

Clean Air Council Urban Forestry Scan

March 2012



Report to the Clean Air Council



Prepared by the Clean Air Partnership

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Preamble

Acknowledgments

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About the Clean Air Partnership

Clean Air Partnership (CAP) is a registered charity that works in partnership to promote and coordinate actions to improve local air quality and reduce greenhouse gases for healthy communities. Our applied research on municipal policies strives to broaden and improve access to public policy debate on air pollution and climate change issues. Our social marketing programs focus on energy conservation activities that motivate individuals, government, schools, utilities, businesses and communities to take action to clean the air.

Clean Air Partnership's mission is to transform cities into sustainable, vibrant, resilient communities, where the air is clean to breathe and greenhouse gas emissions are minimized.

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For more information, contact

Clean Air Partnership
75 Elizabeth Street
Toronto, Ontario M5G 1P4
Canada
416-392-6672

www.cleanairpartnership.org

cap@cleanairpartnership.org

About the Clean Air Council

Origins of the Clean Air Council

In 2000 the Ontario Medical Association (OMA) declared air pollution "**a public health crisis.**" This statement was based on strong scientific evidence linking air pollutants like ozone, nitrogen oxides, carbon monoxide and tiny airborne particulates and acid droplets to various illnesses and breathing problems. According to the OMA's report, [The Illness Cost of Air Pollution in Ontario](#), particulate matter (one type of air pollution) is responsible for almost 5,800 premature deaths per year (2005 updated numbers) in Ontario and almost half a billion dollars in health care costs (not including visits to family doctors) and lost productivity (as employees were too sick to come to work due to smog).

Climate change is the **most pressing environmental, social and economic problem facing the planet.** The consequences of climate change are global and long-term. The synergies between the actions that address air pollution and climate change enable communities to address the two problems with common solutions. Southern Ontario is where the majority of Ontario residents live and it is where the majority of energy is used. The creation of lower carbon communities that are more efficient, livable, sustainable and resilient are one of the main tools that will enable us to tackle the air pollution and climate change challenge.

In order to take action on air pollution and climate change, in 2000 CAP and the City of Toronto organized the first Smog Summit to explore solutions to the clean air and climate change problem. Based on the success and benefits of working via governmental and regional partnerships to address air pollution and energy use, the GTA Clean Air Council (GTA CAC) was launched at the 2001 Smog Summit. Based on the outcomes and benefits of working collaboratively in the GTA, municipalities in Southwestern Ontario formed their own Clean Air Council in 2008 (SWO CAC). The GTA and the SWO CAC work collaboratively and individually to ensure a balance between sharing experiences and learnings across regions while still retaining enough flexibility to ensure regional issues and opportunities are addressed.

The Greater Toronto Area (GTA) and Southwestern Ontario (SWO) Clean Air Council (CAC) promotes the reduction of air pollution and greenhouse gas emissions and increased awareness of regional air quality and climate change issues through the collective efforts of all levels of government. The Council identifies and promotes effective initiatives to reduce the occurrence of air pollution and greenhouse gas emissions in the GTA and SWO, and their associated health risks. The Clean Air Councils works on the very simple premise that if one jurisdiction undertakes a clean air/climate change action that it makes sense to share their experience and lessons learned with other jurisdictions. In this way it helps to promote and raise the bar for the implementation of actions that will lead us to lower carbon and more healthy and livable communities.

There are many benefits to a collaborative approach to addressing air quality and climate change issues. Having multiple jurisdictions at the same table enhances networking and the exchange of resources and information. It ensures that no one group is working in isolation and that those efforts are not unnecessarily duplicated. Inter-governmental and inter-regional cooperation also provides an opportunity to leverage scarce resources for research, outreach and other air quality

improvement initiatives. Bringing together multiple staff from different departments and municipalities across the airshed also helps break down silos that may exist within and amongst municipalities, and increases cooperation on air quality and climate change issues.

Clean Air Council Mandate:

- To enable solutions to air quality and climate change challenges through a dynamic network that expands knowledge and enthusiasm, and encourages practical and successful policies and actions.
- To promote a better understanding of air quality and climate change problems and their implications for public health among policy makers and to improve their ability to address these problems in an economically effective way;
- To explore opportunities for joint initiatives to reduce air pollution and greenhouse gas emissions in the GTA and SWO;
- To develop and report on progress of Inter-governmental Declarations of Clean Air and Climate Change;
- To track and monitor the implementation and transfer of clean air and climate change actions across the jurisdictions; and
- To liaise with municipalities in the GTA, SWO, Canada and internationally, and organizations with compatible mandates to share best practices for reducing air pollution and greenhouse gas emissions.

Clean Air Council Goals

- Develop and promote a Resilient Region¹ vision;
- Identify and maximize synergies between clean air, health and climate change actions and improvements in community livability and resilience;
- Identify financing and business case opportunities to move actions from pilot stage to business as usual and contribute to the building of the emerging green economy;
- Share lessons learned on the implementation of actions and report on the uptake/transfer/consistency of those actions across the region; and
- Identify new opportunities being undertaken elsewhere and applicable/supportive of movement towards the Resilient Region vision in the GTA and Southern Ontario.

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¹ A Resilient Region is defined as “A region that has developed capacities to help absorb futureshocks and stresses (ex. population, climate change, energy scarcity, environmental degradation, income disparity, socio-political) to its social, economic, and technical systems and infrastructures so as to still be able to maintain essentially the same functions, structures, systems, and identity.” Source: ResilientCity.org

Clean Air Partnership's mission is to transform cities into sustainable, vibrant, resilient communities, where the air is clean to breathe and greenhouse gas emissions are minimized.

Clean Air Partnership serves as the secretariat for the GTA and the Southwestern Ontario Clean Air Council, facilitates and supports additional networks such as the Alliance for Resilient Cities and North South Climate Change Network, and participates in numerous others networks including but not limited to the Ontario Regional Adaptation Collaborative, Community Adaptation Initiative, and AMO's Energy Management and Climate Change Task Force, and FCM's Sustainable Communities and Green Municipal Fund.

Introduction and Purpose of the Urban Forestry Scan

Urban trees provide a valuable community resource that contributes significantly to human health and quality of life. Beyond aesthetic value and social well-being; the urban forest provides essential ecosystem services to clean the air, protect and clean water, and support biodiversity; trees decrease the urban heat island effect, provide sun protection, health improvement, and economic value; they shelter homes and conserve energy; and provide climate change mitigation and adaptation properties; all while beautifying the urban area.

In recent years, there has been increasing recognition that urban forests play a key role in the overall health and sustainability of an urban area. Growing a more robust, healthy urban forest will help achieve greater community livability, quality of life and economic competitiveness in the region.

Public policy priorities can foster investment in the urban forest or detract from it. The nature of new residential and commercial development shapes how much and what kind of space is available for growing trees, and how existing trees are preserved. Storm water management, air quality and energy conservation strategies should also consider the substantial role trees play.

While the benefits of urban forests are evident, there is also a growing recognition that urban forests are increasingly susceptible to a number of challenges that are unique to the urban environment. Some of these challenges include: increased competition for light, water and space to grow; inferior soils due to compaction, development and contamination; increased soil salinity due to road salt use; pest infestations; air pollution; constant physical damage due to human interference; as well as being subject to higher temperatures due to the urban heat island effect. Urban trees require an additional level of planning and care to overcome these challenges.

This report defines urban forestry, makes the case for the importance of the urban forest, outlines some of the key benefits of urban forests, identifies the actions that are being undertaken by Clean Air Council municipalities to grow, manage and protect urban forests; and identifies commonalities and areas for future collaboration and action in order to protect the long-term viability of the urban forest.

Definition of Urban Forest

The urban forest is the sum of all woody and associated vegetation in and around dense human settlements. Urban forestry is defined as the art, science, and technology of managing trees, forests, and natural systems in and around cities, suburbs, and towns. This discipline naturally fits with planning processes that strive to improve the quality of life for the region. Local and regional planning strategies should be crafted that recognize urban forestry and aim to maximize its potential to contribute to regional well-being.

Urban forestry is the sustained planning, planting, protection, maintenance, and care of trees, forests, greenspace and related resources in and around cities and communities for economic, environmental, social, and public health benefits for people. The definition includes retaining trees and forest cover as urban populations expand into surrounding rural areas, restoring critical parts of the

urban environment after construction, and retaining larger tracts of forest cover and maintaining or creating linkages between them. The expansion at the urban/rural interface raises environmental and public health and safety issues and presents opportunities to create educational and environmental links between people and nature. In addition, urban and community forestry includes the development of citizen involvement and support for investments in long-term on-going tree planting, protection, and care programs.

Benefits of Urban Forests

Urban trees offer multiple benefits that contribute greatly to the quality of life and livability of communities. Through proper planning, design, and management, urban trees can mitigate many of the environmental impacts of urban development by moderating temperature, reducing building energy use and atmospheric carbon dioxide (CO₂), improving air quality, lowering rainfall runoff and flooding, and reducing noise levels.

Trees can also influence the social and economic environment of a city. They can define community identity, add beauty, encourage active living, directly improve human physical and mental health, and foster a more meaningful connection between people and the natural environment. The benefits associated with trees are highly variable within and among urban areas and are sometimes difficult to measure. Nevertheless, these benefits reflect the important contributions of trees and forests to the quality of life for urban dwellers.

The discussion below highlights how trees provide some of these important benefits.

The USDA Forest Service introduced UFORE/iTree in 2006 to analyze urban forests and assess their benefits (such as carbon sequestration and storage, air pollution and energy savings). Ajax, Brampton, Caledon, London, Markham, Mississauga, Oakville, Pickering, Richmond Hill, Toronto and Vaughan have or are in the process of using the software and methodology to better understand the value of their urban forests.

Energy Conservation

Trees reduce energy needs for heating and cooling by shading buildings in the summer, thus reducing summer air temperatures, and by blocking winter winds. Strategically placing trees to maximize summer shading has been shown to be an effective energy conservation practice. Trees planted to the south should be selected and pruned to allow the sun to reach south walls in midwinter. Evergreen trees can work as windbreaks to block winter winds when planted to the north, northwest, and west of buildings.

Toronto and Region Conservation recently completed an UFORE/ i-Tree analyses for Brampton, Caledon and Mississauga. Findings show that approximately 19,000 tonnes of carbon is sequestered annually, valued at approximately \$550,000; total carbon storage is approximately 400,000 tonnes, valued at approximately \$11.5 million; 855 tonnes of pollutants are removed annually, valued at approximately \$ 9.1 million; and residents save \$2.5 million annually in energy savings through shading and windbreak.

Urban Heat Island Effect

The urban heat island effect is largely a result of high-density, human-made surfaces which absorb and store heat, and human activities which release heat in urban areas. A robust urban forest canopy can help mitigate the urban heat island effect by providing direct shade to cool structures and paved surfaces and by evaporative cooling that lowers ambient air temperatures.

The annual environmental benefit of the ecological services provided by trees within the Town of Oakville is \$ 2.1 million. Oakville's urban forest filter 172 tonnes of criteria air pollutants annually. A total of 22,000 tonnes of carbon dioxide is sequestered annually. The estimated cost reduction from energy use is approximately \$ 812,000 in annual savings.

Air Quality

Increasing tree cover in urban areas will lead to greater pollution removal, as well as reduced air temperatures that can help improve urban air quality. Factors that affect pollution removal by trees include the amount of healthy leaf-surface area, concentrations of local pollutants, and local meteorology.

