest in Ottawa, Not Far From the Tree in Toronto, and Environment Lethbridge in Lethbridge, AB.

Some communities have established 'passive orchards' that include small fruit trees and shrubs available for harvesting by residents. Examples include several 'Community Food Forests' in Red Deer, AB; Sudbury's 'Shared Harvest' orchards; London, Ontario's 'Carolinian Food Forest'; and 'Permaculture Park' in Auburn, NY. A new community master plan in Richmond Hill includes the establishment of a 'Community Orchard' to promote education and outreach related to urban agriculture and urban forest foods.

Urban wood utilization

Some municipalities have implemented programs to divert waste wood created through urban forest maintenance operations to higher uses. An urban forest product utilization policy can promote increased urban wood waste (and other urban forest product) utilization. Such a strategy or policy should:

- Identify sources of wood waste suitable for higher-value usage within and outside of existing urban forestry programs.
- Explore opportunities for partnership with local businesses and other groups with an interest in urban forest product utilization.
- Identify suitable locations for storage and transfer of wood to up-stream purchasers or end-users as efficiently and cost-effectively as possible.
- Develop a process for pre-registration of interested end-users of urban forest products.

The City of Ottawa has partnered with several local businesses to divert some wood waste for firewood and artisanal uses. The Toronto and Region Conservation Authority (TRCA) and cities of Mississauga and Toronto have partnered with a local sawyer under a revenue sharing and materials access agreement to market high-quality urban wood products to residents. The sawyer operates out of a TRCA yard and members of the public are able to purchase urban-sourced wood products directly. Educational programming is also offered at the Tree and Wood Recovery Centre. To date, the partnership reports over 2,257 tonnes of carbon stored in wood products.

The Municipality of Highlands East, Ontario, supports Heat Bank Haliburton County. This firewood bank provides small amounts of firewood to support over 120 families facing cost of living challenges. Wood sources include hydro and lot clearing, as well as single-tree removals.

Best practices for growing the urban forest

On City-owned lands

Planting stock

Stock quality

Sourcing and installing high quality nursery stock can have a significant positive impact upon the health, longevity, and performance of trees in the landscape. However, planting stock quality remains among the most overlooked factors for long-term tree establishment and success.

If planting stock cannot be assessed at the nursery prior to purchase, it should be assessed prior to planting, and unacceptable stock should be rejected. Tree procurement tenders should clearly establish the municipality's right to reject stock that fails to meet established quality standards at the provider's expense.

York Region, ON has developed stock procurement and production agreements with local nurseries, which is beneficial to both parties (i.e., secure revenue for growers, better stock quality for the municipality). Under this agreement, Forestry staff have the opportunity to individually select and mark nursery trees prior to procurement, ensuring that nursery stock meets minimum quality criteria prior to digging and transport. Trees are marked on the north side to ensure that they are planted in the same orientation as in the nursery, thereby reducing the likelihood of sunscald or frost cracking.

In Ajax, ON all trees planted as part of municipal operations are delivered to a designated municipal yard and are individually inspected by staff. Trees with unacceptable defects are rejected at the provider's expense, with these conditions expressed in contract tender documents.

Multiple above- and below-ground factors should be assessed to select high-quality stock. Above-ground criteria to be assessed include, among others, crown form, branch spacing, union structure/branch angle, pruning cuts/wounding, bud density and vigor, leaf vigor, shoot elongation, stem taper, presence of deadwood, pests and diseases, and many others. Trunk flares, root collars, and top surface root should be exposed. Trees with girdling roots must be rejected, and root balls should be inspected for other root defects, if visible (e.g., J-roots, ascending/descending roots, etc.) If possible, trees should be procured from growers that employ active root management techniques, such as in-field root pruning or pruning during container up-sizing.

All nursery stock should conform the latest edition of the *Canadian Nursery Landscape Association* (CNLA) *Canadian Nursery Stock Standard* (currently in the Ninth Edition). This is especially important for root ball diameter relative to tree size; trees with undersized root balls should be rejected outright.

Source verification
Usage of locally procured native tree species seed stock can ensure that trees are 'biologically appropriate' for the local environment, as they have adapted in sync with environmental cues in their location of origin. This can contribute to increased vigour, reduced insect and disease problems, and overall greater hardiness in response to local weather and climate patterns. The threat of climate change may also justify sourcing seed stock from other locations to enhance the genetic diversity of the urban forest, and should be considered in the future.

The Canadian Forest Service's SeedWhere program allows users to match seed sources to planting sites under current or future climate scenarios. The National Tree Seed Centre (Fredericton, NB) maintains over 13,000 unique seed collections from over 200 tree and shrub species and works to undertakes related research that may support urban forest management and restoration.

Tree species selection

Tree species selection should be informed by several factors, among the most important of which include urban forest taxonomic composition (i.e., species diversity) and planting site assessments.

Taxonomic diversity
Best practices for establishing taxonomic diversity targets are outlined in the 'Best practices for understanding the urban forest' section of this appendix.

Planting site assessment
Matching tree species requirements and tolerances with actual site conditions will ensure, to a significant degree, planting of "the right tree in the right place". Key factors to be assessed to inform tree species and site matching include:

- Light exposure
- Spacing, offsets, and conflicts (although regulated utility setbacks may vary, recommended minimum tree/infrastructure setbacks or offsets are outlined in **Table 15**, below)
- Wind exposure
- De-icing salt exposure
- Soil factors: texture, structure, drainage, pH, organic matter, compaction/bulk density, volume, and depth
- Site classification (e.g., boulevard, lawn, hardscape, etc.)
- Maximum tree size class
- Priority or target functions to be supported by tree establishment

In 2009, the Ohio Division of Forestry developed the Urban Site Index (USI), an assessment methodology that uses eight observations (four soil, four street) to classify planting site quality. This was refined into the Rapid Urban Site Index (RUSI), which allows a site to be classified in approximately five minutes and matched to suitable tree species. A planting site's RUSI score can be used for priority-setting and should be included in a plantable spaces inventory to inform tree establishment planning.

Table 15: Typical minimum recommended tree and utility/infrastructure setbacks for tree establishment.

Infrastructure Element	Setback/offset (min.)
Utility service laterals (storm, sanitary, water)	2 m from trunk
Water main	2 m from trunk
Light standard	2 m from edge of canopy
Utility pole	3 m from edge of canopy
Overhead utility	3 m
Transformer box	1.5 m from sides, 3 m from door
Telecom/joint use trench or box	1 m from trunk
Hydrant	3 m from trunk
Gas main	2 m from trunk
Property line	1.5 m from trunk
Pavements/sidewalks	1 m from trunk, 2.5 m clearance
Roadway	1.5 m from trunk to back-of-curb, 5 m clearance
Structure (building)	4 to 6 m from trunk
Road sign	4 m from trunk
Ditch (centreline)	1.5 m from trunk
Intersections	Maintain sight triangles
Trees	8 m to 12 m O.C. (large-stature deciduous trees)

The cities of Richmond Hill and Toronto have developed tree species selection matrix tools that allow users to filter an extensive tree species list based upon multiple species tolerances/requirements and site conditions.

The Vineland Research and Innovations Centre developed a tree species selection tool for Eastern Canada. The online tool allows users to identify suitable species by planting site typology, growing environment tolerances and requirements, and multiple other factors.

Tree species trials

Red Deer, AB undertakes trials of unproven species by planting small numbers of trees in challenging locations and routinely monitoring success rates. Successful species may be incorporated into operations-based planting programs.

Planting requests

Implementation options for request-based programs vary widely according to municipal resources. Some important considerations include species selection (i.e., can residents choose a preferred species?) and maintenance commitment (i.e., should the program require participants to, at minimum, commit to tree watering?) Programs should be actively promoted to encourage uptake, and a centralized service request system (e.g., 311) can facilitate handling resident requests.

Hamilton's Street Tree Planting Program is actively promoted by the City and supported by an easy-to-use online request interface, clear guidelines, a list of 40 tree species, and instructions for post-planting care. In Toronto, the Free Tree Program is promoted through transit shelter posters. Mississauga's tree request program has a 30-day approved service level for site assessment, and allows residents to track the status of their request online.

Oshawa recognizes that urban forest services cross property boundaries and supports municipal tree planting on private property adjacent to the road right-of-way. The Trees by-law (78-2008) states that if "there is insufficient space to plant a tree satisfactorily entirely on municipal property, the [City may plant] a tree at the City's expense on adjacent private property subject to the consent of the owner of the private property and subject to the tree being planted within 2.5 m of the property line. Once planted, the tree becomes the property of the owner of the private property on which it is planted and the City shall not be liable for maintenance or otherwise."

Most municipalities do not permit residents to plant trees on boulevards or elsewhere on municipal lands. However, some exceptions to this general practice exist, and may be considered best practices for urban forestry if managed appropriately.

The City of Vaughan recognizes that residents expressing interest in planting trees will likely be good stewards and that enabling residents to plant their own trees reduces costs, expedites the tree establishment process, and contributes to growing the urban forest canopy. As such, the City permits residents to plant trees, with prior approval, in municipal boulevards. Required criteria include approval of the location by City staff, planting of an approved tree species, resident responsibility for all costs, provision of a 12-month warranty to be signed over to the City, and transfer of post-planting maintenance responsibility to the City. The process is facilitated by the "Planting Your Own Tree" permitting process and must adhere to the City's planting specifications and other provisions.

Guidelines, standards, and specifications

Guidelines (or standards) are intended to facilitate interpretation and guide implementation of higher-level (e.g., official plan) policies, whereas specifications provide more technical guidance for implementation. Guidelines may be applicable across an entire municipality (e.g., site plan or subdivision guidelines) or scoped to specific land use categories, secondary planning areas, or site typologies (e.g., parking lots).

It is beyond the scope of this report to outline in depth the specific policy and technical elements of tree establishment guidelines and specifications. However, key principles and best practices are outlined below:

- **Requiring trees:** Municipal development guidelines should require developers to plant, or support the planting of, trees in new communities and on infill development sites whenever possible. The most commonly required location for trees in new developments is within the road right-of-way fronting properties (i.e., front lawn or boulevard) and in parks; privately planted trees are rarely required under municipal guidelines due to uncertainty about their long-term viability and a lack of jurisdiction over private land landscaping. Planting of one street tree per lot frontage is a typical minimum requirement in many jurisdictions. Many communities also require additional planting for corner lots—spacing of one tree per 8 m to 15 m O.C. (on-centre) is typical. This spacing, or stocking level, is also commonly required along urbanized streetscapes, arterial and collector roads, and other street typologies. Enabling developers to compensate through cash-in-lieu payments for trees that cannot be planted due to site design and layout constraints may result in the under-provision of street trees in new communities, especially where lots are small and rights-of-way are narrow. However, if cash-in-lieu is permitted, fees should cover the full cost of site assessment, planting stock procurement and installation, post-planting maintenance, and monitoring.

Oakville urban forest management plan encourages planting street trees in lawn areas behind sidewalks instead of in boulevards due to greater available soil volumes. However, it recognizes potential implementation challenges if these lands are on private property or if the right-of-way is too narrow to accommodate trees on public lands. Ottawa's *Road Corridor Planning and Design Guidelines* (2008) provide guidance to "plant a second row of trees on the back side of the sidewalk … either in the ROW or on private land, wherever possible."

