Haldimand County Forest Strategy

Prepared for Haldimand County

May 2016

By

WILLIAMS & ASSOCIATES
Forestry Consultants Ltd.

TABLE OF CONTENTS

List of Figures

List of Tables

Appendices

EXECUTIVE SUMMARY

In March 2015 County Council adopted a staff report "To seek Council's approval for staff to further research tree management best practices across Haldimand County and report back with a proposed strategy." In the report Council recognized that there should be a County-wide strategy to deal with all tree-related issues on County-owned land.

This Forest Strategy and Management Plan will help set the direction for Haldimand County to understand more about its urban and rural forest, the environmental benefits it provides and the community's interests; to develop an infrastructure to help maintain and improve the trees and forest; and to develop methods to monitor, maintain and regenerate the forest owned and/or managed by Haldimand County. This includes publically-owned forest on urban streets, parks, cemeteries, and rural roads. In this context the forest refers to the trees, forests, greenspace and related abiotic, biotic and cultural components in areas extending from the urban core to the rural fringe. The strategy covers a five-year period from 2017 to 2021.

The urban forest is a key element of green infrastructure. Without healthy trees and forests, Haldimand County would not achieve its vision of environmental integrity, social wellbeing and economic vibrancy as laid out in its Strategic Direction and Official Plan.

The Forest Strategy includes a vision statement, guiding principles and goals. It provides information on current regulatory and operational situations in Haldimand County, forest benefits, management concerns and public consultation. The Forest Management Plan provides direction on establishing infrastructure management of the forest.

A Vision Statement reflects the desired outcomes of successful implementation of the Management plan. It was developed in consultation with the Forest Strategy and Management Working Committee and community to meet the needs of the County for County-owned trees and forests.

> **Haldimand County, being committed to preserving our natural beauty, values and is dedicated to protecting and managing its urban and rural forest, for the environmental, economic, community and health benefits these forests provide to its residents.**
>
> **Haldimand County will, in partnership with its residents, businesses and stakeholders work to promote and increase urban forest coverage that is a diverse, healthy and sustained asset for future generations.**

Guiding principles are intended to guide the development of the Management Plan and implementation of the plan. These statements represent best practices in the urban and rural forest in Haldimand County. Based on the guiding principles, Haldimand County will work towards a series of goals through the implementation of the management plans. Details of guiding principles and goals are found in Section 2.

Haldimand County is a rural county with a number of small towns and villages. There are numerous parks and cemeteries and over 1,500 km of roads. Background information and context about Haldimand

County are found in Section 3.1. The Haldimand Official Plan (OP) has no explicit support or policy for managing the County-owned forest. There are numerous by-laws and provincial legislation that effect forests and trees in the County. The existing regulatory environment regarding the forest of the County is described Section 3.2. Management of County trees and forests is under the jurisdiction of several departments. There is no full time dedicated staff to tree/urban forest issues. There is currently a backlog of work orders. Information on existing tree related initiatives and tree management occurring in the County is described Section 3.3.

The benefits of the urban forest are widely recognized and documented. Trees in urban areas provide important economic, environmental, community and human health benefits. The community's trees will need to be managed in order to maintain this stream of benefits which are critical to the community's economic well-being and overall quality of life. **Unlike traditional municipal infrastructure such as transportation systems that depreciate, green infrastructure accrues in value and provides greater benefits to the community as time passes.**

Dealing with the urban forest is not without its challenges. There are a number of factors that can adversely affect the management and overall health of the County's trees and forests and these should be factored into the decision-making process when establishing forest policies. Most important among these are lack of policy protection to manage the forest, competition with built infrastructure, ensuring the right tree is planted in the right place, and the effects of pests, pathogens and climate change. Section 3.4 describes benefits of the urban forest and threats and challenges to it.

A Forest Strategy and Management Plan can be effective tools to ensure that municipal resources are efficiently directed, efforts are coordinated and cooperative and existing and potential partnerships are leveraged.

County trees are the citizens' trees and many residents will be compelled to comment on and otherwise advise how County-owned trees are managed. The development of the Forest Strategy and Management Plan included public comment opportunities on this strategy and the subsequent plan.

A public presentation was scheduled for citizens to hear about and comment on the development of the draft Forest Strategy and Management Plan outline. The presentation was also meant to develop community interest about the forest to see how the community can be involved in protecting and building the County's trees and forests. Although the presentations were not about the privately owned trees, ideas for engaging and educating the public are further outlined in the Management Plan. Section 4.0 explains the community involvement process for commenting on the Forest Strategy and Management Plan.

Adequate efforts were made to inform and receive input from the public throughout the vision, guiding principles and goals development. A survey was developed and was available on-line to obtain feedback regarding the draft vision, guiding principles and goals along with the content outline for the management plan. Overall public feedback was positive.

A sample inventory was done that included street, cemetery and park trees in Caledonia, Cayuga, Dunnville, Hagersville and Jarvis. Nearly 1,530 trees were surveyed to provide a reasonable indication of

the urban forest population. The surveys indicated that silver maple is the most common species (20% - primarily on streets), followed by Norway spruce (11% - most in parks & cemeteries), Norway maple (11 %) and Ash (9%, mostly in parks). Silver maple also had the highest number of large trees, most with maintenance needs. Silver maple has the most conflict with public utilities and because there are many large trees there are more maintenance requirements. Maintenance needs are high particularly on street trees. The ash component will drop out within the next few years as ash are removed due to Emerald Ash Borer. Removal of ash in areas of high concentration will result in a number of potential planting areas. Although 56 species were identified, there is potential to plant other species. Preliminary information on the tree inventory sample is found in Section 5.0.

A set of criteria and indicators are included to provide a baseline indication of Haldimand County's forest. They should be used to measure, monitor and evaluate the implementation of the Management Plan at the end of each 5- year period.

A Management Plan will be developed as part of the next phase.
It is clear from the inventory that:

- there are a large number of hazard trees where maintenance is required,
- there is a low diversity of tree species,
- a large number of trees will be removed due to Emerald Ash Borer infestation.

The Inventory should be completed for all County-owned trees along roads and in cemeteries and parks.

The County must develop policy, regulation, and guidelines to:

- support efforts in improving tree health, and reducing tree hazards,
- protect trees during construction and development,
- support tree establishment in the correct locations,
- deal with the large number of dying ash,
- deal with the waste wood resulting from tree removals.

The County must work with citizens and other partners to improve tree cover in the County.

ACKNOWLEDGEMENTS

The Haldimand County Forest Strategy and Management Plan was developed with the input and support of the County's Forest Strategy and Management Plan Working Committee. Committee members included:

Working Committee
Sheila Wilson, Committee Co-Chair Manager, Community Development & Partnerships
Justin Miller, County Planner
Sam Bono, Supervisor, Roads Operations
Adam Chamberlin, Arborist, Norfolk County
Randy Charlton, Manager, Building Controls & By-Law
Brent Hammond, Manager, Roads Operations
Phil Mete, Manager, Facilities & Parks Operations
Peter Minkiewicz, Supervisor, Development Services
Phil Nie, Supervisor, Facilities & Parks Operations

Also
Katrina Schmitz, Community Partnership Liaison
Mike King, Project Manager, Municipal Infrastructure
Cindy King, Administrative Assistant
Lisa McCaughey Division Support
Matthew Davis, Senior GIS Technologist
Bobbi-Jo Grant, Admin Assistant, CDP

Contact Information:
Williams & Associates
5369 Wellington Road 27
R. R. #1
Rockwood, ON
N0B 2K0

Email: forstar@execulink.com
519-856-1286

PREFACE

Haldimand County engaged Williams & Associates, Forestry Consulting Ltd. to develop a Forest Strategy with vision, guiding principles and goals which direct development of the Management Plan. The Plan will include recommendations for a real-time inventory, maintenance standards, address Emerald Ash Borer (EAB) mitigation, and opportunities for revenue and replanting. The project was guided by a Working Committee consisting of staff from county departments and other agencies involved in managing the County forest.

The project started by developing an understanding of the infrastructure involved in managing Haldimand forest assets. A sample urban tree inventory was conducted at selected locations in five urban centres to characterize trees in the urban forest. This was done to assess tree condition and maintenance needs, and as input when developing recommended management strategies and infrastructure to provide for a productive and safe forest. This improved understanding of the existing urban forest will help the county move forward in developing the infrastructure and practices to keep its urban forest healthy and better deal with forest health problems such as EAB. The understanding of the forest also assists with risk management.

The sample inventories and discussions with the Forest Strategy and Management Plan Working Committee provided the baseline information/assessment of current status to start the process of developing of a Forest Strategy, and Management Plan. Williams & Associates assessed current practices and policies through the Working Committee as the project proceeded. This process identified financial, staff and equipment needs, budgets and schedules appropriate for the Haldimand County and its resources.

1.0 STRATEGY

Haldimand County has the responsibility of managing trees on its own lands, ensuring public safety, and maintaining the urban and rural forest for the health of the forest and residents of the County. There are many values that forests and trees contribute in urban and rural environments, including: community health and aesthetics; shade, shelter and energy savings; environmental quality and wildlife habitat; and ameliorating climate change by improving carbon cycles and reducing fuel consumption. On County lands. A high priority in the County is maintaining the health and safety of trees in public-use areas such as roadsides, cemeteries and developed parks. Safety concerns with trees in County-owned woodlands that are along trails and near property lines adjoining developed private properties are also important. Haldimand County, like many Ontario municipalities, is dealing with Emerald Ash Borer (EAB) which is killing ash that have not been protected with pesticides. EAB-induced changes in urban forests and woodlands are forcing municipalities to revise their forest management plans.

This project is divided into two parts; 1) Forest Strategy and 2) Management Plan. The Strategy provides purpose, definition, rational, vision, guiding principles, and goals, current regulatory and operational situation and public consultation. The Management Plan, in a separate document, details action items for the strategies to support the forest, including developing policies and procedures, results of tree inventory, an Emerald Ash Borer plan, and identifies the necessary resources and suggested timelines to see the Management Plan implemented.

1.1 Defining the Urban Forest

Urban forestry was first defined by Eric Jorgensen at University of Toronto in the early 1970's. He defined urban forestry as "… a specialized branch of forestry and 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."

In the first Canadian Urban Forest Conference (Deneke, 1993) expanded on the term: "Urban forestry is the sustained planning, planting, protection, maintenance, and care of trees, forests, greenspace and related resources in and around cities and communities for economic, environmental, social, and public health benefits for people. "

From these definitions, the urban forest can be defined as: trees, forests, greenspace and related abiotic, biotic and cultural components in areas extending from the urban core to the urban-rural fringe. *(Canadian Urban Forest Strategy 2013-2018)*

Urban forests broadly include urban parks, street trees, landscaped boulevards, public gardens, river and coastal promenades, greenways, river corridors, wetlands, nature preserves, natural areas, shelter belts of trees and working trees at industrial brownfield sites. The box shows the components of the urban forest both private and public. This Strategy and Management Plan applies only to County-owned streets, rural ROW trees, parkland, cemeteries and natural areas. The sample inventory for this project looked at trees

on selected streets, cemeteries and parkland in the five urban areas of Caledonia, Cayuga, Dunnville, Hagersville and Jarvis.

2.0 Purpose, Vision, GUIDING Principles, Goals

The vision, guiding principles and goals provide a guiding framework that takes into account the local context and specific management issues faced by the County. They have been developed with consideration for Haldimand County's biophysical and land use context, and in consultation with the Forest Working Committee. They also support the County's broader commitments to environmental sustainability by integrating with the County's Vision statement.

2.1 Purpose

The purpose of the Forest Strategy is to provide a comprehensive suite of strategies– supported by the public - that will enhance the trees and forests over time, and address the risk management and design issues that face the community. It provides a framework within which planning, design, budget and risk management decisions can be made.

This Forest Strategy will help set the direction for the County to understand more about its urban and rural forest, the environmental benefits it provides and the community's interests; to develop an infrastructure to help maintain and improve the trees and forest; and to develop methods to monitor, maintain and regenerate the forest.

Green infrastructure is defined as natural vegetation and vegetative technologies that collectively provide society with a broad array of products and services for healthy living. (Green Infrastructure Ontario).

Green infrastructure takes many forms including but not limited to the following: urban forests, natural areas, greenways, streams and riparian zones, meadows and agricultural lands; green roofs and green walls; parks, gardens and landscaped areas, community gardens, and other green open spaces; rain gardens, bioswales, and engineered wetlands.

Green infrastructure also includes soil- in volumes and qualities adequate to sustain living green infrastructure and absorb water, as well as technologies like porous paving, rain barrels, cisterns and structural soils.

Green infrastructure provides a multitude of economic, social, environmental and health benefits, most of which are not recognized in our current legislation and policies. These benefits are described later.

The infrastructure includes County policy, staff and resources, partnerships with agencies and companies, and links with the Haldimand community and the benefits it provides to the community and environment, the interests of the community. The urban forest is a key element of green infrastructure. Without healthy trees and forests, the County would not achieve its vision of environmental integrity, social wellbeing and economic vibrancy as laid out in its Strategic Direction and Official Plan.

2.2 Policy Support for this Strategy

In March 2015 County Council adopted a staff report "To seek Council's approval for staff to further research tree management best practices across Haldimand County and report back with a proposed strategy." In the report, Council recognized that there should be a County-wide strategy to deal with all tree-related issues on County-owned land. The full report is found in Appendix A.

Background information and context are found in Section 3.1. The existing regulatory environment regarding the forest in the County is described Section 3.2. Information on existing tree related initiatives and tree management occurring in the County is described Section 3.3. Section 3.4 describes benefits of the urban forest and threats and challenges to it. Section 4.0 explains the community involvement process. Preliminary information on the tree inventory sample is found in Section 5.0. A set of criteria and indicators for Haldimand County is Section 6.0 and Appendix D. A summary of what this all means is Section 7.0. Next steps are found in Section 8.0.

2.3 Vision

The Vision Statement reflects the desired outcomes of successful implementation of the Forest Strategy and Management Plan. It was developed in consultation with the Forest Strategy and Management Plan Working Committee to meet the needs of the County for County-owned trees and forests.

Haldimand County, being committed to preserving our natural beauty, values and is dedicated to protecting and managing its urban and rural forest, for the environmental, economic, community and health benefits these forests provide to its residents.

Haldimand County will, in partnership with its residents, businesses and stakeholders work to promote and increase urban forest coverage that is a diverse, healthy and sustained asset for future generations.

2.4 Guiding Principles

Guiding Principles are intended to guide the development of the Forest Strategy, Management Plan and implementation of the plan. These statements represent best practices in the urban and rural forest in Haldimand County.

I. Increased understanding of the County's urban forest will support more effective management.

II. Trees are municipal infrastructure and managed within an integrated asset framework.

III. The County strives to have efficient and cost-effective management of its urban forest.

IV. County trees are maintained in a healthy and safe condition through good management practices.

V. The right tree is planted in the right place to establish and maintain an optimal level of age and species diversity, and to maximize benefits and minimize hazard, nuisance, hardscape damage, and maintenance costs.

VI. The community is engaged in the support of the conservation, management and stewardship of the local urban forestry program.

VII. County trees are monitored and assessed periodically.

VIII. An adaptive management approach is used to adjust management practices as needed using current information and research.

IX. Well-managed privately owned trees also contribute to the urban forest.

X. Work towards optimal levels of tree/canopy cover to maximize urban forest benefits.

XI. New technologies are used to integrate trees in existing and new developed settings.

XII. Heritage tree policies are considered important.

2.5 GOALS

Based on the Guiding Principles, Haldimand County will work towards the following goals through the implementation of this strategy and subsequent management plans.

1. To undertake an inventory of County-owned urban and roadside trees and forests to identify tree species, age, condition and recommendations for maintenance, removal and replacement.

2. To develop a policy framework, infrastructure and procedures for trees on County lands with respect to tree maintenance, removal and replanting practices so that the urban forest is recognized as green infrastructure and a municipal/community asset.

3. To improve the resilience of the urban forest to current and anticipated stressors, including climate change, pests and diseases by implementing policies and management practices that optimize tree species diversity, structure and age classes, with appropriate monitoring.

4. To utilize human resources efficiently and effectively to address the tree-related activities.

5. To prioritize protection and maintenance of mature, healthy trees and preservation of older large-canopied species to the greatest extent possible.

6. To transition towards proactive tree establishment and replacement whereby all potential plantable spots on the County lands are explored and apply "right tree, right place" principles, except where policy requires that new trees be planted on adjacent private property development.

7. To build awareness and engagement among County staff and the community, regarding the importance and value of the urban forest and the County's efforts to sustain this resource.

8. To expand stewardship initiatives, and develop more partnerships that support the urban forest with initiatives such as tree planting and maintenance.

9. To use new technologies in selected areas for integration of trees in hardscapes such as downtown centres and parking lots.

10. Based on the current plan, in year four, update the Forest Management Plan and associated Operating Plans to ensure that the Forest Management Plan and operating budgets are updated on a regular basis.

3.0 Strategy Background

3.1 The Context for Haldimand County's Forest

Haldimand County is located within the Golden Horseshoe, Ontario's most populous region, with a population of 45,200 and a rural landscape of 1,251 square km, which includes 83 km of shoreline along Lake Erie. Its climate is one of the mildest in Ontario. There are six urban areas including Caledonia, Cayuga, Dunnville, Hagersville, Jarvis and Townsend and a number of hamlets, but the County is mainly rural.

Haldimand County was first settled by European and British Loyalists in the late 1700's. Forest clearing and settlement building began as more settlers came. Probably every tree on cultivated land and settlement was cleared or every acre was logged. The County has been predominantly an agricultural community; however a growing industrial and tourism base are important features. Natural/forest cover is 14 percent of the County, consisting mainly of farm woodlots often in the rear of the property, and forests along watercourses and wetlands.

Haldimand County is dominated by the Haldimand Clay Plain physiographic region, with soils deposited during the deep water stages of the post-glacial lakes. Surface soils are mainly clays and silts, except in the Dunnville area where sands overlay the clay. There is exposed limestone pavement (alvar) and karst topography in some areas that also have deep, subterranean catacombs in the limestone bedrock.

The forest is part of the Deciduous Forest Region and the Carolinian Life Zone in Ecodistrict 7E5, an ecological zone that supports native plants and animals having affinities with more southerly areas. Trees typical of the Carolinian Zone include black walnut, shagbark hickory, American chestnut, black oak, tulip tree, sassafras and sycamore.

