Green Infrastructure for Ontario's Rural Communities: Nature and its Contributions to Community Economic Development and Resilience

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1.0 Introduction

1.1 Why this project?

In Ontario, the natural environment is often treated as a barrier to development in the rural context. While planners work within municipalities and the land base, they are faced with the challenge of balancing economic growth, protecting and managing natural resources, and furthering healthy and resilient communities. These challenges are most evident in southern Ontario where various land uses – including agriculture, resource extraction, and human settlements – compete for a limited land base. In other regions of Ontario, municipalities struggle to attract new economic activity and retain their residents, often without diminishing the surrounding natural environment. In both scenarios, the goods and services provided by healthy and resilient ecosystems is often overlooked.

This document promotes the natural environment and its various functions to improve community health, resilience, and sustainability. Further, this document captures how nature and natural systems can be used in a more holistic manner to generate economic and employment opportunities, provide cost savings to rural municipalities, all while maintaining and enhancing protection of the natural environment. More specifically, this document focuses on the multifunctional benefits that green infrastructure (GI) contributes to rural communities, including the provision of natural resources, education, tourism and recreation opportunities, local food production, flood and erosion control, improving surface and groundwater quality, biodiversity and species protection, reducing energy use, improving air quality, climate change adaptation, and creating community cohesion and sense of place. This document provides examples of the way GI can be incorporated into municipal plans, climate change strategies, tourism and recreation development, and environmental initiatives. These examples provide multiple benefits in and around the municipalities they serve. As part of the research, thirteen case studies have been selected to demonstrate innovative ways by which municipalities have made use of GI – in facilitating a healthier environment, providing cost savings to municipalities, creating economic opportunities, and all resulting in more resilient communities. By sharing these case studies, this document strives to promote how nature and natural systems can be used as community assets now and in the future.

1.2 Project Objectives

The purpose of this document is to examine the barriers and opportunities for using nature and natural systems as a mechanism for rural economic development, and as a means to generate rural

community resilience. While GI is typically utilized in urban settings, this document emphasizes the use of it within a rural context.

The project objectives are as follows:

1) To identify current rural municipal activities associated with approaches that make use of the goods and services of nature as an economic development tool.
2) To seek out innovative tools and approaches that offer lessons for other rural municipalities to promote economic activity associated with local nature and natural systems.
3) To examine the provisions of 'Green Infrastructure' as a useful, cost-effective nature-based design tool for providing essential infrastructure in rural communities.
4) To develop resource materials (including case studies and best practices) that can assist rural municipalities in approaching nature and natural systems as a potential economic development tool as well to improve community resiliency.
5) To examine and document the synergies that may occur between an environmentally resilient land use base and opportunities to address health and wellness challenges for rural areas.

1.3 Who is the intended audience?

The information provided in this document has been prepared for the use of rural stakeholders. These include:

- Rural municipal leaders (including politicians and planners);
- Aboriginal communities;
- Community groups and agencies (Conservation Authorities, Public Health Units);
- Economic development agencies (Community Futures Development Corporations); and,
- Rural residents and business owners.

This document should be shared with those interested in developing new and innovative ways to incorporate GI into their community plans.

2.0 Discussion on Green Infrastructure

What is the first thing that comes to mind when you hear the term '*green infrastructure*'? Is it stormwater management? Low-impact development (LID)? Green roofs and walls? Parks and trails? Or schoolyard tree plantings and community gardens? While all of these can be considered examples of GI, one of the main challenges during this project has been in defining it. In short, GI means different things to different people. It can be viewed from a broader, regional scale, to more localized,

site-specific projects (Green Infrastructure Ontario Coalition [GIO], 2012). Examples vary from rain gardens to planting trees as windbreaks to entire watersheds.

In Ontario, professional planners will be most familiar with the Provincial Policy Statement's (PPS) definition of GI. The PPS defines GI as, "natural and human-made elements that provide ecological and hydrological functions and processes. *Green infrastructure* can include components such as natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs" (OMMAH, 2014, p. 42). This definition captures both the environmental elements of GI and emphasizes it in relation to its 'grey' infrastructure water management functions (s.1.6.2, OMMAH, 2014, p. 15). Although this definition is useful, it does not capture the economic and social elements and benefits of GI.

2.1 The Definition of Green Infrastructure as it Pertains to the Research

In this document, GI can be defined as the network of natural and human-made systems and features that provide multifunctional benefits to human and natural communities. GI is considered in a more holistic manner to include the environmental, economic, and social benefits it can contribute. These benefits include clean air and water, productive soils, reduced flooding, outdoor education and recreation opportunities, climate change adaptation, wildlife habitat, reduction of servicing of 'grey' infrastructure, and more.

2.2 Rural Ontario Context and Issues

In Ontario, rural communities are experiencing a time of uncertainty and change. Faced with a diverse range of issues, rural communities have a variety of approaches to addressing those issues. While some areas are experiencing growth, many are experiencing population decline. Aging populations require services and amenities that may not be available in their communities. Attracting and retaining businesses is often difficult in rural areas, and the lack of economic opportunities results in outmigration of younger populations. A diminishing tax base makes it difficult for rural municipalities to update aging and inadequate infrastructure. In some instances, nearby rapid urban growth has led to increased rural land values, fragmentation and loss of farmland and green space. Environmental degradation from both agriculture and urbanization put pressures on water quality, and the natural environment and its ability to adapt to climate change.

2.3 Why is Green Infrastructure Relevant to Rural Ontario?

GI can be used to address many of the issues noted in the previous section. GI offers a wide range of benefits to rural areas, and these include increasing the number of green spaces, protecting and enhancing the natural environment, providing creative job opportunities, improving both water quality and air quality, protecting soil and improving erosion-control. Most importantly, GI can be used as a mechanism to adapt to climate change. Throughout the research process for the project, the researchers found that most of the literature examines the use of GI from an urban perspective in Ontario. To further leverage beneficial actions for human and natural communities, it is important to consider the tremendous natural resources that are available in rural parts of the province to help maximize the benefits of GI.

3.0 Methodology

3.1 Literature Review

To introduce the concept of GI and to examine current examples of GI, a literature review was completed in May 2015. Although the project focuses on rural Ontario, the literature review identified examples across North America to illustrate how GI can be used in unique ways to improve community health, resilience and sustainability. Examples include the *Greenbelt* Plan, Carolinian Canada's "Big Picture", and Milwaukee, U.S.A.'s "Greenseams" program. If you are interested in reading more, the literature review can be found at http://waynecaldwell.ca/Projects/greeninfrastructure.html .

3.2 Distribution of Surveys

An on-line survey instrument was devised and distributed to capture viewpoints on the use of GI in Ontario Municipalities today (see **Appendix 1** for a copy of the survey). The purpose of the survey was to identify the perspectives of municipal leaders across Ontario in relation to GI and the ways in which it can be utilized to create economic opportunities and enhance rural community resilience. A variety of rural organization types were surveyed to assess differing perspectives on GI thinking. The survey was sent to representatives from upper- and lower-tier municipalities, Aboriginal communities, Conservation Authorities, Public Health Units, and Community Futures Development Corporations. As well, the intention of the survey was to capture innovative examples of GI that can be shared and/or replicated across rural municipality jurisdictions.

A major portion of the survey was the inclusion of eight theme areas (see **Table 1** below). The eight themes areas allowed the respondents to consider how GI elements were/ were not being used in their

local area. The survey asked the respondents to identify any programs, policies or uses of nature that contribute to economic prosperity objectives, community building, cost savings, and/or enhancing the environment within their community. **Table 1** provides an overview of cumulative responses to the question, with responses grouped by survey theme. An interesting observation from the survey analysis is that the most abundant answers were included in the broad band theme of 'Community Livability'. Sixty five percent of respondents stated that GI contributed to the theme of 'Community Liveability' (highest response), while fifty percent of respondent stated that GI contributed to the theme of 'Water and Stormwater' (third-lowest response). This is interesting considering GI projects may be geared towards supplementing the management of water and stormwater. A further breakdown of survey statistics is included in **Appendix 2**

