

**CITY OF GUELPH**  
**URBAN FOREST MANAGEMENT PLAN**

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**2013 - 2032**

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**September 2012**





## ACKNOWLEDGEMENTS

This Plan has been developed with input from key stakeholders and the public, as well as with extensive input from City staff. City staff and key stakeholders who have contributed to this Plan, as well as the consultants who have authored the Plan, are acknowledged below.

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## **EXECUTIVE SUMMARY**

The City of Guelph is a single-tier municipality with an area of just over 86 km<sup>2</sup>. The City contains a mix of industrial, commercial and institutional land uses, as well as more than 1,000 hectares of public parks and open spaces. The City's urban forest is comprised of the individual trees and all the treed areas that occur within its boundaries. These include treed natural areas, as well as individual or small groups of trees in parks, along roadways, and on residential, industrial, commercial and institutional properties.

All of these trees form part of the City's green infrastructure, which sustains the community by filtering air pollution, providing shade, contributing to flood control, reducing local energy use, sequestering carbon, and bringing nature to the City. These services are well documented, and trees are known to save municipalities millions of dollars in air pollution control and storm water management. Natural tree cover also provides a wide range of human health benefits that have yet to be fully valued. Contact with nature, and treed areas, has been shown to lower blood pressure, speed up recovery from surgery, enhance mental development and creativity, and reduce aggressive behaviour. The shade, cooling and air quality benefits provided by trees also helps reduce the risks of skin cancer, heat stroke and respiratory ailments.

Guelph has experienced unprecedented growth in the past 25 years. In 1986, the City's population was less than 80,000, and at the time of the last census in 2006, it was just under 115,000. It is currently estimated at about 125,000, and the City is expected to accommodate 50,000 more people by 2031. While new residents bring diversity, ideas and new opportunities, they also increase demand for housing and put more pressure on the City's municipal services, including roads, sewers, parks and natural areas. These pressures, combined with the already present and emerging threats of pests, pathogens, and environmental stresses associated with climate change, make maintaining and enhancing the City's urban forest very challenging. Addressing these challenges will require careful planning, active management, ongoing monitoring, and creative problem solving that make considerations related to trees a priority. This Urban Forest Management Plan (referred to as "the Plan") identifies specific strategies that will guide the planning, management and monitoring of Guelph's urban forest so that it continues to be a healthy, thriving entity.

In recognition of the need for a more comprehensive and strategic approach to urban forest management, the City provided direction for a Framework for an Urban Forest Management Plan in 2006. This Framework was completed and adopted by Council in the fall of 2007. The Framework provided the context for moving forward and identified a number of key gaps, including the need for a 20 Year Urban Forest Management Plan. This Plan fills that gap and is intended to be implemented over a 20 year period through a series of four Five-Year Management Plans (2013 – 2017: Five-Year Management Plan #1; 2018 – 2022: Five-Year Management Plan #2; 2023 – 2027: Five-Year Management Plan #3; 2028 – 2032: Five-Year Management Plan #4).

This Plan provides the guiding principles, vision and strategic goals for the entire 20 year period as well as a more detailed breakdown of the recommendations for the first Five-Year Management Plan. Implementation of these recommendations over time is intended to enable the City to transition from reactive to proactive urban forest management, thereby increasing operational efficiency and effectiveness, improving tree health and diversity, reducing risk to the public, and increasing the wide-ranging benefits provided by a healthy and sustainable urban forest.

The recommendations, which are laid out in more detail in the Plan, are as follows:

#### MANAGEMENT AND MONITORING

1. Create a Senior Urban Forester position
2. Create an interdepartmental “Tree Team” of City staff
3. Increase capacity to complete an inventory of municipal street and park trees
4. Undertake targeted vegetation assessment and management of City parks and natural areas
5. Expand the City’s capacity for planting and maintenance of municipal trees
6. Undertake an Urban Tree Cover (UTC) Potential Plantable Spaces Analysis
7. Develop and implement an Invasive Species and Pest Management Strategy, starting with an Emerald Ash Borer Strategy
8. Develop tree risk management policy and train City Arborists in risk assessment
9. Complete a State of the Urban Forest report every five years
10. Establish a green infrastructure asset valuation

#### PLANNING

11. Assess the effectiveness of current tree-related policies and legislation
12. Update City documents to be consistent with new tree-related policies, guidelines and legislation
13. Develop and implement a Public Tree By-law

#### PROTECTION, ENHANCEMENT, PLANTING

14. Implement and assess use of the new Tree Technical Manual
15. Implement and monitor success of new rooting technologies downtown
16. Develop a Greening Strategy building on the Potential Plantable Spaces Analysis
17. Track municipal tree removals and plantings
18. Expand the City’s capacity to undertake tree-related plan review and site supervision

#### COMMUNICATIONS

19. Create an Urban Forest Advisory Committee (UFAC)
20. Pursue targeted urban forest education and outreach
21. Increase municipal capacity for coordination of volunteers for stewardship activities
22. Pursue targeted stewardship initiatives, partnerships and funding sources

The current staffing and resources allocated for urban forestry in the City of Guelph are inadequate to move the City forward in terms of achieving its identified vision and objectives for the urban forest. Implementation of this Plan will require a sustained commitment of both additional financial resources, and the creation of several permanent full-time staff positions.

The recommended staffing and resource requirements have been developed in close consultation with City staff, and have also been developed with careful consideration for the fact that the City is continually working to limit its expenditures and maximize efficiencies. Opportunities for building on existing programs or systems, and for using existing positions to accommodate urban forestry requirements have been identified to the greatest extent possible. Opportunities for pursuing external funding and support have also been incorporated into this Plan. However, if the City is genuinely committed to maintaining and growing its urban forest, then it also needs to make a long-term commitment to increasing its profile in the community, as well as actively planting, maintaining and monitoring it.

Effective implementation of this Plan will require the following human resources over the course of the first Five Year Management Plan (i.e., between 2013 and 2017), in order of importance:

- 1 full-time Senior Urban Forester position
- 3 full-time Forestry Technician positions
- A half-time GIS Technician / Information Technologies position
- A half-time Administrative Assistant position

In terms of financial resources (from both capital and operational budgets), we have developed estimates for the first two Five Year Management Plans, but not the last two as it is much more difficult and speculative to estimate out beyond 10 years. Based on the recommendations in this Plan and consultations with City staff we estimate the following costs, including the above human resource requirements, over the first decade of this Plan:

- 2013: \$945,000
- 2014: \$1,110,000
- 2015: \$1,085,000
- 2016: \$1,169,000
- 2017: \$1,174,000
- 2018 – 2022: \$6,000,000

This is an estimate of \$5,483,000 for the first five years of the Plan, and \$6,000,000 for the second five years. Notably, almost half of this cost is attributed to the anticipated need to develop and implement a strategy for dealing with Emerald Ash Borer.

We have recommended a continued reliance on in-house staff versus external contractors with identification of needs for contracted services being limited to activities that are either very intensive and time-sensitive, and/or activities that would benefit from specialized external expertise.

When considering the cost of this investment, the full value of the City's current and potential green infrastructure needs to be seriously considered. Beyond contributing to air and water quality improvements, Guelph's urban forest is of tremendous value to the people who live and work here. This value includes, but is not limited to, the cost savings relating to cooling buildings, the health benefits from shade in the summer, the higher property values in treed areas, and the fact that people are more inclined to engage in physical activities outdoors in treed areas..

Finally, this Plan should be considered both a strategic framework and a working document, with its actions and their prioritization subject to review and revision in response to changing conditions, new information, and resource availability as the champion for this document, the City's Senior Urban Forester, deems appropriate.





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*Note: **Comparator municipalities** (as identified in Schedule 2 of the City of Guelph Committee Report for Information Services dated December 7, 2009) have been referenced and used for comparative purposes wherever information was available for the given practice or topic. However, in some cases, examples from other jurisdictions have been provided where they are unique or demonstrate a best practice of relevance to the City of Guelph.*

# 1 THE CONTEXT FOR URBAN FOREST MANAGEMENT IN GUELPH

## 1.1 BACKGROUND

The City of Guelph is a single-tier municipality with an area of just over 86 km<sup>2</sup>. The City contains a mix of industrial, commercial and institutional land uses, as well as more than 1,000 hectares of public parks and open spaces.

The City's urban forest is comprised of the individual trees and all the treed areas that occur within its boundaries. These include treed natural areas, as well as individual or small groups of trees in parks, along roadways, and on residential, industrial, commercial and institutional properties.

All of these trees are living assets that form part of the City's green infrastructure, which sustains the community by filtering air pollution, improving water quality, providing shade, contributing to flood control, contributing to human health, reducing local energy use, sequestering carbon, and bringing nature to the City. Trees are known to save municipalities millions of dollars in air pollution control and storm water management alone (e.g., Town of Oakville 2006). Tree cover has also been directly linked to human health benefits (e.g., skin cancer prevention, reduction in heat island effects, contributing to psychological well-being) and higher property values.



Despite the City being founded in 1827 with the ceremonial felling of a large maple tree, Guelph has a long history of caring for its treed assets. Documented examples of tree plantings date as far back as 1910, when the City worked with the Guelph Horticultural Society to plant 50 elms and 99 maples along the Speed River in what is now known as Royal City Park. Guelph was one of the first municipalities in southern Ontario to enact a private tree by-law (in 1986), and in the 1980s the City began to dedicate staff specifically to urban forestry operations. Through the 1990s the City also identified and protected a number of significant treed areas through its Official Plan.

### WHY IS IT CALLED AN "URBAN FOREST"?

Erik Jorgensen, Canada's first urban forester, defined the term in 1967 as: *"A specialized branch of forestry that has as its objectives the cultivation and management of trees for their present and potential contribution to the physiological, sociological and economic well-being of urban society. These contributions include the over-all ameliorating effect of trees on their environment, as well as their recreational and general amenity value."*

It is understood that trees in urban areas (particularly those outside of natural areas) do not provide the same range of ecological functions as large tracts of natural forests, or the same economic functions as actively managed plantations. However, trees in urban areas do provide a broad range of functions and are most effectively considered, and managed, as a whole. Therefore, the term "urban forest" is used to capture all the trees within a given urban area.

Guelph has experienced unprecedented growth over the past 25 years. In 1986, the City's population was less than 80,000, and at the time of the last census in 2006, it was just under 115,000. It is currently estimated to be about 125,000, and

the City is expected to accommodate 175,000 people by 2031 (City of Guelph 2010).

While new residents bring diversity, ideas and new opportunities, they also increase demand for housing and put more pressure on the City's municipal services, including roads, sewers, parks and natural areas. These pressures, combined with the already present and emerging threats of pests, pathogens, and environmental stresses anticipated with climate change, will make maintaining and enhancing the City's urban forest very challenging. Addressing these challenges will require careful planning, active management, ongoing monitoring, and creative problem solving that make considerations related to trees a priority. This Urban Forest Management Plan (referred to as

"the Plan" from this point forward) identifies specific strategies that will guide the planning, management and monitoring of Guelph's urban forest so that it continues to be a healthy, thriving entity.

In recognition of the need for a more comprehensive and strategic approach to urban forest management, the City provided direction for a Framework for an Urban Forest Management Plan in 2006. This Framework was completed and adopted by Council in the fall of 2007. The Framework provided the context for moving forward and identified a number of key gaps, including the need for a 20 Year Urban Forest Management Plan. This document is that Plan.



## 1.2 AN OVERVIEW OF THE FRAMEWORK

The Framework for strategic urban forest management in Guelph<sup>1</sup> was completed and approved by Council in 2007. This Framework:

- provided a biophysical, planning and operational context for urban forest management in the City;
- laid out a structure for strategic planning (as described in **Section 1.3**);
- identified key areas that need to be addressed, and key strategic elements for:
  - communications
  - tree inventory
  - urban forests sustainability (i.e., tree protection, establishment, risk management and health care), and
  - landscape connectivity; and
- put forward 25 recommendations addressing gaps in each of the areas listed above, with preliminary priority rankings.

Following adoption of the Framework, the City began to address some of the recommendations (see **Appendix A**), and held stakeholder and community workshops in the spring of 2009 to solicit broader feedback on current management directions and priorities. Once again, the pressing need for an Urban Forest Management Plan to provide specific direction was emphasized, along with the need for more municipal resources to be dedicated to urban forest initiatives.

This Plan builds on the Framework by incorporating the original intent and direction of the Framework as key principles (see **Section 2.1**), and addressing all 25 recommendations by explaining how they have been implemented, providing them as key deliverables of this Plan, or incorporating them into the recommendations (see **Appendix A**).

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<sup>1</sup> The *Framework for the Strategic Urban Forest Management Plan* for the City of Guelph (2007) is also referred to in this document as the 2007 Framework for brevity.

## 1.3 PLAN CONTENTS

The purpose of this Plan is to review and assess all aspects of the current management of the City's urban forest, and to recommend specific strategies for maintaining and increasing canopy cover, and improving the effectiveness of urban forest management on both public and private lands.

This Draft Plan has been developed based on information from the Framework, a review of the City's current resources and practices, consideration of best practices and precedents in other municipalities, preliminary input from key stakeholders, and extensive consultation with City staff.

This Plan has been structured to first provide the context (**Section 1**) and lay out the guiding principles, vision and goals (**Section 2**). The subsequent four sections then review existing conditions and best practices, provide an assessment of gaps and opportunities for improvement, and outline recommendations in each of the following areas:

- Administration - Management and Monitoring (**Section 3**)
- Planning - Legislation, Policies and Guidelines (**Section 4**)
- Operations - Protection, Replacement and Enhancement (**Section 5**)
- Communications - Outreach, Stewardship and Partnerships (**Section 6**)

These are followed by a final section (**Section 7**) that discusses implementation of the Plan. A glossary and list of documents cited are provided in **Section 8** and **Section 9**, respectively. The guiding principles, vision and goals in **Section 2** combined with the recommendations from **Sections 3 through 6** provide the basis for moving forward to achieve urban forest sustainability in the City of Guelph.



Figure 1. The temporal structure for the City of Guelph's long-term urban forest management planning.

#### 1.4 PLAN STRUCTURE AND REVIEW

The 20-year strategic framework for urban forest management planning, developed by van Wassenae *et al.* (2000), has been recommended and adopted in Guelph (refer to the 2007 Framework) as well as other municipalities. This longer term framework considers tree longevity and provides a workable time frame in which to achieve tangible results. It also recognizes the practical realities of forecasting and budgeting cycles by incorporating shorter-term management and operational plans. These shorter-term plans also implicitly acknowledge the need for adaptive management by providing specific opportunities within the overall 20 year timeframe to revise recommended actions and / or priorities in response to changing conditions, new information, and resource availability.

The guiding principles, vision and goals provided in this Plan (**Section 2**) are intended to guide the development and implementation of recommendations for the entire 20 year period (i.e., from 2013 to 2032). The recommendations in this Plan (**Sections 3 to 6**) reflect the gaps and opportunities identified through the course of the Plan development, and are intended to be addressed over the 20 year period, with some recommendations considered higher priority than others.

Over the 20 year period, a series of four Five Year Management Plans are required to confirm priority actions and timing, and identify resource requirements for that five-year period. The first such Plan is provided in **Appendix B**.

- 2013 – 2017: Five Year Management Plan #1
- 2018 – 2021: Five Year Management Plan #2
- 2023 – 2027: Five Year Management Plan #3
- 2028 – 2032: Five Year Management Plan #4



Recommendations in this Plan have been assigned timing within one of the Five Year Management Plans, or extending across two or more Five Year Management Plan periods, depending on their priority level and the nature of the recommendation (e.g., a one-time activity or an activity that needs to be implemented over an extended period of time). This Plan also includes a summary of the recommendations specific to the first Five Year Management Plan (see **Appendix B**) that focuses on the anticipated priorities and resource allocation between 2013 and 2017.

Prioritization was assigned based on: a logical sequence for the recommended items; identification of which items are likely to provide the most benefits to the urban forest; consideration of risk-related activities (and their relative urgency), and spreading out the cost of new resource requirements in a manageable way. Priorities and timing were ultimately assigned in

close consultation with City staff, and with consideration for stakeholder and public input.

It is difficult to anticipate the specific priorities beyond the first Five Year Management Plan because these will be largely contingent upon (a) how much is accomplished over the first five years, (b) available resources (both human and financial) at that time, and (c) if any new or significant management issues have emerged in the City. Instead, towards the end of 2017 (and again in 2022 and 2027) a review and assessment of the status of the various recommendations will need to be undertaken to determine: (a) which have been completed, (b) which remain to be completed, and (c) if there are to be any additional recommendations to be considered.

These recommendations will inform day-to-day urban forest management policies and operations through annual work plans developed by City staff.

**Recommendation # X – TITLE**

*Brief description of the recommendation and key elements.*

Lead	<i>Responsible City department(s) and/or partner organizations.</i>
Support / Partners	<i>Supporting City department(s) and/or partner organizations.</i>
Cost	<i>Estimated (identified as one-time, periodic or recurring)</i>
Funding	<i>Includes confirmed, anticipated or potential funding from City and/or outside source(s)</i>
Priority / Target	<i>HIGH / to be started or undertaken within the first Five-Year Management Plan</i>
Timing	<i>MEDIUM / to be started or undertaken within the second Five-Year Management Plan</i>
	<i>LOW / to be started or undertaken within the third or fourth Five-Year Management Plans</i>
Related Goals	<i>As related to this Plan’s strategic goals.</i>

**Figure 2. Template used for Plan recommendations.**





## 1.5 STUDY RATIONALE

### 1.5.1 BENEFITS OF THE URBAN FOREST

The value of trees in urban and urbanizing settings is well-documented, and includes important environmental, economic and community benefits. Trees and shrubs have the capacity to clean the air and water, moderate the local climate, reduce energy consumption in homes and buildings, sequester and store atmospheric carbon, provide shade and screening, help control storm water runoff, and provide habitat for wildlife. Trees also provide community and economic benefits. These include contributing to mental and physical health, and increasing property values. Treed public spaces have been shown to encourage patrons to browse outside commercial areas for longer, and visitors of parks and other outdoor spaces to stay longer and come more frequently. Shade from trees protects people from the damaging health effects of ultraviolet radiation (UVR) and mitigates against the extreme heat of summer. Treed areas and natural areas have also been shown to reduce blood pressure, improve recovery after surgery, and reduce aggressive behaviour.

Cumulatively, these benefits contribute significantly to community sustainability. While some benefits cannot be easily measured or assigned a monetary value, recent research has developed standard methods for quantifying some environmental benefits in order to illustrate the value of trees in terms of the green infrastructure services they provide. Although such a study has not been conducted in Guelph, urban forest studies conducted in comparable municipalities have estimated that: the Town of Oakville's 1.9 million trees provide nearly \$2 million, and the Town of Ajax's 1.4 million trees provide over \$1 million in environmental services annually (i.e., air pollution removal and residential energy savings alone (Town of Oakville 2006, TRCA 2009).

Additional information can also be viewed in the 2007 Framework for Guelph's Urban Forest Management Plan (available on the City's website), in reports cited above, and via on-line resources (as cited in **Appendix C**).

*"Tall deciduous trees with wide canopies of dense leaves will provide maximum shade in the summer, while allowing the warming rays of sun to come through in the winter".*

*Toronto Cancer Prevention Coalition  
Shade Guidelines 2010*

### 1.5.2 LOCAL SUPPORT FOR THE INITIATIVE

The need for an Urban Forest Management Plan has been recognized by the City and local tree advocates, and is supported by Council directives. The 2007 Framework for a Strategic Urban Forest Management Plan (refer to **Section 1.2**) and recent Official Plan policy updates (refer to Official Plan Amendment - OPA 42), which have both been approved by Council, strongly support the development and implementation of this Plan.

*"Conservation of trees in the urban environment can only be achieved effectively through the development and implementation of a strategic urban forest management plan that standardizes policies and practices surrounding activities related to trees".*

*Canadian Urban Forest Network Website (2010)*

### 1.5.3 CLIMATE CHANGE

Climate change is now widely recognized as already underway, and as an inevitable shift that we must all adapt to. Climate change is already thought to have caused an average temperature increase of about 0.5°C in southern Ontario, and further increases are expected to cause periodic drought stress for trees and natural areas, and that a greater frequency of extreme weather events (e.g., ice storms, intense rain storms) will make urban forests more vulnerable to damage, pests, and invasive species (Hellman *et al.* 2008, Varrin *et al.* 2009, 2degreesC 2007, EPCCO 2009). In municipalities that are largely urbanized, like Guelph, the effects of periodic high temperatures and extreme weather events may be compounded by the large extent of impervious and unvegetated surfaces.

Although southern Ontario is generally expected to be less impacted by climate change than regions further north or south, changes are nonetheless expected. These changes will present challenges, but may also present some opportunities, such as the feasibility of introducing tree species from slightly more southern climate zones.

Recommended strategies for helping the urban forest adapt to and mitigate the effects of climate change include many approaches that are consistent with and integral to good urban forest management. These include (from Wieditz and Penney 2007, 2degreesC 2007, Galatowitsch *et al.* 2009):

- Reducing non-climate stressors on urban woodlands (e.g., invasive plants);
- Managing for multi-species and multi-aged stands;
- Planting trees tolerant of warmer and drier summer conditions, including native species that are currently at the northern limits of their ranges;
- Increasing levels of tree diversity (genetic, species, and age-class) and avoiding planting species known to be invasive or susceptible to life-threatening pests (such as Emerald Ash

Borer) already documented or likely to occur in Guelph;

- Developing and regularly reviewing strategies for coping with pest invasions;
- Developing extreme weather response plans for managing damage to trees following severe storms;
- Monitoring the responses of different tree species to changing conditions and new pests in order to facilitate adaptive management, and;
- Exploring research partnerships with local academic institutions (e.g., University of Guelph) and other organizations to evaluate the survival of certain tree and shrub species under controlled conditions to guide species selection.

These strategies are embedded in various recommendations of this Plan.

Protection and enhancement of the urban forest presents a unique, practical and relatively inexpensive opportunity to both mitigate and adapt to climate changes. Trees filter air pollutants, provide shade and cooling, and both sequester and store carbon. These benefits will help communities both mitigate and adapt to some of the anticipated impacts associated with climate change. Implementing management practices designed to improve the native diversity, structure, and extent of the urban forest will also help make the urban forest itself more resilient to the stressors associated with climate change.

## 1.6 URBAN FOREST MANAGEMENT CHALLENGES AND SOLUTIONS

The valuable services and benefits associated with a healthy urban forest provide a strong justification for the expansion of tree cover in urban areas. However, in reality this can be very challenging to implement, particularly in an increasingly urbanizing context. Guelph is already largely urbanized and its population is expected to increase from the current 125,000 to about 175,000 by 2031, without an expansion of the

current municipal boundaries. Protection of existing trees and finding suitable, long-term locations for new trees will require careful planning and support from various City departments, landowners in the City, and the community at large.

Urban forest protection and enhancement must be balanced with, not at the expense of, urban intensification and infrastructure elements that are also intended to support community sustainability (e.g., integration of bike lanes and expanded public transit). Therefore, protection of existing trees and the requirements of intensification and smart growth need to be carefully considered together.

Stressors on trees in urban settings are numerous, and studies indicate that many newly planted street trees do not survive their first year, and that the average lifespan of those that do survive may be as low as 7 to 12 years (Moll and Ebenreck 1989). Key challenges to urban forest management and sustainability include:

- management of trees on municipal lands with limited resources;
- urban forest pests and diseases;
- stressors linked to climate change;
- ongoing development pressures and competition with other land uses;
- current development practices which remove natural soils and do not provide adequate soils or space for trees to grow to maturity;
- conflicts with utilities and hard infrastructure, such as rights of ways;
- inadequate care of trees on private lands, and;
- degradation of wooded natural areas.

Looking creatively for locations where native trees can reach their full genetic potential is an important practice to adopt. It also needs to be widely recognized that trees can complement engineered 'grey' infrastructure and should not necessarily be viewed as impediments. For

example, tree cover can extend the service life of asphalt, reduce pressure on sewer systems by reducing peak storm water flows, and extend the life of building heating and cooling systems by moderating temperature extremes.

Key solutions to urban forest management challenges recommended in this Plan include:

- making protection of healthy, mature trees a priority through the planning process;
- ensuring that all options for safe retention of older trees that provide substantial canopy are explored prior to approving removal;
- implementing and enforcing regulations protecting significant trees in the community;
- providing "tree supportive" guidance to City staff and other stakeholders; identifying adequate space for trees early in the planning approval process;
- improving above and below-ground site conditions for trees;
- coordinating with partner agencies and others responsible for the local urban forest;
- promoting and providing incentives for tree replacement and planting in suitable locations;
- managing natural areas for invasive species and adjacent land use impacts;
- planting a diversity of non-invasive trees;
- systematic monitoring for known tree pests and tree risks, and;
- regular and proactive tree care on public and private lands.

Urban trees provided with regular maintenance and adequate growing space will be more resilient to environmental extremes and the rigours of urban life. As a result, they will pose less risk, require less frequent replacement and provide exponentially more benefits as they mature.

## 2 SETTING THE DIRECTION: PLAN PRINCIPLES, VISION AND GOALS

The following guiding principles, vision and strategic goals have been developed with consideration for the approved Framework for Guelph's Strategic Urban Forest Management Plan (2007), Guelph's environmental and land use context, and input from City staff, various stakeholders and the community. The vision statement reflects the desired outcomes of the successful implementation of this Plan, while the strategic goals are intended to guide the implementation of this Plan over the 20 year planning period (i.e., 2013 to 2032).

### 2.1 GUIDING PRINCIPLES

The following nine principles are intended to guide the implementation of this Plan over the long term.

- i. Develop and maintain a good understanding of the City's urban forest.
- ii. Assess and monitor the state of the City's urban forest management program at regular intervals.
- iii. Continually seek creative ways to leave space for and integrate existing trees into new and infill developments.
- iv. Improve the retention of existing trees and canopy cover.

- v. Plant the right tree in the right place.
- vi. Consider new technologies to integrate trees downtown and in other built-up settings.
- vii. Improve resilience to climate change and other stressors by managing the urban forest for optimal species and structural diversity, and health.
- viii. Strive to maintain City trees in a healthy and safe condition.
- ix. Recognize the value of and invest in the City's green infrastructure on a long-term basis.
- x. Take an adaptive management approach to urban forest initiatives at all levels.

### 2.2 VISION

*The City of Guelph will foster the health and sustainability of its community by increasing its urban forest cover. Continually pursuing and promoting the implementation of best practices for tree protection, tree establishment and tree maintenance will provide a range of environmental, economic, and health benefits for residents, and habitat for a diversity of plant and animal species. By setting an example on its own lands and supporting expanded local stewardship, the City will enjoy and sustain its urban forest for the long-term.*



### THE NATIVE SPECIES DEBATE

Native plants can be broadly defined as species that occur naturally in a particular geographic area without human intervention. There are many trees that are considered native to eastern North America, as well as many species that have been introduced from Asia and Europe. A few of these species are considered highly invasive, and present serious economic and environmental threats.

Native trees should always be planted within and adjacent to natural areas because they are adapted to local climatic and environmental conditions, and have also co-evolved with a wide range of native biota (e.g., fungi, insects, wildlife) and therefore support each other's life cycles. Many native species do well in yards and parks where conditions are suitable. However, conditions in built up environments such as streetscapes and parking lots, can be very harsh for trees. While some native species can survive under these conditions, some non-native species and horticultural cultivars have been shown to be more resilient in these locations.

While there are native species that have yet to be screened for tolerances to urban conditions, given what is generally available from nurseries today, it is better from an urban forestry perspective to have a non-native tree that survives than one that does not, as long as the species is not considered highly invasive. New technologies for improving soil and moisture conditions under pavement are also expanding the range of species that can be planted in mainly paved areas.

The main idea is to plant the right tree in the right place, and in some cases this may mean planting a non-invasive, non-native species to get canopy cover in some of the most widely used public spaces.

## 2.3 STRATEGIC GOALS

1. Improve knowledge of the City's urban forest assets through a more comprehensive inventory program.
2. Monitor and review the status of the City's urban forest management every five years using established criteria and indicators, and revise planning and practices as required to ensure ongoing progress towards realizing the vision.
3. Foster a "tree friendly" culture among City staff through interdepartmental coordination on tree issues and sharing of ideas and best practices for tree protection, maintenance and planting.
4. Foster a "tree friendly" culture in the community through exemplary programs and activities on municipal lands, sharing best practices and techniques, and providing support and incentives for tree protection, maintenance and planting on private lands.
5. Prioritize protection of mature, healthy trees and preservation of older large-canopied species to the greatest extent possible.
6. Transition towards proactive tree establishment and replacement whereby all potential plantable spots in the City are explored.
7. Explore the use of new technologies in selected areas for integration of trees in hardscapes such as downtown and parking lots.
8. Move towards proactive tree risk assessment and Plant Health Care practices on municipal lands, and reduce the need for emergency responses.
9. Improve the resilience of the urban forest to current and anticipated stressors, including climate change, by implementing policies and management practices that optimize tree species diversity, structure and age classes.

10. Build on existing initiatives, and expand partnerships and funding related to urban forest initiatives on private lands, including building partnerships with local industries and businesses.
11. Recognize the urban forest as a critical municipal asset and green infrastructure component through a long-term commitment to proactive management, adequate resource allocation and joint stewardship by the City and the community.



**WHAT IS A “PLANTABLE SPACE”?**

From an urban forestry perspective, a potential plantable space is any place in the City that has vegetated cover (e.g., lawn or meadow) and that could accommodate a tree\*. However, actual plantable spaces need to be identified with consideration for any approved or anticipated development or land use plans, as well as with consideration for balancing open spaces with treed areas. In addition, from a natural heritage perspective, it is beneficial to retain some areas as open meadows for certain species.

On private lands, while manicured lawns present tree planting opportunities, these areas can only be planted at the discretion of the landowners who may want to reserve some lands for other uses.

\* Trees can also be accommodated in hardscapes such as sidewalks and parking lots, but these spaces need to be created, and usually at a much greater cost than taking advantage of naturally occurring spaces.



### 3 GETTING ORGANIZED: MANAGEMENT AND MONITORING

This section focuses on municipal management of its urban forest and looks at five fundamental components needed for effective management of the City’s trees, its’ largest living asset, namely:

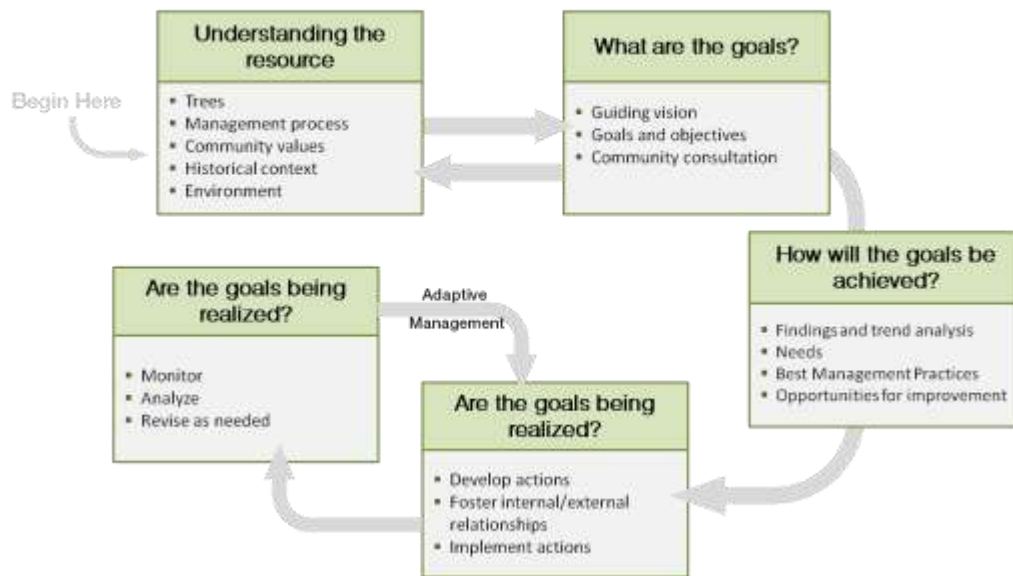
- internal coordination,
- tree inventory and canopy cover assessment,
- proactive tree maintenance,
- proper tree establishment, and
- ongoing monitoring.

