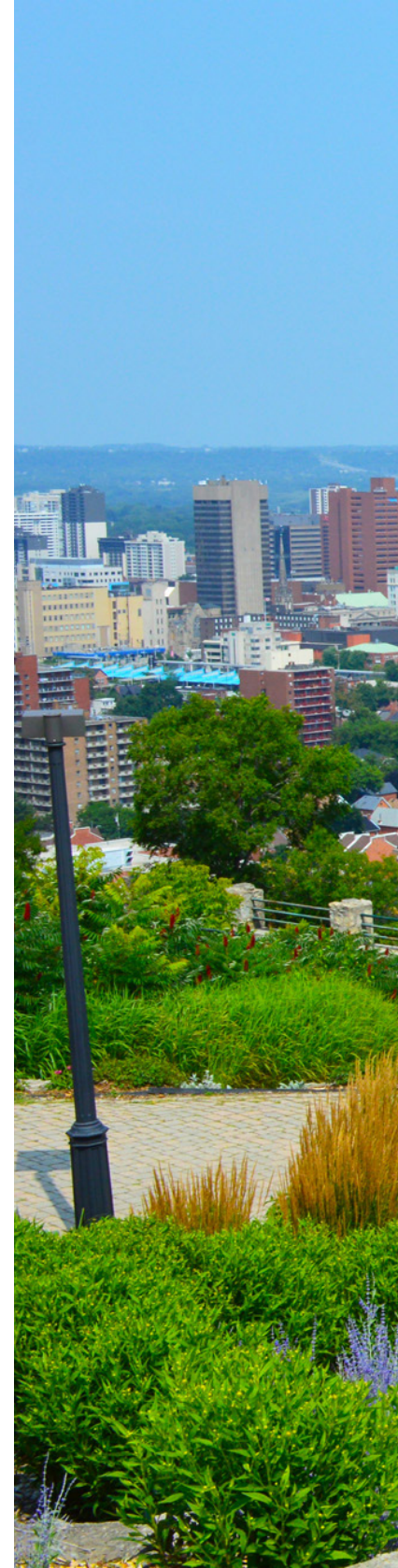




**URBAN
FOREST**
STRATEGY

WWW.HAMILTON.CA





Hamilton



ET

2020

City of Hamilton



**URBAN
FOREST
STRATEGY**

The graphic features a stylized illustration of a city skyline with green trees integrated into the buildings. The word 'URBAN' is in black, 'FOREST' is in black, and 'STRATEGY' is in green. The background of the graphic is a light green and white pattern.

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INTRODUCTION

Hamilton's urban forest is unique. The Niagara Escarpment winds through the urban area, separating it into downtown and "Hamilton Mountain" areas. Cootes Paradise, Dundas Valley, and Red Hill Valley form major natural corridors connecting the escarpment to Lake Ontario. Throughout the city, there are greenspaces and trees that provide habitat for native plants and animals, maintain watershed function, support public health, and make Hamilton a beautiful place to live.

Hamilton's urban forest can be defined as all trees, whether single trees, groups of trees or woodlands that are found on public and private land within the urban boundary. The urban forest is more than just trees - it is part of the natural environment that provides a home to all the species that live within it, including people. Recognizing how important forests are for protecting nature and building livable cities, the Urban Hamilton Official Plan sets a target to reach 30% canopy cover.

Both the Urban and Rural Hamilton Official Plans and the 2016-2025 City Strategic Plan include goals for environmental sustainability and for achieving a balance of healthy natural and urban spaces. The urban forest has an important role in achieving this balance.

This is the first Urban Forest Strategy (UFS) for the City of Hamilton. The UFS is a high-level plan and the roadmap for a sustainable urban forest. It sets the long-term direction for the urban forest for the next 20 years and is supported by a technical report that provides background for the UFS priorities. The UFS includes actions that will help the City achieve its urban forest vision, as defined by the many people who helped shape this plan.

WHAT IS THE URBAN FOREST?

Hamilton's urban forest includes all of the publicly and privately-owned trees and supporting vegetation in the urban area. The urban forest includes more than Hamilton's natural areas.

Individual trees and groups of trees along streets, in backyards, parks, and commercial areas in Hamilton's urban boundary are also part of the urban forest.



CITY OF HAMILTON URBAN FOREST VISION

Hamilton's urban forest is resilient, contributes to the well-being of all neighbourhoods, and is valued as a shared asset.

DID YOU KNOW?

- The Niagara Escarpment is home to some of the world's oldest cliff-dwelling trees, with the oldest living eastern white cedar germinating about 1,050 years ago.
- Original trees are the oldest living things in our streets. They are reminders of the natural habitats they came from and now live among the neighbourhoods that grew up around them. There is a bur oak tree (*Quercus macrocarpa*) on Mountwood Avenue that is older than the City of Hamilton.
- The tallest tree in Hamilton is a native tulip tree (*Liriodendron tulipifera*) that measures 150 feet high - about 50 metres tall.

THE MANY BENEFITS OF HAMILTON'S URBAN FOREST

Investing in the urban forest supports other important City goals like sustainable urban development, stormwater management, recreation and protection of natural assets. In 2019, Hamilton joined other cities across Canada in declaring a climate emergency. Climate change will affect many aspects of life in the city, from public health to infrastructure to transportation and energy systems to biodiversity. A healthy urban forest provides an important tool for mitigating climate change effects and meeting the City's goal to reduce carbon emissions by 30% by the year 2050.

THE URBAN FOREST STRATEGY SUPPORTS OTHER STRATEGIC OBJECTIVES IN THE CITY OF HAMILTON



There are many pressures threatening Hamilton's urban forest today:

- Invasive tree and plant species are affecting local biodiversity;
- Introduced pests, like Emerald Ash Borer, have caused large-scale losses of ash trees;
- Climate change is increasing environmental stress on trees and natural areas; and,
- Development pressure for housing and infrastructure is reducing growing space for trees.

Without intervention, there is a risk that Hamilton will see a slow and steady loss of urban tree canopy cover as the City continues to grow. A clear strategy to guide urban forest management is an

urgent priority to prevent further loss and impacts to urban forest health. Recognizing how important the urban forest is for protecting nature and building livable cities, the Urban Hamilton Official Plan sets a target to reach 30% canopy cover.