- **Ensuring adequate soil volumes:** Municipalities are increasingly recognizing the need to provide adequate soil volumes to sustain large-statured, healthy, and long-lived trees. Urban design and tree establishment guidelines should support the design and implementation of engineered tree growing environment solutions (e.g., soil trenches or cells, structural soils, root break-out zones, etc.) Design of adequate tree growing environments can be facilitated through the basic practice of depicting tree roots and soils on roadway engineering cross-sections and other technical detail drawings (see **Figure 23**). Although soil volume requirements depend on a number of factors, research suggests that the following minimum soil volumes are required to sustain trees in good health at maturity without supplemental irrigation:
    - Small-statured ornamental trees: 15 to 20 m^3
    - Medium-statured trees: 20-30 m^3
    - Large-statured trees: >30 m^3

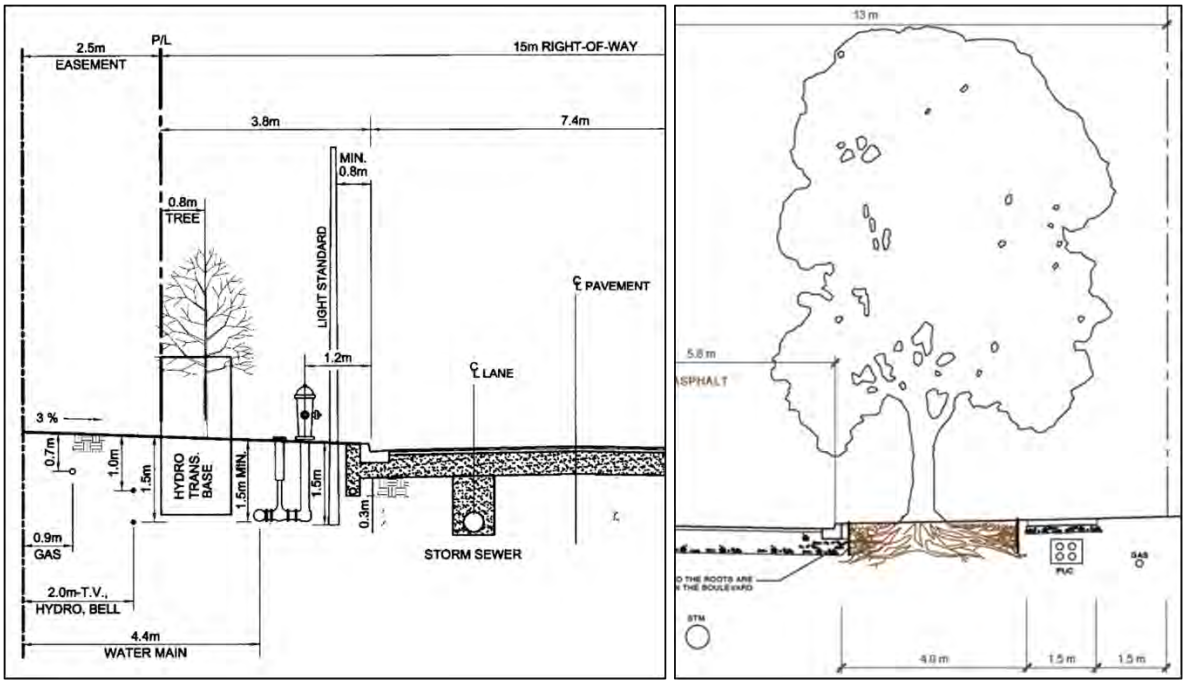


Figure 23: Typical engineering cross-sections (left) do not adequately depict tree roots or growing environments. An enhanced cross-section (right) depicting tree roots demands consideration of the tree growing environment in site design and construction.

Toronto's Green Standards are applicable to a variety of multi-unit dwellings. Tier 1 (mandatory) standards require a specified minimum total site soil volume to support tree growth, a minimum of 30 m^3 per tree planting area, and compliance with other tree planting and soil specifications. Higher-level (Tier 2 through 4) performance measures are voluntary but compliance is incentivized.

Some municipalities establish different soil volume requirements based upon the size class of the planted tree—for example, Appendix B of the City of Kitchener's Development Manual (2021) outlines minimum requirements of 17 m^3 of soil for small-stature, 28 m^3 for medium-stature, and 45 m^3 for large-stature trees. Per-tree soil volumes can be reduced if shared by two or more trees. The City also requires an "urban forest soils report" for new developments, and requires construction of root pathways to adjacent lawn areas if sufficient soil volumes cannot be provided in boulevards. The City also specifies the use of Silva Cells® in certain applications, and requires a minimum of 450 mm of topsoil depth and soil scarification to a minimum depth of 900 mm in "tree habitat zones". Similarly, the municipalities of Guelph, Markham, and Surrey, BC, among others, have established varying soil volume requirements depending upon mature tree size. Oakville requires 30 m^3 of soil per tree, or 15m^3 per tree if soil volume is shared.

- **Innovative approaches:** Guidelines should incorporate innovative or novel approaches to integrating trees into new and infill developments. Examples of such approaches may include:
    - Planting double rows of trees along sidewalks (i.e., in boulevard and back-of-sidewalk).
    - Increasing spacing between street trees (e.g., 15 m) to allow access to greater soil volume per tree and enable the development of wide, non-interfering canopies.
    - Clustering or grouping tree plantings in 'nodes' to allow soil volume sharing, enable increased stocking density, promote visual interest and other functional benefits, and free up space for other sustainable infrastructure (e.g., bicycle share stations, electric vehicle charging, transit, etc.)
    - Combining trees plantings and shrub/understory layers to create "Miyawaki" or "mini forest" communities.
    - Integrating stormwater management systems and bioretention soils into engineered tree growing environments.
- **Consolidation:** In many municipalities, tree establishment is regulated and guided by multiple and often inconsistent policies, guidelines, standards, and specifications. Some municipalities have addressed this issue by compiling all relevant elements in a 'tree technical manual' or similar compendium document. The intent of such a document is to serve as a single overarching resource that clearly outlines all municipal requirements for tree establishment (and protection, if included) and facilitate the consistent implementation of approved standards and specifications across various scenarios, ranging from operations to capital projects, development, and private lands (on a voluntary basis).

Numerous municipalities have developed comprehensive and high-quality urban forest/ tree technical manuals or standalone tree establishment guidelines. Notable examples include:

- Guelph, ON – Tree Technical Manual (2019)
- Halifax, NS – Municipal Design Guidelines, Part A, Section 5.0 - Trees (2021)
- Kitchener, ON – Section M and Appendix B of Development Manual (2021)
- Markham, ON – Trees for Tomorrow Streetscape Manual (2009)
- Richmond Hill, ON – Urban Forest Planting Guidelines (2016)
- St. John's, NL – Landscape Development Policy/Street Tree Planting Standards (2018)
- Tacoma, WA - Urban Forest Manual (2014)
- Toronto, ON - Design Options for Tree Planting in Hard Surfaces (2019)
- York Region, ON - Street Tree and Horticultural Design Guidelines (2022)

- **Site- or typology-specific standards**: Where appropriate, it is beneficial to develop tree establishment guidelines, standards, or even specifications for specific sites or site typologies. These specific guidelines can be integrated as appendices or sections into broader guideline documents or be contained in standalone documents, and can ensure the application of non-standard practices in specific circumstances.

Toronto's *Design Guidelines for 'Greening' Surface Parking Lots* (2013) provides guidance for tree establishment and other considerations specific to surface parking lots.

- **Technical rigor:** Tree establishment guidelines and specifications should be developed or, at minimum, thoroughly reviewed by subject matter experts such as experienced urban forestry staff or external consultants. This level of technical expertise will ensure that municipal requirements for tree establishment reflect current arboricultural standards (e.g., ANSI A300) and accepted industry best management practices. Specifications should be written in technical language and format, such as the architecture, engineering, and construction (ACE) industry's MasterFormat® standard, or in a manner consistent with other approved municipal specifications. If applicable, tree planting specifications should be integrated with the municipality's standard engineering specifications manual, and should be updated on a regular basis. Specifications should be integrated into tree procurement and planting contracts, and should be developed in coordination with other affected groups, such as engineering and planning departments.

In Red Deer, AB, tree planting specifications are reviewed and updated by the urban forester on an annual basis to ensure ongoing application of best practices and adopt lessons learned into tree establishment contracts and operations.

Development

Delivery model

Most mid- to larger-sized municipalities appear to favour a 'developer-led' planting delivery model, whereby developers are responsible for planting trees in new communities (i.e., road rights-of-way and parks) in accordance with municipal guidelines. After planting, trees are maintained by the developer throughout a warranty period (typically two years) and are subsequently assumed as municipal assets along with other infrastructure elements. The primary benefits of the developer-led planting model are, typically, lower cost and complexity for the municipality, as municipal involvement is generally limited to plan review and approval, and (if undertaken) tree inspection prior to assumption.

However, several key drawbacks weigh against the 'developer-led' planting model. Among these include the lack of municipal oversight of planting stock quality, storage, transport, and installation, and, commonly, a lack of adequate post-planting maintenance and care (e.g., watering, mulching, etc.) during the warranty (or maintenance) period. This may result in adverse outcomes for tree establishment, health, and longevity that may not be apparent until after warranty expiry, leading to the assumption of poor-quality or unhealthy trees and increased long-term maintenance and/or replacement costs.

To overcome the challenge of inadequate tree maintenance during the warranty period, Ottawa's urban forest management plan directs the City to require developers to record maintenance and demonstrate that trees have been adequately watered and maintained prior to assumption. New Tecumseth, ON, retains arboricultural consultants to inspect developer-planted trees prior to assumption. Trees in poor health or condition must be replaced at the developer's expense.

Kitchener requires that trees planted in new developments are provided with 25 gallons (95 litres) of water per week throughout the growing season (May to September) for two years. This is termed the Maintenance Period, and occurs between Initial Acceptance (i.e., verification of as-planted condition) and Final Acceptance (i.e., City assumption of ownership). The City also requires that developers submit an "as-recorded submission", including a geospatial point feature inventory of all planted trees prior to Final Acceptance.

Some municipalities, including Hamilton, London, Mississauga, and Sarnia, have adopted a 'municipal-led' service delivery model for tree establishment in new developments. Under this approach, developers are required to deposit a fixed fee to cover the cost of tree establishment.

This approach can be favourable for both the municipality and developers, as it provides significantly more control over nursery stock quality, planting practices, and post-planting maintenance, and reduces complexity (and potentially costs) for developers, who are not required to provide a tree warranty or undertake maintenance or inspections. Provided that adequate resources are available to fully support program requirements, a municipal-led approach is considered preferable and a best practice for tree establishment in new developments.

Some municipalities, including Oakville, Richmond Hill, and Windsor, provide developers the option to choose between developer-led or municipal-led planting in new developments.

Sequencing

The sequencing (timing) of tree establishment in new communities may significantly affect long-term outcomes for tree establishment, health, and longevity. Trees are commonly planted at the time of other landscape installation, which may occur before completion of construction, road paving, and other site disturbance. This may result in tree injury and soil compaction, resulting in adverse long-term outcomes. As a best practice, tree installation should occur following the completion of all other significant site works—in effect, tree installation should be the last site works undertaken in new developments. This can be facilitated by implementing a municipally led planting delivery model, as this approach will alleviate developer concerns about extending the warranty/maintenance period or delaying the refund of landscaping securities.

The City of Lethbridge, AB, requires developers to delay tree planting until the completion of all other site works to avoid tree injury.

In Mississauga, the City's Forestry Section plants street trees in new subdivisions. Street trees are planted when all homes are built, roadways have at least one coat of asphalt, curbs and driveways have been installed and sodding has been completed.

Capital projects

Most best practices outlined in this section of the appendix are applicable to capital project planning and implementation. No tree establishment best practices exclusively applicable to capital projects are identified.

Post-planting maintenance

York Region, ON experienced significant improvement in tree survival, health, and establishment rates following improvements to its tree establishment program. In addition to improved species selection and planting practices, the Region began GPS tracking of watering contractors to ensure that trees were being watered at the required schedule, and installed TreeGator bags on some trees. Prior to program improvements, over 40% of trees required replacement and only 29% of street trees were in satisfactory or good health. By 2020, this figure had risen to 87% of the street tree population, and the Region has established a target of 90%.

Effective post-planting care is essential to allow trees to become successfully established in their new growing environments. Important elements of post-planting care include stabilization, trunk protection, mulching, watering, structural pruning, and pest and disease management, as described below:

- **Stabilization:** Stabilization should only be undertaken when necessary and not as a default practice, as excessive stabilization may be detrimental to the development of good long-term structure and stem taper. Staking using wood stakes fabric ties is the most common method of tree stabilization and is typically effective. The tree should be tied to the stakes as low as possible while still stabilizing the root ball with a broad and flexible material to avoid trunk scarring. Stakes and ties should be removed after the first growing season unless further stabilization is required.

- **Trunk protection:** Trunk guards should be avoided where animal damage is not a concern, and mulch should be used to protect against grass trimming equipment damage instead of plastic trunk guards. If installed, guards must be loose-fitting to allow for air circulation and moisture dissipation. If necessary, light-coloured fabric wrapping may be installed on thin- or smooth-barked species susceptible to frost cracking. Trunks should be wrapped from bottom-up with overlapping layers of wrap (to shed water), and wrapping should be removed in the spring to avoid moisture retention. If installed, wrapping should be regularly inspected and removed if excessive moisture retention, insect damage, or trunk constriction are observed.

- **Mulching:** After watering, application of organic mulch around newly planted trees is perhaps the most effective and beneficial intervention to promote health, growth, longevity, and performance. Mulch should be applied to an approximate depth of 5 cm to 10 cm, in a ring set approximately 10 cm away from the trunk flare. Mulch depth should not exceed 5 cm over the root ball to enable water percolation. There is no limit to the maximum extent of the mulch ring, and rings should be at least 1 m in diameter to encourage root development beyond the root ball. Plantings should be checked annually, and mulch should be topped up as required to maintain the specified depth. In urban hardscape settings, resin-bound aggregate or similar surface treatments may be required instead of wood chip mulch.