Among the pollutants that urban trees remove from the air are ozone, fine particulate matter, nitrogen dioxide, sulphur dioxide and carbon monoxide. Urban trees have also been shown to remove harmful substances such as cadmium, chromium, nickel and lead from the air. The scrubbing effect of trees has been shown to be so significant that researchers in the United States recently stated that increasing urban forest canopy and management may provide a viable means to improve air quality and help meet clean air standards.

The UFORE/iTree project in the City of Toronto in 2000 found that trees filtered from the air an amount equal to all of the nitrogen dioxide and PM10 that was produced within the City of Toronto in 2000 by industrial facilities.

Urban Hydrology

By intercepting and retaining or slowing the flow of precipitation reaching the ground, urban forests can play an important role in urban hydrologic processes. They can reduce the rate and volume of storm water runoff, decrease flood damage, reduce storm water treatment costs, and enhance water quality.

In reducing runoff, trees function like retention structures. In many communities, reduced runoff due to rainfall interception also can reduce costs of managing storm water by decreasing the volume of water handled during periods of peak runoff.

Toronto's urban forest provides the equivalent of at least \$60 million in ecological services each year, far exceeding the annual cost of management. Toronto's trees store 1.1 million metric tonnes of carbon annually or the equivalent annual carbon emissions from 773,000 automobiles. Gross carbon sequestration by trees in Toronto is estimated at 46,700 metric tonnes of carbon per year with an associated value of \$1.3 million. Net carbon sequestration in the urban forest is

36,500 metric tonnes. Toronto's urban forest is estimated to reduce energy use from heating and cooling by 41,200 MWh (\$9.7 million/year). Toronto's urban forest intercepts 1,430 metric tonnes of air pollutants annually (the equivalent value of \$16.1 million/year). Urban tree canopy helps to mitigate storm water runoff.

Noise Reduction

Strategic plantings of trees and shrubs can reduce noise levels significantly. Leaves and stems reduce transmitted sound primarily by scattering it, while the ground absorbs sound. For optimum noise reduction, trees and shrubs should be planted close to the noise source. Wide belts (30 meters) of tall dense trees combined with soft ground surfaces can reduce apparent loudness by 50% or more. Although noise reduction from plantings along roadsides in urbanized areas often is limited due to narrow roadside planting space and safety considerations, reductions in noise of 3 to 5 decibels can be achieved with narrow dense vegetation belts with one row of shrubs roadside and one row of trees behind.

Vegetation also can mask sounds by generating its own noise as wind moves tree leaves or as birds sing in the tree canopy. These sounds may make individuals less aware of offensive noises because people are able to filter unwanted noise while concentrating on these more desirable sounds. The perception of sounds by humans also is important. By visually blocking the sound source, vegetation can reduce individuals' perceptions of the amount of noise they actually hear.

Each year every street tree in Burlington provides over \$67 in net benefits by reducing building energy use, improving air quality and storing carbon. This means that Burlington's 52,000 street trees combined provide \$ 3.5 million annually for these environmental benefits alone.

Urban Wildlife and Biodiversity

There are many benefits associated with urban vegetation that contribute to the long-term functioning of urban ecosystems and the well-being of urban residents. These include wildlife habitat and enhanced biodiversity. Urban wildlife can serve as biological indicators of changes in the health of the environment.

Surveys have shown that most city dwellers enjoy and appreciate wildlife in their day-to-day lives. Among the State of New York's metropolitan residents, 73% showed an interest in attracting wildlife to their backyard. Feelings of personal satisfaction from helping wildlife were the most frequently reported reason for feeding wildlife in backyards.

Benefits to Individuals

Urban trees improve human health in a wide variety of ways, ranging from improved air quality to reduction of stress and inter-personal conflict. Urban trees provide beauty and are among the most important features contributing to the aesthetic quality of residential streets and community parks. Perceptions of aesthetic quality and personal safety are related to factors such as the number of trees per acre and viewing distance. Urban trees and forests provide significant emotional and spiritual experiences that are important in people's lives and can foster a strong attachment to particular places and trees.

Nearby nature, even when viewed from an office window, can provide substantial psychological benefits that affect job satisfaction and a person's well being. Reduced stress and improved physical health for urban residents have been associated with the presence of urban trees and forests in a number of environments. Living in a green environment has been associated with a wide range of individual benefits, including improved learning and behaviour by children in urban areas. Experiences in urban parks have been shown to change moods and reduce stress, and to provide privacy refuges. Hospital patients with window views of trees have been shown to recover significantly faster and with fewer complications than comparable patients without such views.

Sun Protection and Health Improvement

Exposure to ultraviolet (UV) rays can lead to many adverse health impacts, including sunburns, cataracts, a weakened immune system and skin cancer. Planting a canopy of urban trees for shade along streets and sidewalks, in parks and in areas where children play can greatly reduce exposure to UV rays, thus reducing the risks of developing adverse health impacts such as cataracts and skin cancer.

As public concern about obesity grows, trees and forests are receiving increasing attention. They can serve as environments that encourage exercise, such as playing in well-landscaped parks or running along tree-lined streets and trails. The physical work involved in caring for trees and landscapes can also be a way for volunteers to get exercise.

Benefits to Communities

Urban forests can make important contributions to the economic vitality and character of a city, neighbourhood, or subdivision. It is no accident that many cities, towns, and subdivisions are named after trees. Often, trees and forests on public lands—and on private lands to some extent—are significant "common property" resources that contribute to the economic vitality of an entire area. The substantial efforts that many communities undertake to develop and enforce local tree ordinances and manage their urban forest resources attest to the significant return that they expect from these investments.

A stronger sense of community and empowerment of inner city residents to improve neighbourhood conditions can be attributed to involvement in urban forestry efforts. Active involvement in tree-planting programs has been shown to enhance a community's sense of social identity, self-esteem, and territoriality; it teaches residents that they can work together to choose and control the condition of their environment. Planting programs also can project a visible sign of change and provide the impetus for other community renewal and action programs. Several studies have shown that participation in tree planting programs influences individuals' perceptions of their community. Conversely, a loss of trees within a community can have a significant psychological effect on residents

While there is sometimes concern over the influence of trees and other vegetation in urban areas on the incidence of crime, research has provided management guidelines that can reduce the fear of crime in forested areas.

Streetscape greening has been shown to positively affect customers' purchasing behaviour, suggesting important benefits to commercial establishments and a basis for partnerships with the business community in urban forest planning and management. However, improper landscaping of business areas can have a negative impact by blocking business signs or reducing the attractiveness of the area.

US research suggests that 40% tree cover in cities will ensure the sustainability of the urban forest and maximize community benefits from trees. Urban trees and forests can help alleviate some of the hardships of inner city living, especially for low-income groups. Extensive research in inner city areas of Chicago suggests that urban trees and forests contribute to stronger ties among neighbours, greater sense of safety and adjustment, more supervision of children in outdoor places, healthier patterns of children's play, more use of neighbourhood common spaces, fewer incivilities, fewer property crimes, and fewer violent crimes.

Real Estate Values

The sales value of real estate reflects the benefits that buyers attach to attributes of the property, including vegetation on and near the property. In addition, increased real estate values generated by trees also produce direct economic gains to local governments through property taxes.

A survey of sales of single-family homes in Athens, GA, indicated that landscaping with trees was associated with an increase in sales prices of 3.5% to 4.5%. Builders have estimated that homes on wooded lots sell on average for 7% more than equivalent houses on un-wooded lots.

Parks and greenways have been associated with increases in nearby residential property values. Some of these increased values have been substantial, and it appears that parks with "open space character" add the most to nearby property values. Part of the contribution to the value of residential property is associated with the view from that property. One study suggests that a good view adds 8% to the value of a single-family house. A premium of 5% to 12% in housing prices in the Netherlands was associated with an attractive landscape view from the property.

Climate Change Mitigation and Adaptation

Urban trees and forests form an important element in the defence of cities against climate change by providing shade; reducing energy use and associated emissions from the power generation) required for heating and cooling buildings; cooling nearby buildings and ambient air, reducing stormwater runoff, erosion and surface water pollution; and minimizing smog formation. In addition, the carbon sequestration capabilities of urban trees can help to offset urban greenhouse gas emissions.

Climate change is having an impact on urban forests, perhaps to a greater extent than on wildlands. Warmer temperatures and extreme weather events such as violent wind, heavy snow, and ice storms are taking a heavy toll on urban forests. The changing patterns of rainfall we are seeing under climate change are devastating for urban forests. While the annual amount of rainfall is not changing dramatically, it is falling in intense downbursts, with drought periods in

between. This has major consequences for vegetation, where smaller, more regular precipitation events are more desirable.

Conversely, the urban forest has been seen by many as a possible vehicle to reduce some of the impacts of climate change through thermoregulation and hydrologic control.

Table 1: Considerations for True Accounting of Benefits and Costs of Urban Forests	
Benefits	Costs
Electricity Savings	Tree & Planting
Natural Gas Savings	Pruning
CO ₂ Reduction	Remove and Dispose
Ozone Avoidance	Infrastructure Repair
NO ₂ & SO ₂ Reduction	Irrigation
PM ₁₀ Removal	Clean-up
Rainfall Interception	Liability & Legal
Other Benefits	Administration

Partners in the Urban Forest

As the concept of green infrastructure has taken root, the urban forest has come to be seen as a holistic system of interconnected natural and cultivated landscapes that support trees, people, and biological diversity. This new approach values the environmental, social, and economic services of the urban forest and offers greater opportunities to enhance and reap these benefits for area residents. However, it also demands strong and creative leadership at the regional level and across organizations and disciplines. Many partners are needed to protect, maintain and grow urban forests.

Residential Landowners

The majority of the urban forest stock is held on privately owned land. The residential landscape is the first connection that most people have to the natural world. Their understanding of this most intimate of natural systems shapes their expectations of public and private land management. In the best situations, homeowners may choose to plant native trees that bring seasonal color, attract birds, provide shade, or provide screening. Homeowners may also landscape for maximum energy conservation by strategically shading their homes and diverting wind. Professional arborists provide services to help homeowners nurture valued landscape trees, keep pests at bay and prune the crowns to maximize beauty and function. But in other instances, residents may object to mature trees or not plant trees at all, and valuable environmental services are lost to residents and the community.

Developers

Development can cause the loss of trees on individual sites and thus diminish total urban forest canopy at the regional scale. Though development in wooded lots, especially for residential development, can be desirable, current methods used in site clearance and construction can damage or destroy existing trees and woodlands. A typical approach is to clear land of tree cover and install new, primarily ornamental landscaping upon completion of construction. Urban forest integrity and ecosystem health is damaged with extensive earth moving operations.

Developers control extensive landscapes and install landscapes in accord with subdivision codes and the goal to create pleasant, shared landscapes that are enjoyed for property-value enhancement, beauty, and recreation. Traditionally, many new subdivisions are often marked by fast-growing but poorly suited and poorly planted young trees that will be difficult and costly to maintain over their shortened lifespan.

These landscapes are not usually designed for long-term sustainability and ecosystem function. Because these landscapes utilize high-maintenance trees and other plants, homeowners or property management firms must maintain them intensively, using pesticides and fertilizers. Sustainable landscape concepts are not at present the norm among developers and homeowner associations. Yet, many developers have adapted and implemented sustainable considerations such as: long-lived, pest-resistant trees replacing high-maintenance ones; strategic planting to conserve energy and intercept storm water; replacement of turf with native and sustainable plantings.

Successful tree preservation by-laws protect the most valuable trees on private property during site development. Often placed in the building section of municipal codes, tree protection requirements are usually triggered by development or building permit requests. Such ordinances allow tree preservation procedures to be integrated into overall site planning. Significant opportunities exist to set standards and guidelines to build the capacity for developers to create environments suitable to maintaining urban trees and forests.