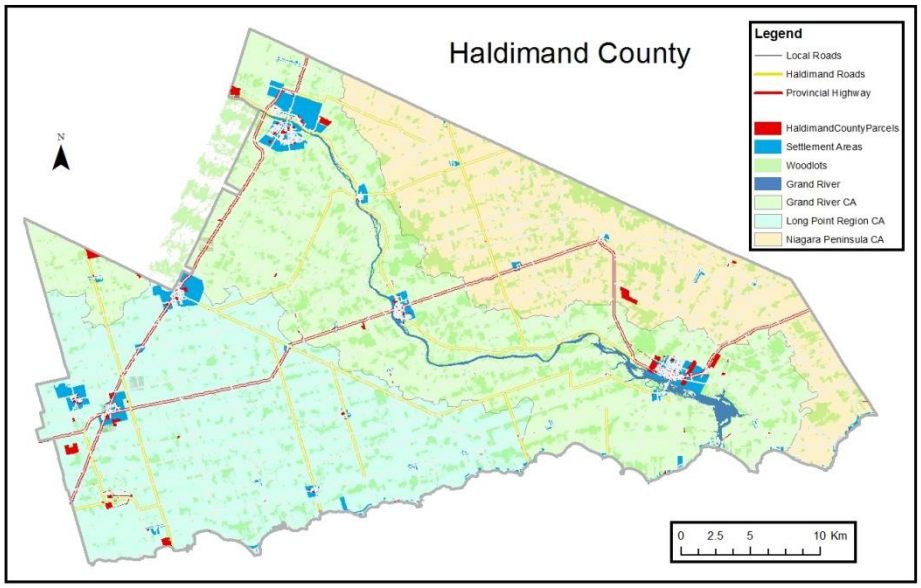


Figure 3.1. County map showing Conservation Authority boundaries, settlement areas, County lands and woodlots.

The County is bisected by the Grand River, a Canadian Heritage River that extends through Haldimand from the north to its mouth at Port Maitland on Lake Erie. Haldimand County also has many protected areas. Several provincial parks line the edge of Lake Erie within the County, and include Selkirk Provincial Park, James N. Allan Provincial Park, and Rock Point Provincial Park. Three Conservation Authorities have jurisdiction within the county. Niagara Region, Grand River and Long Point Region Conservation Authorities cover the County from east to west respectively and each own a number of properties. See Figure 3.1.

An extensive trail system and many heritage properties offer opportunities for community connection and outdoor activities including hiking, bird watching, cycling and canoeing (Haldimand County Economic Development, 2010) (Haldimand County, 2011).

Haldimand County owns 203 ha of active and passive parks, 31 ha of cemeteries, 115 ha of managed forest, 346 ha of municipal infrastructure, forest, industrial and other land under various levels of management. See Table 3.1. As well, the County manages a large park (including tree management) on a Grand River CA property and numerous small cemeteries. There are just over 1,500 km of roads and streets in the County including 145 km of streets in the five urban areas. Depending on location and public use, the County has to deal with tree management issues on its property. However, because of the higher public use, most maintenance concern is on street trees. Most tree planting opportunities may be on some of the urban and rural lands not designated for development.

Table 3.1. Land class, numbers of properties and area of Haldimand owned land

Land Class	# of Parcels	Area (ha)
Park (Not including managed forest)	50	203
Cemetery	21	31
Other land in urban area Including public infrastructure, ROW, forests but not including roads	171	205
Land in rural area	89	141
Managed forest land	5	115
Total area owned by Haldimand	**336**	**695**

Based on Ontario Places to Grow estimates, the County is forecasted to increase by approximately 1.1 percent in population and housing between 2011 and 2041. Population is expected to increase by 17,300 growing from 46,700 persons in 2011 to 64,000 in 2041. This represents an average annual population growth rate of 1.1 percent similar to Ontario's overall growth. Haldimand County's housing base is forecast to increase from approximately 16,830 in 2011 to 24,140 in 2041. All urban areas are expected to grow. Caledonia is projected to double its population from 10,800 in 2016 to approximately 21,200 by 2041 mainly due to its close proximity to Hamilton. (Watson & Associates Economists Ltd, 2014.)

The result of this expansion will be new trees planted along streets in new construction (although mostly on private property) and new public parks established. Having a plan to plant and manage these trees, as well as one to educate citizens, will benefit the community and save costs in the future. Involving community partners will result in greater acceptance and understanding of the value of trees. This green infrastructure will continue to increase in value for more than two generations.

3.2 Current Policy and Regulatory Status of Forestry in Haldimand County

3.2.1 County Policy

3.2.1.1 County Official Plan

The Haldimand County Official Plan (OP) was adopted in by Council in 2006 and approved by the Ministry of Municipal Affairs and Housing in 2009. The OP has specific policies for development and site alteration required to protect the Natural Environment as mandated by the Provincial government including Provincially Significant Wetlands, and Habitat for Endangered and Threatened Species, and adjacent lands. There are general policies for protecting other significant natural environmental features but no Significant Woodlands guidelines). Many municipalities in southern Ontario have policies addressing woodland protection. Haldimand County has a Forest Conservation Bylaw for privately owned woodlands. **The Haldimand OP has no explicit support or policy for managing the County-owned forest.** The OP does not specifically use the words "urban forest" or "green infrastructure", but clearly asserts the importance of green spaces and natural areas to the community, and provides specific direction to development projects.

Sections that reference trees are mostly referring to private lands, however some could apply to County-owned land as well. Areas in the OP that refer to trees include:

- Site Plan Control requires buffering and landscaping that require "Landscaped vegetation in the form of trees and bushes or grassed areas preferably using indigenous plant material";

- Regarding Commercial development in Commercial areas;
  - Landscaping requires "New street trees shall be required to be planted on private property along the road frontages";
  - "A variety of plant material should be provided including perennials, shrubs, coniferous and deciduous trees, and groundcovers";
  - "Exotic or non-species, which are considered invasive, should not be used";

- In Dunnville, specifically along Broad Street, the streetscape plan requires tree planting for an attractive environment;

- In the section on Site – Specific Policies, the County undertook to establish Urban Design Guidelines that include among other things, tree preservation and conservation of natural environment areas. These guidelines are meant for new residential development in designated greenfield areas.

Through its OP Haldimand County encourages active transportation such as walking and cycling. "The development of streetscapes that are safe, convenient and attractive for pedestrians shall be encouraged through measures such as …, trees ….".

3.2.1.2 Haldimand County Streetscape Plan and Urban Design Guidelines

The Haldimand County Streetscape Plan and Urban Design Guidelines is a short-term plan and implementation strategy that guides County-funded initiatives into streetscape improvements for the urban areas and rural hamlets in the County. Implementation started in 2010 and all five urban areas have

started implementation. The hamlet plan has also been approved for six hamlets with four of them receiving an initial phase of construction (Selkirk, Fisherville, York, and Byng) and two to take place in 2016 (Port Maitland and Rainham Centre).

This work is intended to be a catalyst to; stimulate private sector investments of property within the designated downtown area, improve the physical and visible qualities of the downtown area, protect and enhance attributes of the historical crossroads and downtown core, and promote economic development by increasing opportunities for shopping, tourism, employment, and living in the downtown area. Streetscaping elements will include lighting, street furniture, cross-walk materials, and landscaping measures. (Office for Urbanism, 2010).

Trees and landscaping are shown in every plan as an integral part of the beautification. These trees will be located on the public right-of-way. These plans define number, situation, size and cost of trees to be planted. Specifically and most important the original plans call for "determining the ideal healthy state of trees, the care required to maintain health (such as avoiding over-salting of streets, which kill tree roots), and any regular pruning, hedging, or planting required." (Office for Urbanism, 2010).

The Rural Streetscape Plan (RSP) is being developed for six identified hamlets: York; Byng; Port Maitland; Rainham Centre; Fisherville and Selkirk, and will identify recommended improvements to the public places and spaces. The intent is to improve the physical and visible qualities of the core areas of each hamlet, protect and enhance attributes of the historical crossroads, and increase opportunities for shopping, tourism, and employment. Streetscaping elements can include lighting, street furniture, decorative cross-walks, and landscaping measures.

The Urban Design Guidelines provide aesthetic direction for both private sector and the County, for ongoing development of these areas. Guidelines are provided for placement, species, size and situation for trees.

3.2.1.3 Haldimand County Design Criteria

Haldimand County Design Criteria for Street Tree Planting (Section 0) was revised in 2015. It guides tree planting on new developments on private lands but may apply on public lands. It lays out locations and spacing, time of planting, types of trees, quality and source, installation and use of trees as screens (Haldimand County, 2015).

3.2.2 By-laws and Related Legislation

3.2.2.1 Property Standards By-law 730/06

The Property Standards By-Law can ensure that yards, lots and vacant places "shall be kept clean and free from…dead, decayed or damaged trees or other unmaintained natural growth' and 'trees or parts thereof that have expired shall be removed or maintained in a condition which is not hazardous to person expected to be on or about the property."

3.2.2.2 Policy #2014-02 Public Conduct on Haldimand County Property

This policy provide for consequences for acts of vandalism as well as inappropriate behaviors and violence to County property. Damage to trees and other natural heritage is not specifically mentioned in the vandalism section, but includes arson, graffiti and theft.

3.2.2.3 Cemetery By-law 1501-15

This by-law protects trees in cemeteries owned by the County. There are 84 cemeteries in the County. However, the County is responsible for maintaining the cemetery landscaping and trees on the 19 County-owner cemeteries and on 20 inactive cemeteries accounting for about 42 hectares. The active cemeteries - nine the County owns and 10 the county maintains, but does not own, cover 31 hectares. Trees and shrubs can be planted only with the permission of the County. The County is responsible for trees and shrubs "in any lots which have become detrimental to adjacent lots, drains, roads or walkways by means of their roots or branches, which negatively affect the general appearance of the cemetery, that are diseased or pose a safety hazard and may be removed by the Corporation."

3.2.2.4 Public Parks and Facilities By-law 1535-15

Under this by-law the injury or damage to property is prohibited.
"No person shall in any Public Park:
a. injure any Natural Attribute or tree;
b. injure any Parkland;
c. climb any building, structure or equipment unless it was intended or designed for recreational climbing;
d. cut any vegetation along the banks of the Grand River or other riverbank unless authorized by the County and the Grand River Conservation Authority."

3.2.2.5 Forest Conservation By-law 15-00

Existing trees in woodlands in Haldimand County are protected by the Regional Municipality of Haldimand-Norfolk Forest Conservation By-law 15-00. The OP states "development within and/or adjacent to woodlands as defined by the Forest Conservation By-law may be reviewed by the County Forester. Prior to removal of trees within woodlands defined in the Forest Conservation By-law, a permit may be required." This by-law pre-dates municipal restructuring however, remains in effect for regulating the cutting or destruction of trees in woodlands in Haldimand County. The County has a By-Law officer that enforces this bylaw and a contract with Norfolk County for Forestry Conservation and Management Services to support the By-law and provide other services as noted below. The cost of these services in 2014 was approximately $26,110. This contract management activity is administered by the Building Controls & By-law Enforcement Division.

Haldimand Contract with Norfolk County for Forestry Conservation and Management Services
Haldimand County contracts with Norfolk County for forest management of the County-owned forest land. This includes forest health monitoring, boundary delineation and monitoring of encroachment, GIS forest stand mapping, prescription development, tree marking, tender development and harvest contract supervision. There are 115 ha of managed County forest on five properties. They include from largest to smallest, Haldimand woodlot 17 & 19, Marshall Woodlot, Canborough Transfer Site, Haldimand US Steel woodlot and Dunnville soccer field woodlot. Norfolk also provides forest extension services for

private landowners. They also provide site inspection for development application review and professional arborist consultation as noted elsewhere. See Appendix B for contract details.

3.2.3 Other Regulatory Environment

3.2.3.1 Conservation Authority Policies

Portions of the County fall within the jurisdiction of three Conservation Authorities (CA) (Figure 1); the Long Point Region Conservation Authority (LPRCA), the Grand River Conservation Authority (GRCA), and the Niagara Peninsula Conservation Authority (NPCA). Under the *Conservation Authorities Act, 1990,* each CA regulates designated hazard lands within and adjacent to watercourses, wetlands and shorelines; and regulates alterations to wetlands in order to protect the natural environment from damaging activities. Some County lands are found in these regulated areas.

3.2.3.2 Province of Ontario Policies

The involvement of the provincial government in urban forestry matters is limited, leaving the bulk of the responsibilities to municipal governments. However, there are a number of provincial statutes, policies and plans that directly and indirectly affect municipal urban forest management and regulation, as presented in Table 3. 2.

Table 3.2. Province of Ontario Statutes and Policies affecting the urban forest

Statute or Policy	Relevance
Planning Act, 1990	Establishes the framework for municipal planning in the province. It provides municipalities with the power to develop official plans and regulate development, including requiring landscaping with trees and shrubs on the site and parkland dedication.
Provincial Policy Statement(PPS), 2014	This companion to the *Planning Act* provides guidance for land use planning, protection for significant woodlands, and encourages jurisdictions to integrate green infrastructure, including the urban forest.
Growth Plan for the Greater Golden Horseshoe (Places to Grow) 2013.	This plan encourages planning authorities to; - identify natural heritage features and areas that complement, link, or enhance natural systems, - develop a system of publicly accessible parkland, open space and trails, including shoreline areas, - establish an urban open space system within built-up areas, which may include … public parks. When there is a conflict between this and the PPS with regard to natural environment then the direction that applies the most protection to the natural environment prevails.
Municipal Act, 2001	Allows any municipalities to regulate the injury or destruction of trees on public and private lands. It allows the municipality to enter land along its highway to inspect trees and remove trees if they pose a hazard to persons using the highway.
Ontario Heritage Act, 1990	Allows for the designation of heritage properties and/or cultural heritage landscapes in the Province, including trees on such lands that may have heritage value.
Forestry Act, 1990	Provides a legal definition for "woodlands" based on stem densities, and "good forestry practices" for tree by-laws, as well as certain provisions pertaining to boundary/shared trees.
Endangered Species Act 2007	Applies to species listed as Endangered or Threatened in the Act. There are about 50 terrestrial species in Haldimand including trees such as American chestnut, butternut, flowering dogwood.

3.2.3.3 Federal Policies

The involvement of the Canadian federal government in urban forest management remains limited and indirect. However, some support related to pest management is provided through by Canadian Food Inspection Agency (CFIA) and Canadian Forest Service, which monitor and control the spread of invasive insect pests, the most important of which include Asian Long-horned Beetle and Emerald Ash Borer.

3.2.4 Supporting the Forest: Education, Outreach and Stewardship

3.2.4.1 Haldimand County

The County website has little in the way of information about trees or forests. There is a tab for the Forest Conservation Service (contracted to Norfolk County) to advise private landowners interested in a forest harvest to make contact with the Forest Conservation Service. As well, there is a FAQ under Residential Services to advise citizens about urban trees on private and County property. There is a contact telephone number to generate a work order to request a tree inspection for potentially hazard or problem trees.

The ***Community Partnership Program*** (CPP) is a County program that helps the County partner with community groups to develop and enhance community assets on property owned by Haldimand County. The CPP ensures a single entry-point into the County for proposals from groups and/or individuals, as well as a fair and consistent approach to reviewing, assessing and approving community proposals. *(Policy 2011-01*). Only proposals for projects taking place on County-owned property are considered. The CPP considers and approves all work conducted on County property regardless if funding is provided.

The first funding component of the program is for Capital Projects on County property. Currently, there is an annual budget of $150,000 for these capital projects. The funding formula is 35% from the County and 65% from the community organization.

The second funding component of the program is the Community Beautification Fund. Tree planting is one component that includes community signage and streetscape and park improvements. Currently, $60,000 is available annually for disbursement among eligible community groups to support community beautification projects on County-owned property. The funding is provided in recognition of the importance of beautification to the vitality of any community, as well as the sense of pride and quality of life it fosters for residents and visitors to the County. Showcasing the communities supports business attraction and retention, and leads to potential new tourism and economic development opportunities. Groups may apply for beautification funding of up to 50% of the total cost of the proposed project to a maximum of $4,000 per year/per organization. Through the Community Beautification program, the County has provided grant funding related to tree planting to four organizations (six grants over ten years for a total funding value of $21,966) for; replacement of trees planted during streetscaping, planting of trees in soccer park for shade, native tree plantings and tree distribution for roadside beautification.

The ***Haldimand Rural Water Quality Program*** (HRWQP) is an initiative of Haldimand County and its partners to improve water quality in the County. This voluntary program provides technical assistance and funding to private landowners for tree planting/natural restoration - stream buffers, fragile land retirement, and field windbreaks among other projects to protect and improve water quality. The program

is delivered by the three local Conservation Authorities, the GRCA, the LPRCA and the NPCA. The HRWQP also provides funding for Living Snow Fences as defined by Haldimand Roads Operations. The benefits of improved water quality include a safe secure water supply, a healthy aquatic ecosystem, increased recreational opportunities, sustainable agricultural operations and a vibrant economy. Everyone benefits when water quality is improved and protected.

3.2.4.2 Other Incentives

The Conservation Authorities also work with landowners to access the Forests Ontario, 50 Million Tree Program funding as well as their own tree planting programs. The LPRCA also has tree planting programs funded through Ontario Power Generation and their own Erosion Control Incentive Program, and Trees for Roads Program. The Niagara Peninsula Conservation Authority provides support and funding for habitat restoration including buffer strips, shelterbelts and windbreaks, floodplain & fragile land retirement, reforestation of sensitive lands & connecting fragmented woodlands.

3.3 Current standards and practice in Haldimand County

3.3.1 Program Management

Management of County trees and forests is under the jurisdiction of several departments. There is no full time dedicated staff to tree/urban forest issues. Haldimand County contracts with Norfolk County for "consulting" arborist services and forestry support for the by-law officer.

- Trees in parks and cemeteries are the responsibility of the Facilities and Park Operations within the Community Services Department.
- Street trees, including those trees under the Streetscaping improvements, and trees on rural right-of-ways, are managed by Roads Operations in the Public Works Department.
- Trees in new developments are established through the development process in the Planning and Economic Development Department.
- The Community Development & Partnership Division provides Beautification grants to community groups whose project may include tree planting.
- Building Controls and By-Law Enforcement Division implement regulations affecting privately owned trees through the Property Standards and Forest Conservation By-Laws, as well as some protection of public trees under various by-laws.
- Community groups also fund and plant trees on County property.