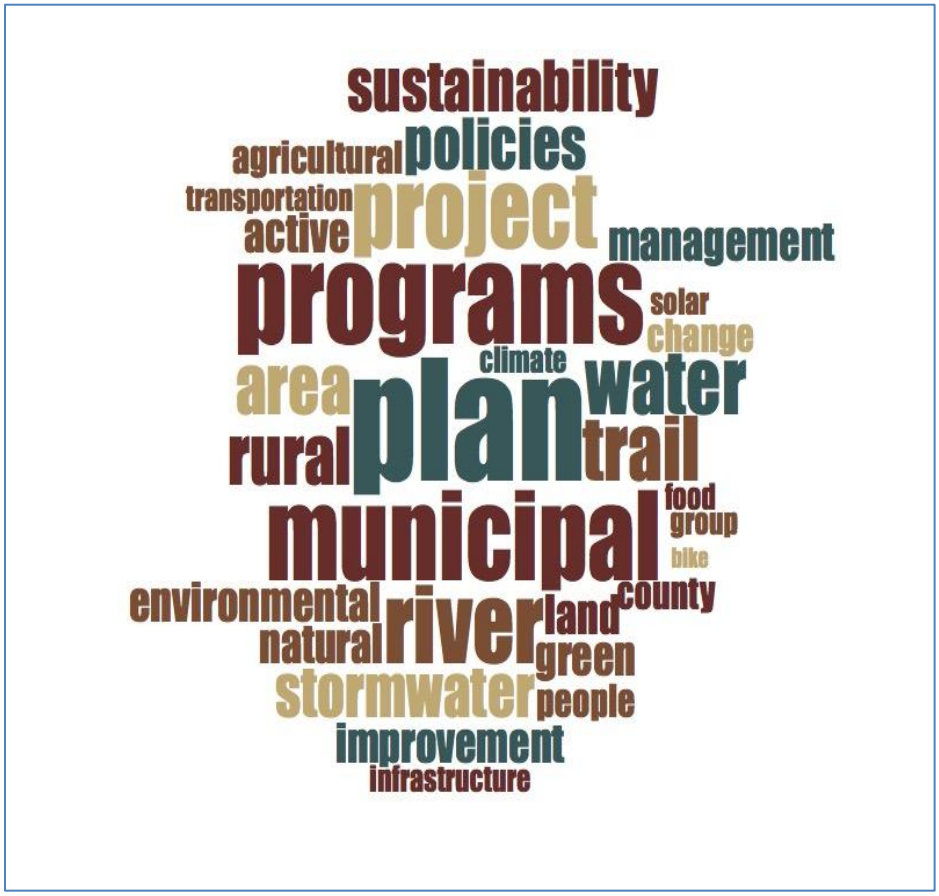
Table 1: Perspectives from Ontario Municipality Community Leaders on the Use of GI, and Ranked Per GI Theme

Category (Themes)	**Ranking of All Responses (1 – 8)**	**Responses in Category (% of all Surveys)**
Community Livability	1	65%
Culture, Education, Recreation and Tourism	2	63%
Woodlands, Woodlots, & Street Trees	3	53%
Local Food Production; Soil Quality Enhancement	4	54%
Water & Stormwater Management	5	*50%*
Other (vacant or recycled lands, landfills, brownfields, etc.)	6	43*%*
Biodiversity, Habitat & Species Protection	7	43*%*
Climate Change Adaptation & Mitigation	8	35%

The survey prompted the respondents to highlight the examples of GI use within their areas they considered to be innovative and replicable elsewhere. These responses aided the researchers in selecting the key informants for the next stage of data collection – interviews and case studies. The responses were analyzed using NVivo software, and a word cloud summary of responses to the question can be viewed in **Figure 1.** This figure is a good summary illustration of the breadth and

frequency of responses concerning the innovative use of GI today. The relative size of the words in the image represent how common certain words were repeated by survey respondents.

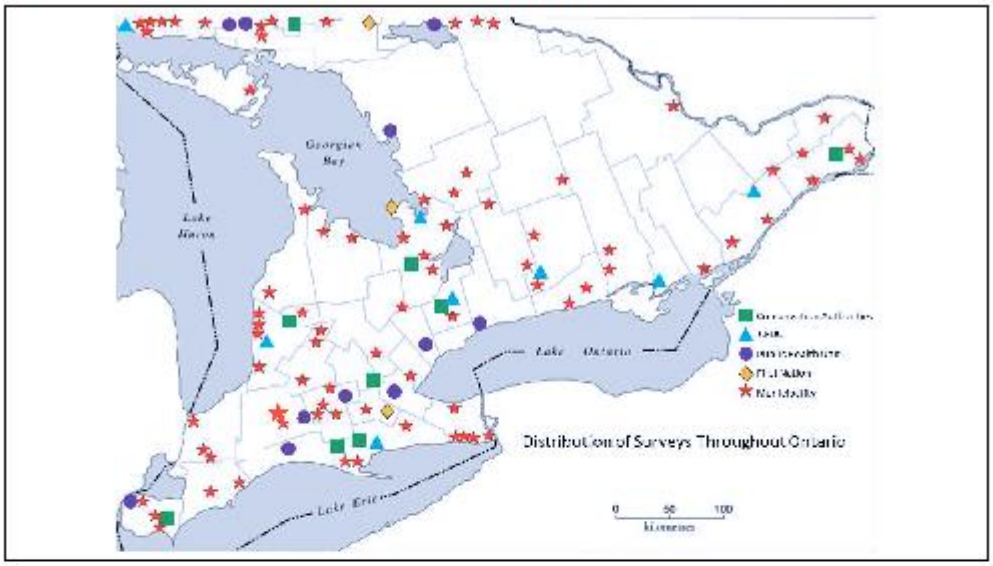
Figure: 1 Word Cloud Illustrating Frequency of Survey Ideas Concerning GI Use Innovation



Source: GI survey data, and analyzed using NVivo software

Through the distribution of seven hundred (700) surveys, one hundred ten (110) responses were received. A map has been provided in **Figure 2** to give a visual representation of the areas covered in the surveys that were completed.

Figure 2: Map Illustrative of Survey Respondent Locations, by Type of Organization



Source: Google Maps

3.3 Key Informant Interviews

Selection of the key informants came directly from the responses to the 'innovative' question in the survey. Provided with a variety of examples, the key informants were selected based on the following:

- Relevance to the research project's definition of GI;
- Associated economic development and employment opportunities;
- Representation from each of the eight 'GI theme' categories identified in the survey;
- Representation from each of the organizations; and,
- Uniqueness of the green infrastructure approach to the researchers.

Every attempt was made to interview representatives from various regions of Ontario to reflect varying conditions and location contexts. Key informants were selected from the following general areas of Ontario, and reflective of the southern and mid portions of the Province.

- Central Ontario (Simcoe County, the Muskokas, and Timiskaming);
- Eastern Ontario (Lanark County);
- Western Ontario (Windsor- Essex Region and Huron County)

The interviews were used to garner an in-depth understanding of the identified innovative uses of GI from the surveys. The interviews explored the planning and implementation behind these approaches

– motivating factors, who was involved, limitations or challenges, level of local support, economic rationale, and the ways in which they contribute to community sustainability.

Identifying the process behind these examples can aid other municipalities or organizations interested in adopting similar approaches to using GI. The results from these interviews are the thirteen case studies highlighted in this document.

4.0 Key Themes Identified from the Research

The eight key themes identified in this project are an amalgamation of nature/ natural system themes derived in the European Union, whom we consider to be progressively leading the way in the use of GI (European Environment Agency, 2011). It was anticipated to be difficult for respondents to list every example of GI they are aware of within their communities. The themes were used to provide guidance for respondents in recognizing that some programs, projects, or plans within their communities may in fact be an example of GI. It is the researcher's opinion that the themes are more understandable to the average person, rather than terms such as 'provisioning, supporting, or regulating' aspects of nature. As you read along you will notice that these themes are inter-related, and that is intentional. An integral element of GI is that it offers a variety of benefits to communities, and that it does not do just one thing. This document continually stresses the multifunctional benefits of GI throughout the eight themes and case studies that have been included in this document.

4.1 Community Liveability

Ultimately, community liveability can be what we strive for. A healthy local environment contributes to healthy, resilient rural communities. Opportunities for education, employment, and social and cultural experiences, improved health and well-being, clean air and water, local food production and food security, and a functioning natural environment all factor into local and regional quality of life. Community livability includes providing access to attractive natural spaces that promote exercise and leisure, opportunities for community members to get involved in local initiatives and to connect with others from diverse backgrounds and all ages. These play a role in community cohesion and precede a sense of pride and place. It is no coincidence that we consider all thirteen GI initiatives in our case studies to be an example of community liveability.

Examples:

- Parks and gardens

- Street trees, windbreaks
- Pollinator plantings
- Wetlands
- Woodlands
- Recreational trails

4.2 Culture, Education, Recreation and Tourism

The theme of culture, education, recreation and tourism incorporates the environmental elements of GI with social and economic elements. Since we view GI in a holistic manner, and as a multifunctional tool for community resilience, this category includes a broad range of examples that are integral to a community and its livability. Enhancing natural attributes and incorporating them into a community's identity, highlights local distinctiveness and fosters feelings of pride and 'sense of place' (European Environment Agency, 2011, p. 36). It goes without saying that areas with aesthetically appealing surroundings that offer numerous outdoor activities draw visitors and new residents to rural communities. Attracting visitors and residents increases spending at local businesses and promotes economic spinoffs. Programs that engage citizens of all ages provide opportunities for education, training, and social interactions. Finally, providing open space, parks, and trails encourages citizens to participate in recreation and leisure activities, contributing to improved local health and wellbeing

Examples:

- Community gardens
- Tree planting initiatives
- Recreational trails
- Lakes, rivers
- Parks
- Cemeteries

4.3 Local Food Production and Soil Quality Enhancement

The theme of local food production and soil quality enhancement includes the multiple benefits of GI as it pertains to direct food production on agricultural land and local gardens. The implementation of GI assets increases the ability of ecosystem and farming services. For example, it helps to maintain the potential for agricultural and food security while contributing to soil development and nutrient cycling. The functions of GI contribute to food production and soil enhancement that help to maximize the benefits that it creates. Case studies included under this theme focus on soil erosion prevention strategies such as windbreaks which can perform many multifunctional roles with many value-added benefits.