THE URBAN FOREST - A SHARED RESOURCE

The urban forest is a shared resource. Managing the forest is a joint effort between City departments and other agencies working together. It also relies on the actions of residents, community groups, Council and the private sector. Working together and communicating often are important ingredients for a successful urban forestry program.



WHAT TREES DO FOR US

The City's Strategic Plan lays out a clear vision: "To be the best place to raise a child and age successfully." Research shows that exposure to nature, is good for the well-being of residents at all ages. Hamilton's urban forest contributes to the City's vision of a healthy community. It also provides many other environmental and economic benefits to government and the community.¹

TREES ARE PART OF HAMILTON'S "GREEN INFRASTRUCTURE"

Green infrastructure (GI) is defined as the "natural vegetative systems and green technologies that together provide a multitude of economic, environmental and social benefits."² It includes soils that can sustain vegetation and absorb water, as well as other stormwater infiltration and retention technologies like porous pavements, bioswales, rain barrels and cisterns. All of these mimic natural ecosystem services. The urban forest is an important part of Hamilton's green infrastructure.

Trees contribute to GI services in a number of ways:

- Trees reduce stormwater runoff by capturing and storing rainfall in their canopy and releasing water into the atmosphere;
- Trees draw moisture from the soil ground surface, thereby increasing soil water storage potential;
- Tree roots and leaf litter create soil conditions that promote the infiltration of rainwater into the soil as well as reduce erosion and sedimentation;
- Trees help slow down and temporarily store runoff and reduce pollutants by taking up nutrients and other pollutants from soils and water through their roots; and,
- The urban forest canopy lowers air temperatures and reduces the urban heat island effect through shading and evapotranspiration, which improves energy efficiency in buildings.

ENVIRONMENTAL

Improved local air and water quality
Biodiversity conservation
Reduced flooding
Mitigate urban heat island effect
Carbon sequestration and storage

ECONOMIC

Reduced pressure on stormwater infrastructure
Extended pavement life
Increased residential property values
Improved visitor perception
Lower energy costs for heating and cooling
Improved climate resiliency

SOCIAL

Mental health benefits
Shade and cooling
Increased physical activity
Better walking environments
Noise reduction
Solace and a sense of place
Cultural and heritage values

Source: Tree Canada, Benefits of Urban Trees

¹ See Tree Canada – Compendium of Best Urban Forest Management Practices, Chapter 3: Benefits of Urban Trees with literature cited.

² Green Infrastructure Ontario – <https://greeninfrastructureontario.org>.

10 WAYS TREES HELP US



10. Improved climate resiliency



1. Reduced storm water runoff and improved flood mitigation

2. Improved local air and water quality



9. Shading and cooling to mitigate the urban heat island effect

8. Noise buffering



7. Lower energy costs for heating and cooling

6. Habitat for wildlife

5. Increased property values, benefiting developers and homeowners

3. Physical and mental health benefits for residents

4. More attractive and livable neighbourhoods and commercial areas

WHAT YOU CAN DO FOR TREES

With approximately 58% of Hamilton's trees located on private property, residents and business owners have a large stake in the urban forest. Many people believe that planting new trees is the best way to grow the urban forest. Planting helps to maintain a sustainable tree population by replacing trees that are lost. Tree planting can also help increase canopy cover in the longer term.

Taking care of existing healthy trees is actually one of the best ways to grow the urban forest. Large trees and their big crowns provide the most benefits to the residents of Hamilton. Large trees are not 'replaceable' – it took a century or more to grow some of the mature trees that spread their branches over Hamilton's oldest neighbourhoods. Trees are a long-term investment and every resident and business owner has an important role to play in the effort to protect Hamilton's valuable urban forest.

10 THINGS YOU CAN DO FOR TREES

-  PRESERVE EXISTING TREES ON YOUR PROPERTY WHENEVER POSSIBLE
-  PLANT NEW TREES ON YOUR PROPERTY AND PARTICIPATE IN COMMUNITY TREE PLANTING EVENTS
-  WATER YOUNG TREES DURING PERIODS OF LOW RAINFALL
-  HAVE MATURE TREES ASSESSED BY A QUALIFIED ARBORIST
-  PROTECT TREE STEMS AND ROOTS FROM DAMAGE DURING CONSTRUCTION AND LANDSCAPING
-  RESPECT CITY TREE BY-LAWS
-  ADVOCATE FOR BETTER TREE PROTECTION IN HAMILTON
-  PARTICIPATE IN CITIZEN SCIENCE
-  SPEND TIME WITH TREES - GO FOR A HIKE IN THE WOODS OR A WALK IN YOUR LOCAL PARK
-  TALK TO YOUR NEIGHBOURS ABOUT WHY TREES ARE IMPORTANT

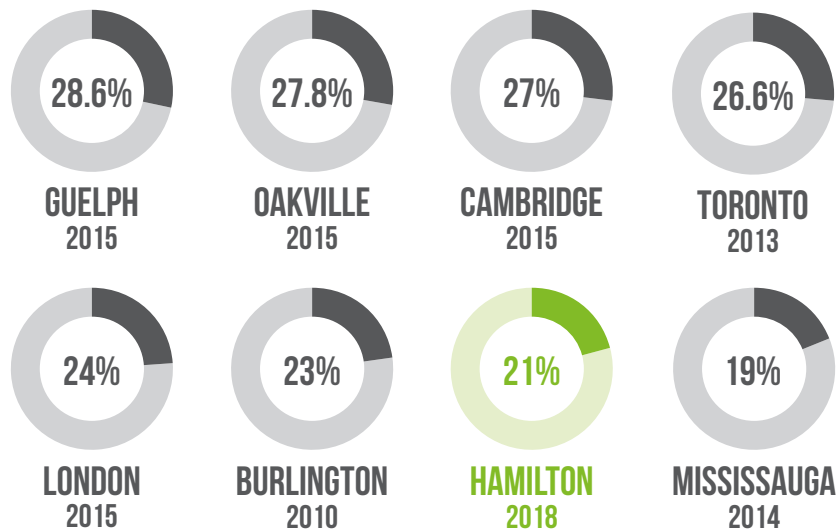


THE BIG PICTURE

HAMILTON'S URBAN FOREST

Hamilton's urban forest is part of the Carolinian forest region, one of the most biologically diverse areas in Canada. In the past, the Carolinian forest covered 80% of the region before settlers started clearing land and building cities.³ Total canopy cover in Hamilton's urban area is currently estimated at approximately 21.2%.⁴ The loss of natural canopy cover affects watershed health and native biodiversity. Compared to other Ontario municipalities, Hamilton's canopy cover is relatively low, at approximately two thirds of the City's 30% target.