- **Watering:** Trees should be irrigated (watered) following transplanting and throughout the growing season until they are successfully established in the landscape (potentially three to five years). Irrigation requirements will vary depending on multiple factors. To simplify the irrigation program, at minimum of 25 L of water should be provided per newly planted tree per watering visit. Watering may be aided by the use of watering bags, which should be tied to the tree stake rather than the tree to prevent entrapping debris and moisture against the thin-barked stem, potentially contributing to decay and tissue necrosis. Where trees are supplied and warrantied by contractors, a tree warranty must not be considered a substitute for tree watering; tree establishment contracts should include post-planting watering on an established schedule as a discrete deliverable.

Markham and Milton both provide an informational door hanger notification with every newly planted tree that requests resident assistance with watering and mulching.

- **Structural pruning:** Best practices for structural pruning are outlined in the 'Best practices for maintaining the urban forest' section of this appendix.

- **Pest and disease management:** Tree pests and diseases should be managed using an Integrated Pest Management (IPM) approach. Integrated Pest Management describes the implementation of a variety of methods and materials to prevent and mitigate the effects of pests (and diseases), which are described in detail in the 'Best practices for maintaining the urban forest' section of this appendix.

Engaging the community

Municipalities are increasingly recognizing the benefits of encouraging residents to share in the responsibility for urban forest stewardship, which include reduced costs, improved post-planting survival rates, and increased community support for urban forestry programs. Some municipalities operate programs whereby volunteers are engaged to water and mulch trees, and some even engage trained participants in structural pruning. Participants often include schools, Business Improvement Associations (BIAs), neighbourhood associations and individuals. Tree adopters can also be engaged to monitor the urban forest more widely for pests and diseases. Depending upon the level of engagement, resident-involved tree stewardship programs may require staff time to assign and track work and monitor quality.

Thunder Bay established Canada's first citizen pruner program in 2011. Up to 25 participants are trained annually and are required to complete a minimum of three 2-hour supervised work sessions, after which Citizen Pruners are permitted to prune young boulevard trees in assigned areas. Neighbourwoods on the Grand, an urban forest advocacy group located in Centre Wellington, operates a volunteer-based Citizen Pruner program based on the Thunder Bay model in coordination with the Township. Training is provided by local ISA Certified Arborists.

Naturalization

Evergreen's *Urban Naturalization in Canada: A Policy and Program Guidebook*outlines comprehensive best practices for successful naturalization programs. Key elements include:

- **Municipal plans, policies, and operating procedures**, or developing an effective policy framework to help building internal support and create a foundation for positive change. Key elements include reviewing senior government policy and legislation for supportive policies, developing specific Naturalization Master Plans or other types of policy documents, developing supportive staff operational procedures, addressing naturalization in official plans and local area/secondary plans, review existing policies, codes and By-laws for constraints, creating site plan approvals and/or subdivision control policies which support or require naturalized

landscaping, creating supportive by-laws for the naturalization of private property, and developing supportive pest management policies and programs.

- **Community support and participation,** or encouraging ongoing public participation and stewardship throughout all stages of a naturalization project. Key elements include involving the community in all stages of the project, supporting existing community-based naturalization efforts, establishing a citizen's advisory environmental or land-use committee, organizing community education and outreach programs, and providing interpretive signage and project tours.

- **Public and private sector partnerships,** or developing broad-based, multi-level partnerships to expedite project implementation, encourage community participation and build political support. Key elements include developing demonstration projects or programs involving one or more internal departments, identifying departments with a potential interest in naturalization and seeking out supporters or "champions", assessing potential naturalization projects for jurisdictional overlap, partnering with local regional governments and/or conservation authorities, developing projects with corporate partners, engaging the development community, and promoting naturalization on institutional properties.

- **Building internal capacity,** or enhancing a municipality's ability to support and deliver successful projects. Key elements include assessing current capacity, organizing training seminars and field trips, providing information to council and senior staff through existing environmental advisory committees, identifying qualified consultants and contractors, auditing municipal landscape management practices and costs, developing criteria to identify urban naturalization candidate sites, undertaking projects that offer multiple benefits, and establishing a native plant nursery.

- **Project management and design,** or using pilot projects and other means to develop effective management approaches and evaluation criteria. Projects can also be designed to support broader environmental and recreational objectives. Key elements include managing projects within the context of an ecologically-based management program; compiling an inventory of public green space within the municipality; carrying out large, multi-year pilot or demonstration projects; visibly managing the site throughout the naturalization process; monitoring and evaluating sites; undertaking wildlife management; buffering and enhancing remnant natural areas; and integrating projects into existing urban trail systems.

In addition to planting trees, the Red Deer's urban forestry division recognizes "forest creep" as a viable means of growing the city's urban forest canopy. Promoting forest creep primarily entails reducing mowing around forest edges to allow natural regeneration of trees and shrubs through seeding and vegetative growth. Some tending is required to control invasive species, but tree mortality rates are lower than experienced with naturalization plantings.

Richmond Hill's Environment Strategy (2014) included a priority action (NE5) to "develop a Naturalization Plan that identifies and prioritizes areas of publicly owned land for naturalization and potential opportunities for private land naturalization." The City's award-winning Community Stewardship Program (CSP) engages partners in naturalization planting, post-planting maintenance and monitoring, and invasive species control. The program is partnership-based, with the City contributing $2 for every $1 of partner funding. Naturalization plantings are located and prioritized according to the CSP Prioritization Plan, which includes multiple criteria and a scoring matrix for project assessment and prioritization. The monitoring protocol entails baseline data collection and survival, maintenance, and invasive species assessment two and five years post-planting.

Planting targets

Best practices and guidance for establishing tree establishment and planting targets are outlined in the 'Best practices for understanding the urban forest' section of this appendix.

On private lands

Municipalities are increasingly recognizing the value of supporting tree establishment on private lands, including residential, commercial, and institutional properties. Several municipalities have developed strategies to engage private landowners and support tree establishment efforts through grants, incentives, subsidies, and other means.

Tree subsidies

New Tecumseth offers residents a one-time rebate (up to $75) for the purchase of a hardwood tree from a recognized nursery, and offers up to $250 in rebates for arborist services on private property.

Several Greater Toronto Area municipalities support Local Enhancement and Appreciation of Forests (LEAF), an urban forestry advocacy and engagement-focused NGO, in the delivery of its Backyard Tree Planting Program, which provides residential property owners with tree planting services and trees at a subsidized cost.

Richmond Hill's Healthy Yards program offers residents trees and shrubs at a subsidized cost.

Carleton Place recognizes that post-planting survival rates are higher if participants pay a small fee (currently $25) for their trees, as residents feel a sense of investment in the tree's survival.

Tree giveaways

Peterborough offers a tree giveaway program in conjunction with National Forest Week; up to 300 trees are given away to households on a first-come, first-served basis at selected parks in the city. St. Catharines tree giveaway requires participants to register online in advance. Most tree giveaway programs allow one free tree per household.

The Town of Petrolia's Parks and Recreation Department hosts the Resident Tree Program, whereby residents can register for a 'tree certificate', exchangeable for one tree at a local partner nursery.

Private tree planting strategies and programs

Toronto's Tree Planting Strategy recognizes that the greatest potential for growing the urban forest is on private lands. The City offers several grant and incentive programs, including:

- The Community Planting and Stewardship Grant, which supports tree planting and stewardship on private land by non-profit organizations.
- The Greening Partnership Grant, which supports partnerships with public school boards, hospitals, colleges, universities, and other eligible institutions.
- The Neighbourhood Planting Program, which supports community-led tree giveaway and planting events through financial support, free native trees and shrubs, and technical support.
- The Backyard Tree Planting Program, which offers backyard tree planting services at a subsidized cost. The program is administered by LEAF.
- The Planting on Private Property Program, in partnership with the Toronto and Region Conservation Authority (TRCA) to offer tree planting services to industrial, commercial, institutional, and residential landowners on a cost-shared basis.
- The Community Canopy Program, in partnership with the Arbor Day Foundation, which allows participants to use mapping software to identify planting locations to maximize the air, water, energy, and carbon benefits of their tree, and obtain a free tree of their species of choice.

London's "Plant More" tree planting strategy identifies 89% of the potential opportunities for tree planting as occurring on privately-owned lands. The strategy proposes increasing funding for private tree planting incentives to $800,000 per year by the 2028 budget cycle. Funding for the Council-approved strategy has been accommodated within the 10-year capital budget forecast.

Best practices for protecting the urban forest

Within the development process

Higher-level policies

If appropriately structured, higher-level (i.e., Official Plan) policies can lend significant support to planning decisions that encourage or require existing trees to be protected through the development process. Every municipality's Official Plan is different and tailored to the local context; therefore, it is difficult to articulate specific best practices *per se* in relation to urban forest policy organization and hierarchy in Official Plans. However, several key policy principles can support tree protection. These include:

- **Include a standalone urban forest policy section:** Including a standalone urban forest policies in the Official Plan demonstrates the municipality's recognition of the value and importance of the urban forest and provides scope for detailed and extensive policies.

London's Official Plan includes a comprehensive "Forest City" policy section, with strategic directions to Protect More, Maintain Better and Monitor, and Plant More.

- **Recognize the urban forest as green infrastructure:** Policies should recognize the urban forest as vital community green infrastructure that provides a wide range of important functional services and associated benefits. Policy support for the urban forest can be strengthened by highlighting linkages between urban forest services and improved human health outcomes and climate change resilience and adaptation.

Mississauga's Official Plan recognizes that "clean air is critical to human and environmental health" and that it is "important to protect, enhance and restore the Natural Heritage System and Urban Forest, which all assist in capturing carbon emissions, reducing the heat island effect and providing overall air quality benefits."

- **Include urban forest targets:** Integrating locally appropriate targets, such as urban tree canopy (UTC) or more technical targets (e.g., performance indicators, tree equity, etc.), into higher-level policies lends significant support to urban forest management, protection, and enhancement. However, while higher-level policy urban forest targets should be both visionary and attainable, care should be exercised in making specific commitments as there can be a significantly greater degree of accountability required for targets embedded in Official Plans compared to other supporting strategies (e.g., urban forest management plans).

Some municipalities have established urban tree canopy (UTC) targets in their official plans. It should be noted that, unless these targets are supported by a comprehensive assessment of capacity and dedicated resources, commitment to such targets at the official plan level is not considered a best practice. Such targets are likely more appropriately embedded in supporting plans, such as urban forest management strategies, with higher-level policies providing support for action item implementation.

- **Adopt 'no net loss' or 'net gain' principles:** Higher-level policies must recognize that some extent of tree removal is unavoidable and required to accommodate growth and development. However, policies should require replacement of and/or compensation for tree loss (preferably as measured by canopy cover or tree diameter, instead of ratio-based replacement), and should ensure that opportunities for enhancing and expanding the urban forest are pursued on lands where trees may not have been present prior to development.

Richmond Hill's Official Plan states "the Town [City] shall require the landowner to replace the lost tree cover based on an appropriate methodology to the satisfaction of the Town, at the sole expense of the landowner in a location agreed by the Town".

- **Require detailed reporting of existing conditions:** Development plans are reviewed and approved on the basis of reports and studies submitted by applicants, often without the benefit of site visits by reviewing authorities and subject matter experts. It is important that detailed information about existing site conditions and potential on- and off-site tree impacts is submitted for all applications. Detailed submission requirements may be outlined in specific policies or manuals, but Official Plans can also establish detailed reporting as a required component of development applications.

Mississauga's Official Plan (Section 6.3.44) enables the City to require the submission of an "arborist report and tree inventory that demonstrates tree preservation and protection both pre and post construction".

- **Protect existing mature trees:** Many municipalities focus on achieving urban forest management goals and targets through increased levels of tree planting. However, protecting existing mature trees can be just as important to achieving urban forest management objectives and should be supported explicitly in higher-level planning policies.

- **Lead by example:** Enactment and implementation of policies requiring comparable tree protection standards and practices to be applied on both municipal and private lands can promote voluntary compliance by demonstrating the municipality's commitment to effective tree protection.

The Protect More urban forest policy section in London's Official Plan supports municipal tree protection and requires replacement or cash-in-lieu for all trees removed "as a result of new municipal development or infrastructure works".

Tree protection policy

Tree protection policies may be Council-approved or departmental documents that outline the multiple facets of a municipality's overall approach to tree protection. Common elements of many municipal tree protection policies include:

- **Purpose statement:** Most municipal tree protection policies outline the rationale and purpose of the policy. Typically, the purpose is to protect the urban forest canopy by ensuring the site-level protection of existing trees that meet established criteria. Policies also commonly cite the services and benefits provided by trees as the underlying rationale for tree protection.