Examples:

- Community gardens
- Farms and farmland
- Windbreaks
- Pollinator plantings
- Stormwater management systems
- Erosion controls
- Buffers

4.4 Biodiversity, Habitat & Species Protection

This theme identifies the benefits of GI related to enhancing biodiversity, habitat and species protection. The integration of GI can address concerns around protecting ecosystems while supporting the sustainable management of biodiversity and species protection. This theme also highlights practices that are geared towards protecting biodiversity and provide vital ecosystem services. Ontario's Biodiversity Strategy (Ontario Biodiversity Council, 2011) and the Provincial Policy Statement (*Section 2.1 - Natural Heritage Systems)* (OMMAH, 2014) are examples of GI elements being integrated into the policy sectors which has promoted the use of GI throughout many municipalities in Ontario.

Examples:

- Woodlands, forests
- Parks and gardens
- Street trees, windbreaks
- Pollinator plantings
- Wetlands
- Buffers

4.5 Climate Change Adaptation & Mitigation

This theme identifies the benefits of GI related to climate change adaptation and mitigation. This theme highlights case studies that contribute to strengthening ecosystem resilience, mitigating climate change impacts, the management of floodwater and runoff, carbon sequestration, reducing energy use for heating and cooling. This theme also investigates GI practices that ensure the sustainable delivery of ecosystem goods and services in addition to increasing the resilience of ecosystems. Ontario's Climate Change Adaptation Plan (OMECCA, 2014) is an example of GI being integrated into the policy sector to contribute to Ontario's climate change adaptation objectives.

Examples:

- Forests, woodlands (carbon sequestration)
- Street trees

- Retention ponds
- Permeable pavement

4.6 Water and Stormwater Management

The theme of water and stormwater management incorporates case studies that highlight the ways GI is a cost-effective and resilient strategy to managing runoff and wet weather impacts. While the goal of conventional "gray" stormwater infrastructure is to move stormwater away from urban environments, GI aims to improve stormwater management while delivering environmental, social, and economic benefits to communities. In the Ontario planning legislation context, the PPS has an emphasis on using GI as a stormwater management tool. To further illustrate this context, case studies included in this theme contain examples of GI as it contributes to sustainable drainage systems, fostering groundwater infiltration and the removal of pollutants from water. These examples ultimately aim to reduce erosion and flooding in urban and rural areas and reduce damage to habitats, properties and infrastructure.

Examples:

- Rain gardens
- Permeable pavement
- Retention ponds
- Buffers
- Tree planting
- Grassy waterways

4.7 Woodlands, Woodlots and Street Trees

The theme of woodlands, woodlots and street trees encompasses a wide range of examples and case studies from many areas throughout Ontario. The case studies included in this theme highlight natural areas such as woodlands and woodlots and their environmental benefits such as carbon sequestration, increasing biodiversity and habitat, offering recreational elements and acting as a water purification mechanism. Permeable pavement, planter boxes, and street trees are among the elements that can be integrated into urban and rural street design.

Examples:

- Forests and woodlands
- Windbreaks
- Schoolyard tree plantings

4.8 Other – Brownfields, Vacant lots, Recycled Lands, Landfill

The theme of brownfields, vacant lots, recycled lands and landfills investigates innovative ways local governments and developers have installed GI features on to these types of sites to restore them to a more developable state. The case studies included in this theme highlight properties that experienced an increase in water management benefits which were key elements of brownfield revitalization efforts. In addition, examples of GI being utilized on properties to promote future redevelopment and reduce long term cumulative impacts on local environmental properties have also been included in under this theme. The integration of GI has ultimately reduced flooding risk and resulted in more effective stormwater management, while providing greenspace, parks, and trails for residents.

Examples:

- Groundwater cleanup
- Natural succession
- Tree planting
- Community gardens

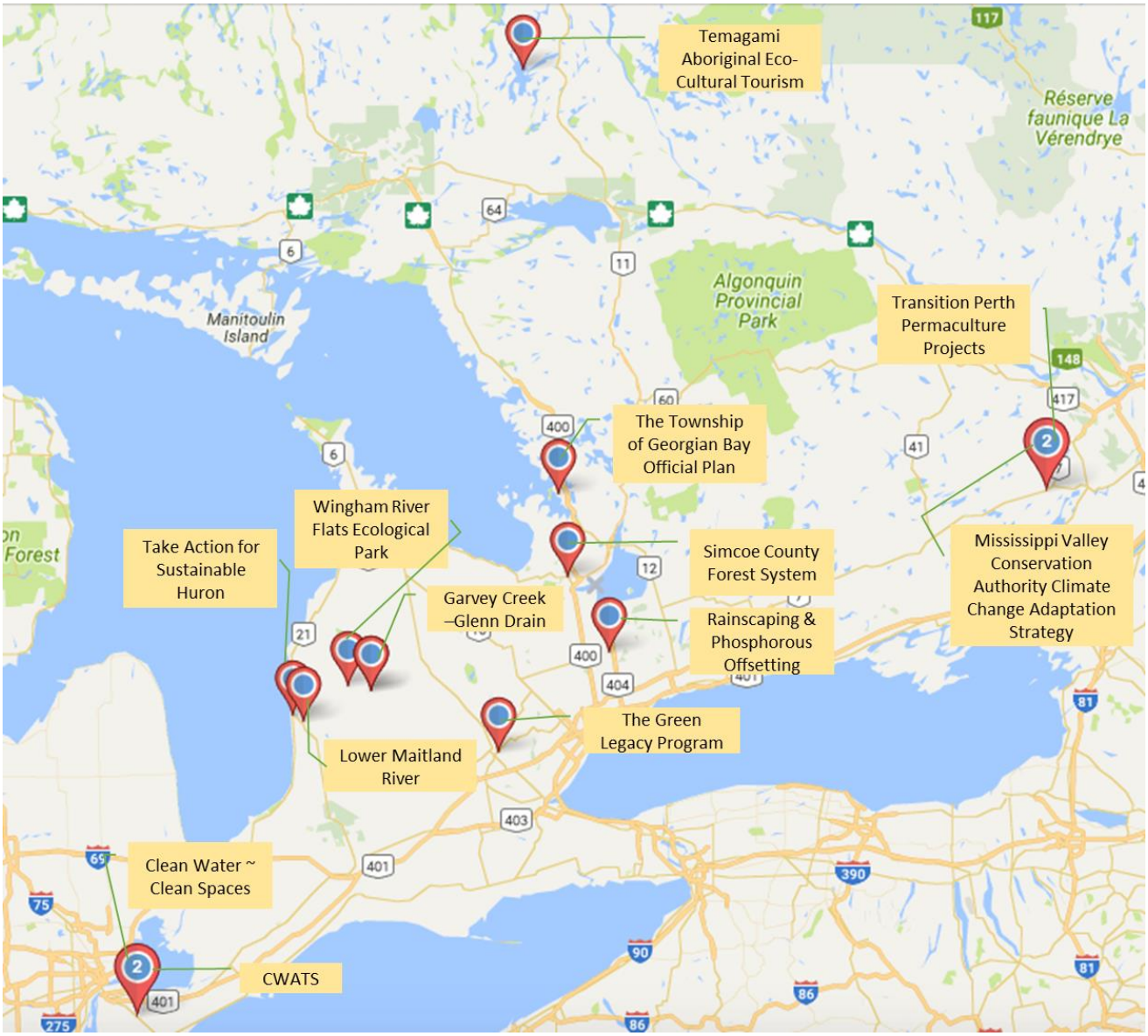
5.0 Case Studies

The case studies that are included in this section of the report illustrate how GI contributes to promoting a network of natural and human-made systems that provide multifunctional benefits to human and natural communities through the maintenance and enhancement of ecosystem services. In addition, this section also investigates how the use of GI has many multi-functional benefits, while providing multiple opportunities for stimulating economic activity and offering cost benefits to rural municipalities. Many of the case studies have varied approaches to integrating and utilizing GI in the respective rural municipalities and will be investigated below.

5.1 General Location of Case Studies

Figure 3 is provided as an orientation piece to illustrate the general location of the various case studies.