CANOPY COVER IN NEARBY CITIES



DISTRIBUTION OF CANOPY COVER

The distribution of the urban forest is uneven across the city. Canopy distribution is affected by many things, including development history and land use. Areas with large parks or mature residential neighbourhoods generally have higher average levels of canopy than industrial or commercial areas, and generally have more room for planting new trees as well. This shows the effect that different land uses have on the amount of canopy cover, as well as potential canopy cover. It also means that access to the benefits of trees is not equal around the city. Identifying and prioritizing planting opportunities across all land uses can help improve the future distribution of the urban canopy.

WHAT IS CANOPY COVER?

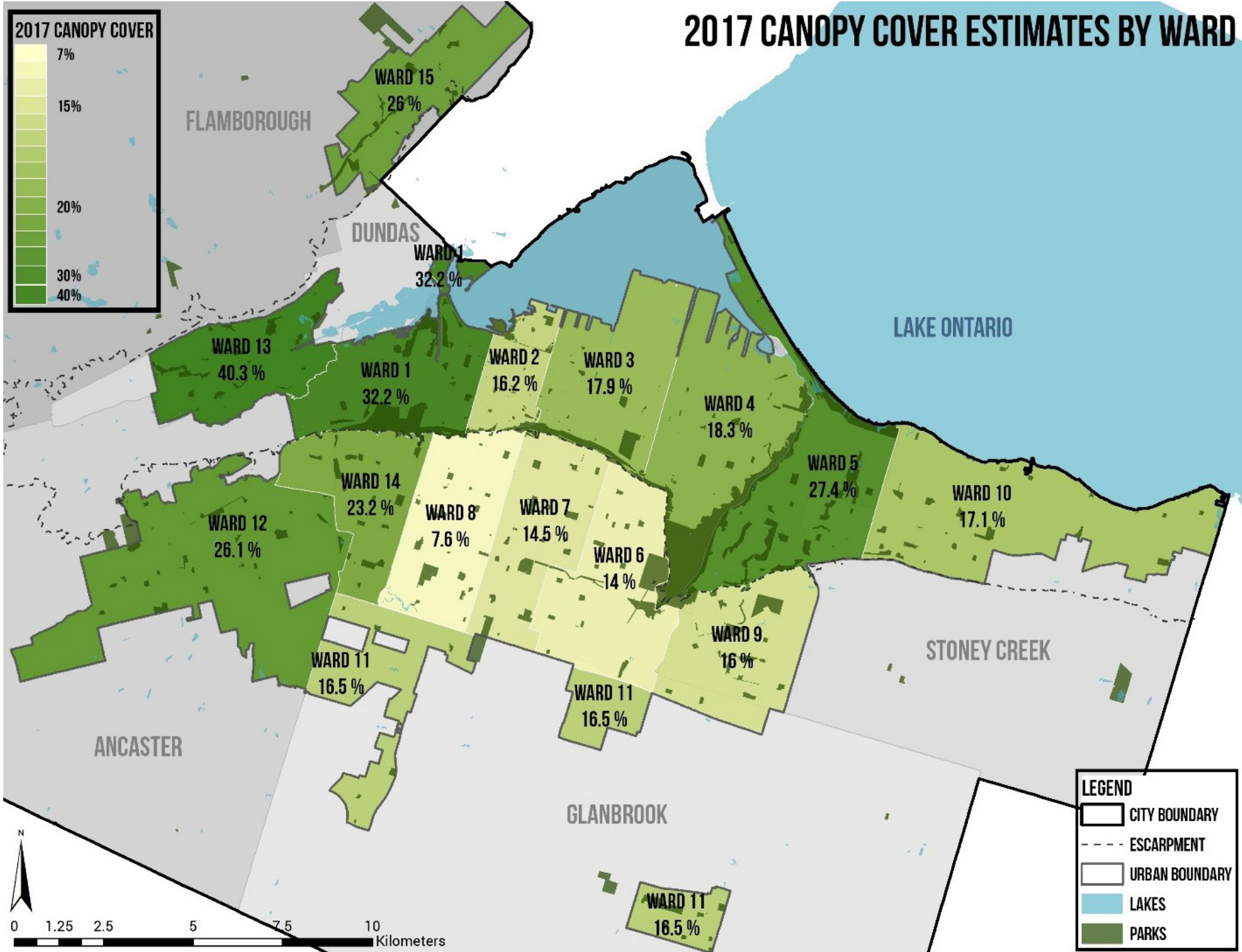
Canopy cover represents the amount of land area covered by individual trees and woodlands as seen from above. It is one of many ways to describe the urban forest. The term includes all trees and shrubs that make up the urban forest.

Many cities are setting canopy cover targets, recognizing the many benefits of urban trees for people, for sustaining watershed function and for supporting biodiversity.

³ According to LANDSAT TM satellite imagery (vintage 1987-1993).

⁴ Land and tree cover were assessed using the USDA Forest Service i-Tree Canopy tool using 2017/2018 leaf-on imagery from Google Earth. This was the most recent and complete year available.

2017 CANOPY COVER ESTIMATES BY WARD





European Buckthorn

SPECIES DIVERSITY

Although it makes up only one percent of Canada's total land area, the Carolinian forest is home to more species than all the other forest regions in Canada. Oak, hickory, ash, chestnut, black walnut, red and sugar maple, sassafras, tulip tree, and beech are just some of the tree species that are found in the Carolinian forest.

In Hamilton, black walnut, Norway maple and Manitoba maple represent the top three species in terms of leaf area⁵. Norway and

Manitoba maple are classified as invasive species in Ontario. About 67% of the total forest leaf area consists of native species and about 29% consists of invasive species.⁶ Some of these species, like Norway maple, were commonly planted because of their ability to thrive in tough urban environments but later became invasive in natural areas. Now, forest managers develop tree planting lists for streets and natural areas that reflect the different management goals and growing conditions on these sites. Climate change is another factor that will affect tree species selection for the City of Hamilton.