The Property Standards By-Law can ensure that yards, lots and vacant places 'shall be kept clean and free from…dead, decayed or damaged trees or other unmaintained natural growth' and 'trees or parts thereof that have expired shall be removed or maintained in a condition which is not hazardous to person expected to be on or about the property'. The Forest Conservation Bylaw limits harvesting in, and clearing of, woodlands larger than one hectare in size.

3.3.2 Tree inventory

Currently there is no tree inventory for the publically owned urban forest in the County. The Norfolk County Arborist responds to maintenance requests and adds trees to a database as trees are assessed. The

Norfolk Arborist compiled an independent tally of trees and an inventory of trees in Central, Kinsmen, Gardiner and other Parks in Dunnville in October 2015. As part of this project, Williams &Associates completed a sample inventory on selected streets, cemeteries and parks in Caledonia, Cayuga, Dunnville, Hagersville and Jarvis.

3.3.3 Tree Establishment

The County does not have a professional arborist/landscape architect that plans tree planting/forest replacement. Planting regularly occurs in new sections of cemeteries, in park developments, or in areas being re-developed. Some trees are replanted as trees are removed for safety reasons. However there are no policies or guidelines regarding tree replacement. Local garden centers (e.g., Mohawk Garden Centre) are contracted to supply and plant trees. Streetscapes plans, designed to invigorate and make people-friendly downtown areas, include tree planting on streets in the County-owned urban areas.

Haldimand County has developed design criteria for street-tree planting in new developments where trees are required to be planted on private property. The guidelines specify locations and distances from road allowances, timing of planting, species, quality, source and installation as well as trees for screening. Currently Norfolk forestry staff comment on development plans. Landscape architects were involved in the implementation of development/streetscape plans.

3.3.4 Tree Maintenance

3.3.4.1 Service Delivery and Inspection - Requests

Roads Operations mandate is to maintain approximately 1,500 kilometers of public right of way (roads), 120 kilometers of sidewalk and eight Municipal Parking Lots consisting of approximately 20,000 square metres in asphalt surface area. This includes responsibility for tree maintenance issues within the County owned right-of-way.

Tree maintenance is conducted on a complaint and/or risk basis. When staff or a member of the public identifies a tree problem and sends a request to the County, Customer Service generates a work order. The work order is delivered to the appropriate department work location. One of four Road Maintenance staff, situated at the Cayuga, Dunnville, Oneida or Walpole Yards, is assigned to review it. The contract arborist assesses the tree as requested and determines maintenance or removal requirements. Road Operations has two chippers, 17 chainsaws and four polesaws.

If tree removal can be conducted without out risk to property or utility lines, the Roads staff will fell and remove the tree. If the work has risk or requires specialized equipment or arboricultural expertise or requires stumping, the work is contracted to a local tree service. The Roads Operations Division has seen an increase in tree management activity. In 2014, 253 work orders were created. This is an increase from 2013 which saw 230 work orders, which was a substantial increase from the 68 reported work orders in 2012. There is currently a backlog of work orders.

Facilities and Parks Operations (FAPO) contracts the Norfolk arborist to assess any trees in question by staff or the public. The recommendations of the arborist are implemented and the majority of tree maintenance or removal issues are contracted out. The FAPO Division has also experienced increased tree maintenance and removal costs in various parks and cemeteries.

As a result of Emerald Ash Borer infestation there is a one-time capital budget of $250,000 for ash tree removal and storm water management in Dunnville Lions Park and another $100,000 for replanting for 2016-17. As shown in Table 3.3 this project was under budget.

Table 3.3. Chart of costs related to the urban forest and tree removal 2013 to 2016

Project	Costs				
	2013	2014	2015	2016 YTD (Oct 2016)	2016 Budget
	$	$	$	$	$
Roads Operations - removals:					
Internal resources (staff & equipment) 1	252,729	133,390	213,866	215,330	not segregated
Tree Service contract 2	91,284	91,874	123,059	97,912	105,710
Facilities and Parks Operations:					
Administration Facilities	1,131	-	1,913	458	not segregated
Cemeteries	2,936	6,400	21,750	3,150	not segregated
Parks	4,142	9,441	9,575	10,563	not segregated
Arborist contract (Norfolk)	25,825	26,109	27,083	-	27,240
Tree management strategy (contract)					30,000
Capital Program:					
Cemeteries		17,100			
Parks				52,745	400,000
Roads	16,678			78,725	234,200
Total	**394,725**	**284,313**	**397,246**	**458,882**	**797,150**

[1] There were 68 Roads Operations work orders in 2012; 230 in 2013, 253 in 2014 and 220 in 2015.
[2] The Roads tree service contract manages approximately 124 trees per year.

As a by-product of tree maintenance operations such as pruning and removal, Roads and Parks produce both wood chips and stem and limb wood. Smaller branches are processed through an on-site brush chipper, producing wood chips. Stem and limb wood are cut into manageable pieces by staff equipped with chainsaws. For work being conducted in Parks and natural areas, all chipped material is left on site. Large pieces are cut to manageable size and left for public use. For street trees, wood and/or chips are left for the home owner if they want it. Large pieces may be left at roadside for removal on a 'first-come first-serve' basis. Otherwise material is moved to the Roads yards for free pickup. Schools and service groups get priority for mulch material. Eventually material is moved to the Canborough Waste Management Facility. This Facility is newly opened so procedures are not defined. The plan is to have a contract tub

grinder once a year to produces mulch. The tub grinder pulverizes wood into small pieces. Depending on the terms of the contract this will be removed from the site or left for the public to pick up.

3.3.4.2 Pruning

Pruning is conducted on trees through customer service/work orders and generally contracted to a local tree service following direction of the Norfolk Contract Arborist. Trees planted in downtown areas as part of the Streetscape plans, are maintained by Roads Operations. Otherwise there is no corrective/structural pruning program for young trees.

3.3.4.3 Utility Line Maintenance

Tree maintenance along utility lines was previously done by Haldimand Hydro following a five-year maintenance cycle. This consists of removing branches in conflict with the electrical wires. Communication wires are not affected by this work. In June 2015, Haldimand Hydro was purchased by Hydro One who will be expected to continue the maintenance schedule beginning in 2016. Hydro One contracts tree work on utility line maintenance to Davey Tree Service. Work scheduled for the larger urban areas in 2016 has been completed.

3.3.5 Risk management

The County does not have a formal process to assess and catalogue risk associated with publicly-owned trees. The County does not have a tree risk management policy, nor is there a post-storm inspection protocol or inspection process. Tree risk issues are usually identified through customer service requests or observations by staff or contactors doing other tasks. With no assessment protocol, the County is potentially vulnerable when damage or safety issues arise.

3.3.6 Tree Protection

Tree protection in the County is conducted through several policies and regulations. Protection for trees in parks and cemeteries is provided through the Cemetery By-law (1501-15), the Public Parks and Facilities By-law (1534-15), and overall coverage under the Public Conduct on Haldimand County Property Policy (2014-02). There is no by-law protecting privately owned trees. A Forest Conservation Bylaw protects trees in private woodlands greater than one hectare. Property Standards can require maintenance or removal of trees on private land that threaten public or other property.

When new infrastructure projects are planned, the County involves the contract arborist to identify trees that show signs of risk and to establish protection measures to ensure trees on site are not damaged by construction.

3.3.7 County Forests

County owned forests are managed under contract to forestry staff from Norfolk County. The County receives money from harvest operations and prosecutions which is deposited into a special Forest Recovery account. The current balance is about $30,000 which is targeted for reforestation.

3.4. Benefits, Threats and Challenges

3.4.1 The Benefits of the Urban Forest

Adapted from; Urban Forest Strategic Plan for the City of Peterborough, 2011

Benefits of the urban forest are widely recognized and documented. Trees in urban areas provide important economic, environmental, community and human health benefits. The community's trees will need to be managed in order to maintain this stream of benefits which are critical to the community's economic well-being and overall quality of life. Unlike most other urban infrastructure, the value of the urban forest generally increases over time.

The urban forest is an essential part of a livable and economically-sound community. A healthy community is one that has a strong and vibrant green infrastructure. Environmental benefits of trees include the reduction in air pollution, greenhouse gases and storm water runoff. Economically, trees moderate temperature and the need for summer cooling and winter heating. Trees increase property values, and, as part of the green infrastructure, provide important ecological and social functions that result in cost savings to local government and stimulation of the local economy. **Unlike traditional municipal infrastructure such as transportation systems that depreciate, green infrastructure accrues in value and provides greater benefits to the community as time passes.**

The Environmental Benefits

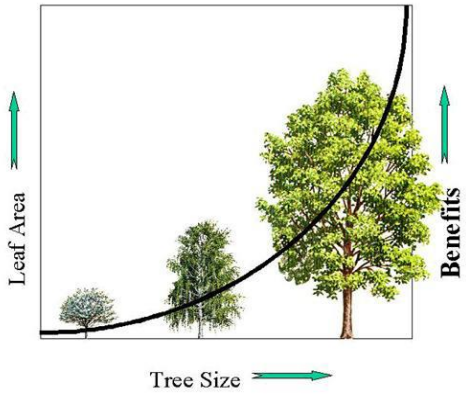
For the Air: Trees have the ability to collect and remove pollutants from the air (such as carbon, nitrogen oxides, and sulphur dioxide). By consuming carbon dioxide, trees reduce greenhouse gases and release oxygen as a by-product. Trees filter dust, pollens and smoke.

The benefits from just 100 mature trees provide the following benefits:

- Remove 52 tons of CO2 from the atmosphere per year
- Remove 430 lbs. of particulate pollutants per year
- Catch 538,000 gallons of rainfall per year. (McPherson *et al.* 2002).

For Storm Water: The urban forest takes up water from the ground and delays the movement of rain water, thus diminishing the peak capacity requirement of storm water systems such as storm sewers. Roots provide bank stabilization along open watercourses and remove toxins from ground water. The leaves of trees impede and soften the impact of heavy rain on ground conditions, thereby reducing erosion. Trees reduce the incidence of flooding by intercepting rainfall and enhancing percolation of storm water into the soil.

For Wind Reduction: Wind impacts at ground level can be mitigated with the strategic placement of trees as wind breaks.



The Social Benefits

For Mental and Physical Health: Studies indicate that one of the social benefits of trees is an improved sense of well-being. Trees reduce the stress of everyday life by creating greenery and softness among the hustle and hard surfaces of the City and provide the public with a sense of calmness. Studies have demonstrated that patients recover more quickly after surgery if their windows look out over treed landscapes. (Trees Ontario, undated)

For Public Safety: Trees along transportation corridors narrow a driver's field of vision, reducing traffic speeds and increasing pedestrian safety by providing a natural, physical barrier. Studies have found that urban highways lined with trees decrease driver stress, resulting in fewer incidents of road rage (City of Vancouver Urban Forest Management Plan, 2007).

For Social Interaction: Public spaces with trees are inviting to visitors. Trees encourage social interaction and increase a sense of community. Trees foster sociable neighbourhood environments (Sullivan and Kuo, 1996).

Example of the ecological benefits of trees increasing exponentially as leaf area increases (source: Faculty of Forestry, University of Toronto 2006

The Cultural Benefits

For Heritage: People associate many different events and memories with specific trees and stands of trees. Trees offer a link to past histories, providing connection to times and events of a bygone era. This connectivity gives society a sense of belonging not only to the here and now but also a sense of purpose for continuing to enjoy and appreciate these living memories.

For Sense of Place: The character of a neighbourhood is determined by private and public trees. People feel an immediate connection to the landscape fostered by ongoing association with trees.

The Economic Benefits

For Development: The presence of trees within a community provides an invitation to visitors, developers and investors thus enhancing the prosperity of a city. Mature trees on public and private property increase the value of these properties. "A mature tree can often have an appraised value of between $1,000 and $10,000 (Council of Tree and Landscape Appraisers, www.arborday.org/trees/benefits.cfm).

For Municipal Infrastructure: Tree cover reduces storm water run-off through interception and absorption. In 50 years, one tree can generate $30,000 in oxygen, recycle $35,000 of water and eliminate pollutants that would otherwise cost $60,000 to remove from the air.

For Energy Conservation: The reduction in energy costs as a result of tree shade is well documented. Trees reduce heating and cooling costs (Sustainable Forests in Urban Ontario, 1995).

The Engineering Benefits

Trees provide acoustical control. A screen of dense coniferous trees 30 meters wide can absorb 6-8 decibels. In terms of traffic control, trees provide pedestrian and vehicular-safety barriers and screen headlight glare (Faulkner, 2004).

Trees improve pavement performance. Research has documented that tree canopy over a road extends pavement life (McPherson et al. 1999).

Trees reduce peaks and base stormwater flows, reducing the costs and capacity of infrastructure

Other references

22 Benefits of Urban Street Tree 2008. Dan Burden, Walkable Communities *(http://ufmptoolkit.com/pdf/Benefits-of-Urban-Street-Trees.pdf)*

The **Ontario Urban Forest Council** *http://www.oufc.org/urban-trees/benefits-of-trees/*

"The net cooling effect of a young, healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day." —*U.S. Department of Agriculture*
"If you plant a tree today on the west side of your home, in 5 years your energy bills should be 3% less. In 15 years the savings will be nearly 12%." —*Dr. E. Greg McPherson, Center for Urban Forest Research*
"A mature tree can often have an appraised value of between $1,000 and $10,000." —*Council of Tree and Landscape Appraisers*
"In one study, 83% of realtors believe that mature trees have a 'strong or moderate impact' on the salability of homes listed for under $150,000; on homes over $250,000, this perception increases to 98%."—*Arbor National Mortgage & American Forests*
"Landscaping, especially with trees, can increase property values as much as 20 percent." —*Management Information Services/ICMA*
"One acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people." —*U.S. Department of Agriculture*
"Trees properly placed around buildings can reduce air conditioning needs by 30 percent and can save 20–50 percent in energy used for heating." —*USDA Forest Service*

3.4.2 Threats and Challenges

There are a number of factors that can adversely affect the management and overall health of the Haldimand County's urban forest and these should be factored into the decision-making process when establishing urban forest policies.

There are numerous threats and challenges to the sustainability of the County's urban forest, including:

1. Lack of policy protection to plan and manage the existing forest and forest renewal;
2. Lack of knowledge about the status and value of the urban forest;
3. Competition with built infrastructure;
4. Ensuring the right tree is planted in the right place;
5. An aging urban forest without a strategy in place to increase tree cover;
6. Invasive plant species, pest and pathogens;
7. Tree-related risk from structural and health problems;
8. Climate change (and associated extreme weather events);
9. Limited resource allocation;
10. Lack of biodiversity;
11. Attitude that trees are more trouble than they are worth; and
12. Engaging community.

These threats and challenges are described in greater detail, below.

1. Lack of policy protection to plan and manage existing forest and renewal

Presently there are no specific policies for protection, management and renewal for urban trees in the County. There is no policy regarding EAB, tree replacement or maintenance. Having trees outside of

the County infrastructure system will continue to treat trees as second class. Green infrastructure is as important to the vitality of the County as grey infrastructure.

Municipal design guidelines regulate tree location species and other requirements on private property. They do not, however, regulate minimum requirements for green space and make no allowance for natural processes. This leads to trees being planted in poor growing conditions such as compacted soil, in spaces with too little room for root growth, in soil of insufficient nutrient quality, and left without enough permeable surface to allow water to percolate to tree roots. Moreover, the County does not have much power to protect existing trees. To protect the urban forest, the Official Plan must identify the significance and benefits that trees provide to the community.

Creating a sustainable urban forest requires planning for the biological needs of mature trees, and that trees are given equal consideration during development. New planning strategies that focus on intensification and road renewal are just two examples of the potential of losing tree canopy unless the requirements of trees are recognized and planned for.

2. **Lack of knowledge about the status and value of the urban forest**

The County does not have a comprehensive inventory of the trees it manages. The sample inventory undertaken for this project is a first step towards understanding the existing urban forest. While most residents appreciate treed streets, relatively few understand their value for cooling ambient air, reducing air pollution and reducing stormwater runoff and flooding from intense rainfall. Even less is known about the trees on private property[1]. In the absence of a complete survey of the urban forest and clearly defined objectives for its management, resource requirements are difficult to determine. Protecting existing trees and finding suitable, long-term locations for new trees will require careful planning and support from various County departments, landowners, and the community at large.

3. **Competition with built infrastructure**

Growing conditions for trees in urban areas typically include a more exposed environment, degraded and compacted soils, altered moisture regimes, little to no natural regeneration, and substantially reduced soil biological activity. In addition, trees in urban and urbanizing areas must compete for space with infrastructure, both above and below ground. Below ground, rooting habitat in built-up areas is typically characterized by inadequate soil volumes, quality and drainage. Roots must share space with underground utilities, and soils can become too compacted to support the fine roots that provide water, oxygen and nutrients to the tree. Above ground level, trunks, branches and foliage compete for growing space with buildings, utilities and transportation infrastructure. Trees must also contend with infrastructure maintenance activities such as de-icing salt application, pruning, and removal for the expansion and repair of infrastructure services such as sidewalks to under-serviced areas. As a result, conditions both above and below ground are challenging to tree growth, health and longevity.

[1] Neighbourwoods© surveys in Dundas and Elora/Fergus and found 71 and 85 percent respectively, of all urban trees are privately owned.

Managing infrastructure renewal requires integration of urban forest goals and targets at the onset of planning and construction; including better cooperation with both the private and public sector in designing these projects. County departments must improve inter-departmental procedures and practices to improve urban forest performance in both the short and long term.

4. Ensuring the right tree is planted in the right place

Planting the right tree in the right place helps ensure that young trees can thrive and provide maximum benefits. Currently in Haldimand County there are no plans or guidelines for replacement or enhanced tree planting. It is important to ensure that trees are planted and protected in areas where they can reach their genetic potential. The average street tree in an intensively developed urban area lives 10 to 25 years (Urban, 1989) and most urban tree survival problems are due to insufficient soil volumes.

Often tree plantings are based on available stock, with little consideration for soil conditions. Nurseries may have a limited supply of desirable species and may be unavailable unless orders are made a number of years in advance. Development and construction practices often create poor growing conditions that include limited rooting space that restricts the potential for young trees in new subdivisions. Native soil is often displaced or removed only to be put back in a thin layer over compacted subsoil. Tree roots are starved for oxygen and nutrients. The selection of species for these poor sites is much narrower because fewer species are able to tolerate these harsh conditions.