Figure 3: Case Study Areas in Southern and Mid-Southern Ontario



Source: Google Maps

5.2 Case Study Examples

The following section outlines 13 case studies of specific attributes of GI as applied in various community settings across southern and mid-central Ontario. Each case study is written with a description of the principle attributes and lessons learned with respect to GI application in the field.

5.2.1 Initiative: *Take Action for a Sustainable Huron*
Theme: Community Livability
Additional Themes:

- Culture, Education, Recreation, and Tourism
- Local Food Production and Soil Quality Enhancement
- Biodiversity, Habitat and Species Protection
- Climate Change Adaptation and Mitigation
- Water and Stormwater Management
- Woodlands, Woodlots, and Street Trees
- Other (recycled lands, active transportation)

Contact:
Huron Business Development Corporation
Paul Nichol – Manager
pnichol@smallbusinesshuron.ca
(519) 527-0305

About:
Published in 2009, this sustainability plan is a community-wide initiative that brought together municipal leaders, residents, businesses, and community groups to create a clear vision for Huron County's future. It was developed as a tool to raise awareness and enhance community capacity in respect to global issues that will impact Huron County and its residents, including climate change, rising energy prices, competitive global markets, and an aging population.

Context:
In 2011, the County had an overall population of 59,100 within its 9 municipalities: Ashfield-Colborne-Wawanosh, Bluewater, Central Huron, Goderich, Howick, Huron East, Morris-Turnberry, North Huron, and South Huron (Huron County Population Fact Sheet, 2012). Largely considered rural, Huron County is situated along the shoreline of Lake Huron. Agriculture is a predominant land use, which has led to a significant loss of wetlands, woodlands, and other natural habitats. Additional impacts on the land base include soil erosion, pollution from agricultural runoff, and stormwater and flood damage.

Motivating Factors:

- Recognized that community sustainability in the form of a thriving economy, healthy natural environment, and engaged community is essential in moving forward to build resiliency
- Incentivized by Federation of Canadian Municipalities
- Closely relates to Huron County's planning department mandate
- When applying for climate change mitigation and adaptation funding resources, the County can present a comprehensive sustainability plan to senior officials that highlight the goals and intentions of the Huron community

Process:

- To engage with local residents and organizations, outreach efforts were comprised of community events, a Sustainable Huron newsletter, surveys, questionnaires, steering committee meetings, presentations, public forums, and social media

- This was a collaborative effort involving residents, grassroots and community-based groups, economic sectors (incl. agricultural and manufacturing sectors), Conservation Authorities, Health Units, and local governments
- Collective and ongoing visioning, they reconnect on a regular basis
- Prioritization of ten overlapping theme areas: Economy, transportation, agriculture, energy, liveable communities, natural environment, population, downtowns, community needs, and healthy active communities

Role of Green Infrastructure:
The plan includes goals of maintaining healthy, resilient ecosystems that connect natural areas, provide clean water, and enhance biodiversity. Included in this are projects that address rural water quality and quantity through stormwater management systems, protection of natural areas, and ecological restoration projects. At the beginning of the plan, "Early Win" projects such as the School Yard Planting Project were introduced to demonstrate community sustainability in action. The School Yard Planting project included planting of trees in and around Huron County to add to natural areas, provide shade, wind, and erosion protection, and to educate and engage youth. Additionally, they strive to implement more green space within downtown areas to improve environmental aesthetics and community health in the more 'urban' spaces of the County.

Economic Rationale:
- Environmental sustainability
- Attracting tourists
- Developing workforce skills, training and education
- Opening of new business opportunities
- Attracting young working professionals to retain populations and bring creative business to Huron County
- Increasing profile of local food and diversification of local food sector

Innovative Features:
- Their definition of sustainability goes beyond focusing on the environment to include many facets of Huron County (economic, social, and cultural)
- Allows differing community organizations to focus on their priorities, while remaining in partnership and contact with others (not competing)
- Actionable

Key Lessons to Share:
1) Breadth is important – always think broad.
- Sustainability plans need to be multi-faceted, and go beyond environmental sustainability to include all aspects of communities
2) Don't just plan it; implement it!
- Sustainability is something we have to work towards, it does not just happen

> "It is a *community* document, made *by* the community and *for* the community." - Paul Nichol

5.2.2 Initiative: *Township of Georgian Bay Official Plan*
Theme: Community Livability
Additional Themes:

- Culture, Education, Recreation and Tourism
- Biodiversity, Habitat and Species Protection
- Water and Stormwater Management
- Other (recycled lands, landfill)

Contact:
Township of Georgian Bay
Nick Popovich – Director of Development Services
npopovich@gbtownship.ca
(705) 538-2337 ex. 232

About:
The Official Plan for the Township of Georgian Bay was updated in 2013, and approved in 2014. Identified as "green" in nature, it emphasizes the importance of the natural heritage and natural environmental assets of the municipality. Protection, support, and enhancement of the natural environment are the first goals and objectives within this plan.

Context:
The main industry in the District of Muskoka is tourism; therefore municipalities within this area rely heavily on their natural environment for their economy. As a result, the Official Plans in these municipalities are generally considered 'green', and work to balance a healthy natural environment and thriving economy through their land use planning. The Township of Georgian Bay is unique for its abundance of waterfront areas including inland lakes, various rivers and streams, and along the shores of Georgian Bay. This area is part of the world's largest freshwater archipelago and has been designated by the United Nations Educational, Scientific, Cultural Organization (UNESCO) as a Biosphere Reserve. Additionally, the Township is home to 23 Provincially Significant Wetlands (PSWs). Protection of these areas, and protection of the waterfront has led to limitations on development in order to maintain these natural resources.

Motivating Factors:

- The main draws to this area include the natural environment and proximity to numerous water bodies; the local economy is heavily dependent on maintaining a healthy, attractive environment
- 85% of the population is seasonal, about 2500 residents live here year-round
- Protection of shorelines, steep slopes, narrow water bodies, and PSWs
- Protection of Fish Habitats, specifically in Critical Habitats (Type 1)
- Many Species-at-Risk are located in this area

Process:

- Public-oriented process – the municipality turned to the community to accommodate and address their concerns as much as possible
- Much of the input came from seasonal landowners who were interested in protecting their "little piece of paradise"
- No major appeals of OP have resulted – the OCP is considered to be well-supported

Role of Green Infrastructure:
It is in the Township's short-term and long-term interest to continue to conserve the natural landscape, tree cover, and vegetation. With an emphasis on protecting, supporting, and enhancing the natural environment, the Official Plan sets out several guidelines for development, particularly along shorelines and waterways. For example, to protect the *Character* of waterfront areas, a minimum of 75% along shorelines must remain in a natural state, with a 15-meter depth (D.2.2.4.2). This allows for a maximum of 25% of the shoreline to be cleared or pruned back, leaving only small gaps in the green canopy, maintaining a buffer for flood and erosion control, shoreline protection, and providing essential habitat. When such areas have been cleared, landowners are encouraged to participate in a re-vegetation plan implemented through the Site Plan Control agreement (p. 196). Natural vegetative buffers are required, particularly within proximity to the PSWs and the linkages between them. This ensures the ongoing protection of these areas, and maintains the overall natural appearance and aesthetics of the Township.

Economic Rationale:
- The natural environment is the main attraction for visitors and prospective landowners and businesses; the local economy and employment rely on the continual protection and enhancement of natural heritage and environmental assets
- The value placed on the natural environment is "priceless", loss of the environment would make them lose their main attraction
- Environmental consultants have many opportunities related to development proposals

Innovative Features:
- The Official Plan is environmentally-oriented, as the environment is the main economic driver
- The Township has 23 PSWs and is located within a designated UNESCO Biosphere Reserve
- Zoning bylaws within the OP include the PSWs and Type 1 Fish Habitats – in these areas they do not allow docks or shoreline structures – which is often not done elsewhere

Key Lessons to Share:
1) Take a look at their OP and borrow from it
    - Their OP can be used as a successful example for achieving environmental goals
2) Hire a consultant to do the OP that can also "shepherd" the process and facilitate at public meetings
3) The OP works for areas that are similar to the Township – i.e. north of Parry Sound. It will likely not work for areas focused on agriculture or intensified urban expansion areas

> The value of nature here is "priceless." - Nick Popovich

5.2.3 Initiative: *County Wide Active Transportation System (CWATS)*
Theme: Other (Active Transportation)
Additional Themes:

- Community Livability
- Culture, Education, Recreation, and Tourism

Contact:
Windsor-Essex County Health Unit
Cathy Copot-Nepszy – Health Promotion Specialist
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About:
In 2012, the County Wide Active Transportation System (CWATS) Master Plan was completed for the county of Essex, Ontario. CWATS was developed as a way to create a bicycle-friendly and pedestrian-friendly environment to encourage use of non-motorized methods of transportation. It is a 20-year master plan that is aimed at improving active transportation facilities. This active transportation plan is a county-wide project that helps to link together various social, economic and environmental elements to create a diverse mobility system. When completed, the CWATS will be more than 1,410km long with many linking active transportation facilities that will increase mobility throughout the County. The local initiative is heavily supported by its seven municipalities and regional government, the health unit, and Conservation Authority. Citizens and many advocacy groups also provide feedback into the plan through various community consultations and celebrations. CWATS has had a positive impact on mobility throughout the county and beyond the region as it now completely connects to the Trans Canada Trail system. Through the collaborative commitment in CWATS, active transportation will continue to evolve and grow as a key form of transportation for many years to come.