⁵ Leaf area is a measure of the total one-sided surface area contributed by all leaves on a tree. It is used, along with the number of trees, to describe the extent of Hamilton's urban forest.

⁶ The remainder are non-native, non-invasive species.

TOP FIVE TREE AND SHRUBS SPECIES BY LEAF AREA

(SOURCE: 2018 HAMILTON I-TREE ECO STUDY)

TREE SPECIES	% OF TOTAL LEAF AREA	SHRUB SPECIES	% OF TOTAL LEAF AREA
Black walnut	19.8	Gray dogwood	17.4
Norway maple*	7.3	Honeysuckle species	13.4
Manitoba maple*	4.8	European buckthorn*	7.3
Silver maple	4.7	Yew species	5.8
Black locust	4.6	Eastern white cedar (shrub form)	4.5

*Invasive species

The presence of these invasive species shows how dramatically Hamilton's forests have changed over time. This is also true of the urban forest shrub layer, with 14.3% of the shrub leaf area made up of invasive species like European buckthorn. This shift in species matters, because it causes changes in the structure and composition of ecosystems. Invasive species can quickly change natural areas and degrade their ecological, aesthetic and recreational values. Early detection and active management of invasive species is critical for reducing the negative impacts of invasive species in Hamilton's parks and natural areas.

NATIVE, EXOTIC OR INVASIVE?

Native plants are those that occur naturally in an area.

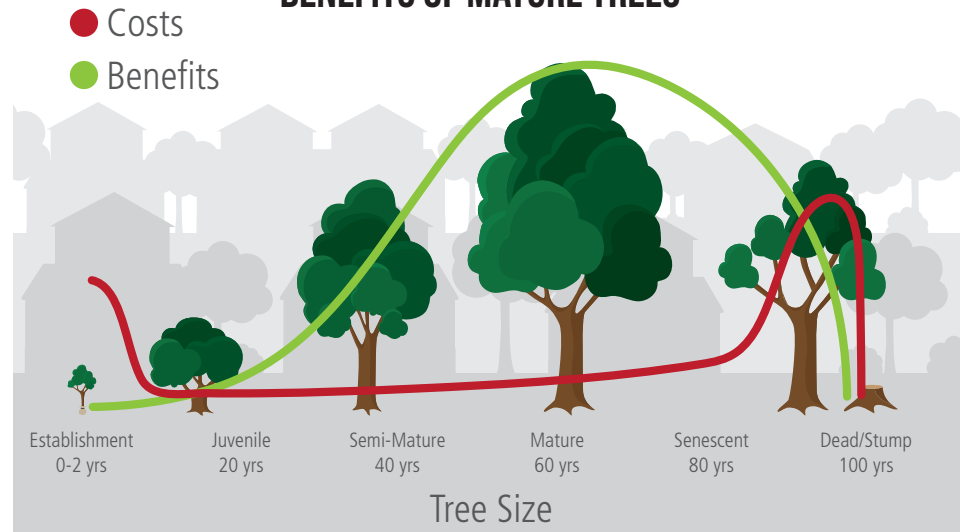
Invasive plants are not local and are spread by global trade, human and animal transport and escape from gardens. They tend to spread quickly and interfere with native plants, which reduces habitat for native wildlife.

Exotic, non-invasive plants are non-native species that have been introduced from an area out of their natural distribution but do not generally cause environmental harm.

TREE SIZE

The average diameter of trees in Hamilton is 12.3 cm, measured at 1.3 metres from the ground (this is referred to as "diameter at breast height", or DBH). This includes newly planted trees and new growth found in the understory in woodlands, on vacant properties and other areas left to naturalize. Street trees tend to be larger, with an average diameter of 25.1 cm. Compared to nearby cities, Hamilton has a similar number of small trees. However, it falls short on trees in the largest size classes, which provide the most benefit. Keeping a range of age classes is important for urban forest health.

BENEFITS OF MATURE TREES



STREET TREES

Hamilton's street trees are the most intensively managed trees within the urban forest. This is because street trees occupy prominent locations in the city and provide some of the most tangible benefits to people. In some neighbourhoods, street trees represent almost all of the canopy cover and make an important contribution to neighbourhood character and livability. The structural (replacement) value of Hamilton's 168,610 street trees is approximately \$500 million.

This is about 24% of the total forest value even though they represent only 3.2% of Hamilton's total tree population.

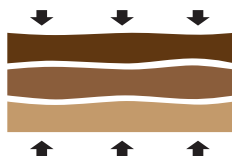
Their location on city roadways means that street trees face additional stress like compacted soil, road salt and limited growing space. Despite these pressures, 87% of street trees are rated in good condition. This shows the benefit of a good maintenance program for protecting the City's investments in its valuable street trees.

Overall, there is a good diversity of street tree species in Hamilton with the exception of an overabundance of maple species. This makes street trees more vulnerable to pest outbreaks like Asian Longhorned Beetle that target certain tree species. A recent, sample-based inventory showed that city right-of-ways may offer some opportunity for growing Hamilton's tree canopy, with approximately 37,000 possible planting sites located along city roadways. However, gaining community support for tree planting in right-of-ways will be an important part of greening Hamilton's streets.

LAND COVER CHANGE

Another important change in Hamilton has been an increase in paved area across the city. Between 2008 and 2018, the amount of hard surface in the city increased from 42.3% to 46.3%. This increase in roads, sidewalks, driveways, parking lots, decks, pools and patios means less growing space for trees. As cities grow, the use of hard surface planting techniques will become an important tool for maintaining and expanding the urban forest in increasingly urban areas. At the same time, the City should develop better policy tools to protect growing space (including native soils) for trees.