5. An aging urban forest without a strategy in place to increase tree cover

Most urban forest ecosystems have been dramatically altered from their original state and are no longer "natural". They cannot be left "as is" and must be managed to ensure their sustainable long-term existence, use and protection. Recognizing that large stature trees at maturity provide the greatest benefits to the community, action must be taken to ensure that; 1) existing large stature trees and their soil habitat are managed and protected and 2) that new tree planting efforts focus on the planting of large stature trees and the establishment of the required soil volumes to grow trees to their mature size. With upgrades and expansions to infrastructure, the preservation of existing trees and the integration of new trees into developed landscapes become more challenging. The requirements of older, mature trees can be tempered through a system of risk assessment so that resource requirements are assessed realistically across the broad spectrum of the urban forest.

6. Invasive plant, animal and pathogens species

An invasive species is any plant, animal or pathogen that has been introduced to an environment where it is typically not indigenous, and where it becomes a nuisance through rapid spread or population growth, often to the detriment of indigenous species. Today, the greatest current threat to eastern North America's urban forests is the Emerald Ash Borer (EAB), which has the potential to eliminate the entire ash tree population. Ash comprises an estimated 9 percent of the tree canopy in the County. EAB was first identified officially in the County in 2014 (although it is presumed to be present from 2007) and has been responsible for killing large numbers of trees. Ash removals are ongoing throughout the County. It is projected that almost all ash will be lost to the EAB over the next few years. Because of this high level of threat, a separate focus has been placed on managing the

ash trees as they are being killed by EAB. Extra resources are needed to ensure trees are removed in a timely manner. Unfortunately it is too late to treat any ash to keep a few on the landscape.

Another insect of concern is gypsy moth which appears in cycles and defoliates many species but particularly oak trees. Fortunately there are a number of introduced pathogens that have kept defoliation levels low in recent years.

There are numerous invasive plants in southern Ontario trees and shrubs. A few such as buckthorn, Norway maple, garlic mustard are prevalent in the urban forest. In urban woodlands and forests, they can threaten local ecosystems by outcompeting and displacing indigenous plant communities. Numerous tree species are threatened by exotic fungi and parasites. Butternut is being killed by butternut canker; beech, by beech bark disease. Eradication of most invasive plant species is impractical or impossible, and even targeted control may be difficult. As such, management of invasive plant species typically requires dedicated resources over multiple years to be effective.

The challenge of identifying and controlling invasive pests has become more urgent for urban forest managers as increasing movement of people and commercial goods continue to bring new invasive species to North American forests. Once introduced, invasive pests can be difficult to detect, limiting management options and increasing the difficulty of effective control. Although natural areas are frequently affected by intense invasive species pressure, urban forests are under significant threat as well. Important urban trees are increasingly at risk; elm has been essentially wiped out by Dutch elm disease and EAB sees no boundaries. Trees in urban areas can be more susceptible to the effects of pests and pathogens than trees in natural settings due to stressful urban environments. Problems brought on by invasive pests are often compounded by insufficient management practices that promote tree health and vigour. This can result in limited street tree species diversity, and overreliance on pest-prone species, improper sanitation and disposal of infected wood materials, and continued production and use of poor-quality nursery stock.

7. Tree-related risk from structural and health problems

Many urban trees possess some inherent degree of risk, although relative to other sources of risk that exist in urban areas, it is relatively small. Nevertheless, as trees mature and grow in size, they may develop structural or health problems that predispose them towards higher likelihoods of breakage or whole-tree failure. Risk is related to the presence of potential ‘targets’ of tree failure (i.e., people and/or property), and is therefore greater in more densely populated urban environments.

As municipalities are responsible for managing trees they own according to a reasonable standard of care, potential personal injury or property damage and subsequent legal action is magnified if due diligence in identifying and mitigating tree risks is not being met. Unfortunately, tree risk mitigation is often unduly focused on reactive tree removal rather than pre-emptive management, such as structural tree pruning or young tree maintenance. Striking a balance between proactive mitigation of risk to a reasonable degree and maintaining mature and ageing trees in the urban landscape is an ongoing challenge for urban forest managers.

There is also a lack of public understanding of the considerable care urban trees require to be able to survive and mature in the stressful urban environment. Urban trees on private and public land need to be watered, pruned and monitored for disease, pests, and stress arising from heat and air pollution. Many urban trees are planted by contractors who must water and maintain the trees for two years after they are planted. However, in an urban environment, trees require a longer period of care and many trees die five to seven years after planting. Split or broken limbs are hazardous and pose a threat to public safety and property. Roots penetrate water mains, and crack and lift sidewalks. Foliage and other tree debris clog eaves troughs which can be mitigated or avoided through proper planning, policies and maintenance. The County has no pruning regimen due to insufficient funding. The decrease in overall tree maintenance results in increased operating costs because there are more hazardous tree work orders generated that must be dealt with on an emergency basis.

8. Climate change (and associated extreme weather events)

Climate change also poses a significant threat to the County's urban forest. While there is general consensus that climate is changing, there is a great deal of uncertainty around the nature and extent of these changes. The general predicted trends for southern Ontario are warmer, longer summers with little or no increase in precipitation resulting in more droughts, and warmer, shorter winters with more snowfall generally a milder climate. Extreme weather events such as windstorms, intense rainfall, snow storms and very high temperatures are expected to occur more frequently. Specific challenges and are presented in the next section.

9. Limited Resource Allocation

Responsible urban forest management, planning and maintenance can be costly but is normally more economical than dealing with contingencies. Currently, there is only a contract arborist (part-time) to provide arboricultural advice. The removal of high-risk trees on roads is conducted by contracted tree services and roads personnel. Current funding and infrastructure are not able to meet arboriculture requirements to maintain County trees on a planned, regular basis. Activities are undertaken in a reactive mode. Municipal trees should be inspected and where required receive arboricultural intervention on a pre-planned rotation cycle. Both roads and parks departments have a recognized lack of resources related to staffing and equipment required to meet existing service levels.

Urban forestry programs must compete with other municipal initiatives to secure adequate resources, and staff and financial resource constraints can limit the ability to deliver core forest management services such as routine tree maintenance, risk mitigation, and urban forest monitoring. Providing sustained support for urban forest initiatives will be important to keeping Haldimand a vibrant and livable community, with due diligence over its urban forest assets.

10. Lack of biodiversity

While there are many tree species in the County (over 55 inventoried on County land), relatively few make up the majority of the urban forest. Silver maple (22% of sample inventory), Norway maple (11%), Norway spruce (11 %) and ash (9%) are a significant portion of the urban forest. This species diversity leaves the urban forest more susceptible to invasive insect and other problems, like the expected loss of all ash trees. There are challenges to increasing the diversity of trees. These can be overcome by effective planning and purchasing or by municipalities growing their own trees.

Variability in the species age and structure in an urban forest helps to limit potential damage from disease or infestation. Managing the urban forest to ensure a wide variety of species, and a good mix of old, medium-aged and young trees, and offers enhanced protection from the stresses that impact trees. In landscaped areas where lawns surrounding trees are mown, natural tree regeneration is not possible and young trees must be planted. This makes the selection of planting stock a key factor in the diversity of the urban forest.

Biodiversity at the genetic level is an important consideration for all new plantings. The horticultural industry often uses cultivars (identical copies, or clones of a parent tree). Cloned individuals can all succumb to a single pest that affects the parent tree. Trees grown from seed that was naturally cross-pollinated have greater potential to adapt to changing conditions and resist new problems.

Monitoring and control of invasive species is an important factor in protecting biodiversity. Increasing biodiversity is an effective means of mitigating the impact of invasive species and insects on the urban forest. As witnessed with the EAB, ash trees represent 9% of the trees growing in Haldimand and 22 percent of park trees (from the current inventory sample), and it is a costly undertaking to replant these trees. In all likelihood, it will also be many years before these newly planted trees provide the same level of benefit.

11. Attitude that trees are more trouble than they are worth

The desires, attitudes, and perceptions of stakeholders and decision makers can have a large impact on an urban forest plan. There are many concerns among citizens such as general annoyance with the nearby tree because of yard maintenance and potential property damage. This is offset by those who understand the value and benefits of trees, who are willing to deal with problems, and who are looking for ways to contribute to having more trees in the community. Cooperation is required from multiple groups to develop, fund, and implement the plan. Municipal plans typically require wide public input and support.

12. Engaging community

Engaging the community during the development of forest management strategies and plans improves knowledge of the forest and its management and helps to ensure public support for policies and activities. Community engagement takes time and resources from those directly involved in planning and operations, as well as other departments. Through years of experience, urban forest managers have found that public education is the true key to reaching the goals of an urban forestry program in a community.

Having a functional tree inventory and urban forest management plan improves public relations and education. The inventory data, maps, and/or summary reports can be made available on a website or in print so the public can access them. In this way, the public can gain a better understanding of the work of urban forestry and become more willing to support its program, and potentially reduce the number of calls to staff. Including policies and goals in a management plan helps citizens understand why actions are taken. The County will gain more public support for its policies and activities as the value of trees to economic development, environmental health, and quality of life issues in the community are realized.

3.4.3 Climate Change Threats

In the case of Haldimand's urban forests, the most important potential impacts of climate change include drought stress, storm damage, insects and disease, and invasive species. These environmental stressors will make urban forests more vulnerable to damage, pests, and invasive species. Climatic conditions may even become entirely unsuitable for certain species of trees adapted to current climatic conditions as range shifts proceed (McKenney *et al*., 2007).

Potential and specific impacts to Haldimand's urban forests that are anticipated based on these predictions include:

- more frequent and / or more long-lived insect and disease outbreaks;
- increased tree drought stress may affect tree health and forest growth, as well as other related functions;
- some local tree species may be less suited to local conditions, potentially reducing their resilience to other stressors;
- reduced ability to store and sequester carbon;
- the geographic range of plants and wildlife is predicted to move north as the temperature increases;
- changes in water and air temperature that may make conditions more favorable for diseases and invasive species, which may stress native species;
- some species may disappear from their current habitats; and
- in the short term, tree growth of some species may increase due to longer growing season.

A number of the stressors that have been linked with climate change have the potential to pose a threat to the long term sustainability of the trees and forests throughout the County. While there is general consensus that climate is changing, there is a great deal of uncertainty around the nature and extent of these changes. The general predicted trends for southern Ontario are warmer, longer summers with little or no increase in precipitation resulting in more droughts, and warmer, shorter winters with more snowfall – generally a milder climate. Extreme weather events such as windstorms, intense rainfall, snow storms and very high temperatures are also expected to occur more frequently.

In the case of Haldimand's urban forests, the most important potential impacts include drought stress, storm damage, and conditions that favour a proliferation of tree insects, diseases and invasive plant species. Some of these pests already occur in the area and others are likely to become problems in Haldimand in the future.

3.4.3.1 Climate Change Impacts on the Urban Forest

Climate change is already beginning to exacerbate the stressors that threaten urban trees and adds urgency to the need to address the challenges that County staff currently face in managing the forest. Climate change creates challenges for some trees and forests, and results in changes that favour other species or forests. The following climate change impacts were adapted from and are described below.

Climate change adaptation options for Toronto's urban forest. 2007. The Clean Air Partnership http://www.cleanairpartnership.org

Hotter Summers

The hotter summers associated with climate change, are expected to have major impacts on trees in urban areas. Trees are already under stress from extreme heat (Ubbens 2006) and the expected rise in summer temperatures will worsen this situation. Newly planted trees are particularly vulnerable to heat and drought conditions, and require regular watering to survive, especially in the first three to five years after planting.

More Variable Winter Temperatures

Milder winters and increased variability of winter temperatures under climate change (Franklin 2007) can negatively impact trees. Warm weather too early in the year can trick trees into triggering bud or bloom formation. When the warm spell is followed by a cold snap, the new growth often dies. Milder winters also allow insect pests that are normally killed during cold spells to overwinter. As a result, pests with a more southerly range will be able to move north, and foreign pests introduced via shipping have a greater likelihood of surviving (Greifenhagen and Noland 2003).

More Variable Precipitation

As climate change progresses, precipitation patterns are expected to become more variable (Koshida *et al*. 1999; Meteorological Service of Canada 2005), making it more problematic to rely on rainfall to provide trees with water at regular intervals.

Increase in Ground-Level Ozone

Concentrations of ground-level ozone are expected to increase with the onset of hotter summers. High concentrations of ozone can damage tree leaves and slow down growth, and in combination with drought conditions can leaves trees and other plants more vulnerable to pathogenic fungi and pests.

Threats to Biodiversity

Growing seasons are lengthening as the climate gradually gets warmer. This leads to a northward migration of flora as plants move to locations with conditions more favourable for their survival. Because climate change is occurring faster than vegetation can migrate (MacIver 2005), the change in climate is more likely to lead to stressed plants, vegetation dieback and a loss of native biodiversity. There is more likelihood to see more southern species move into the region. Although these species may be better adapted to the warmer average temperatures, they may not fare well in Haldimand's winter climate, which is subject to periods of cold extremes not common to more southerly regions.

Tree Damage from Increased Frequency of Extreme Weather

The expected increase in ice storms and high winds will take its toll on trees, taking down branches or entire trees altogether. Ice and wind storms, common in southern Ontario have potential to take down hundreds of limbs and a number of trees. Extreme weather in combination with a host of other urban stressors has the potential to seriously devastate Haldimand County's urban forest.

A sound climate change mitigation and adaptation strategy requires two fundamental components:

1) a proactive program that influences day to day operations and activities improving the resilience of the urban forest; and
2) a reactive program that can respond to extreme events such as ice storms, drought, wind, and insect and disease outbreaks.

A significant focus of the Urban Forest Strategy and Management Plan is to improve the current level of tree care and tree management within the urban forest. As the standards and best management practices within the County improve it is expected that these changes will improve the overall health and resilience of the urban forest which will provide a significant buffer to future climate change impacts.

3.4.4 Responding to the Challenges – The Need for a Forest Strategy and Management Plan

The existence of a Forest Management Plan in a community indicates a high level of commitment to protecting trees, and it indicates a higher level of awareness about natural resource issues in general. The benefits of trees can be maximized when both professional management resources and an informed public coexist. A Forest Strategy and Management Plan are effective tools to ensure that municipal resources are efficiently directed, efforts are coordinated and cooperative, and existing and potential partnerships are leveraged so that the County's trees and forests are established, managed and protected in order for the forest to remain resilient to various stresses and sustained for generations to come.

The primary purpose of this Forest Strategy is to provide purpose, vision, guiding principles, and goals to improve the current regulatory and operational situation and to consult with the community. The Plan is to identify the most effective ways to achieve urban forest sustainability and improve the urban forest management program while considering the physical and social context.

4.0 Community Engagement Process

This strategy is about supporting, protecting and rejuvenating trees and forests on County-owned property. County trees are the citizens' trees and many residents will be compelled to comment on, and otherwise advise how County-owned trees are managed. This development of the Forest Strategy and Management Plan includes public comment opportunities on this strategy and the subsequent plan.

One presentation is scheduled for staff and one for citizens to hear about and comment through a facilitative workbook process on the draft strategy and management plan content. The presentations are also to meant to develop community interest about the trees and forests to see how they can be involved in protecting and building the forest. Although the public meetings are not about the privately owned trees, ideas for engaging and educating the public are further outlined in the Management Plan.

During the development of the draft strategy and management plan, it is expected that key documents will be made available for public review online, at County offices, or at local libraries. Adequate efforts have

been made to inform and get input from the public throughout the plan development process. However, issues may be raised from citizen input that will need to be addressed in the plan in some way.

A survey will be developed available on-line to obtain feedback regarding the draft strategy and content outline for the management plan.

4.1 Presentation to View and Respond to Draft Forest Strategy and Management Plan Content

The objective of this is to:

- present the Forest Strategy with vision, guiding principle, strategic goals and current status of the Haldimand forest;
- allow public input through a facilitated workbook session; and
- understand interest and potential volunteer activities.

The presentations will be held in early June with presentation in the afternoon for staff, and in the evening for the public (targeted stakeholders will be notified directly). It will be held at the County Office, Cayuga. Williams & Associates, Working Committee members and/or County staff will be present.

Presentation Agenda

Displays

- Vision statement
- Guiding principles
- Goals
- Draft inventory results (State of Resource)

Presentation by Williams & Associates on the above

Facilitated Workbook session for feedback

Comment form

Respond to questions

Post Public Information Centre

- Immediate Debrief
- Summarize comments and survey
- Respond to questions, if not able to at the presentation
- Finalize Forest Strategy
- Finalize Management Plan content

4.2 Summary of Community Engagement

Public engagement was held to obtain opinion on the draft Vision, Guiding Principles and Goals. In person presentation were made June 9 for Haldimand staff and the public in two separate sessions. Participants were asked to provide feedback on the draft Vision, Guiding Principles and Goals. On-line feedback was open to the public for a 2 week period immediately following. General questions asked for age, gender and residence by ward (online only).

Participants were asked to respond to the two parts of the Vision statement, the 12 Guiding Principles and the 10 Goals with “I agree; I can live with it; I have no opinion; I don’t like it; and I fundamentally

disagree. In some cases there was no response. Thirteen staff completed the survey; nine members of the public attended the second session and completed the survey. There were 34 responses online. Age of participants was skewed to 50 plus among the public and 40 to 59 among staff. Staff males outnumbered females about 2:1 ratio; the public was 50:50 male: female.

The entire report with scores and all comments is found in Appendix E.

Response to Vision

Almost all respondents 'agree' or 'can live with it' for with both Vision statements. One person had no opinion and one didn't like it.

Comments included

> "… already have many complaints from residents that see a green tree & don't understand that it is not healthy or is a liability to property."
>
> "Would like to eventually see canopy % targets for communities to engage in and aim for."

Response to Guiding Principles

Combining all the responses to the 12 Guiding Principles, 83% agreed, 11% can live with it, 4% had no opinion and 2% did not like or fundamentally disagreed.

Response to Goals

Combining all the responses to the 10 Goals, 91% agreed, 6% can live with it, 2% had no opinion and less than 2% did not like or fundamentally disagreed.

5.0 Sample Inventory - Summary

5.1 Introduction

The foundation of an effective urban forest management program is a functional tree inventory that supports a tree inspection cycle and proper tree maintenance and hazard abatement. Effective tree monitoring enables park managers, urban foresters and planners to evaluate the forest resource and develop short and long-term initiatives which can in turn provide substantial cost savings and mitigate safety issues.

There are many considerations when planning an inventory. The type of inventory used is important and depends on information needed and size of community or area to be surveyed. Windshield surveys are a good first step to collect general information on tree characteristics or specific information such as the number of ash trees when faced with EAB infestation. Statistically sound surveys using sampling are cost-efficient particularly for large areas but provide information on an area rather than on specific trees. Partial surveys where defined areas are surveyed provide good information on important areas are helpful but only apply to the areas sampled. A full inventory provides the most complete information on the trees, but should be easily updated to reflect current conditions. The cost and usefulness of an inventory is affected by the type and amount of information collected on each tree.