Context:
Essex County is the southern-most county in Ontario and is largely composed of rural agricultural land. The county had a population of 388,782 in 2011 and is divided into 7 municipalities: LaSalle, Tecumseh, Lakeshore, Amherstburg, Essex, Kingsville and Leamington. The County of Essex is neighbours with the City of Windsor, The Township of Pelee and the Municipality of Chatham-Kent. It lies along the shorelines of both Lake Erie and Lake St. Claire. A number of rural areas within the County have been designated as protection areas such as the Hillman Marsh Conservation Area and Point Pelee National Park. The protection of both wetlands and woodlands is very important for preserving the pristine natural landscape in this region.

Motivating Factors:

- Recognized that community mobility was restricted and thus the county wanted to create an environment with improved transportation conditions for all types of road users, not just motorists.
- Helping citizens recognize that active transportation is an excellent mode of transportation.
- Incorporating active transportation throughout the county helps to address elements improving the local economy, creating a healthy rural environment, and engaging the community is essential in moving forward to continue to grow and build resiliency in this region.
- Improving overall health of citizens (reduce obesity, increase social interactions, increase physical and mental fitness).

- According to the 2010 Regional CWATS survey, residents said they would use trails for these top reasons (Actively Connecting Windsor-Essex, Go For Health, 2011):
    - Quality of life and health benefits (77%)
    - Recreational use (93.5%)
    - Environmental benefits (46.3%).

Process:

- CWATS was a study that become adopted by Essex County Council in 2012, and is into its fourth year of building active transportation facilities and promoting active transportation through comprehensive outreach campaigns.
- Use of the 20-year Master Plan to implement active transportation facilities.
- Committee meets bi-monthly – municipal leaders (directors of planning, engineers), WECHU, Essex Region Conservation Authority (ERCA).
- Ongoing annual public consultation meetings are held to gain insight on what the public wants to see in CWATS projects.
- Through collaboration with CWATS stakeholders and new stakeholders, CWATS outreach is done on an annual basis to reach the public and decision-makers.
- The MTO supports the CWATS Committee meetings.
- Element of "branding" CWATS (logo, regional active transportation signage, community celebrations).

Role of Green Infrastructure:

The interconnected trails that are associated with the CWATS create a built and natural environment that the citizens of this region are able to interact. The combination of both on-road and off-road active transportation facilities help to create more of an interaction for users and supports the element of active living infrastructure. CWATS supports citizens that are passionate about the outdoors and provides a new opportunity for residents that want to explore new natural environments within Essex County. Recreational walking and cycling paths help to connect citizens with natural areas by providing them with a first-hand experience with nature and the added benefit of promoting physical activity for a better quality of life. The integration of active living infrastructure in regions such as Essex makes active transportation and recreation appealing and accessible to residents and visitors. The nature of CWATS will help to guide the integration of active transportation into mobility systems over the next 20 years.

Economic Rationale:

- Encourages visitors to extend their stay in the area
- Economic benefits to surrounding land and business owners (hotels, eateries and bike shops)
- Attracts tourists and investors to the region
- Increases opportunities for spending and tourist activities (i.e. cycling tourism)
- Spending of money in the local economy
- Attracts and retains resident of all ages

Innovative Features:

- Encompasses elements of social, economic and environmental sustainability
- The use of the Master Plan can be transferable to other counties and regions (used as a template)
- Network of trails is planned and designed to meet user needs

Key Lessons to Share:

1) It is important to gain support at various levels of government to successfully implement the master plan and hold the interest in decision-makers.
2) Rely heavily on the public interest and key benefits:
    - Desire for change was driven by the citizen demand
    - Municipality needed to take the leadership role
    - Health and well-being, economic and environmental benefits help to drive investment in CWATS
3) Integrative design approach
    - Use of resources (funding and staff from many organizations)
    - Ongoing outreach campaigns and communication with public and key government stakeholders

"Active transportation helps to improve the local economy, create a healthy rural environment, and engage the community." - Cathy Copot-Nepszy

5.2.4 Initiative: *Temagami Aboriginal Eco-Cultural Tourism*
Theme: Culture, Education, Recreation, and Tourism
Additional Themes:

- Community Livability
- Biodiversity, Habitat and Species Protection

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Temagami First Nation
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About:
In its planning stages, this is a low-impact cultural tourism business that will be owned and operated by the Temagami First Nation. It will provide employment and economic development opportunities to community members. The business will attract tourists from around the world interested in experiencing Temagami culture and enjoying the rugged surrounding environment.

Context:
Temagami First Nation is a remote community on Bear Island in Lake Temagami, 100 miles north of North Bay. There are currently 200 members of the community living on the island, and around 1800 members living elsewhere. Similar to other small, remote communities, there are limited employment opportunities, other than natural resource extraction jobs in the region. Funding has been secured for the project from the Northern Ontario Heritage Fund and Federal Economic Development Initiative for Northern Ontario (FedNor), an organization interested in community-based economic development and job creation in northern Ontario. While Chief and Council are supportive, the project is currently awaiting final approval from the community before moving forward. It will be owned and operated by the Temagami First Nation; therefore all decision-making and control on how it proceeds, falls into the community's hands.

Motivating Factors:

- Following a recommendation by a consultation report stating the potential for cultural tourism
- Employment and economic development opportunities for the community

Process:

- Most importantly, to gain community consensus
- Funding (primarily federal, some provincial)
- Staffing – training to be provided
- Construction of outpost cabins will commence in spring 2016
- Additional plans include a greenhouse (by summer 2016, if the community agrees)

Role of Green Infrastructure:
The business is not expected to cause any major alterations or enhancements to the surrounding environment. Within the region are old growth forests and numerous rivers and lakes, as well as sacred sites. Outpost buildings will not be located on the island, but on the shores of the lake in Temagami territory. They will promote the natural beauty of the region and the culture and traditions of Temagami First Nation. The idea is to protect the pristine natural environment, while providing educational and recreational opportunities and participation in local traditions, such as spiritual

advice, sweat lodges, retreats, tent shakers, traditional food, and language classes. While protecting the land is at the heart of the business, it also honours the history of the Temagami First Nation and provides learning opportunities for visitors and community members alike. Future plans call for the addition of local food production for the local community to improve access to healthy foods.

Economic Rationale:

- Full- and part-time employment for the community including:
    - Cultural guides
    - Catering
    - Boat operators and maintenance
    - Outpost cabins – construction, maintenance
- Economic spinoffs including (but not limited to) wild rice production, maple syrup production, and greenhouse operations providing a sustainable fresh food source year-round

Innovative Features:

- The mining and forestry sector have often been the primary employment for the community – tourism highlighting local culture and traditions offers an alternative
- Aboriginal cultural tourism has become increasingly popular in Ontario – people from around the world are trying to understand Aboriginal culture
- Education and capacity-building opportunity for community members

Key Lessons to Share:

1) Respect the decision-making process of the community
- The general population has the final say in decisions surrounding initiatives like this
2) Establish trust between the community and external companies
- Need to be aggressive in business opportunities
- Educate community members on the benefits
3) Remind tourists that they are visiting a remote community – plan ahead, be prepared
- Respect the culture and traditions and the day-to-day lives of the community.

> "Building capacity, skills, and improving local self-esteem and livelihoods" - Kim Cowan

5.2.5 Initiative: *Lower Maitland River Video*
Theme: Culture, Education, Recreation, and Tourism
Additional Themes:

- Community Livability

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About:
Started in 2015, this video project is led by the volunteer-based Lower Maitland Stewardship Group (LMSG). It showcases the Lower Maitland River Valley during all four seasons of the year, from a birds-eye view. Its intention is to reach a broad audience and highlight its ecological importance, while advertising the beauty and recreational opportunities that the Lower Maitland River has to offer.

Context:
The Maitland River has a history of environmental and ecological degradation over time from various land uses. Agriculture is the predominant land use in this area because of the fertile soils and relatively flat lands. The LMSG is actively involved in protecting, maintaining, and restoring the health of the Lower Maitland River Valley through various stewardship projects related to water quality, and biodiversity and habitat protection. There has been plenty of community interest and support for the video project. The video has been completed and had its official launch at the Maitland Trail Association Annual General meeting on April 1, 2016. The video is intended to raise awareness about the Maitland River, in hopes of increasing visitors to the area. It will be important to balance an increase in human activity while maintaining the ecological functions of the natural environment.