STRESSES ON TREES PLANTED IN HARD SURFACES



SOIL COMPACTION

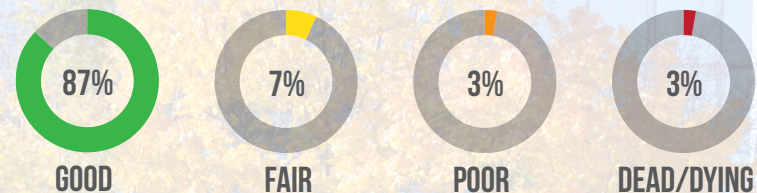


ROAD SALT



LIMITED SOIL AVAILABLE FOR ROOTS TO GROW

CONDITION OF HAMILTON'S STREET TREES





STATE OF THE FOREST

Hamilton's existing urban forest management activities were graded with a set of performance indicators used by many cities in North America.⁷ This approach allows for comparison between municipalities using the same criteria. Currently, Hamilton's urban forest program lands mainly in the 'fair' performance category.

Areas of strength that Hamilton can build on in its urban forest program include:

- A successful city-wide street tree maintenance program;
- Strong community engagement; and,
- The Niagara Escarpment, which runs through the City and connects natural areas.

Key areas for improvement include:

- Protection of private trees;
- Integration of trees in infrastructure and development projects; and,
- Management of natural areas, including invasive species.

The UFS includes baseline measures that can be used in the future to measure progress towards Hamilton's urban forest goals. These are grouped into three themes (Environment, Economy and Community) to describe the many benefits that urban forests provide.



⁷ Leff, Michael. 2016. *The Sustainable Urban Forest Guide: A Step-by-Step Approach*. Davey Institute and United States Department of Agriculture, Forest Service.



STATE OF THE FOREST: ENVIRONMENT



% CANOPY COVER

The City's goal is to achieve 30% canopy cover.
Hamilton currently has 21.2% canopy cover.



OF TREES IN HAMILTON

Hamilton's urban forest consists of about 5.2 million trees.
168,000 (3.2%) of those are street trees.



SPECIES SUITABILITY

67.3% of total canopy leaf area is comprised of native Ontario species.
29.3% of total leaf area is comprised of invasive species.



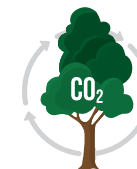
AVERAGE TREE DIAMETER

Large, healthy trees provide more benefits.
The average size of all trees is 12.3 cm. Street trees have a larger average size of 25.1 cm.



TREE CONDITION

Overall, 80.1% of Hamilton's trees (public and private) are in good or excellent condition.
87% of street trees are in good condition.



CARBON STORAGE AND SEQUESTRATION

Trees sequester 13,412 tonnes of carbon annually and store a total of 395,000 metric tonnes of carbon.



STATE OF THE FOREST: ECONOMY



ECOSYSTEM SERVICES

Ecosystem services produced by the urban forest include pollution removal, oxygen production, stormwater and climate change mitigation, energy savings.

Hamilton's urban forest provides \$8.2 million in ecosystem services annually.



OF TREES PLANTED

Planting trees can help replace and grow the canopy, if growth rates exceed removals.

Hamilton planted approximately 10,000 trees a year between 2013-2018.



AVOIDED STORMWATER RUNOFF

Trees reduce the burden on stormwater infrastructure by slowing surface runoff.

Hamilton's trees intercept 815,639 m³/year of stormwater, a service worth \$1.9 million annually.



ENERGY SAVINGS

Trees contribute to cost savings related to heating and cooling.

Hamilton's trees reduce energy use by 282,319 MBTUs, with a value of \$3.63 million annually.



GRID MAINTENANCE RETURN CYCLE

Hamilton has achieved a 7 year pruning return cycle for street trees.



STATE OF THE FOREST: COMMUNITY



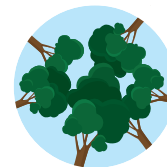
AIR QUALITY

Hamilton's urban forest improves local air quality by producing 13.46 thousand metric tonnes of oxygen and absorbing 256 tonnes of pollution every year.



OF STREET TREES

Street trees contribute to healthy, walkable communities.
Hamilton has 168,000 street trees.
There are an estimated 37,000 planting locations in City ROWs.



DISTRIBUTION OF CANOPY COVER

Canopy cover is distributed unevenly across the City.
There is a 32.7 percentage point difference between the wards with the highest and lowest percent canopy cover.



SCHOOLS ENGAGED

The Forestry Schools Program engaged with an average of 19 schools per year between 2013-2018.



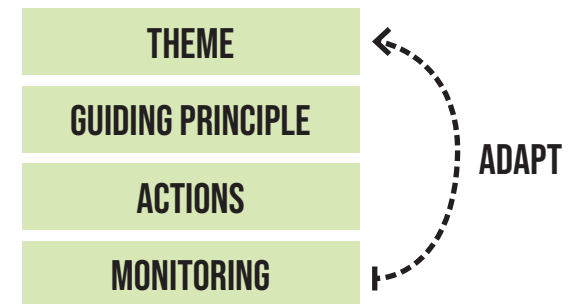
THE URBAN FOREST STRATEGY

Hamilton's first Urban Forest Strategy (UFS) is an important step toward a healthy urban forest that provides maximum benefits to residents and to the City of Hamilton. Many people were involved in the development of a vision statement for the urban forest and helped define the themes, guiding principles and actions for the UFS.

The UFS is a high-level document that will guide management decisions moving forward. The UFS is meant to answer the 'what and why' questions of urban forest management under a set of themes and guiding principles. The UFS also includes a monitoring approach that uses a set of criteria and targets to track progress.

Actions to support UFS goals are identified under each theme and range from simple to complex. For that reason, the details of 'how' to implement the UFS actions will be part of operational planning moving forward. This will consider local context, resources, opportunities and constraints that are best understood by City staff and other stakeholders whose work influences the urban forest.

Successful implementation requires a group effort that involves many City departments, other management agencies, the public and the business community in Hamilton.



A bold strategy for Hamilton's urban forest, endorsed by Council, signals to all stakeholders that Hamilton is committed to building a climate resilient, livable city where people want to live and work. This includes trees and healthy natural areas as an essential part of city infrastructure. It also means investing in the urban forest and doing the hard work to make that vision a reality.