Inventory data can provide a raft of valuable information. Location, species, size and condition and maintenance needed are important initial attributes. Other important information includes more specific attributes such as vigour, wire conflicts, insect problem, plantable spots and more.

Information collected is summarized or analyzed to help in strategic planning. Inventory data can be used to identify species diversity and distribution, percentage of canopy cover, size/class distribution, etc.

5.2 Sample Inventory Procedure

Sample inventory locations were provided by the County, consisting of cemeteries, parks and on County-owned streets in Caledonia, Cayuga, Dunnville, Hagersville and Jarvis (Table 5.1). Data specified in the Terms of Reference and additional recommended information was collected from all trees in the specified areas. The variables assessed are shown and described in Table 5.2. Initial surveys began January 6, 2016 and were conducted variably until February 4, 2016. Final survey review was completed in late May and early June to assess tree health and vigour.

Table 5.1. Location of sample inventory in the five urban areas.

Town	Siting	Location
Cayuga	Street	Winnett St. from Hill St. to Brant St.
Cayuga	Street	Echo St. from Ottawa St. to Johnson St.
Cayuga	Park	Cayuga Kinsmen Park, 61 Ouse St. (lower Kinsmen)
Cayuga	Cemetery	Riverside Cemetery, 65 Cayuga St. South
Caledonia	Street	Caithness St. East from Edinburgh Square to Aberdeen St.
Caledonia	Street	Sutherland St. East from Edinburgh Square to Banff St.
Caledonia	Street	Wigton St. from Argyle St. to Haddington St.
Caledonia	Park	Caledonia Kinsmen Park, 49 Caithness St.
Caledonia	Cemetery	Caledonia Cemetery,150 Wigton St.
Dunnville	Street	Broad St. from George St. to Ramsey Dr.
Dunnville	Street	Alder St. from Niagara St. to George St.
Dunnville	Street	Pine St. from Main St. to Concession St.
Dunnville	Park	Dunnville Kinsmen Park, 985 John St.
Dunnville	Cemetery	Riverside Cemetery, Main St. West
Hagersville	Street	Howard St.
Hagersville	Park	Hagersville Park, 38 Sherring St. North
Hagersville	Cemetery	Ballsville Cemetery, 4488 Hwy #6
Hagersville	Cemetery	Hagersville Cemetery, 8904 Indian Line
Jarvis	Street	Talbot St. East and West
Jarvis	Street	Mary St.
Jarvis	Park	Jarvis Park, 1 James St.

The tree inventory attributes were developed based on the Norfolk and other municipal inventories and are shown in Table 5.2. Further explanation of attributes such as structure, vigour, risk, maintenance priority are found in Appendix C. Data was collected using Motion tablet computers with ArcPad™ software. Data was mapped and analyzed using ArcGIS 10.3.1™ and MS Excel™.

Table 5.2. Haldimand tree inventory variables collected with description.

Attributes	Data Type	Description/units
FID	Numeric	Computer generated number
SHAPE	Numeric	Represents point location of tree
ID	Numeric	Tree number (assigned individual value given to each tree).
Street Name	Text	Street name of tree location.
Municipal Number	Numeric	Street Address # or 911 #
Township	Text	Not used
Town	Text	Urban area.
Siting	Text	Boulevard, residential (between sidewalk & building), park, woodland or cemetery.
Ownership	Text	County, Private Landowner, shared/unclear.
Access	Text	Notes on access/location and aerial imagery.
Specie	Text	Menu of 242 species common and scientific name.
DBH	Numeric	Cm – measured-Diameter at Breast Height (1.3m).
Height	Numeric	Meters – Ocular Estimate of total height.
Crown Diameter	Numeric	Meters – Ocular Estimate.
Structure	Text	Poor, Fair, Good:
Vigour	Text	Dead, Poor, Fair, Good:
Risk	Text	Low, Medium, High (estimate of potential risk to people or property associated with the tree
Risk Problem	Text	Noted risk elements with the tree, such as hanging branch, deadwood, poor structure etc.
Maintenance Required	Text	Options for removing or limiting risk problems – includes pruning, crown reduction, deadwood removal, etc.
Maintenance Priority	Text	Low, Medium, High
Wire Conflict	Text	Hydro, Phone/Cable - No conflict, Potential conflict, Conflict
Insects	Text	EAB, Gypsy moth, other.
Date Survey	Date	Survey date.
Date Review	Date	Date of 2nd visit.
Surveyors	Text	Name of Surveyor
Comments	Text	Notes of useful information about said tree.

5.3 Sample Inventory Results

This is a general overview of preliminary results. A more comprehensive analysis and reporting will be included in the final Management Plan. Table 5.3 summarizes the number of surveyed tree by specific location. Fifty-six species were identified.

The sample inventory assessed 1523 trees in the specific locations (Table 5.1) over a length of 10.9 km of streets (7.5 percent of the total length of 145 km) of all streets in the five urban areas. The inventory included approximately 16 and 13 percent of streets in Dunnville and Jarvis respectively, 8 percent of Cayuga streets, and 2 and 3 percent of streets in Hagersville and Caledonia respectively. The number of street trees ranged from 280 in Dunnville to 13 in Hagersville (Table 5.3).

The inventory also included 17 ha in cemeteries and 25 ha of parks. The cemeteries assessed, included the largest and most developed County-owned cemeteries with the exception of Dunnville Woodlawn Cemetery. Trees at five parks (25 ha) were assessed. All had sports fields except at Cayuga Kinsmen Park. Caledonia Kinsmen Park is owned by the Grand River Conservation Authority but maintained by Haldimand.

Table 5.3. Number of trees surveyed by site and urban area.

Urban Area	Cemetery	Park	Street	Total
Caledonia	168	105	95	368
Cayuga	155	30	85	270
Dunnville	96	77	297	470
Hagersville	111	135	13	259
Jarvis	-	108	48	156
Grand Total	530	455	538	1523

Silver maple was the most common species in the inventory, accounting for 20 percent of all trees surveyed. However it was more common among street trees where it was 26 percent of trees surveyed. Figure 5.1 shows the distribution of most common trees on the three main sites; streets, parks and cemeteries. Figure 5.2 shows the number of trees by diameter class of the four most common species and black walnut. Silver maple, in addition to being most common, had the highest number of large trees. Many ash were smaller trees - less than 20 cm, while Norway maple and Norway spruce had many medium-sized trees in the 21 to 50 cm size range.

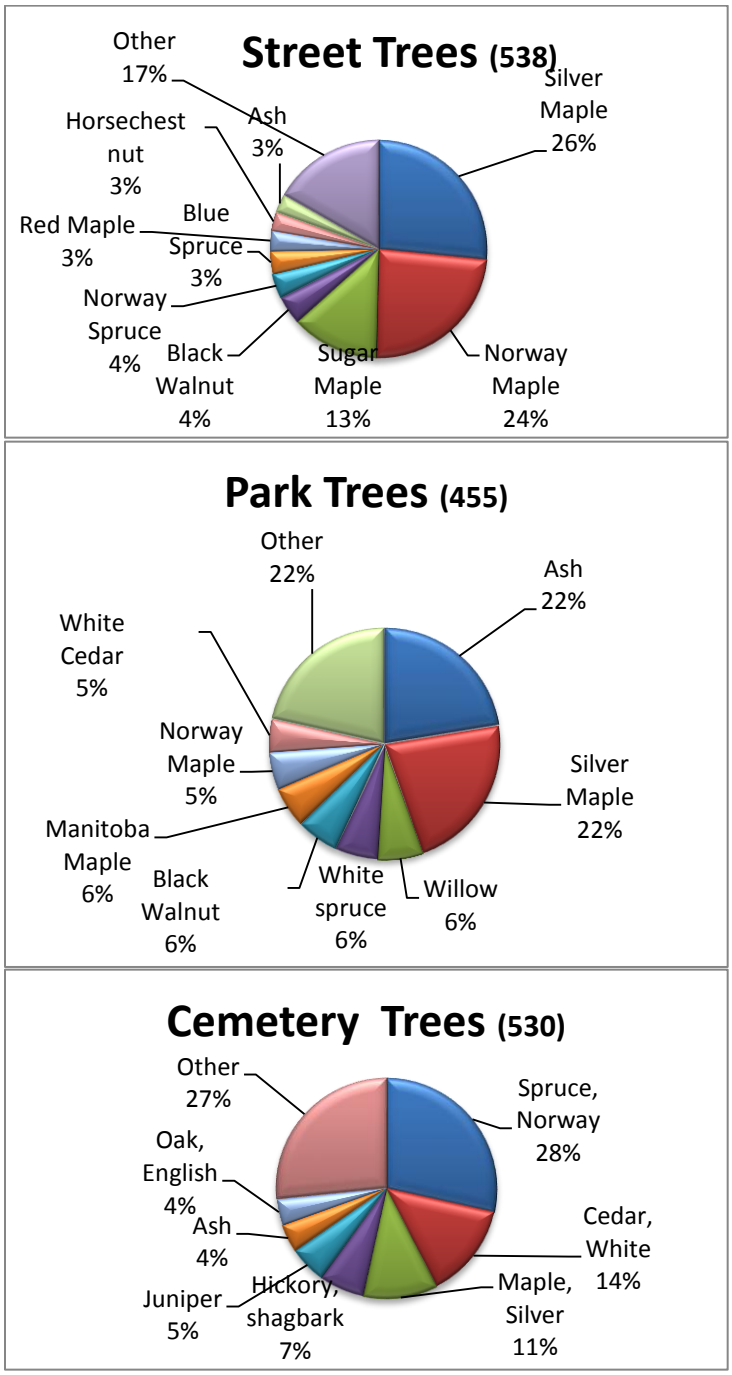


Figure 5.1. Main tree species on streets, in parks and cemeteries in five County urban areas.

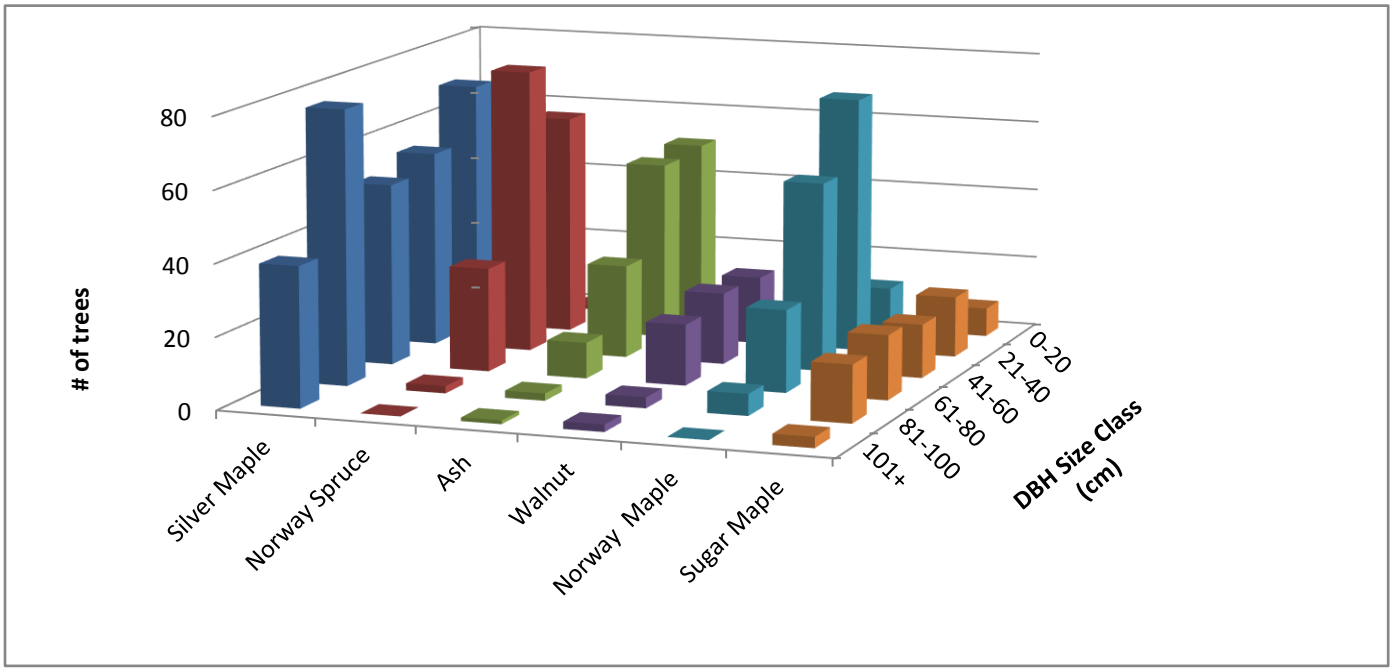


Figure 5.2. Number of trees by diameter distribution of most common species. (n=922)

Urban trees that are larger or poorly-maintained can be in conflict with public utility wires. Wire conflicts include hydro, cable/communications and telephone. For hydro lines, Haldimand Hydro (soon to be Hydro One) has a five-year maintenance schedule in Haldimand County. The five urban areas in Haldimand are scheduled for tree trimming and line clearance in 2016. Overall 46 percent of surveyed street trees were in conflict or had potential to be in conflict with utility wires. Sixty-seven percent of the wire conflicts were with the three maples that make up 63 percent of street trees (mostly older and larger). Only a few cemetery (20) and park (15) trees were or had potential to conflict with utility wires. Most streets with utility wires had current or potential wire conflicts.

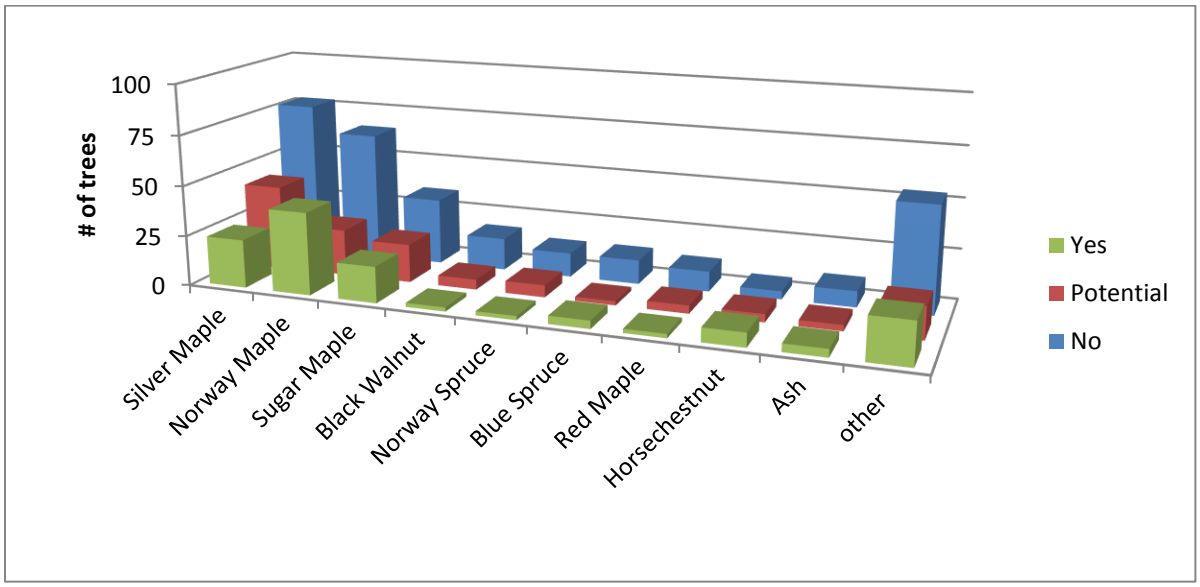


Figure 5.3. Number of street trees by common species with wire conflict. (n=538)

Figure 5.4 shows risk categories for most common species. A high risk tree is one where the possibility of a person or valued area/thing being obstructed by said tree is great and immediate. A low risk tree is unlikely to neither occur immediately nor cause significant damage. There are a number of high risk silver maples due to their age/size and location close to building or utility wires. Ash does not have many high risk trees because they were mostly smaller size and located in parks. However overall ash vigour is low (as is expected). The high-risk ash are street trees. Cedar and Norway spruce are low risk since most are in cemeteries and along the property borders. Maintenance needs are high among the large maple, both silver and Norway. Most maintenance work involves removing deadwood and various amounts of pruning.

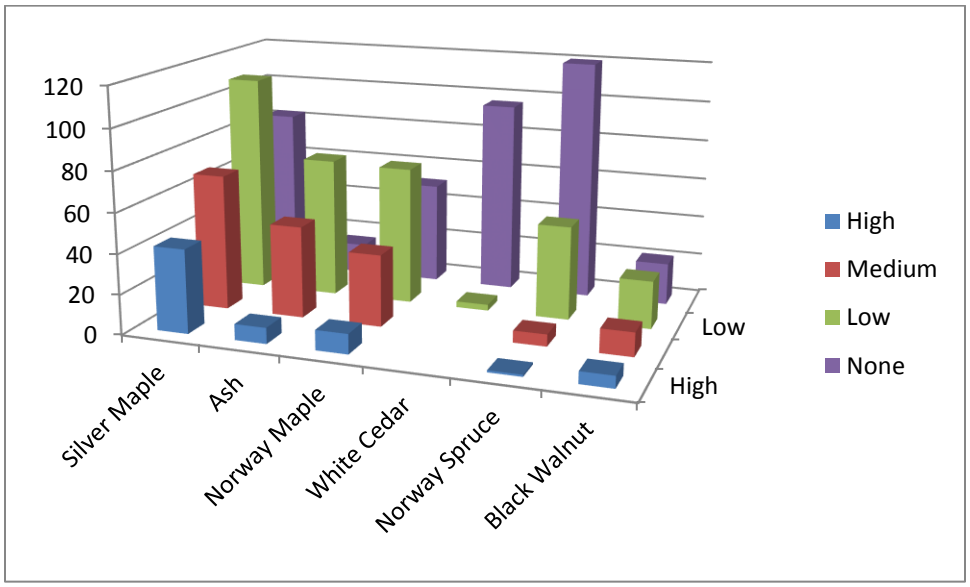


Figure 5.4. Risk categories of common species (n=943).

5.4 Summary and General Observations

Nearly 1,530 trees surveyed provide a reasonable indication of the urban forest population in the five urban areas. The Cemetery survey covered most of the important sites. Street trees surveyed covered only 7.5 percent of the streets although almost all of those surveyed were along streets with mature trees. Only 25 ha of park area were surveyed. No rural roads were surveyed.