Motivating Factors:

- To raise awareness about the importance of protecting the Lower Maitland River
- To enhance public appreciation for the Lower Maitland River
- To advertise the many recreational opportunities the Maitland River offers

Process:

- Stakeholder collaboration; community members with an interest in protecting local natural resources, including the long-term protection of the Maitland River
- Reach out to other communities to showcase what they have accomplished locally
- Funding has come from various levels of government including from the County and local tier municipalities

Role of Green Infrastructure:
The Maitland River is a unique natural resource in southwestern Ontario that flows into Lake Huron. Its watershed spans three counties (Huron, Perth, and Wellington). The Lower Maitland River is an important fish habitat, and is home to several Species-at-Risk. It includes a natural riparian zone and floodplain at the bottom of the valley that help to control erosion and keep pollutants out of the river. Through preservation and enhancement of these natural areas, the Maitland can continue to provide

essential ecosystem functions in the surrounding environment. The video not only advertises the natural aesthetics of the river, it highlights the important role the Maitland River plays in enhancing the health and wellbeing of the natural environment, wildlife, and humans within the area.

Economic Rationale:

- Strong driver for eco-tourism
- Showcases the Lower Maitland River as a "hidden gem" – the intention is to attract attention to the beauty of the river, to raise awareness of the stewardship projects they are doing, and to draw outdoor enthusiasts to the area

Innovative Features:

- Example of community-wide collaboration towards a common goal of protecting the environment
- Bottom-up driven – the project has been led by an informal group of community members
- Encourages neighbor-to-neighbor promotion of sustainable practices
- Makes use of social media and technology to share examples of green infrastructure
- As of June 9, 2016 the video has been viewed 4,671 times on YouTube. It can be viewed at https://www.youtube.com/watch?v=M8MRB7wGcjs

Key Lessons to Share:

1) The need for community champions – people who can advocate at a local level
2) Important to have a local organization who can take the lead, but not be the "authority"
3) Do not reinvent the wheel – if other people are doing amazing things, follow their lead
4) Sustainability entails collaboration and a common interest

> "People want to help, you just have to connect the dots to give them the opportunity." - Rachel White

5.2.6 Initiative: *Garvey Creek - Glenn Drain (Healthy Lake Huron)*
Theme: Local Food Production and Soil Quality Enhancement
Additional Themes:

- Community Livability
- Water (Quality) and (Rural) Stormwater Management

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About:
Part of the Healthy Lake Huron initiative, the Garvey-Glenn Watershed Project is a partnership project involved in protecting and improving soil and water quality in the Garvey Creek-Glenn Drain watershed. Landowners involved in the project have predominantly been farmers but also include two lakefront associations. The project balances landowner interests with the greater public good through the use of best management practices (BMPs) that deal with improving soil health, sediment and nutrient runoff, and erosion control.

Context:
The Garvey-Glenn watershed has been identified as one of five priority watersheds in the Healthy Lake Huron initiative. The predominant land use of the area surrounding the watershed is agriculture. The Maitland Valley Conservation Authority (MVCA) works with 40 farmers throughout the watershed to develop ways to keep soil and nutrients on the land and out of watercourses in order to improve water quality along the nearshore of Lake Huron. By working with farmers to keep soil, nutrients, and water on their land, the project endeavors to develop a rural stormwater management system to slow the water down, spread it out and to let it soak in. This helps to keep soil and nutrients on the land. It is important to recognize that the project encompasses an entire watershed, so in order for it to succeed everyone must participate and do their part. Farmers will typically wait for their neighbor to implement something first before they are willing to give a new practice a try. The MVCA works with every farmer on an individual basis to identify what is the best course of action for their land from a conservation perspective to keep soil and nutrients on their land and out of the river (and Lake Huron). In order for the program to succeed, funding must continue to be in place. A question of who should pay, and whether the public should share in the costs, often arises. Since water is a public resource, farmers believe that the public should contribute to the cost of keeping parts of their farmland, such as flood plain and river valley lands, out of production in an effort to protect water quality.

Motivating Factors:

- Erosion, sediment, and pollution control in waterways
- Interest in developing a coordinated stormwater management system to control runoff increased following a severe rainstorm that dropped over 150 mm of water in a few hours, washing out fields and roads
- Watershed and lakeshore water quality

Process:

- Estimated cost to implement all best management practices is around $3 million for the 4000 acres and 40 farms
- Funding secured by the MVCA and from the Healthy Lake Huron initiative
- MVCA assesses conditions, identifies landowner concerns, and works with them to identify BMPs for their land
- MVCA does ongoing water quality monitoring throughout the watershed

Role of Green Infrastructure:

The end goal of the Garvey Creek-Glenn Drain project is to improve and protect water quality within the watershed and the nearshore of Lake Huron. Multiple BMPs have been employed to meet these goals. They include: planting cover crops and grassy waterways, building wetlands and berms, planting tree and shrub buffers along waterways, and planting woodlots. These BMPs do all, or most of, the following: build organic matter in the soil, minimize soil and nutrient loss, decrease erosion, reduce the amount of water leaving properties during heavy rainfall, effectively drain water and protect properties from floods, and improve water quality. These projects contribute to community sustainability by improving the health of the watershed, restoring degraded ecosystems, building community resilience, and providing climate change adaptation mechanisms.

Economic Rationale:

- Cost savings for farmers in outputs by decreasing loss of soil and nutrients
- Deals with problems at the source, decreases cost of solutions
- Improves land prices
- Businesses that focus on putting in green infrastructure – building natural channels and wetlands, rural stormwater management systems, horticultural and landscaping jobs

Innovative Features:

- Example of a systemic change – includes a large part of a watershed (4000 acres and 40 participating farmers)
- Widely recognized that watercourses cross properties and that one individual cannot make a difference, they must cooperate to achieve success
- Proactive, rather than reactive
- Participate in ongoing monitoring of the project to demonstrate the effectiveness and transferability of this approach for other watersheds

Key Lessons to Share:

1) We must implement change at a program level, and at a scale that can make a landscape-sized change
2) We need to change the way we think – we currently think of what impacts us locally, rather than globally
3) In addition to GI feature provision, mechanisms for proper maintenance need to be instituted

> "Everyone has to participate and do their part for the system to work for everybody." - Phil Beard

5.2.7 Initiative: *Transition Perth Permaculture Projects*
Theme: Local Food Production and Soil Quality Enhancement
Additional Theme:

- Community Livability
- Culture, Education, Recreation, and Tourism

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About:
"Transition" is a global grassroots network that strives to build local resilience in response to global challenges. Transition "Towns" engage their community members and inspire them to take action in projects related to environmental sustainability and economic resilience. Located in Lanark County, Transition Perth was founded by three Perth residents who were interested in addressing local community needs and making long-term changes that benefit the local community and society in general (cutting down on fossil fuel use, for example). One of their priorities is to promote sustainable agriculture and local foods. One way they have done this is by offering free community tours of various permaculture farms in close proximity to the Town of Perth.

Context:
Lanark County is located in Eastern Ontario, west of the City of Ottawa. Located within the Canadian Shield, this area has a thin layer of low-capability soils that are typically unsuitable for agriculture. Despite this, there are many small- to medium-scale farms throughout the area. To support local farmers, the Perth Farmers Market was established to directly connect them to the public. Within the Town of Perth are a collection of community members who are leading the way in creating solutions and alternatives to the way we currently live. Some of these residents are involved in permaculture farming methods and design, as an alternative to conventional farming in the area. Many of these residents are actively involved in Transition Perth. Through the efforts of Transition Perth and community involvement, the Town of Perth has become a progressive and innovative leader in community sustainability through various initiatives.

Motivating Factors:

- Building community capacity and relationships
- Raising awareness and educating people
- Addressing the impacts of climate change and the global food system
- Providing an alternative to current farming practices

Process:

- Offer workshops and courses on permaculture design
- Offer free farm tours for community members and visitors interested in sustainable agriculture and permaculture
- Encourage local municipalities to construct permaculture and garden projects on public parkland in place of 'traditional' mowed lawns
- Collaborate with communities to design new projects based on permaculture principles

Role of Green Infrastructure:
Permaculture is a holistic ecological approach to farming and/or gardening that mimics natural forests. It is a fusion of a garden, orchard, and woodland, making use of a diverse selection of plants that compliment and interact with each other. All elements work together to create a natural ecosystem, while providing food. It can be implemented at a small scale (backyard) to a larger scale (community-wide). Waste is limited or eliminated by using outputs as inputs. Permaculture makes use of various tools – including full-cycle nutrient management, xeriscaping, polyculture, and infiltration swales – in order to limit impact on the surrounding environment. Transition Perth's permaculture tours are used to educate and promote local resilience, and to connect community members and visitors to nature, food, and each other.