There are many examples of developers who have overcome many of the above mentioned problems and significant opportunities exists for municipalities to work with developers to increase the resilience of urban trees in their developments and provide value for the homeowners and the public.

Municipalities

Of the public land managers responsible for the urban forest, municipalities generally have the greatest capacity for management of community trees. Street trees, the trees that are planted and cultivated in the public right-of-way, are the most familiar components of the urban forest. Residents have grown to expect municipalities to plant and maintain trees in public parkways, and they generally support public investment in these trees.

The National Tree City USA program, sponsored by the Arbour Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters, recognizes good municipal forestry programs. The criteria demand a governing authority for public trees, staff

resources, community involvement, and a minimum expenditure of \$2 per capita for trees. An advanced program, the Growth Award, recognizes deeper stewardship of community trees. In Illinois, nearly 200 communities currently hold the Tree City USA status. On average these communities spend about \$82 million, or \$12 per capita on average, planting, and caring for community trees.

The road right-of-way, which includes the parkway, planting strip, and tree pits (or planting boxes), is a demanding environment in which to grow trees. Streets and infrastructure limit growing space for roots. Additionally, reflected and retained heat from concrete and asphalt, road salt, and collisions with both lawnmowers and vehicles stress trees and shorten their lives. Many aesthetic and safety concerns, such as weak wooded trees that cause damage during storms, limit the types of trees that can be grown. Only a limited selection of trees can tolerate these demands, and this limited diversity leaves street tree populations vulnerable to disease and pests.

Progressive municipal forestry programs retain certified arbourists to oversee tree planting, maintenance, and removal operations to protect public investment in trees and maximize the benefits communities derive from them. Some also aim to protect trees during development and other operations, and to assure that development plans accommodate trees over the long-term. Many municipalities inventory their street trees as a basis for management plans. Older communities may have a highly valuable urban forest partly because they have retained mature trees that were present at the time of development. Other communities have planted trees long ago that are now mature. As mentioned above, unfortunately, new subdivisions are sometimes marked by fast-growing, poorly planted, costly to maintain, young trees.

Fundamental to urban and community forest stewardship are municipal ordinances that assign agencies responsible for community trees, set requirements for planting and removing trees on public property, and treat tree-related public nuisances like the transmittable Emerald Ash Borer. Ordinances may also establish a community tree board or commission to advise the municipality.

Generally, a greater diversity of trees exists in parks than in street parkways, and these tend to live longer because of the more favourable growing conditions. Where park management is separate from other municipal services, park districts are the stewards of public trees and landscapes that support recreation. Natural resource management is often, but not always, secondary to the recreation mission of park districts and their urban forestry programs reflect that priority. Yet, trees are essential and valued components of active and passive parks. Playgrounds and athletic facilities are more desirable and attractive when trees are incorporated into the design and maintained well.

Conservation Authorities

Conservation areas are designated and protected parcels of land that are valued as the support system that maintains natural communities, sustains clean air and water, supports wildlife habitat, and offers recreational and educational opportunities to connect people to nature. Restoration of degraded ecosystems has become an important objective for Conservation Authorities. Technical expertise, resources, and public support are strong for land preservation, restoration, and stewardship. Conservation Authorities are excellent leaders and/or partners

who appreciate trees as forests and woodlands and understand their important ecosystem benefits within the greater urban area.

Transportation Departments and Agencies

Trees and landscaping enhance expressways and arterial streets, creating functional buffers and community gateways. Sustainable landscaping with trees, shrubs, and native and ornamental plants reduces roadside mowing requirements and can enhance driver and pedestrian safety by calming traffic and separating vehicles and pedestrians. It also reclaims medians and right-of-ways as functioning green infrastructure that enhances storm water infiltration and cleanses the air. However, road salt and roadway contaminants harm trees or render the soil chemistry inhospitable, so that growing trees along transportation corridors is a formidable challenge.

Institutional and Commercial Landowners

The urban forest that grows on private non-residential land varies from golf courses and campuses to sparse landscaping on industrial lands. Campuses often support large-stature specimen trees that are treasured and protected. At the other extreme, many landscaping ordinances require the planting of trees to buffer parking lots and strip malls, but these trees, which are coveted for shade during summer months, receive little or no care and have short, difficult lives. Industrial and commercial land uses are found to have the lowest canopy cover and present significant opportunities for improvement to build canopy cover.

Utilities

While community trees are highly valuable and desirable, reliable utility services are essential. Conflicts arise when trees grow in utility rights-of-ways. Overhead power lines traverse many communities and share public space with trees. Line clearance tree-trimming, which diverts tree growth away from overhead power lines, is unpopular among residents and city leaders. But without this type of pruning, branches can grow into power lines, or large, unstable limbs may break in storms and threaten reliable delivery of electricity. In some instances, a best practice for utility vegetation management programs is to collaborate with city foresters to replace tall trees with lower-growing, compatible trees.

Transmission lines outside of residential areas afford utility companies opportunities for urban forest stewardship in large and contiguous rights-of-way. Utilities with underground transmission assets also maintain rights-of-way or set vegetation policies that affect the urban forest.

Provincial Governments

Despite the importance of the urban forest there is no direct regulation by the provincial government in this area. The make-up and maintenance of virtually all urban forests are handled either by the local municipality, Conservation Authorities, or thousands of individual landowners. The Ministry of Municipal Affairs and Housing has some authority over forests and natural heritage under the Municipal Act, the Planning Act, and the Provincial Policy Statement. The Ministry of Natural Resources has a great deal of regulatory involvement in forestry matters on

Crown land in Ontario, but does not dedicate resources to urban areas. Where major events occur that have dramatic consequences for urban forestry, the Province does make funds available (such as those made available through the Ontario Ministry for Municipal Affairs and Housing after the 1998 ice storm). However, this type of funding is ad-hoc, and only addresses major shocks. More persistent issues such as Emerald Ash Borer or annual storms receive no consistent support.

Urban forests are not considered a provincial interest at this time. To address this issue (and others), the [Green Infrastructure Ontario Coalition](#) was formed in 2009 when sixty people representing municipal and provincial governments, conservation authorities, the landscape trades and environmental organizations came together to discuss shared interests, concerns and ideas related to green infrastructure. The Coalition advocates for policy improvements at both the municipal and provincial level to facilitate green infrastructure opportunities.

Federal Governments

Unlike the United States, where the Federal Government is actively involved in urban forestry issues, in Canada, there is no such involvement at a federal level. However, in catastrophic circumstances, involvement and support is on an as needed basis. This was evident during Asian long-horned beetle outbreaks in Toronto and Vaughan in 2003 where the Canadian Food Inspection Agency was actively involved in removing infected stems. Another example of federal involvement in urban forestry was after the 1998 ice storm when Human Resources Development Canada made \$10m available for post-emergency clean up.

Why Have an Urban Forest Strategy?

Generally, when municipalities attach valuations to urban trees, they only account for their amenity contributions. This underestimates the real value of trees and fails to capture their social, economic, and environmental services. When we consider all of these contributions (through UFORE/iTree studies for example), urban forestry becomes a good public investment.

As previous research has illustrated, urban trees and urban forests serve many purposes and provide a multitude of benefits to residents of urban areas. Despite their cost-saving properties and their environmental and aesthetic benefits, urban trees and forests are still at great risk. Development pressures, inferior soils, human interference, pests and a changing climate all make for a much more difficult growing environment than non-urban trees encounter. As such, there is a need to institute plans at a municipal level that encourage the planting, maintenance and protection of urban trees and forests. Support and assistance is also required from other levels of government and other urban forest community partners to implement such plans. As the effects of climate change become more apparent, cities are becoming increasingly vulnerable to severe weather systems, droughts, floods, runoff, and increased heating and cooling costs. The role of urban trees and forests in mitigating these changes cannot be understated.

The urban forest is the thread that weaves green infrastructure into the psyche of the urban resident and the agenda of local government. By modestly investing in our urban forest to sustain large, long-living, healthy trees, we can earn back valuable benefits for people in the region.

Special Needs of Trees in Urban Centres

Limited Space

Provision of adequate growth medium (soil) is a constant impediment to the growth and survival of street trees. In response to this, some municipal forest departments are installing structures such as soil trenches and Silva Cells to foster the root expansion that is critical for tree growth. The costs of such plantings are high, but results in a considerably higher survival rates and may also allow a greater range of tree species to be planted. Even with better soil quality, watering and additional maintenance is required to keep newly planted trees alive. Community partnerships are key to maintaining and supporting urban trees and are vital in ensuring tree survival after planting.

Tree Protection

Some cities have created very detailed standards regarding the sizes of trees to be planted in new developments, the required soil volumes, guard rails and protections, the amount of tree cover relative to paved surface, and the spacing of trees for property frontages. Higher growth and/or larger urban centres could consider imposing these rules. Working collaboratively on such rules would be a worthwhile initiative especially in light of the Province of Ontario's Plan for intensification under the Places to Grow initiative.

Homeowner Education

The perceived burden and cost of maintenance can make private landowners reluctant to plant or replace trees on properties. Education around tree selection may help ease this reluctance – native species like Pin Oak are drought tolerant, have reduced watering needs, and smaller limbs and roots. Also, recognition of the value of urban trees through the property tax assessment system could provide private property owners with the incentive needed to maintain trees on their property.

Replacing Old Canopy with New Canopy

Many urban forests are aging and dying, often without a replacement plan or budget at the local level. While there are budgets for tree replacement, there are not budgets for canopy replacement, so mature trees with developed canopies are replaced with younger trees with limited canopy.

Pests and Disease Infestations

Global trade, climate change and the stressed conditions in which urban trees must grow, have contributed to a rash of invasive pest introductions that pose serious threats to urban and community forests. Many urban forests have a poorly diversified species mix. This narrow genetic base leaves urban forests vulnerable to insects and disease infestations. In addition, cities tend to be the “port of entry” for most introduced pests including Dutch Elm Disease, Asian Long-Horn Beetle, Brown Spruce Long-Horn Beetle, Emerald Ash Borer, etc. Invasive plant species that threaten many commercial forest ecosystems also find their way to these habitats

through urban regions. Consequently, an effective program to monitor and control invasive pests in our urban forests will not only reduce their impact locally but will also help protect peri-urban and rural commercial forest interests.

Unless invasive pests are found and stopped at points of introduction, they will continue to be an imposing threat to the health of the ecosystem. The most cost effective long-term management response is to plant a diverse urban forest that offers the greatest opportunity for resistance, and therefore resilience, to new pest introductions.

For all of these reasons, greater resources and attention will need to be paid to the trees of urban Ontario in order to maintain the forest cover that exists at present in certain areas of the province.

Large, mature trees provide up to 16.4 times more environmental and economic benefits over their lifetime than small trees. Air and water quality benefits are a function of leaf surface area, and large trees have exponentially more leaf surface area than small trees. Large trees also provide the greatest boost to property values and contribute strongly to aesthetics, sense-of-place, and other user experiences.

Challenges to the Establishment of New Trees

Urban and regional planning and development directly influence the quality, extent, and function of the future urban forest. Once structures and land use decisions are in place, the condition of the growing medium and quality of the growing space is difficult to change. It is important to consider the need for a sustainable urban forest canopy early in the planning and site design process. Current construction practices do not always result in ideal growing conditions for trees, and once landscapes are completed, non-sustainable, or even harmful, landscape maintenance practices can reduce or impede urban ecosystem health.