PHASE ONE

January to December 2018

Background Information Review

Data Collection and Analysis

PHASE TWO

May 2018 to November 2019

Public Engagement

Activities:

May 17, 2018 – Stage 1 Internal and External Stakeholder Workshops

May 29, 2018 – Public Open House

June – September 2018 – Online Survey

April 17, 2019 – Stage 2 Internal and External Stakeholder Workshops

June 5, 19, and 24, 2019 – Public Workshops

PHASE THREE

January 2019 to October 2020

Draft Report Preparation

PHASE FOUR

Fall and Winter 2020-2021

Draft Report Review and Public Engagement

2021

Final Report and Council Approval

WHAT WE HEARD

Collecting input from the community, City staff and stakeholders that work in the urban forest was an important part of the UFS process. Stage 1 of public engagement included an online survey, stakeholder workshops and a public open house that helped shape a first draft of the UFS priorities. This draft was taken back to stakeholders for a second round of input, which helped define the key values, themes and actions for Hamilton's UFS. People were concerned about the future of the urban forest. They came to the table to talk about challenges, but they also came with ideas for better management of the urban forest.



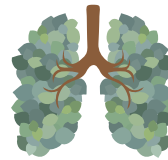
THINGS WE VALUE MOST ABOUT THE URBAN FOREST

Hundreds of comments were received from members of the public and stakeholders – both in person and online – that helped identify key values and priorities. The following represents a summary of what people value most about Hamilton’s urban forest:



BEAUTY

Trees contribute to the beauty of the urban landscape. That perception of beauty can promote a sense of local pride and add value to tourism. Trees can create a sense of connection to where people live, work and play. They can also screen unattractive views.



AIR QUALITY

Trees provide oxygen, remove carbon dioxide from the atmosphere and trap particulate matter (air pollution) through their leaves.



STORMWATER MANAGEMENT

Trees absorb water from the ground, preserve soil, and reduce the risk of flooding. This is increasingly important in order to manage the impacts of intensified development and land use.



CLIMATE CHANGE MITIGATION

Climate change is an increasing concern for many people. Trees are widely recognized as part of the green infrastructure in cities that will help mitigate the impacts of climate change (absorbing CO₂, reducing major storm flooding, shading homes to reduce energy demands, relief from hot summer temperatures).



ENVIRONMENTAL PROTECTION

The urban forest provides habitat for wildlife, insects and plants. Ensuring proper tree maintenance, removal, and replacement benefits trees and other living organisms in local ecosystems.



MENTAL HEALTH AND WELL-BEING

The innate beauty and benefits that trees offer can provide people with calmness, serenity and improved quality of life. They can also encourage outdoor activity, provide opportunities for play and create linkages to other green spaces.



ACTIONS

The UFS includes five themes and guiding principles that are the foundation for a good urban forestry program. Using this information, the UFS identifies 25 actions that will address some of Hamilton's immediate challenges and build on opportunities for growth.

The actions and guiding principles were developed with consideration for current management context and resources, a review of scientific and technical literature, what other similar Ontario cities have accomplished as well as consultations with City staff, other management agencies and a range of stakeholders and residents.

The actions include immediate activities that will contribute to better forest planning and management as well as longer-term policy actions that will support Hamilton's urban forestry goals.

THEME 1: INSPIRE

Guiding Principle: Engage and inspire the community with a bold vision for Hamilton's urban forest.

THEME 2: ACT

Guiding Principle: "Goals are good. Action is better."
(Vibrant Cities Lab)

THEME 3: PROTECT

Guiding Principle: Trees are a valued city asset and an essential part of Hamilton's infrastructure.

THEME 4: GROW

Guiding Principle: Regular investments in tree planting and maintenance programs will optimize long-term benefits and reduce risk to people, property and the health of the urban forest.

THEME 5: ADAPT

Guiding Principle: Urban forest management is evidence-based and responsive to change.

Guiding Principle: Engage and inspire the community with a bold vision for Hamilton's urban forest.

Short-term (1-2 years)

- | | |
|---|--|
| 1. Develop and implement an inspiring urban forest communications strategy. | Creating a greater public appreciation for the value of Hamilton's urban forest through frequent, transparent and positive communications will help support the City's forestry goals. Applying marketing and branding principles with a consistent message to promote the value of the urban forest can be a powerful, effective tool to improve the awareness of and support for trees in Hamilton. These should include all aspects of the City's urban forestry presence, including a web page, educational materials and videos, public events, social media and open data. |
| 2. Create a permanent new staff position in the Public Works Department dedicated solely to outreach, communications, education, and partnership development. | A major goal of the UFS is increasing general awareness of and appreciation for the urban forest. Inspiring the community to value trees is critical for building a strong forestry program in Hamilton. Outreach and education should target city departments, Council, private landowners, planners, developers, utilities and any other groups whose activities affect the urban forest. Activities will include outreach to landowners to identify opportunities for tree planting on private lands. This position is critical for supporting UFS implementation. |
| 3. Work directly with Hamilton's development community to improve awareness, identify urban forest allies, and recognize best practices and innovation. | Integrating the urban forest in new community design or revitalization projects has social and economic benefits that are often poorly understood and communicated. Regular dialogue between planners, forest managers and the development community may uncover opportunities for innovative design and cost-neutral options for making trees a valued part of Hamilton's urban future. Recognizing best practices and innovation is an important part of this work. |
| 4. Partner with organizations that support the City's urban forestry program. | Many types of external organizations can add value to municipal urban forestry programs and help diversify funding sources for urban forest management. The City should broaden its scope to include non-traditional partners, which could include emergency response agencies, power companies, philanthropic organizations, medical facilities, corporate foundations and local universities and colleges. Identify areas where urban forestry intersects with organizational mandates and support partnership work with a dedicated staff position (see Action 1). |
| 5. Present regular 'State of the Forest' reports to City Council. | One of the most critical success factors for urban forestry programs is a supportive Council that understand the value of forests for creating livable, resilient cities. Council support for regulatory and policy changes that promote the integration of trees in policy, planning and urban development is key. A regular 'State of the Forest' Report to Council can help highlight progress and challenges, and provide context for funding requests. |
| 6. Carry out an annual evaluation of the effectiveness of stakeholder engagement strategies. | Including social indicators in UFS monitoring is important for understanding trends in citizen and private sector engagement. Examples of social indicators include tracking forestry web page visits or the number of people attending community planting events. The urban forest communications and engagement strategies should include indicators with supporting data to monitor and report on progress. This information should be included in the "State of the Forest" report to Council. |