Economic Rationale:

- With enough local interest, the tours could become a niche market and tourist attraction for the area
- Jobs in permaculture-based agriculture
- Permaculture gardens create green infrastructure and produce food – food can be sold at farmers markets, and in the case of public gardens, donated to food banks

Innovative Features:

- Permaculture is relatively new to the region – Perth has quickly become a hub for permaculture in Eastern Ontario
- Awareness raising for alternatives to conventional farming practices

Key Lessons to Share:

1) Have community leaders willing to try new practices and share their experiences
2) Convince municipal leaders to think 'outside of the box', in hopes of influencing community members to do the same

- Instead of traditional parks and mowed lawns, creating public spaces that are more natural, and offer other benefits, such as food forests

> Convince leaders to think 'outside of the box'. - Noelle Reeve

5.2.8 Initiative: *Clean Water ~ Green Spaces*
Theme: Biodiversity, Habitat and Species Protection
Additional Themes:

- Community Livability
- Local Food Production and Soil Quality Enhancement
- Water and Stormwater Management
- Woodlands, Woodlots, and Street Trees
- Other (recycled lands)

Contact:
Essex Region Conservation Authority
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About:
A grant incentive stewardship program for landowners in the Essex Region that aims to improve regional water quality, reduce soil erosion, and increase natural habitat and biodiversity. Participation by landowners is completely voluntary. Grants cover up to 90% of costs for qualifying landowners to implement projects on their properties that help to improve local water quality, decrease soil erosion, and increase natural cover. Additionally, the Conservation Authority works with local volunteers and School Boards to participate in naturalization and tree planting projects.

Context:
Given its location between Lake Erie and Lake St. Clair, and along the eastern shores of the Detroit River, it is no surprise that water quality and quantity play a significant role in the Essex Region. This area's flat land, fertile clay soils, and excellent growing conditions have resulted in agriculture becoming the predominant land use. However, these conditions negatively impact water quality (from direct runoff of chemicals and fertilizers) and water quantity (the soil clay base makes it difficult for water to permeate into the ground, causing floods in extreme weather events). Drinking water for this region is drawn from Lake Erie, leaving it vulnerable to blue-green algae blooms that frequently occur. Additionally, this region has very low forest cover (2^{nd} lowest in Canada) and highly fragmented forests. For the most part the program is successful in finding funding to continue to improve the natural environment in the Essex Region. They are actively seeking out more landowners and advertise extensively, but in some cases they have more funding than landowner participation.

Motivating Factors:

- Water quality issues
- Lack of habitat
- Lack of, or declining, biodiversity
- Numerous Species At Risk

Process:

- The Conservation Authority works with the County of Essex, the City of Windsor, and the eight other municipalities in the county
- Partner with the Department of Fisheries, Environment Canada, MOECC, OMAFRA, and MNRF

- Landowners (primarily agricultural landowners) apply for grant funding to restore properties through the use of various land stewardship tools
- Land acquisitions by the Conservation Authority to protect existing natural areas and for areas in need of restoration

Role of Green Infrastructure:
There are numerous green infrastructure elements that are used in this program to address the four motivating factors. These include: creation of wetlands, planting woodlots and prairie habitat, planting windbreaks and buffers, no till farming, pollinator plantings, and remediation and restoration of properties. Through monitoring, they have found that water quality is better in naturalized areas, marshes and wetlands, while water quality decreases significantly in built up areas, or where agricultural runoff is able to flow directly into the rivers and lakes. Landowners participating in tree plantings are more likely to be motivated by the aesthetics of trees, rather than viewing them as a crop to be harvested, since trees in this region are slow-growing species found in the Carolinian Life Zone.

Economic Rationale:
- Employment through creation/re-creation of environmental conditions – including the construction of wetlands, and creation of forests, prairie, and grassland habitat
- Drinking water is safe to drink
- Healthier environment = reduced health care costs
- Most recently, encourage pollinator planting between rows of trees for the "double benefit" – possible future economic spinoff

Innovative Features:
- It is an action-based program that effects change in the region
    - Since 1973, they have increased regional forest cover from 3.5% to 8.5%
- Completely replicable

Key Lessons to Share:
1) Collaboration and the creation of partnerships are important
- Must work with landowners to build trust over time
- Must work with agricultural partners to benefit both the environment and their farms
2) Must provide credibility for buy-in
- The program is science-based, what they do is proven to be good for the environment
- They employ many of the soil health ideologies upheld by OMAFRA

> "Find the win-win-win (social, economic, environment)." - Kevin Money

5.2.9 Initiative: *Mississippi Valley Conservation Authority Climate Change Adaptation Strategy*
Theme: Climate Change Adaptation and Mitigation
Additional Themes:

- Community Livability
- Education
- Water and Stormwater Management

Contact:
Tay Valley Township
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About:
In an effort to understand the effects of climate change on local aquatic ecosystems, the Mississippi Valley Conservation Authority (MVCA) developed a Climate Change Adaptation Strategy with the Ontario Ministry of Natural Resources and Forestry (MNRF) and the Rideau Valley Conservation Authority (RVCA). This project will aid the MVCA in building local capacity and resilience against climate change impacts.

Context:
This region of Ontario has countless wetlands, streams, and lakes, many of which are located in the MVCA's watersheds. As well, there is increasing concern over keeping water as clean as possible as it flows downstream to the Ottawa River. There are hundreds of landowners located along these waterways, leaving them vulnerable to floods and drought. It is widely recognized that climate change is impacting aquatic ecosystems globally. In order to better understand these impacts on local waterways, the MVCA became interested in developing an adaptation strategy for the region. In the beginning stages, public meetings were not well attended by local municipalities or landowners. Farmers in particular were reluctant to participate, unless better compensation was provided to alter their land. Following a severe drought in the area that widely impacted the local farming community and water levels downstream, there was a shift in local perspective. The MVCA continues to educate residents and municipalities in creating more proactive ways of handling climate change impacts. Funding is continually needed to gather data and proceed.

Motivating Factors:

- A severe drought 4 years ago put pressure on local water levels
- Mitigating fluctuations in water levels
- Understanding and managing the impacts of climate change on local water quality and quantity
- Education of community members, landowners and local municipalities

Process:

- Local data from the last 40 years was used to develop a model to understand the changes in their waterways and wetlands
- A series of studies in partnership with MNRF and RVCA are being used to inform the strategy
- Local planners point to the model for Site Plan Control agreements
    - Limit paths to waterways to only 6-meters wide

- Encourage 30-meter vegetative buffers

Role of Green Infrastructure:
The MVCA works to maintain healthy natural systems as their best adaptation tool against climate change impacts. They recognize the value of wetlands in flood mitigation and water storage. The conservation authority has made it a priority to therefore protect and support wetlands in their role. The MVCA encourage landowners to maintain natural vegetative buffers, adding swales on properties, and limiting the width of paths to waterways to preserve vegetation and habitat. As much as possible, the MVCA push for natural growth, rather than plantings, to maintain biodiversity. Additionally, they work with farmers to control soil erosion and manure and chemical runoff into waterways.
The MVCA partners with municipalities to share knowledge, build local capacity, and aid in decision-making and land-use planning by using the collected scientific data. The Adaptation Strategy will help to retain natural ecosystem functions, limit costs on taxpayers and municipalities, and improve the social well-being of local populations by providing a healthier environment.

Economic Rationale:
- Avoids the costs of flooding, repairing roads – saves tax payers money
- Mitigating drought costs – For example: reducing costs on farmers to have to truck in water for crops and livestock
- Local businesses, such as King Consultants, have had an increase in business – help install bioremediation cells, retain existing green infrastructure
- Health benefits – clean air, water, green space

Innovative Features:
- Thought to be the first Climate Change modeling project east of Toronto
- Led by a small conservation authority (MVCA) with limited resources, who had the foresight and initiative to understand what impact climate change would have on local dams and water levels
- Hired a staff member to dedicate their time to learning about global climate change models, while implementing regional data to develop a local model
- Encourage natural growth, rather than planting

Key Lessons to Share:
1) Have access to staff that can provide information and help raise the issue with municipalities
2) Recognize the value of wetlands, buffers, and the whole system of green infrastructure for its environmental, economic, and social benefits

> "This project is a 'triple bottom line winner', and hits on all 3 aspects of sustainability (environment, economy, social)." - Noelle Reeve

5.2.10 Initiative: *Rainscaping & Phosphorous Offsetting*
Theme: Water and Stormwater Management
Additional Themes:

- Community Livability
- Climate Change Adaptation and Mitigation

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About:
As part of the Lake Simcoe Protection Act, these projects work to protect and restore the ecological health of the watershed and lake. Prior to new development, the Rainscaping program builds stormwater management systems based on Low Impact Development (LID) that maintain natural hydrological functions. The Phosphorous Offsetting program involves clean-up of previous development and follows a strict rule of zero phosphorous runoff on new development sites. When runoff occurs, there are charges through an offsetting program.