Besides tree preservation by-laws, by-laws or standards that guide development, transportation, and the environment will influence the character and extent of future urban forests. Examples include subdivision and zoning by-laws, which may encourage healthy tree growth or unwittingly stifle the growth of robust urban forest landscapes. These codes will typically call for a certain number of trees to be installed per parking space or per foot of new roadway, and they will also detail some of the engineering requirements for tree pits, parking lot islands, and so forth. The objective of these codes is generally to provide visual screening of unattractive areas, to “soften” paved areas, and to provide amenities to residents and customers. Indeed, trees are a desirable component of plazas, streetscapes, and roadways. Yet, too often the design requirements in subdivision and zoning codes do not allow adequate space above ground for tree crowns to mature without conflicting with structures, nor adequate below-ground space for vital roots to develop to support tree growth. In new developments, the most limiting factors to growing a robust urban forest canopy are space and soil. As trees require rooting space, traditional restricted tree pits, parking lot islands, and medians cannot sustain trees over time. New plantings in such spaces rarely last more than a few years, imposing costs on property owners or local governments to replace them.

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Greater Toronto Area Clean Air Council Urban Forestry Reports, Strategies, Actions and Next Steps

Town of Ajax

- In the Town's [Official Plan Amendment No. 38](#), the Town of Ajax recognizes the value of their urban forestry assets, and commits to developing an Urban Forestry Master Plan (Section 2.1.4 Tree Canopy)
- **Excerpt from Official Plan:** To maintain, protect, and enhance the existing tree canopy, the Town shall: a) Develop and implement an Urban Forest Management Plan; b) Encourage the planting of native or non-native non-invasive tree species and vegetation that are resilient to *climate change* and provide high levels of carbon sequestration, subject to the Town's approval, particularly through new *development* and on municipally-owned land; c) Consider enacting a Town-wide tree-cutting by-law to regulate the destruction or injury of trees; d) Encourage the use of water-conserving irrigation systems and the provision of adequate permeable surfaces around newly planted trees to establish a secure root system; e) Require reimbursement, in the form of new trees or financial compensation, for all healthy trees proposed to be removed in *development* applications, based on the findings of a Tree Inventory and Preservation Plan; f) Encourage tree planting by local residents and organizations, and educate residents about the benefits of planting trees versus the environmental impact of removing trees; and g) Implement measures to protect, enhance, and expand the tree canopy, including but not limited to: i) requiring tree planting in areas of extensive surface parking; ii) promoting *development* that maximizes areas for tree planting; and, iii) preserving the existing tree canopy.
- In 2008, the Town of Ajax partnered with the Toronto and Region Conservation Authority (TRCA), to conduct a UFORE study of the Town's urban forest. The purpose of the study was to assess the structure and function of the forest, and to provide management recommendations for enhancing the sustainability of both the forest resource and the community. The urban forest canopy cover across the Town of Ajax is currently estimated at 18.5%.
- In June of 2011 Town of Ajax Council reviewed the [Urban Forestry Management Plan 2011-2015](#). Topics addressed in the Plan include: Municipal Arboricultural Standards and Practices; Tree Establishment and Urban Forest Enhancement; Urban Forest Pest Management; The Planning and Development Process; A Private Tree By-law; Protecting and Enhancing Wooded Natural Areas, and; Awareness, Engagement and Partnerships.

Town of Aurora

- Town of Aurora's urban forest is under the jurisdiction of the Parks Department who manages and maintains more than 15,000 trees across 35 municipal parks, 700+ acres of woodlots/open space areas and municipal boulevards. Case Woodlot, Vandorf Woodlot, Mackenzie Marsh Wildlife habitat and a tree nursery are also under management.
- The Town of Aurora instituted a Woodlot Management Plan in 1998, which was aimed towards preserving the large tracts of forested land in Aurora. The plan was revised in 2010 to address population growth over the next 10 years, affects of recreation within the forest and provides ways to mitigate the impact.

- The town has a Boulevard Tree planting program, which encourages residents to assist in the selection of species and care of trees planted on the town road allowance. Homeowners water, mulch and visually monitor the boulevard trees resulting in health benefits and increased pride in the neighborhoods.
- Woodlands (size greater than 1 hectare) are under the jurisdiction of the York Region Forest Conservation by-law.
- The town has a private Tree Bylaw, which prevents the injury or removal of trees on private property without a proper permit or replanting agreement. [By-law #4474-03.D](#) regulates the removal of trees by requiring residents and landowners to obtain a Town permit to remove and replant trees under certain conditions. It also enables the Town to impose fines and penalties for unauthorized removal of trees from privately owned land.
- The town also has a landscape standards document, which outlines criteria for tree planting and vegetation plans for new developments and rehabilitated land. The standard includes the improvement of planting site conditions, requiring a minimum of 300 mm of top soil in the entire boulevard. Document is under revision in 2012.
- Aurora initiated a Tree Inventory of municipal street trees and open spaces in 2007, data continues to be collected in parks and new developments.
- Tree Information on website:
<http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=3353&lang=en-CA>
- Woodlots and Trail Systems information :
<http://www.town.aurora.on.ca/aurora/index.aspx?ArticleID=3351>

City of Brampton

- In section 4.5.8 of the City of Brampton's [Official Plan](#), strategies to protect and increase the Urban forest in Brampton are outlined. These strategies include: Vegetation surveys on new developments; Tree removal permits for new and existing developments; Requirements for boulevard tree planting; and Development charge credits for planting initiatives.
- Woodlot Conservation Bylaw and Tree Preservation Bylaw - The City has two bylaws that protect private woodlands and individual trees. All landowners require permission from the City before they perform any work on their property that has the potential to injury or destroy trees.
 - [Woodlot Tree Protection By-law](#)
 - [Tree Preservation By-law](#)
- In the City's forthcoming Draft Environmental Master Plan there will be recommendations included that address the need for a long term strategy for protecting, maintaining and enhancing the City's urban forest by coordinating the various existing urban forest programs under a series of measurable goals and objectives.
- The City of Brampton has undertaken a number of tree inventory activities. They have undertaken an inventory of all trees on public land in the City, and have completed the first phase, in which they inventoried all of the street trees. The second stage is to inventory parks and valleyland trees, then finally to inventory city owned woodlots.
- The City has also undertaken the Urban Forest Effects Model (UFORE) in conjunction with the TRCA, The Region of Peel, the City of Mississauga and the Town of Caledon. This inventory revealed that Brampton has an 11% canopy cover, more information on Brampton's urban forest can be found in [the City of Brampton Urban Forestry Study](#).

- The City has a number of tree planting and replacement initiatives, including a 10 Year Valley Re-Naturalization Program aimed at renaturalizing areas that had no native vegetation due to prior agricultural activities, a community forest initiative focused on planting trees along the Etobicoke Creek, a tree replacement program whereby any tree that falls or is removed is replaced within a calendar year and landscape guidelines for new developments requiring trees and shrubs to be planted along boulevards, in parking lots, along stormwater management facilities, in buffers and in parks and valleys.

City of Burlington

- The City of Burlington's [Urban Forest Management Plan](#) was released in July of 2010. The vision statement for this document states: The trees and woodlands of Burlington's urban forest will be maintained and enhanced for the long term, in recognition of the valued environmental, social and economic services they provide. The city will work with its partners and the community in the urban and rural areas to ensure that this essential resource is managed effectively to maximize tree cover and health, increase native biodiversity, minimize risks to public and property and contribute to the environmental sustainability and quality of life in Burlington.
- Burlington has 52,000 street trees; providing a net benefit of 3.5 million in carbon sequestration, air pollution absorption and energy savings; street tree replacement value is estimated at \$ 107 million and annual management costs are \$ 2.1 million per year.
- This Plan focuses on the expansion and enhancement of Burlington's Urban Forest through five key areas: Management and Implementation; Community Engagement and Stewardship; Protection and Preservation; Replenishment and Enhancement; and Tree Health Care and Risk Management.
- In each of the sectors, key issues, current practices in Burlington, input from public consultation, best practices from the GTA and opportunities for improvement are identified, finally leading into a recommendations table at the end of each of the 5 sections.
- The Plan establishes 40 recommendations for Burlington's Urban Forest, ranging from a more comprehensive inventory of the current tree stock to enhancing the information available on the city's Urban Forestry page of its website.
- The City of Burlington has a [Emerald Ash Borer Action Plan](#) under review that recommends continued inventories for signs of infestation and treatment for infected trees with a diameter of 30 cm or more.
- Halton Region's by-law 121-05 regulates woodland of at least one hectare. Burlington is presently delegating woodlands between half and one hectare to be under the regulation of this by-law.
- Under by-law 116-1986 as part of the site plan approval process applicants must submit a Tree Saving Plan, enabling the city to retain securities against damage to trees and require the applicants replace removed trees.
- [City's urban forestry web page](#)

Town of Caledon

- Caledon has partnered with Halton/Peel Woodlands and Wildlife Stewardship Council to offer a native seedling planting service to its residents.

- Woodlands Conservation By-law enacted by the Town in 2000. The by-law regulates the destruction and removal of trees and is intended to promote good forestry management practices within the Town. Applications for tree removal are reviewed to ensure that tree cutting will maintain woodlot values, including ecosystem health, fish and wildlife habitat, water quality, and long term productivity.
- Caledon partnered with Region of Peel to undertake [Peel – Caledon Significant Woodlands and Significant Wildlife Habitat Study](#) in 2008.
- According to Peel Region’s draft Urban Forest Strategy, the carbon stored and sequestered by Caledon’s urban forest within Bolton and Caledon East account for 1.1 tonnes/hectare/year and canopy cover is Bolton (17%) and Caledon East (29%). Through the Town’s seeding program which has led to 118,000 native seedlings for planting by local residents across 120 acres of land, an additional 4600 tonnes of Co2 has been sequestered. For more information on Caledon’s urban forest visit the [Town of Caledon Urban Forestry Study](#).
- Credit Valley Conservation (CVC), Toronto Region Conservation (TRCA) and Region of Peel currently offer tree planting (naturalization and reforestation) programs for Caledon landowners.

Municipality of Clarington

- As part of any urban development in Clarington, an applicant has to address the policies of the natural heritage section of the Official Plan, in addition, as part of the subdivision agreements they are responsible for planting of street trees along all road right-of ways in the newly urbanized area. The [requirements for developers are articulated in the various guidelines](#) maintained by the Planning Services Department . [Natural Heritage Section of the Official Plan](#)
- “[Trees for Rural Roads](#)” is a new program by Clarington to address the loss of street trees along Rural Roads and this cultural landscape (also part of the listing on the left side of the Planning Services webpage)
- Clarington’s tree removal urban forestry practices [brochure](#) provides a summary of the tree cutting conditions that trigger a permit.
- 82% of Clarington is within the Greenbelt, the policies of the Greenbelt protect natural heritage features
- The Municipality of Clarington has voted to not expand its urban boundaries into the whitebelt lands and is examining ways to continue to protect the whitebelt lands from future urban encroachment.
- The Municipality of Clarington’s woodland forestry practices are largely dictated by the Region of Durham’s Tree by-laws.

Durham Region

- Durham Region has a tree by-law updated in 2008 which requires anyone removing trees on woodlands greater than 2.5 hectares to apply for a permit of good forestry practices, and for anyone who is clear-cutting an area to apply for a permit and host a public meeting.
- If the Woodland area to be clear cut is less than one hectare in size, the Permit may be issued administratively by the Regional Commissioner of Planning. If the area to be clear

cut is greater than one hectare, approval from Regional Council would be required, as well as a public meeting.

- The Regional Tree By-law does not apply to the following situations: activities undertaken by the Region, an area municipality, or a conservation authority; trees removed for surveying purposes; trees removed on lands licensed for a pit or quarry; where a building permit has been issued for a building or structure; the removal of dead and/or hazardous trees.