Guiding Principle: “Goals are good. Action is better.” (Vibrant Cities Lab)

Short-term (1-2 years)

- | | |
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| 1. Establish an inter-departmental working group to support UFS implementation. | The UFS includes actions that require collaboration to support successful implementation of the plan. Because the mandate for forest management is currently divided among several city departments, a working group will also support plan implementation and ensure that roles and responsibilities are assigned appropriately. The working group should meet regularly for the first five-year term of the UFS and report back to Council on progress through an annual 'State of the Forest' report. |
| 2. Improve implementation of Tree Protection / Management Plans and Landscape Plans required through development application review. | The city should ensure that required landscape and tree protection plans submitted as part of development applications are fully implemented. This should include costing, collection and release of securities, ensuring that qualified staff are conducting site inspections and providing a complete set of plans to inspection staff. |
| 3. Complete land cover and canopy cover mapping for the City of Hamilton urban area. | <p>Land cover maps describe the location and distribution of water, soil, trees, buildings, grass, roads and paved areas in the urban landscape. Detailed tree canopy maps can be derived from land cover data. Satellite imagery and specialized software are used to develop these maps, which are an important part of the urban forestry toolbox. They can be used to:</p> <ul style="list-style-type: none"> • Map the distribution of canopy cover in Hamilton; • Set canopy cover targets for defined management areas; • Help staff identify and prioritize possible planting areas; and, • Track land and tree cover change. |
| 4. Apply standardized tree planting details and specifications in all city tree planting projects. | Tree planting details and specifications should be based on a review of best practices from other jurisdictions and address soil volume and quality, stormwater management and other key factors affecting tree growth. These should be implemented by all city departments that are involved in planting trees. |
| 5. Develop and apply minimum canopy cover targets to new development proposals. | One of the key issues limiting expansion of the urban tree canopy in Hamilton is a lack of tools to translate high level policy goals (e.g., Official Plan goal of 30% canopy cover) into site level development activities. Targets for canopy cover can be set by land use area, neighbourhood, ward, secondary plan area, sub-watershed or other geographic unit of interest. These targets can be integrated in urban design guidelines to provide guidance for staff. Up-to-date data for land and tree cover can guide targets by land use or other area of interest for individual development projects. This will help Hamilton reach its 30% canopy cover goal and facilitate more equitable distribution of canopy cover. |

Medium-term (3-5 years)

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| 6. Identify and complete priority amendments to improve the integration of trees through applicable policies, plans, and guidelines. | Legislation, policies, plans, standards and guidelines that regulate and promote development in Hamilton have a strong influence on the current and future health of the urban forest. Having a strong voice for the urban forest at the table when these are being developed will help ensure trees are considered early on in urban planning, design and development. The city should identify and complete a list of priority amendments to improve urban forest canopy retention and establishment in planning processes such as Official Plan, secondary plans, urban design guidelines, master plans for stormwater and transportation planning, streetscape and urban design guidelines, Draft Plan Guidelines, Draft Plan of Condominium and Subdivision Guidelines, Site Plan Guidelines, City- Wide Corridor Planning Principles and Design Guidelines, Tree Protection/Management Plans for new developments, zoning by-laws, lot severance applications, minor variances, building permits, demolition permits and other relevant guiding documents. |
| 7. Determine the main drivers of canopy change in Hamilton. | A change detection completed for the UFS showed that canopy cover has remained the same or possibly declined between 2008 and 2018. However, it does not any provide information on the underlying cause of change. Understanding what is driving canopy change based on empirical data (such as permits issued and tree management plans) gives managers information to develop effective solutions. It also allows managers to allocate limited resources most efficiently. |
| 8. Review current urban forest management structures and identify resources required to achieve the City's urban forest vision. | The urban forest is defined as all trees and forested landscape features within the urban area and the UFS reflects the high degree of connection between these elements. However, urban trees in Hamilton are currently managed separately of natural areas in the City, giving Forestry a very limited mandate for managing only a small portion of the city's urban forest resource. Consolidating responsibility for urban forest management under one city department may present opportunities to achieve cost efficiencies and improved forest management. The city should carry out a review of urban forest management structure and determine if the current division of roles and responsibilities is optimal for achieving UFS and other strategic environmental goals. |
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Guiding Principle: Trees are a valued city asset and an essential part of Hamilton's infrastructure.

Short-term (1-2 years)

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| 1. Identify options for increasing the preservation of healthy trees in Hamilton. | Improving the retention of mature trees in Hamilton is a priority to prevent further canopy loss. Protection can be achieved through either regulation and incentives, or a combination of both. Approaches in Hamilton could include improved private tree by-laws and permitting systems, direct outreach to private landowners with significant trees, incentives for preserving existing trees on proposed development sites, outreach on best practices with other city departments and improved monitoring and enforcement of tree protection requirements. |
| 2. Complete a climate change vulnerability assessment for Hamilton's natural systems, including the urban forest. | Climate change is already having impacts on the urban forest and these will increase in the future. Every city is different and is uniquely affected by climate change. 'Vulnerability assessments' look at the local context and work with community input to prioritize and find the best ways to mitigate the risks and reduce the residual effects of climate change on Hamilton's natural systems, including the urban forest. |

Medium-term (3-5 years)

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| 3. Develop and implement an Invasive Species Management Strategy. | The 2018 forest inventory shows that about 25 % of Hamilton's urban forest leaf area is comprised of Category 1 and 2 invasive species, which are aggressive plants that interfere with native ecosystems. In the last ten years, the invasive Emerald Ash Borer has also resulted in the widespread loss of ash species across Ontario. Another invasive pest (the Asian Longhorned Beetle) represents a future threat to a third of Hamilton's urban tree canopy. Without intervention, invasive insect pests, diseases and plants will continue to degrade the quality of the urban forest. Hamilton should cooperate with neighbouring municipalities, Conservation Authorities and other levels of government to develop and implement an invasive species management strategy. |
| 4. Develop service standards and emergency response plans for:

Hazard trees and other forestry service requests.