- **Objectives:** A tree protection policy may outline discrete objectives. Examples include preventing damage or destruction of trees, providing adequate tree replacement or compensation, or coordinating various municipal practices to promote tree protection.

- **Definitions:** Most tree protection policies include a series of definitions for key terms to clarify scope and guide implementation of the policy. In instances where a municipality has enacted both a tree protection policy and by-law, definitions should be consistent between both.

- **Scope:** A scope statement typically defines where the policy applies. Scope may be area-based, but more commonly is prescribed by tree-specific characteristics, such as ownership (public and/or private), tree size (typically expressed as DBH), species, or other factors.

- **Responsibilities:** Policies may outline departmental responsibilities to ensure that municipal staff, development applicants, and others affected by the policy understand their roles in the overall tree protection process.

- **Processes and procedures:** Tree protection policies may outline procedures for components of the municipality's approach to tree protection. For example, the policy may outline the steps required to prepare, submit, review, and approve tree protection plans in association with development or building permit applications.

- **Specifications:** Tree protection policies typically include, or refer to, technical standards, specifications, and guidelines for tree protection measures, such as Tree Protection Zones (TPZ), tree protection barriers, root-sensitive excavation and grading, soil compaction protection, and others.

- **Security/compensation:** Tree protection policies may establish a process for collecting securities for tree protection or replacement and the assessment of appropriate compensation for tree injury or removal.

- **Penalties:** Some tree protection policies stipulate penalties for non-compliance with tree protection requirements. However, a tree protection policy alone is generally insufficient to enable the municipality to levy fines or issue stop-work orders; typically, a tree protection by-law is necessary to support such enforcement.

- **Incentives:** Some municipalities provide developers with incentives to encourage tree protection.

Edmonton requires tree planting on both municipal and private lands in new developments. The City has introduced an incentive program wherein new developments can receive credits towards their tree planting and landscaping requirements in exchange for preserving existing trees.

The City of New Westminster provides a Retained Tree Incentive of a 50% discount off retained tree securities if the applicant revises the Site Plan to protect trees in response to a City request.

London Official Plan Policy 399 provides for incentives to support the protection of existing mature trees, including increasing allowable building heights and densities (in conformity with Bonus Zoning policies) "to support the safe and long term preservation of existing healthy trees, rare species, and wildlife trees."

To be effective, a tree protection policy must be integrated with tree protection by-laws (if applicable) and the development and building permit application review and approval process. Adequate staffing levels and resources are also necessary to administer and enforce the policy.

Municipalities with leading-edge tree protection polices include Edmonton, Oakville, Ottawa, Peterborough (draft), Regina, Toronto, and York Region. The City of Vaughan recently developed a highly detailed Tree Protection Protocol document.

Development guidelines and standards

To ensure implementation in a consistent and effective manner, tree protection should be guided by detailed and comprehensive technical specifications for a range of tree protection measures. Such specifications may be included in a tree protection policy, integrated with a municipal engineering standards package or other guidelines, or contained in a standalone document. Tree protection measures that should be included in a comprehensive tree protection specifications package include:

- **Tree Protection Zone (TPZ):** The area around a tree that is subject to tree protection measures is commonly referred to as the Tree Protection Zone, or TPZ. The TPZ is usually expressed as a circular area with a radius measured from the base of the tree's main stem. The minimum

required size of the TPZ is typically a function of the tree's DBH. The TPZ radius may be based upon a DBH class to TPZ radius table, or it may be derived through a TPZ equation, wherein a specified TPZ radius is required per unit DBH (**Figure 24**).

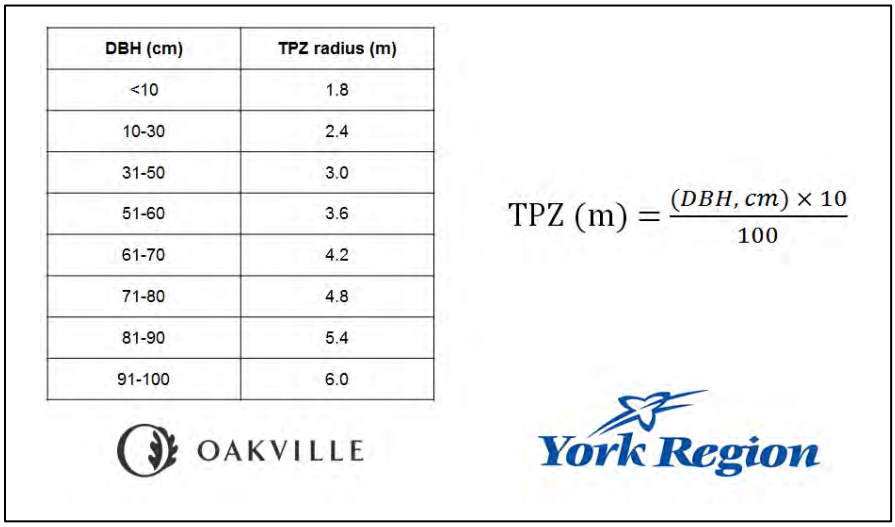


Figure 24: Two different approaches to determining Tree Protection Zone (TPZ) radius. Oakville uses a DBH class / TPZ radius table. For trees greater than 24 cm DBH, York Region uses a basic equation of 10 cm of TPZ radius per centimeter of DBH. For all trees less than 24 cm DBH, a minimum TPZ of 2.4 m is required.

- **Tree protection barrier:** The most basic, and arguably most effective, tree protection measure is the establishment of a tree protection barrier around the tree(s) to be protected. Some municipalities require different types of barriers depending upon the installation location; in Toronto, for example, framed construction fencing (i.e., orange plastic mesh) is required within the road right-of-way or in other locations where sightlines must be maintained, and solid hoarding is required elsewhere. Tree protection barrier specifications may also include requirements for informational signage and maintenance and inspection procedures.

- **Root zone soil compaction protection:** Root zone soil compaction protection should be implemented if vehicular or pedestrian traffic, or material storage, may occur within the TPZ. Specifications typically include installation of load-absorbing and -dissipating materials such as geotextiles, wood chips, plywood sheeting, or steel plates, depending upon intensity. The City of Toronto provides a specification for "horizontal hoarding" to protect against root zone soil compaction.

- **Root-sensitive excavation:** Root-sensitive excavation should be implemented whenever excavation is required within TPZ. This includes the use of root-sensitive methods such as air or hydraulic excavation of a narrow trench at the limit of disturbance. Roots in the trench can be investigated to inform further action. If it is determined that root loss associated with the proposed excavation is unlikely to result in tree decline or destabilization, root pruning should be undertaken. This entails pruning roots using correct arboricultural methods in advance of conventional excavation to prevent root fraying, tearing and breakage.

- **Other tree protection measures:** Specifications may also be provided for other tree protection measures such as sensitive grading (i.e., limiting the depth of fill in the TPZ), soil decompaction and restoration (e.g., aeration, mulching, etc.), and stem protection, among others.

Written specifications should be supported by standard technical detail drawings for the specified tree protection measures. To ensure successful tree protection, protection measures for municipally owned trees must be implemented in accordance with municipal technical specifications on both City-initiated project (e.g., capital works) and private projects that impact public lands.

Exemplary specifications for multiple tree protection measures can be found in York Region's Street Tree and Forest Preservation Guidelines (January 2022). Other Ontario municipalities with high-quality tree protection specifications include Barrie, Peterborough (draft), Thunder Bay, and Toronto.

Development approvals process

Effective tree protection requires consistent and fulsome application of the municipality's tree protection policies, specifications, and/or by-laws during the development application review and implementation (i.e., site development) process.

Staff with knowledge of and expertise in tree protection should be engaged early in and throughout the process to ensure that:

- Potential conflicts with trees can be identified and resolved early enough to avoid major revisions to plans in a more advanced state of completion,
- Tree protection measures can be integrated into site designs and construction plans in accordance with municipal specifications,
- Compensation requirements for approved tree injury or removal can be communicated to the applicant in a timely manner, and
- Incentives for tree protection can be made available early in the planning process.

Procedures should, at minimum, be implemented ensure that tree protection policies and standards are applied to any proposed applications that may adversely impact existing municipal trees. Where possible, these procedures should also extent to on- and off-site privately owned trees.

Best practices for development approvals in in the context of tree protection include:

- **Pre-consultation:** Pre-application consultation can provide an opportunity for the municipality to convey tree protection requirements early in the application process.

While pre-consultation is commonly required for *Planning Act* submissions, several municipalities including Clearview and King Townships and Norfolk County, among others, also require pre-consultation for Committee of Adjustment applications. In Barrie, Toronto, and Whitby, CoA pre-consultation may be required at the municipality's discretion and is otherwise strongly encouraged.

- **Tree questionnaires or declarations:** A tree questionnaire or declaration can be included on Site Plan, Building Permit, or other application forms to request applicants to declare whether regulated or otherwise significant trees are present in a specified distance or location relative to proposed site disturbance or development. The declaration process can assist in application pre-screening for potential tree impacts, "flagging" application for more detailed review by urban forestry subject matter experts. However, applicant-submitted declarations may not always accurately reflect actual site conditions, and measures should be in place to verify the accuracy of submitted declarations (e.g., desktop review of aerial imagery, site inspection, etc.)

Municipalities that require tree declarations to be submitted in conjunction with various municipal permit application types include Burlington, Mississauga, New Tecumseth, Toronto, and Vaughan, among others.

Toronto's Tree Protection By-law Declaration provides summary information about the City's tree protection by-laws and policy, and requires applicants to provide basic information about the "proposed construction's impact on protected trees."

- **Tree preservation plans/reports:** Where proposed site development may conflict with existing trees, applicants should be required to submit tree preservation plans/reports to document existing site conditions and review proposed impacts and mitigation measures in accordance with municipal tree protection requirements. These should be submitted as part of the overall development application package in the same manner as other required supporting studies, reports, and plans.

- **Integrated application review:** Development applications should be reviewed through a coordinated process with clearly established procedures, responsibilities, and communication protocols. This process can be facilitated through a 'single window' submission platform. Discrete parts of the application are then circulated to appropriate municipal staff (and/or external reviewers) with relevant subject matter expertise for review, and resultant comments are returned to the applicant in a consolidated package. Ideally, resources would permit urban forestry plan reviewers to review all submitted development applications for potential conflicts with existing trees; however, this is rarely feasible due to staffing constraints. However, resource constraints may require application pre-screening for potential tree conflicts before wider circulation.

In Ottawa, two "planning foresters" are integrated directly into the City's Planning and Growth Management Department. This ensures that tree protection subject matter experts are circulated on all development applications and increases efficiency by separating the planning and operational aspects of urban forestry. The City has also established an "infill team" specifically focused on the review of infill applications in a collaborative manner. This ensures that tree protection is considered equally alongside other planning considerations. Edmonton has also created an infill team and is working to improve the team's integration with the Urban Forestry section to promote more effective tree protection on residential infill development sites.

- **Conditions of approval/permit coordination:** Tree protection conditions imposed upon certain permit categories are frequently not carried over to other stages of the development process even though existing trees remain on-site and require protection through all stages of the development process. Application review procedures should be designed to facilitate 'carry-over' of tree-related conditions of approval permit types and stages, or at minimum 'red-flag' sites for which tree-related conditions have previously been issued. Permit issuance should consider all potential stages of development and their impacts upon trees—for example, even if initial construction of a dwelling may not adversely affect existing trees, driveway access or swimming pool installation (which are commonly subject to separate permits) may cause tree injury or loss. To address such issues, discrete permit applications should be reviewed for their potential impacts on trees in conjunction with the broader review of the development application, wherever possible and permissible by law. Tree protection subject matter experts should be involved in the review of these 'lesser' permits in the same manner as in the review of planning applications.

Recognizing that the development planning process is subject to the *Planning Act* and that tree protection by-laws are therefore not applicable law, The City of Mississauga has established a "Tree Removal Permission" process for development applications. The same standards outlined within the Tree Permit process under the tree protection by-law, including fees and conditions for removal (e.g., compensation) are applied as conditions to planning approval under Tree Removal Permission process.

In the City of Toronto, urban forestry staff review every minor variance and consent application. Given the relatively short legislated timelines for Committee of Adjustment (CoA) hearings following receipt of complete applications, the urban forestry division has developed 'form letter' responses and checklists to provide comments on CoA applications. These responses address most categories of comments provided on CoA applications, including requested deferral, 'no objection' confirmation, or confirmation subject to conditions. Where possible, urban forestry staff consolidate comments on multiple applications in a single comment letter. Outright objections are provided in a standalone memo for each application. The City's standardized urban forestry review and commenting process ensures consistent and timely advice to the CoA in the context of tree protection. Urban forestry has also provided training to CoA members and staff regarding Official Plan natural environment policies and urban forest-specific issues, such as protecting soils.