Town of East Gwillimbury

- The Town adopted a new [Official Plan](#) in 2010, which includes a forest cover target of 30% as well as policies and objectives to help achieve this target.
- [Natural Heritage System \(NHS\)](#) & [Restoration and Securement Strategy](#) for Enhancing the Town of East Gwillimbury Natural Heritage System (RSS) -In 2010, the Town updated its Natural Heritage System (NHS) policy to support the Official Plan. The RSS takes a multi-faceted approach to the restoration and enhancement of the urban forest and natural systems using a landscape levels approach. The implementation strategy for the RSS will be developed in conjunction with the 2013 tree study.
- While the Town of East Gwillimbury maintains the trees on its streets and in its parks, the town's urban forestry practices largely follow the Region of York's Forest Conservation by-law and urban forestry practices. The Town also utilizes York Region's Acceptable Street Tree lists, with a few exclusions.
- Thinking Green Development Standards (TGDS) - The Town's Draft Thinking Green Development Standards require that "existing healthy trees are maintained on site in accordance with the approved Tree Preservation Plan" and encourages the use of trees to reduce the heat island effect using predominantly native species.
- LEAF (Local Enhancement & Appreciation of Forests):-The Town is partnering with LEAF to:
 - Promote the local enhancement and appreciation of forests (LEAF) DIY Backyard planting program in East Gwillimbury,
 - Facilitate a community workshop and community planting event for the newly completed Harvest Hills subdivision
- 2013 Tree Inventory and Study – LEAF will also be helping the Town prepare a Terms of Reference for developing a tree inventory in 2013, largely to address concerns related to Emerald Ash Borer and the extent of the impact it will have on annual budgets. The tree inventory will be set up as a database for managing the urban forest, with a focus on street trees and park trees.
- Peggy's Wood and Surrounding Area Management Plan & Implementation Plan - East Gwillimbury is in partnership with York Region, The Nature Conservancy of Canada, and the Town of Newmarket to enhance and manage this remnant urban woodland in protecting the headwaters of the Holland River.

Halton Region

- Halton Region has a [Forest Management Plan](#) which applies to the 665.72 ha of forests across 14 tracts of regionally owned lands. The Region also has a Regional Forest

- Stewardship Advisory Committee in place to advise and assist the Region on the implementation of the Halton Regional Forest Management Plan.
- The Region also has a [Tree Replacement Policy](#), which ensures that any trees that die, are damaged or are displaced during development are replaced by a specified number of saplings.
 - The Region also has in place a Woodlands Stewardship Program, whereby landowners can apply for financial and technical assistance to either prepare a local forestry management plan, purchase and plant nursery stock or employ tree marking services.
 - [Halton Tree By-law 121-05](#) came into effect on January 1, 2006. The Tree By-law applies to two types of land and property owners. The first group is those whose property contains all or part of woodland that is greater than 0.5 hectares (1.1 acres) in size. The second group is those whose property is partially or entirely within the Regional Greenlands system.
 - There are two types of permits under the by-law: Approval of a [Tree Harvesting Permit Application](#) is required to selectively harvest trees while following good forestry practices. There is no fee for a Harvesting Permit. Approval of a [Special Council Permit Application](#) is required for tree harvesting that does not conform to good forestry practices.
 - Guidelines and Resources: A [Guide to Halton Region's Tree By-law](#) provides answers to common questions and sources of information about good forestry practices and about potential tax incentives for practicing good forestry. [Guidelines for Good Forestry Practices](#) and [Guidelines for Normal Farm Practices](#).
 - Additional information related to development of the Halton Tree By-law is available through [Report PPW120-05 By-Law to Restrict and Regulate the Destruction of Trees](#) (this by-law prohibits the destruction or injury of trees in Carolinian Canada sites and in areas of natural and scientific interest).
 - [Halton Region Official Plan](#) states that the Region is committed to protecting significant tree-covered areas and to promote the enhancement of woodland coverage, including linkages between woodlands as part of the Natural Heritage System. The Region has also committed to monitoring and reporting on the amount and quality of tree cover across Halton.
 - Halton Region's [Corporate Sustainability Action Plan](#) sets out annual targets for tree planting and in 2011 planted more than 4,000 trees on Region owned lands.

Town of Halton Hills

- In the Town's [Site Plan Application Guide](#), it is specified that any trees that exist on a property must be protected during development, and if they are damaged, they must be replaced.
- In some instances, The Town requires an Edge Management Plan for development applications in order to illustrate how the impacts of adjacent development will be mitigated through restorative planting and/or tree edge management (removal of hazardous trees etc).
- In the Town's [Official Plan](#), section C9 outlines the Town's goals of protecting and planting new trees, including planting trees along roadways to build up urban canopy cover.

- The Town has performed a [survey](#) of natural features within the town boundaries, including wetlands and woodlots greater than 0.5 ha.
- The Town works in partnership with local environmental groups and Conservation Authorities to implement restorative planting projects on Town property as part of on-going stewardship programs like Future Forests.
- The Town participates in a Regional approach (with partners like the Bruce Trail Conservancy, Conservation Authorities and Halton Region) for the securement of sensitive open spaces lands to ensure that they come into public ownership whenever possible.

City of Hamilton

- Hamilton maintains more than 120,000 trees located in parks, open spaces and cemeteries and over 300,000 street trees.
- The City of Hamilton has several programs and projects that are geared towards increasing the health of the Urban Forest in Hamilton, and can be found at: <http://www.hamilton.ca/CityDepartments/PublicWorks/Parks/Forestry/>. These programs and actions include: A scheduled maintenance program including pruning, dead tree removal and pest control.
- The City of Hamilton has bylaws and policies in place to protect [public](#) and [private](#) trees; to protect trees from injury during [construction](#) and to [guide development on tree planting and soil requirements](#).
- The City of Hamilton also has a [Street Tree Planting Policy](#) - Planning & Design.
- The City of Hamilton and Kayanase (the City's ecological restoration partner from Six Nations) are carrying out the restoration of the Red Hill Valley. This involves the planting of native materials and the removal of exotic species.

Township of King

- The Township of King's woodland (size >1 hectare) and woodlot (0.2 hectare to 1 hectare) urban forestry practices are dictated by the Region of York's Forest Conservation by-law and urban forestry practices.

Town of Markham

- The [City of Markham programs and projects that are geared towards increasing the health of the Urban Forest](#) include:
- [Trees For Tomorrow](#) program, which set a goal of planting 75,000 new trees in Markham by the end of 2010. In actuality, by May 2010, Markham residents had planted 125,000 trees. Markham created a fund to pay for equipment and materials for planting trees on public lands, and by creating a partnership between Markham, York Region, and [LEAF](#) which provided full planting services for homeowners for a cost of between \$80 and \$190. This program also created significant community support for new urban forestry developments, and is expected to pay dividends in the future as residents are more engaged in the care of the urban forest. Markham has also partnered with LEAF to provide Tree Tender workshops to community members, where they learn about trees and how to care for them.

- The Town of Markham's woodland (size >1 hectare) and woodlot (0.2 hectare to 1 hectare) urban forestry practices are dictated by the Region of York's Forest Conservation by-law and urban forestry practices. (see York Region section on page 33).
- Markham has a single [tree protection by-law](#) which prohibits the removal of any tree greater than 20cm in diameter on any property without a permit, including private property.
- City staff plant 800 boulevard trees annually, and perform maintenance on all public trees.
- The Town has undertaken the UFORE Study, and are utilizing the results as a baseline from which they can move forward.

City of Mississauga

- The [City of Mississauga undertakes an annual Natural Areas Survey \(NAS\) update](#) which reviews and inventories existing natural areas and explores the opportunity to increase natural areas within the City. The update makes management recommendations and highlights areas of concern to ensure the long-term protection and preservation of these valuable sites.
- The Recreation and Parks Urban Forestry Unit is responsible for the planting, maintenance, protection and removal of all trees located on municipally owned property. It is illegal for any unauthorized individual to interfere with trees on city property (By-Law 91-75).
- City Council enacted [Tree Permit By-law 0474-2005](#) with respect to regulating the injury and removal of multiple trees on private property. The tree permit policies regulate the removal of trees by requiring landowners to obtain a permit to remove trees under specific conditions. The by-law enables the City to impose fines and penalties for unauthorized tree removal from private property. The City is currently reviewing this by-law with the intent to regulate the removal of individual and multiple trees of a certain diameter.
- The Tree Preservation and Protection Program ensures review and input from the Urban Forestry Unit relating to tree protection and preservation in association with site plan and rezoning applications, and land divisions. Preservation and protection of municipal trees is a major objective pertaining to site plan and rezoning application. Prior to construction, all trees to be preserved are protected with hoarding and securities are retained to assist in ensuring that the terms and conditions related to tree protection are upheld.
- In conjunction with the Region of Peel, Toronto Regional Conservation Authority, City of Brampton and the Town of Caledon, the City of Mississauga has completed two Urban Forestry Studies.
 - [Peel Region Urban Forest Strategy](#) - The strategy is to provide the framework and strategic direction for the protection and enhancement of the urban forest as natural infrastructure.
 - [City of Mississauga Urban Forest Study Technical Report](#) – The purpose of the study was to assess the distribution, structure and function of the urban forest and to provide management recommendations for enhancing the sustainability of both the urban forest resource and the community as a whole.

- The City has a street tree inventory of approximately 250,000 street trees which provides species, diameter, digital mapping and a condition index for each tree. The inventory is an integral component of the asset management and customer service software systems utilized by City staff.
- Through the City's Naturalization Program over 20,000 potted trees were planted in 2011 through partnership projects with local community groups, corporate groups, schools, conservation authorities and the City's Urban Forestry Unit. Along with the tree planting component of the Naturalization Program, these groups also participate in stewardship programs where volunteers take part in activities such as tree tending, trail maintenance, and invasive species removal.
- The One Million Tree Program is an initiative outlined in the City's Strategic Plan and is currently being developed for implementation over a twenty year period.
- The Tree Planting section is responsible for the planting of large calliper trees (approximately 5000 trees per year), in new subdivisions as well as replacement trees in older established neighbourhoods on road right of ways and in parks. This section is also responsible for the maintenance of all newly planted trees after the initial warranty period, which involves watering, mulching, and fertilizing.
- Mississauga is currently developing a Strategic Urban Forest Management Plan which will identify key goals and implementation strategies for those goals over a specific timeframe.

Town of Newmarket

- The Town of Newmarket has a [Tree Preservation, Protection, Replacement and Enhancement Policy](#) for the preservation, protection, replacement and enhancement of significant trees addressing the development approval process and specifically applies to lands subject to applications for subdivision, site plan approval and minor variance and consent.
- The policy aims to educate the development industry by: consideration of the location of existing trees in the design of development plans prior to the submission of development applications; the ongoing protection of trees during development activities on properties subject to development applications; encouraging no net loss of trees through the planting of replacement trees; and the planting of additional trees to enhance development properties and streetscapes beyond the requirements of boulevard trees.
- The Town of Newmarket's woodland (size >1 hectare) and woodlot (0.2 hectare to 1 hectare) urban forestry practices are dictated by the Region of York's Forest Conservation by-law and urban forestry practices.
- Official Plan policy – development and site alteration are not permitted in Woodlots identified on Official Plan Schedule "B" – Natural Heritage System
- Official Plan target to increase tree cover of the entire Town from current level of 9% to 12% by 2026. Given that Newmarket is an urban municipality that is close to build-out, this is an aggressive yet achievable target.
- Site Plan Approval Process Manual and Development Standards Checklists include Tree Planting Guidelines intended to maximize long-term plant survival and the sustainability of our urban tree canopy.