The focus of this section is on procedures and systems around urban forest management practices on municipal lands, although in some cases the activities discussed below extend to trees on lands not owned by the City of Guelph.

This administrative section is necessarily more focused on municipally-owned trees, as these are the trees for which the City is directly responsible and over which it has the most control. Establishing and implementing effective assessment, management and monitoring systems will help ensure that the City understands the evolving condition of its urban forest, and is able to allocate available resources where they are most needed. These systems also allow the City to continually and adaptively integrate new findings and trends into its action planning (as shown in **Figure 3**).

Implicit to this section is the recognition of the urban forest as a municipal asset that needs to be assessed, maintained and replenished on an ongoing basis. Although trees are unique as an asset in that they tend to appreciate in value with time (until they need to be removed), it is important to recognize them on the same level as other municipal assets so that they are given an appropriate level of investment.

#### Urban Forest Management Process



**Figure 3. Urban forest management plan process model** (adapted from the from Urban Forest Toolkit at [www.ufmptoolkit.com](http://www.ufmptoolkit.com))

### 3.1 CURRENT MUNICIPAL PRACTICES AND RESOURCES IN GUELPH

#### 3.1.1 INTERNAL COORDINATION

The following is based on information from City staff and reflects general practices regarding internal coordination with respect to tree issues.

The current organizational functional model identifies the six following Service Areas:

- Office of the Chief Administrative Officer;
- Community and Social Services (including Community Engagement and Parks and Recreation);
- Corporate and Human Resources (including Legal Services);
- Finance and Enterprise Services;
- Operations, Transit and Emergency Services (including Bylaw Compliance and Public Works); and
- Planning, Building, Engineering and Environment (including Water and Wastewater Services).

All of these departments have a role to play in managing the City's urban forest, although Planning, Building, Engineering and Environment, and Operations, Transit and Emergency Services have more significant roles.

Currently, there are several practices in place that support multi-disciplinary review of plans that have the potential to impact trees. For example, for capital projects where the City is the lead, drawings are circulated to Operations, Transit and Emergency Services, as well as Planning, Building, Engineering and Environment, as are any related tree impact assessments and planting plans. However, for projects where time is of the essence, work sometimes proceeds without staff review. For development projects, proposals where treed natural areas and/or individual trees may be

impacted require reports (i.e., Environmental Impact Study, Environmental Implementation Report, Tree Preservation and Replacement Plans) and supporting plans to be reviewed by Planning, Building, Engineering Environment as well as Operations, Transit and Emergency Services. Plans for park blocks, and associated trees, are screened by Operations, Transit and Emergency Services, as well as Community and Social Services. Redevelopments of existing parks, or the detailed design of new parks are also reviewed by Operations, Transit and Emergency Services, and Community and Social Services.

Notably, larger parks projects are subject to public review and Council approval, larger capital projects are subject to public review, and Environmental Impact Studies are subject to review by the City's Environmental Advisory Committee (EAC) and approval by Council.

#### 3.1.2 URBAN FOREST ASSET INFORMATION COLLECTION AND MANAGEMENT

##### *Tree and Woodland Inventory*

A comprehensive inventory is the foundation of good urban forest management. It is virtually impossible to manage any asset effectively without knowing the nature and condition of that asset.

The City currently has one rugged field laptop computer dedicated to inventory data collection and, to date, the Forestry Supervisor has collected data on about 16,000 street trees (about 2000 trees per year since 2005). The City estimates that there are about 100,000 trees on municipal lands.

Since the completion of the 2007 Framework, the City's Forestry Supervisor has worked with the Information Technologies department to develop an application in ORACLE (the City's asset management system) tailored to collect data on trees that can be (a) entered into a Geographic Information Systems (GIS) platform, and (b) used



to generate work orders. This is a well-designed tool intended for trees outside of natural areas, with the potential to be a very valuable asset management system for the City's trees once all trees have been inventoried. Currently, work orders for municipal trees are primarily based on service requests rather than being proactively generated through the City's asset management system.

### ***Green Infrastructure Asset Valuation***

Like many municipalities, the City's Financial Services records the City's assets according to standards set by the Public Sector Accounting Board (PSAB). However, there is currently no mechanism in this system to account for the City's trees. Unlike most other "hard" assets which have an initial cost and depreciate over time, trees have an initial cost and then (assuming they are able to establish themselves and grow) tend to appreciate in value over time until they need to be removed. Further complicating matters is the fact that there are several approaches for valuing trees (as shown in **Table 3**), and no real standard, with different methods potentially resulting in significantly different values being assigned. So while grey infrastructure (such as roads and sewers) automatically gets factored into annual budgetary requirements with respect to its maintenance and replacement, trees (i.e., part of the City's green infrastructure) are not treated in the same way.

### ***Canopy Cover***

The 2007 Framework included a rough canopy cover estimate for the City using data on natural areas from (the Natural Heritage Strategy work) combined with dated mapping of trees in parts of the City's urban areas and some air photo interpretation to capture larger groupings of trees in the urban matrix. This resulted in a very rough estimate of about 30% canopy cover.

In the spring of 2011, the City was awarded a grant through the TD Green Streets program to

undertake a more accurate and current canopy cover assessment as part of an exercise to identify several target areas in the community for focussed tree planting. The results of this exercise revealed that the City's canopy cover is currently lower than originally estimated in 2006, and is actually closer to 20%. Notably, this value is within the range to be expected for a City that is growing rapidly and has no designated rural areas within its boundaries. Furthermore, this level of cover is higher than, or the same as, many comparable jurisdictions (see **Table 1**).

The key reasons for the discrepancy between the 2006 and the 2011 canopy cover estimates are: (a) the use of older aerial photography and habitat mapping combined with incomplete and dated tree point count data (i.e., from 1983) for the preliminary assessment, and (b) overestimation of tree number and size in the third of the City not covered by the point count data. Ongoing development in the City has also resulted in incremental losses of some treed areas, and the new plantings from the past decade or so have not yet matured to the point where they provide any real canopy.

A more comprehensive discussion on the value and limitations of canopy cover as an urban forest metric is discussed in **Section 3.2**.

### ***3.1.3 TREE MAINTENANCE, PEST MANAGEMENT, AND RISK ASSESSMENT PROTOCOLS***

The City's Forestry staff currently adhere to the following tree maintenance protocols:

- Structural pruning of newly planted trees twice within the first 10 years;
- Structural pruning of established trees on an informal basis as resources permit;
- Watering of new trees, as needed, within the first two years;
- Annual inspection of all mature street trees (e.g., approximately 60 cm DBH or greater);

- Annual inspection of cabled trees;
- Removal of hazard trees (including stumping) as required;
- Keeping a log of inspections and work orders completed; and,
- Responding to service requests, as required.

Guelph recently undertook proactive tree maintenance through a comprehensive plan to reduce the risk associated with mature trees in Royal City Park, and introduce new plantings (Silv-Econ Ltd. 2009). However, there are currently inadequate resources to pursue a comparable exercise in other City parks with mature trees.

When new trees are planted they are entered into the tree inventory database and automatically scheduled for structural pruning. Health assessments (e.g., observations of decline, hazard limbs, disease, or pest damage) are also completed for established trees during service requests. In addition, some invasive species removals (e.g., European buckthorn) are undertaken in conjunction with service requests in selected wooded natural areas, but formal woodlot assessments do not take place on a regular basis. In particular, tree risk assessments along City-owned trails are lacking.

Currently, there is no formalized urban forest pest management program in the City. Tree pests are typically identified on an ad-hoc basis by staff, residents or contractors, and management to date has been limited. Biological or cultural controls are favoured over chemical controls, particularly since the implementation of the provincial *Cosmetic Pesticides Ban Act*, 2008. However, the controlled use of certain chemicals is permitted under the Act and should be a component of the City's pest management program. For example, invasive plants such as European buckthorn are very pervasive in the City and are very difficult to control without chemical assistance.

In recent years, there has been some external support through local volunteer groups, such as Trees for Guelph, who have begun to undertake invasive species (i.e., European buckthorn) management in conjunction with their spring tree planting efforts in selected areas.

Guelph Hydro is responsible for pruning all vegetation that may interfere with utility right-of-way and corridors, on both public and private lands. This maintenance is conducted with the primary objective of providing adequate clearance between trees and hydroelectric wires to prevent hazards and service disruptions, particularly during storms. Utility pruning is generally conducted on a more frequent basis than municipal tree pruning and, often out of necessity, with lesser regard for tree health or proper structure.



### 3.1.4 MONITORING

The City does not currently undertake any regular monitoring related to its urban forest. However, a criteria and indicators approach to monitoring the success of the urban forest management program was put forward in the 2007 Framework, and a baseline assessment was completed as part of this Plan (see **Appendix D**). How these are to be applied is discussed in **Section 3.2.4**.

### 3.2 BEST PRACTICES AND PRECEDENTS FROM OTHER JURISDICTIONS

#### 3.2.1 INTERNAL COORDINATION

In most municipalities where urban forest management is undertaken, it is recognized that a multi-departmental and multi-disciplinary approach is required to effectively manage the urban forest.

In Oakville, the first municipality in southern Ontario to undertake an urban forest study (Town of Oakville 2006) and to develop a comprehensive urban forest management plan, one of the first recommendations was to create an Inter-departmental / Interagency Technical Advisory Committee (IITAC) comprised of staff from Parks and Open Space, Engineering, and Planning. The intent was for this group to:

- bring a multi-disciplinary perspective;
- review plans (particularly larger scale plans) early in the process to ensure all opportunities for tree preservation and planting were considered, and;

- review / develop staff operating procedures or policies supportive of urban forest sustainability.

Saanich, British Columbia, another municipality to have recently developed an urban forest management plan (2010), also proposed an inter-departmental working group to synchronize tree-related initiatives. The working group was to include departmental representatives from Planning, Development, Engineering (including Public Works), Legal Services, Risk Management, Finance, Parks and Recreation, and Fire/ Police. Tasks for this group included:

- Coordination of by-laws, policies and regulations so that the urban forest is consistently referenced, planned, enhanced and maintained, and;
- Coordination of various initiatives that have tree-related components (e.g., Stormwater Management By-law, Watershed Planning, Climate Action and Adaptation Plan, Natural Areas Action Plan, Invasive Species Plan; Parks and Recreation Master Plan).

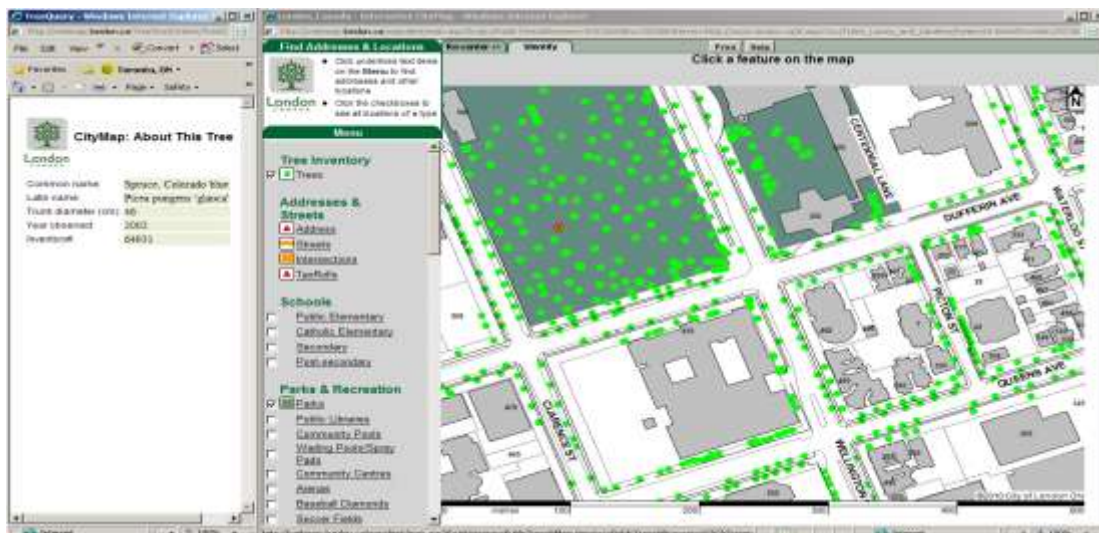


Figure 4. Screenshot of the City of London’s CityMap application, enabling users to view basic information about more than 120,000 publicly-owned trees (©2010 City of London, ON).

### 3.2.2 URBAN FOREST ASSET INFORMATION COLLECTION AND MANAGEMENT

#### **Tree Inventory**

While it is ideal to have a complete inventory of all the trees and wooded natural areas in a given jurisdiction, it is typically only feasible to collect such data comprehensively on publicly owned lands. Furthermore, in most municipalities resources are limiting, and the first priority is to inventory publicly-owned street and, where possible, park trees, because these are the trees that tend to require the most maintenance and present the most potential risk.

A detailed public tree inventory can include a wide range of individual tree data such as location, species, size (diameter, height, canopy), condition, and maintenance requirements. This data can be a powerful tool to improve the effectiveness and efficiency of urban forest management on public lands (i.e., streets, parks and other open spaces).

State-of-the-art street tree inventories have been completed by New Tecumseth, ON; Kitchener, ON; London, ON (see **Figure 4**); Vancouver, BC; and Pittsburgh, Pennsylvania; among others. These have all included collection of key tree attributes (i.e., more than just species and size, including condition and risk assessments) and were linked to GIS so that the data could be readily accessed and displayed visually on maps.

A comprehensive inventory can be used to support many aspects of urban forest management, including:

- contributing to a better understanding of the local urban forest as a whole;
- improved engineering and infrastructure project planning (i.e., identification of potential conflicts and opportunities for protection early on in the planning process);
- more efficient urban forest management and maintenance (e.g., prioritizing service requests, early identification of potential hazard trees);
- targeted pest and disease management (e.g., knowing how many ash trees are in the municipality and where they occur);
- flagging of trees of special interest (e.g., heritage trees<sup>2</sup>), and;
- budgeting for capital and operating expenses.

A few municipalities, like the Cities of Toronto and London, have gone beyond street and park tree inventories and have also developed vegetation management plans for a number of their best used natural areas. These plans address issues commonly encountered in public natural areas within cities such as encouraging appropriate use through carefully planned and well-marked trails, as well as educational signs, and active removal of hazard trees and invasive plants combined with replacement by native plantings.

#### **i-Tree Eco Studies**

A number of southern Ontario municipalities (e.g., Oakville, Ajax, Region of Peel) have undertaken studies based on the Urban Forest Effects (UFORE) model, now known as i-Tree Eco. These are based on data collected in plots located randomly throughout a given municipality, and allow for extrapolation of rough estimates of overall urban forest canopy cover, species composition and abundance, age classes, and tree condition.

These data can then be used to generally compare the extent and type of tree cover in different areas or among different land use types, as well as provide estimates of the value of the urban forest in terms of some of the green infrastructure services it provides (e.g., air pollution reduction)

<sup>2</sup> Heritage trees may be individually designated, designated as part of a Heritage Conservation district or included on the Heritage Register as per the *Ontario Heritage Act*. See the definition of “heritage tree” provided in the Glossary.

and contributions to climate change mitigation (e.g., carbon sequestration).

This “big picture” information is particularly useful to promote community engagement. However, this high-level analysis does not replace the need for a more detailed public tree inventory to guide site level urban forest management activities, or more detailed canopy cover analyses to support identification of potential plantable spaces.

### **Canopy Cover**

A popular way to describe the extent of the urban forest is to measure the amount of canopy cover provided by trees. “Canopy cover” is essentially a two-dimensional measurement of the horizontal surface area of the forest as seen from a “birds-eye” view. It is a popular metric because it is readily understood, but it does not capture other important aspects of the urban forest, such as species diversity, urban forest structure (i.e., size and age ranges) or condition, level of maintenance, or level of community engagement, etc. (see **Appendix B** for a more complete suite of monitoring measures).

Canopy cover measures can also be problematic because there is no standard assessment method. Different methods can result in different estimates for the same jurisdiction with different levels of accuracy. Therefore, estimates of canopy cover should be understood to truly be estimates.

Nonetheless, canopy cover remains an important metric, and if used, should be measured in a consistent way so that changes in its status and extent can be tracked. There are currently several approaches used to assess canopy cover:

- UFORE or i-Trees ECO: This approach is based on data extrapolated from plot-based assessments and is readily replicated but has a fairly large margin of error, which varies depending on the number of plots in a given jurisdiction. Such studies have been completed in the Town of Oakville and Town of Ajax, as well as a number of municipalities in western Canada and the United States. These studies are a fairly cost-effective way of generating some useful data for estimating canopy cover, urban forest species diversity and structure, and eco-service values. However, it is not as accurate as the following two methods, and cannot be used for identifying potential plantable spaces.
- Orthorectified Air Photos and GIS: Several municipalities have used a combination of current air photos and GIS mapping / analysis tools to obtain canopy cover estimates (e.g., City of Toronto, City of Burlington, City of Thunder Bay). This involves combining mapping of treed natural areas with point count data on trees in the urban matrix, and / or sub-samples within various land use types, to get an overall estimate of canopy cover that is reasonably accurate. This mapping can be used to identify potential plantable spaces along streetscapes if the point count data is sufficiently detailed.
- UTC (Urban Tree Canopy) Method: Analysis of high quality satellite imagery provides the most accurate estimates of canopy cover, as long as the imagery is of adequate resolution and was taken while the leaves were on the trees. This approach requires fairly powerful computing and specialized software to separate trees out from other land use covers within an urban matrix, and also requires a fair bit of desktop digitizing and analysis, but can yield the most comprehensive mapping and data of any approach, including jurisdiction-wide identification of potential plantable spaces. This type of analysis has recently been undertaken by the City of Toronto and the Region of Peel in collaboration with experts from the United States Department of

Agriculture (USDA) and the University of Vermont. As GIS tools and technologies evolve, this option will be more readily available to municipalities like Guelph in the near future.

In the spring of 2011, the City was awarded a grant under the TD Green Streets program to undertake a current canopy cover assessment. The use of orthorectified air photos and GIS was determined to be the best method given the available

resources at the time. This resulted in an estimate of 20%, as documented in the 2011 report. However, the UTC method is really the only method that can provide a truly accurate canopy cover as well as an identification of all potential plantable spaces in the City. The next step is for the City to use the UTC method, which is the most accurate and the most easily replicated, for future canopy cover (and plantable space) assessments.

**Table 1. Comparison of canopy cover estimates from comparator municipalities.**

Municipality	Canopy Cover Estimate*	Canopy Cover Target	Source
<b>City of Guelph</b>	<b>20%</b>	<b>40%</b>	<b>Urban Canopy Cover Study (2011)</b>
<b>Town of Ajax</b>	18.50%	none	<i>Town of Ajax Urban Forestry Study, Part A (2009)</i>
<b>Town of Oakville</b>	29.10%	40%	<i>Oakville's Urban Forest: Our Solution to Our Pollution (2006). Target set in Official Plan (2009)</i>
<b>City of Thunder Bay</b>	47.40%	none	<i>Thunder Bay Urban Forest Canopy Cover Project (2009)</i>
<b>City of Burlington</b>	23%	none	<i>Urban Forest Management Plan 2011-2030 (2010)</i>
<b>City of St. Catharines</b>	15-17%	30%	<i>Urban Forest Management Plan (2011)</i>
<b>City of Mississauga</b>	15%	to be set by 2013	<i>Region of Peel Urban Forest Strategy (2011)</i>
<b>City of Brampton</b>	11%	to be set by 2013	<i>Region of Peel Urban Forest Strategy (2011)</i>
<b>City of Pickering</b>	20%	none	<i>City of Pickering Urban Forest Study, DRAFT (2011)</i>

\* These estimates have not all been developed using the same method.



## CANOPY COVER TARGETS

Canopy cover is a simple, intuitive indicator of the extent and approximate maturity of an area's urban forest and, as such, is considered a good measure of the state of the urban forest by many jurisdictions. However, canopy cover does not provide information about other essential parameters required to effectively manage and sustain a community's urban forest. For example, it provides no indication of the species diversity, the condition, the age or the size class distribution of the trees making up the urban forest.

The City of Guelph, through its Official Plan Amendment 42 (currently under appeal), sets a target of 40% canopy cover for the City by 2031. While the target is commendable, recent work has confirmed that the City's current cover is about 20%, and further analysis is required to assess the City's potential canopy cover and the extent to which a 40% target is feasible. Realizing such a goal assumes that there are enough actual plantable spaces, as well as adequate human and financial resources being allocated to support increased levels of tree planting and the associated long-term management of the expanding urban forest.

In reality, increasing canopy cover in an urban area is more challenging than might be expected. For example, analysis done for the Town of Oakville's Urban Forest Management Plan (2008) estimate that increasing tree planting efforts by 10% per year would increase canopy cover from 29.1% to 29.6% over a period of about 30 years, assuming relatively low mortality rates. Real considerations and challenges in Guelph (and elsewhere) include: natural tree mortality; loss of trees to pests, diseases and storm events; climate change; the need to accommodate ongoing development, and associated servicing; and resource limitations that limit the proactive management of the current urban forest.

Furthermore, increases in canopy cover cannot simply be achieved by planting more trees. As this Plan illustrates, effective urban forest management requires an ongoing commitment to managing trees in all phases of their life-cycle, as well as strategic planning to bolster the resilience of the overall urban forest against the numerous stressors it may be subjected to. The primary objective should not be to simply meet a canopy cover target, but should be to steadily move the City forward with respect to the various strategic initiatives identified in this Plan in support of a truly sustainable urban forest.

**Table 2. Comparison of scheduled grid pruning cycles among selected comparator municipalities. Hydro pruning cycles not included.**

Municipality	Pruning / Inspection Cycle	Approximate Number of Street Trees	Population
<b>City of Brantford</b>	4-5 years	60,000	90,192
<b>Town of Whitby</b>	5 years (subdivisions)	50,000	111,184
<b>Town of Oakville</b>	5 years (proposed)	Unknown	165,613
<b>City of Burlington</b>	7 years	51,868	164,415
<b>Town of Ajax</b>	8 years	32,000	97,167
<b>City of Hamilton</b>	10 years	Unknown	504,559

### **3.2.3 TREE MAINTENANCE, PEST MANAGEMENT, AND RISK ASSESSMENT PROTOCOLS**

The following section summarizes optimal urban forest maintenance practices, based on a review of the current literature and experience from other municipalities. It is recognized that Guelph, like many municipalities, does not necessarily have the resources to sustain a full range of optimal practices at this time. However, these are standards that should be considered and targeted for implementation over time.

#### ***Block Pruning and Maintenance***

Many municipalities inspect and maintain street trees in a scheduled, cyclical manner. This is termed “grid”, “block” or “cyclical” pruning. There are many variations to this approach in terms of how blocks are organized and length of cycles (see **Table 2**), but it typically involves dividing the municipality into areas (e.g., wards) that can be maintained within a given time period. Research has shown that an optimal grid pruning cycle is typically around five years, and provides the optimal balance between resource expenditure, tree health and condition, and accrued benefits.

This system also allows for a proactive assessment of all City trees in a given area, and is considered an efficient approach because it focuses on one area at a time. Proactive structural pruning greatly reduces incidences of tree-related risk, and also provides an opportunity for work crews to identify other issues (e.g., urban forest pests or diseases) proactively. Furthermore, this system works on a pre-determined schedule so that residents can be notified in advance. Where possible, it is useful to coordinate this activity with hydro pruning around utility lines so that efforts are coordinated where possible and residents are notified about both activities at once.

Data collected during block pruning should be integrated into a municipal tree database which,

among other attributes, records maintenance history, condition data and risk assessment results.

#### ***Young Tree Pruning***

Periodic structural pruning of newly-planted and young trees is among the best investments that can be made in a municipality’s urban forest. Providing young trees with proper structure means eliminating co-dominant unions, establishing a central leader (where appropriate) and strong scaffold branches, and making small cuts which minimize decay. These proactive steps reduce the need for future pruning, the likelihood of branch and tree failure, future conflicts with utilities, and overall management costs.

In general, structural pruning conducted two to three times within the first ten years after planting is considered optimal. This work can be done by municipal staff, but can also be done by trained summer students or volunteers.

Unique programs exist in Ithaca and New York (USA) where volunteer “Citizen Pruners” are trained and engaged in proper tree planting, mulching, watering and young tree pruning techniques. In New York, participants receive 12 hours of classroom and field training, and take an exam that certifies them to work on trees owned by the City. Recertification is required every five years.



#### ***Plant Health Care and Pest Management***



The urban environment is often hostile to the long-term health of the urban forest. Dedicated programs to identify and manage plant health issues can help reduce urban forest stressors. This approach is often referred to as Plant Health Care (PHC). PHC is an industry-recognized term that reflects an approach focused on preventative care and cultural practices. Key aspects of PHC include:

- proper tree selection;
- early pruning of young trees;
- fertilization and watering according to the soil conditions and the species requirements, and;
- use of structural support systems such as cabling and bracing, where required.

PHC is closely linked with Integrated Pest Management (IPM), which takes a holistic approach to pest management (e.g., use of manual or cultural practices, or biological controls) with the objective of minimizing pesticide use. Some leading municipalities have implemented IPM programs to control plant pests such as noxious weeds and invasive species in natural areas, but IPM is generally applied in localized areas (e.g., specific natural area management plans in the City of Toronto) or targeted at specific pests (e.g., gypsy moth). For example, Winnipeg's comprehensive IPM program applies non-pesticide approaches, such as sticky banding and monitoring, in combination with the targeted application of chemical pesticides.

In southern Ontario, several municipalities including Burlington and Oakville, among others, currently undertake annual gypsy moth and Emerald Ash Borer<sup>3</sup> surveys. With the advent of Emerald Ash Borer in southern Ontario, municipalities are now beginning to develop and implement strategies and management programs to deal with this destructive pest. For municipalities without detailed inventory data, this can entail a strategy

that includes a pest vulnerability analysis for the given jurisdiction based on its location and species known to occur or be planted within its boundaries. For municipalities with complete inventories, a more robust management strategy that targets specific locations is possible.

Options for consideration typically include reactive management (i.e., letting the infestation run its course and removing dead trees), proactive removal and replacement of susceptible trees, and chemical treatments or inoculations (where available). Management of invasive plants is also a serious issue, particularly in natural areas, across southern Ontario, and a comprehensive PHC approach also needs to integrate management practices for trying to control some of the most aggressive invasive plants. Typically this requires a combination of manual and chemical treatments, as well as ongoing efforts to prevent the planting of invasive species in the City.

#### ***Public Woodlot Management in Urban Areas***

The goal of good forest management is generally to protect and expand native species diversity so that the area is intrinsically more resilient to natural and anthropogenic stressors, such as climate change. Mechanisms for protection include controlling the types and extent of access and preventing the spread of invasive plant species. Mechanisms for restoring native biodiversity include control and removal of invasive plants combined with replacement using site-appropriate native species (ideally from locally collected seed), as well as allowing for natural regeneration where a healthy proportion of native species is already present.

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<sup>3</sup> Emerald Ash Borer was confirmed in the City of Guelph in late 2011, and was confirmed in the County in 2010.



The importance of ongoing management in these types of areas cannot be overemphasized; natural areas in urban and urbanized settings cannot simply be protected and left unmanaged because there are too many impacts and stressors that can adversely impact their sustainability. Management of publicly accessible natural areas requires a long-term commitment, and striking an appropriate balance between providing access and protecting the local natural features and their functions is a perpetual challenge.

Development of an ecologically-sensitive trail system is a key component of good public woodlot management. Trails should be designed to avoid highly sensitive areas, but provide enough access to discourage informal trail creation. There should also be consideration for trail widths and surfacing. Boardwalks, bridges and platforms should be integrated over wet areas to minimize soil compaction and habitat degradation related to trail use.

Additional site-specific strategies for balancing access with protection of ecological systems include: planting native species as a buffer between natural areas and public uses, formalizing trails to discourage informal trail creation, closing informal trails with large logs and/or prickly shrubs, and installing signs that indicate what types of activities are permitted or prohibited.

Safety is another important consideration in any public space, and natural areas are no different. Clear and consistent directional signs should be provided and tree risk assessments (particularly along formal trails) should be undertaken on a regular (e.g., annual) basis.

Publicly accessible natural areas provide excellent opportunities for in situ demonstrations and education, and use of well-designed educational signs in key locations is also recommended.

Various examples of good urban woodlot management plans in southern Ontario are available online. These include the Greenwood Conservation Area Management Plan (2004), Cruickston Park Environmental Management Plan (2002) and Crother's Woods Trail Management Plan (2007).

### ***Risk Management***

In light of increasing liability and a growing body of legal precedents establishing a Duty of Care for tree owners to maintain their trees in reasonably safe condition, municipalities are beginning to recognize the importance of tree risk assessment and proactive risk management. While resource constraints invariably restrict the ability of any municipality to ensure the safety of all trees, the development and implementation of a realistic risk management strategy is becoming increasingly recognized as a necessity.

A careful balance is required since mature deciduous trees provide the most benefits in the context of the urban forest, and should be retained wherever possible. As stated in the 2007 Framework, the term "hazard" should be reserved for trees that have significant structural defects and have a significant target that would be hit if a failure should occur. Context is also an important consideration, and a mature tree in a high-use public park could be considered more of a risk than its counterpart within a public woodland away from formalized trails, simply due to its location.

Risk assessments are best undertaken by a trained professional, and options for retaining trees safely (e.g., dead wood removal, strategic pruning, cabling, crown reduction) should be carefully considered. However, in cases where actions cannot correct the fundamental problem, the tree(s) may need to be removed.

### Managing Risks in City Parks

*Although the trees serve as an attractant to park visitors, all trees have some degree of [risk] and many [in Royal City Park] pose an immediate threat to park users... [M]any trees [in Royal City Park] have dead limbs, cavities in main scaffold branches, and root damage which could cause failure of some or all of the component parts of trees. This presents a safety issue where people are present beneath or adjacent to the tree. The safety of park users must be considered the top priority for management of the trees.*

Royal City Park Plant Material Management Plan (2009)

Although many municipalities, including Guelph, continue to primarily address tree risk in response to service calls and complaints, some are beginning to undertake risk mitigation. In Burlington, arborists cable and brace some trees, remove those determined to present a serious hazard, and conduct visual inspections of trees along City trails annually (followed by pruning or removals if required). Other municipalities, like the Town of Ajax, do not implement cabling and instead focus on more proactive maintenance of their urban forest through block pruning and underplanting trees in anticipation of the eventual removal of mature trees. In general, best practices indicate trees along trails that are 1.5 times the tipout distance should be assessed.