Securities

Some municipalities collect securities for tree protection, which are refundable upon completion of site works if trees have been appropriately protected. Commonly, municipalities will apply a tree value appraisal formula and/or a replanting ratio to determine the value of securities to be retained. Early release of securities may be an effective incentive for enhanced tree protection.

Saskatoon collects 120% of a tree's appraised value as securities as a "damage holdback" to account for additional costs which may be incurred (administration, removal, etc.) Toronto appraises securities using its own modified version of the CTLA Trunk Formula Method for tree value appraisal and only retains securities for the protection of City-owned trees.

Compensation

Requiring compensation for the approved or unapproved removal (and occasionally injury) of regulated or otherwise significant trees is a relatively common practice among municipalities. Municipal approaches for assessing the value of compensation vary widely, and there is no single 'gold standard' best practice; each approach has positives and drawbacks that should be considered when developing a compensation valuation methodology. An overview of various tree compensation methods is presented in **Table 16**, below.

To ensure adequate compensation, policies must explicitly separate compensation requirements from baseline site landscaping requirements. The policies of several municipalities (e.g., Barrie, Guelph, Whitby) clearly state that tree removal compensation is required *above and beyond* basic landscaping that may be obligated through urban design guidelines, park or engineering standards, etc. This ensures that applicants do not attempt to count basic landscaping against required compensation, thereby reducing the total number of trees planted and the extent of tree canopy, leaf area, and urban forest services replaced.

Table 16: Overview of approaches to assessing tree compensation.

Compensation Method	Description	Pros	Cons
Tree Replacement Ratio	A ratio of replacement trees is planted to compensate for injury or removal (e.g., 3:1 replacement to removal ratio). May be adjusted according to size of removed.	Easy to calculate, implement, and verify. May result in increased leaf area and canopy over time, but only if planted trees are of large stature and survive to maturity.	Often does not adequately replace lost canopy, leaf area or function/value. May under- or over-compensate, depending on size of removed tree, if a 'flat rate' unadjusted ratio is used.
Aggregate Caliper	Area of removed tree(s) stem, typically at DBH, is replaced by equivalent combined caliper of replacement trees. May be adjusted based upon condition or other factors of the removed tree.	Relatively easy to calculate, implement, and verify. Large number of trees is typically planted for a single mature tree.	May be highly costly for applicant if a large number of trees are removed. May not account for (good or poor) condition of removed trees. Some or many replacement trees may not survive to maturity, thereby not replacing lost canopy and services/benefits.
Appraised Value (e.g., CTLA Trunk Formula Technique)	A mathematical formula is used to appraise the value of a tree. Compensation equal to that value is paid for tree removal.	Broad industry acceptance. Well-suited to individual amenity trees.	Poorly suited to woodland, forest, or tree stand valuation. Elements of appraisal are subjective and open to interpretation and bias. Does not replace lost canopy, leaf area or function. May over- or under-value trees.
Cash-in-lieu	Used in conjunction with other methods; a monetary sum is paid instead of actual tree planting. Most effective if funds are deposited in tree planting-directed accounts. Per-tree value should reflect	Easy to calculate and implement if standard formula or value for determining replacement cost is used.	Like ratio-based compensation, rarely accounts for true value of tree(s) being removed. Results in fewer trees planted. Funds may "disappear" (i.e., not be directed to tree establishment) if deposited in general accounts.

Compensation Method	Description	Pros	Cons
	actual cost to establish a tree, incl. supply, planting, warranty, maintenance, etc.		
Leaf Area Replacement	The leaf area of removed tree(s) is calculated using a mathematical formula. Equivalent leaf area is replaced with new trees.	Services and benefits lost by removing leaf area are replaced. Ensures increase in leaf area and canopy cover above baseline condition as planted trees grow, resulting in 'enhancement' through compensation.	May be highly costly if large number of trees are removed, and require additional land for planting. Calculating leaf area is complex. No known municipal precedent.
Area-based replacement or mass planting	A defined number of trees are planted per unit area (e.g., stems/ hectare).	Applicable to woodlands, forests, and plantations.	Not generally appropriate for individual trees or low-density sites. May not adequately compensate for lost ecosystem functions. May result in net loss of canopy or slow canopy replacement.
Canopy Cover Replacement	The area of lost canopy cover is replaced.	Well-suited to plantations or forests where tree density is high. Allows for a more diverse stand in terms of species and structure to be established.	Will not result in immediate canopy replacement. Requires active management of regeneration. Costly and complex to calculate, plan, implement, and enforce.

Site monitoring

Development sites subject to tree protection requirements should be monitored and inspected and, where necessary, enforcement action should be undertaken to ensure consistent application of approved tree protection measures. Ideally, all development sites would be routinely inspected by municipal staff, but resource requirements rarely enable this level of monitoring. Site-level tree protection inspection can be significantly enhanced by requiring developers working in proximity to trees to submit site condition reports on a regularly scheduled basis or in conjunction with significant site changes, thereby augmenting municipal monitoring capacity. Applicants should also be required to inform the municipality well in advance of any excavation or other works within minimum required Tree Protection Zones (TPZs), and such works should only be permitted if undertaken under in accordance with an approved tree preservation plan and with arborist supervision.

Mississauga requires applicants to retain an arborist for site monitoring. The arborist must submit regular tree inspection reports, including photographs, to provide evidence of compliance with approved tree protection plans. Failure to submit such reports may trigger field inspections by City staff and other enforcement actions.

Calgary requires applicants to sign a Tree Protection Plan Agreement committing them to compliance with approved tree protection plans throughout the development process. Edmonton requires that developers working around City-owned trees sign a Construction Site Management Practices Acknowledgement form, thereby acknowledging their tree protection obligations. In Regina, property owners are requested to enter into a voluntary agreement with the City to protect City trees in proximity to works on private property, which may include allowing access for necessary branch or root pruning.

Outside the development process

Tree by-laws

Although tree protection by-laws across Ontario are based upon the same enabling legislation and tend to share the same structural elements and key components, no two by-laws are the same and each is tailored to reflect local values and customary practices and procedures in the specific municipality. It is therefore difficult to identify specific best practices for tree protection by-laws in Ontario. However, several best practice directions can be identified based upon comprehensive consideration of existing by-laws. These include:

- **Regulating public, private, and woodlot trees through separate by-laws:** Because enabling legislation, municipal procedures, and other by-law elements will vary, it is preferable to enact separate by-laws for the regulation of public and private trees and woodlots/woodlands (or trees in woodlots/woodlands). Enacting separate by-laws provides clarity for applicants and regulators and facilitates future by-law revisions and updates.
- **Establishing a clear purpose:** Tree protection by-laws can be perceived by some as regulatory overreach and may be subject to public, political, and special interest group scrutiny or

opposition. It is therefore important to clearly articulate the rationale and purpose for such by-laws, thereby helping to insulate from attempts to weaken or repeal regulatory authority. Examples of strong rationale for tree by-laws include, among others:

- Supporting the implementation of Official Plan or other high-level policy direction or specific initiatives related to environmental sustainability and protection,
- Promoting good forestry and arboricultural practices,
- Supporting community health and well-being,
- Promoting the provision of urban forest ecosystem services and associated environmental, economic, and societal benefits, and
- Promoting climate change resilience

The by-law purpose statement should also clearly establish the municipal Council's regulatory authority pursuant to the *Municipal Act* and other relevant enabling legislation.

- **Defining key terms:** Technically accurate and clear definitions of key terms are critical to promoting by-law compliance and ensuring enforceability. It is imperative that defined terms do not conflict with enabling and other applicable Provincial legislation or higher-level policies such as the municipal Official Plan. Efforts should also be made to maintain consistency between by-law terminology and terms used in other relevant municipal policies, guidelines, specifications, etc.

  Perhaps the most important term to be defined in a tree by-law is "tree". A common definition used in many tree by-laws is "*any species of woody perennial plant which has reached or can reach a height of at least 4.5 metres at physiological maturity*" or similar. However, it is vitally important for the purposes of by-law compliance and enforceability that the by-law clearly exempt trees below the desired threshold of regulation—typically expressed by a dbh threshold or other characteristics (e.g., species, location, etc.) (see 'Reasonable exemptions', below).

  The terms "injure" and "destroy" should also be defined, but definitions should be broad enough to capture a wide range of potentially injurious scenarios that may lead to tree decline or mortality.

  With particular relevance to woodland by-laws, Section 135 of the *Municipal Act* requires that by-laws regulating trees in woodlands define woodlands of at least 1.0 ha in accordance with the *Forestry Act* definition of the term and have regard for "good forestry practices"; therefore, both of these terms should be included and defined in the bylaw per the *Forestry Act*. Where municipalities choose to regulate other wooded features such as woodlots (i.e., wooded areas between 0.2 ha and 0.99 ha), the tree stocking/size per area criteria should be adjusted to reflect *Forestry Act* definitions (e.g., Whitby, York Region by-laws).

- **Reflecting local context/scope of regulation:** To promote compliance, tree by-laws should reflect local values concerning tree and environmental protection. While there are no specific best practices in this regard, general trends suggest that in Ontario municipalities, where present:

  - The minimum size threshold for private tree by-law regulation typically ranges from 15 cm to 30 cm dbh,
  - Municipal street and park trees are regulated irrespective of size, although regulations are often contained in road or park by-laws and not in standalone municipal tree by-laws, and
  - Woodland by-laws regulate features of at least 1.0 ha in area, in accordance with *Forestry Act* definitions based on tree size and stocking, although some by-laws regulate woodlots as small as 0.2 ha in area.

  It should be noted that, where existing, 'public tree' by-laws are often scoped to road rights-of-way and/or parks, leaving trees on other municipal lands (e.g., facilities) effectively unregulated—an oversight that should be addressed in any such by-law. When regulated in broader by-laws, such as road right-of-way or park by-laws, public trees may not be adequately protected due to a lack of detail in the by-law.

  In some municipalities (e.g., Guelph, Ottawa), trees are regulated according to site-based criteria such as lot area, or a combination of tree- and site-based criteria (e.g., trees above a specified dbh on lots of a specified size).

  Tree by-laws should also consider boundary trees (i.e., trees that grow on or cross property boundaries). As a best practice, municipalities should require applicants to secure and demonstrate approval of the tree's co-owner for any proposed injury or removal prior to permit issuance.

  Ultimately, the scope and nature of a tree protection by-law must be determined with careful consideration for: (a) the issues that the bylaw is intended to address, (b) the scope and nature of the municipality's urban forest assets, and (c) the resources available for outreach, implementation, and compliance enforcement.

- **Including reasonable exemptions:** The *Municipal Act* includes eight categories of activities exempted from tree protection and woodland by-laws enacted under Section 135. These include municipal activities and specified activities under the *Crown Forest Sustainability Act, Surveyors Act, Planning Act, Electricity Act, and Aggregate Resources Act*. Many tree by-laws also include various location-based exemptions for trees on golf course grounds, building rooftops or other structures, farms, orchards, nurseries, or Conservation Authority lands. Common exemptions also include emergency works or works subject to administrative orders issued by the municipality, dead or terminally diseased trees, trees that pose a high level of risk, and certain undesirable species (e.g., invasive species). Pruning and other arboricultural works, provided they are undertaken in accordance with clearly referenced standards such as ANSI A300 standards and/or International Society of Arboriculture (ISA) Best Management Practices, should also be exempted from by-law regulation.

Some tree by-laws exempt a specified number of trees per calendar year from permitting and other requirements. For example, the Town of Aurora permits the removal of two trees per calendar year without a permit, or two trees per 0.25 ha of property for "larger properties". It should be noted, however, that several municipalities that have previously allowed such exemptions (e.g., Mississauga, Oakville) have removed these provisions during the course of tree by-law updates. Such exemptions are not considered a best practice, but may be appropriate based on local context.

It is imperative that tree by-laws seek to strike an appropriate balance between tree protection/regulation and owners' property rights. For example, while it may be reasonable to require that owners/applicants provide verification of exempted conditions (e.g., dead or high-risk trees), it may be unduly burdensome or contribute to increasing risk to require arborist reporting in conjunction with permit applications or exemption requests for conditions that require rapid action (e.g., tree risk mitigation) or that already pose a significant cost to tree owners (e.g., removal of EAB-infested ash trees).