Town of Oakville

- Oakville has undertaken the [Urban Forestry Effects Model \(UFORE\)](#), and released a number of subsequent reports, bylaws and actions relating to the Urban Forest. These culminated in the release of [Oakville's Urban Forest Strategic Management Plan](#) in 2008.
- In that Plan, the Town committed to a canopy target of 40% and the Plan also identifies 66 recommendations aimed at increasing canopy cover and improving the health of Oakville's Urban Forest, from official plan amendments to planting policies and guidelines to pest management to progress monitoring and reporting criteria.
- Outlines a process of review and revision to the Plan to take place every 5 years, beginning in 2008 and finishing in 2027. Has led to the development of an additional [Urban Forestry Plan for the area of Town for north of Dundas Street](#). Has also been incorporated in Oakville's Environmental Plan and their Official Plan.
- Major findings for the Oakville UFORE study found that there are 1.9 million trees in Oakville, with 820,000 being trees owned by the Town. Average forest canopy cover is 29; replacement value of the urban forest is estimated at \$878 million; 6,000 tonnes/year; CO₂ filtered by trees- 22,000 tonnes; with 6,300 being filtered by Town trees, 172 tonnes of criteria air contaminants removed (with ozone being the most removed); energy savings from trees is estimated at \$ 840,000.
- Oakville has several by-laws in place to protect the urban forest. These include:
 - [Private Tree Protection By-law](#)- which prevents residents from removing any trees over 20cm in diameter without either notice or a more formal application.
 - [Town's Tree Protection Policy](#) - which states that public trees will only be removed for public safety reasons.
 - [Tree Protection During Construction Procedure](#) - which requires developers to either pay the amenity value of any trees removed, or to plant a specified number of new trees which will ensure no net canopy loss.
 - A [Private Tree by-law](#) to prohibit or regulate the injuring or destruction of trees on private property in the Town of Oakville.
 - A [By-law to Protect and Conserve Topsoil within the Town of Oakville](#) - In 2009 Council approved a new by-law that doubles the depth of topsoil required in new subdivisions from 4 to 8 inches and trenching for boulevard trees must be up to 30 inches.
 - 4,500 trees are planted annually in Oakville, many by Town staff, with about 1500 being planted by OakvilleGreen community volunteers.
 - Emerald Ash Borer - Municipal Ash tree inventory completed in 2009' Private Ash tree Inventory undertaken in 2010; and [Emerald Ash Pest Management Strategy](#) being implemented.
 - Trees are pruned, maintained and removed in Oakville according to practices endorsed by the [International Society of Arboriculture](#).

City of Oshawa

- Oshawa's municipal tree inventory includes over 25,000 street trees in urban and rural settings, an estimated 125,000 trees in parks, open space, leased lands, and other municipal areas and a 24% canopy cover.

- In 2006, Oshawa city council approved the Forestry Business Plan, which outlines a series of recommendations for actions to be implemented to improve the city of Oshawa's Urban Forest.
- Some of these actions include:
 - Analyzing the staff resources available and the resources needed to implement the strategies in the business plan and ensuring that whatever additional staffing resources are required are secured.
 - Ensuring that service standards are reviewed and updated every five years to ensure financial sustainability and a high level of service.
 - Coordinating schedules and resources between the city of Oshawa, Durham Region and the Oshawa Public Utility Company Networks to improve service delivery and cost effectiveness.
 - Ensure that the city has nursery supply resources available to keep up with the planting program for the next 5-10 years.
 - Inventory all city-owned trees and develop a program to locate and inventory all individual trees.
 - Periodically review and update the city's forestry standards to reflect the best practices available, including support for the pest management program.
 - The report recommends expanding current planting programs and investigating the potential increases in planting opportunities on a regular basis.
 - Review and revise development standards and tree levys to ensure that tree planting is considered early in the development process, and that the tree levy paid by developers adequately reflects the costs of planting and maintaining new trees.
 - Establish a comprehensive Forestry communication and marketing strategy for the city, which will serve to inform residents of new forestry operational information and establish a forestry outreach program to encourage residents to get involved in urban forestry stewardship.
- Oshawa city staff plants 1,500 – 2,000 trees on streets, in parks and in natural areas each year.
- Oshawa has a [City Trees by-law](#) which protects city-owned trees from injury or removal.

Peel Region

- The Region has partnered with their local jurisdictions within Peel Region and the TRCA to produce a [Peel Region Urban Forest Strategy](#), which includes a regional Urban Forestry Strategy and technical reports for Mississauga, Brampton, Bolton and Caledon East using the i-Tree Eco model. Eight strategic goals have been established in the Strategy to facilitate a coordinated and consolidated regional approach for urban forestry management.
- The Region of Peel's [Official Plan](#) features policy 2.5.2.9, which directs Regional staff to work with agencies and area municipalities to develop urban forest strategies to maintain and enhance the urban forest canopy.
- In the [Peel Region Climate Change Climate Change Strategy](#) mitigation and adaptation strategies are identified to build resilience in spite of changes in climate conditions. A mitigative action to reduce greenhouse gas emissions and adaptation action to improve

Peel's resilience to the local impacts of climate change are included to encourage initiatives that will strengthen urban forests.

- 45% of Peel Region's urban canopy cover is located on residential property.

City of Pickering

- In 2009, the City of Pickering partnered with the Toronto and Region Conservation Authority (TRCA) to conduct a UFORE study of the City's urban forest. The study area included all of South Pickering which extends from the shoreline of Lake Ontario to the Canadian Pacific Railway Line. The fieldwork and data collection were completed during the summer of 2009, followed by data analysis and a Stakeholder Workshop. The final Urban Forest Study report was completed in 2011. Twenty-seven recommendations were made, including the development and implementation of an urban forest management plan. Staff will be preparing a report to go to City Council in 2012, to advise them of the findings of the study and request for support to further advance an Urban Forest Strategy.
- The total canopy cover in the Pickering study area is 26%; 20% of that being tree cover and 6% shrub cover. The trees in Pickering are estimated to store 104,000 metric tonnes and annually sequester approximately 4,200 metric tonnes of carbon. The forest also removes 91 metric tonnes of air pollution annually: 48 metric tonnes of ozone, 24 metric tonnes of particulate matter, 15 metric tonnes of nitrogen dioxide, 3 metric tonnes of sulphur and 1 metric tonne of carbon monoxide.
- Pickering is currently working on an Official Plan Amendment to update the environmental policies and, where appropriate, will be incorporating a number of the recommendations into the new document.
- The City currently has a boulevard tree planting program and a [tree protection by-law](#) in place requiring residents backing onto watercourse ravine areas to obtain a permit for felling healthy trees and that by-law includes a permit fee and fines for violation of the by-law clearly outline very limited circumstances where the felling of healthy trees would be permitted.

Town of Richmond Hill

- When writing the subdivision agreements between the Town and the developer, the Town often requires the developer to prepare and submit for approval, a comprehensive community landscaping plan, addressing boulevard tree planting, entrance features, buffer plantings, pedestrian walkways and community connectivity. Parks, Recreation and Culture draft plan conditions will require the applicant to pay the Town's boulevard Tree Planting Fee to facilitate Town planting of street trees in the areas of the subdivision will be developed with single family detached and semi-detached residential units. Street trees are to be planted by the applicant within those areas of the subdivision which will be developed with units of other types. A cost estimate for the approved landscape work to be undertaken by the applicant (including the cost of street trees to be planted by the applicant) will be required for Letter of Credit purposes when the subdivision agreement is executed.
- [Richmond Hill's programs and projects](#) that are geared towards increasing the health and canopy of the Urban Forest include: **Community Stewardship Program**: Increases

- environmental awareness and provides hands on assistance to protect and enhance the Town's natural areas; **Healthy Yards Program**: Engages the community about planting native trees, shrubs and wildflowers and the importance of creating biodiversity in our ecosystem. It also provides an opportunity for people to learn about organic lawn care practices; **LEAF: Backyard Tree Planting Program**: Richmond Hill provides in-kind support to promote this program; and **Arbor Week Program** in conjunction with local Elementary Schools. This program provides an awareness of the benefits of trees to our future generations, as well as a hands-on approach to the "greening" of their schoolyards
- [Richmond Hill's EAB Management Strategy](#) was adopted by Council in October 2011. As part of the strategy, the Town will be implementing a proactive pesticide treatment option for street and park trees. This will include the treatment of specimen ash trees which have a 50cm diameter at breast height (DBH) or greater as well as treatment of the largest and healthiest 50% of ash trees along streets that are predominantly lined with ash trees averaging greater than 20cm DBH. Residents will also be allowed to pay for the 10-year cycle of treatments of additional Town owned ash trees that are in good condition should they desire to do so.
 - The [Town's Street Tree by-law](#) protects trees on public boulevards.
 - Richmond Hill requires developers in certain areas of the city to plant street trees along the roads for new developments (Note: any more information on this? link?).
 - Enacted in 2007, the Town of Richmond Hill's private property [Tree Preservation By-law No. 41-07](#) regulates the destruction or injury of trees on private lands within the Town of Richmond Hill. The by-law requires the application for a permit before injuring or destroying any tree in the Town with a diameter of 20 cm or more at breast height (1.4 metres).
 - The Town of Richmond Hill's woodland (size >1 hectare) and woodlot (0.2 hectare to 1 hectare) urban forestry practices are dictated by the Region of York's Forest Conservation by-law and urban forestry practices.

City of Toronto

- The City of Toronto has more than four million trees in ravines, on streets and in parks. Six million more trees are located on private property. As a percentage, 60% of the trees in the City are located on private property, 34% are in City parks and natural areas and 6% are on City road allowances. In 2007, Toronto City Council set a goal of achieving 30-40% urban forest canopy cover in the next 50 years. Toronto's current canopy cover as of 2008 was 20%.
- Toronto has a [private tree by-law](#), which protects trees on private property that are 30 cm (12 inches) or larger in diameter from unauthorized injury or removal.
- The City's Street Tree By-law, Ravine and Natural Feature Protection By-law and Parks By-law are examples of other legislation that regulate the injury and destruction of trees, other vegetation and natural features within the City of Toronto. The Parks By-law and Ravine and Natural Feature Protection By-law have no minimum size of applicability, all trees and vegetation in these areas are protected.
- In 2010, the City of Toronto released the report [Every Tree Counts](#) - A Portrait of Toronto's Urban Forest, which presented the results of a study on the state of the City's tree canopy. The report identified the value of Toronto's urban forest in terms of ecological services, heating and cooling reductions and pollutant reduction. The report also

presents recommendations for actions that can be undertaken in the future in order to achieve the goal of 30-40% canopy cover in the next 50 years. Highlights from this report include:

- A complete canopy assessment and analysis of Toronto's Urban Forestry assets.
- 60% of the trees in Toronto are on private property.
- Toronto has increased the number of street trees that it plants each year since 2004. In 2008, the City planted 4000 more street trees than it removed.
- The rate of planting on City property steadily increased between 2004-2009, and during that period, the City planted on average, 84,000 trees annually. Between 2004-2009, the City together with its partners planted nearly 500,000 trees. The report identifies current planting rates as necessary to meet the city's canopy goal.
- This report also identifies areas where the Urban Tree Canopy (UTC) could be increased, and notes that 13% of Toronto's possible UTC is located in Single Family Residential land use areas.
- This report also identifies the importance of reducing mortality of existing trees by identifying potential threats such as diseases and pests, and establishing strategies to reduce their impact on the UTC.
- The report identifies the importance of public stewardship and tree planting incentives for private property owners in order to achieve the UTC goals.
- The urban forest provides millions of dollars in ecological services, including benefits from energy savings and emissions reductions (\$10.2 million/year), air quality improvements (\$16.1 million/year), carbon storage (\$31.6 million) and carbon sequestration (\$1.3 million/year).
- The structural value of Toronto's urban forest is estimated at \$7 billion.
- Toronto Public Health has developed [shade guidelines](#) and Toronto Urban Forestry is in the process of using Toronto Public Health research related to Heat Vulnerability to help guide Toronto's tree planting strategy.
- The City of Toronto offers a [Free Tree program](#), which allows residents to order a tree free of charge to be planted on the road allowance in front of their property.
- The recent tree canopy study estimates that there are 860,000 ash trees in total on public and private lands. As a result, Emerald Ash Borer (EAB) will have a significant impact on streets and in forested areas throughout Toronto. It is expected that unless treated through pesticide injection every 2 years for the life of the tree, most, if not all ash will be gone from the City's landscape by 2017. Urban Forestry's [EAB plan](#) identifies 80,000 City-owned street and parkland ash trees that will require management. Besides a small pesticide treatment program that will retain up to 8,000 ash trees on a temporary basis, the plan identifies a strategy of removal of dead and dying ash trees and replacement of up to 32,000 street trees. In parkland, Urban Forestry will continue the significant planting program already established.