The Royal City Park Management Plan recently completed for the City of Guelph (Silv-Econ Ltd. 2009) provided a comprehensive risk assessment and incorporated input from City staff as well as the community. Ultimately this resulted in a combination of removals of the most serious risk trees, pruning of others, and an extensive planting plan to allow for gradual replacement of the lost mature trees over time.

Safety should also be a primary consideration during planning for existing trees that are being integrated into parks or neighbourhoods, as well as for new trees being planted. Considerations should include potential conflicts with buildings and/or other infrastructure elements. Where existing trees are protected, there must also be enough of the original soil, rooting area and elevations so that the tree(s) survive post-construction and do not ultimately pose an elevated risk.

The key to effective risk management is in an operational policy that coordinates inspection, mitigation and proactive planning in order to reduce risk, uncertainty and liability. This must be combined with adequate staffing to support implementation. Key components of an effective risk management policy or strategy include:

- A policy statement framing the scope of the policy and assigning responsibility, goals and a standard of care statement;
- Determination of acceptable risk;
- Minimum training and qualifications of risk assessors;
- Frequent assessments;
- Management options;
- Record-keeping protocols;
- Strategy funding and partnerships, and;
- Program assessment and reporting.

Development and implementation of such a policy requires forestry staff that are specifically trained in tree risk assessment, and have this task identified as part of their regular duties.

**3.2.4 MONITORING**

Urban forest management plans are a relatively new tool that only a few municipalities have begun to implement, and there are no known urban forest monitoring reports available to refer to as of yet. However, there has been recent work on developing a set of standard criteria and indicators for urban forest management (Kenney *et al.*, 2011). These criteria and indicators build on the model for measuring urban forest sustainability developed by Clark *et al.* (1997) and provide a useful tool for tracking the three key components of effective urban forest management: the condition of the urban forest, municipal management, and community and stakeholder engagement. The 25 criteria laid out in the model include measures that are commonly used (e.g., canopy cover, species distribution, agency co-operation, tree inventory and tree risk management) and ensure that all aspects of urban forest management are considered and evaluated.

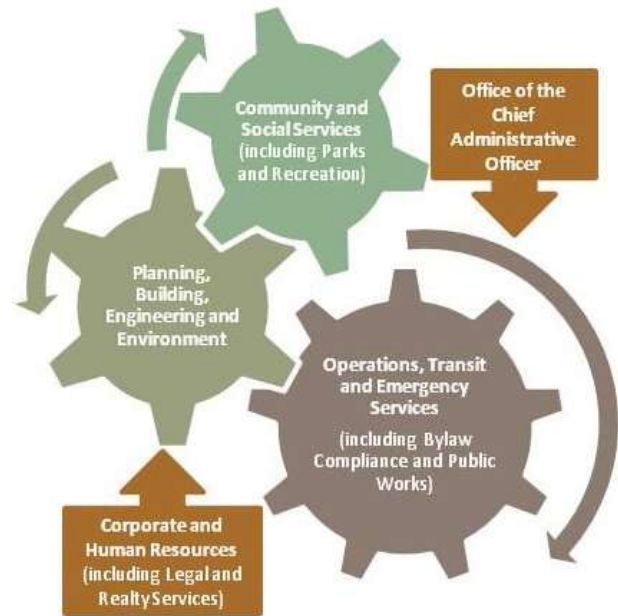
**3.3 GAPS AND OPPORTUNITIES FOR IMPROVEMENT**

**3.3.1 INTERNAL COORDINATION**

As is described in the 2007 Framework, while inter-departmental meetings between Executive Directors and Senior Managers are formalized and regularly scheduled, communications between key staff members on tree-related issues remain informal and ad-hoc.

Staff have indicated that the creation of a “Tree Team” comprised of key staff from all departments (including senior staff where appropriate) involved in tree-related issues that meets quarterly, or more

frequently if needed, would provide a forum for effective discussion and information sharing. Such a structure would help to ensure a consistent approach to implementation of policies and practices around tree protection and replacement, and would also be useful for identifying opportunities for improved urban forest management.



**Figure 5. Representation of service areas in the City that should be involved in implementation of an urban forest management plan.**

A subset of this team from service areas more involved in day-to-day decisions related to the City’s trees (e.g., Operations, Transit and Emergency Services; Planning, Building, Engineering and Environment) should also meet more regularly (e.g., monthly) to review current draft plans and discuss outstanding issues.

Another impediment to coordination on tree issues identified in the 2007 Framework was the lack of comprehensive and consistent guidelines, policies and specifications for tree protection or tree planting. Such a document has been developed in tandem with this Plan, but needs to be finalized by City staff prior to release. It will then be the responsibility of various departments and staff to

use this Tree Technical Manual as their reference guide, and implement the direction provided in it. This document should be a core resource for members of the “Tree Team” who should ensure it is utilized across departments and who can bring forward changes or additions as needed for this document. For example, useful additions to the City’s “Tree Technical Manual” in the future might include specific design guidelines for greening and shading parking lots, as well as a detailed list of recommended tree and shrub species with information about their tolerances, requirements and potential sizes. The City’s Healthy Landscapes program has already developed a list of suitable native plant species that would serve as a good starting point.

### **3.3.2 TREE INVENTORY AND INFORMATION MANAGEMENT**

#### ***Tree Inventory***

The City of Guelph has developed a comprehensive platform for an inventory of publicly-owned trees (in ORACLE). However, progress in collecting inventory data has been slow due to recurring technical issues with transferring data into a GIS platform and the limited staff resources available to undertake ongoing inventory work. If the City’s estimate of 100,000 trees on municipal lands is reasonably accurate, at the current rate, all of the City’s trees (including street trees and those in public parks and open spaces) will not be inventoried until close to 2060, by which time the inventory will be functionally obsolete due to the age of most of the data.

In order for this inventory to be useful to the City as a management tool, it requires more dedicated technical support as well as more dedicated resources to collect data on trees at a quicker pace. Options include hiring one or more arborist(s), at least on a seasonal and contractual basis, to collect this data over a period of several years, or contracting the work out to consulting arborists (as

has been done in Milton, New Tecumseth, and Burlington among other municipalities).

Another option is to coordinate volunteer-based surveys to collect basic data on trees (e.g., species and diameter) through a NeighbourWoods program. NeighbourWoods is a specific program developed to promote local resident involvement in tree care by conducting basic assessments of trees in their neighbourhoods, with some training. Communities such as Peterborough and Centre Wellington (Elora and Fergus) have implemented NeighbourWoods programs with some success. The City of Guelph may be able to build on the Healthy Landscapes program it already has in place to coordinate such a project with some staff time required to provide coordination and quality control. However, at best this will only be a partial solution to the current data gap.

#### ***i-Tree Eco Study***

An i-Tree Eco study, as done in Oakville, Ajax and the Region of Peel, would provide metrics regarding overall tree diversity and structure that could be used to estimate the value of some of the urban forest’s green infrastructure services. However, such a study would cost the City approximately \$40,000, and given the other urban forest management needs, is not considered a priority at this time. At this time, completion of a municipal tree inventory and a detailed UTC canopy cover analysis are considered more useful and important priorities.

#### ***Green Infrastructure Asset Valuation***

The Public Sector Accounting Board (PSAB) accepts proposals for changes to its accounting standards and has a process for considering and reviewing such proposals. Exploring the possibility with PSAB, and potentially other jurisdictions, of having public green infrastructure such as trees accounted for in this system would be worth exploring for the City of Guelph, and for the growing number of municipalities concerned about the valuation and

management of their urban forest. If something can be developed and implemented, this has the potential to be both a progressive and practical mechanism to ensure public green infrastructure is genuinely recognized and accounted for in the same way as all other public infrastructure.

### **Canopy Cover**

The City obtained a preliminary estimate of canopy cover through the 2007 Framework and undertook a more accurate estimate in 2011 (with support from a TD Green Streets grant) using the orthorectified air photo and GIS analysis approach (as described in **Section 3.2.2**). The next step is to undertake a detailed City-wide canopy cover and potential plantable spaces analysis using the UTC method (also described in **Section 3.2.2**). With the proper imagery and supporting software, this analysis can be undertaken and will provide (a) a canopy cover estimate that is accurate to within  $\pm 5\%$ , (b) an approach that can be replicated consistently to assess changes over time, and (c) identification of all potential plantable spaces within the City.



### **3.3.3 TREE MAINTENANCE, PEST MANAGEMENT, AND RISK ASSESSMENT PROTOCOLS**

#### **Block Pruning and Maintenance**

The City does not currently have a formalized tree maintenance and inspection program in its parks, parkettes, open spaces, or natural areas. Maintenance is focused on mulching and structural pruning of newly planted trees, and inspection (and pruning or removal where required) of older trees. Established trees on City streets, parks and open spaces are generally maintained on a per-request or as-needed basis, or when City arborists have completed outstanding customer service requests. Tree maintenance in City-owned woodlands is undertaken on a similar basis.

Although the City of Guelph has attempted to implement a block pruning cycle for street and park trees in the past, it does not currently have the resources to undertake this work. It does, however, have a system of young tree pruning that is in-line with best practices (i.e., two pruning rounds within the first ten years). Given that young tree pruning could be done by trained summer students from the ground, the City should consider hiring students to undertake this task so that more qualified staff can conduct cyclical block pruning on larger trees. Ideally, students and staff conducting this work would be equipped with at least one rugged laptop computer per crew so that inventory data could be collected and entered into the City's tree inventory/asset management system in conjunction with routine maintenance work.

The City should explore the feasibility of setting up a volunteer-based "Citizen Pruner" program in Guelph (like the one described in **Section 3.2.3**) for newly planted trees so that more staff time can be allocated to pruning mature trees, which typically requires machinery and more skill.

As resources permit, the City should also explore the possibility of coordinating scheduled pruning activities with local Hydro contractors, so that trees along utility corridors and streets are pruned in the same areas at the same time.



#### ***Public Woodlot Management in Urban Areas***

Although the City has, with volunteer and community support, developed a management plan for Norm Jary Park which contains a wooded area, it has not conducted risk assessments or developed vegetation management plans for any other public wooded / natural areas in the City apart from Royal City Park. City Park Planners have an inventory database of all City parks and their associated grey infrastructure (e.g., benches, parking spaces, fields, etc.) that includes a list of natural areas. The latest inventory indicates there are nearly 200 ha of City-owned natural areas. However, this inventory does not identify or assess the treed assets (i.e., green infrastructure) in any of these parks.

As the City becomes more populated and there is increasing pressure on its natural areas, it will become increasingly important to ensure that these areas are managed to protect their ecological values (including control of invasive plant species), and to ensure that they provide safe opportunities for low impact recreation. Staff is well aware of this need and have, in the past, made resource requests for completing management plans for all City parks, with a priority on older City

parks (i.e., with more mature trees). The absence of such plans remains a gap in the City's practices.

#### ***Plant Health Care and Pest Management***

In terms of Plant Health Care (PHC), the City established a student watering crew in 2008, and formalized procedures during these periods of seasonal employment. However, this support has been inadequate in periods that have been unusually dry and hot, and such summer conditions are only expected to increase under climate change. Tree inspection, especially as part of block pruning activities, should also be more regular and widespread.

An Emerald Ash Borer (EAB) Strategy has been identified as a critical need to be developed and implemented in the City. Having a broader invasive species and pest management strategy that would encompass EAB, and address other current and anticipated pest related issues, would help the City be more prepared to respond to these important urban forest stressors. The City's strategy could build on the recently released Ontario Invasive Species Strategic Plan (2012). The Federal and Provincial governments provide some support in the form of scientific research and communication tools that can be of assistance.



### Risk Management

The City currently undertakes some operational risk management in the form of regular inspections of larger (i.e., over 60 cm DBH) trees, cabling, and follow-up on service calls related to potential tree risks. However, the City should develop a formal urban forest risk management policy (as described in **Section 3.2.4**) so that procedures and expectations are explicitly laid out, and to ensure that activities are documented. A dedicated policy will also ensure consistency of assessment and highlight the need for sustained resources dedicated to inspection over the long term.

resources are inadequate to move beyond replacement of trees at the time of removal. Recommendations to address this gap are provided in **Section 5**.

The City should also develop and implement vegetation management plans in City-owned natural areas and parks focussed on risk management, particularly those with large numbers of mature trees. Public natural areas and wooded parks, particularly those that are well-used by the community, present potential tree-related risks that should be addressed proactively rather than through emergency response.



Figure 6. Notice for Emerald Ash Borer in Wellington County (Guelph Tribune, 11/25/2010).

Proactive pruning of younger trees and more extensive plantings before mature trees begin to potentially pose elevated risk are also highly effective risk management approaches. The former is already pursued by the City, but current



It is also recommended that at least two of the City's arborists obtain formal risk assessment training, and that at least one Planning and one Parks staff obtain International Society for Arboriculture (ISA) certification (or that an ISA certified Arborist be provided to support Parks and



Planning staff). This level of competency should be set as a requirement in the standard of care statement in the City's tree risk management policy.



### 3.3.4 MONITORING

The need to assess the status of urban forest management planning in the City of Guelph is recognized by the City, stakeholders and community alike. As part of this Plan, a series of 25 criteria have been put forward to measure all aspects of urban forest management in the City, as follows:

1. Relative Canopy Cover
2. Age Distribution
3. Species Suitability
4. Species Distribution
5. Condition of Publicly Owned Trees
6. Publicly Owned Natural Areas
7. Native Vegetation
8. Public Agency Cooperation
9. Involvement of Land Holders
10. Green Industry Cooperation
11. Neighbourhood Action
12. Citizen-Municipality-Business Interaction
13. General Awareness of Trees
14. Regional Cooperation
15. Tree Inventory
16. Canopy Cover Inventory
17. City-wide Management Plan
18. City-wide Funding
19. City Staffing
20. Tree Establishment Planning
21. Tree Habitat Suitability
22. Maintenance of Publicly Owned Trees
23. Tree Risk Management
24. Tree Protection
25. Natural Areas Management

These criteria, adapted from the work of Kenney *et al.* (2011) have been tailored, with input from City staff and stakeholders, to Guelph's context, and a 2011 baseline assessment has been conducted (see **Appendix D**). A ranking of "low", "moderate", "good" or "optimal" has been assigned to each criterion where possible.

Several staff and stakeholders indicated a preference for more measurable, quantitative indicators that could be easily replicated. These have been incorporated into the refined indicators to the greatest extent possible. However, in some cases, the absence of data (e.g., lack of a completed municipal tree inventory) has precluded some criteria from being properly evaluated at this time. It is hoped that as the City continues to invest in urban forest management, this information will become increasingly available, and the measures will become more refined.

It is anticipated that review and assessment of the status of the 25 indicators, as well as review of the status of the recommendations in this Plan will occur on a five year cycle in conjunction with the development of each new Five Year Management Plan so that the progress made (or lack thereof) in various areas will can inform the priorities of the next five year period.

### 3.4 RECOMMENDATIONS FOR MANAGEMENT AND MONITORING

#### Recommendation # 1 – Create a Senior Urban Forester position

Implementation of this Plan requires additional and sustained investment into the City’s urban forest. First and foremost, this will require creation of a new Senior Urban Forester position to champion and coordinate the various activities and initiatives outlined in this Plan. This person will need to be able to influence activities related to trees in multiple departments, and provide City-wide leadership on urban forestry issues. Without this position being created and filled, it will be very difficult to move this Plan forward.

Lead	Operations, Transit and Emergency Services
Support / Partners	None required
Cost	\$110,000 annually plus \$10,000 start-up costs
Funding	Operating Budget
Priority / Target	HIGH / to be established in 2013 and ongoing
Timing	
Related Goal(s)	11, and all the other objectives

#### Recommendation # 2 – Create an interdepartmental “Tree Team” of City staff

Create an inter-departmental “Tree Team” comprised of key staff from all departments involved in issues related to trees, ranging from planning and communications, to operations and engineering. This group is to meet at least quarterly. A sub-set of this group (e.g., from Planning, Building, Engineering and Environment, Operations, Transit and Emergency Services) should meet more regularly (e.g., monthly) to jointly review plans and discuss day-to-day decisions.

Note: To be led by the Senior Urban Forester, but should begin immediately in 2013 with an interim lead.

Lead	Operations, Transit and Emergency Services (under direction of the Senior Urban Forester)
Support / Partners	Community and Social Services; Legal and Realty Services (when required)
Cost	None (but requires Senior Urban Forester position)
Funding	None required
Priority / Target	HIGH / to be established in 2013 and ongoing
Timing	
Related Goal(s)	3 as well as 2, 5, 6, 7, 8, 9, 10, 11



**Recommendation # 3 – Increase capacity to complete an inventory of municipal street and park trees**

In order to complete the City's inventory of municipally-owned trees over the next decade, two things are required: (1) one City staff trained in GIS and ORACLE asset management to be dedicated, on a part-time basis to maintaining and supporting the City's tree inventory and ensuring it is transferrable into mapped format; and (2) qualified staff or contractors to inventory the City's trees (more rapidly than current staff can manage).

Note: Documentation of heritage trees and designated heritage trees should also be incorporated.

Lead	Operations, Transit and Emergency Services (under direction of the Senior Urban Forester)
Support / Partners	Information Technology (note: new IT/GIS support required); possibly contract qualified help through Healthy Landscapes Program
Cost	\$200,000 (divided over two years, to be contracted out, and four rugged laptops) plus \$40,000 for a part-time GIS Technician on an ongoing basis (includes (will also require ongoing coordination, updating and management through Operations & Transit Forestry staff)
Funding	Operating Budget
Priority / Target	HIGH / to be initiated in 2013 and completed prior to end of first Five-Year Management
Timing	Plan (i.e., 2016), inventory to be continually updated and managed once complete
Related Goal(s)	1, 11

**Recommendation # 4 – Undertake targeted vegetation assessment and management of City parks and natural areas**

As part of implementing a more proactive approach to risk management and expanding its forest canopy, the City should undertake vegetation assessments and implement management of its parks with the objectives of (a) reducing risk (i.e., particularly for parks with mature trees), (b) selective control of highly invasive species (combined with targeted native species replacements), and (c) increasing opportunities for tree planting on public lands. This should include proactively undertaking works required to preserve older and large canopied trees, regular risk assessments along trails, and identification of areas where tree plantings should be staged to replace mature trees as they require removal.

Lead	Operations, Transit and Emergency Services
Support / Partners	Community and Social Services; Planning, Building, Engineering and Environment; Grand River Conservation Authority
Cost	\$660,000 (2015 - \$75,000, 2016 - \$75,000, 2017 - \$80,000, 2018-2022 - \$430,000)
Funding	Operating Budget
Priority / Target	MEDIUM to HIGH / to be initiated during the first Five-Year Management Plan (2013 – 2017) and completed over the second Five-Year Management Plan (2018 – 2022)
Timing	
Related Goal(s)	4, 5, 9, 10, 11

**Recommendation # 5 – Expand the City’s capacity for planting and maintenance of municipal trees**

5a) Increase current levels of tree establishment on municipal lands and through capital projects by:

- undertaking proactive plantings on City lands (i.e., parks, streetscapes) dominated by mature trees where there is no natural regeneration, as well as plantings of species (other than ash);
- maximizing replacement ratios for all capital projects, and;
- requiring new tree plantings as part of capital projects even where none are removed whenever they can be accommodated.

5b ) Expand the City’s operational capacity so that a block pruning and maintenance program can be undertaken. Such a program would include cyclical street, and if possible, park, tree pruning and basic assessment. This should include:

- a basic inspection for pests and risk assessment;
- working towards a five to seven year pruning cycle; and
- tracking changes to the status of trees in the inventory database (once completed).

Note: Tree plantings should be consistent with the guidelines and specifications provided in the City’s Tree Technical Manual, including the general species diversity guidelines which should be followed until the City’s municipal tree inventory data can be used to provide more specific targets. Should block pruning this be implemented in a timely manner, the City may consider integrating more comprehensive risk assessments into its pruning cycles.

Lead	Operations, Transit and Emergency Services
Support / Partners	University of Guelph (e.g., student volunteers for pest monitoring), summer students for watering and mulching
Cost	\$240,000 annually for an arboricultural crew of two; a half time Administrative person; s a one-time expense of \$200,000 for rolling stock to expand the forestry section
Funding	Capital and Operating Budgets
Priority / Target	HIGH / to be initiated between 2014 and 2017 if possible, or in 2018 as part of the
Timing	second Five-Year Management Plan
Related Goal(s)	4, 6, 8, 9, 11

**Recommendation # 6 – Undertake an Urban Tree Cover (UTC) Potential Plantable Spaces Analysis**

Use the most current and best available aerial imagery of the City combined with UTC software and related desktop analyses to generate detailed City-wide land cover mapping. This mapping will: (a) provide an accurate baseline for future canopy cover studies, (b) identify potential plantable areas in the City (i.e., open vegetated areas large enough to accommodate a tree), and (c) assess if a 40% canopy cover target is feasible for the City.

Note: The mapping of potential plantable spaces based on desktop analyses is only a first step. This must be followed by distinguishing between City-owned lands and other lands, and screening for actual suitability for tree planting based on approved and anticipated land uses, and consultations with various City staff and landowners (Recommendation # 16).

Lead	Planning, Building, Engineering and Environment under direction of Senior Urban Forester
Support / Partners	Healthy Landscapes Program
Cost	\$25,000 cost for specialized flyover and UTC software
Funding	Capital Budget (possibly with matching funds from TD Green Streets grant)
Priority / Target	HIGH / to be initiated in 2013 and repeated as part of monitoring in 2017-2018, 2022-
Timing	2023, and 2027-2028
Related Goal(s)	1, 2, 6, 11

**Recommendation # 7 – Develop and implement an Invasive Species and Pest Management Strategy, starting with an Emerald Ash Borer Strategy**

A City-wide Invasive Species and Pest Management Strategy is needed to ensure the City is prepared for all known and anticipated pest threats to its urban forest. However, with the confirmation of Emerald Ash Borer in Wellington County in 2010, and Guelph in 2011, an Emerald Ash Borer Strategy (EAB) is needed most urgently. Interim actions (e.g., monitoring of EAB traps, branch sampling, provision of information to the public with information pamphlets, completing inquiry-based private and public tree inspections) are being undertaken but do not take the place of a strategy. Data on the locations of ash trees within the City, which would be collected through the municipal tree inventory (Recommendation #3), will help inform this strategy.

Where appropriate, the City should coordinate its efforts on the EAB Strategy, as well as a broader Invasive Species and Pest Management Strategy, with agencies such as the Canadian Food Inspection Agency, the Canadian Forest Service, the Ontario Ministry of Natural Resources, Grand River Conservation Authority, the County and other area municipalities. The Ontario Invasive Species Strategic Plan (2012) should also be a key resource.

Lead	Operations, Transit and Emergency Services
Support / Partners	Planning, Building, Engineering and Environment; Legal and Realty Services
Cost	\$100,000 in 2013 and \$500,000 every year from 2014-2022
Funding	Capital Budget
Priority / Target	HIGH / to be started in 2012, and implemented from 2013 to 2022
Timing	
Related Goal(s)	1, 8, 9, 10, 11

**Recommendation # 8 – Develop tree risk management policy and train City Arborists in risk assessment**

Create a new position for a Forestry Technician with risk assessment expertise to develop a Tree Risk Management Policy that: defines the scope of the policy and assigns responsibility, goals and standard of care statement; determines acceptable risk with regards to tree care; prioritizes the retention of older, large canopied trees wherever possible; sets minimum training and qualifications for risk assessors; sets protocols for assessment and record-keeping; lays out management options; and (if possible) identifies funding opportunities. This person should also provide risk assessment training for at least two, but ideally all, of the City's arborists. International Society of Arboriculture (ISA) certification should be obtained by at least one staff in Planning, Building, Engineering and Environment and one staff in Parks and Recreation (or equivalent support should be provided to these departments).

Lead	Operations, Transit and Emergency Services
Support / Partners	Planning, Building, Engineering and Environment; Legal and Realty Services
Cost	\$44,000 annually for a half-time Forestry Technician and related training (see Recommendation # 18 for the other half-time tasks for this position)
Funding	Operating Budget
Priority / Target	MEDIUM to HIGH / to be initiated towards the end of the first Five-Year Management
Timing	Plan (i.e., 2016 – 2017)
Related Goal(s)	5, 8, 9



### Recommendation # 9 – Complete State of the Urban Forest report every five years

Use the established criteria and indicators (provided in **Appendix B**) to monitor the state of urban forest management in Guelph. This exercise should be coordinated with the review of the recommendations in this Plan and development of new Five-Year Management Plans in 2016-2017, 2021-2022, and 2026-2027.

Lead	Operations, Transit and Emergency Services (under direction of the Senior Urban Forester)
Support / Partners	Internal City “Tree Team” (see Recommendation #2); External Urban Forest Advisory Committee (see Recommendation #19)
Cost	No additional cost - use of existing staff resources
Funding	None required
Priority / Target Timing	MEDIUM / to be in conjunction with the second, third and fourth Five-Year Management Plans in 2017-2018, 2022-2023, and 2027-2028
Related Goal(s)	2, 4, 11

### Recommendation # 10 – Establish a green infrastructure asset valuation

The City should research the feasibility of tracking municipal trees as assets through the Public Sector Accounting Board (PSAB) system currently used for tracking other municipal grey infrastructure assets (e.g., sewer pipes, roads, bridges, playground equipment, buildings), and work to establish a mechanism for valuing the City’s urban forest. This has the potential to be both a progressive and practical mechanism to ensure public green infrastructure is genuinely recognized and accounted for as along with all other public infrastructure. If nothing can be resolved through the PSAB system, other available tools for valuing the urban forest using available tools (e.g., Eco i-Trees) can be applied.

Lead	Operations, Transit and Emergency Services; Finance and Enterprise Services
Support / Partners	Community and Social Services
Cost	No additional cost - use of existing staff resources
Funding	None required
Priority / Target Timing	MEDIUM / to be in conjunction with the second Management Plan in 2018-2022
Related Goal(s)	3, 4, 11

## 4 PLANNING FOR TREES: LEGISLATION, POLICIES AND GUIDELINES

As the City of Guelph continues to urbanize, planning that values trees and supports their integration into communities will result in a City that is “green” in practice and in reality. When trees are considered early in the planning process, whether they are being protected or planted, there are much greater opportunities to ensure that they are provided with adequate growing space, and for identifying (and eliminating) conflicts between requirements for trees and other types of infrastructure and servicing.

The City of Guelph is identified as a growth centre by the Province and will, like many other municipalities in southern Ontario, continue to experience intense growth pressures over the next few decades. The current population of approximately 125,000 is expected to increase to nearly 175,000 by 2031, and be accommodated both through intensification of already developed areas and development of remaining greenfield areas. This will present a real challenge to sustaining the urban forest and the benefits it provides (Pauleit *et al.* 2005; Nowak *et al.* 2005).

**Section 3** largely focused on practices and strategies that could be pursued by City staff on City-owned and operated lands in terms of day-to-day management and operations. While this section includes legislation, policies and guidelines that pertain to trees on public lands, it largely addresses legislation, policies and guidelines that do or can apply to tree-related activities on private lands.

Notably, there have been a number of changes in the City’s tree-related policies since the City’s

Framework for an Urban Forest Management Plan was completed and adopted by Council in 2007. These are presented, in brief, below. The specific 2007 Framework recommendations addressed by these changes are noted in **Appendix A**.

### 4.1 CURRENT LEGISLATION, POLICIES AND GUIDELINES FOR TREES

#### 4.1.1 FEDERAL AND PROVINCIAL POLICIES

Two relatively new pieces of legislation protect tree (as well as other) species that are designated as Species at Risk. Federally, there is the *Species at Risk Act* which was passed in 2002 and applies to species that are naturally occurring or have habitat on federal lands. Provincially, there is the *Endangered Species Act* which was originally passed in 1971, and updated in 2007. The updated Act provides broad protection for provincially designated Species at Risk and their habitats wherever they occur in Ontario, and support for volunteer stewardship efforts (e.g., of private landowners and conservation organizations).

Currently, the only tree Species at Risk known to be naturally occurring within the City of Guelph is Butternut (*Juglans cinerea*), which is designated as Endangered both provincially and federally. A number of other cultivated tree Species at Risk, which are also subject to the *Endangered Species Act*, are also known to occur in the City. For example, Kentucky Coffee trees have been planted at the University of Guelph’s Arboretum as well as outside City Hall.

Another piece of federal legislation that can have some bearing on trees is the *Migratory Birds Convention Act* (1994). This act prohibits the disturbance of nests being utilized by any of the listed species of birds, and in practice is used to prevent the removal of trees (or other structures) while listed birds are using them as nesting sites. There is also the Provincial Policy Statement

(2005) which, in its Natural Heritage section, directs municipalities to develop policies that define and provide protection for significant woodlands in their jurisdiction.

#### 4.1.2 REGIONAL POLICIES

The City of Guelph is surrounded by the County of Wellington, but is a single-tier municipality, so it does not need to defer to or be consistent with County policies. However, the City and County must maintain an open dialogue and collaborate on tree-related issues for both planning and ecological reasons. Wellington County has identified a Greenlands System in its Official Plan, including a number of areas that abut the City of Guelph. It has also recently updated its forest conservation by-law (Conservation and Sustainable Use of Woodlands By-law 5115-09) to regulate all woodlands of at least 1 ha in area within the County.

From an ecological perspective, it is important to maintain connectivity between forested natural areas in the County and in the City, and coordinate efforts to control aggressive tree pests and invasive species.

From an urban forest management perspective it is important to be aware of practices and activities in the County since the trees (and their pests) are not constrained by political boundaries. For example, the presence of Emerald Ash Borer was first documented in the County in 2010 and in the City of Guelph in 2011, putting all ash trees in the City at serious risk. Planned responses to this pest must be coordinated with the County and other provincial and federal agencies in order to be effective.

The City of Guelph also falls within the Grand River Conservation Authority's (GRCA) jurisdiction. The GRCA provides support for tree protection and planting initiatives on its own lands (of which there

are several parcels within the City of Guelph, including portions of the Hanlon Creek Swamp Conservation Area). The GRCA also regulates all development and site alteration activities within 120 m of wetlands (including treed wetlands).

Swamps, which are treed wetlands, represent a significant proportion of the City's natural heritage areas, are the most common type of wetland in the City, and contribute substantially to the City's overall tree cover (Dougan & Associates with Snell and Cecile 2009).



Butternut photo courtesy of Rose Fluegel, RVCA

#### 4.1.3 MUNICIPAL POLICIES

##### **Strategic Plan**

There are two objectives in the City's 2007 Strategic Plan that support urban forest sustainability. From a broad perspective, the plan identifies one of the City's objectives as implementing "*Municipal sustainability practices that become the benchmark against which other cities are measured*" (objective 1.2). More specifically, objective 6.6 commits the City to being "*A biodiverse City with the highest tree canopy percentage among comparable municipalities*".

##### **Official Plan**

The City of Guelph undertook updates to its Official Plan over 2009 and 2010. These updates included revisions to all policies related to natural heritage



and urban forestry under Official Plan Amendment 42. OPA 42 was passed by Council in July of 2010 and approved by the provincial Ministry of Municipal Affairs and Housing in February of 2011, but has subsequently been appealed to the Ontario Municipal Board (OMB).