- **Balancing cost recovery with incentivising compliance:** Recognizing that tree injury or removal is typically undertaken to provide private benefits, tree by-law permit applications should be accompanied by reasonable fees to offset the cost of application processing, review, and follow-up inspection or enforcement. However, although the *Municipal Act* enables municipalities to levy fees to recover costs incurred in the administration of by-laws, it is generally recognized that full cost recovery through permit fees and other charges may serve as a disincentive to by-law compliance, especially if enforcement is insufficient to encourage such compliance. As such, municipalities should seek to strike a balance between cost recovery and incentivising compliance through actions such as waiver of permit fees for specified categories of trees (e.g., dead, dying, high-risk, etc.), reduction of permit fees for lower-income applicants, keeping permit fees to a 'reasonable' level, or capping fees at a prescribed maximum. In Richmond Hill, the maximum application fee is $440 irrespective of the number of trees subject to the application, whereas there is no such cap in Oakville or Toronto.

  In some instances, it may be appropriate to assess different fees according to the nature of the permit application—for example, the City of Toronto categorizes construction-related and non-construction tree injury or removal permit applications separately, with considerably higher fees for construction-related, City, or boundary tree applications due to the increased workload for review of such permit applications. In Burlington, permit application fees are assessed per property, and a higher fee is charged for development-related applications ($680 vs. $390). Mississauga levies a base permit fee of $434, with additional per-tree fees of $98.

  Like permit fees, compensation requirements should be reasonable while striving to adequately replace the stem counts, tree canopy, leaf area, and ecosystem services lost as a result of tree removal.

- **Including reasonable and clear conditions:** Permits issued under tree by-laws are typically subject to conditions imposed by the municipality. A wide range of permit conditions can be

imposed; some tree by-laws explicitly state the nature of such conditions, while other by-laws use more general "as appropriate" language. Common examples of tree by-law conditions include, among others:

- Tree protection in accordance with municipal guidelines or standards (for trees to be retained and subject to 'injury' permits)
- Requirements for tree removal timing (e.g., no tree removal from March 20-July 31 to avoid breeding bird nesting disturbance)
- Adherence to plans (e.g., tree protection plans, silvicultural prescriptions, etc.) approved by the municipality or other designated authorities
- Obtaining consent from boundary tree co-owners for injury or removal
- Deposit of securities (i.e., cash or letters of credit) for tree protection and/or planting
- Provision of compensatory tree planting and/or cash-in-lieu

In addition to those outlined above, conditions imposed upon permits issued pursuant to woodland by-laws may include conformity with "good forestry practices" as defined in the by-law and/or *Forestry Act*.

- **Penalties:** To ensure enforceability, including the ability to issue administrative orders, levy administrative penalties, or issue offence notices under to the *Provincial Offences Act*, tree by-laws should clearly identify the municipal regulatory and administrative authority (e.g., Council, Director, Commissioner, etc.) and establish a penalty structure that is generally consistent with relevant provisions of the *Municipal Act* (e.g., Section 429.3) and other by-laws enacted in the municipality (e.g., administrative monetary penalties, fees and charges, etc.) In practice, the system of fines established under the *Municipal Act* is generally thought to provide a sufficient deterrent to non-compliance with tree by-laws. In all instances, penalties should be sufficiently high to avoid the perception of fines as "the cost of doing business", thereby encouraging non-compliance.

  Section 429 of the *Municipal Act* gives municipalities the authority to establish fines for offences under by-laws established under the Act. The system of fines may designate contraventions as "continuing offences" or "multiple offences", and allows municipalities to levy special fines to "eliminate or reduce any economic advantage or gain from contravening the by-law." Under the prescribed system, minimum fines shall not exceed $500 and maximum fines shall not exceed $100,000. In the case of continuing or multiple offence, maximum daily or per-offence fines shall not exceed $10,000 per day or offence, although the maximum total fine is not limited.

- **Avoiding 'dynamic' content:** To prevent obsolescence and promote enforceability, tree by-laws must avoid content or references to parameters that may be dynamic or subject to periodic or unforeseen change. Examples of such content include municipal and staff contact information (e.g., names, email addresses, telephone numbers), cost/pricing (including for fines, fees, and cash-in-lieu, among others), or urban forest health threats (e.g., EAB infestation). Instead, such content should be included in referenced policy or guideline documents or in periodically/annually updated by-laws, such as 'fees and charges' by-laws. Avoiding dynamic

content reduces the need to update by-laws, which can result in the introduction of undesirable provisions or in by-law repeal should the update process coincide with a period of reduced public or Council support.

- **Other considerations and best practices:** Other best practice directions for tree by-laws include:
    - **Appeals:** Although there is no such requirement under the *Municipal Act*, tree by-laws should establish a transparent appeals process for permit issuance denial in conformity with the *Statutory Powers Procedure Act*, R.S.O. 1990, c. S.22.
    - **Conformity with other policies:** To ensure consistency of implementation, reduce confusion, and promote compliance, tree by-laws should align with other municipal policies, guidelines, standards, specifications, etc. in technical content, language, and direction.
    - **Education:** While enforcement and penalties are important tools to encourage compliance with tree protection by-laws, education about urban forest benefits and the importance and application of by-laws is commonly viewed as a more effective and cost-efficient strategy. Some municipalities have developed informational videos about their tree protection by-laws to promote awareness (e.g., Edmonton, Halifax, Surrey, Victoria), while Ottawa has developed a user-friendly decision tree to assist prospective applicants in understanding the by-law.
    - **Ensuring adequate resources:** Tree by-laws must be supported with adequate staff and capital/operating resources for outreach and education, implementation, administration, and enforcement. Among other considerations, this may require maintaining appropriately trained and qualified by-law enforcement officers, implementing tools and staffing to administer by-law permit applications and processes, sustaining outreach and education efforts, and pursuing prosecution when necessary to demonstrate the 'will to enforce' the by-law.
    - **Inspection:** If possible, based on resource availability, urban forestry staff should undertake site inspections prior to tree permit issuance to ensure application accuracy and completeness. The City of Burlington has established a level of service of three weeks to complete site inspections; in the City of Markham, the Level of Service for application processing is 30 days. In both municipalities, among others, site inspections are consistently undertaken for all tree permit applications, and may be undertaken by municipal staff or external contractors on behalf of the municipality.
    - **Reporting:** Applications made under tree protection by-laws should be accompanied by, at minimum, a basic tree inventory and mapping, a narrative description of proposed impacts upon trees subject to the application, and proposed compensation/mitigation measures in accordance with municipal requirements.

By-law applicability to planning and development

Pursuant to Section 135 of the Municipal Act:

(12) A by-law passed under this section does not apply to:

(d) the injuring or destruction of trees imposed after December 31, 2002 as a condition to the approval of a site plan, a plan of subdivision or a consent under section 41, 51 or 53, respectively, of the *Planning Act* or as a requirement of a site plan agreement or subdivision agreement entered into under those sections;

(e) the injuring or destruction of trees imposed after December 31, 2002 as a condition to a development permit authorized by regulation made under section 70.2 of the *Planning Act* or as a requirement of an agreement entered into under the regulation;

The statutory scheme created by the Province has, in interpretation and in practice, constrained the ability of municipalities to impose tree protection by-laws to matters under the *Planning Act*—in other words, tree protection by-laws cannot be applied to lands that are subject to applications for Official Plan or zoning by-law amendments, site plans, draft plans of subdivision or condominium, or consents. However, many municipalities have been successful in imposing development approval conditions, such as tree protection or compensation requirements, that are consistent with tree protection by-law provisions, provided that these measures are supported by established guidelines and/or policies.

Other by-laws

Site alteration by-laws

Pursuant to Section 142 of the *Municipal Act* and subject to similar exemptions as tree by-laws, municipalities may enact by-laws to regulate the placing or dumping of fill, removal of topsoil, or alteration of the grade of the land, and to require that permits be obtained prior to the aforementioned activities and impose various conditions upon such permits. Because tree injury and long-term tree mortality are typically caused by site disturbance, site alteration by-laws provide an effective tool to promote tree protection in the absence of other tree protection by-laws. For example, site alteration permit applications can require applicants to disclose the location of significant trees or provide supporting information such as tree protection plans or reports, and permit conditions may include the implementation of tree protection measures.

Site Alteration by-law as de facto tree protection by-law?

Waterloo's Site Alteration By-Law (2010-066) includes multiple provisions to support the protection of existing trees. Key provisions include:

- Authority to impose conditions to implement tree protection measures beyond what is required in Schedule D of the by-law (tree protection measures) prior to commencing any work
- Requirement to provide a Site Alteration Plan that includes "the location and type of vegetation cover on the site, including the variety and dbh (diameter at breast height) of every tree on the site" and "tree reports, plans, or studies prepared by qualified tree consultants"
- Ability to require tree protection for any trees at the discretion of the General Manager where protection is required as a condition of any other City approval or bylaw

It is notable that Waterloo does not have a private tree protection by-law in effect. As such, private trees may be protected against injury due to site alteration, but are not effectively protected against removal at the property owner's discretion.

Building Permit application process

Best practices for promoting effective tree protection through the Building Permit application process overlap considerably with those for the development approvals process (see above).

Capital projects

Although capital projects are typically planned and managed internally (or by departmental consultants), municipalities should approach these projects in a similar manner as private applications, including by requiring the provision of tree preservation plans and reports, and implementation of tree protection measures, and on-site monitoring.

Toronto's Urban Forestry division requires that other departments engaging in capital projects with the potential to adversely affect existing trees prepare arborist reports and tree preservation plans and obtain internal 'tree permits' issued by Urban Forestry. Permits may be conditional upon payment of amenity value for removed trees, provision of compensation replanting or cash-in-lieu, arborist supervision of works in Tree Protection Zones, and routine site monitoring and reporting. While efforts are made to maintain flexibility and collaboration, municipal departments are, in effect, treated in a similar manner as external applicants in the context of tree protection.

Awareness-building

The lead municipal division responsible for tree protection should work to increase other departments' awareness of the value of the urban forest and the requirements and methods for effective tree protection both within and outside of the development process. Interdepartmental outreach and education efforts, such as project-specific working groups, "lunch and learn" workshops by tree protection subject matter experts, and open channels of communication, can assist other divisions in promoting tree protection throughout the planning, design and implementation stages of their projects and operations.

External partners and the community-at-large should also be engaged in the overall effort to enhance and implement effective tree protection. Builder, developer, and trades groups; community and neighbourhood associations; community-based stewardship groups; individual residents; and others should be approached through tactics such as surveys, public information sessions, or workshops to provide insight into challenges and opportunities for tree protection in the municipality.

Prior to the COVID-19 pandemic, Oakville regularly hosted tree protection by-law and policy information sessions for the arboricultural industry and the development community. These sessions helped to ensure that tree-related development application submissions, prepared by licensed arboricultural consultants, adequately addressed the Town's tree protection requirements. These sessions reduced application review complexity and costs for developers and helped to ensure more consistent and effective application of tree protection measures.

Municipalities should also provide clear and concise public-facing information materials related to tree protection (and urban forestry in general). These include webpages and social media content, fact sheets, and pamphlets/brochures. These materials should be consistent with updated policies and should concisely outline the requirements and procedures for building and development plan permit application and review.

Some municipalities have developed concise brochures to convey municipal tree protection requirements. Example municipalities include Edmonton (3 brochures: tree protection, trees and construction, and tree hoarding requirements), Halifax, Langley, Nanaimo, and Ottawa (Infill Tree Conservation Program brochure). Calgary has published a more comprehensive 8-page tree protection step-by-step guide to accompany all development applications. The guide outlines the entire tree protection process, from the public tree disclosure statement to implementing the approved tree protection plan.

Best practices for partnerships in the urban forest

Outreach and education

Guiding principles

While effective urban forest outreach and education can take many forms, municipal or partner-delivered awareness-building efforts should be guided by several universal principles:

- **Understanding the audience:** Urban forest partner perspectives and characteristics should be understood to better respond to needs and interest. Important factors to consider may include socio-economic status, education, age composition, cultural background, existing neighbourhood resources, and community context.

- **Transparency:** The purpose and rationale of urban forest outreach and education, as well as potential limitations and the roles and responsibilities of persons involved, should be clearly communicated at the outset to strengthen community trust, increase engagement, support a positive partner experience, and manage expectations.

- **Avoiding advocacy:** Initiatives should remain impartial and municipal staff should avoid acting, or appearing to act, in favour of particular groups or organizations. Initiatives should be non-partisan and non-polarizing.

- **Open-mindedness:** Education should be considered a 'two-way street'; urban forest managers may have as much or more to learn as urban forest partners, particularly when the community may be impacted by projects, plans, or regulations. Outreach organizers should remain open-minded to new ideas, novel approaches, and genuinely held values, beliefs, or concerns expressed by participants. Urban forestry staff must recognize that most partners, and remaining open-minded can guide the development of programs and initiatives that build support for urban forest management while addressing partner needs.

Tactics

Examples of effective urban forest outreach and education tactics include:

- **Internal outreach:** Building awareness and support within the municipal corporation (i.e., among internal partners) can be as important to achieving urban forest management goals as pursuing external engagement. Staff, senior management teams, and Councils can be engaged through internal outreach and education efforts such as 'lunch-and-learns', briefing notes, interdepartmental working teams, and others.