The surveys indicated that Silver maple is the most common species (20% - primarily on streets), followed by Norway spruce (11% - most in parks & cemeteries), Norway maple (11 %) and Ash (9%, mostly in parks). Silver maple also had the highest number of large trees, most with maintenance needs. Silver maple has the most conflict with public utilities and because there are many large trees there are more maintenance requirements. Maintenance needs are high particularly on street trees.

The ash component will drop out within the next few years as ash are removed due to Emerald Ash Borer. There are only a few ash on the streets. Most are in parks and removal will generally be easier than for street trees. Removal of ash in areas of high concentration will result in a number of potential planting areas.

Although 56 species were identified, there is potential to plant other species. Other species could be planted in greater amounts. For example, there are very few Honey locust or Little leaf linden – both commonly planted urban tree – planted on County streets. Planting locations need to be identified.

6.0 Criteria and Indicators for Haldimand County Urban Forest.

An important component of strategic planning is tracking of progress. In adaptive management, urban forest managers must be able to identify where specific goals or targets have been met and when adaptations to approaches appear to be necessary. Part of the development of strategies to achieve sustainable resource management has been the identification of criteria and indicators.

Kenney *et al.* (2011) have developed a comprehensive list of criteria and performance indicators for sustainable urban forest management. This list was derived from the work of Clark *et al.* (1997) and may be used to quantify progress in meeting key goals of a sustainable urban forest. They should be used to measure, monitor and evaluate the implementation of the Management Plan at the end of each 5- year period. The Tables found in Appendix D are a Baseline Assessment from 2016.

7.0 Summary (What does all this mean?)

Haldimand County covers a large area of southern Ontario above the northeast corner of Lake Erie and contains the lower channel and estuary of the Grand River. There are 45,200 people in five urban areas, numerous hamlets, Lake Erie and Grand River shoreline and an extensive rural area. Population projections predict population growth in the north closer to Hamilton and stagnant in the south. The County is rich in natural areas and has 14 percent tree cover. The County owns 695 ha of land, of which 155 ha is managed forest, 203 ha of parks and 31 ha of cemeteries, and approximately 1,500 km of roads and streets. Depending on location and public use, the County has varying responsibility to deal with tree management issues on its property. However, most maintenance and concern is with county-owned trees in urban areas because of their significant amenity contributions to the community and safety concerns.

The Official Plan pays little reference to trees and forests and most references apply to planting trees on private land. The County Urban Design guidelines apply mostly to private land and has funded Streetscape Plans that involve tree planting for urban areas and selected hamlets. A number of by-laws consider protection for established trees including Property Standards, Public Conduct on County Property, Cemeteries, Public Park and Facilities. There is a Forest Conservation by-law to regulate harvest of trees in areas greater than one hectare and Haldimand contracts Norfolk County to provide support for this by-law. In addition to municipal by-laws, some Conservation Authority regulations and provincial laws t may have some impact on management of County trees and forests.

Haldimand County has a Community Partnership Program that provides grants for planting trees for various purposes. The Rural Water Quality Program, a county-sponsored Conservation Authority program provides assistance for landowners to plant trees on their own properties. As well, the Conservation Authorities and Forests Ontario provide incentives for tree planting. Community groups are recognized and involved in various tree planting projects.

Five Divisions or Departments are involved in tree-related issues, including Facilities and Parks, Roads, Planning and Economic Development, Community Development & Partnerships and By-law Enforcement.

Presently tree establishment is mostly in new development on private lands (where design criteria are in place), streetscape plantings cemetery and park developments, and community projects. However there are no guidelines for tree placement, species, size, etc. on County-owned lands. Tree replacement is of particular concern with the anticipated and current removal of ash trees.

There is no comprehensive tree inventory of County-owned trees. A sample inventory was completed as part of this strategy and the contract arborist has collected some inventory information and on specific projects and as work orders are completed. An inventory is one of the most important tools to support policy and management actions.

Roads Operations is responsible for tree maintenance issues on 1,500 km of County right-of-way. Parks and Facilities Operations is responsible for tree maintenance in parks and cemeteries. Tree maintenance is conducted on a complaint and/or risk basis. Pruning is conducted on trees through customer service/work orders and generally contracted to a local tree service following direction of the Norfolk Contract Arborist. High risk or specialized work is contracted to a tree service company. There is no corrective/structural pruning program for young trees. Both Operations groups have had a substantial increase in work orders for tree work in the past few years. There is a serious backlog of tree pruning required. Utility line maintenance is carried out by Haldimand Hydro (change to Hydro One in 2016).

The County does not have a formal process to assess and catalogue risk, have a tree risk management policy, a post-storm inspection protocol or inspection process associated with publicly-owned trees. Tree risk issues are usually identified through customer service requests or observations by staff or contactors doing other tasks. With no assessment protocol, the County is potentially vulnerable when damage or safety issues arise.

Tree protection policy for construction near County-owned trees is not standardized. Generally trees in parks and cemeteries are protected through by-laws. The County has recognized that tree protection is required in development projects and infrastructure upgrades. A formalized policy would ensure some standard of protection and recognize the value of existing trees.

The benefits of urban trees and forests are well documented and include environmental, social, cultural, engineering and economic aspects. Trees are considered green infrastructure in urban communities. Unlike traditional municipal infrastructure such as transportation systems that depreciate, green infrastructure accrues in value and provides greater benefits to the community as time passes.

There are many threats and challenges to trees and forests in Haldimand County. Most of these are common issues for southern Ontario municipalities. Most large urban centers have developed inventory, policies and plans that recognize the value of the urban forest and identify measures to protect it. Presently Haldimand has limited policy to plan and manage the existing forest and forest renewal. There is a lack of information regarding County-owned trees. The sample inventory for this project indicated

that most of the tree cover is older, composed of a few species, and needs considerable maintenance work to mitigate risk associated with numerous structural and health problems. See Inventory Summary, Section 5.4.

New policies can help ensure placement of trees in the right location, protect existing trees during infrastructure work and development; increasing tree diversity; prescribe pruning and maintenance procedures; help deal with some plant, pest and pathogen issues; and give consideration for climate change and associated extreme weather events.. The most important potential impacts include drought stress, storm damage, and conditions that favour a proliferation of tree insects, diseases and invasive plant species. Some of these pests already occur in Haldimand and others are likely to become problems in the future. A proactive program that guides day to day operations and activities that improve the resilience of the urban forest, and a reactive program that can respond to extreme events such as ice storms, drought, wind, and insect and disease outbreaks will benefit the entire Haldimand community.

The development of a Forest Strategy and Management Plan for Haldimand indicates a high level of commitment to protecting trees, and it indicates a higher level of awareness about natural resource issues in general. The benefits of trees can be maximized when both professional management resources and an informed public coexist. The County will conduct a community engagement process to educate staff and citizens and to encourage involvement in protecting and building the County trees and forests. Other resources such as an informative website prove beneficial in informing the public.

Finally, adequate resources must be allocated to ensure necessary planning and implementation. Proactive planning and tree maintenance is more economical than dealing with contingencies and is an important investment. Sustained support for urban forest initiatives will be important to keeping Haldimand a vibrant and livable community, with due diligence over its urban forest assets.

8.0 NEXT STEPS

Development of Draft Management Plan
Main Components
- Sample Inventory Results and options for full inventory
  - Urban tree asset management
- Using regulation to protect, manage and grow the forest
- Tree Health and Maintenance
  - Pruning and maintenance
  - Risk assessment and liability mitigation
  - Tree removal guidelines
- Tree replacement protocol
  - Tree species
  - Tree establishment
- Promotion, Education, Stewardship & Partnerships
  - Incorporate Public meeting results
  - Outreach Using Public Websites and Social Media Marketing
  - Stakeholder Engagement & Fostering Community Partnerships

Funding Opportunities and Incentives
Emerald Ash Borer Plan
Impact of EAB on County land
Urban Wood Waste and Revenue Opportunities
Budget and Financial Implications
Recommendations

Finalize Management Plan

Present to Council
Implementation of Management Plan

GLOSSARY OF TERMS

Adaptive Management is the systematic process for continually improving management policies and practices by learning from the outcomes of previously employed policies and practices. In response to these imperfect predictions, planning and management strategies are modified frequently as better information becomes available.

Biodiversity is the total diversity of all organisms and ecosystems at various spatial scales (from genes to entire biomes).

Climate Change is a significant and persistent change in an area's average climate conditions or their extremes.

Hazardous Lands means property or lands that could be unsafe for development due to naturally occurring processes. Along the shorelines of the *Great Lakes - St. Lawrence River System*, this means the land, including that covered by water, between the international boundaries, where applicable, and the furthest landward limit of the *flooding hazard*, *erosion hazard* or *dynamic beach hazard* limits. Along *river, stream and small inland lake systems*, this means the land, including that covered by water, to the furthest landward limit of the *flooding hazard* or *erosion hazard* limits.

Hazard Tree is a tree that has structural defects in the roots, stem, or branches that may cause the tree or tree part to fail, where such failure may cause property damage or personal injury.

Heritage Tree
A heritage tree may consist of the following:

- A notable specimen because of its size, form, shape, beauty, age, colour, rarity, genetic constitution or other distinctive features;
- A living relic that displays evidence of cultural modification by Aboriginal or non-Aboriginal people, including strips of bark or knot wood removed, test hole cut to determine soundness, furrows cut to collect pitch or sap, or blazes to mark a trail;
- A prominent community landmark;
- A specimen associated with a historic person, place, event or period;
- A representative of a crop grown by ancestors and their successors that is at risk of disappearing from cultivation;
- A tree associated with local folklore, myths, legends, or traditions.
- A tree that has been designated under Part IV of the Ontario Heritage Act

Nuisance (tree)
Nuisance is largely an undefined term as it depends on individual interpretation. The closest definition would include "unnecessary hardship"

A **streetscape plan** identifies the specific places where investments will be made in the public realm to make the urban design Vision a reality. It usually includes a design concept for the public right of way

(streets and sidewalks) including urban amenities, such as lighting, street furnishings, and benches. In some instances, it also considers the façades of existing buildings, and the relationship between buildings and the street – such as patios.

Tree Risk Management is the process of inspecting and assessing trees for their potential to injure people or damage property. Trees will vary, ranging from low- to high-risk for failure and may require attention immediately or in the near future. The threshold of risk acceptable to liable parties is dependent upon their policies and objectives. Trees that surpass the level of acceptable risk are hazards from a programmatic viewpoint.
The two guiding principles of tree risk management programs are:
• Increase public safety
• Promote tree health and sustainability

Urban Design Guidelines are a tool used in the municipal decision-making process to ensure that space is developed to reflect the intended look and feel of a given setting. To make a vision real, it is necessary to have Urban Design Guidelines that quantify, regulate and monitor changes in the urban environment.

Urban Forest refers to the trees, forests, greenspace and related abiotic, biotic and cultural components in areas extending from the urban core to the rural fringe.

Urban Forest Sustainability is managing the naturally occurring and planted trees to provide the community with a continuing level of economic, social, environmental and ecological benefits today and into the future.

BIBLIOGRAPHY

Canadian Urban Forest Network. Compendium of Best Urban Forest Management Practices. Tree Canada. . http://www.cufn.ca/

Council of Tree and Landscape Appraisers, http://www.arborday.org/trees/benefits.cfm

City of Cambridge. 2015. Urban Forest Plan (2015-2034) Urban Forest Innovations Inc. *and* Beacon Environmental Ltd.

City of St. Catharines. 2011. Urban Forestry Management Plan. Recreation and Community Services Department

City Of Guelph. 2007. Framework for the Strategic Urban Forest Management Plan 2008 – 2028. Urban Forest Innovations Inc. and Dougan & Associates

City of Kingston. 2011. Kingston's Urban Forest Management Plan. A Plan for City-Owned Trees. Senes Consultants Ltd.

City of Kitchener. 2011. A Sustainable Urban Forest - *For Today and Future Generations.* Operations Infrastructure Services Department

City of London. 2014. Urban Forest Strategy - *Enhancing The Forest City.* B.A. Blackwell & Associates Ltd

City of Peterborough. 2011. Our Forest – Our Future. Urban Forest Strategic Plan for the City of Peterborough.

City of Thunder Bay. 2011. Urban Forest Management Plan. Davey Resource Group

Haldimand County. 2004. Strategic Directions

Haldimand County. 2006. Official Plan

Town of Milton. 2015. Urban Forest Management Strategy 2015-2024. Urban Forest Innovations Inc. *and* Beacon Environmental Ltd.

Urban Forest Management Plan Toolkit. http://ufmptoolkit.com

Urban Forestry South. http://www.urbanforestrysouth.org

REFERENCES

Canadian Urban Forest Network. Canadian Urban Forest Strategy 2013-2018. Tree Canada. http://www.cufn.ca/

City of Vancouver Urban Forest Management Plan, 2007.

Clark, J.R, N.P. Matheny, G. Cross, and V. Wake. 1997. A model of urban forest sustainability. Journal of Arboriculture 21:17–30.

Deneke, F. 1993. Urban Forestry in North America: Towards a Global Ecosystem Perspective. pp 4-8. IN Blouin, G. and Comeau, R. [eds.] Proceedings of the First Canadian Urban Forests Conference May 30- June 2, 1993. Winnipeg MB. 151 pp. Accessed on Jan 22, 2016 http://www.opfa.ca/practice-and-advocacy/professional-practice/urban-forestry/general

Faulkner, K.H., 2004, Lecture notes/Arboriculture practices, Sir Sandford Fleming College, 2004. IN Urban Forest Strategic Plan for the City of Peterborough, 2011.

Franklin, S. 2007. Nichols Park Advisory Council. Personal Communication. . IN Climate change adaptation options for Toronto's urban forest. 2007. The Clean Air Partnership http://www.cleanairpartnership.org

Green Infrastructure Ontario http://www.greeninfrastructureontario.org/benefits (accessed Feb 11, 2016).

Greifenhagen, S. and Noland, T.L. 2003. A synopsis of known and potential diseases and parasites associated with climate change. Forest Research Information Paper No. 154. Ontario Ministry of Natural Resources and Ontario Forestry Research Institute, Sault Ste. Marie, Ontario. . IN Climate change adaptation options for Toronto's urban forest. 2007. The Clean Air Partnership http://www.cleanairpartnership.org

Haldimand County. 2015. Design Criteria. Section O, Street Tree Planting. Revised.

Haldimand County. 2015. Haldimand County Tree Management. Report PED-GM-02-2015.

Haldimand County. 2011. Community Partnership Program. PED-COM-15-2011, Policy 2011-01.

Haldimand County, 2011. Economic Development. Community Profile 2011.

Kenney, W.A., P.J.E. van Wassenaer, and A.L. Satel. 2011. Criteria and Indicators for Strategic Urban Forest Planning and Management. Arboriculture & Urban Forestry. 37(3): 108–117.

Jorgensen, E. 1974. Towards an urban forestry concept. Proceedings of the 10th Commonwealth Forestry Conference. Ottawa, Canada; Forestry Service. Accessed on Jan 22, 2016. http://www.opfa.ca/practice-and-advocacy/professional-practice/urban-forestry/general

Koshida, G., Mills, B., and Sanderson, M. 1999. Adaptation Lessons Learned (and Forgotten) from the 1988 and 1998 Southern Ontario Droughts. Report from the Adaptation Learning Experiment. Toronto, Environment Canada and Emergency Preparedness Canada**:** 23-35. IN Climate change adaptation options for Toronto's urban forest. 2007. The Clean Air Partnership http://www.cleanairpartnership.org

MacIver, D. 2005. Climate Change and New Science. Integration of Climate Change Impacts and Adaptation into Municipal Policy and Programs: A Focus on Water Management, Toronto and Region Conservation Authority, Toronto Ontario. IN Climate change adaptation options for Toronto's urban forest. 2007. The Clean Air Partnership http://www.cleanairpartnership.org

McKenney, D.W., J. P. Pedlar, L. R. Iverson LR, M. F. Hutchinson, K. Lawrence and K. Campbell. 2007. Potential impacts of climate change on the distribution of North American trees. Bioscience 57(11): 939-948.

McPherson,E.G., S.E, Maco, J.R. Simpson, P.J.Pepper, Q. Xiao, A.M. VanDerZanden, N. Bell. 2002. Western Washington & Oregon Community Tree Guide: Benefits, Costs and Strategic Planning. Centre for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service. IN Urban Forest Strategic Plan for the City of Peterborough, 2011.

Meteorological Service of Canada. 2005. <www.mscsmc.ec.gc.ca/education/scienceofclimatechange/understanding/trends/index_e.html>. IN Climate change adaptation options for Toronto's urban forest. 2007. The Clean Air Partnership http://www.cleanairpartnership.org

Office for Urbanism. 2010. Haldimand County Streetscape Plan and Urban Design Guidelines. *www.haldimandcounty.on.ca/uploadedFiles/Our_County/Planning/Community_Vibrancy/Downtown%20UDG%282%29.pdf*

Sullivan, W.C. and Kuo, E.E. 1996. "Do Trees Strengthen Urban Communities, Reduce Domestic Violence?" Arborist News, 5) IN Urban Forest Strategic Plan for the City of Peterborough, 2011.

Sustainable Forests in Urban Ontario: A Report of the Urban Forest Working Group, 1995. Queen's Printer for Ontario. IN Urban Forest Strategic Plan for the City of Peterborough, 2011.

The Clean Air Partnership. 2007. Climate change adaptation options for Toronto's urban forest. http://www.cleanairpartnership.org

Trees Ontario. 2012.A Healthy Dose of Green: A prescription for a healthy population. *http://www.forestsontario.ca/files/healthy_dose/TO_HP_4WEB_FA.pdf*

Ubbens, R. 2006 Interview. February 9, 2006. . IN Climate change adaptation options for Toronto's urban forest. 2007. IN The Clean Air Partnership http://www.cleanairpartnership.org

Watson & Associates Economists Ltd 2014. Haldimand county population, household & employment forecast update, 2011-2041.

APPENDICES

APPENDIX A. HALDIMAND COUNTY REPORT PED-GM-02-2015

HALDIMAND COUNTY

REPORT PED-GM-02-2015
OF THE GENERAL MANAGER OF PLANNING AND ECONOMIC DEVELOPMENT
FOR CONSIDERATION BY COMMITTEE OF THE WHOLE

RE: Haldimand County Tree Management

OBJECTIVE: To seek Council's approval for staff to further research tree management best practices across Haldimand County and report back with a proposed strategy.