Although the general direction and intent of OPA 42 are discussed, the policies therein will not be fully in effect until the appeals are resolved at the OMB. Therefore, the policies cited are all from the current Official Plan from 2001 which was last consolidated in 2006.

**City of Guelph Official Plan (2006 Consolidation)  
Community Form Statement**

*Guelph's beauty lies in its compact, small town character. It is a friendly sized City marked by rolling hills and scenic river valleys meandering through a low-profile townscape that is blanketed by a canopy of mature trees.*

The City's current Official Plan (2006) provides general protection for woodlands and treed areas, and also supports the protection of individual – particularly mature – trees. OPA 42 provides more explicit direction by providing:

- protection for significant woodlands within the Natural Heritage System, including minimum buffer requirements;
- policies specific to cultural woodlands and plantations;
- policy supporting planting of native and non-invasive trees and shrubs;
- a canopy cover target of 40% by 2031, and;
- a commitment to a monitoring program for the urban forest.

The current Official Plan requires a tree inventory (of trees of at least 10 cm DBH) for all development

proposals, and OPA 42 also explicitly requires a tree protection plan and vegetation compensation plan for all healthy, non-invasive trees.

**City of Guelph Official Plan (2006 Consolidation)  
Policy 3.5.14**

*The City will encourage measures to preserve mature trees of scenic value, and any other cultural heritage landscape resources of heritage significance. Existing trees, tree and hedge lines should be an essential consideration in the design of any development proposal. The City will consider measures to preserve mature, desirable trees along streets and roads, except in circumstances where removal is necessary because of disease, damage, or to ensure public health and safety.*

Additional new policy direction in OPA 42 also includes strong support for the use of native species in plantings on public and private lands.

**City of Guelph Official Plan (2006 Consolidation)  
Policy 3.6.26**

*The City will promote the planting of street trees as desirable elements of the streetscape.*

OPA 42 also includes policies that support the establishment of trees outside the Natural Heritage System, particularly within public use areas. These include parklands being dedicated to the City as part of new developments, open spaces, streetscapes, roadways, and trails for pedestrians and/or cyclists. These policies are found in various sections (e.g., active transportation, urban design and public realm) and support the City's objective of fostering active living by integrating trees in

public spaces where they can provide shade, cooling and wind breaks.

**City of Guelph Official Plan (2006 Consolidation)  
Section 6.8 Forestry Resources**

*The City places a high priority on protecting existing trees, hedgerows and wooded areas. In addition, the planting of new trees in all areas of the City is encouraged for environmental and aesthetic reasons.*

Heritage trees and designated heritage trees are also specifically addressed in OPA 42 as elements to be protected to the fullest extent possible. These trees are listed on the Municipal Register of Cultural Heritage Properties as a heritage attribute of non-designated or designated property through Part IV or Part V of the *Ontario Heritage Act*. They may be older, native trees, but can also be non-native trees with cultural heritage value or interest (refer to the definition provided in the Glossary, **Section 8**). In addition to listing and designation under the *Ontario Heritage Act*, some heritage trees may have additional protection through Species at Risk legislation and the City's natural heritage policies.

Because of the specificity of the definition used in the City of Guelph, heritage trees should be distinguished from other mature native trees (called veteran trees by some), that are representative of trees that were historically present on the landscape, or remnant plantings that persist in the urban context. Mechanisms to identify and protect healthy veteran trees exist through the City's current Official Plan policies, OPA 42, and Tree By-law (2010)-19058 (discussed below).



**City Plans, Guidelines and Specifications**

The City of Guelph has a number of plans and guidelines that are used to help implement various aspects of the Official Plan. City-wide documents that include components related to tree protection and establishment include the following:

- Guelph Trails Master Plan (2005)
- City of Guelph Draft Tree Protection Policies and Guidelines (last revised in 2008)
- Site Plan Approval Guidelines (last revised in February 2010)
- Design Principles for Stormwater Management Design Guidelines (1998)
- City of Guelph Planting Standards and Specifications for Street Tree Planting (last revised in 1998 and being updated)
- City of Guelph Urban Design Guidelines (1995)
- Guelph Property Demarcation Policy (1996)
- Naturalization in the City of Guelph Parks - Policy (1993)

In addition there are a few reports that provide area-specific guidelines related to trees, as follows:

- Stone Road Corridor Urban Design Guidelines (2000)
- South Guelph District Centre - Urban Design Study and Guidelines (2002)
- River Systems Management study (1993)

These documents are discussed briefly below.

The Guelph Trails Master Plan (2005) does not provide direction related to tree protection or establishment *per se*, beyond recommending shading along trails to reduce radiant heat. However, the plan relates closely to urban forest planning and sustainability because trails provide a primary mechanism for residents and visitors to interact with the local urban forest, and trees along those trails provide shade, cooling and windbreaks. These valuable services allow and encourage people to enjoy their public and outdoors recreational spaces for longer in all seasons.

The Guelph Trails Master Plan (2005) supports ecologically-based urban woodland management through sensitive trail design, specifying that deadfall trees be left except where they present an obstruction, and addressing issues related to the City's living fence policy.

In 1996 the City passed a Property Demarcation Policy that required installation of a living fence between new developments (residential, commercial or industrial) and adjacent City parks or natural areas. While this policy is supportive of urban forest enhancement, there have been some issues concerning trespassing on private property, encroachments into public natural areas, living fence plantings encroaching onto trails, and additional maintenance associated with these plantings.

The City also has several documents that direct tree protection and establishment during development. The Draft Tree Protection Policies

and Guidelines (last revised in 2008) are being updated and consolidated with tree establishment standards and specifications in a Tree Technical Manual, developed in conjunction with this Plan and being finalized by City staff. This manual incorporates best and current practices from other comparable jurisdictions, as well as input from City staff and stakeholders. Once finalized, this Manual will provide City-wide guidance and standards related to tree protection and planting.

The Tree Technical Manual is intended to be used in conjunction with other documents, such as the Site Plan Approval Guidelines, Design Principles for Stormwater Management Design Guidelines, and Planting Standards and Specifications for Street Tree Planting to ensure that tree protection and establishment techniques support the long-term tree survival and health.

The City's Urban Design Guidelines (1995), despite being more than 15 years old, include many principles and guidelines supportive of tree establishment in built areas that are consistent with current best practices. The document places emphasis on the use of trees and shrubs to screen parking and other unsightly areas, provide protection from excessive wind and sun, stabilize steep slopes and generally contribute to the overall aesthetics of streetscapes and built-up areas. It also recommends:

- using indigenous or non-invasive plants, especially near natural areas (as per the River Systems study species list);
- avoiding large masses or significant numbers of single species;
- the use of trees for building climate control, and;
- retention of the natural topography in new and infill developments.

These guidelines should be applied in conjunction with the Tree Technical Manual, which provides more detailed guidance and specifications.

The Naturalization in the City of Guelph Parks Policy (1993) report is another somewhat dated document that remains relevant and supportive of Guelph's urban forest sustainability. This document describes naturalization approaches and methods, provides a list of parks where naturalization should be integrated, and presents the results of several trial naturalization areas. It also provides templates for educational signs. Naturalization would typically, but not necessarily, include plantings of trees and shrubs.

*Natural parkland is an integral part of our urban park system(s). These natural areas represent self-perpetuating landscapes that lend strength, beauty and ecological stability to our urban parks, while providing passive recreational opportunities for its users.*

**Naturalization in the City of Guelph Parks Policy (1993)**

Three studies that provide more area-specific design guidance, including some related to trees, are the Stone Road Corridor Urban Design Guidelines (2000), South Guelph District Centre - Urban Design Study and Guidelines (2002), and River Systems Management Study (1993). The Stone Road and South Guelph studies generally support integration of trees and shrubs along arterial roads and use of suitable native species. However, the South Guelph Study also recommends fairly extensive use of ash, which should no longer be established in the City due to the 2011 arrival of Emerald Ash Borer (EAB). The River Systems Study (1992) includes a list of native

trees adapted to Guelph's environment and suited to planting along the river corridor.

#### **City By-laws Regulating Trees and Zoning**

There are several by-laws that relate to trees in the City, although some only relate marginally.

- The City's Encroachment By-law (2009-18799) prohibits encroachment on to City-owned lands including parks, woodlands and greenbelts, although it does not specifically protect trees on these lands.
- The Property Standards By-law (2000-16454) requires properties to be kept free of dead or decaying trees that create "an unsafe condition".
- The Parkland Dedication By-law (1989-13410) lays out requirements for parkland dedication as part of development as per the *Planning Act* (1990). It also allows for cash payment in lieu of conveyance. Parklands typically include either protection of some existing trees, establishment of new trees, or both.
- The Site Alteration By-law (2007-18420) requires a permit from the City Engineer for any changes in elevation of 100 mm or more. Permit applications require an existing conditions report that provides the location, size, species and condition of all trees of at least 100 mm diameter. A permit may be issued where the City Engineer is satisfied that the proposed alteration will not result in "a detrimental effect on any vegetation that has been designated for preservation".

The primary by-law that relates to trees in the City is the Private Tree Protection By-law (2010-19058). This by-law, which was updated from the 1986 by-law in August of 2010, protects all trees of at least 10 cm DBH on parcels of at least 0.2 ha (0.5 acres) throughout the City.

Different directions for the by-law were explored by City staff and discussed during consultations with stakeholders and the public, as well as before

Council. Options seriously considered included regulation of all trees of at least 20 cm diameter in addition to the protection of smaller trees on lots of at least 0.2 ha. However it was ultimately decided, given the mixed responses from the community and the limited resources available for enforcement, to approve a by-law similar to the original one that focuses on protection of trees on lots likely to be developed.

Notably, the City’s current Private Tree Protection By-law doesn’t specifically address boundary tree issues, but the City does require developers to obtain written consent from adjacent landowners when damage to shared trees is possible or anticipated.

Zoning by-laws are currently used in the City, as in most municipalities, as a tool to ensure land uses within different parts of the City are supportive of the Official Plan and consistent with municipal vision and strategic planning. Zoning by-laws are prescriptive by nature and currently regulate aspects of land use such as minimum lot areas, parking requirements, lighting and fill placement. They also prohibit buildings or structures within protected natural heritage features, as per the Official Plan, including significant woodlands.



## 4.2 BEST PRACTICES AND PRECEDENTS FROM OTHER JURISDICTIONS

### 4.2.1 OFFICIAL PLAN POLICIES

Official Plan policies can be the basis of a planning framework supportive of urban forest protection. While most municipalities in southern Ontario have policies addressing woodland protection, and many address the protection of trees “where possible” through the development process, only recently have municipalities begun providing explicit support for the urban forest through their Official Plans (e.g., Region of Peel, Town of Ajax).

The Town of Ajax’s Official Plan Amendment 38 provides repeated support for native and non-invasive plantings, and the use of trees to mitigate climate change and urban heat island effects. Policy 2.1.4, “Tree Canopy”, provides direction for developing an urban forest management plan and specifically directs consideration of a Town-wide tree cutting by-law, watering for newly planted trees, compensation for healthy trees removed through development, support for increased awareness about the benefits of trees and tree care, and expansion of local tree canopy (including plantings in extensive parking areas).

Guelph’s OPA 42 (currently under appeal, as described above) also specifically addresses tree protection outside natural areas and recognizes the role of the urban forest in relation to mitigating the effects of climate change.

It is expected that as the interest in and awareness of the value of the urban forest increases across southern Ontario, particularly in the context of climate change, more municipalities will incorporate such policies into their official plans.

On a broader landscape scale, connectivity is a central theme in all natural heritage planning policies and studies in southern Ontario, and elsewhere. Although connectivity between natural areas can have some undesirable ecological consequences (e.g., facilitating spread of invasive species), scientific literature continues to report that in fragmented landscapes the benefits far outweigh the risks (e.g., Damschen *et al.* 2006; Gilbert-Norton *et al.* 2009). The importance of habitat connectivity and enhancement is stressed even more under conditions of climate change, because these elements allow even low mobility populations to potentially respond, at least over time, via migration (e.g., Spring *et al.* 2010; Beier and Brost 2009).

#### 4.2.2 GUIDELINES AND SPECIFICATIONS

The *Planning Act* (in particular Section 41, site plan control) provides municipalities with the authority to identify trees for protection and require replacements on private lands subject to the development process. A number of municipalities in southern Ontario use this authority and require that all trees of at least 10 centimetres in diameter be assessed and inventoried and that detailed tree preservation plans be submitted as part of site plan application (e.g., City of Burlington, Town of Ajax, City of Kitchener, Town of Richmond Hill). The City of Guelph also requires this in its Official Plan and supporting documents (i.e., Site Plan Application Guidelines, Tree Protection Policies).



Municipalities with more proactive approaches to urban forest management also tend to prescribe minimum standards for arborist reports to support tree protection on construction sites (e.g., City of Toronto, City of Mississauga, Town of Oakville, Town of Ajax). Generally, these reports require tree inventories and specifications for protection, and must be written by a certified arborist, professional forester, or comparably qualified individual. The most comprehensive report guidelines require regularly documented site inspections by the project consulting arborist before, during and after construction in order to ensure that tree protection methods remain intact throughout the course of the works.

Strong policies at the higher level that support tree protection and establishment can be undermined on the ground if more detailed guidelines and specifications that are equally supportive of trees are not developed and implemented.

Municipalities seeking more proactive and effective urban forest management in southern Ontario have begun to develop documents tailored to their local context and issues. These include the Town of Markham and City of Barrie. The Town of Oakville is also working to synthesize best practices for local tree-related standards, specifications and guidelines into single documents. In Guelph, a Tree Technical Manual has been developed in conjunction with this Plan. Further internal review is required prior to its release.

This Tree Technical Manual provides comprehensive guidance for tree protection and planting in the City (e.g., minimum soil volumes, soil quality, etc.), and has been developed with consideration for the most current information from scientific and technical literature, as well as from the consulting team's practical experience, and extensive consultation with City staff.

### **Compensation**

Compensation in the form of on-site replacement for trees removed through the development process is sought by many municipalities, and is supported by the *Planning Act*. While some municipalities use specific formulas for replacement (e.g., the City of Burlington), others allow for flexibility and determine what is appropriate on a case by case basis. Typically, tree valuations are conducted by Certified Arborists.

Less common, but more progressive, is seeking formal compensation, either in the form of off-site plantings or cash-in-lieu, for trees removed through development that cannot be replaced on-site. In municipalities with private tree by-laws there is a legal basis for seeking such compensation for trees regulated by the by-law, and as municipalities come to value their urban forests more fully, more are seeking mechanisms for ensuring that any lost canopy is replaced. Municipalities which currently specify the ability to require compensation for trees removed in the form of replanting or cash-in-lieu in their private tree by-laws include the Town of Collingwood, City of Guelph, Town of Oakville, Town of Richmond Hill, and City of Toronto. The question then becomes one of determining what is appropriate and reasonable compensation for healthy trees approved for removal through the development process (see **Table 3**).

Some more urbanized centres, like Toronto and Oakville, have also developed specific guidelines for enhancing tree cover in highly built up environments such as parking lots (e.g., Toronto's Design Guidelines for Greening Parking Lots). Toronto has partnered with local health professionals and organizations to develop Shade Guidelines (2010) which address the importance of both natural and artificial shade in cities, and mechanisms for integrating it into urban design.

Possible approaches to determining adequate compensation, and their pros and cons, are outlined in **Table 3**. While there is no perfect method for valuing different trees, implementing tree compensation sends the message that trees have value, that removing a tree means reducing urban tree canopy cover, and that replacing canopy cover, and the multiple benefits it provides, is important. Mechanisms of compensations that would be appropriate for Guelph include aggregate caliper, amenity value compensation, cash-in-lieu and tree replacement.

Another tool at a municipality's disposal, already utilized in the City of Guelph and many other municipalities, is requiring letters of credit for landscaping works approved through the development process. A credit equivalent to 50% of the cost of replacing and maintaining trees planted is typically required to ensure that the proponent establishes and maintains the trees as approved, at least until the end of the warranty period which is usually two years. In the case of trees identified for protection, letters of credit can also be required to ensure that trees are protected as specified (as per private tree by-laws in Guelph, Ajax, Kingston, and Mississauga, among others). The use of letters of credit is often overlooked, and requires some type of valuation of the protected tree(s), but can be a good incentive for ensuring on the ground tree protection, or at least providing coverage for tree replacement if required.

A number of municipalities and conservation authorities have also developed recommended lists of tree and shrubs species, sometimes within their Tree Technical or "Treescape" manuals, as well as lists of invasive species to avoid (e.g., Credit Valley Conservation, Markham, Richmond Hill, Ottawa). The City of Guelph currently provides this information as part of its Healthy Landscapes program, and also has lists of recommended species for street plantings that include some non-native species more tolerant of urban conditions.

**Table 3. Overview of approaches for tree compensation.**

Compensation Method	Description of Method	Pros	Cons	Example Municipalities Where Method is Used
<b>Aggregate Caliper</b>	Area of removed tree's stem at DBH is replaced by equal combined area of planted trees.	<ul style="list-style-type: none"> <li>Relatively easy to calculate and implement</li> <li>Large number of trees are typically planted</li> </ul>	<ul style="list-style-type: none"> <li>May be costly if large number of trees are removed</li> <li>Does not account for condition of removed trees</li> </ul>	<ul style="list-style-type: none"> <li>Ajax, ON</li> <li>Burlington, ON</li> <li>Guelph, ON (new policy)</li> </ul>
<b>Amenity Value Compensation (e.g., CTLA Trunk Formula Method)</b>	A standard formula is used to appraise the value of a tree. Compensation equal to that value is paid to municipality for tree's removal.	<ul style="list-style-type: none"> <li>Defensible</li> <li>Widely accepted as a fair and reasonable method</li> <li>Well-suited to individual trees</li> </ul>	<ul style="list-style-type: none"> <li>Poorly suited to woodlot or forest valuation</li> <li>Assessments may be subject to interpretation and bias</li> </ul>	<ul style="list-style-type: none"> <li>Ajax, ON (large trees)</li> <li>Oakville, ON (town-owned trees)</li> <li>New Tecumseth, ON</li> <li>City of Toronto, ON</li> </ul>
<b>Cash-in-lieu</b>	A predetermined sum is paid to the municipality to compensate for tree removal and fund tree establishment.	<ul style="list-style-type: none"> <li>Easy to calculate and implement if standard formula for determining replacement cost is used</li> </ul>	<ul style="list-style-type: none"> <li>May not always result in tree establishment</li> <li>Rarely accounts for true value of tree(s) being removed</li> </ul>	<ul style="list-style-type: none"> <li>Ajax, ON</li> <li>Toronto, ON (\$583/tree, when trees cannot be planted on-site)</li> </ul>
<b>Leaf Area Replacement</b>	The leaf area of removed tree(s) is calculated using a standard formula (see Nowak 1996). Equivalent leaf area is replaced with new trees.	<ul style="list-style-type: none"> <li>Benefits lost by removing leaf area are replaced</li> <li>Ensures increase in leaf area and canopy cover as planted trees grow</li> </ul>	<ul style="list-style-type: none"> <li>May be costly if large number of trees is removed</li> <li>Calculating leaf area may be difficult</li> </ul>	<ul style="list-style-type: none"> <li>No municipalities currently known to implement this approach</li> <li>Recommended in Oakville UFMP (2008)</li> </ul>
<b>Stems per Unit Area Replacement</b>	A minimum number of trees are planted per unit area (e.g. , stems/ha).	<ul style="list-style-type: none"> <li>Applicable to woodlots, forests and plantations</li> </ul>	<ul style="list-style-type: none"> <li>Not applicable to individual trees or low-density sites</li> </ul>	<ul style="list-style-type: none"> <li>Unknown</li> </ul>
<b>Timber Value</b>	The value of standing timber is calculated using basic forestry methods.	<ul style="list-style-type: none"> <li>Applicable if trees are to be sold for timber</li> <li>Well-suited to plantation stands</li> </ul>	<ul style="list-style-type: none"> <li>Does not recognize the amenity value of trees</li> <li>Susceptible to market fluctuations</li> </ul>	<ul style="list-style-type: none"> <li>Unknown - not a common method for assessing compensation value, particularly in urban areas</li> </ul>
<b>Tree Replacement</b>	A predetermined ratio of replacement trees must be established to compensate for injury or removal (e.g., 3 trees planted for every tree removed). Typically allows cash-in-lieu if trees cannot be planted on-site.	<ul style="list-style-type: none"> <li>Easy to calculate and implement</li> <li>May result in increased leaf area and canopy over time, if planted trees survive</li> </ul>	<ul style="list-style-type: none"> <li>May be costly (e.g., 3 trees planted for 1 small, poor condition tree removed)</li> <li>May not adequately replace lost leaf area and benefits (e.g., 3 small trees planted for 1 large mature tree removed)</li> </ul>	<ul style="list-style-type: none"> <li>Halton Region (defined ratio based on size of tree removed)</li> <li>Toronto, ON (1:1 ratio for injury, 3:1 minimum for removal)</li> </ul>



#### 4.2.3 PRIVATE AND PUBLIC TREE BY-LAWS

Tree by-laws regulating injury to and destruction of trees on private property are another tool that municipalities in Ontario have at their disposal to try and ensure that trees considered significant in a municipality are not unduly removed. Private tree by-laws are best implemented as one of several tools to support tree protection, and most effective when they find a balance between private property rights and community values and are developed with consideration for the local context and resource availability.

As of June 2010, 28 lower or single tier Ontario municipalities had private tree by-laws, with Guelph being the first in the Province to implement such a by-law in 1986. There is a wide range in what is regulated among these by-laws, although most lower or single tier municipalities regulate trees above a specified minimum diameter, with various qualifications and exemptions. Some examples are provided below:

- In Kingston, ON, all trees above 15 cm DBH are regulated along with all “distinctive trees” and trees in Environmental Protection and Open Space areas, however all trees on residential lots are exempt.
- In Ottawa’s recently passed “Urban Tree Protection By-law”, a two tiered approach provides residential lots with more flexibility. All trees on lots greater than 1 ha in the urban area are regulated (to capture most potential development or re-development sites), while on lots less than 1 ha trees of at least 50 cm DBH are regulated.

Guelph’s current by-law integrates many aspects of current and progressive private tree by-laws in Ontario. Its effectiveness will, however, need to be monitored over time.

Public tree by-laws are another tool available to municipalities to provide legislated protection for trees on municipal lands. Such by-laws are much less controversial than their private counterparts and have been developed in most municipalities with urban forest sections or departments, including those without private tree by-laws for individual trees (e.g., London, Waterloo, Hamilton and Burlington, ON). Such by-laws typically prohibit damage or destruction of trees on municipal lands, and allow the municipality to issue a fine for contravention of the by-law (which is typically applied to replacement tree establishment).

Boundary trees can become an issue when activities or development on one property have the potential to harm trees shared by the adjacent property owner. Trees may be shared between two private lots, or between private and public property. The *Forestry Act* (1990) makes it an offense to injure or destroy a boundary tree without the neighbour’s formal consent, and municipalities should be aware of their rights and responsibilities related to boundary trees and should address this issue in some form.

While no municipalities currently have by-laws to specifically address private boundary tree issues, a few municipalities manage boundary tree issues through their broader private tree by-laws (e.g. Mississauga, Orillia, Toronto and Markham), whereby a permit to impact such a tree will only be issued if the neighbour consents in writing. In Toronto and Ajax, the municipality assumes ownership of boundary trees, even if they only extend marginally onto public lands, although in Toronto only with the landowner’s written consent. The City of Burlington addresses boundary trees through its Site Plan Application guidelines, which require either that the adjacent property owner be consulted regarding the proposed development and provide written consent, or that a Certified Arborist confirm in writing that the proposed development will not negatively impact

the boundary vegetation. If an agreement cannot be reached, the matter must be resolved through civil litigation.

#### **4.2.4 ZONING BY-LAWS AND SITE PLAN APPROVAL**

Zoning by-laws are prescriptive regulations that define what types of uses and structures are permitted in lands with a given type of zoning.

A few municipalities have considered using zoning by-laws to require set minimum areas for planting trees within given zones. For example, Oakville's Urban Forest Strategic Management Plan (2008) suggested a regulation for "planting area for trees" in land uses classes that typically have extensive hard surfaces. The Draft Urban Forest Strategic Management Plan for North Oakville (2009) refined this recommendation by suggesting two specific zoning requirements:

- One tree per five parking spaces in parking lots, and;
- Prohibiting landscape strips or areas too small to support medium to large stature trees (e.g., buffer strips around parking lots of at least 4.5 m wide).

However, this approach does not appear to be gaining traction because zoning by-laws do not provide flexibility to easily respond to site-specific conditions or opportunities without specific amendments. As described in the Draft Urban Forest Strategic Management Plan for North Oakville (2009) and supported by the approach taken by Burlington in its recently completed Urban Forest Management Plan (2010), the site plan approval process is a much more effective and flexible tool that can be used to achieve urban forestry objectives.

Site plan approval, if applied in conjunction with guidelines and specifications intended to support tree health and longevity (e.g., appropriate soil

volumes, adequate above-ground space, and appropriate species selection), is one of the best tools at a municipality's disposal to foster urban forest sustainability through the development process. It is at this planning level where important decisions around tree protection and planting are ultimately made, and where municipalities with a vision for their urban forest and the will to implement it can ensure that all opportunities are explored.



### **4.3 GAPS AND OPPORTUNITIES FOR IMPROVEMENT**

#### **4.3.1 FEDERAL AND PROVINCIAL LEGISLATION AND POLICIES**

The legislation and policies related to Species at Risk are outside of the City's control, but given the known presence of Butternut in Guelph, the City should provide more resources related to this species. Links to the recently released guide to Butternut developed by the Ontario Ministry of Natural Resources should be included on the City's website, and hardcopies could be provided in some public locations (e.g., City Hall, public libraries). This gap is addressed through the updated communications strategy in **Section 6**.

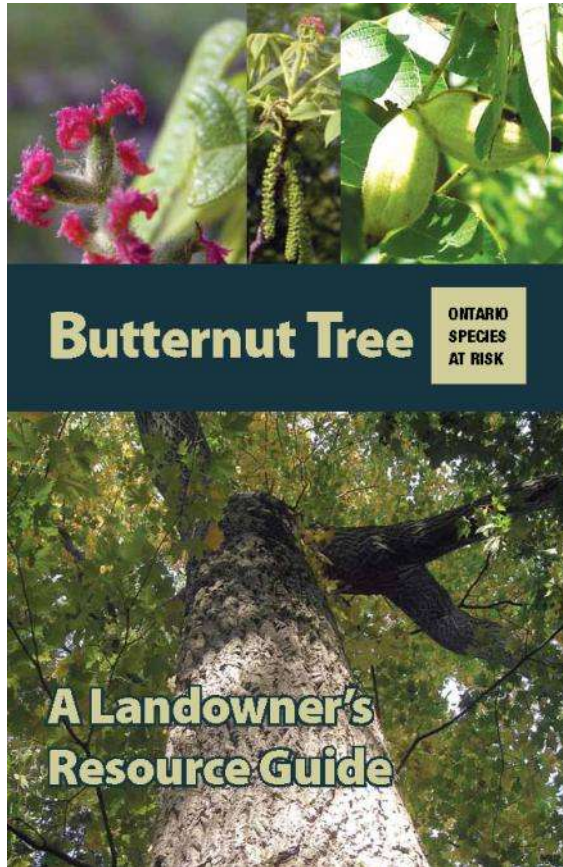


Figure 7. Butternut information pamphlet, (available online at <http://www.ont-woodlot-assoc.org/>).

#### 4.3.2 OFFICIAL PLAN

The City's recently approved Official Plan Amendment 42 (currently under appeal) provides comprehensive and specific direction that addresses both the City's natural wooded areas and opportunities for tree preservation and planting outside the natural areas. Significant woodlands are fully protected from development and assigned a minimum buffer; ecological linkages, including potential reforestation areas, are identified; support is provided for protection of healthy, native trees outside of significant woodlands (e.g., from plantations, hedgerows, etc.) and their integration within the urban matrix; and establishment of trees, as well as compensation for healthy trees removed through development, is also required.

Although there is a shift in planning in southern Ontario to better recognize and integrate urban forestry goals and policies, most municipalities have yet to adopt policies as comprehensive as Guelph's with respect to the urban forest. No real gaps or opportunities for improvement were identified at the Official Plan level.

Some stakeholders and members of the community expressed concern that protection of existing trees does not seem to get enough consideration as part of the site plan or infrastructure expansion / renewal processes. The City should monitor the effectiveness of these new policies and identify issues for consideration as part of the second Five-Year Management Plan, with particular consideration for how the preservation of mature, healthy trees is being prioritized through the planning process.

#### 4.3.3 GUIDELINES AND SPECIFICATIONS

The City's Tree Technical Manual (developed in conjunction with this Plan and currently under review by City staff) incorporates current best practices, as well as input from local staff and stakeholders. Once the manual is finalized, emphasis should be placed on:

- Implementing the guidelines and specifications in the manual for all tree-related activities on both public and private lands where the City has control;
- Ensuring other City guidelines, plans and specifications (e.g., Site Plan Application guidelines, Street Tree Guidelines, Storm Water Management Design Guidelines) are consistent with and complement the manual, and;
- Encouraging use of some aspects of the manual (e.g., planting specifications) on private lands outside the City's control.

The City should also consider a specific policy for relaxing its engineering guidelines for slopes and grading, on a case by case basis and in consultation with City or project engineers, to support preservation of retainable trees or treed areas, particularly for development adjacent to protected natural areas. This could be addressed through the City's Alternative Design Standards, under development by City staff.

The City's Naturalization Policy (1993) is another valuable tool supporting local urban forest sustainability. This document should be updated to include a City-wide plan. This policy would also benefit from a consolidated recommended native species list that excludes invasive species and hybrids. Integration of some species at the northern edge of their historical ranges should also be considered in response to climate change. This policy should be linked to a broader Greening Strategy that identifies potential tree planting and naturalization areas throughout the City on both public and private lands developed with the participation of local residents, landowners, agencies, institutions, and businesses.

Moving forward, more explicit links should be made between this Plan and the City's Community Energy Plan (2007), particularly in relation to the energy savings provided by trees adjacent to homes and one or two storey buildings.

With all the competing land uses in urban areas, one approach adopted by municipalities is to combine their plans for connected trail networks with plans for natural area connectivity. This is an effective approach for trying to balance access and natural area protection, but one that requires ongoing management, monitoring, and awareness building to ensure that natural areas and their functions are not degraded.

*Stringent tree protection guidelines and enforcement on construction projects would help to conserve our existing mature trees rather than jeopardizing their health in the coming years.*

Doug Steel, local arborist, stakeholder consultations (fall 2010)

#### 4.3.4 PUBLIC TREE BY-LAW

Although the City of Guelph has had a private tree by-law in place since 1986, it does not have a public tree by-law protecting trees on its own lands. Such a by-law should be developed based on a review of public by-laws from other comparable municipalities that have recently developed or amended theirs (e.g., London, Burlington and Barrie, among others.). It should also incorporate the City's desired approach to boundary trees.

#### 4.3.5 PRIVATE TREE BY-LAW

There is no "best practice" for private tree by-laws, but the approach taken should be one of "best fit". In Guelph, the current private tree by-law tries to balance tree protection and practical realities in an urban setting, as well as preservation values with private property rights. The by-law also recognizes that there are limited resources, and administration of the by-law must be manageable for staff. This by-law should be evaluated in terms of its cost versus its benefits related to the urban forest over the next five years, at which time possible amendments to the by-law can be considered.