City of Vaughan

- Vaughan has developed a 5 year strategy called Planting Our Future: A 5 Year Plan to Expand the Urban Forest, which includes an exploration of the importance of, and the challenges facing the urban forest. The plan then introduces a series of recommendations, which are:

- Undertake urban forest effects (UFORE) study: this study will identify areas of insufficient cover in Vaughan, and will provide direction for the new planting policy;
- Review and revise the current tree planting policy: Current practice is to replace removed trees, but the new policy would result in 100 new trees being planted every year;
- Re-brand the current tree planting programs under the name of Vaughan B'Leaves;
- Enhance civic engagement by expanding park adoption and stewardship programs;
- Implement and enhance outreach program;
- Appoint a tree advocate;
- Promote the local enhancement and appreciation of forests (LEAF) program in Vaughan;
- Promote the Earth Rangers program;
- Review current planting policies to increase the topsoil depth and the total number of trees planted, including requiring developers to leave minimum 18 inches of topsoil for trees in new developments and considering which species is best suited for the existing soils and site conditions;
- Revise the current private tree by-law to include cash-in lieu option for trees that are removed: if a resident requests a private tree removed and the property cannot accommodate a new tree, then the land owners have the option to pay into a fund which will go towards planting new trees elsewhere in Vaughan;
- Establish a reserve account to ensure that budgetary shortfalls do not impact planting on a year-by-year basis;
- Review street tree planting guidelines; and
- Explore new techniques of watering newly planted trees.
- The City of Vaughan has a Tree Dedication program that provides an opportunity for trees to be planted in neighbourhood parks to commemorate a birthday, anniversary, or other special occasions.
- City of Vaughan has [private tree by-law \(185-2007\)](#) that protects trees 20cm in diameter or greater located on private property.
- City of Vaughan has a [public tree by-law \(95-2005\)](#) that protects trees located on public property.

Town of Whitby

- The Town of Whitby urban forest is under the jurisdiction of the Public Works Department, Operations Division, Parks Depot. This department is responsible for the maintenance of approximately 40,000 municipal street trees, and 11,000 trees in 383 municipally owned properties covering 809 hectares of land.
- The Forestry program includes the general maintenance of trees on Town streets, in parks, and in other designated Town properties. This program involves tree planting (including boulevards/streets, parks, rural roads and community involved naturalization planting) tree mulching, tree fertilization, tree pruning (includes Winter Block Pruning program which operates on a 5 year rotation), mature tree inspection and maintenance, tree and stump removal, and tree pest and disease management.

- The Asset Management Services Division of the Operations Department is engaged in creating a database Inventory of Municipal Trees with the support of Forestry and Planning Staff.
- As of June 2011, Emerald Ash Borer has now been positively identified in the Town of Whitby. Town Forestry staff has removed seven heavily infested boulevard trees and one park tree. Town staff is now conducting a survey to determine the extent of the infestation on municipally owned Ash trees in other areas of the Town. Early indication shows that the Emerald Ash Borer infestation is likely contained in this one area only.
- Woodlands one hectare or more in size are under the jurisdiction of The Regional Municipality of Durham By-Law No. 27-2008 which prohibits or regulates the destruction or injuring of Trees in Woodlands in Durham Region.
- Section 5 – Environmental Management of the Town of Whitby [Official Plan](#) speaks to the protection, conservation and enhancement of major woodlands. This section also encourages the rehabilitation, reforestation, improvement and renewal of urban woodland and existing wooded and natural areas within the Municipality.
- Schedule ‘C’ of the Town of Whitby Official Plan identifies through Section 5.3.7.1, forested areas outside of Environmentally Sensitive Areas, with established stands over 60 years old. Stewardship of these woodland areas in private ownership is encouraged through sustainable forest management practices. Development applications within these areas require the preparation of a Tree Preservation Plan included in Development Agreements.
- The Planning Department has developed Guidelines for Site Plan and Subdivision Developments, which outlines criteria for landscape plans for new development applications and identifies minimum requirement standards (including quantities, locations, caliper size, spacing and species selections).
- The Planning Department has developed [Tree Preservation and Clearing Guidelines for New Developments](#) (Subdivisions and Site Plans) that establish objectives and performance standards which will ensure that tree management, assessment and evaluation for new developments will be optimized.
- The Town of Whitby Bylaw No. 5456-11 regulates the maintenance, occupancy, use of and other matters pertaining to boulevards, protecting trees and other vegetation located within the municipal boulevard area from injury and destruction.
- The Town of Whitby has developed a policy that provides an opportunity for remembrance by permitting the donation of a tree or park bench in remembrance of passed loved ones.

York Region

- [Natural Heritage and Forestry Section](#) is responsible for environmental restoration, protection and education. Strategic Regional Programs are integral to the sustainable management of the Regions ‘Green Infrastructure’. The development and implementation of these priority initiatives helps to ensure that the natural environment, including the urban forest, is protected and enhanced for the enjoyment of present and future generations. Services are provided in five main business areas: [Regional Greening Strategy](#), [Forest Conservation By-law](#), [York Regional Forest Management](#), [Urban Forestry Program](#) and [Invasive Species Management](#).

- The Greening Strategy “provides a context for Regional decision making that affects the natural environment”, and demonstrates on the ground action. Aligned with Regional goals such as the Official Plan Forest cover target of 25%.
 - Projects are delivered in partnership with the federal government, provincial governments, local municipalities, NGO’s and other Regional departments (e.g. Community and Health Services, Transportation and Community Planning).
 - Over 960,000 trees planted by community groups, volunteers and partners since 2001.
 - The Strategy was built on Action Areas including: legislation/ policy, land securement, the urban forest, environmental education, stewardship, and rehabilitation (e.g. tree planting).
 - Includes a Greenland Securement Strategy for the conservation of strategic environmental lands. 973 hectares of conservation land secured directly or through partnerships since 2001.

- [York Region’s Forest Conservation By-law](#) provides protection to the 40,000 hectares of woodlands across the Region. The Region has had a private land Tree By-law since 1991 and in 2005 due to changes in the Municipal Act (2001) Regional Council adopted a new Forest Conservation By-law (No. TR – 0004-2005-036). The purpose of the by-law is to restrict and regulate tree cutting in forests on private land and promote good forest management practices.
 - The by-law requires the issuance of permits to cut trees on private woodlands. Special Permits involving large scale clearing of land are presented to Regional Council.
 - There are three types of permits: Good Forestry Practices permit; Harvest permit; and Special permit.
 - The Regional By-law does not apply to single trees in individuals’ front and backyards; however, it complements the local municipality’s single tree By-laws (Aurora, Markham, Newmarket (policy), Richmond Hill, Vaughan).
 - Public education, stewardship and promotion of sustainable woodlot management are key to the delivery of the by-law.

- The Region owns and manages the 2300 hectare York Regional Forest. Established in 1924 through the Agreement Forest Program, the Regional Forest demonstrates long term forest restoration and sustainable forest management.
 - In 2001, the York Regional Forest became Canada’s first publicly owned forest to be certified as responsibility managed according to the *Forest Stewardship Council (FSC) principles and criteria*. The Region continues to maintain this certification.
 - The Regional Forest continues to grow with 263 hectares of land acquired since 2001.

- The Region is responsible for the planting and maintenance of over 50,000 street trees along Regional Roads. Protection and incorporation of trees in Regional capital infrastructure projects (water & wastewater, roads, utilities, development) are required through the Region’s [Streetscaping policy](#). The Region’s Urban Forestry/Street Tree Program includes:

- Planting and establishment of 2000 + street tree's annually.
- Forest health monitoring and management.
- York Region is committed to invasive species management plan to address environmental sustainability and biodiversity. In 2011 York Region adopted the [Emerald Ash Borer Management Plan](#).
- [York Region Official Plan](#) provides significant policies for protection of our urban forest including:
 - To increase woodland cover to a minimum of 25% of the Region's total land area.
 - That local municipalities shall develop an Urban Forest Management Plan, together with York Region that may include additional locally significant woodlands.
 - To encourage and work with the Province and other stakeholders involved in woodlands management, to maintain and enhance publicly and privately owned forested lands, and to encourage landowners through stewardship initiatives, to use good forestry practices.

Southwestern Ontario Clean Air Council Urban Forestry Actions

City of Brantford

- The City of Brantford has 60,000 trees along streets; 26,000 trees in parks (not including forest/woodland; on average about 200 dead, dying, or hazardous trees removed and 500 trees are planted each year along roadsides; and 5,000 trees are planted by community groups each year.
- Four Brantford By-laws relate specifically to trees: City Tree Bylaw, Private Tree Bylaw, and Property Standards Bylaw (protects private trees via the Building Department).
- The Private Tree Bylaw only refers to trees on Private Property. There is a list of 11 rare species that are protected anywhere in Brantford. There are also 32 protected woodlots that have strict protection. [Brantford Private Tree Bylaw](#).
- The [City Tree Bylaw](#) protects all trees on City property. Trees may only be removed with the City's permission. This includes trees on roadsides, in parks, in cemeteries, and on any other municipal land.

Bruce County

- Bruce County Forestry Conservation By-law 4071 prohibits or regulates the destruction or injuring of trees in woodlands.

City of Cambridge

- The City of Cambridge has a [City Tree By-law #71-06](#), which protects trees on all municipal lands.
- The [City of Cambridge also has a Tree Management Policies and Guidelines for New Developments](#) which aims to reduce the amount of removal of vegetative cover that occurs during development. This is done by requiring that developers of subdivisions and

site plans consider opportunities to maintain and enhance on-site vegetation in conjunction with site development.

- The City of Cambridge offers a [Tree Dedication Programme](#). Trees are planted in approved areas within City Parks and Cemeteries.

Municipality of Chatham Kent

- The Municipality provides young trees free of charge to property owners of Chatham-Kent for planting on their own property subject to an application and regulations as set out in the Tree Planting Policy. This policy include the provision for all new subdivision agreements to include a clause making at least one tree per residential lot mandatory.
- A [Chatham-Kent Forest Management Strategy Background Report](#) was undertaken and provides a series of actions and recommendation to increase canopy cover.