RECOMMENDATIONS:

1. THAT Report PED-GM-02-2015 Re: Haldimand County Tree Management dated March 2, 2015 be received;

2. AND THAT staff be directed to bring forward a Tree Management Strategy to address inventory creation, timely maintenance, Emerald Ash Borer mitigation, revenue exploration and replanting matters for Council consideration;

3. AND THAT the County's Community Partnership Capital Grant Program be amended to include tree planting on municipal property as an eligible category of grant funding;

4. AND THAT revenues collected pursuant to the County's Forestry Conservation By-law and from harvesting of Haldimand County owned woodlots be held as a source of funding for expenditures needed to implement Haldimand County's Tree Management Strategy, as presented for consideration in future years' budgets.

Prepared by:

Zach Gable, MAES, EcD, CEcD
Research Technician
Date: March 2, 2015

Respectfully submitted:

Craig Manley, MCIP, RPP
General Manager
Planning & Economic Development Department

Approved:

Donald G. Boyle
Chief Administrative Officer

BACKGROUND:

In May of 2014, Council put forth the following motion:

> *"That prior to the 2015 budget, staff investigate and report back regarding options and financial implications and parameters of a program to encourage tree planting on street boulevards and other public lands in partnership with community stakeholders."*

Benefits of Trees to the Community

There is growing evidence of the benefits that trees can have on a community, with many economic, social, and environmental spin-offs. For instance, a recent study prepared for the City of Toronto indicated that its urban forest, of an estimated 10 million trees, has a perceived value of $7 billion when attributing a dollar value to the benefits they create for the City.

Some of the benefits associated with trees include:

- Trees make a positive aesthetic impact helping to boost community pride and place-making.
- Trees can help protect municipal infrastructure by absorbing precipitation.
- Trees provide rain, sun and heat protection for pedestrians thus encouraging walkability.
- Trees reduce the impacts of vehicle emissions for improved air quality.
- Reduction in temperature of asphalt and residences from shade trees which can lead to energy savings and longer pavement life.

Source: *Urban Street Trees, 22 Benefits* Dan Burden (2006)

- Conserve biodiversity, enhance or protect wildlife habitat, watersheds and other values, and reduce the build-up of greenhouse gases (a major cause of climate change).
- Support Ontario communities, provide recreation opportunities (hiking, hunting, fishing and more), and provide a healthy living environment.

Source: *Ministry of Natural Resources*

Trees are also an important element to the natural heritage of Haldimand County with the existence of Carolinian forest species which is unique to this part of the Province.

Scan of Other Tree Planting Programs

In accordance with the Council resolution of May 2014, staff investigated street tree planting programs undertaken by other municipalities and other organizations. These programs typically allow a resident, without any trees on the municipal right-of-way in front of their property, to request a tree which is then planted by municipal staff. Staff must ensure that there is an appropriate setback and that the tree will not interfere with utilities.

It became apparent through this review that these programs were undertaken by municipalities with dedicated forestry staff with forestry management plans and in some cases, municipal nurseries, which substantially lowers the cost of new plantings. The City of St. Catharines has a budget of $300,000 to be used strictly for the planting of trees on boulevards and parks.

Sample Tree Planting Programs in Ontario

Program Type	Example Community	Process
Municipal Tree planting	City of St. Catharines, City of Brantford, City of Hamilton, City of Toronto	Residents request a tree to be planted on municipal right-of-way; tree is professionally installed.
Cost Sharing	LEAF program in Toronto	Backyard tree planting program in Toronto. City contributes and homeowner pays a reduced price for consultation, tree, delivery and planting.
Rebate	Peterborough Green-Up	Residents pick up a list of approved tree species from the Green-Up office, along with a coupon entitling them to a 50% rebate on the cost of purchasing a new tree (maximum rebate $50) .

While there are numerous economic, social and environmental benefits which could be obtained through the planting of new trees on municipal right-of-ways, cross-departmentally Haldimand staff agree that money spent on a tree planting program would be of greater benefit if used to undertake improved forestry management best practices in the County, to address existing conditions.

ANALYSIS:

Existing Tree Related Initiatives in Haldimand County

Private Lands:

Existing trees in woodlands in Haldimand County are protected by the Regional Municipality of Haldimand-Norfolk Forest Conservation By-law 15-00. This by-law pre-dates municipal restructuring however, remains in effect for regulating the cutting or destruction of trees in woodlands in Haldimand County.

"Woodlands" are any area of land, 0.2 hectares in size or larger, having a density not less than:

i. 1,000 trees, of any size, per hectare; or
ii. 750 trees, measuring over 5 centimeters in diameter, per hectare; or
iii. 500 trees, measuring over 12 centimeters in diameter, per hectare; or
iv. 250 trees, measuring over 20 centimeters in diameter, per hectare; and
v. Does not include a cultivated fruit or nut orchard, or a plantation established for the purpose of producing Christmas trees.

Haldimand has a contract with Norfolk County for Forestry Conservation and Management Services to enforce this By-law and provide other limited services. The cost of these services in 2014 was approximately $26,110. This contract management activity is administered by the Building Controls & By-law Enforcement Division. **Attachment 1** outlines the scope of work associated with the Forestry contract.

Haldimand County presently partners with a variety of organizations including the Grand River Conservation Authority, Niagara Peninsula Conservation Authority, Long Point Region Conservation Authority and Haldimand Stewardship Council Inc. for administration of the Rural

Water Quality Program (RWQP) which offers incentives for a variety of projects including tree planting and living snow fences. Launched in 2012, funds leveraged through the RWQP has aided in the planting of over 21,400 trees in rural areas of Haldimand County.

When new development is reviewed for approval by the County, trees are encouraged on all types of development through site plan approval. In new subdivisions, one tree is required to be planted per lot and two on corner properties. Please note that these trees are planted on private property, not municipal right-of-ways.

Public Lands:

Within the urban areas of Haldimand County, the Facilities and Parks Operations Division accepts donations for the planting of new trees on public lands. Given resource limitations, the work is currently completed by a contractor. To address potential liability issues, tree planting locations must be carefully selected to avoid damaging infrastructure. Plantings must be done with consideration of drainage, safety, crime prevention, maintenance, and the movement of people. Trees are removed when a public safety hazard is identified, however, there is no tree inventory or tree management program currently available. The cost to Haldimand County for a contractor to obtain locates and plant a tree of the required caliber is estimated at $400 - $500 per tree.

Currently, trees within the public road allowance are managed by the Roads Operations Division. As time permits, staff undertake tree removals and tree trimming but a significant portion of tree removal is contracted out. The Roads Operations Division budgets $109,000 per year for contracted tree removal services. Currently, there is no dedicated tree replacement program in place due to limited funding. The County presently does not have an inventory of trees on the public road allowance.

In the downtown areas, street trees have also been planted as part of recent streetscaping plans, with the downtown business associations partnering to undertake basic maintenance (i.e. watering). With the investments made to improve the quality of the downtown areas, there is increasing demands to replace dead trees in a timely manner. Additional trees have been planted on public property through the Community Development and Partnerships Division on a very limited basis as part of Community Beautification projects.

Existing Conditions of Trees Located on Municipal Property

There are growing indications that, throughout the County, existing trees on public lands are reaching end of life and are deteriorating. Once a tree dies it can become more brittle creating a hazard to the immediate area, and is more costly to remove. The County has an obligation to ensure trees on public property do not create a hazard. Over the past five years, there has been a noticeable increase in insurance claims where trees on public property are alleged to have caused damage to private property.

The Roads Operations Division has seen an increase in tree management activity. This Division receives requests from residents for trees to be assessed or removed, which creates a work order. In 2014, 253 work orders were created. This is an increase from 2013 which saw 230 work orders, which was a substantial increase from the 68 reported work orders in 2012.

The Facilities and Parks Operations (FAPO) Division has also experienced increased tree maintenance and removal costs in various parks and cemeteries. In 2014, $15,840 was spent by FAPO on contractors for tree maintenance and removal in parks and cemeteries; this is a sizeable increase from the $4,752 spent in 2010.

It is expected that these issues will be exacerbated by the recent arrival of the Emerald Ash Borer (EAB). Ash is a significant part of the Carolinian forest and Haldimand County appears on the list of regulated areas by the Canadian Food Inspection Agency with several confirmed cases of EAB infestation (See **Attachments 2** and **3**). EAB has killed millions of ash trees in Southwestern Ontario. Trees infected with EAB have a mortality rate of nearly 100%. Across the Province ash trees make up 10 - 40% of the canopy coverage. Without a tree inventory it is difficult to project the impact of the EAB County-wide, but it is anticipated to be significant. It is clear, however, that the combined impact of EAB and increasing public demands to address street tree conditions, particularly in the urban areas, will likely have major community and ecological impacts to the urban tree canopy within the next ten years.

EAB also could have a significant impact on the County's parklands. A recent (2014) inventory of the Lion's Park in Dunnville indicates that 329 of the 382 trees in the park (86%) are the ash species and are vulnerable to EAB. The arborist contracted by the County has examined these trees and has indicated that a quick decline in the park's tree health will likely occur this year and next.

The above information suggests that increasing demands to remove and maintain existing trees due to age, condition and infestation from the EAB, is straining existing resources and is creating liability issues. In addition, there is no program in place to replace trees that need to be removed in order to restore forest cover over time. Staff are of the opinion that the County needs to put in place a structured forestry management framework to address these issues. The first step in this process is to develop a Tree Management Strategy that defines the scope of the work, the cost, and the method of service delivery.

Tree Management Strategy

The development of a Tree Management Strategy will specifically consider the following forestry management activities to help address the issues identified above:

- **Obtaining Better Inventory Information**: There is currently a lack of information in regards to the number, species and condition of trees across the County outside of arborist reports for problem areas. In the short term, sample inventories of key areas would assist in better defining expected demands on resources by understanding and extrapolating information relating to the type, age and health of the species. This information can be used to understand shade cover and locations of future plantings. Species-age distribution can help model what the changes to County trees look like over time to help anticipate future needs. It is suggested that the focus should be on the major urban settlements, active parks and cemeteries, as this is where the impact of tree loss will be most evident, where risks to the public are highest and where environmental benefits from trees are highest. This inventory information would form the basis of subsequent maintenance programs. In the longer term a more comprehensive inventory could become part of the County's Geographic Information System (GIS) data to be used to prioritize resources. The tree management strategy will help identify priority

inventory areas, the necessary degree of tree asset evaluation and the resources required to undertake this work.

- **Program Funding**: Based on the tree inventory and tree condition analysis, the strategy will develop a program budget that includes consideration of existing expenditures in the Facilities and Parks Operations and Public Works functions for tree related matters and any additional funding or other resource needs that may be required to implement it. The program funding evaluation should also include an economic analysis of existing wood products from the active tree maintenance and removal. Revenue from these wood products could help offset some of the maintenance costs. By-products such as sawdust and wood chips have value as they can be repurposed as pellets or mulch. Large pieces of marketable wood could be sold as firewood or for use in furniture and wood-working. Finally, the program funding should include revenues collected pursuant to the County's Forestry Conservation By-law and from the periodic harvesting of Haldimand County owned woodlots to be held and applied as a source of funding for the program.

- **Tree Replacement on County Lands:** Current resources are used primarily to remove dead and dangerous trees. The County does not have a tree replacement policy or program in place. Norfolk County forestry staff have adopted a policy that when street trees on public lands in the urban areas are removed, one tree is required for every 10 centimeters of diameter at breast height (DBH) removed. Thus, the removal of a tree with a DBH of 100cm would require 10 replacement trees. The replacement trees are targeted to specific replanting areas in order to maximize the cumulative impact and to ensure that new tree planting takes place in appropriate areas. The tree management strategy will include an assessment of an appropriate municipal tree replacement policy and the associated costs required to include tree replacement as part of the overall framework.

- **Planting Partnerships:** There are a number of dedicated organizations devoted to the preservation and planting of trees in Haldimand County. The County's Community Partnership Program (CPP) could be used to encourage civic groups to invest in a public tree replacement program where it aligns with identified municipal needs. To address the May 2014 Council resolution, staff are recommending that the CPP program be amended to include tree planting on municipal property as an eligible category of grant funding within the current annual funding allocation limit.

BUDGET/LEGAL IMPLICATIONS:

Based on the foregoing information, the Planning and Economic Development Department is introducing a New Initiative for Council's consideration during the 2015 Operating Budget deliberation process to develop an overall asset management approach through a Tree Management Strategy. This strategy will address tree management on public lands by setting out policy frameworks related to inventorying, maintenance and replacement activity.

Once a strategy is adopted by Council, it will allow the County to identify and remove declining trees and/or EAB infected trees in the public road allowance and in active parks and cemeteries before they become a safety risk and hazard to residents, and where possible, ensure timely replanting of appropriate native species trees in suitable locations. If approved, this $30,000

one-time new initiative to create a tree management strategy will be funded from the Insurance Reserve. The volume of deteriorating trees on County property also has the potential to impact the County's liability insurance policy due to the potential risk. A more proactive approach to maintain existing trees would help mitigate the County's future liability.

The Tree Management Strategy will be used to develop tree maintenance and replacement costs that will be incorporated into future Budgets for review and evaluation within the corporate priorities. As this enhanced program is anticipated to be over and above the current service level, it will ultimately impact the County's existing long range capital funding plan and associated operating costs.

Currently, the County has a small sum of money ($2,700) resulting from enforcement of the Forestry Conservation By-law. On a very infrequent basis, the County also receives proceeds from the sale of timber from municipally owned woodlots (2014 saw proceeds of $21,000 from the harvest of woodlots, but this was the first sale of timber in many years given the limited number of County owned woodlots). Staff recommends that the revenues from these tree related activities be held as a source of funds to help offset the future cost of tree management initiatives.

INTERDEPARTMENTAL IMPACTS:

Currently, tree management is reactive and is distributed amongst three separate operating Divisions:

- Building Controls and By-law Enforcement Division – tree protection in woodlots;
- Roads Operations Division – trees within the public road allowance; and
- Facilities and Parks Operations Division – trees within parks and cemeteries.

There is no comprehensive approach taken to manage trees on public lands or to develop tree related policies and procedures. Currently, tree management matters impact resources in the Divisions of Roads Operations, Facilities and Parks Operations and Support Services, as well as, impacting all Divisions in the Planning and Economic Development Department.

LINKS TO STRATEGIC PLANS:

This initiative supports the Corporate Strategic Pillar of Community Vibrancy and Healthy Community, as well as Corporate Image and Efficient Government.

The project also aligns well with other County projects such as:

- Active Transportation
- Urban and Rural Streetscaping Plans
- Rural Water Quality Program

CONCLUSION:

With the growing evidence of deteriorating tree conditions and threats from invasive species, Haldimand County should work to establish a forestry management framework to include inventory creation, timely maintenance, and mitigation of the effects of invasive insects such as the Emerald Ash Borer, preservation and planting. The first step in this regard is to develop a

tree management strategy. If Council approves the 2015 budget initiative to develop a long term approach, a future report will be presented outlining a proposed Tree Management Strategy. This strategy will then guide the development of future years' budgets required to implement this program

Appendix B.

Haldimand Contract with Norfolk County for Forestry Conservation and Management Services

1. Forest Conservation By-law Enforcement
- Notice of Intent (NOI) processing, Inspection, Summary Report
- Good Forestry Practices processing, Inspection, Summary Report
- Minor Exception processing, Inspection, Summary Report
- Statistical Development, Quarterly Reports
- Processing of General By-law inquiries from woodlot owners
- Forest Health Monitoring – Liaison with Provincial / Federal Agencies

2. Forest Management of County Owned Woodlots
- Forest Health Monitoring
- Boundary Delineation / Monitoring of Encroachment
- GIS Forest Stand Mapping
- Prescription Development, Tree Marking
- Tender Development
- Harvest Contract Supervision

3. Public Extension
- Client inquiries
- Liaison with the Woodlot Owners Association
- Development / Partnership on Landowner Extension / Education Workshops
- Resource Information Development Distribution

4. Site Inspections / Planning / Development Application Review
- Review Planning / Development Applications
- Summary Report / Comments
- On-site meetings
- Development of alternative models / mitigation resources

5. Professional Arborist Consultation
- Review Planning / Development Applications
- Summary Report / Comments
- On-site meetings
- Development of alternative models / mitigation resources

Additional Services within Contract
6. Single Tree Assessment
- Provision of single tree assessments
a) to County - typically for trees that have shown excessive decay or appear structurally unsound, i.e. parks, roads and other County lands
b) to citizens of the County (where approved by the municipality)
- The use is dependent on demands which relate to development pressure, natural catastrophes (i.e. ice or wind event), and natural decline

7. Giant Hogweed Control
- Site investigation and identification of Giant Hogweed
- Trained staff to provide recommendations and/or eradication
- Licensed pesticide applicators and appropriate equipment to destroy

Appendix C. Haldimand Tree Inventory. Selected variables collected with description

See Table 5.2 for complete list of variables.

VARIABLE	Data Type	Description/units
Structure	Text	**Good**: Growing straight without competing leaders, forks and or low branches. This can be dependent on specie. **Fair**: Tree is growing in a manner that corresponds to that individual specie and site conditions. **Poor**: Numerous defects and abnormalities are affecting the growth of the tree.
Vigour	Text	**Good**: Tree appears to be growing well with no significant stress or health factors. **Fair**: Tree shows normal stress and health factors for its specie and site conditions. **Poor**: Tree is demonstrating high levels of stress/health damaging defects and is growing slowly. **Dead**
Risk	Text	**High**: The possibility of a person or valued area/thing being obstructed by said tree is great and immediate. **Medium**: The possibility of a person or valued area/thing being obstructed by said tree is likely to occur eventually with variability in damage. **Low**: The possibility of a person or valued area/thing being obstructed by said tree is unlikely to neither occur immediately nor cause significant damage.
Risk Problem	Text	There is variability in potential hazards a tree might possess towards a person or valued area/thing such as hanging branches, deadwood, etc.
Maintenance Required	Text	There are several options available for removing or limiting risk problems a tree may have. This can vary from pruning, crown reduction, deadwood removal, etc.
Maintenance Priority	Text	**High**: The risk problem associated with said tree can potentially cause significant harm or damage and must be dealt with immediately. **Medium**: The risk problem associated with said tree has the potential to cause harm or damage and should be dealt with in a timely manner. **Low**: The risk problem associated with said tree is minor in severity and will unlikely be an issue any time soon.
Wire Conflict	Text	Hydro, Phone/Cable - **No conflict**: No aspect of the tree will interfere with wires. **Conflict**: Some aspect of the tree is interfering with the wires such as branches are touching wires. **Potential conflict**: No immediate hazards but as a tree develops its branches may interfere with the wires or the tree itself could fall on them.