Although a growing number of municipalities have private tree by-laws, most "single-tree" (as opposed to woodland) by-laws have been in place for five years or less, and no comprehensive analyses of resource requirements across jurisdictions have been done to date to assess the

costs or effectiveness of these by-laws. This will be useful reference information as it becomes available.

Some stakeholders and members of the community have commented that the current by-law is inadequate, and that they would like to see a more stringent by-law that regulates trees above a specified diameter (e.g., 20 cm DBH) on all private properties. However, given the other urban forest management issues that need to be addressed, re-visiting the current by-law is not considered a high priority. At this time, it is recommended that the City implement and assess the effectiveness of its newly updated by-law for a period of at least five years, and then re-evaluate it in the context of its other urban forest management needs.

It is also important to recognize that a private tree by-law is only one potential component of effective urban forest management, and is best used as an educational tool rather than a punitive measure (e.g., site visits that may be conducted as part of permit application process provide opportunities for increasing awareness, and sometimes even exploring alternatives to the proposed tree removal). Re-consideration of the by-law should be done in the context of other urban forest management objectives and priorities, and available resources, as part of the second Five-Year Management Plan (2017 – 2021) development in 2016.

#### 4.4 RECOMMENDATIONS FOR “PLANNING FOR TREES”

##### **Recommendation # 11 – Assess effectiveness of current tree-related policies and legislation, and revise if required**

The City updated its tree-related policies through Official Plan Amendment 42 in 2010 (currently under appeal), is finalizing a Tree Technical Manual of best practices for protection and establishment, and has recently updated its private tree by-law (2010). The next few years will provide an opportunity to assess the effectiveness of these urban forest management planning tools, and identify opportunities for improvement if needed, particularly in relation to the retention of existing large-canopied, healthy trees.

This should include a formal review of the private tree by-law in 2016, including consideration of revisions to address boundary trees. Consideration of a formal policy to relax engineering guidelines, on a case by case basis and as approved by the City Engineer, to support tree retention, is also recommended through the City’s Alternative Design Standards.

Lead	Planning, Building, Engineering and Environment
Support / Partners	Operations, Transit and Emergency Services; Internal City “Tree Team” (see Recommendation #2); External Urban Forest Advisory Committee (see Recommendation #19)
Cost	No additional cost - use of existing staff resources
Funding	None required
Priority / Target	LOW to MEDIUM / to be ongoing with revisions in conjunction with the second, third and fourth Five-Year Management Plans in 2017-2018, 2022-2023, and 2027-2028 if required
Timing	
Related Goal(s)	2, 3, 4, 5

**Recommendation # 12 – Update City documents to be consistent with new tree-related policies, guidelines and legislation**

Existing tree-related documents, as well as documents under development or to be developed that address tree-related issues, should be consistent with the final approved Official Plan Amendment 42 (currently under appeal), the new Tree Technical Manual (to be released in 2012) and the Private Tree By-law (passed in 2010). Key documents include:

- Site Plan Application Guidelines and Street Tree Planting Guidelines; Storm Water Management Design Guidelines (currently under review); Property Demarcation Policy (due to be updated); Naturalization Policy (due to be updated); Community energy Plan (2007); Alternative Design Standards (in progress)

As part of this process, costs related to contracted tree plantings (as well as for compensation in-lieu) need to be updated annually and applied consistently across for types of development.

Note: No updates will be possible until the policies related to OPA 42 currently under appeal are resolved through the Ontario Municipal Board, or until the Tree Technical Manual is released by City staff.

Lead	Planning, Building, Engineering and Environment
Support / Partners	Internal City “Tree Team” (see Recommendation #2); Operations, Transit and Emergency Services
Cost	No additional cost - use of existing staff resources
Funding	None required
Priority / Target	MEDIUM to HIGH / to be undertaken on an annual basis as needed (i.e., as new policies /
Timing	legislation are approved)
Related Goal(s)	3, 9

**Recommendation # 13 – Develop and implement a Public Tree By-law**

In order to demonstrate urban forestry leadership and a consistent standard for public and private lands, the City should develop and implement a public tree by-law regulating trees on public lands. This by-law should consider treatment of boundary trees, and involve consultation with other public landowners in the city such as the Grand River Conservation Authority. Notably, these issues are currently being dealt with using trespass legislation.

Lead	Operations, Transit and Emergency Services; Legal and Realty Services
Support / Partners	Planning, Building, Engineering and Environment
Cost	No additional cost - use of existing staff resources
Funding	None required
Priority / Target	LOW to MEDIUM / to be completed as part of the second Five Year Management Plan
Timing	(starting in 2018)
Related Goal(s)	4, 5

## 5 LEADING BY EXAMPLE: PROTECTION, ESTABLISHMENT AND ENHANCEMENT

Like the majority of Wellington Country, the City of Guelph was once largely covered with upland Sugar maple and Beech forests, as well as lowland White cedar forests and swamps (Frank and Anderson 2009). However, most of the upland forests were cleared for farming over the nineteenth century, and the treed areas that stand today are a combination of small remnant woodlands, trees that have regenerated naturally on abandoned agricultural lands, and trees that have been planted or seeded in naturally. These remaining treed assets are now increasingly under threat from the pressures of urbanization and intensification, as well as other environmental stressors including pests and more frequent temperature and weather extremes associated with climate change.

If the City is to protect its current treed assets and ensure urban forest regeneration and, where possible, expansion, it will need to embrace and implement current best practices related to tree protection and tree establishment. While **Section 3** focused on management and monitoring of the overall asset, and **Section 4** addressed planning considerations, this section outlines approaches and tools for protecting, sustaining and enhancing the urban forest “on the ground”. Although the emphasis is on municipal best practices and protocols, many of these can be readily applied throughout the City, including on private property. The community, including local residents, schools and businesses, have an important role to play in implementing these practices on their lands, as discussed in **Section 6**.

*In April of 1827, John Galt travelled through what was described as a primeval forest of huge hardwood trees... On the future site of Guelph, Galt struck the first blow at a huge maple tree with a girth of 6 m.*

The Flora of Wellington County (2009)

### 5.1 CURRENT PRACTICES

#### 5.1.1 TREE PROTECTION

Protection of existing trees during development and construction is among the most important activities that can be undertaken to promote the long-term sustainability of the urban forest, as canopy and leaf area lost during construction can take years to replace.

*A 75cm tree ... intercepts ten times more air pollution, can store up to 90 times more carbon and contributes up to 100 times more leaf area to the City's tree canopy than a 15cm tree.*

City of Toronto Urban Forestry Study (2010)

Construction activities can seriously damage trees through a number of means, including: root injury by trenching and excavation; soil compaction by heavy machinery or materials storage; trunk abrasion and branch injury from inadequate clearance and poor operation; and defoliation from exhaust heat. The City of Guelph has been working on a consistent set of standards and specifications for tree protection, and has begun to implement some measures (e.g., fencing and signs) during construction and site development. However, the City does not yet have a comprehensive and finalized source of guidance to inform the review of Site Plan applications where trees may be

adversely affected and to evaluate proposed tree preservation methods such as tree protection zones (TPZs).

The draft protection policies and guidelines currently in place are to be replaced by the recently developed Tree Technical Manual (to be released in 2012). This Manual includes a comprehensive set of tree protection and establishment policies, standards and specifications for use by all municipal departments and for all tree-related activities on City-owned and private lands subject to any type of development process under the *Planning Act* or *Environmental Assessment Act*

### 5.1.2 TREE ESTABLISHMENT

Current direction, as provided in the City's updated Official Plan and the recently drafted Tree Technical Manual, emphasizes use of native or indigenous species, selection of site-appropriate species, and selection of a diversity of species for plantings throughout the City. These practices, combined with suitable site selection or creation, will contribute substantially to building the urban forest's resilience to a wide range of stressors, including pests and extreme weather conditions associated with climate change.

Trees are currently planted in the City by municipal staff, contractors overseen by City staff, volunteers (sometimes in collaboration with City staff) and private landowners.



### Municipal Operations

City staff are responsible for overseeing the planting of trees on City lands through capital projects that involve plantings in new and existing City parks, as well as construction jobs that include street tree plantings. Trees are also planted through the Site Plan approval process (typically on private lands).

A portion of these plantings on city lands are completed directly by City staff, and the Forestry group is currently able to replace trees which have been removed from City-owned lands at a about a 4:1 ratio (i.e., 300 to 400 trees are felled annually and about 1,500 trees are planted). Tree replacement on private lands and as part of capital projects varies by project. In some cases more trees are replaced than have been removed, while in other cases this cannot be accommodated. These numbers are not currently being tracked.



New trees on municipal lands are planted and maintained in accordance with the current City of Guelph *Planting Standards and Specifications for Street Tree Planting*. Newly-planted trees are mulched and scheduled for structural pruning twice within the first ten years of planting. Watering is typically scheduled during the



maintenance and warranty periods for newly-planted trees.

City staff also work with some local organizations and schools to assist with some smaller scale tree plantings in local parks, conservation areas and school yards.

### **Volunteer-based Tree Planting**

A number of non-profit groups have been involved in tree planting in and around Guelph. Current examples are provided here.

Trees for Guelph, a non-profit volunteer-based organization, plants an impressive 5,000 trees per year in locations throughout the City, primarily on public lands, but also on some private industrial, commercial and institutional properties. These trees are grown from local, native seed sources by the Grand River Conservation Authority and local nurseries. The cost for the saplings is largely covered by McNeil Health Care (to offset its carbon emissions), while the City provides mulch and some financial support.

Although Trees for Guelph does not undertake any formal monitoring of their plantings and does not have the resources to do follow-up watering in drier years, estimated survivorship is around 70% to 80% (M. Neumann, pers. comm. 2010). Recently, Trees for Guelph has also begun to undertake invasive species management (i.e., European buckthorn) control in conjunction with its annual plantings. City Forestry and Parks staff recognize invasive species as a major issue in the City, and would like to explore mechanisms for engaging more groups in its management.

Wellington County's Green Legacy Program has been providing 1,000 trees annually through the Community Environmental Leadership Program for planting the lands around Arkell Springs. These springs are just outside the City of Guelph, but are on City-owned lands and are a primary source of

drinking water for the City. Green Legacy plans to continue providing trees to the City's Healthy Landscapes Program until they reach their goal of 10,000 trees for this location.

Just outside the City, in Guelph Lake Conservation Area, the Rotary Club of Guelph has initiated a large tree planting project with the objective of planting 65,000 trees between 2008 and 2020.

Groups such as Roots and Shoots, and OPIRG have also been active in tree planting efforts in the City over the years.

Tree plantings undertaken by individuals, other groups or institutions are not currently tracked by the City in any formal way, although there is an on-line registry on the Rotary Club's website<sup>4</sup>.

These examples illustrate that there are already a number of successful joint initiatives both within the City and on lands outside but adjacent to it related to tree planting that are underway, and have been occurring for a number of years.

### **5.1.3 URBAN FOREST ENHANCEMENT**

Through its updated Official Plan Amendment 42, the City has identified areas for potential natural area restoration, including specifically designated Restoration Areas and Ecological Linkages. This restoration may take the form of meadow creation in some areas (e.g., on Eastview's former landfill) but is expected to predominantly take the form of gradual succession towards forested habitats.

Reforestation in portions of the Natural Heritage System is specifically supported through requirements for Vegetation Compensation Plans, as well as on-site Landscape Plans, which typically include tree plantings. Urban forest enhancement in new development areas is supported through naturali-

<sup>4</sup> [http://www.rotaryclubofguelph.com/tree\\_form.php](http://www.rotaryclubofguelph.com/tree_form.php)

zation and/or tree plantings in natural area buffers, parks and open spaces, as well as plantings along streetscapes and in hardscapes such as parking lots. Recently the City has begun experimenting with some of the new tree rooting technologies as part of Downtown redevelopment projects (e.g., Market Square and the Guelph Central Station).

While such plantings are pursued throughout the City through planning, capital projects and operations as opportunities arise, there have not (until now) been standards or specifications in place to try and maximize tree longevity and urban forest resilience.

## 5.2 BEST PRACTICES AND INNOVATIVE IDEAS (FROM OTHER MUNICIPALITIES/JURISDICTIONS)

### 5.2.1 TREE PROTECTION

A large number of municipalities in southern Ontario and elsewhere maintain tree protection policies, guidelines and specifications to ensure trees are adequately protected during site development or other construction works. Key elements of such policies include:

1. Guidelines or specifications for tree protection zones (TPZ) and specifications for the construction of proper barriers to prevent root compaction and physical damage;
2. Required and recommended procedures within or adjacent to TPZs to minimize damage to trees and tree roots, and;
3. Methods of enforcing and encouraging compliance, such as requirements for site inspections and reporting or collection of securities.



#### ***Tree Protection Zones (TPZ)***

Tree protection zones are areas where construction activities are prohibited or restricted. The size of TPZs is typically based on the diameter or drip line of the tree(s) being protected. A common minimum measurement is 6 cm of TPZ radius for every 1 cm of DBH. TPZs can also be limited by the drip line of the tree being protected, but this may be less effective for columnar or unevenly-shaped canopies.

Another innovative practice is to outline a Critical Root Zone (CRZ) for trees to be protected, where works such as trenching and excavation may be allowed if root-sensitive procedures such as linear root pruning are undertaken beforehand. The CRZ radius should be a minimum of 1.5 times the TPZ radius.

TPZs should be enclosed by well-signed fencing or solid hoarding, depending upon the location. Solid hoarding such as plywood provides the most effective and permanent barrier, while high-visibility construction fencing is typically required where sightlines must be kept clear. Sedimentation fencing may also be required. Activities discouraged or prohibited within TPZs include:

grade changes (cut or fill), trenching or other excavation, material and equipment storage, and vehicle and foot traffic.

Where excavation or other works must take place within TPZs, best practices include root-sensitive excavation, root pruning, directional boring, or high-pressure air root excavation. Such methods are more costly but enable the retention of roots or, where necessary, proper root pruning. This prevents root tearing and fracture, which can lead to tree decay.

A number of municipalities in southern Ontario and elsewhere have developed detailed specifications regarding the design, construction and maintenance of tree protection zones during construction and site development.

Some municipalities, such as York Region, have developed in-depth “tree technical manuals” – compendia of all regulations, guidelines and specifications pertaining to trees in that municipality. As part of this Plan, the City of Guelph has undertaken the development of its own Tree Technical Manual, due to be released later in 2012.



#### **Site Supervision and Inspection**

Municipalities typically have limited resources for site inspections to ensure that tree protection measures specified in given plans are implemented and maintained during the course of construction.

Ideally, tree-related protection under municipal control should provide for the following:

- Pre-construction Inspection: To ensure protection measures, as specified, have been implemented.
- During Construction Inspection: Random spot checks to ensure protection measures are being kept in place.
- Post-construction Inspection: To confirm trees identified for protection appear to have been protected, and assess compensation required for infractions to approved protection, if required.

While some aspects of supervision can be undertaken by planners or engineers (e.g., confirming specified signage and hoarding are in place), most aspects of site supervision and inspection should be undertaken by a certified arborist or similarly qualified professional (e.g., to determine construction effects upon trees).

#### **5.2.2 TREE ESTABLISHMENT**

Key best practice considerations related to tree establishment include the following four elements:

- guidelines for tree habitat, including adequate soil volumes, soil depths, and soil quality requirements;
- specifications for typical right-of-way cross-sections (e.g., arterial, collector, local, etc.), new subdivisions, parklands and open space that integrate appropriate tree rooting environments;
- a list of recommended trees and shrubs with indications of suitability for different conditions and that account for urban forest diversity targets, and;
- requirements for review and supervision of proper plan implementation by an arborist, as well as follow-up both immediately and two years post-construction to assess tree health and overall condition.

These are each discussed in more detail below.

### ***Tree Habitat Below Ground***

- Research indicates that minimum soil volume for optimal tree growth is 2 cubic feet (0.06 m<sup>3</sup>) for every square foot (0.1 m<sup>2</sup>) of future crown projection area, and greater soil volumes should be encouraged wherever possible (Urban 1992).
- Planting soils should not be screened (in order to maintain their structure), and soil organic content should not exceed 5% in order to avoid drainage and soil pH problems.
- Unless carefully designed and implemented, metal grates and tree protectors are not recommended for tree establishment. Both types of installations may girdle or otherwise damage trees if not properly maintained.
- Standard tree pits in built environments generally do not enable trees to reach their full genetic potential, often leading to early mortality and increased maintenance requirements. Although costly, the City should explore the implementation of advanced rooting environment techniques, particularly sub-soil structural cells, particularly in built up areas where having decent sized trees is considered a priority.
- For parking lots and other large asphalt areas, minimum size requirements for tree islands and borders in Burlington are 2.5 m, and 3 m in Toronto with a minimum soil depth of 900 mm or soil volume of 30m<sup>3</sup>. Although far from optimal, the effectiveness of these in supporting tree growth can be improved with appropriate species selection, watering and drainage, and surrounding landscape design that discourages compaction from trampling.
- Minimum soil requirements for street tree planting are highly variable and difficult to generalize. For example, the City of Nanaimo, BC requires a minimum of 4 m<sup>3</sup> of soil while Calgary, AB provides a minimum of 14 m<sup>3</sup>.

Requirements will vary with local conditions and trees planted, as well as the nature of the rooting environment provided (e.g., adequate drainage, soil quality, structure, etc.). The City of Toronto provides useful guidelines for this climate zone.

The City's Tree Technical Manual outlines guidelines and specifications for the provision of adequate below-ground rooting habitat, including soil volume and quality. Optimal volumes vary depending on the type of tree being planted, and cannot always be accommodated in retrofit or infill situations. Specifications are provided to ensure minimum requirements regarding adequate soil quality, including appropriate drainage, pH, organic and mineral content, etc. are met and that trees are not planted in places where there really is no suitable habitat for them.



### ***Plant Species Selection and Diversity***

- Given the low costs and potentially high quality of bare-root planting stock (Trowbridge and Bassuk 2004), more consideration should be given to use of bare-root planting stock, particularly in conjunction with enhanced rooting environment techniques.
- In general, 50 mm caliper stock is increasingly being recommended in new developments and street tree plantings, as larger stock is more difficult to establish in the poorer soils typically found in many new developments (Trowbridge and Bassuk 2004).

- Avoid use of invasive species in all situations, and encourage widespread use of native species recognizing that in hardscape or built-up environments some hardy non-native species may be better adapted and more long-lived.
- In response to anticipated climate changes, planting trees tolerant of warmer and drier summer conditions, particularly when planting in open areas such as along roadways or sidewalks, as well as native species that are currently at the northern limit of their ranges. These plantings should be regularly monitored as a form of species suitability trial; results can then be used to inform future planting decisions.
- Tree species selection should ultimately be informed by the findings of a tree inventory. Areas with an abundance of mature trees should be targeted for proactive underplanting of trees and shrubs, while areas with low species diversity should be considered as candidate areas for the establishment of underused species. Overly-abundant species (such as Norway maple) and species susceptible to potentially catastrophic pest or disease infestations should also be avoided. Ideally, in the urban matrix neighbourhood-level tree species diversity should conform to the 30-20-10 rule of acceptable diversity proposed by Santamour (1990), whereby:
  - No tree family exceeds 30% of the inventory;
  - No tree genus exceeds 20% of the inventory, and;
  - No tree species exceeds 10% of the inventory.
- Upon completion of a public tree inventory, City planting initiatives can also be informed by the Relative Diameter at Breast Height (RDBH) criterion, with the ultimate objective of an even distribution of trees among four general age/size classes. Appropriate relative DBH size class targets (i.e., 0 – 25%, 26 – 50%,

51 – 75%, 76 – 100%) can only be developed once a complete inventory is available and the range of sizes in a given urban forest are known.

Notably, these species diversity and size class guidelines above are not intended for application in natural areas, woodlots or similar lands, where natural stand dynamics, species composition and successional processes should be encouraged. Rather, they are targeted to municipal street trees and park trees, as well as other individual trees in the urban matrix.

### ***Planting Locations***

In general, taking advantage of any suitable planting location for trees is a good mechanism to work towards enhancing and expanding the urban forest (assuming some post-planting care will be provided within the first two to ten years of planting). However, there are additional considerations for more targeted tree plantings in urban areas to achieve specific benefits. These include tree establishment directed to areas:

- of known urban heat islands and/or poor air quality;
- where trees will provide shade to residents and visitors who may be exposed to ultraviolet radiation, such as: bus loops, walkways, trails, cycling paths, parks and other places where people gather for social / cultural activities;
- intended for storm water management;
- close to buildings to cool in the summer (deciduous trees on south and west sides) and buffer against winds in the winter (coniferous trees on the north side).

### ***New Technologies***

Cities across North America and Europe are beginning to adopt techniques and technologies to provide enhanced rooting environments, while maintaining the ability to provide core municipal services such as sidewalks and utilities. The

objective of implementing any enhanced rooting environment technology is to provide the greatest amount of good quality soil suited to the tree species planted and the local drainage regime. Inadequate soil volume, quality, and drainage are the major limiting factors for tree growth in urban areas.

The two most common enhanced rooting environment techniques in use in other jurisdictions are engineered soils and soil cells. Engineered soils mix crushed gravel and mineral soil to form a supporting lattice work that maintains essential macropores. Soil cells are modular containers constructed of plastic and/or steel, and are designed to support loads without compacting the soil within them. While costly, both techniques have been extensively tested with consistently positive results.

Several Canadian cities have experimented with soil cells in some capital projects. In Ontario, the City of Burlington has recently installed some trial plantings using these technologies which, to date, look promising. The City of Guelph has recently installed their first trees using some of these rooting technologies in the downtown area. However, due to the costs associated with these approaches their use is typically restricted to built up areas where there are very limited or no opportunities for integrating trees with adequate areas of undisturbed soils, and where there is adequate community use to justify the additional expense.



**Site Supervision and Inspection**

A robust site inspection protocol for tree establishment activities under municipal control provides for the following, as applicable:

1. Pre-planting Inspection: Assessment of nursery stock condition and species, as well as site preparation and conditions, as specified in approved site plans.
2. Site Supervision and Inspection During Installation
3. Post-planting Inspection: Assessment of condition of planted trees / shrubs trees at the end of the warranty period (typically two years after planting), and again after five years (if on municipal lands).

**5.2.3 URBAN FOREST ENHANCEMENT**

Urban forest enhancement can take several forms and may be measured in several ways. Municipalities that are already investing in the management of their urban forest sometimes have goals such as increasing canopy cover, and generally seek to do achieve these goals through increased tree planting. Enhancing the urban forest should, however, also be achieved by supporting passive naturalization / restoration, protecting existing trees, and managing existing trees to maximize their life spans and the benefits they provide.

Although it can be attractive to set a lofty canopy cover target, realistically every municipality is different and the true target for canopy cover should not exceed what is possible in a given jurisdiction. A number of municipalities and conservation authorities have undertaken preliminary mapping exercises to identify potential “plantable areas” at various scales (e.g., Credit Valley Conservation, Toronto Region Conservation, Town of Ajax) to obtain a sense of the potential as compared to the current canopy cover of a given jurisdiction. Such mapping needs to be carefully screened with respect to current, approved and

projected land uses, and must also be developed in consultation with private landowners, if they might be affected. If a municipality has an inventory of its trees, information about potential plantable spots within the municipal land base can also be factored in. Depending on the desired level of accuracy and the size and nature of the municipality, such an exercise can be quite resource-consuming. However, it can be a very useful tool for targeting areas for individual tree planting and/or reforestation, as well as for estimating the maximum potential canopy cover a given jurisdiction could attain.

**5.3 GAPS AND OPPORTUNITIES FOR IMPROVEMENT****Tree Technical Manual**

In conjunction with the development of this Plan, a Tree Technical Manual has been developed in consultation with City staff to integrate existing municipal standards and practices and update them with consideration for best practices and useful precedents from other municipalities.

The Tree Technical Manual for Guelph (expected to be released late in 2012) is meant to be an inter-departmental resource that includes guidelines and specifications for tree protection as well as tree establishment in different municipal contexts. Specific elements addressed include:

- procedures for tree preservation and vegetation compensation plans;
- guidelines for tree habitat including adequate soil volumes, soil depths, and basic soil quality requirements;
- specifications for typical right-of-way cross-sections (e.g., arterial, collector, local, etc.), new subdivisions, parklands and open space that integrate appropriate tree rooting environments; and,
- requirements for site supervision and follow-up.

This manual should be adopted as the new standard and reference document for guidelines and specifications related to tree protection, enhancement and replacement for capital projects, development projects, and operational activities.

*Implementation of all aspects of the City's new Tree Technical Manual will be a significant step in support of urban forest sustainability and will help the City achieve its strategic objective 1.2 of having "Municipal sustainability practices that become the benchmark against which other cities are measured".*

Potential refinements or additional elements that would strengthen and broaden its application (e.g., list of suitable non-invasive species for planting in different contexts) should be considered over the period of the first Five-Year Management Plan and be undertaken as part of the second Five-Year Management Plan. The list should indicate if the species is non-native, as well as environmental tolerances, size at maturity, and other considerations. The City already has several lists to draw from (e.g., River Systems Study 1993, 1998 Street Tree Planting Guidelines, Healthy Landscapes Species Lists), but these lists should be reviewed, consolidated and amended with additional information. A number of southern Ontario municipalities already maintain such lists, which can also provide valuable information.

### ***Municipal Tree Planting and Diversity***

Trees are currently replaced on municipal lands at a ratio of about 4:1 with about 900 planted on streets and in parks, about 500 planted as street trees in new developments, and 300 to 400 removed annually. For capital and development projects, the ratio varies depending on the site conditions and what can be accommodated.

Notably, there are a number of areas in the City dominated by mature trees planted in the early 1900s, where underplanting of young trees has not yet begun or has only recently been undertaken. As a result, it is expected that in these locations there could be a decline in canopy cover as mature trees are removed and are only replaced by limited numbers of caliper-size trees with much smaller canopies and less leaf area. In addition, there are a number of recently developed areas where planted trees have yet to reach a size where they provide any real canopy.

If the City is to gradually close this gap over the 20 year period of this Plan and increase its canopy cover, the rate of new plantings in the urban forest will need to be increased significantly. While the City should not be solely responsible, and some of the onus must be on lands outside the City's jurisdiction (as discussed in **Section 6**), the City should strive to ensure that all canopy cover (preferably leaf area) removed from lands under its jurisdiction is replaced at least at a 5:1 ratio

This can be achieved, in part, by:

- undertaking proactive plantings on City lands (i.e., parks, streetscapes) dominated by mature trees where there is no natural regeneration<sup>5</sup>, as well as plantings of species other than ash in areas known to be dominated by ash;
- clearing areas overrun by invasive woody species and replace them with native trees that will become large canopy trees at maturity;
- increasing replacement ratios for capital projects, and requiring new tree plantings as part of capital projects (even where few or none are removed) wherever possible, and;
- use of the Tree Technical Manual guidelines to ensure that trees planted have optimal longevity and can grow into large, canopy trees.

<sup>5</sup> Underplanting in treed areas will, obviously, require selection of shade tolerant species.

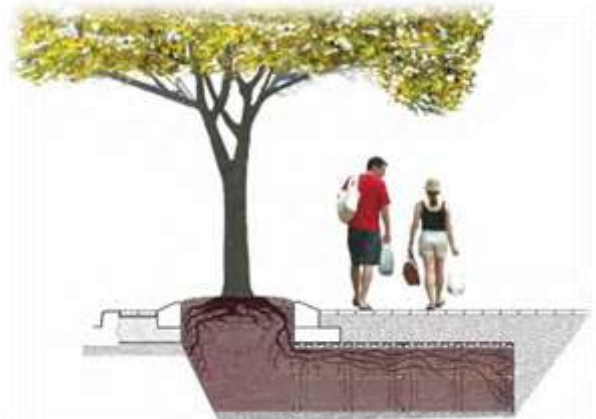


However, tree plantings should not be increased unless the City has the capacity to undertake the necessary follow-up care for these trees. Unless the City's Forestry group is permanently expanded, additional plantings on municipal lands will only further increase the workload of a staff already stretched to its limit, and will pull them away from other important maintenance tasks.

The City does not currently have any targets for species or age diversity for its urban forest, and developing such targets would be premature until a municipal tree inventory is complete. However, it should implement practices to support the avoidance of invasive species and provide support for a diversity of native species. Non-native, non-invasive species may be considered in locations where conditions are too harsh to sustain native trees. Trees with relatively large leaf area (e.g., Maples, Cottonwoods, Elms) that are known to sequester more carbon and other air pollutants than other species should also be integrated into the urban matrix. General policies for this are already provided in the City's new Official Plan (Envision Guelph) and are supported through the guidelines in the new Tree Technical Manual.

#### ***Use of New Technologies***

The Tree Technical Manual also includes specifications for planting trees in hardscapes, such as those found in the City's downtown. These support the use of new rooting technologies for improving the survivorship and longevity of trees and facilitate the integration of natural shade in the downtown core and other commercial nodes in the City. Such approaches may be embraced more broadly in the coming years as intensification development becomes more widely undertaken.



*From City of Toronto Urban Forest Study (2010)*

#### ***Plantable Spaces and Areas Strategy***

Trees are currently planted either (a) to replace tree removals as part of public or private infrastructure or development projects, or (b) through local community / volunteer programs. For both of these types of projects, it would be very useful to have a City-wide map of plantable areas and spaces, and a strategy for establishing trees in these areas over time. Some areas potentially suited to naturalization and reforestation activities have already been identified through the City's Natural Heritage System, but there are additional open areas in the City that have not been included in this assessment. In addition, mapping of plantable spots in the urban matrix (e.g., gaps along roadways or in parks) would also contribute useful data. Data would need to be collected from various sources ( e.g., a desktop Urban Tree Cover analysis and municipal tree inventory as described in **Section 3**). The product would also require review by City staff with a knowledge of approved and anticipated land uses for different parts of the City, as well as consultations with all non-municipal and private landowners who may have parcels with plantable areas (e.g., industrial lands).

### ***Tracking Tree Removals and Plantings on Municipal Lands***

Although not a high priority at the current time, it would also be useful to have a more comprehensive tracking system for trees removed and planted in the City for all projects, particularly those under the City's purview. This would facilitate recordkeeping and enable a better assessment of progress towards achieving the City's canopy cover objectives. Trees removed and planted on municipal streets are tracked by the Forestry group in their asset management system, and the City currently has a page on its website for residents to submit records of their tree plantings, but this is by no means comprehensive. Although the engineering department plants trees as part of its capital projects, it does not currently track these plantings (e.g., numbers, species, etc. by project or by year) or compare them in relation to any removals related to capital projects. Similarly, trees are typically removed and planted as part of the site plan process on development sites, and while this information is available in various reports and

drawings, it is not tracked in any systematic way. Developing a simple system for tracking this information would provide a useful indicator of the City's progress related to its urban forest establishment and enhancement objectives.

### ***Site Supervision / Inspection***

In order for the City to effectively ensure the implementation of the guidelines, standards and specifications outlined in the new Tree Technical Manual, it will likely require a new Arborist/Urban Forester position to assist with review of plans and follow up with site supervision and inspection to confirm that plans are implemented as approved. Given that the Planning, Building, Engineering and Environment department does not currently have an Arborist on staff, creating the position in this department may provide this much-needed support (particularly for capital projects led by Engineering), and will also greatly facilitate interdepartmental collaboration on a wide range of tree-related issues.