- **Creative and targeted marketing:** Potential urban forest partners can be more effectively reached through targeted marketing, such as in-person engagement at relevant locations like garden centres, hardware stores, and nurseries. Cohesive urban forest program branding and targeted social media outreach can also support increasing engagement.

Richmond Hill won the Gold AVA Digital Award in 2017 for educational urban forestry videos hosted on its YouTube account. One video was about the City's emerald ash borer (EAB) program, while another promoted the use of free woodchips by residents.

"A Tree of All Trades", a video produced by the Halifax Regional Municipality to educate residents about urban forest benefits, has high quality production values and has garnered over 74,000 views on YouTube.

Lethbridge maintains an active social media presence, including a X (Twitter) account with over 22,000 followers. The City's social media accounts (particularly the Instagram account) have repeatedly featured photographs of the urban forest and are effective and important engagement and awareness-building tools.

Several municipalities have deployed cohesive and well-branded campaigns to promote community engagement in the urban forest. Examples include the One Million Trees Mississauga campaign, Toronto's Every Tree Counts campaign, and Oakville's P.L.A.N.T (Please Let's Add New Trees!) program.

- **Engaging with third parties:** External third-party partner organizations, such as local environmental non-governmental organizations, neighbourhood or community groups, businesses, and homeowners' associations, can play an important role in sharing urban forest knowledge and building awareness among their membership networks and target audiences. These organizations can also be engaged as program delivery partners, either by complementing municipal efforts or implementing components of a broader urban forest management program. There are many models for such relationships, but all require close coordination between the municipality and the external partners to ensure successful implementation and positive outcomes.

London, ON provides financial support to, and works in close collaboration with, ReForest London—a local urban forest advocacy and action organization. Among ReForest London's programs include (1) park naturalization, whereby residents are engaged in tree planting and aftercare in parks and woodlands, (2) Neighbourhood ReLeaf tree giveaways, which incentivize residents to plant trees on their private properties, (3) 'Trees for Teachers', which provides professional development workshops and schoolyard tree planting and seedling growing kits, and (4) the Million Tree Challenge, which aims to plant 1 million trees in London. ReForest London and the City work together to coordinate the location, scheduling, and maintenance of stewardship plantings; ensure the communication of consistent messaging; and establish a shared strategic direction and program goals. This close level of collaboration also reduces duplication of efforts and ensures that municipal partner roles and responsibilities are clearly understood.

- **Combining enforcement and education:** Opportunities to build awareness of urban forest issues (e.g., threats and challenges, services and benefits, regulations, etc.) and encourage stewardship may arise through the planning process and by-law enforcement. In many instances, working with developers and other landowners to explore opportunities for tree

protection and replacement can lead to positive outcomes that would have been lost if the process were approached from a strict enforcement perspective.

Tools

Examples of effective urban forest outreach and education tools and programs include:

- **Art contests/exhibitions:** Public art exhibitions or open submission contests related to, or situated within, the urban forest can be an effective tool for building interest and awareness and engaging partners.

Brampton, ON hosted the "Our Urban Forest" art contest to build public awareness of, and encourage engagement in, the City's urban forest management plan development process. Contest winners and runners-up were featured in the public UFMP document and associated materials.

Initiated in 2020, Charlottetown, PEI's Rooted in Art project celebrates the importance and beauty of Charlottetown's urban forest through tree-inspired art installations along an accessible route, In 2021, six installations were facilitated; 2022 will include four installations.

- **Brochures and other printed materials:** Printed materials may include informational door hangers or brochures and leaflets. Materials can be distributed by urban forestry staff or contractors in response to specific events (e.g., tree planting, maintenance operations), while more general informational materials may be available for public distribution at community centres, libraries, or other municipal facilities.

York Region, ON distributed informational door hangers to inform residents about EAB management (tree removal or stem injection) in proximity to their homes. The door hanger also encouraged and provided information about management of private ash trees.

The municipalities of Markham and Milton, among many others, provide an informational door hanger with every newly planted tree to request resident assistance with watering and mulching.

The City of St. Catharines, ON distributes door hanger notifications in response to tree inspection or service requests. The door hanger outlines the findings and proposed actions and advises residents of a 14-day comment period on proposed tree management.

- **Conversation guides:** Conversation guides are documents or other materials that outline a framework for discussions among groups of people with similar or differing viewpoints. Guidance can be implemented in structured settings (e.g., workshops) or informally (e.g., family gatherings). Components of a typical conversation guide may include introductions, conversation agreements, prompts/discussion questions, and reflections.

The 100K+ Conversations Lethbridge initiative was developed to encourage community engagement in strategic and land use planning as the city approached a population of 100,000 residents. A key tool in this initiative is the Kitchen Table Conversations Toolkit, which encourages organisations, businesses, and residents to host "mini community participation workshops". The kit outlines several topics and provides guiding questions to promote discussion. Participants are requested to report outcomes to the City.

- **Enforcement and outreach:** Regulatory enforcement provides an opportunity to educate community members about the urban forest and secure positive outcomes. Moreover, it is important to proactively education residents *about* by-laws and policies to encourage voluntary compliance. Education can also be reactively undertaken during the enforcement process, irrespective of whether or not penalties are levied.

Port Coquitlam's "Good Neighbour Development Policy Brochure" references the City's tree protection requirements as one of multiple considerations for infill development. Kingston, Mississauga, and Toronto have developed similar guides that reference tree protection.

- **Green industry engagement:** Engaging members of the local green industry, such as tree service providers, landscape architects and landscapers, and related others, can encourage compliance with municipal by-laws and standards and promote support for urban forest goals and initiatives. Green industry members can also educate clients and community members.

- **School curriculum support:** Urban forest managers or partners can support local educators with educational materials such as lesson plans, classroom presentations, field demonstrations, and tree establishment on school grounds.

In Red Deer, the City's Environmental Educator—a position within the Environmental Services department—delivers classroom presentations on a variety of educational topics. On Arbor Day, Urban Forestry staff provide every Grade One student with a white spruce seedling, and the program includes school visits by the "Becky the Birch" tree mascot to teach the value of trees.

Project Learning Tree (www.plt.org) is an environmental education program and includes educator tips, a K-8 activity guide, activity collections, a "forest literacy framework", and other educational resources.

- **Social media:** Municipalities should develop and disseminate a cohesive and consistent brand, campaign, and messaging across major mainstream social media platforms. A process

for rapid development, review, approval, and posting of high-priority content should be developed to facilitate emergency or timely communications. Social media communications should include "evergreen", "seasonal", and "responsive" content. Evergreen content can be posted at any time to maintain engagement and interest, and may include facts, tips (e.g., tree maintenance), photos, or links to external sources. Seasonal content may include seasonally-specific tree maintenance tips, program updates, or other periodic content. Responsive content is developed in response to specific conditions or situations, and may require rapid development and posting (e.g., emergency response). Where feasible, photo and video content should be used due to higher engagement rates. Engagement can also be increased by asking questions, acknowledging others' engagement, and sharing humorous (but audience appropriate) content. Existing 'green networks' should be leveraged where possible to amplify content.

- **'Text-a-Tree':** Under a 'text a tree' program, individual trees are assigned contact information (e.g., email address, text messaging), which is made available through online mapping or other methods. Although there are few examples of such programs in effect, they appear to be a positive and popular engagement tool.

In Halifax, a university student established the 'Text-a-Tree' program whereby participants could send a text message to, and receive a volunteer-written reply from, one or more of 15 selected trees in the Halifax Public Gardens. Although time-limited, the project was considered a successful awareness-building tool.

- **Training:** While content may vary, tree-related training programs typically address topics such as tree biology, pests and diseases, protection (including local policies), maintenance, and planting. Participants can apply lessons learned to the maintenance of trees on private lands or to support public tree care (in coordination with municipal staff and programs). Participation is usually on a cost-recovery/fee basis. Municipalities can support external partners in program delivery or in-house staff can provide training. Support can include logistics, staff time, materials and equipment, or direct financial support.

Toronto supports LEAF (Local Enhancement and Appreciation of Forests) in delivering the successful Tree Tenders program, wherein participants learn about tree biology, tree establishment and maintenance, urban forest regulations, and other topics. Similar programs include ReForest London's tree specialist training, the Pennsylvania Horticultural Society's Tree Tenders, Trees New York's Tree Care Training, and Arlington/ Alexandria, VA-based Tree Stewards training.

- **Urban forest ambassadors:** Urban forest ambassador programs engage volunteers to complement and expand municipal urban forest health monitoring activities. Additionally, ambassadors can undertake community outreach and education and spread information about the value of the urban forest, good arboricultural practices, invasive species and pests, and other urban forestry subjects to their neighbours and communities.

To ensure success, the goals and scope of the ambassador program should be clearly articulated, volunteers should be trained by municipal staff or contractors, ambassador activities should be tracked and audited, and the program should be adequately resourced.

Oakville's Forest Health Ambassador Program engaged volunteers to monitor street trees conditions that may indicate forest pest infestation and to engage with residents to build urban forest awareness. The program was initially advertised through the Town's Canopy Club education initiative, the local newspaper, in community centres, and in local high schools.

- **Urban forest guides:** While content may vary, guides can include a summary of current municipal urban forestry programs, basic tree care tips, information about local tree species, tree protection requirements, common tree pests and diseases, engagement and stewardship opportunities, and contact information for urban forest service requests.

Saskatoon has published "Saskatoon's Urban Forest: A Guide to Urban Forestry Services". The guide reviews urban forest benefits, summarizes current City urban forestry programs, provides tree care information, includes detailed descriptions and photographs of local tree species, outlines tree protection requirements, describes common tree pests, and provides a tree request form.

The City of Clyde Hill, WA, published "A Citizen's Guide to Urban Forest Management" which details all aspects of the municipality's urban forestry programs.

- **Urban forest tours:** Urban forest tours may be self-guided or led by urban forest expert staff or volunteers. The purpose of such tours is to build awareness and encourage appreciation of the urban forest by highlighting selected features such as unique (or typical) trees, pests, diseases, other stressors, innovative solutions, or other features. To encourage participation and build awareness, tour feature maps should be accompanied by narrative text, photographs, or other content of interest.

Kitchener periodically hosts "Trees in My Neighbourhood" tours in selected neighbourhoods. Tours are led by the City's urban forester and promoted in partnership with a local environmental NGO.

- **Web content:** An active and engaging urban forestry website can be a cost-effective and impactful means to reach a large audience. An optimal urban forestry website should be a well-structured portal with links to urban forest policies, information about municipal programs, technical but user-friendly information, data and mapping tools, and regularly updated information about community events and other engagement opportunities. The website should also include have service request submission and tracking functionality.

Toronto maintains one of the most comprehensive and accessible urban forestry websites of any Canadian municipality. Other examples of high-quality urban forestry websites include Calgary, Edmonton, Halifax, New Westminster, and Surrey. Brampton's recently updated "Trees" portal is also an exemplary urban forestry webpage.

Partnerships and engagement

Guiding principles

Key principles to guide municipal or partner-led urban forest engagement efforts include:

- **Genuine engagement:** Community engagement in the urban forest is often viewed as simply enlisting participants to supply labor for tree planting or other stewardship projects. While important, these activities in isolation represent a narrow interpretation of urban forest engagement. In addition to basic stewardship, community members and other partners should be engaged in shaping urban forests in other ways, such as through consultation and input into strategic planning, citizen advisory and oversight functions, and cooperative awareness-building and outreach, among many others.

- **Involving partners early:** Where appropriate, urban forest partners should be engaged early on in the "idea" stage of the project or engagement opportunity and be provided opportunities to share information, interest, and concerns. Early involvement helps to secure a sense of ownership in the process, builds momentum (which must be actively sustained), and allows for diverse perspectives to be considered.

- **Building broad support:** Support for urban forest initiatives can be broadened by bringing together representatives of diverse community interests, such as local businesses, civic and social service organizations, community and neighbourhood groups, faith-based communities, and many others. This can provide an opportunity to improve understanding of the community's diverse goals and integrate urban forest program objectives with the goals and actions of these various groups.

- **Accessibility:** Urban forest engagement initiatives, such as stewardship activities (e.g., tree planting) or consultation sessions, should be made as accessible as possible or required by legislation and regulation. This may include providing information in appropriate formats and to external sources that may be able to disseminate information to target audiences more effectively. Engagement activities should be scheduled, located, and implemented in a convenient and physically accessible manner.

- **Facilitating ownership:** Urban forest partners should be enabled to feel a sense of 'ownership' (or co-ownership) of the engagement activity and its outcomes. Although leadership, organization and co-ordination are required to run any engagement event, the emphasis should be on facilitating, rather than directing, engagement.