Town of Collingwood

- [Tree preservation by-law number: 2003-037](#) prohibiting and regulating the injuring or destruction of certain trees (located on lands designated Environmental Protection, Hazard Lands, Recreation, Conservation, Rural or Rural Residential on Schedule A of the official plan; located on lands designated “Residential” on Schedule A of the official plan which is one-half hectare in size or greater; located in a woodlands, or identified as a tree for preservation in a tree preservation plan approved by the Director).

Elgin County

- [Elgin County Woodlands Conservation By-law 05-03](#) prohibits or regulates the destruction or injuring of trees in woodlands.

Town of Goderich

- In the January 2009 update to the Town’s [Official Plan](#), Maitland Woods (p.24) was rezoned from an industrial designation to a natural environment designation thereby protecting about 22.2 hectares of forest. References to protecting heritage trees and the spring boulevard planting program are available on page 27 of the Official Plan.
- All trees on boulevards and in parks or other property of the Town are protected from trimming or removal by [Tree Cutting Policy - By-Law # 35 of 1993 & amending By-Law #82 of 1993](#).

Grey County

- The County’s current tree conservation by-law was passed under the Forestry Act in 1996 and applies to all woodlots greater than two acres. A new tree by-law is currently in the process of being developed.
- Approximately 50% of the County is forested. Approximately 90% of the cutting of trees that takes place in the county is for the commercial sale of timber. The remaining 10% is done by private landowners for their own personal use.
- The County of Grey currently manages 8340 acres of county forest.

- Grey County Forestry Advisory Committee. The forest advisory committee is composed of members representing such groups as the local conservation authorities, members of the local logging industry, members of the Grey County Council, the Ministry of Natural Resources, the Grey County Woodlot Association, the Grey Forest Stewardship Network, the Niagara Escarpment Commission, the Federation of Agriculture, the Bruce Grey Trail Network, the Owen Sound Field Naturalists, and the Fish & Wildlife Sydenham Sportsmen.
- The County is currently in the process of developing a forest management plan.
- Woodlands are managed via the Forest Management by-law 4341-06. The current administrative process for the tree conservation by-law is enforced and carried out principally by the tree commissioner.

City of Guelph

- [Guelph By-law Number \(1986\)-12229](#) prohibits the injury or destruction of any live tree in the City of Guelph. A revision of the by-law is currently under development and anticipated to be brought forward in 2010.
- The City of Guelph has developed a [Strategic Urban Forest Management Plan 2008-2028](#)
- Tree Protection Policy and Guidelines to be finalized in 2010.

Huron County

- [Huron County By-law No.10, 2006](#) prohibits or regulates the destruction or injuring of trees in woodlands.

City of Kitchener

- Kitchener's urban forest includes the City's natural areas and trees found in the city's parks and along residential streets. The City's inventory includes 1,600 hectares of parkland, which includes more than 75 natural areas, 220 parks, more than 125 kilometers of community trails and 45,000 street trees.
- In the City of Kitchener trees within Woodlands as defined in the [Conservation of Trees in Woodlands By-law](#) are under the jurisdiction of the Region of Waterloo.
- In 2010 the City enacted a [Tree Conservation By-law](#) for trees on private properties greater than 0.405 hectares (1 acre) with respect to regulating the injury and removal of trees greater than 10 cm dbh. The By-law may require a permit be obtained to remove trees. The By-law enables the City to impose fines and penalties for unauthorized tree removal from private property.
- The City's [Tree by-law](#) protects trees on city property. The Operations, Infrastructure Services Dept. (Tree Services) is responsible for the planting, maintenance, protection and removal of all trees located on municipally owned property. It is illegal for any unauthorized individual to interfere with trees on city property.
- Section 7.7 – Forest Resources of the [City's Official Plan](#) outlines the City's objectives related to the protection, preservation and wise management of woodlands with objectives of increasing the tree coverage and continue to reintroduce the natural environment into the urban fabric. The City is currently reviewing and [updating the Official Plan](#). As part of the Natural Heritage System (Section 2.8) woodlands include

treed areas, woodlots, or forested areas and vary in their level of significance at the local, regional and provincial level. A woodland may be recognized as significant to reflect its size, ecological function, uniqueness or social value. The intent of this Plan is to protect woodlands from incompatible land uses and activities that would compromise the benefits and services woodlands provide. The Urban Forest (Section 2.12) provides objectives to protect, manage and enhance the urban forest, conserve and enhance the urban tree canopy, preserve the natural appearance, character and aesthetics of the city and engage, educate, and assist with the conservation and stewardship of the urban forest.

- In 1994 the City approved a [Tree Management Policy](#), which includes requirements to perform vegetation overviews on sites where development (subdivision, consent, site plan etc.) is to take place, and to ensure that as little canopy cover as possible is lost when development occurs.
- The City's [Urban Design Manual](#), a comprehensive document intended to foster a high quality of urban design on a city-wide basis has guidelines for new or redevelopments regarding landscaping, trees and woodlands.
- In August of 2010, Emerald Ash Borer (EAB) was positively identified in the City of Kitchener. Forestry staff have removed 19 infested trees. An EAB Strategy based on current information, projected costs and management options will be developed.
- The City is working to develop a [Sustainable Urban Forest Plan](#).

Lambton County

- County Forest Management Plan was adopted in 1994 as the management plan for the Lambton County Heritage Forest, with an emphasis on the preservation and management of its rare oak savannah forest.
- Lambton County's first tree by-law was originally passed in 1979 under the Trees Act. A new Tree County's Woodlands Protection By-Law 45 of 2003 was adopted in 2003 under the Municipal Act.
- Lambton County has approximately 13% forest cover. To reach a goal of 30% forest cover an additional 126,000 Ac. (51,100 ha.) would need to be planted. 1% of the County's gross area is 7,424 Ac. (3,000 ha.).
- The County currently has policies in its [Official Plan](#) that speak to conservation of forest cover.
- The County of Lambton and the St. Clair Region Conservation Authority are undertaking consultations to develop draft land management plans for several county-owned parcels of land.

City of London

- London's average leaf cover is 24.7% based on an analysis of high resolution aerial infrared photography completed in 2008
- The City of London has 123,359 street trees and 32,101 trees in manicured portions of park parks
- The UFORE analysis conducted in 2008 found that there are 4,400,000 trees in the urbanized portion of London mainly north of Highway 401. These trees have a structural value value of \$1.5 billion. Environmental services provided by these trees include:

- Carbon storage at 360,000 tonnes (10.3 million); CO₂ removed from the atmosphere of 45,800 tonnes per year (\$ 355,000 per year); Carbon sequestered of 370 tonnes of air pollutants removed per year (\$4.5 million per year); energy savings to residential homes estimated at \$ 1.7 million per year.
- A summary of the key findings of the UFORE analysis are available on the following staff report [City of London has undertaken the UFORE project](#),
 - The final report of the UFORE analysis will be published this spring and will form the scientific basis for the development of an Urban Forest Strategy, also to be completed by December 2012.
 - The Urban Forest Strategy will be in support of the Official Plan and will guide the city-wide planning, policies, standards, guidelines and practices that affect the urban forest
 - Emerald Ash Borer (EAB) was found in London in 2006. A new EAB strategy was prepared in 2011 and endorsed in principle by Council. Additional EAB funding has been approved by council starting in 2012.
 - London has a [Trees and Forests Advisory Committee](#) that provides input, advice and recommendations to Committee and Council regarding the formation and implementation of London's Urban Forest Strategy.
 - Trees on public property are protected from injury or removal by a [tree bylaw](#).
 - The City of London and [ReForest London](#) during the summer of 2011 are delivering a [pilot project](#) where they are providing 500 tree watering kits to Londoners who have received a new tree on the city boulevard in front of their homes. Each tree watering kit contains a 20 litre (5 gallon) bucket, a new brochure describing how to care for new trees and the benefits of trees, and a fridge magnet reminding people to water their trees.

Norfolk County

- [Norfolk County Forest Conservation By-Law](#). Norfolk County's tree conservation by-law is administrated and enforced by the department of Forest and Conservation Services. To enforce the by-law, the county currently employs a full-time forest conservation officer and a part-time deputy forest conservation officer.
- Currently over 25% of Norfolk County is covered in forests.

Owen Sound

- The City of Owen Sound has a [public tree by-law](#) (by-law 1994-020) that protects City trees from pruning and cutting.

Oxford County

- [Woodlands Conservation By-law 4489-2004](#) prohibits or regulates the harvesting, destruction or injuring of trees in woodlands in the County of Oxford.

City of Stratford

- [Stratford's By-law 5-2003](#) regulates the planting, maintenance, protection, preservation and removal of trees on highways within the City.

- [Stratford's By-law 1-2006](#) prohibits or regulates the destruction or injuring of trees in woodlands and appoints a commissioner for enforcement purposes.

Region of Waterloo

- There are 16 forest systems owned by the Region.
- The Region also oversees the *Conservation of Trees in Woodlands By-law*, which regulates tree cutting in private and public woodlots throughout Waterloo Region. Under this By-Law, a permit is needed from the Region to harvest trees in woodlots of one hectare or more. The purpose of the By-Law is to promote good forestry practices and protect woodlots, but also to restrict harvesting times and methods in order to protect breeding habitats.
- In 2006, the Region developed a [Regional Forest Management Plan](#). The main goal of this plan is to maintain the ecological health and integrity of the regionally owned forests and woodlands, and to ensure they continue to provide a natural resource for the enjoyment of Region residents and visitors. Since implementing the plan in 2006, the Region has: Restored parts of Hilborn Regional Forest in Cambridge to an oak savanna condition; Completed an improvement and thinning harvest at the Mannheim Water Treatment Plant Woodland; and Started the development of five-year management plans for Doon Regional Forest in Kitchener and the Regional Landfill Woodland in Waterloo.

City of Windsor

- The City of Windsor maintains 70,000 street trees, 35,000 park trees and provides required maintenance in woodlots.
- Windsor maintains a city wide tree inventory of trees along public rights of way as a basis to monitor the effectiveness of urban forestry practices.
- By-laws have been adopted to protect trees on Municipal property (By-law#135-2004) and all Natural Environment Areas (By-law #231-2005) as identified in the Official Plan.
- City has been actively purchasing natural areas in order to ensure their protection.
- New developments are required to pay a tree planting fee. These funds are used by the City to plant street trees in the new developments.
- The City of Windsor has partnered with Essex County to create a two-pronged strategy to protect and enhance the region's urban forestry assets. Essex County only has a tree canopy cover of eight percent, so the city is aiming to launch a comprehensive environmental and educational program for the City.
- The environmental aspect of the plan has seen increased planting of Carolinian tree species in Windsor and the construction of two new nurseries in Windsor.
- The educational aspect of the plan will raise awareness of the City's One Million Trees program through volunteer outreach programs and a new user-friendly website with the goal of achieving 100,000 trees planted by volunteers annually.

City of Woodstock

- The City of Woodstock has over 40,000 trees representing over 40 individual tree species.

- Woodstock has a Landscape Plan Guidelines and Requirements related to protecting and ensuring tree cover in developments, [City of Woodstock Landscape Plan Requirements and Guidelines](#) and [City of Woodstock Landscape Specifications and Tree Protection](#).
- The City of Woodstock's forestry inventory includes 249 Ha. of woodlots/vegetative features which make up 7.8% of the City's land mass. It includes: 13,000 Street Trees; 3,500 Park Trees; and woodlots/SWM ponds & other naturalized areas.
- The City has committed to developing a Comprehensive Tree Management Plan which will include: and Invasive Pest Plan (i.e. Emerald Ash Borer); A Tree Maintenance & Plantings plan for replacement of trees in older areas of City and in new subdivisions; hiring of forestry students to do maintenance work on younger City trees planted over the last 10 years and to monitor for EAB /ALB.