## 5.4 RECOMMENDATIONS FOR URBAN FOREST PROTECTION, ESTABLISHMENT AND ENHANCEMENT

### Recommendation # 14 – Implement and assess use of the new Tree Technical Manual

Adopt the new Tree Technical Manual (to be released late in 2012) as the reference document for guidelines and specifications related to tree protection, enhancement and replacement for capital projects, development projects, and operational activities. Assess the usefulness of the guide and make refinements or add elements that would strengthen and broaden its application.

Lead	Senior Urban Forester through Operations, Transit and Emergency Services
Support / Partners	Internal City “Tree Team” (Recommendation #2); External Urban Forestry Advisory Committee (Recommendation #19)
Cost	No additional cost - use of existing staff resources
Funding	None required
Priority / Target	HIGH / to be implemented in 2013-2014 and ongoing for the duration of the Plan
Timing	MEDIUM / review of the manual to be undertaken as part of the second or third Five-Year Management Plan
Related Goal(s)	3, 4, 5, 9

### Recommendation # 15 – Implement and monitor success of new rooting technologies downtown

Integrate the use of new rooting technologies, as specified in the Tree Technical Manual, for increasing the longevity and health of trees installed in hardscapes within the downtown core and other areas in the City with extensive impermeable surfaces (e.g., parking lots). The success of trees planted with these technologies should be monitored and compared to those in comparable conditions without.

Lead	Planning, Building, Engineering and Environment
Support / Partners	Operations, Transit and Emergency Services
Cost	\$2,000 – 5,000 per tree, depending on the scale and nature installation (20 to 50 trees annually, so up to \$100,000 annually)
Funding	Capital Budget
Priority / Target	HIGH / to be initiated as part of the first Five-Year Management Plan (i.e., 2014 - 2015)
Timing	and be ongoing for the duration of the Plan (i.e., to 2032).
Related Goal(s)	7

### Recommendation # 16 – Develop a Greening Strategy building on the Potential Plantable Spaces Analysis

Build on the Plantable Spaces Analysis (Recommendation #6), this strategy should work towards identification of (a) areas suited to naturalization and reforestation, and (b) opportunities for individual tree establishment.

Areas on City lands where no further development has been approved or is anticipated should be targeted first. Street and park tree planting opportunities can be informed by the municipal tree inventory (Recommendation #3). Opportunities on private lands should be pursued as well (e.g., particularly larger lots owned by industries), in consultation with landowners. This process should be staged over several years to target different areas across the City through ongoing stewardship initiatives (Recommendation #22).

Lead	Senior Urban Forester through Operations, Transit and Emergency Services
Support / Partners	Healthy Landscapes; Community and Social Services
Cost	\$75,000 (including stakeholder consultations) – one time cost, may be multi-year
Funding	Capital Budget
Priority / Target	MEDIUM / to be initiated as part of the second Five Year Management Plan (i.e., 2018 –
Timing	2022)
Related Goal(s)	4, 6, 10

**Recommendation # 17 – Track municipal tree removals and plantings**

Implement a comprehensive tracking system for trees removed and planted in the City for all projects, particularly those under the City’s purview. Develop a simple system for tracking this information would provide a useful indicator of the City’s progress related to its urban forest establishment and enhancement objectives.

Lead	Operations, Transit and Emergency Services; Information Services
Support / Partners	Planning, Building, Engineering and Environment
Cost	None for the first Five Year Management Plan; 1 FTE - Forestry Technician to be added over the course of the second or third Five Year Management Plan
Funding	Operating Budget
Priority / Target	MEDIUM/ to be initiated as part of the second Five-Year Management Plan (i.e., 2018–
Timing	2021)
Related Goal(s)	1, 2

**Recommendation # 18 – Expand the City’s capacity to undertake tree-related plan review and site supervision**

Create a role or position to assist with review of plans and follow-up site supervision / inspection so that plans are implemented as approved.

Lead	Senior Urban Forester through Operations, Transit and Emergency Services
Support / Partners	Planning, Building, Engineering and Environment
Cost	\$40,000 annually for a half-time Forestry Technician position (remaining half-time covered by Recommendation #8).
Funding	Operating Budget
Priority / Target	MEDIUM to HIGH / to be initiated as part of the first Five-Year Management Plan if
Timing	possible (i.e., by 2016), but if not as part of the second (i.e., over 2018 – 2022)
Related Goal(s)	9, 11



## 6 SHARING THE RESPONSIBILITY: OUTREACH, STEWARDSHIP AND PARTNERSHIPS

One of the key objectives of this Plan is to update the communications strategy provided in the 2007 Framework. This section presents the communications component of the urban forest management plan, which has been updated to:

- look beyond the consultations undertaken as part of the development of this Plan;
- reflect new and current initiatives in the City;
- add information on broader partnerships and potential funding sources;
- fit within the vision, objectives and recommended actions of the overall Urban Forest Management Plan, and;
- be consistent with and fit within the City's broader Communications Plan (2010).

The urban forest communications strategy will be directed and supported by the City of Guelph, but will primarily target tree-related activities on private lands. Therefore, successful implementation will require the strengthening of existing partnerships and fostering of new ones within the community. It will also require ongoing dialogue and involvement of both City staff and members of the community to develop partnerships built on mutual trust and resource sharing.

This section presents an overview of current communications and initiatives, some notable examples and best practices from other municipalities, and recommendations for the form and general content of the urban forest communications plan.

### 6.1 CURRENT OUTREACH, STEWARDSHIP AND PARTNERSHIP INITIATIVES

#### 6.1.1 OUTREACH AND EDUCATION

##### *City Website*

The City of Guelph's most public, and readily accessible tool is its website. Since completion of the 2007 Framework, there has been a significant effort put in to improving and expanding the City's website in general, including significant enhancements to the resources available regarding urban forestry issues.

The website currently includes a section called "Caring for Guelph's Trees" that provides information about:

- planned forestry and horticulture activities (e.g., tree trimmings and removals);
- information about watering trees;
- Emerald Ash Borer;
- descriptions of common tree problems;
- general information about trees;
- the City's tree registry;
- the 2007 Strategic Urban Forest Management Framework and related consultation reports, and;
- the City's new private tree by-law.

The website also has some information posted about the selection, planting and watering of native trees (as well as other plants) through the City's Healthy Landscapes Program, described below.



**Healthy Landscapes Program**

The Healthy Landscapes program was started in the spring of 2007 to support implementation of the City's former pesticide by-law, but has become a well-recognized and well-used public resource that has diversified to provide a range of support related to chemical-free and water conservation landscaping.



**healthy  
landscapes**

One of the program's focuses includes tree health and promotion of urban tree cover, and outreach on this and other core areas (e.g., native, non-invasive plant selection; best practices for landscape maintenance) is directly supportive of the City's urban forest vision.

Since its inception, the Healthy Landscapes program has:

- forged relationships with local community groups, several branches of the University of Guelph, and a few local businesses;
- helped coordinate and promote the native shade tree subsidy (described in **Section 6.1.2**);
- made dozens of presentations to various groups and at various events;
- taken promotional displays to numerous local events at venues ranging from Riverside Park to the Home Depot, and including the annual Operations, Transit and Emergency Services Open House;
- organized Healthy Lawn Care Day;
- created several public demonstration gardens;
- completed 500 landscape assessments per year, including recommendations for native plantings, for homeowners across the City on a first-come, first-served basis;
- developed website and other outreach materials, including lists of suitable native trees and shrubs for Guelph;
- completed a comprehensive and attractive guide for healthy gardening,
- created a 'Trees for a healthy community: planting and caring for urban trees' guide,
- given out over 300 trees to residents as part of a TD Green Streets initiative,
- designed an interactive tree game to take to community events to teach young children about the importance of trees and groundwater, and;
- led workshops on various topics including native trees for urban gardens, and tours of the City's notable native gardens and trees.

These activities and initiatives have significantly expanded the City's education and outreach with respect to tree planting and care on private property within the City, and have created a positive vehicle whereby voluntary activities can be supported in the community.

**Other Outreach – Operations**

Other outreach activities that the City Operations department continues to undertake include presentations to horticulture societies and tours for horticulture students, and annual Open Houses that include urban forestry displays. The City also has a Commemorative Tree Program whereby dedication trees can be ordered through Operations, Transit and Emergency Services and planted by Forestry staff.



### 6.1.2 STEWARDSHIP

Since 2010 there have been three new programs aimed at supporting tree planting in the City.

The first is a trial tree subsidy program with Toronto-based NGO “Local Enhancement and Appreciation of Forests” (LEAF), funded by the Ontario Power Authority. Two local nurseries have offered rebates of up to \$100 for native trees and shrubs purchased by residents in conjunction with this program. LEAF has provided planting and care guides to go with the subsidized trees. This program has been successful and ran for a third year in 2012.

The second is a living Christmas tree program organized by the Guelph International Resource Centre and the Ignatius Jesuit Centre. It has involved people purchasing a living spruce or balsam tree in a planter over the Christmas holidays for decorating, and then having the trees planted by volunteers on the north bank of the Speed River, just west of Edinburgh Road. This program was offered in 2010 and 2011.

The third is an adopt-a-tree program for local residents, subsidized by a TD Green Streets grant, that provided 300 trees to selected residential areas targeted for tree plantings. Residents were invited to attend an event, where they were given help selecting a tree that was right for their yard. They were also given planting and care instructions with a book entitled “*Trees for a healthy community – planting and caring for urban trees*”.

City staff in Operations continue to provide some support, as time and resources permit, to community groups involved in tree-related activities, such as provision of mulch and assistance for local tree-planting events in public spaces.

The City also provides delivery of coarse mulch to homeowners on a per request basis, for a cost of \$60 per load (2010 rates). This mulch is generated from trees pruned or removed as part of ongoing urban forest management operations.

Beyond the City, Wellington County’s Green Legacy Programme just planted its one-millionth indigenous tree this fall. While many of the more than 150,000 trees planted annually are in rural parts of the County, some have been planted within the City of Guelph.



Figure 8. City of Guelph tree rebate program advertisement from spring 2010.

6.1.3 PARTNERSHIPS AND FUNDING

The City has already worked and/or continues to collaborate on urban forestry issues with groups such as:

Governmental Organizations

- County of Wellington
- Grand River Conservation Authority (GRCA)
- Ontario Ministry of Natural Resources (OMNR)
- Ministry of Transportation

Schools

- University of Guelph (including the Arboretum and several departments)
- School boards

Other Stakeholders

- Guelph Hydro
- various private landowners

Local Advocacy and Community Groups

- Guelph’s Environmental Advisory Committee (EAC)
- Guelph Environmental Leadership (GEL)
- Guelph Urban Forest Friends (GUFF)
- Ontario Public Research Group (OPIRG)
- Rotary Club, Guelph
- Trees for Guelph

Partnerships

Both the OMNR and GRCA provide advice to the City on issues related to woodlot protection, while the OMNR has provided direction specifically related to tree Species at Risk in the City, and the GRCA has focused more on wooded wetland regulation and upland wood protection as part of natural heritage system functioning.



Wellington County’s Green Legacy Programme has been running since 2004 with the objective of increasing the County’s canopy cover from its current estimated 18% to closer to 30%. This program is entirely funded by the County, which has its own greenhouse and raises its own native tree stock (more than 160,000 seedlings and saplings annually). With respect to the City of Guelph, the program:

- leads educational field trips with classes from the Upper Grand District School Board and the Wellington Catholic District School Board (in the City and the County), and;
- has been providing 1,000 seedlings annually for volunteers to plant around Arkell Springs, City owned lands just outside the City.

City staff have helped schools in the City develop Tree Management Plans, and the Ministry of



Transportation has recently agreed to provide compensatory tree plantings for trees removed in relation to construction of a new interchange along the Hanlon Expressway at Laird Road.

The University of Guelph's Arboretum staff have been providing support, primarily on a volunteer basis, through the City's Healthy Landscapes program in the form of workshops and an Annual Tree Tour (launched in June 2010). They also provide workshop venues and advertising.

The City currently provides some funding from its operating budget to local groups such as the Rotary Club, as well as some in-kind support (e.g., such as provision and delivery of free mulch) for their tree planting efforts. This type of support has been ongoing for several years.

Guelph Urban Forest Friends (GUFF) has developed into a strong advocacy group for trees in the City, as has the local Sierra Club, while the Ontario Public Interest Research Group (OPIRG) and Rotary Club (Guelph) are focused more on hands-on activities. The Guelph-Wellington Development Association (GWDA) also remains an active advocacy group.

Guelph Hydro Inc. is a private sector corporation with its sole shareholder being the City of Guelph. In the past, Guelph Hydro has offered free trees for changing to automated billing, and more recently provided free trees to new account holders.

### **Funding**

In 2010 the City began to actively set up structures and pursue sources of funding specifically dedicated to urban forestry initiatives.

An application submitted to the TD Canada Green Streets program in December of 2010 for a targeted residential plantable areas project was successfully awarded in April 2011. This project identified three target communities where free

trees were offered on a first come first serve basis for installation on private residential lots.

Even more significant was Council approval of a motion put forward by staff for establishment of a Green Infrastructure account, with an initial allocation of \$100,000 to be dedicated to urban greening activities. This was followed in 2011 with the launch of a web-based Greening Guelph program that solicits monetary donations, corporate sponsorships, donations in-kind and commemorative donations towards planting trees on City owned and managed lands. The program is designed to complement, not compete with, other community initiatives.

## **6.2 BEST PRACTICES AND INNOVATIVE IDEAS FROM OTHER JURISDICTIONS**

Outreach, education, stewardship and partnerships are a vital part of urban forest management planning. For some, the full range of benefits provided by urban forest is unknown. However, in order for it to be valued, the urban forest must be widely recognized and understood as important. The following describes some general best practices and tools used elsewhere to make this happen.

A number of municipalities in southern Ontario and elsewhere offer a range of resources to foster engagement and support stewardship of their urban forests. Typically, cities with larger urban forestry departments offer the broadest range of information and services, but some mid-sized municipalities like Guelph are also finding creative ways to engage their communities. Some examples are cited below.

### **6.2.1 OUTREACH AND EDUCATION**

Increasing awareness can be achieved through printed and digital media, workshops/seminars/

presentations, open houses, and targeted marketing campaigns.

Educational materials should be circulated throughout the community, and a diversity of educational tools and venues should be utilized.

Points to keep in mind are:

- Schools are an effective starting point as children will bring their newfound knowledge home to their parents;
- Flyers containing specific information can be mailed in conjunction with other municipal mail-outs as a cost-savings measure;
- A municipal website provides a cost effective means of providing a wide range of information regarding urban forestry, including links to resources developed by others;
- Hands-on presentations, workshops and urban forest tours by City staff involved in forestry are also valuable outreach mechanisms, and;
- Homeowners who garden tend to spend most of their “garden dollars” in the spring at larger nurseries and big box stores, so forging partnerships with these retailers can have a significant impact.

Examples of good urban forest information pages in Canada on municipal websites include those from the City of Toronto, Town of Richmond Hill, City of Ottawa, and City of Edmonton.

There are also many options for and examples of hands-on activities that increase awareness and engage people. Examples of outreach events include:

- candidate heritage tree hunts;
- expert- and volunteer-led site tours;
- restoration events in local parks, schools or other lands (e.g., open spaces in business parks) with landowner consent;
- workshops on urban forestry issues targeted to (a) residents and (b) local businesses;

- presentations, community meetings and open houses;
- hosting local, national or international urban forestry conferences (e.g., International Society of Arboriculture, Canadian Urban Forest Conference, etc.).

Specific examples in Ontario include the City of Ottawa’s annual Emerald Ash Borer Awareness Week each May, and the Town of Oakville’s co-sponsored (with Oakville Green) urban forest arts contest (held in 2010).

Public Information Centres (PICs) or Open Houses are another opportunity to inform community members about what the City is doing to better manage its urban forest, and about what they can do to improve the urban forest by planting and/or caring for trees on their own property. However, effort should be made to either highlight a particular topic or area of interest that will draw people, or to combine the event with some other related activity or project to garner interest. Such events can be held in the spring, when gardeners are out and thinking about planting, and in locations where people are going to purchase trees and/or garden supplies.

### 6.2.2 STEWARDSHIP

Recent social marketing research conducted in the City of Toronto has found that a fundamental barrier to fostering stewardship is the growing detachment most people have from nature in contemporary society (TRCA Stewardship, pers. comm. September 2010). The key challenge, then, is how to overcome this barrier.

Fostering stewardship of the urban forest can take many forms and should be targeted to a range of groups and sectors. Strategies for achieving local level engagement in urban forest activities include:

- Recognition of current volunteers and attraction of more volunteers for stewardship

activities (e.g. awards, commemorative plaques);

- Recognition of urban forestry initiatives undertaken by local businesses, and provision of technical support for implementing such initiatives;
- Organization of community events with environmental themes geared for volunteer participation (e.g., tree plantings, boardwalk building);
- Facilitation of public participation in the planning, design, and maintenance of the urban forest (e.g., through workshops, open houses, supervised tree plantings), and;
- Support for external organizations designed to get the right tree planted in the right place on private lands (e.g., LEAF, Tree Canada).

There is a continued need to teach local residents, businesses and other institutions such as schools about proper care for the trees on their lands, and how best to take advantage of opportunities for tree planting on them. This can be achieved through partnerships with various groups, as well as by having a person on staff to provide this type of technical support and coordinate various volunteer activities related to the urban forest. The value to the municipality is that in exchange for providing this service, the municipality's urban forest is enhanced and a commitment to community sustainability is demonstrated.



While active engagement in urban forest activities is critical, it is also important to have clear guidelines and policies about volunteer activities so that volunteers clearly understand their roles and that the City provides support but does not assume liability. Guidelines should be simple and accessible because if the process itself becomes too onerous, community groups and volunteers may lose interest or become frustrated.

For restoration activities, it is also important to verify the appropriate tree planting locations and ensure they are intended to be treed for the long-term. For example, it is very discouraging for a community group to see that a site on which they planted trees has been disturbed or altered by development. Good planning and direction of volunteer activities can avoid these scenarios. When planted trees must be removed, volunteers at least appreciate efforts to have them properly transplanted.

Other examples of municipally supported stewardship include subsidies for tree planting and care. The Town of Markham funds local tree planting projects through its Trees for Tomorrow Fund, and the City of Kelowna (BC) provides \$30 subsidies for trees purchased by residents for their properties. Through their respective parks departments, both Ithaca, NY and New York City have organized Citizen Pruner programs, through which volunteers are trained and engaged in proper tree planting, mulching, watering and young tree pruning techniques.

In New York, participants receive 12 hours of classroom and field training, and take an exam that certifies them to legally work on trees owned by the city. This includes street trees and most park trees, excluding parks that have their own conservancies, such as Central Park. Certificates are issued by Trees New York and the New York City Department of Parks and Recreation.

In Ithaca, the training certifies the citizens to work on public trees, shrubs, and other beautification projects undertaken by the City. Volunteers receive work assignments from the City Forester and are encouraged to suggest projects. Urban forest management work conducted by Citizen Pruners includes: removal of suckers, weeding and/or mulching around the base of trees; pruning damaged, dead, diseased limbs within reach of the ground; pruning to shape young trees to ensure proper canopy structure; monitoring and reporting tree problems and suggesting sites for new trees, and planting bare root trees, as instructed.

Citizen Pruners attend meetings with the City Forester and Cooperative Extension staff to review tasks and receive instruction and training as necessary. They also assist in educating the public about trees at special events and workshops.



The City of Ottawa supports several tree planting programs including:

- "Trees in Trust Program - City provides and plants trees at no cost for City-owned frontage where the resident requests a tree, and has space with no conflicts with overhead utilities.
- Community Tree Planting Program (2007-2010) - A municipal grant program offering \$5K to \$10K to support tree planting in schoolyards, parks and other community green spaces.
- Commemorative Tree Program - City assists in planting a tree in memory of a lost loved one. A \$400 cost includes the planting of a tree (50

mm caliper) in an agreed location and 3 years of maintenance, and installation of a small plaque if desired.

### 6.2.3 PARTNERSHIPS AND FUNDING

Building relationships with local agencies, organizations and businesses on urban forest initiatives is the cornerstone of urban forest stewardship. These relationships will be unique to each municipality, but common sources of partnerships include non-governmental non-profit organizations, schools, and businesses or industries. Many non-governmental organizations have volunteer programs and experience in fundraising that can be drawn upon. Schools are often keen to get involved, particularly if activities can support their existing curricula. Businesses can be interested in these partnerships as well, particularly if they are given recognition for their activities, and can accomplish goals that support their corporate vision or objectives.

There are also a number of opportunities for funding support for urban forest activities through various programs in southern Ontario (see **Table 3**), many of which can benefit municipalities but require leadership from an external non-profit organization or school. Taking advantage of these opportunities requires partnerships.

For municipalities within the GTA, LEAF offers reasonably priced workshops and backyard tree planting programs. Given the success of these in Toronto, Markham and elsewhere, LEAF is considering expanding the geographic range of its programs.

In addition to building on existing and creating new partnerships, the creation of an urban forest working group comprised of representatives from active local organizations is a good way to maintain communications between the municipality and its external partners, and also a source of input for Urban Forest Management Plan review and

updates. Such groups are frequently recommended in urban forest management plans (e.g., Town of Oakville, City of Burlington, City of Saanich, BC).



### 6.3 URBAN FOREST COMMUNICATION PLAN

As described in the 2007 Framework, community outreach and stewardship are vital to urban forest management planning in Guelph, as in most communities, because the City's private lands make a significant contribution to the City's tree cover.

#### 6.3.1 PLAN GOALS AND PRINCIPLES

The specific goals of a City-wide urban forest communications program should be as follows, with the first three adopted from the 2007 Framework, and the fourth and fifth added as part of this Plan:

1. increase residents' and businesses' awareness and knowledge concerning Guelph's urban forest;

2. foster the interest of residents and businesses regarding the protection and enhancement of Guelph's urban forest, including trees on private land;
3. involve residents and businesses in caring for Guelph's urban forest, including trees on their own properties;
4. build and expand partnerships across various sectors of the community, and;
5. support community-based initiatives to seek and utilize funding and/or resource sharing targeted to local urban forest initiatives.

The following sections discuss key areas and opportunities for fulfilling these objectives over the course of this 20-year Plan.

Principles, as outlined in the 2007 Framework, to guide the communications plan should include:

1. Use of eye-catching and/or thought provoking, consistent, simple (but not simplistic), and consistent messaging.
2. Use of a variety of media (including social media and networking tools).
3. Use of social marketing techniques (in accordance with the City's Communications Plan).

Notably, the City has made significant progress with respect to community urban forestry outreach and stewardship since the 2007 Framework was developed, and is already providing support for and pursuing a number of initiatives (as described in **Section 6.1**). The gaps and opportunities described below are not meant to represent a comprehensive range of all possible actions, but rather focus on items targeted to the City of Guelph's context that would be expected to yield the greatest benefits in terms of supporting the long-term sustainability of the City's urban forest.

A representative from Corporate Communications team should maintain an active role in the City's

internal “Tree Team” meetings (see Recommendation #2) as part of a more collaborative process moving forward.

### **6.3.2 OPPORTUNITIES FOR IMPROVEMENT: OUTREACH AND EDUCATION**

#### **Urban Forest Advisory Committee**

While the City has a group of stakeholders with which it has collaborated over the years on urban forest issues, there has never been a formal urban forestry group that meets regularly to provide input and support to the City. With the City’s Urban Forest Management Plan and supporting Tree technical Manual in place, the creation of such a committee will serve as an invaluable resource to City staff, and also provide a forum for sustained stakeholder involvement in implementation of the Plan.

An Urban Forest Advisory Committee (discussed under the 2007 Framework as a “Technical Steering Committee”) is recommended as part of this Plan and should function similarly to the other advisory committees at City Hall that provide advice to staff on various topics (e.g., transportation, cultural heritage, etc.). This committee would have a set number of positions that should be filled by individuals with experience and/or qualifications in urban forestry, and should also include several City staff who play a key role in urban forest management and are in a position to bring the committee’s input back to other staff and where appropriate, Council, for consideration.

Although this committee would not have draft plans or reports to review like the City’s Environmental Advisory Committee, another important function it could fulfill is the pursuit of joint funding opportunities for urban forest initiatives. This would be particularly important for initiatives that must be community-based, but

need to be matched by the City if funding is awarded.

#### **Targeted Education and Outreach**

The City already has a number of outreach initiatives and programs underway, primarily through its Healthy Landscapes Program, which it should continue.

Additional tools that could raise the profile of urban forestry among the community include:

- More information on the “Caring for Guelph’s Trees” section of the City’s website, better integration with the information, and links to useful resources;
  - This should include an assessment of the “State of the Urban Forest” (as measured by the 25 criteria and indicators provided in **Appendix D**);
- An Annual Urban Forest Open House highlighting the City’s Urban forest Management Plan and a topical subject (e.g., Emerald Ash Borer, trees and climate change);
- Development of urban forest pamphlets on key topics for posting on-line and availability in local community centres and libraries (e.g., highlighting key elements of the UFMP; basics of tree care);
- Speaking engagements at local schools and to local community groups to describe the Plan and its ongoing implementation;
- Engagements with local business/industry and health care facility representatives, and;
- Workshops focused on the use of the new Tree Technical Manual.

Discussions should be held with representatives from the local business community (through organizations such as the local Chamber of Commerce and Board of Trade, and the Guelph-Wellington Development Association) along with local health care institutions to explore opportunities, and building on existing models and

successes (e.g., St. Joseph's Health Care naturalization area, Blount industries healthy landscaping works, McNeil Health Care tree plantings, etc.). Current successes should, with permission, be showcased by the City.

Tree Technical Manual workshops should be geared towards a broad range of groups and encompass those that would be expected to use the manual, as well as those that could use it on private lands within the City. Key groups to consider include:

- City staff from planning, engineering, parks and operations;
- Local consultants and contractors working on capital or development projects (e.g., planning consultants, landscaping contractors, etc.);
- Private landscaping businesses operating in the City;
- Contractors working on tree establishment, maintenance and care, including local arborists and landscaping companies, and;
- Local environmental groups and schools involved in tree protection and/or establishment.

During these workshops, potential refinements to the manual, as well as components that could be added, may be brought forward for future consideration.

The City should also incorporate some targeted social marketing into their plan.

Other activities that could be community-led (but supported by the City) include:

- Renewal of the City's "Great Tree Hunt" (originally spearheaded by the Guelph Field Naturalists in 1991 during the City's Environment Week activities) and use of this information to develop a list of veteran trees in the City;

- Expert-led site tours in local, public wooded areas, and;
- Hosting international conferences<sup>6</sup> about tree care and/or urban forestry.

Figure 9. City of Guelph's successful landscape assessment program as advertised in spring 2010.

### 6.3.3 OPPORTUNITIES FOR IMPROVEMENT: STEWARDSHIP

The City of Guelph has already become a leader in ecologically-sensitive landscape outreach and stewardship through its ongoing Healthy Landscapes program. Community-based stewardship of the urban forest should build on the work already

<sup>6</sup> The 2009 Ontario Urban Forest Council annual conference and general meeting was held at the University of Guelph and included talks by City staff.

completed and underway through this program and can be further fostered through:

- formal recognition of current volunteers;
- organization of more community events geared for volunteer participation (e.g., tree plantings, boardwalk building);
- continued facilitation of public participation in the planning, design, construction and maintenance of local parks and natural areas, and;
- expansion of partnerships and collaborative initiatives (as described in **Sections 6.1.3 and 6.2.3**).

Specific recommendations to support this direction are provided below.

#### ***Targeted Stewardship Initiatives***

Specific community-based stewardship initiatives that could work well in Guelph include:

- Recognizing current volunteers and businesses undertaking urban forestry initiatives through a dedicated webpage and annual urban forestry awards (e.g., “Tree Top Awards”);
- “Prune Patrol” training for volunteers on municipal lands, as well as potentially for businesses who want to have their own “tree team” and;
- NeighbourWoods surveys in selected City parks.

NeighbourWoods is an approach developed by Guelph resident Dr. Andy Kenney from the University of Toronto and Daniela Puric-Mladenovic to foster a better community understanding about local trees and collect useful data at the same time. Volunteer surveyors must be trained and data must be screened, collected and consolidated by someone with knowledge of trees and basic urban forest data analysis.

Although the City will plant trees on City lands in front of homes where the owner requests it and if funding is available, this service is not well advertised and should be promoted with options for site-appropriate native tree species.

#### ***Volunteer Coordination***

Trees for Guelph (as well as other similar local groups) continue to struggle to find the time to coordinate the logistics related to a given tree planting in addition to finding prospective locations and actually doing the work. While they have managed to secure some funding in the past to sustain a coordination position, this funding is inconsistent from year to year, which interferes with the mission of planting trees. As outlined in the 2007 Framework, a staff member responsible for coordinating volunteer activities related to tree planting (as well as other land stewardship activities in the City) would greatly facilitate tree-related stewardship activities in the City.

As part of providing volunteer support, the City should develop a set of brief guidelines that lay out the roles and responsibilities of volunteers working on City lands, and provide this to volunteer groups. The City staff person responsible for volunteer coordination could also assist with researching and pursuing joint community-based stewardship funding.

#### ***6.3.4 OPPORTUNITIES FOR IMPROVEMENT: PARTNERSHIPS AND FUNDING***

##### ***Building Partnerships***

The City should continue to foster good working relationships with groups and organizations with which it has already worked (and/or continues to work with) on urban forestry issues (as listed in **Section 6.3.1**). It should also work to expand its network of partners to include some of the following:



Schools

- Private schools within the City (e.g., Montessori, Waldorf)
- Upper Grand District School Board
- Wellington Catholic District School Board
- University of Guelph (including the Arboretum and several departments)

Health Facilities

- Guelph General Hospital
- St. Joseph’s Hospital
- Homewood Health Centre

Local Advocacy and Community Groups

- Roots and Shoots
- Speed River Land Trust

Local Utility Companies

- Bell
- Rogers Cable
- Union Gas

Other Stakeholders

- local golf courses (i.e., Springfield, Victoria Park, Cutten Club, WildWinds, Guelph Country Club)
- Ontario Realty Corporation (ORC)
- local industries

The City has already been developing partnerships on urban forest issues with Trees for Guelph, the local Rotary Club, and the University of Guelph Arboretum, and has an excellent and long-standing partnership with GRCA. These partnerships should continue to be developed and expanded, and new partnerships with the groups and organizations listed above should be pursued. In addition, the City should build on existing partnerships with GRCA and explore additional opportunities through the Wellington County Green Legacy Programme.

Guelph Hydro has provided support for tree-related initiatives in the past and may be willing to engage in similar programs again.

The tree subsidy program supported by LEAF on a trial basis in 2010 and has continued successfully over 2011 and 2012. In the future, it is possible that LEAF may decide to expand its more intensive backyard tree planting program into Guelph, or work through the City’s Healthy Landscapes program to supplement the existing landscape assessment program.



Table 4. Summary of partnership and funding opportunities identified for Guelph.