Appendix D

Criteria and Indicators for Haldimand County urban forest.
These Criteria and Indicators should be used to measure, monitor and evaluate the implementation of the Management Plan at the end of each 5- year period. The Tables are a Baseline Assessment from 2016. Criteria without shading either could not be measured or are not a goal of this Strategy and Plan.

Table A1-1. Criteria and performance indicators for the Vegetation Resource

Vegetation Resource					
Criteria	**Performance Indicators**				Key Objectives
	Low	**Moderate**	**Good**	**Optimal**	
Relative canopy cover		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
Age distribution of trees in the community	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.
Species suitability	The existing canopy cover equals 0-25% of the potential**.**	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.
Species distribution	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
Condition of Publicly-owned Trees (trees managed intensively)	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
Publicly-owned natural areas (trees managed extensively, e.g. woodlands, ravine lands, etc.)	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.
Native vegetation	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 encouraged 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 required 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

Community Framework					
Criteria	Performance Indicators				Key Objectives
	Low	Moderate	Good	Optimal	
Public agency cooperation	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
Involvement of large private and institutional land holders	Ignorance of issues	Educational materials and advice available to landholders.	Clear goals for tree resource 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 resource management plans.
Green industry cooperation	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.
Neighbourhood action	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.
Citizen-municipality-business interaction	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.
General awareness of trees as a community resource	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.
Regional cooperation	Communities cooperate independently.	Communities share similar policy vehicles.	Regional planning is in effect	Regional planning, coordination and /or management plans	Provide for cooperation and interaction among neighbouring communities and regional groups.

Table A1-3. Criteria and performance indicators for the Resource Management Approach					
Resource Management Approach					
Criteria	**Performance Indicators**				Key Objectives
	Low	**Moderate**	**Good**	**Optimal**	
Tree Inventory	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 tree resource to direct its management. This includes: age distribution, species mix, tree condition, risk assessment.
Canopy Cover Inventory	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.
City-wide management plan (PLAN IN DEVELOPMENT)	Plan in Development/No plan	Existing plan limited in scope and implementation	Comprehensive plan for publicly-owned intensively- and extensively-managed forest resources accepted and implemented	Strategic multi-tiered plan for public and private intensively- and extensively-managed forest resources accepted and implemented with adaptive management mechanisms.	Develop and implement a comprehensive urban forest management plan for private and public property.
Municipality-wide funding	Funding for reactive management	Funding to optimize existing 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
City staffing	No staff.	No 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
Tree establishment planning and implementation	Tree establishment is *ad hoc*	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
Tree habitat suitability	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.

Resource Management Approach					
Criteria	**Performance Indicators**				Key Objectives
	Low	**Moderate**	**Good**	**Optimal**	
Maintenance of publicly-owned, intensively managed trees	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.
Tree Risk Management	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.
Tree Protection Policy Development and Enforcement	No tree protection policy	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.
Publicly-owned natural areas management planning and implementation	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.

Appendix E. Summary of Public Engagement

The County received 34 responses to the online survey. The table below shows the questions with summary data and comments. Reponses at the public meeting and by staff are found below without the questions repeated.

Ward #	1	2	3	4	5	6	na
What area of Haldimand County do you currently live in?	6	6	8	6	1	2	3

Are you male or female?	Male		Female	
	15		19	

What is your age?	21-29	30-39	40 49	50-59	60 +
	2	2	6	10	14

Vision	**I agree**	**I can live with it**	**I have no opinion**	**I don't like it**	**I funda-mentally disagree**	**Skipped**
Q4. Haldimand County-being committed to preserving our natural beauty-values and is dedicated to protecting and managing its urban and rural forest. The County recognizes these forests provide environmental, economic, community and health benefits these forests provide to its residents	29	3				2
Comments	• What about 'increasing' the urban and rural forest as part of the vision??? Trees are being cut in the lakeshore area but there is no plan to replace these! • I don't feel this vision statement was followed in the past but I am hoping it holds true for the present and the future. I am optimistic but it needs to be proven. • roadside tree planting needed where road allowance permits					
Q5. Haldimand County will, in partnership with its residents, businesses and stakeholders, work to promote and increase urban forest coverage that is a diverse, healthy and sustained asset for future generations.	27	4	1			2
Comments	• Again proof is in the pudding as they say. Many homeowners cannot afford the cost of purchasing trees and having trees maintained. Perhaps an incentive program for homeowners would help.					

Guiding Principles	I agree	I can live with it	I have no opinion	I don't like it	I funda-mentally disagree	Skipped
Q6. Increased understanding of the County's urban forest will support more effective management	28	1	1			4
Comments						
Q7 Trees are municipal infrastructure and managed within an integrated asset framework. Trees are part of the green infrastructure and considered a capital asset along with buildings, sewers, roads, etc.	25	3	1	1		4
Comments	• Although sewer work can kill trees. I have seen a beautiful 100 year old tree have to be cut down because of sewer work.					
Q8 The County strives to have efficient and cost-effective management of its urban forest.	20	6	3			5
Comments	• A forest strategy policy would be a great first step. • Hopefully Haldimand will have its own Forestry division instead of using Norfolk department. • Efficient, cost effective management needed for ALL county assets. Active management of trees more important for trees then most other infrastructure.					
Q9 County trees are maintained in a healthy and safe condition through good management practices such as pruning and mulching.	21	9				4
Comments	• To date, trees are managed only when necessary. There is no apparent proactive program. • And Regular Routine Inspection. • Pruning of trees and hedgerows is not well done. Often a hacking job and trees are cut around obstacles that then makes them lop sided and top heavy requiring more pruning or complete cut down in a few years. • I would like to see the County actually start pruning trees. Right now they just cut them down when they are dead. Many beautiful trees could have been saved with proper maintenance.					
Q10.The right tree is planted in the right place to establish and maintain an optimal level of age and species diversity, and to maximize benefits and minimize hazard, nuisance, hardscape damage, and maintenance costs.	25	5				4
Comments	• Many of the existing trees on county property are of inappropriate size and species. • However, does "right tree" mean an emphasis on 'native species' which will also assist our birds and insect life with their ongoing loss of habitat; need to add emphasis on native species					
Q11. The community is engaged in the support of the conservation, management and stewardship of the local urban forestry program.	21	3	4		1	5
Comments	• What does this mean in practical terms? • County should work with local horticulture groups and businesses. • I am not sure how this is working. I am not aware of any community initiatives where trees are concerned, just gardens and planters. They may be there and I just don't know it. • See answer to # 3 can only be accomplished when citizens are engaged as continuing participating partners.					
Q12. County trees are monitored and assessed periodically.	23	2	2	3		4

Comments	• Monitoring would prevent hazardous situations with fallen limbs or trees. • County trees should be inspected, monitored and assessed, particularly in the urban areas, regularly on a routine inspection schedule basis. • Not specific enough; monitor for what? How often, remediation plans. • and inventoried • Not done by Haldimand but Norfolk • see # 3 • What is the minimum maintenance standard? 5 year inspection intervals? If so this standard should be adhered to. • I don't think that this is happening right now, but I would like to see it happen. The County should hire an arborist to assess the trees to ensure they are being properly maintained.					
Q13. An adaptive management approach is used to adjust management practices as needed using current information and research.	25	2	1	1		5
Comments	• To our knowledge, there has been little attention or research to threats regarding our county trees					
Q14.Well-managed privately owned trees contribute in large amount to the urban forest.	28	2				4
Comments	• We observe greater value placed on urban forests in surrounding cities than in Haldimand County.					
Q15. Work towards optimal levels of tree/canopy cover to maximize urban forest benefits.	28	1	1			4
Comments	• Educational workshops would be beneficial to Haldimand residents. Incentives such as provided by Haldimand County Stewardship Council are positive. • As privately owned trees are outside of the county's control, I don't believe they should be considered within the urban forest - owner could clear cut their property. • All County employees when travelling around in the course of their employment should be alert to trees being cut down on private land. • As said above, it takes money to maintain trees and many homeowners do not have extra to spend on arborists. I believe programs that reduce the cost of purchasing trees, educating homeowners on the right trees to plant for their property and providing free or discounted mulch by the county for homeowners would help. • Communication and citizen engagement important.					
Q16.New technologies are used to integrate trees in existing and new developed settings.	20	4	5			5
Comments	• Hopefully Haldimand County will see an opportunity with the new housing developments within their jurisdiction. • What is a new technology? • What does this mean • not sure what these technologies are					
Q17.Heritage tree policies are considered important.	29	2			1	5
Comments	• Given the opportunity, community members would likely submit suggestions. A contest or some means of recognition would help. • Nice statement but how does it apply in practical terms • Very important. • I don't believe heritage trees were considered important in the past. Just as I believe architecture of heritage value should be preserved, I sincerely hope that every effort will be used to preserve these trees.					

Goals	I agree	I can live with it	I have no opinion	I don't like it	I funda-mentally disagree	Skipped
Q18. To undertake an inventory of County-owned urban and roadside trees and forests to create an understanding of the age, composition and quality of trees and implications for maintenance, removal and replacement;	25	3	2			4
Comments	• Thank you for the opportunity for public input.					
Q19. To develop a policy framework, infrastructure and procedures for trees on County lands with respect to tree maintenance, removal practices and replanting so that the urban forest is recognized as green infrastructure and a municipal/community asset.	28	1	1			4
Comments	• It would be nice to see a replanting policy when a tree is removed. This is not the case now. I would also like to see developers have to replace all the trees that they cut down for their new housing projects.					
Q20. To improve the resilience of the urban forest to current and anticipated stressors, including climate change, pests and diseases by implementing policies and management practices that optimize tree species diversity, structure and age classes, with appropriate monitoring.	27	2	1			4
Comments	• Tree management is becoming increasingly important.					
Q21. To utilize human resources efficiently and effectively to address the tree-related activities.	26	2		1		5
Comments	• Community volunteers and organizations would be willing partners given leadership from their municipal council. • How would the human resources be utilized and at what anticipated cost? Using hydro crews to prune may not be the best use or correct use of resources. • community groups, schools Earthday each year tree planting throughout Haldimand					
Q22. To prioritize protection and maintenance of mature, healthy trees and preservation of older large-canopied species to the greatest extent possible.	28	1	1			4
Comments	• A priority. Preserve existing healthy trees. Stop destruction of trees solely for convenience or selfish gain. • I absolutely agree!! • many large farms, and those that are rented wide swaths of trees, wind rows, fence lines being removed, loss of habitat, only to use larger equipment but removing often very old growth that has withstood years of parasite, drought etc. *** should be discussed					
Q23. To transition towards proactive tree establishment and replacement whereby all potential plantable spots on the County lands are explored and apply "right tree, right place" principles, except where policy requires that new trees be planted on adjacent private property development	29	3				5
Comments	• Educational workshops, publications, seminars, news releases. Most importantly: municipal example. • I do not understand the statement • Why wouldn't the same policy be applied on both properties? • Would like more detail on requiring new trees on private property?					

	• Nurture partnerships with adjacent property owners and engage in formal agreements were appropriate.					
Q24. To build awareness and engagement among County staff and the community, regarding the importance and value of the urban forest and the County's efforts to sustain this resource.	26	1	2			5
Comments	• Seminars, workshops organized by municipal staff are offered on tourism. Businesses and residents would benefit from the same effort on tree management. • schools					
Q25. To expand stewardship initiatives, and develop more partnerships that support the urban forest with initiatives such as tree planting and maintenance.	25	2		1		4
Comments	• Hopefully the county of Haldimand will develop along with the numerous MAPS, comprehensive brochures on tree and forestry initiatives using the Williams & Associates information. • Community groups capable of assisting in providing healthy trees at a much lower cost, utilize this contribution, currently county practice is to spend a lot on a tree for a warrantee!!! Why spend $1000 when a community group can provide same tree for $100 for reputable grower.					
Q26. To use new technologies in selected areas for integration of trees in hardscapes such as downtown and parking lots.	24	3		2		5
Comments	• In the past many unsuitable trees were unknowingly planted by well-intended folks. A comprehensive guide published by Haldimand County would be helpful. • Again I don't understand what a new technology is. However I'm all for planting and protecting trees in downtown cores. • As long as it is adding to, not taking away. • More green, an easier way to beautify concrete. • Although you may need to use a force field for the poor trees in front of the Victoria Hotel in Dunnville that where torn up last spring. Sad. • when the tree is planted, it can't be for forgotten needs regular watering first year, the uprights that support it, need to be adjusted, removed as trees grow, current streetscaped trees have gouging because rubber/wire uprights put on were forgot about never adjusted, neglected causing permanent damage on tree trunks.					
Q27. Based on the current plan, in year four, update the Forest Management Plan and associated Operating Plans to ensure the Forest Management Plan and operating budgets are updated on a regular basis.	27	2			1	4
Comments	• Follow-up to the study conducted by Williams & Associate is critical; otherwise, taxpayer's money has been wasted. County council is to be commended for contracting the study. • Hedgerows and trees located alongside public thoroughfares should also be included. • I think it is about time that the County realize the value of their trees and recognize how beautiful they make the community.					

Summary of Public presentation

Are you male or female?	Male		Female		
	7		2		

What is your age?	21-29	30-39	40 49	50-59	60 +
				3	6

Vision	**I agree**	**I can live with it**	**I have no opinion**	**I don't like it**	**I funda-mentally disagree**	**Skipped**
Q4.	9					
Comments	• Google "Financial Post" and "Claire Brownell" and "Toronto Urban Forest is worth $7-billion". • Give this presentation to Grade 5 students. • Haldimand County can definitely use a keen attention to increasing tree management.					
Q5.	9					

Guiding Principles	**I agree**	**I can live with it**	**I have no opinion**	**I don't like it**	**I funda-mentally disagree**	**Skipped**
Q6.	9					
Q7	9					
Q8	9					
Comments	• I have not seen this as principle advocated by most Councilors. • I do not think this is the current practice.					
Q9	9					
Comments	• Providing jobs perhaps.					
Q10.	9					
Comments	• Educated workshops possibly? Available through municipality.					
Q11.	8	1				
Q12.	9					
Comments	• If funding is an issue, I suggest partnership with appropriate organizations be established.					
Q13.	7	1	1			
Comments	• Humans are a threat also.					
Q14.	8		1			
Q15.	9					
Comments	• Privately owned trees (Ash) that HAVE to come down should be replanted with help					

	from the county!!!!					
Q16.	7	2				
Q17.	8	1				
Comments	• Very important.					

Goals	I agree	I can live with it	I have no opinion	I don't like it	I funda-mentally disagree	Skipped
Q18.	9					
Q19.	9					
Q20.	9					
Q21.	8	1				
Comments	• Include the use of Haldimand Wood Lot Assoc. & Stewardship for their help. • How is this to be done?					
Q22.	9					
Q23.	9					
Q24.	9					
Comments	• Very important. • I encourage publicity of Council's plan and hope that response is good.					
Q25.	9					
Comments	• Publicity is crucial. Educational effort essential.					
Q26.	7	1	1			
Q27.	9					
Comments	• Excellent presentation. • A well organized plan!!!					

Summary from Staff and Council

Are you male or female?	Male		Female		
	9		4		

What is your age?	21-29	30-39	40 49	50-59	60 +
	1	3	5	4	

Vision	**I agree**	**I can live with it**	**I have no opinion**	**I don't like it**	**I funda-mentally disagree**	**Skipped**
Q4.	9	3		1		
Comments	• "Protecting" sets a mindset with residents & we already have many complaints from residents that see a green tree & don't understand that it is not healthy or is a liability to property.					
Q5.	10	3				
Comments	• Would like to eventually see canopy % targets for communities to engage in and aim for.					

Guiding Principles	**I agree**	**I can live with it**	**I have no opinion**	**I don't like it**	**I funda-mentally disagree**	**Skipped**
Q6.	12	1				
Comments	• I think it makes sense to get buy in for private trees as well					
Q7	8	5				
Q8	8	5				
Q9	11	2				
Comments	• Based on the presentation-training on proper pruning techniques is required. • Resources will need to be committed to this. • This will be extremely costly. Training is required and increased staffing level.					
Q10.	12	1				
Comments	• The decisions need to be made by a qualified person educated in forestry. • Good idea to try to have more trees on private property and less in the road allowance area. 100% agree with parks and cemeteries • Need in house expertise in tree species, maintenance procedures					
Q11.	11		1	1		
Comments	• Caution in that "squeaky wheel" (tree hugger) will be the main body that is heard. • I think the community should support a good program.					
Q12.	10	1	1		1	
Comments	• As budgeting allows. • The management plan needs to outline who is responsible for what as there are so many cross divisional things happening in relation to trees • Again, an increase in funding and staffing levels, and training is required					
Q13.	10	1		2		

Q14.	11		1	1		
Comments	• See comment on first page. • I think some of the tree canopy and replacement needs to take place on private property to minimize cost impacts an maintenance long term.					
Q15.	13					
Comments	• Support for private trees is needed. Be it educational to start					
Q16.	8	4	1			
Q17.	8	3	1	1		
Comments	• We should be including a heritage tree policy in this plan. It is an important part, and involves public safety... as many trees are not removed because we 'think' they may be heritage and a clear program would help with that					

Goals	**I agree**	**I can live with it**	**I have no opinion**	**I don't like it**	**I funda-mentally disagree**	**Skipped**
Q18.	10	2				1
Comments	• Will need to hire a specialist to manage this plan.					
Q19.	8	3				2
Q20.	8	3	1			1
Q21.	9	2	1			1
Comments	• Increased staffing					
Q22.	9	2		1		1
Comments	• Statement should include where the location is safe (Roadside Safety audit)					
Q23.	4	3		1	3	2
Comments	• Obviously not planting trees everywhere. • There needs to be a balance between open space & treed areas. • Not all possible locations • Think it should try to influence and encourage private plantings as well					
Q24.	8	3		1		1
Comments	• "All potential plantable spots" - interpretation by public could be wrong.					
Q25.	10	1	1			1
Q26.	8	4				1
Q27.	6	5	1		0	1
Comments	• Follow-up to the study conducted by Williams & Associate is critical; otherwise, taxpayer's money has been wasted. County council is to be commended for contracting the study. • Hedgerows and trees located alongside public thoroughfares should also be included. • I think it is about time that the County realize the value of their trees and recognize how beautiful they make the community.					