Severe weather events. | Risk management is currently undertaken through a combination of proactive and reactive methods. Risk management on City trees through removal of deadwood and structural pruning is a part of the City's regular grid maintenance program. City staff currently performs tree risk assessments, and if deemed necessary, conduct aerial inspections or hire consultants to perform advanced tree risk assessments as needed. Formalizing the current risk management and emergency response approach is recommended as part of the UFS outcomes. |

Guiding Principle: Regular investments in tree planting and maintenance programs will optimize long-term benefits and reduce risk to people, property and the health of the urban forest.

Short-term (1-2 years)

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| 1. Increase the level of tree planting and/or natural forest regeneration in the City over the next five years. | The base tree planting budget has not increased in Hamilton over the last five years even though pressures on the forest have increased through Emerald Ash Borer, ice storm damage and ongoing storm events. Allocating more funds to tree planting is one approach to increasing canopy cover. City departments can also co-operate to identify other opportunities for increasing the number of trees established such as using smaller stock for planting or identifying areas to promote natural forest regeneration. |
| 2. Develop a best practices manual for tree protection, planting and preservation to share with all City departments and utilities whose activities affect trees. | All City departments should prioritize the retention of mature trees, protection of trees from damage and the planting of new trees in capital and operations and maintenance projects. Early consideration of trees in planning should identify ways to reduce conflict for space with underground and overhead utilities. The manual should include clear criteria for planting site suitability and tree species selection as well as standardized tree planting specifications for all City departments, other agencies or private sector organizations involved with planting trees. Staff workshops to roll out a best practices manual will help improve awareness and reduce conflicts between trees and infrastructure/utilities in Hamilton. The manual should be reviewed periodically to ensure it reflects changing environmental conditions. |
| 3. Complete a tree planting priority analysis to guide a city-wide tree planting strategy. | To increase canopy cover on both public and private lands, the City can use detailed land cover data to identify priority tree planting locations. These could include floodplains, areas with extreme summer temperatures, areas with low tree canopy or other criteria as determined by input from the community. |

Medium-term (3-5 years)

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| 4. Fund regular, active management of natural areas in Hamilton to support native biodiversity and forest health. | Urban trees and natural areas are interconnected systems, though they are managed separately in the City of Hamilton. Invasive species and growing recreation pressure are affecting the health of natural areas. These pressures will increase as Hamilton grows and the effects of climate change intensify. Increasing active forest management in high priority management areas will help protect native biodiversity and maintain the natural character of the City's trees and forests. There are many agencies and groups in Hamilton who can contribute expertise to identifying priority management areas. The city should investigate the costs of establishing a dedicated funding stream for natural areas management and include it as an annual budget request to Council. |
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Guiding Principle: Urban forest management is evidence-based and responsive to change.

Short-term (1-2 years)

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| <p>1. Implement a forest health monitoring program in Hamilton, including natural areas.</p> | <p>Forest health threats to Hamilton having already put intense pressure on the City's canopy cover. Emerald ash borer led to the removal of thousands of ash trees across the City. Insect and disease cycles are dynamic, and the City needs to have access to up-to-date information to be able to respond pro-actively to future forest health threats. Potential future threats include oak wilt and the Asian Longhorned Beetle which could affect over a third of Hamilton's total tree leaf area. The City should co-operate with other agencies to pro-actively monitor and report on forest health threats in Hamilton.</p> |
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Medium-term (3-5 years)

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| <p>2. Implement a forestry asset management system.</p> | <p>Tree inventory data and location information should be managed using specialized software programs designed for urban forest management and other green assets. There are customized software programs for public works agencies that facilitate updating and link inventories to work order systems. These programs are also capable of producing required reports like:</p> <ul style="list-style-type: none"> • Work histories and costs for each tree; • Citizen service and information requests; • Work orders; • Available planting sites; • Tree valuation; and, • Maps. <p>As a management tool, customized software programs promote efficient allocation of work crews and equipment; speeds up responses to service requests; identify safety risks; helps with cost analysis; provide data for accurate reporting to Council and other departments; can provide information needed for grant applications and improve budget forecasting based on historical data.</p> |
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Long-term (5-10 years)

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| <p>3. Update urban forest inventories and studies every 10 years or in response to significant environmental change.</p> | <p>Urban forest inventories are the cornerstone of good asset management. Having up-to-date information about urban forest structure, composition and condition is critical to effective strategic and operational planning as well as risk management in Hamilton. Inventories should be undertaken in tandem with the implementation of GIS-based asset management software that links the inventory to work order systems, to ensure that asset information remains reliable and up to date.</p> |
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THE FUTURE

Hamilton currently has a relatively healthy and diverse urban forest. The City's program has strengths to build on that can help preserve Hamilton's unique urban forest character. Hamilton has an engaged public and knowledgeable non-profit community. There is high level policy support for the urban forest and the foundations of a good street tree maintenance program are in place.

However, background studies completed in support of the UFS shows that the city is not meeting urban forestry goals and targets as set out in the Official Plan. The health of the urban forest is threatened by climate change and invasive species. These have resulted in a long-term decline in forest cover as well as the quality of natural habitats in and around Hamilton. While there is support for the urban forest in principle through the Official Plan and other policies, staff have limited tools to support the achievement of 30% canopy cover at the site level.

Public input to the UFS helped identify some key gaps in the City's forestry policies and program and participants emphasized the need for urgent action. These gaps are addressed through the 25 actions outlined in the UFS. Some solutions will be easy to implement on a short time horizon. Others are more complex, and solutions will rely

on collaboration between City departments and other stakeholders over longer periods of time.

While the UFS findings provide valuable information about current forest condition and change, they also raise new questions. These can be answered through future research and community partnerships as part of the ongoing process of learning and adapting to change. Some of the areas for future learning include:

- What are the main causes of canopy cover change?
- Where are invasive species located in Hamilton? How quickly are they spreading? How can threats from invasive species be prioritized and managed?
- How would an improved private tree protection by-law help prevent future canopy cover loss?
- What factors are affecting the survival of newly planted trees?

Answers to these questions will inform UFS implementation moving forward. This will support Hamilton's vision to achieve a resilient urban forest that is valued by the entire community as a shared asset. A bold strategy backed by strong Council support will help ensure a thriving urban forest that contributes to the well-being of all residents of Hamilton now and into the future.