Organization	Program Name	Opportunity in Guelph	Required Lead and/or Partnerships	Nature of Support
<b>Canadian Tree Fund</b>	Jack Kimmel Grants	Could be pursued in partnership with someone at the University to explore success of different species in streetscapes, or success of trees in streetscapes using different soil amendments.	Most suited for an academic lead (e.g., University of Guelph).	Grants (from this registered charitable organization)
<b>Environment Canada</b>	EcoAction Community Funding Program	City could support or partner with a local non-profit organization to apply for a reforestation / restoration project in any one of a number of identified potential restoration areas on City or GRCA lands.	Non-profit community group	Program supports projects that address clean air, clean water, reducing greenhouse gas emissions that contribute to climate change and nature. Grant values are variable.
<b>Evergreen</b>	Toyota Learning School Grounds Greening	City could post / provide this information to interested schools, and potentially provide technical support.	Schools	Grants
<b>Evergreen</b>	Common Grounds	City could work with a community group to secure funding in support of greening a shared public space.	Non-profit community group	Grants of \$1,000 to \$12,000
<b>GRCA</b>	Providing support to various other groups / initiatives (i.e., Wellington County Green Legacy, Trees for Guelph).	In addition to the ongoing initiatives, GRCA has indicated its willingness to provide some support related to tree inventory efforts, particularly on its own lands.	Depends on program / initiative	In-kind and technical support.
<b>LEAF</b>	1. Residential Planting Consultations (Toronto, s. York Region) 2. On-line Workshop and Tree Pick-up (Trial - North York Region) 3. Tree Planting Guides and In-Store Rebates (Trial - Kitchener-Waterloo/Guelph/Cambridge)	Since 2010 the City has engaged with LEAF on program #3 on a trial basis; could explore further options with LEAF.	Could be City or others in partnership with LEAF	Depending on the program: 1. Consultation with a LEAF arborist in participant's back yard, tree delivery and planting. 2. Provision of on-line workshop followed by tree delivery to central location. 3. Provision of guides and in-store rebates at selected nurseries for native species.
<b>Ontario Trillium Foundation</b>	Community Program or Province-Wide Program	City could apply for a grant if they are part of a community collaborative that involves at least one eligible organization (i.e., a registered charitable or non-profit organization) and has a clear benefit to the community.	Non-profit or charitable organization	Community Grants Program (up to \$15K) or Province-Wide Grants Program (over \$15 K; up to about \$100 K)

Organization	Program Name	Opportunity in Guelph	Required Lead and/or Partnerships	Nature of Support
Trees Canada	TD Green Streets Program	City could obtain funds to for tree planting, inventory, maintenance and educational activities. Wide range of potential activities.	Municipality	Grants of up to \$15,000 for successful municipalities (from Trees Canada through TD Friends of the Environment Fund). Requires 50% matching funding from another source.
Trees Canada	Greening Canada's School Grounds	Provides to the selected schools: educational information, technical advice and financial support towards the transformation of their school grounds into environmentally enriched learning landscapes.	Schools	Up to \$10,000 value for successful schools. Application form available on-line.
Trees Canada	Corporate Greening for Carbon Credits	Tree Canada estimates the amount of carbon potentially sequestered by the number of trees planted. Useful to businesses who wish to enter their carbon credits on to the Voluntary Challenge Registry.	Industries	Businesses are required to plant and maintain the trees themselves, but are provided with a "Carbon Certificate" at no cost.
Trees Ontario	Tree Planting Subsidy Programs: 1. Full Service Incentive Program (50 Cent Program)	Limited application in City of Guelph, but should be supported and advertised to larger landowners who may be interested in reforesting portions or all of their lands. Potential partners include WCSC, GRCA.	Private landowner must lead but GRCA and /or Wellington County Stewardship Council must support.	Provision of subsidized trees, but must plant at least 100 to 1500 trees (depends on program), have adequate plantable area and sign an agreement with Trees Canada not to cut the trees for 15 years.
Wellington County Stewardship Council (WCSC)	Various programs and partners throughout the County	May be "fringe" opportunities for support to larger landowners wanting to re-forest their lands.	Private landowner	Provide technical support (e.g., how and where best to replant), can coordinate tree orders and delivery, and may provide small amounts of funding for approved projects. Requires landowner to contact them.

#### ***Pursuit of Potential External Funding Sources***

Sources of potential subsidies, provision of in-kind resources and direct funding have also been identified with Environment Canada, Evergreen, Ontario Trillium Foundation, Trees Canada and Trees Ontario. The nature of the support from these various organizations, and potential opportunities in Guelph, are summarized in **Table 4**. The City should determine which of these programs and/or funding sources it wishes to

pursue, and identify staff and support people willing and able to coordinate and pursue applications.

In the past, the Ontario Trillium Foundation supported a grassroots urban forest inventory in Peterborough. If the City can partner with a non-profit organization, perhaps through a Neighbourhoods program, some funding may be possible for tree inventory data collection. Such

activities might be best targeted in local parks (rather than street trees) for safety reasons, and to foster a sense community ownership of their local trees.

The University of Guelph has also successfully obtained grant money through the Jack Kimmel Award in the past, and there may be opportunities to collaborate specifically on some targeted urban forest research projects in the future.

#### **Green Infrastructure Capital Account**

The recently created “green infrastructure” capital account should be used as a place to collect and consolidate funds to be exclusively dedicated to tree planting and care within the City. Donations

from the community or businesses from programs like “adopt-a-tree”, as well as funds collected from development activities such as cash-in-lieu provided through vegetation compensation plans, should be directed towards this account.

The City can also use this account to support opportunities within the community for local residents and businesses to plant trees on their lands, as well as to supported related outreach and stewardship initiatives (e.g., training and tools for volunteer pruners or invasive species removal crews).

## **6.4 RECOMMENDATIONS FOR OUTREACH, STEWARDSHIP AND PARTNERSHIPS**

### **Recommendation # 19 – Create an Urban Forest Advisory Committee (UFAC)**

Form an Urban Forest Advisory Committee (UFAC) comprised of local stakeholders and members of the community knowledgeable about urban forest issues, as well as City staff from key departments involved in urban forest management. Meetings to be three to four times per year.

Key responsibilities of this committee include:

- providing advisory input regarding implementation of various aspects of the Urban Forest Management Plan;
- providing input to the second, third and fourth Five-Year Management Plans as well as the State of the Urban Forest reviews (using the criteria and indicators as provided in **Appendix C**), and;
- assisting with the pursuit of expanded partnerships and funding for urban forest initiatives.

Note: This is equivalent to the Technical Steering Committee recommended as part of the 2007 Framework.

Lead	Senior Urban Forester (Recommendation #1) through Operations, Transit and Emergency Services
Support / Partners	Community and Social Services; Operations, Transit and Emergency Services; Legal and Realty Services (as required)
Cost	None – use of existing staff resources
Funding	None required
Priority / Target	HIGH / to be established in 2013 and ongoing
Timing	
Related Goal(s)	2, 3, 8, 11

**Recommendation # 20 – Pursue targeted urban forest education and outreach**

Although the City already has a number of outreach initiatives and programs underway (primarily through its Healthy Landscapes Program) there are a number of tools that could raise the profile of urban forestry among the community. Key tools include:

- More information on the “Caring for Guelph’s Trees” section of the City’s website, better integration with the information, and links to useful resources;
- An Annual Urban Forest Open House highlighting the City’s Urban forest Management Plan and a topical subject (e.g., Emerald Ash Borer, trees and climate change);
- Development of urban forest pamphlets on key topics for posting on-line and availability in local community centres and libraries (e.g., the Plan highlighting key elements of it; basics of tree care);
- Speaking engagements at local schools and to local community groups to describe the Plan and its ongoing implementation;
- Engagements with local business / industry and health care facility representatives, and;
- Workshops focused on the use of the new Tree Technical Manual for local contractors, volunteers, residents and City staff.

Lead	Senior Urban Forester (Recommendation #1) through Operations, Transit and Emergency Services
Support / Partners	Community and Social Services (Community Engagement), Healthy Landscapes Program
Cost	\$15,000 per year (promotional materials, advertising)
Funding	Operating Budget
Priority / Target Timing	MEDIUM to HIGH / to be initiated in 2013 and ongoing for duration of the Plan
Related Goal(s)	4, 11

**Recommendation # 21 – Increase capacity for coordination of volunteers for stewardship activities**

The City should increase its ability and capacity to coordinate volunteer activities related to tree-planting and stewardship. The responsible staff person(s) need to become the “go to” person for volunteer stewardship activities related to urban forestry. This individual would provide support to existing partners as well as new ones.

Lead	Senior Urban Forester (Recommendation #1) through Operations, Transit and Emergency Services
Support / Partners	Community and Social Services (Community Engagement), Healthy Landscapes Program
Cost	To be supported through other new positions created (Recommendation #1 – Senior Urban Forester, and Recommendations #5, 8, 18 for new Forestry Technician
Funding	None required
Priority / Target Timing	MEDIUM to HIGH / to be initiated as part of the first Five-Year Management Plan if possible (i.e., by 2014 or 2015)
Related Goal(s)	4, 10, 11

**Recommendation # 22 – Pursue targeted stewardship initiatives, partnerships and funding sources**

The City should continue to build relationships with the community groups and organizations with whom they have already worked (or continue to work) on urban forestry issues, and expand their network of partners (e.g., local schools, health facilities, utility companies, golf courses and local industries).

Targeted stewardship initiatives recommended for Guelph include:

1. Recognizing current volunteers and businesses undertaking urban forestry initiatives through a dedicated website page and annual urban forestry awards (e.g., “Tree Top Awards”);
2. Providing a “Prune Patrol” program that includes training for volunteers on municipal lands, as well as potentially for businesses who want to have their own “tree team”; and
3. Coordinate and undertake NeighbourWoods surveys in selected City parks.

Sources of potential subsidies, provision of in-kind resources and direct funding have been identified (refer to **Table 4**). The City should determine which of these programs and/or finding sources it wishes to pursue, and identify staff and support people able to coordinate and pursue applications.

Lead	Senior Urban Forester (Recommendation #1) through Operations, Transit and Emergency Services
Support / Partners	Community and Social Services (Community Engagement); Healthy Landscapes Program; Planning, Building, Engineering & Environment
Cost	\$5,000 annually for duration of Plan (for stewardship initiatives)
Funding	Operating Budget (from the City’s Green Infrastructure account) with additional support from external funding
Priority / Target Timing	MEDIUM to HIGH / to be initiated as part of the first Five-Year Management Plan if possible (i.e., by 2014 or 2015)
Related Goal(s)	4, 6, 10, 11



## 7 MOVING FORWARD WITH THE PLAN: IMPLEMENTATION

The recommendations from **Section 3** through **Section 6** reflect existing gaps, best practices and input from various parties, but are also intended to be practical and possible within the range of resources that might reasonably be available to the City and its partners.

Implementation of these recommendations over time is intended to enable the City to transition from reactive to proactive urban forest management, thereby increasing operating efficiency and effectiveness, improving tree health and diversity, reducing risk to the public, making the urban forest more resilient to the stressors anticipated in relation to climate change, invasive species and pests, and maximizing the wide-ranging benefits provided by a healthy and sustainable urban forest.

This Plan is intended to be implemented over a 20 year period through a series of four Five-Year Management Plans:

- 2013 – 2017: Five-Year Management Plan #1
- 2018 – 2022: Five-Year Management Plan #2
- 2023 – 2027: Five-Year Management Plan #3
- 2028 – 2032: Five-Year Management Plan #4

The key components of the first Five Year Management Plan are highlighted in **Appendix B**.

This report provides the guiding principles, vision and strategic goals for the entire 20 year period (as provided in **Section 2**) as well as the recommendations for the first Five-Year Management Plan. It also provides recommendations for actions beyond the first Five-Year Plan that either (a) will carry over from the first Five-Year Management Plan into subsequent plans, or (b) are recommended for

implementation during the second, third or fourth Five-Year Plan periods.

It is difficult to confirm the timing of activities beyond the first Five-Year Management Plan, and towards the end of 2017 (as well as in 2022 and 2027) there will need to be a review and assessment of the status of the various recommendations to determine: (a) which have been completed, (b) which remain incomplete, and (c) if there are any new recommendations justified by new developments. This exercise should be informed by a review of the urban forest monitoring criteria and indicators (as attached in **Appendix D**). There may also need to be revisions to responsible and/or supporting parties as partnerships evolve, as well as potential funding sources as new programs or opportunities arise.

With input from stakeholders and/or the Urban Forest Working Group, staff will confirm the priority actions and timing, and identify resource requirements for the second, third and fourth Five-Year Management Plans. The revised recommendations will then inform day-to-day urban forest management policies and operations through annual work plans developed by City staff.

### 7.1 DISCUSSION OF RESOURCE REQUIREMENTS

The current staffing and resources allocated for urban forestry in the City of Guelph are inadequate to move the City forward in terms of achieving its identified vision and objectives for the urban forest. Implementation of this Plan will require a sustained commitment of both additional financial resources, and the creation of several permanent full-time staff positions, as outlined in this Plan. Most critical will be the creation and filling of a Senior Urban Forester position (Recommendation #1), as this individual will assume ownership of this Plan and champion its short, medium and long-term implementation. The position will report

directly to the General Manager of Public Works and play a vital role in the day-to-day operations of forestry services. The position will also involve a great amount of multi-departmental coordination, and a leadership role among various service areas to ensure all approved aspects of this Plan are being implemented.

#### **CURRENT STAFFING AND SUPPORT**

Staffing dedicated to the maintenance and management of the City's trees has not changed since completion of the 2007 Framework (and was identified at that time as being a key limiting factor in moving the City from a reactive to a proactive management paradigm). Currently, the Forestry group consists of eight full-time Forestry Technicians and two summer student who take care of all tree related work in the City, plus one Supervisor, who report to the General Manager of Public Works. The Senior Urban Forester position will fill the gap between G.M and Supervisor. Notably, since completion of the Framework, one Forestry Technician position was lost as a result of budgetary cuts in 2010. Summer students are typically hired to provide basic tree health care (e.g., watering and mulching) but are not trained or qualified to do many other arboricultural tasks.

The City's Forestry group (now within Operations, Transit and Emergency Services) is responsible for work related to trees on City streets, parks, riparian areas and greenways, and publicly owned natural / conservation areas. They also deal with emergency storm damage, and some inquiries and service requests for trees on private properties adjacent to City lands. Their work includes tree pruning, planting, mulching, watering, removal and stumping, as well as risk assessment.

Staff in Planning, Building, Engineering and Environment currently focus primarily on the design, review and implementation of projects on both public and private lands. As part of this work, they develop and implement tree-related policies,

guidelines and specifications. This department also includes Waterworks which oversees the Healthy Landscapes program responsible for so much of the education, outreach and stewardship undertaken by the City over the past few years with respect to trees and landscaping with native species.

Resource requirements related to the new tree by-law are also being covered by Planning staff for the time being with support from By-law, and are being monitored.

The City continues to undertake these tasks in-house with very limited support from contracted personnel. Guelph Hydro does, notably, hire contractors for pruning trees along hydro line allowances, on a five-year cycle.

#### **RECOMMENDED STAFFING AND SUPPORT**

The recommended staffing and resource requirements have been developed in close consultation with City staff, and have also been developed with careful consideration for the fact that the City is continually working to limit its expenditures and maximize efficiencies. Opportunities for building on existing programs or systems, and for using existing positions to accommodate urban forestry requirements have been identified to the greatest extent possible. Opportunities for pursuing external funding and support have also been incorporated into this Plan. However, if the City is genuinely committed to maintaining and growing its urban forest, then it also needs to make a long-term commitment to increasing its profile in the community, as well as actively planting, maintaining and monitoring it.

Effective implementation of this Plan will require the following human resources over the course of the first Five Year Management Plan (i.e., between 2013 and 2017), in order of importance:



- 1 full-time Senior Urban Forester position
- 3 full-time Forestry Technician positions
- A half-time GIS Technician / Information Technologies position
- A half-time Administrative Assistant position

In terms of financial resources (from both capital and operational budgets), we have developed estimates for the first two Five Year Management Plans, but not the last two as it is much more difficult and speculative to estimate beyond 10 years. Based on the recommendations in this Plan and consultations with City staff we estimate the following costs (excluding the above human resource requirements):

- 2013: \$945,000
- 2014: \$1,110,000
- 2015: \$1,085,000
- 2016: \$1,169,000
- 2017: \$1,174,000
- 2018 – 2022: \$6,000,000

This is an estimate of \$5,483,000 for the first five years of the Plan, and \$6,000,000 for the second five years. Notably, almost half of this cost is attributed to the anticipated need to develop and implement a strategy for dealing with Emerald Ash Borer (Recommendation #7). A more detailed breakdown is provided in **Appendix B**.

### **PRIORITIZATION**

Prioritization was assigned to the various recommendations based on: a logical sequence for the recommended items; identification of which items are likely to provide the most benefits to the urban forest; consideration of risk-related activities (and their relative urgency), and spreading out the cost of new resource requirements in a manageable way. Priorities and timing were ultimately assigned in close consultation with City staff, and with consideration for stakeholder and public input. These will need to be continually reviewed and updated as the Plan is implemented.

Successful implementation of this Plan will also require some changes in the current approaches and attitudes to urban forestry among some City staff, members of the community, and many of the planners, designers and contractors who plan for and work with trees in the City.

Urban forest management in Ontario, with few exceptions, is conducted using the model of joint municipal and contracted service provision. This model is applied in cities such as Windsor, Hamilton, Burlington, Oakville, Mississauga, London, Toronto, and Ajax. The key variable is the relative distribution of specific operations between contractors and staff. In most municipalities, municipal staff and contractors share the tasks of routine maintenance such as pruning and tree removals. Planting is often outsourced as part of capital projects, with additional infill planting undertaken by the municipality or contractors by tender. In some municipalities, like Brantford, almost all urban forest work is contracted out, while City staff coordinate and oversee the various activities.

This Plan recommends a continued reliance on in-house staff versus external contractors with identification of specific needs for contracted services for activities that are very intensive and time-sensitive, and/or activities that would benefit from specialized external expertise.

A number of municipalities also permit residents, at their own expense, to hire contractors to conduct maintenance on City-owned trees. In the City of Toronto, for example, an “Agreement for Contractors to Perform Arboricultural Services on City Owned Street Trees” enables a property owner to contract standard tree maintenance work to a City approved tree service company. This option is made available in the event that the property owner wishes to expedite a request for standard tree maintenance and to avoid waiting for City Forestry crews to conduct the required

work. Typically, this is regulated through a basic permitting process, and contractors must meet specific criteria in order to obtain approval to conduct works. This is one option for relieving some of the pressure on City staff, however it also takes away from the City's ability to track and monitor the condition of its trees directly.

Irrespective of the approach taken, the current staffing and resources allocated for urban forestry in the City of Guelph are inadequate to move the City forward in achieving any substantial increases in forest canopy or in terms of managing its urban forest so that it continues to be diverse, healthy and sustainable in the decades to come. Implementation of this Plan will require a sustained commitment of new human and financial resources, as described.

When considering the cost of this investment, the full value of the City's current and potential green infrastructure (which has yet to be measured) needs to be seriously considered. This value includes, but is not limited to, the unmeasured cost savings relating to cooling and health benefits from shade in the summer, air pollution removal and moderation of storm water flows in the City.

This Plan should be considered a strategic framework and working document with its actions and their prioritization subject to review and revision in response to new information, new realities and available resources.

## 8 GLOSSARY

**“30-20-10” Rule:** A rule-of-thumb, proposed by Santamour (1990), to guide the establishment of the urban forest. The rule states that no tree family exceeds 30%, no tree genus exceeds 20%, and no tree species exceeds 10% of the total urban forest inventory. The objective of this guideline is to promote urban forest diversity and resilience to pests, pathogens and other stressors.

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

**Arboricultural Assessment:** Refers to an assessment of an individual or small group of trees, as opposed to an entire woodland or forest. Typically these are conducted on trees in open grown contexts.

**Atmospheric carbon:** Carbon dioxide gas (CO<sub>2</sub>) suspended in Earth’s atmosphere. A greenhouse gas, atmospheric carbon dioxide is known to be a primary contributor to climate change.

**Boundary tree:** A tree growing on the boundary between two properties. According to the Ontario Forestry Act, 1990, “Every tree whose trunk is growing on the boundary between adjoining lands is the common property of the owners of the adjoining lands. Every person who injures or destroys a tree growing on the boundary between adjoining lands without the consent of the land owners is guilty of an offence under this Act.”

**Caliper:** The diameter of a young tree, typically measured at 15 cm above ground for trees up to and including 100 mm cal., or 10 cm above the bud union where applicable. From 125 mm and up, measurements are taken at 30 cm above the ground.

**Canopy cover:** A measurement of the areal extent of vegetation foliage, typically measured in percentage of total land area. For example, the City of Toronto’s canopy cover is estimated at 17% of the total land area of the city.

**Co-dominant:** With respect to tree stems, where two or more of similar diameter are emerging from the same location on the trunk. Co-dominant unions are typically weak and face a higher risk of failure than normal unions. Commonly found on improperly maintained trees, and more common among certain tree species.

**Comparator municipalities:** A list of municipalities (as identified in Schedule 2 of the City of Guelph Committee Report for Information Services dated December 7, 2009) identified as suitable for comparison purposes to the City based on their: proximity to Guelph, average family income, population, expenditures, number of employees, governance level and structure, services provided, presence of a post-secondary institution.

**Council of Tree and Landscape Appraisers (CTLA) Trunk Formula Method:** A commonly-accepted method used to appraise the monetary value of trees considered too large to be replaced with nursery or field-grown stock. Determination of the value of a tree is based on the cost of the largest commonly available transplantable tree and its cost of installation, plus the increase in value due to the larger size of the tree being appraised. These values are adjusted according to the species of the tree and its physical condition and landscape location.

**Designated Heritage Tree:** Any tree (or trees) identified as a heritage attribute of a property designated under Part IV of the *Ontario Heritage Act*, or any tree (or trees) identified as a heritage attribute within a Heritage Conservation District designated under Part V of the *Ontario Heritage Act*.

**Diversity (species):** Variation in the family, genus and species composition of trees in the urban forest. Species diversity encourages resilience to physiological stressors by reducing the number of pest or pathogen hosts or spreading them across a wider area at lower densities.

**Diversity (structural):** Variation in the age, size, structure, location and other physical characteristics of urban forest trees. Structural diversity encourages a continuous urban forest canopy as larger and older trees are removed.

**Ecozone:** The largest scale biogeographic division of the Earth's land surfaces, based on the historic and evolutionary distribution patterns of terrestrial plants and animals. Ecozones represent large areas where plants and animals developed in relative isolation over long periods of time, and are separated from one another by geologic or climatic conditions that formed barriers to plant and animal migration. Canada has 15 terrestrial Ecozones (adapted from Wikipedia accessed September 2010).

**Ecoregion:** (or bioregion) An ecologically and geographically defined area that is smaller than an ecozone and larger than an ecosystem. Ecoregions cover relatively large areas of land or water, and contain characteristic, geographically distinct assemblages of natural communities and species. The biodiversity of flora, fauna and ecosystems that characterise an ecoregion tends to be distinct from that of other ecoregions (adapted from Wikipedia accessed September 2010).

**Family:** For plants, the family includes plants with many botanical features in common and is the highest classification normally used. Modern botanical classification assigns a type plant to each family, which has the distinguishing characteristics of this group of plants, and names the family after this plant.

**Genetic Potential:** A tree's inherent potential to reach a maximum size, form and vigour. Achievement of maximum genetic potential enables a tree to provide the greatest number and

extent of benefits possible. Urban trees are frequently unable to reach their genetic potential.

**Genus:** The taxonomic group containing one or more species. For example, all maples are part of the genus called "Acer" and their Latin or scientific names reflect this (e.g. Sugar maple is *Acer saccharum*, while Black maple is *Acer nigrum*).

**Greenfield areas / development:** The creation of planned communities on previously undeveloped land. This land may be rural, agricultural or unused areas on the outskirts of urban areas. Greenfield development aims to provide practical, affordable and sustainable living spaces for growing urban populations.

**Green Infrastructure:** A concept 1990s that highlights the contributions made by natural areas to providing important municipal services that would cost money to replace. These include storm water management, filtration of air pollution, provision of shade and others.

**Heritage tree(s):** A single tree (or group of trees) that has cultural heritage value or interest according to Regulation 9/06 of the *Ontario Heritage Act*. Heritage trees may be located on private and/or public property, or form part of a cultural heritage landscape. Heritage trees may be identified as a heritage attribute of a non-designated property listed in the Municipal Register of Cultural Heritage Properties under the *Ontario Heritage Act*.

**Integrated Pest Management (IPM):** An integrated approach to managing pest populations that reduces or eliminates the use of pesticides. Key components of IPM may include setting thresholds, population monitoring, trapping, cultural practices (e.g. tree species selection), mechanical or biological controls and chemical pesticide application.

**Invasive Species:** A plant, animal or pathogen that has been introduced to an environment where it is not native may become a nuisance through rapid spread and increase in numbers, often to the detriment of native species.

**i-Tree:** A publicly-available software suite that provides urban and community forestry analysis and benefits assessment tools to communities as well as state forestry agencies, municipal foresters, non-profit organizations, commercial arborists, environmental consultants, planners, and others interested in their community forests.

**i-Tree Eco:** A computer model used by managers and researchers to quantify urban forest structure and function. Using field and meteorological data, Eco calculates forest attributes (species composition and diversity, diameter distribution, tree health, etc.) as well as forest functions and values related to tree effects on air pollution, greenhouse gases and global warming, pollen, and building energy use. Formerly known as UFORE (Urban Forest Effects model).

**i-Tree Streets:** A street tree management and analysis tool for urban forest managers that uses tree inventory data to quantify the dollar value of annual environmental and aesthetic benefits: energy conservation, air quality improvement, CO<sub>2</sub> reduction, stormwater control, and property value increase.

**Living fence:** A fence comprised of living plant materials – typically a combination of trees and shrubs, including coniferous species, to provide a natural break between properties. This may be combined with other markers (e.g., bollards to mark property lines) or more conventional fencing.

**Leaf area index:** The ratio of total upper leaf surface of vegetation divided by the surface area of the land on which the vegetation grows. LAI is a dimensionless value, typically ranging from 0 for bare ground to 6 for a dense forest.

**Mulch beds:** Continuous expanses of wood chips or other mulch spread at the base of trees and tree

groupings. Mulch beds promote tree health by regulating soil moisture and temperature, reducing competition from weeds and reducing soil compaction.

**Native (or Indigenous) Species:** A species that occurs naturally in a given geographic region that may be present in a given region only through natural processes and with no required human intervention.

**Pest vulnerability analysis:** An assessment of the threats posed by a wide range of pests and pathogens to a jurisdiction's urban forest based on an analysis of available tree inventory and species composition data.

**Plantable space:** Potential plantable spaces are vegetated or exposed open spaces that could accommodate tree planting (i.e., plantable soil that is not filled with tree canopies or other overhead restriction). Actual plantable spaces are spaces meeting the above criteria that are in fact feasible for tree planting based on approved or anticipated land uses, including consideration of the need to balance treed and open spaces.

**Plant Health Care (PHC):** A holistic approach to improving the health and quality of landscape vegetation, especially trees, through a wide range of practices, including proper species selection and planting, mulching, watering, fertilization, protection, pruning and risk mitigation. Particular attention is paid to the rooting environment, as a majority of plant health issues originate as a result of below-ground stressors.

**Potential canopy cover:** A refined measurement of urban forest canopy which accounts for the subject area's carrying capacity for tree cover. It provides a useful baseline for assessment and enables more informed target and goal setting.

**Replacement value:** A monetary appraisal of the cost to replace one or more trees, as described by the Council of Tree and Landscape Appraisers.

**Significant woodlands:** An area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size, or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history. The City of Guelph has identified significant woodlands through its Natural Heritage Strategy.

**Species at Risk:** Any naturally-occurring plant or animal in danger of extinction or of disappearing from the province. Once classified as "at risk", they are added to the Species at Risk in Ontario (SARO) List.

**Street trees:** Municipally owned trees, typically found within the road right-of-way along roadsides and in boulevards, tree planters (pits) and front yards.

**Successional plantings / processes:** With respect to forested areas, succession is the term used to describe the natural and gradual evolution of an open area to a forest. Although many aspects of this model continue to be debated, in general a meadow habitat will naturally evolve into woodland and then forest as long as there is input of seed from nearby sources, and no major disturbance that interrupts this progression takes place. Successional plantings are intended to speed up this process and typically involve the introduction of sun-tolerant pioneer species, followed by the gradual introduction of more shade-tolerant species as a canopy cover is formed, followed by eventual removal (or loss) of the pioneer species.

**Tree Protection Zone (TPZ):** An area within which works such as excavation, grading and materials storage are generally restricted or forbidden. The size of a TPZ is generally based upon the diameter or drip-line of the subject tree.

**Underplanting:** The establishment of young trees in areas dominated by mature trees. Underplanting

ensures continuity in the tree canopy as older individuals are removed over time by enabling young trees to fill in such gaps.

**Urban Forest:** Generally refers to all trees and associated woody vegetation (e.g. shrubs), on both private and public lands, within a jurisdiction that is urbanized, in whole or in part. This includes trees in natural areas as well as trees in more manicured settings such as parks, yards and boulevards.

Rather than being valued as timber from a conventional forestry perspective, trees in urban forests are primarily valued for the benefits they bring to the community. Erik Jorgenson, Canada's first urban forester, defined the urban forest in 1967 as: "*A specialized branch of forestry that has as its objectives the cultivation and management of trees for their present and potential contribution to the physiological, sociological and economic well-being of urban society. These contributions include the over-all ameliorating effect of trees on their environment, as well as their recreational and general amenity value.*"

**Urban heat island effect:** Increased surface temperatures during summer months in urbanized areas resulting from paved surfaces, such as asphalt, and dark building rooftops which absorb and release more heat from the sun during the day and night-time than the natural landscape, thereby increasing the ambient temperature and prolonging periods of higher air temperature.

**Urban matrix:** The portion of a developed landscape that is built up with residential, commercial, institutional and sometimes industrial uses. It is typically compared to the rural matrix which is dominated by agricultural land uses.

**Veteran trees:** A broader term that can be used to describe older trees occurring throughout the City that are representative of trees that were historically present on the landscape, or remnant plantings that persist in the urban context. Mechanisms to identify and protect healthy veteran trees exist through the City's new Official Plan policies, and Tree By-law (2010)-19058.