Stewardship events such as naturalization plantings are a "one-time" event, whereby tree planting by partners typically represents the end of the engagement. However, facilitating post-planting care (e.g., mulching, weeding, watering) for the same participants encourages ongoing engagement and provides survival, health, and growth benefits to newly planted trees.

- **Building trust:** Building trust between the engagement organizers and the participants is key to ensuring a positive partner experience and ongoing support for urban forest initiatives more broadly. Important aspects of trust-building include demonstrating respect for participants regardless of their skill level or reason for participating, transparency about program objectives and outcomes, keeping commitments made and, in the event of 'hands-on' stewardship activities such as tree planting or invasive species management, undertaking sustained tree and site maintenance to demonstrate long-term value and commitment.

Tactics

Examples of effective urban forest engagement tactics include:

- **Providing incentives:** Incentives such as technical services, recognition, rebates, subsidies, or giveaways (e.g., trees, food, 'swag', etc.) can substantially increase community engagement in stewardship events. Subsidies, instead of giveaways—especially in the context of tree planting stock—can reduce cost barriers while fostering a sense of investment and ownership, which may result in increased tree planting and post-planting maintenance relative to free trees, which may be perceived as disposable.

The Sacramento Tree Foundation (STF), a community-based urban forest advocacy organization in California, recognized that publicizing and providing free food or other relatively low-cost incentives (e.g., free gloves, t-shirts, etc.) contributed to significantly increased participation in community stewardship events. STF also works to support other ongoing community initiatives by providing space for community groups to set up booths or displays at tree planting events. Because STF relies on support from the governments of the communities it serves, efforts are made to ensure that the supported initiatives are appropriate for all community members.

- **Tying-in/building on existing programs and activities:** Partner uptake in urban forest stewardship or other engagement opportunities can be increased by 'piggy-backing' on or integrating with other programs, events, or activities. Among the most common examples include coordinating stewardship events with Earth Day, Arbor Day, or other calendar-based celebrations, although many other opportunities to leverage the momentum of existing programs are available. Urban forest engagement opportunities should also be promoted at other events and municipal facilities (e.g., farmer's markets, festivals, recreation centres, etc.)

- **Providing hands-on opportunities:** Providing opportunities for 'hands-on' involvement encourages a sense of empowerment and ownership and can be more enjoyable for many participants and urban forest partners, encouraging sustained and ongoing participation.

- **Staffing a coordinator position:** Coordinating sustained partner engagement may require a 'go-to' staff member. Among the responsibilities of this position may include development of the engagement program strategy (i.e., goals, objectives, targets) and actions, coordinating between partners and the municipality on engagement activity logistics (e.g., planting location, equipment and materials delivery, publicity and advertisement, follow-up maintenance), providing technical support, and facilitating communications between various partners.

Tools

A nearly limitless variety of tools, programs, and initiatives are available to engage internal and external urban forest partners in urban forest stewardship. Example urban forest engagement tools and programs are grouped by theme and organized in one of seven categories, below.

Urban forest inventory, analysis, and monitoring

- **Community tree inventory:** Volunteer community members are trained by experts (e.g., staff or contractors) to collect basic tree inventory data, commonly for all trees (public and private) in a defined area. This provides census-level information to support urban forest management at a local scale.

The Neighbour*Woods* community tree inventory protocol has been successfully applied by several communities, including Centre Wellington, Champlain Park and Beaverbrook (Ottawa), Harbord Village and Long Branch (Toronto), and Mitchell, among others.

- **Community-involved monitoring:** Participants are engaged in monitoring urban forest features, such as street and park trees, woodlands, and naturalization or restoration plantings. Participants report monitoring findings to appropriate authorities (e.g., urban forester, partner organization or agency) to inform management.

Richmond Hill's Community Stewardship Program (CSP) includes a Restoration Monitoring Protocol that engages volunteers to support City staff or contractors with restoration/naturalization planting monitoring efforts. Volunteers can assist with plot delineation, tree counts, hazard identification, and other monitoring tasks.

Urban forest health/maintenance – public

- **Adopt-a-Tree:** Individual participants, local community groups, businesses, or other partners register interest in and provide basic required care for (typically) newly planted or young trees. The level of care typically includes watering, mulching, weeding, and monitoring/reporting of issues. Active coordination is not critical to program success if resource constraints preclude it, and programs can often be successfully implemented on an 'honour system', especially if trees are adopted by internally accountable groups or organizations rather than by individuals.

Cambridge, Massachusetts runs the exemplary 'Forest Friend' AAT program, which includes an online map of 'available' and 'adopted' trees. The City also employs seasonal 'Water-by-Bike Tree Ambassadors' to inspect and water trees and interact with residents and businesses to promote tree care and educate about urban forest benefits.

- **Citizen pruner:** Volunteers are instructed in young tree structural pruning techniques and must demonstrate proficiency in proper pruning techniques and only apply the minimum necessary pruning dose. Work must be tracked and audited by staff to ensure proper implementation.

- **Community 'weed pulls':** Participants can be engaged in basic invasive species management. Only non-toxic, non-noxious, and easily removed invasive species should be targeted for community-involved management. Volunteers should never be engaged in pesticide application or other potentially hazardous control methods.

The Invasive Species Council of BC Organize an Invasive Weed Pull fact sheet provides implementation guidance for community invasive weed pull events.

- **Post-planting care:** Participants can be engaged in post-planting maintenance of restoration and naturalization plantings. The level of care typically entails inspection/monitoring, weeding, mulching, and watering—if a nearby water supply or truck/tank is available. Community-involved post-planting care encourages sustained engagement, can significantly improve survival and growth rates for newly planted trees, and promotes positive public perception of naturalization plantings.

- **Tree watering:** Engagement in tree watering is similar to but less formalized than an Adopt-a-Tree program and focuses on supporting watering—the most important factor in successful tree establishment. Engagement can be promoted through direct resident contact at the time of planting or distribution of informational materials such as door-hangers or leaflets. As many residents are concerned about the cost of watering, participation can be increased by clearly explaining the very low cost of tree watering (approximately 3.7 cents for 50 litres of water at ENWIN's 2023 water rates).

Kitchener proposed a Community Stewardship and Tree Watering Program whereby residents could register their willingness to water the City-owned tree(s) fronting their property. Residents would receive a tree watering bag and registered trees would be marked with blue flagging tape to signify that they were under stewardship. On a weekly basis, the City would notify residents via email about the week's tree watering requirements, which may vary depending upon rainfall, temperature, and other factors. It is not known if this program remains active, but it serves as an example of best practices for engaging residents in tree stewardship.

Barrie and New Tecumseth distribute tree watering bags to interested residents with access to water and a recently planted boulevard tree. Residents are requested to water the tree once per week. Program cost is approximately $18 per tree, not including administration.

Urban forest health/maintenance – private lands

- **Technical support:** Urban forestry staff or municipal contractors can provide advice or assessments for landowners to encourage the implementation of best practices for tree maintenance and planting. Care must be taken to avoid undue interference with the private sector, which can be achieved by limiting the scope of advice and assessments and providing advice on how to retain arboricultural services. Care must also be taken to limit liability exposure, and municipal staff/contractors should not provide any technical services on private lands.

Many municipalities host urban forest Frequently Asked Questions (FAQ) and include technical information (or links to external resources) on their urban forestry webpages. Notable examples include Brampton, Halifax, London, Markham, and Toronto,

Edmonton offers free tree pest identification for residents, who can deliver specimens in-person or by mail, or can submit photographs of suspected urban forest pests, diseases, and invasive species.

- **Grants, subsidies, and rebates:** Grant, subsidies, or rebates can be offered to provide direct financial support for tree maintenance on private property, thereby promoting urban forest health and supporting the provision of urban forest services and benefits.

London offers the Veteran Tree Incentive Program (VTIP) which provides up to a 25% rebate on eligible costs for maintenance of a designated Distinctive Tree that helps to meet the goal "to defer the removal of the largest trees to the latest possible date while allowing for successional planting to catch up".

Tree establishment – public trees

- **Memorial trees:** Memorial tree programs allow participants to pay for the cost of tree procurement, installation, and post-planting maintenance, or to "adopt" an existing tree, in exchange for a commemorative element. These programs do not typically significantly support urban forest objectives and are, at best, operated on a cost-recovery basis. However, they can serve as a useful engagement and awareness-building tool to promote further engagement in the urban forest.

- **Request-based planting:** Request-based planting programs allow participants to request tree planting in available locations within the municipal road right-of-way or other locations prescribed by the program. Implementation options for request-based programs vary widely according to municipal resources. Some important considerations include species selection (i.e., can residents choose a preferred species?) and maintenance commitment (i.e., should the program require participants to, at minimum, commit to tree watering?) Programs should be actively promoted to encourage uptake.

Hamilton's Street Tree Planting Program is actively promoted by the City and supported by an online request interface, clear guidelines, a list of 40 tree species, and instructions for post-planting care.

Tree establishment – multiple trees/naturalization

- **Community-based stewardship:** Community-based stewardship is among the most basic and common forms of urban forest engagement, and most commonly entails involving participants in tree planting or similar activities.

- **Tree donation:** Through tree donation programs, participants are encouraged to harvest (dig) trees from their properties and transfer them to pots to support planting efforts elsewhere in the municipality.

ReForest London's TreeCycle program encourages residents to pot and donate their surplus trees to support the organizations One Million Trees Challenge projects and initiatives. Most trees are self-seeded individuals obtained from flower and garden beds, but program participants also include seed collectors, growers, and local businesses. Donors receive a charitable tax receipt for $10 per tree.

Tree establishment – private lands

- **'Free tree' programs:** These programs encourage private tree planting by providing free (or low-cost) trees to community residents or other participants. While the structure of such programs varies widely, effective elements include:
    - Requirement for pre-registration and a scheduled pick-up window
    - Distribution of a variety of native tree species
    - Use of small-stature, typically potted stock
    - Requirement to maintain the tree post-planting
    - Request to obtain utility locates before planting
    - Request for post-planting reporting
- **Large landowner/ICI engagement:** Large land holdings, particularly in the Industrial, Commercial, and Institutional sector, may provide among the best opportunities for growing the urban forest. However, large landowners commonly request incentives to participate in urban forest stewardship, recognizing that tree establishment may remove land from other economically productive uses.

The Brantford Commercial/Industrial Cost Share Tree Planting initiative, part of the City's broader Tree Canopy Expansion Program, provides reimbursement of up to $500 to cover 50% of the cost of planting trees on industrial or commercial property. Eligible expenses include the cost of trees, contract planting of trees, or equipment rentals to plant trees. City staff are available to provide guidance on recommended tree species, size, and care, and will conduct a follow-up site visit as part of the program.

- **Rate/fee reductions:** Reductions in rates or fees in exchange for tree planting or other urban forest stewardship initiatives can promote engagement. Prior to offering rate reductions, municipalities must ensure that such incentives are permissible by law or regulation. As such, rate reductions are typically only offered for fees or rates collected by the municipality, and not on fees or rates collected by third parties (e.g., taxes, utility rates, etc.)

Newmarket, ON offers a $100 Stormwater Management Rebate for private land tree planting through the Full Service or 'Do-It-Yourself' tree planting programs provided by LEAF.

- **Subsidies or grants:** Programs may provide direct financial and/or in-kind support for tree planting on private properties. The structure of such programs varies widely according to available resources and partnerships.

- **Tree 'challenges':** Tree challenges are typically community-wide initiatives to inspire a broad range of partners to establish trees on both public and private lands through a shared 'call to action'. Common examples include 'One Million Tree' challenges, although the scope of challenges varies widely according to factors such as community size, target audience, and resource availability. Many tree challenges now commonly integrate an online tree tracking tool, which participants can use to register their trees against the tree planting goal. Some tree trackers allow users to map the location of planted trees, which can assist in future monitoring efforts.

Brampton, London, Mississauga, and Winnipeg, among other communities, have established goals and issues challenges to support the planting of one million trees. Each challenge is supported by a tree tracker tool and mapping.

Civic engagement

Civic engagement entails participation by community residents and other urban forest partners in municipal governance and decision-making processes. The scope and nature of civic engagement tools and program varies widely according to the local governance structures, and distinct best practices for civic engagement are difficult to identify.

London's Trees and Forests Advisory Committee serves as a resource and information support group to the Planning and Environment Committee and City Council. The committee is composed of members-at-large, representatives of local tree-related businesses, and other local organizations.

Active since 1971, the Truro (Nova Scotia) Tree Committee is composed of six citizen volunteers, the Director of Public Works, a member of Town Council, and a full-time staff Urban Forestry Coordinator. The Committee oversees the management of the Town's urban forest on behalf of the Town Council and residents.