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# Appendix A

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**Recommendations from the 2007 Framework  
for Guelph's Urban Forest Management Plan:**

**Current Status and Relationship to this Plan**



2007 Framework Recommendation	Update	
	Status	Relationship to 2013 – 2032 Urban Forest Management Plan (UFMP)
1. The City should ensure that all policy revisions and updates define the urban forest, identify it as a high priority for protection, and describe it as “green infrastructure” which needs to be actively managed.	Urban forest policies were integrated into the updated Official Plan (OPA 42) along with protection for wooded natural features. OPA 42 currently under appeal.	The 2012 UFMP supports the direction of the new Official Plan, recommends assessing the effectiveness of these new policies (#11) and ensuring other supporting documents are consistent with the new policies (#12).
2. The City should develop comprehensive City-wide policies and guidelines for tree preservation, replacement and enhancement on both public and private lands.	A Tree Technical Manual is being developed as part of the UFMP; planned to be released by City staff in 2012.	The 2012 UFMP supports the finalization and implementation of this as a new City-wide standard (#14).
3. The City should commit to protecting and, where feasible, enhancing the natural linkages within the City and to the County identified through the City’s Natural Heritage Strategy (see Section 8).	Existing and potential natural linkages were identified through the City’s Natural Heritage Strategy, and designated through the new Official Plan (OPA 42). OPA 42 currently under appeal.	The 2012 UFMP supports the direction of the new Official Plan, recommends assessing the effectiveness of these new policies (#11).  Enhancement of natural linkages (and other areas) through reforestation is supported through recommendations #5 and #21.
4. The City’s tree by-law should be reviewed and updated to be consistent with the Municipal Act.	The 1986 Private Tree By-law was revised over 2010 and an updated by-law was passed August 3, 2010.	The 2012 UFMP supports the direction of this by-law and recommends its effectiveness be assessed along with other new tree-related policies (#11).
5. The City should evaluate if existing staffing is adequate to review and enforce tree protection on development sites once more comprehensive policies are put in place. Should a new Tree Preservation By-law be passed, additional staffing (e.g. an arborist also trained in by-law enforcement) may also need to be considered.	The City reviews staffing needs on a regular basis. Since 2007, there has been one arborist position lost (2010). A second Environmental Planner was hired in 2009 to develop and implement tree-related policies.	The 2012 UFMP recommends an increase in staffing to support plan review and site supervision for tree-related activities (Section 7), but no specific recommendation for tree by-law enforcement.
6. The City should develop a Strategic Urban Forest Management Plan and adopt a 20-year strategic planning approach with 5-year management plans and annual operating plans nested within the 20-year plan.	Completed as part of the UFMP.	The 2013 - 2032 UFMP fulfills this recommendation.
7. The City should adopt the principle of adaptive management to ensure that management approaches and priorities can be adjusted as new information is obtained.	Completed as part of the UFMP.	This principle is embedded in the 2013 - 2032 UFMP.

2007 Framework Recommendation	Update	
	Status	Relationship to 2013 – 2032 Urban Forest Management Plan (UFMP)
8. The City should develop and use a series of criteria and indicators to track progress towards short and long-term objectives.	Completed as part of the UFMP.	The baseline assessment is provided in the UFMP ( <b>Appendix C</b> ), and should be re-visited every five years.
9. The City should host workshops or public meetings to get community input into the vision and goals for the Strategic Urban Forest Management Plan (SUFMP).	Completed as part of the UFMP.	Stakeholder consultations and public meetings were held in 2009, 2010 and early 2012.
10. The City should explore options for providing support and coordination of ongoing and potential volunteer activities related to tree planting in the City.	A number of initiatives are underway through the Healthy Landscapes program.	The need for additional support and opportunities are identified in the UFMP. Recommendation #21 supports the need for volunteer coordination through the Senior Urban Forester (#1).
11. The City should support, and provide the resources for, the creation of an Urban Forestry Management Plan Technical Steering Committee to review and evaluate the status of the SUFMP.	Reviewed as part of the UFMP development.	Recommendation #19 supports creation of a technical Urban Forest Advisory Committee comprised of external stakeholders and City staff.
12. The City should explore mechanisms for more inter-departmental coordination regarding proper protection and management of the City's green infrastructure (i.e. its trees) and educate about tree protection guidelines, policies and best practice.	Reviewed as part of the 2012 UFMP development.	Recommendation #2 supports creation of internal, multi-departmental City staff "Tree Team". The Plan also identifies multi-departmental involvement in many action items.
14. The City should determine specific goals for a tree inventory and develop a system of data collection and asset management in the SUFMP.	The City has established a system (using ORACLE) and objectives for municipal tree data collection.	No recommendation required.
15. The City should complete a tree inventory for all trees on City lands outside of natural areas as part of the first 5-year management plan.	Approximately 10,000 trees have been entered to the City's system to date.	The 2012 UFMP recommendation #3 speaks to dedicating new resources to complete a municipal tree inventory over the next two years.
16. The City should collect the tree inventory based on SYNERGEN and use the UTC GIS Toolbox to monitor overall tree canopy cover in the City, and help identify potential planting locations.	A canopy cover study was approved and undertaken over 2011.	A GIS-based approach for tree canopy assessment was undertaken, and a related Greening Strategy is recommended (#16).
17. The City should explore options for administering and maintaining their forestry asset management system (e.g. tree inventory software, database, etc.) as it develops.	The City has selected and developed a system for urban forest asset management (using ORACLE).	Dedicated technical support to improve the use of this system is recommended as part of increasing the City's tree inventory capacity (#3).
18. The City should complete a tree inventory for all municipal woodlands based on accepted forest stand inventory protocols as part of the	Reviewed as part of the 2012 UFMP development.	The 2012 UFMP recommendation #4 supports development of targeted vegetation assessment and risk

2007 Framework Recommendation	Update	
	Status	Relationship to 2013 – 2032 Urban Forest Management Plan (UFMP)
second 5-year management plan.		management plans for City parks.
19. Comprehensive specifications for tree preservation that can be consistently applied to all projects across the City should be developed and implemented. These should include: (1) requirements for newly planted trees that maximize their growth and lifespan potential, (2) requirements for protecting existing trees, and (3) progressive tree cabling practices, integrated with an inspection cycle, to support the preservation of large canopied trees.	Completed as part of the 2012 UFMP.	<p>Provided in the form of a stand-alone Tree Technical Manual for the City, to be released in 2012.</p> <p>Notably, progressive cabling practices have not been specifically included in this document, but are to be developed as part of the City's risk management policy (#8).</p>
20. The City should coordinate an inventory of City trees with a risk assessment of this resource, and commit to implementing corrective measures for identified high risk or hazard trees as a high priority item.	Reviewed as part of the 2012 UFMP development.	More proactive risk assessment is encouraged through the 2012 UFMP in recommendations #4, #5, and specifically in #8.
21. The City should establish a pruning cycle and a grid pruning program for street and park trees to shift from a reactive to a proactive maintenance mode.	Reviewed as part of the 2012 UFMP development.	Implementation of block pruning approach is strongly supported through recommendation #5.
22. Once a preliminary City-wide risk assessment has been conducted, the City should implement an inspection protocol for trees that have been identified as having some level of risk possibly in conjunction with pruning activities.	Reviewed as part of the 2012 UFMP development.	More proactive risk assessment is encouraged through the 2012 UFMP in recommendations #4, #5, and specifically in #8.
23. The City should hire additional qualified staff members to support current operations activities, or consider sub-contracting out to (1) catch up on the back-log of tree pruning / maintenance work, (2) undertake an assessment of risk trees on all City lands and, where required, undertake mitigative measures or removals, and (3) increase the tree replacement ratio.	The City reviews staffing needs on a regular basis. Since 2007, there has been a net loss of one City arborist.	The 2012 UFMP recommends targeted increases in staffing and through contracted labour to support: overall direction and implementation of this Plan (#1), completion of a municipal tree inventory (#3), more proactive tree maintenance and expanded tree planting (#5), undertake plan review and site supervision for tree-related activities (#18), and coordinate and pursue volunteer partnerships (#21).
24. The City should develop a strategy for the monitoring and control of alien invasive species. Where appropriate the City should coordinate its efforts with agencies such as the Canadian Food Inspection Agency, the Canadian Forest Service, the Ontario Ministry of Natural Resources, Grand River Conservation Authority and other area municipalities.	Staff currently monitor for Asian Long-horned Beetle and Emerald Ash Borer (EAB), and remove invasive woody plants (sometimes with volunteers) as time permits. EAB has been confirmed in the County and the City.	<p>The 2012 UFMP recommends an Emerald Ash Borer Strategy (#7) which can be used as a template for strategies for other pests.</p> <p>Invasive plant species management is to be addressed through the vegetation management plans for City parks (recommendation #4).</p>

2007 Framework Recommendation	Update	
	Status	Relationship to 2013 – 2032 Urban Forest Management Plan (UFMP)
25. Once a municipal tree inventory has been undertaken, the City should conduct a study (using GIS) to identify opportunities for reforestation within the City's urban matrix, and work with the County of Wellington and the GRCA to support linkages to natural areas extending outside the City.	Some restoration areas associated with the City's Natural Heritage System have been identified through the new Official Plan. A City-wide plan remains to be done.	The 2012 UFMP recommendation #16 supports a City-wide Greening Strategy.

# Appendix B

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## First Five Year Management Plan 2013 – 2017





Recommendation	COST CATEGORY	2013 - 2017					2018 - 2022	Overall Scope	New Staffing Needs	Comments
		2013	2014	2015	2016	2017				
# 1 – Create a Senior Urban Forester position	OPERATING	\$120,000	\$110,000	\$110,000	\$110,000	\$110,000	\$550,000	2013 - 2032: Prime role in direction and co-ordination of the various initiatives outlined in the UFMP.	1 full-time Senior Urban Forester position	This is a requirement for successful implementation of this Plan as this position is to oversee all of the recommendations in this Plan, and help implement many of them. 2013 includes start-up costs.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 2 – Create an interdepartmental “Tree Team” of City staff	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2013 - 2032: Monthly meetings (12) for core Tree Team. Quarterly meetings (4) for all other Tree Team members.		Should begin immediately with an interim lead if the Sr. Urban forester position is not filled yet. Will require involvement of staff from multiple departments. Meetings for core staff to be monthly, for other staff to be about four times per year.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 3 – Increase capacity to complete an inventory of municipal street and park trees	OPERATING	\$140,000	\$140,000	\$40,000	\$40,000	\$40,000	\$200,000	2013 - 2032: Initial inventory should be completed intensively over no more than two years (e.g., 2012, 2013) then City staff will need to maintain and manage the inventory (2014 - 2031); see Recommendations #4, 5 and 7.	1 half-time GIS/Auto CAD Technician	To be contracted and coordinated by the Senior Urban Forester. Effective collection and integration of inventory data with the City's ORACLE system will require half-time dedicated IT/GIS support. Following completion of initial inventory, additional Forestry Technician support will be required to maintain and update the inventory.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			

Recommendation	COST CATEGORY	2013 - 2017						Overall Scope	New Staffing Needs	Comments
# 4 – Undertake targeted vegetation assessment and management of City parks and natural areas	OPERATING	\$0	\$0	\$75,000	\$75,000	\$80,000	\$430,000	2015- 2022: Vegetation management and risk assessment plans to be developed and implemented for City parks (as prioritized by City staff).		City staff to contract out the development and initial implementation of vegetation management and risk assessment in priority City parks. City staff to coordinate work and undertake follow-up management as required.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 5 – Expand the City’s capacity for planting and maintenance of municipal trees	OPERATING	\$240,000	\$240,000	\$240,000	\$240,000	\$240,000	\$1,200,000	2013 - 2032: Need to increase ability to plant, and maintain existing and new trees on City lands.	2 full-time Forestry Technicians; 1 half-time Administrative Support	At least two full-time Forestry Technicians are required, as well as the Senior Urban Forester to oversee this work. A half-time administrative person will also be required in Operations to help field calls and coordinate work. These staff will also assist with EAB plan response.
	CAPITAL	\$200,000	\$0	\$0	\$0	\$0	\$0			Forestry equipment for new staff.
# 6 – Undertake an Urban Tree Cover (UTC) Potential Plantable Spaces Analysis	OPERATING	\$25,000	\$0	\$0	\$0	\$0	\$25,000	2013: Need to undertake a detailed land cover analysis City-wide to (a) get a more accurate canopy cover and (b) be able to identify potential plantable spaces and assess the feasibility of a 40% canopy cover.		Cost is for obtaining the right kind of aerial photography and the appropriate analytical software. Work anticipated to be undertaken in-house by the Planning & Engineering Department.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			

Recommendation	COST CATEGORY	2013 - 2017						Overall Scope	New Staffing Needs	Comments
# 7 – Develop and implement an Invasive Species and Pest Management Strategy, starting with an Emerald Ash Borer Strategy	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2013 - 2022: Need to prepare and plan for EAB infestation in Guelph, and then implement the response.		External expertise will be required to develop a strategy, and then sustained funds for a period of at least ten years will be required to implement this strategy. To include contracted tree removals and replacement; may also involve treatment of EAB with annual injections of trees. Will require support from City Forestry staff.
	CAPITAL	\$100,000	\$500,000	\$500,000	\$500,000	\$500,000	\$2,500,000			
# 8 – Develop tree risk management policy and train City Arborists in risk assessment	OPERATING	\$0	\$0	\$0	\$44,000	\$44,000	\$220,000	2015 - 2032: Need for dedicated and specialized risk management for long-term care of mature trees.	1 half-time Forestry Technician	Required to develop the policy and train for selected existing staff under the supervision of a Senior Urban Forester. Duties to be shared with plan review and site supervision (Recommendation # 18).
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 9 – Complete a State of the Urban Forest report every five years	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2017, 2022, 2027: Need for review of the state of the urban forest and this Plan every five years.		Work to be undertaken by the Senior Urban Forester with support from City staff as required.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
Recommendation # 10 – Establish a green infrastructure asset valuation	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2018 - 2022: Find the best method of valuing the City's trees, including integration into the City's overall asset management and accounting system.		Work to be undertaken by City staff as a specialized project.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			

Recommendation	COST CATEGORY	2013 - 2017						Overall Scope	New Staffing Needs	Comments
# 11 – Assess the effectiveness of current tree-related policies and legislation, and revise if required	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2013 - 2017: Assess effectiveness of new policies and legislation as they are implemented. 2017 - 2021: Assess need for changes.		Work to be undertaken by City staff in Planning & Building, Engineering and Environment. To include identification of any revisions to be made or recommended.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 12 – Update City documents to be consistent with new tree-related policies, guidelines and legislation	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2014 - 2016: Update existing City documents to be consistent with OPA 42 (once appeals are settled) and the Tree Technical Manual (once finalized by City staff).		Work to be undertaken by City staff in Planning & Building, Engineering and Environment in consultation with other City staff.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 13 – Develop and implement a Public Tree By-law	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2018 - 2022: Need to implement a public tree by-law to complement the private tree by-law.		Work to be undertaken by City staff in Operations, Transit and Emergency Services with support from Legal Services.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 14 – Implement and assess use of the new Tree Technical Manual	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2013 - 2032: Implementation to the through Tree Technical Team (Recommendation #1) and existing as well as expanded review and site supervision (Recommendation #17).		To be led by the Senior Urban Forester, but Manual release and finalization should begin in 2012 with an interim lead even if the position is not filled yet. Will require involvement of staff from multiple departments.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			

Recommendation	COST CATEGORY	2013 - 2017						Overall Scope	New Staffing Needs	Comments
# 15 – Implement and monitor success of new rooting technologies downtown	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2013 - 2032: Install and monitor success of these new technologies in selected hardscapes (i.e., downtown).		Work to be contracted by City staff in Planning & Building, Engineering and Environment in consultation with other City staff. Estimated \$2,000 - \$5,000 per tree, installed.
	CAPITAL	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$500,000			
# 16 – Develop a Greening Strategy building on the Potential Plantable Spaces Analysis	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2018: To use existing analyses / mapping to work with internal and external stakeholders to verify actual "plantable areas" in the City		To be contracted out under direction of the Senior Urban Forester with support from staff in Operations, Parks, Planning and Communications.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$75,000			
# 17 – Track municipal tree removals and plantings	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2018 - 2032: Develop and use of a system for tracking all trees planted and removed under municipal purview.		Will require some effort from staff in various departments (i.e., Operations, Planning, Building, Engineering and Environment staff).
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 18 – Expand the City's capacity to undertake tree-related plan review and site supervision	OPERATING	\$0	\$0	\$0	\$40,000	\$40,000	\$200,000	2015 - 2032: Need for dedicated plan review and site supervision to ensure implementation of tree-related policies and specifications.	1 half-time Forestry Technician	The new Forestry Technician position would share their time between risk management, plan review and site supervision. Under direction of Senior Urban Forester.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			

Recommendation	COST CATEGORY	2013 - 2017						Overall Scope	New Staffing Needs	Comments
# 19 – Create an Urban Forest Advisory Committee (UFAC)	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2013 - 2032: Quarterly meetings (4).		To be facilitated by the Senior Urban Forester.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 20 – Pursue targeted urban forest education and outreach	OPERATING	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000	2012 - 2031: Pursuit of a number of outreach and educational initiatives to raise the profile of the City's urban forest		To be undertaken by City staff. Costs are related to advertising and promotional materials.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 21 – Increase capacity for municipal coordination of volunteers for stewardship activities	OPERATING	\$0	\$0	\$0	\$0	\$0	\$0	2014 - 2032: Ability to become more involved in community stewardship of the urban forest.		Will require direction from the Senior Urban Forester and support from the Forestry Technicians.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
# 22 – Pursue targeted stewardship initiatives, partnerships and funding sources	OPERATING	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000	2015 - 2032: More active direction of and involvement in community stewardship of the urban forest by the City.		Under the direction of the Senior Urban Forester with support from staff in Operations, Planning, as well as Community Services and Communications.
	CAPITAL	\$0	\$0	\$0	\$0	\$0	\$0			
<b>TOTALS</b>		<b>\$945,000</b>	<b>\$1,110,000</b>	<b>\$1,085,000</b>	<b>\$1,169,000</b>	<b>\$1,174,000</b>	<b>\$6,000,000</b>			
<b>YEARS</b>		<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018 - 2022</b>			

# Appendix C

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## Selected Online Urban Forestry Resources





## Selected On-line Urban Forestry Resources

- Candain Forests Website - Links to Sites on Urban Forestry  
[http://www.canadian-forests.com/urban\\_information.html](http://www.canadian-forests.com/urban_information.html)
- 22 Benefits of Urban Street Trees by Dan Burden, 2006  
[http://www.michigan.gov/documents/dnr/22\\_benefits\\_208084\\_7.pdf](http://www.michigan.gov/documents/dnr/22_benefits_208084_7.pdf)
- David Suzuki Foundation - Value of Greenbelt Eco-Services Study  
<http://www.greenbelt.ca/news/press-releases/david-suzuki-foundation-value-greenbelt-eco-services-study>
- Trees Canada Grow Clean Air Program (information on how to become carbon neutral through tree planting)  
[http://www.treecanada.ca/site/?page=programs\\_gca&lang=en](http://www.treecanada.ca/site/?page=programs_gca&lang=en)
- Evergreen Native Plant Database  
<http://nativeplants.evergreen.ca>
- Evergreen Invasive Species Fact Sheets  
<http://www.evergreen.ca/en/resources/native-plants/fact-sheets.sn>
- Ontario Invasive Plant Council - various on-line publications about **invasive species**  
<http://www.ontarioinvasiveplants.ca>
- Clean Air Partnership - Urban Heat Island - various on-line publications related to heat island mitigation and adaptation  
[http://www.cleanairpartnership.org/UHI\\_resources](http://www.cleanairpartnership.org/UHI_resources)
- ISA (International Society of Arboriculture) Trees Are Good Website - excellent and comprehensive information source  
<http://www.treesaregood.org>
- Ontario Nature pamphlet: Urban Forests – An Important Part of Our Natural Heritage  
<http://www.ontarionature.org>
- Compendium of Best Management Practices for Canadian Urban Forests.  
[http://www.treecanada.ca/programs/urbanforestry/cufn/resources\\_bmp.html#\\_top](http://www.treecanada.ca/programs/urbanforestry/cufn/resources_bmp.html#_top)
- Canadian Urban Forest Network  
<http://www.treecanada.ca/programs/urbanforestry/cufn/cufn.html>
- Durham Health Department Sun Safety  
[http://www.durham.ca/health.asp?nr=/departments/health/health\\_protection/sun\\_safety/](http://www.durham.ca/health.asp?nr=/departments/health/health_protection/sun_safety/)
- Land Owner Resource Centre (via the Rideau Valley Conservation Authority)  
<http://www.lrconline.com/lrc/products/index.htm>

This list is not exhaustive, and should be updated with new information and links periodically.



# Appendix D

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## **Criteria and Indicators for Monitoring the State of Guelph's Urban Forest Management (baseline assessment completed in 2012)**



Vegetation Asset*						
Criteria	Performance indicators				Key Objectives	Comments/ Clarification
	Low	Moderate	Good	Optimal		
<b>1. Relative Canopy Cover</b>	The existing canopy cover equals 0-25% of the potential.	The existing canopy cover equals 25-50% of the potential.	The existing canopy cover equals 50-75% of the potential.	The existing canopy cover equals 75-100% of the potential.	Achieve climate-appropriate degree of tree cover, community-wide	Potential canopy cover needs to be determined to enable assessment of criterion.
<b>2. Age distribution of trees in the community</b>	Any Relative DBH (RDBH) class (0-25% RDBH, 26-50% RDBH, etc.) represents more than 75% of the tree population.	Any RDBH class represents between 50% and 75% of the tree population	No RDBH class represents more than 50% of the tree population	25% of the tree population is in each of four RDBH classes.	Provide for uneven-aged distribution city-wide as well as at the neighbourhood level.	RDBH classes to be determined after completion of inventory to enable assessment of criterion.
<b>3. Species suitability</b>	Less than 50% of trees are of species considered suitable for the area.	50% to 75% of trees are of species considered suitable for the area.	More than 75% of trees are of species considered suitable for the area.	All trees are of species considered suitable for the area.	Establish a tree population suitable for the urban environment and adapted to the regional environment.	Clear definition of suitability required. Most trees likely suitable to sites but perhaps not to city-wide context or natural areas.
<b>4. Species distribution</b>	Fewer than 5 species dominate the entire tree population city-wide.	No species represents more than 20% of the entire tree population city-wide.	No species represents more than 10% of the entire tree population city-wide.	No species represents more than 10% of the entire tree population at the neighbourhood level.	Establish a genetically diverse tree population city-wide as well as at the neighbourhood level.	Current numbers estimated but unknown; need to be verified through municipal tree inventory.
<b>5. Condition of Publicly-owned Trees (trees managed intensively)</b>	No tree maintenance or risk assessment. Request based/reactive system. The condition of the urban forest is unknown	Sample-based inventory indicating tree condition and risk level is in place.	Complete tree inventory which includes detailed tree condition ratings.	Complete tree inventory which includes detailed tree condition and risk ratings.	Detailed understanding of the condition and risk potential of all publicly-owned trees	Absence of widespread proactive tree management at the current time.
<b>6. Publicly-owned natural areas (trees managed extensively, e.g. woodlands, ravine lands, etc.)</b>	No information about publicly-owned natural areas.	Publicly-owned natural areas identified in a “natural areas survey” or similar document.	The level and type of public use in publicly-owned natural areas is documented	The ecological structure and function of all publicly-owned natural areas are documented and included in the city-wide GIS	Detailed understanding of the ecological structure and function of all publicly-owned natural areas.	Have Natural Heritage Strategy and NHS policies. Better understanding of management needs and uses in individual parcels required.
<b>7. Native vegetation</b>	No program of integration	Voluntary use of native species on publicly and privately-owned lands; invasive species are recognized.	The use of native species is <i>encouraged</i> on a project-appropriate basis in both intensively and extensively managed areas; invasive species are recognized and their use is discouraged.	The use of native species is <i>required</i> on a project-appropriate basis in both intensively and extensively managed areas; invasive species are recognized and prohibited.	Preservation and enhancement of local natural biodiversity	

\* The original framework refers to the urban forest as a “vegetation resource”, and uses this as the heading for the first seven criteria. However, feedback from the consultations pointed out that the term “resource” implies exploitation from a forestry perspective, and does not reflect the value of trees in an urban setting. Therefore this term has been changed to “asset” here, and elsewhere, in the Plan.

## Community Framework

Criteria	Performance indicators				Key Objective	Comments/ Clarification
	Low	Moderate	Good	Optimal		
<b>8. Public agency cooperation</b>	Conflicting goals among departments and or agencies.	Common goals but no cooperation among departments and/or agencies.	Informal teams among departments and or agencies are functioning and implementing common goals on a project-specific basis.	Municipal policy implemented by formal interdepartmental/ interagency working teams on ALL municipal projects.	Insure all city department cooperate with common goals and objectives	Cooperation currently largely informal for tree matters and alignment of internal departmental goals still required. Cooperation with agencies has been limited and could be improved.
<b>9. Involvement of large private and institutional land holders</b>	Ignorance of issues	Educational materials and advice available to landholders.	Clear goals for treed assets by landholders. Incentives for preservation of private trees.	Landholders develop comprehensive tree management plans (including funding).	Large private landholders embrace city-wide goals and objectives through specific asset management plans.	Improvements in this area presents a significant opportunity for improving urban forest stewardship,
<b>10. Green industry cooperation</b>	No cooperation among segments of the green industry (nurseries, tree care companies, etc.) No adherence to industry standards.	General cooperation among nurseries, tree care companies, etc.	Specific cooperative arrangements such as purchase certificates for “right tree in the right place”	Shared vision and goals including the use of professional standards.	The green industry operates with high professional standards and commits to city-wide goals and objectives.	Industry has standards which they are generally meeting – City cannot require more than standards, but can explore additional incentives.
<b>11. Neighbourhood action</b>	No action	Isolated or limited number of active groups.	City-wide coverage and interaction.	All neighbourhoods organized and cooperating.	At the neighbourhood level, citizens understand and cooperate in urban forest management.	Some groups active but average homeowners not engaged.
<b>12. Citizen-municipality-business interaction</b>	Conflicting goals among constituencies	No interaction among constituencies.	Informal and/or general cooperation.	Formal interaction e.g. Tree board with staff coordination.	All constituencies in the community interact for the benefit of the urban forest.	City does have informal cooperation with County and some industry reps (e.g., Guelph Hydro).
<b>13. General awareness of trees as a community asset</b>	Trees seen as a problem, a drain on budgets.	Trees seen as important to the community.	Trees acknowledged as providing environmental, social and economic services.	Urban forest recognized as vital to the communities environmental, social and economic well-being.	The general public understanding the role of the urban forest.	Few individuals may appreciate street trees but there is active group-based advocacy. Need for a clear measure of involvement and awareness.
<b>14. Regional cooperation</b>	Communities operate independently.	Communities share similar policy vehicles.	Wide-scale planning beyond municipal boundaries is in effect.	Regional planning, coordination and /or management plans	Provide for cooperation and interaction among neighbouring communities and regional groups.	City of Guelph is single-tier and therefore does not need to implement regional planning, but could improve and formalize cooperation within Wellington County and beyond.

## Urban Forest Management Approaches

Criteria	Performance Indicators				Key Objective	Comments/ Clarification
	Low	Moderate	Good	Optimal		
<b>15. Tree Inventory</b>	No inventory	Complete or sample-based inventory of publicly-owned trees	Complete inventory of publicly-owned trees AND sample-based inventory of privately-owned trees.	Complete inventory of publicly-owned trees AND sample-based inventory of privately-owned trees included in city-wide GIS	Complete inventory of the treed asset to direct its management. This includes: age distribution, species mix, tree condition, risk assessment.	Currently have inventoried less than 20% of all municipally-owned trees.
<b>16. Canopy Cover Inventory</b>	No inventory	Visual assessment	Sampling of tree cover using aerial photographs or satellite imagery.	Sampling of tree cover using aerial photographs or satellite imagery included in city-wide GIS	High resolution assessments of the existing and potential canopy cover for the entire community.	Have completed canopy cover estimates; a more detailed City-wide assessment using the current imagery and land cover mapping is required..
<b>17. City-wide management plan</b>	No plan	Existing plan limited in scope and implementation	Comprehensive plan for publicly-owned intensively- and extensively-managed forest assets accepted and implemented	Strategic multi-tiered plan for public and private intensively- and extensively-managed forest assets accepted and implemented with adaptive management mechanisms.	Develop and implement a comprehensive urban forest management plan for private and public property.	To be completed over 2011.
<b>18. Municipality-wide funding</b>	Funding for reactive management	Funding to optimize <i>existing</i> urban forest.	Funding to provide for net increase in urban forest benefits.	Adequate private and public funding to sustain maximum urban forest benefits.	Develop and maintain adequate funding to implement a city-wide urban forest management plan	
<b>19. City staffing</b>	No staff.	Limited training of existing staff.	Certified arborists and professional foresters on staff with regular professional development.	Multi-disciplinary team within the urban forestry unit.	Employ and train adequate staff to implement city-wide urban forestry plan	Limited training for staff.
<b>20. Tree establishment planning and implementation</b>	Tree establishment is <i>ad hoc</i>	Tree establishment occurs on an annual basis	Tree establishment is directed by needs derived from a tree inventory	Tree establishment is directed by needs derived from a tree inventory and is sufficient to meet canopy cover objectives (see Canopy Cover criterion in Table 1)	Urban Forest renewal is ensured through a comprehensive tree establishment program driven by canopy cover, species diversity, and species distribution objectives	Currently about 3:1 replacement of municipal trees removed.



## Urban Forest Management Approaches

Criteria	Performance Indicators				Key Objective	Comments/ Clarification
	Low	Moderate	Good	Optimal		
<b>21. Tree habitat suitability</b>	Trees planted without consideration of site conditions.	Tree species are considered in planting site selection.	Community-wide guidelines are in place for the improvement of planting sites and the selection of suitable species.	All trees planted in sites with adequate soil quality and quantity, and growing space to achieve their genetic potential	All publicly-owned trees are planted in habitats which will maximize current and future benefits provided to the site.	With infill and density development, providing adequate sites is becoming difficult. Site locations for some trees may not be suitable, but considered in planning.
<b>22. Maintenance of publicly-owned, intensively managed trees</b>	No maintenance of publicly-owned trees	Publicly-owned trees are maintained on a request/reactive basis. No systematic (block) pruning.	All publicly-owned trees are systematically maintained on a cycle longer than five years.	All mature publicly-owned trees are maintained on a 5-year cycle. All immature trees are structurally pruned.	All publicly-owned trees are maintained to maximize current and future benefits. Tree health and condition ensure maximum longevity.	Trees are mostly maintained on a reactive basis with some exceptions.
<b>23. Tree Risk Management</b>	No tree risk assessment/ remediation program. Request based/reactive system. The condition of the urban forest is unknown	Sample-based tree inventory which includes general tree risk information; Request based/reactive risk abatement program system.	Complete tree inventory which includes detailed tree failure risk ratings; risk abatement program is in effect eliminating hazards within a maximum of one month from confirmation of hazard potential.	Complete tree inventory which includes detailed tree failure risk ratings; risk abatement program is in effect eliminating hazards within a maximum of one week from confirmation of hazard potential.	All publicly owned trees are safe.	
<b>24. Tree Protection Policy Development and Enforcement</b>	No tree protection policy	Draft policies in place to protect public trees.	Policies in place to protect public and private trees with enforcement.	Integrated municipal wide policies that ensure the protection of trees on public and private land are consistently enforced and supported by significant deterrents	The benefits derived from large-stature trees are ensured by the enforcement of municipal wide policies.	Tree Protection Policy being finalized as part of UFMP. Private tree protection by-law in place.

## Urban Forest Management Approaches

Criteria	Performance Indicators				Key Objective	Comments/ Clarification
	Low	Moderate	Good	Optimal		
<b>25. Publicly-owned natural areas management planning and implementation</b>	No stewardship plans or implementation in effect.	Reactionary stewardship in effect to facilitate public use (e.g. hazard abatement, trail maintenance, etc.)	Stewardship plan in effect for each publicly-owned natural area to facilitate public use (e.g. hazard abatement, trail maintenance, etc.)	Stewardship plan in effect for each publicly-owned natural area focused on sustaining the ecological structure and function of the feature.	The ecological structure and function of all publicly-owned natural areas are protected and, where appropriate, enhanced.	