Context:
Quite simply, the water quality of Lake Simcoe is in a bad state. The phosphorous levels in the lake are beyond capacity. Up to 60% of the watershed was built prior to implementation of stormwater management systems; therefore runoff is widely uncontrolled. The area is becoming increasingly urban, with an expected 12,000 hectares of proposed new growth in the region by 2041. The current growth "as usual", is not sustainable. Previously, stormwater ponds were used to capture stormwater runoff. These have become outdated, are incredibly costly to maintain and clean-up, and no longer protect properties from flooding. If no changes are made, phosphorous runoff will increase by 4.6 tonnes a year, but through these two programs they hope to see a 7.6 tonne reduction. Currently Lake Simcoe has about 82 tonnes a year of phosphorous, the end goal is 44 tonnes a year.

Motivating Factors:

- Water quality of Lake Simcoe
    - Phosphorous levels are almost double the target
- Stormwater ponds are costly and have become a phosphorous source
- 60% of watershed has uncontrolled drainage into rivers and lakes
- 12,000 hectares of proposed new growth in the region by 2041

Process:

- Applications by landowners – must meet criteria
    - Provide grants for rain gardens
- Grant funding provided to farming community for environmental stewardship and best management practices
- Provide pre-consultation with developers
    - Work with developers from beginning of new development
- Retrofit funding comes from municipal partners
- Also federal and provincial funding connected to Lake Simcoe/Georgian Bay

Role of Green Infrastructure:
Both of these programs deal with ongoing water quality issues of Lake Simcoe and its watershed, and the reduction of flood damage. The Rainscaping program requires that 25 mm of stormwater be controlled on site through infiltration. It uses water harvesting, rain gardens, exfiltration systems, engineered wetlands, and bio-filtration systems to control stormwater. In urban areas, the Phosphorous Offsetting program also uses exfiltration systems, rain gardens, biofilters, and streetscaping; while in rural areas free technical assistance and financial incentive programs are available to provide funding for farmers to implement cover crops, windbreaks, and vegetative buffers. The LSRCA upholds the protection of their natural capital and consider it priceless for the ecosystem goods and services it provides. It is valued at close to $1 billion.

Economic Rationale:

- Huge opportunity for change – creation of green industry (design, construction, maintenance)
- Less spending by municipalities
- Landscaping and horticultural spinoffs
- Increases property values – rain gardens on properties have become an added benefit attracting prospective buyers
- Generates money from fees

Innovative Features:

- Proactive, rather than reactive
- Rainscaping is currently voluntary – the CA is working to make it a requirement. The policy will take effect September 1, 2016.
- Work with residents, farmers, and industry – all have a say
- Different approach to offsetting – new development are charged a fee for what they cannot control coming off the site

Key Lessons to Share:

1) Educate – if you are going to effect change, you need to provide training and tools to enable that change
2) Communicate and demonstrate the benefits
3) Work with the industry – they are the early innovators that drive change
4) Lead by example – "you have to walk the talk"
5) Have to provide incentives when people are taking risks

> "If you are going to drive change and public opinion, there has to be a win-win in it for everybody." - Mike Walters

5.2.11 Initiative: *Simcoe County Forest System*
Theme: Woodland, Woodlots, and Street Trees
Additional Themes:

- Community Livability
- Recreation and Tourism
- Biodiversity, Habitat and Species Protection
- Climate Change Adaptation and Mitigation
- Water and Stormwater Management
- Other (recycled and vacant lands)

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County of Simcoe
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About:
The Simcoe County Forest System is a 32,000-acre forest managed by the county. The forests are at various levels of stand age and growth, as the county continues to add land, replant, maintain, and sustainably harvest the trees. While the county uses these forests as an economic driver through timber sales, they also must balance this with ongoing protection of these valuable natural resources and the benefits they provide.

Context:
In the 1920s in Simcoe County, it was recognized that county-wide deforestation had led to many negative environmental impacts on the landscape. As a result, the County began purchasing land to protect and reforest. The current forest is believed to be the largest municipal forest in southern Ontario. Over time, emphasis has swayed between reforestation efforts and management of the naturally forested areas, depending on funding. The community supports the forest system, as it provides important environmental functions to the area, beautiful green space, and various outdoor recreational opportunities.

Motivating Factors:

- County-wide deforestation resulting in negative environmental impacts (such as massive erosion)
- Improvement of local woodlot management
- Enhanced protection of natural areas
- Contributes to county-wide health and wellbeing

Process:

- Purchase land for replanting from private landowners or different tiers of government
- Some landowners approach the County to sell their property
- Hire Registered Professional Foresters to assess tree stands and mark the trees that are ready for harvest
- Excess funds are used to purchase more land

Role of Green Infrastructure:
The Simcoe County Forest System contributes multiple functions and benefits to the surrounding environment and population, and protects natural heritage features. Forest ecosystems provide a healthy forest cover that plays a role in the hydrological cycle, protects and enhances water and soil resources, controls erosion, purifies the air, produces oxygen, provides wildlife habitat and biodiversity, and offers climate change mitigation tools such as carbon sequestration. The forests are considered a 'recreational gem', offering multiple outdoor recreation opportunities, including cycling, hiking, horseback riding, and snowmobiling. By providing multiple connecting trails and paths throughout the county, they are a source of active transportation. Additionally, the forests impart a sense of place, and give people a green space to relax and enjoy. They provide health benefits to the community and contribute to overall wellbeing. The forests enhance the beauty of the area, and are an attractor for people.

Economic Rationale:
- Natural revenue generator for County
- Provides wages to County employees
- Management and maintenance
- Tourism generator (160 km trail system)
- Economic spinoffs
- Cost avoidance – the County would have to regulate the forests anyway, if they didn't participate in the active forest management and timber harvesting, they would still have to pay staff to manage and maintain the forest anyway

Innovative Features:
- Oldest managed forest in Ontario, started in 1922
- Add more land to the forest each year
- Self-sustaining – with the money from harvesting the timber, they run the department and pay all staff in the department

Key Lessons to Share:
- Engage users, get them involved
- Bring them together once a year to hear each other
- Maintain communication when policy changes
- Start as early as you can, prioritize the now
- Be proactive, rather than reactive

1) Get political leaders on board

> "Nature is an asset (needs to be managed and maintained)." - Debbie Korolnek

5.2.12 Initiative: *The Green Legacy Programme*
Theme: Woodlands, Woodlots, and Street Trees
Additional Themes:

- Community Livability
- Culture, Education, Recreation and Tourism
- Local Food Production and Soil Quality Enhancement
- Biodiversity, Habitat and Species Protection
- Climate Change Adaptation and Mitigation
- Water and Stormwater Management
- Other (recycled lands)

Contact:
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About:
The Green Legacy Programme is an innovative municipality-funded operation of the County of Wellington. The program is involved with education and direct action with community stakeholders in the growing, nurturing, distributing and planting of trees throughout the County. Trees are grown in two municipally owned and operated nurseries, and once the trees are of suitable height and age, they are distributed to Conservation Authorities, local community groups, local municipalities, and the general public in all areas of the County. The overall aims of the Programme are stated in its strategic plan:

> "to change our community's view towards the value of trees and the environment. Through education and involvement in Green Legacy, the people of Wellington will increase forest cover to a healthy level and create a green infrastructure. Achieving this goal will ensure ongoing environmental benefits and help the County adapt to climate change" (The Green Legacy Programme, 2008).

Context:
The County of Wellington is located in Southwestern Ontario and is largely composed of small rural municipalities and surrounding agricultural areas. The County had a population of 86,672 living in two towns (Erin and Minto) and five townships (Centre Wellington, Guelph/Eramosa, Mapleton, Puslinch, and North Wellington). There are a number of rural protected areas within the County of Wellington's Official Plan involving prime agricultural land areas and natural heritage features within 'greenland' designations. The County encourages the protection of woodlands landscapes, and has direct ownership of 1,200 acres of forests. These areas are noted for their importance in the preservation of the natural landscape in this region.

Motivating Factors:

- Started as a one-time event to celebrate the 150th anniversary of the founding of the County
- Promotes the importance of understanding the value of nature through education and direct involvement with tree planting

- Recognizes that trees have an important function in mitigating and adapting to the negative effects of climate change
- Helps citizens recognize that trees are a valuable asset to the community, adding benefits locally and globally
- Improves the local economy, creating a healthy rural environment and providing a wide range of social, environmental, health, and economic benefits

Process:

- Originated as a one-time event commemorating the County of Wellington's 150th anniversary. Following its success in meeting its initial objective of planting 150,000 trees, the program has continued and grown. Since 2004, over 2 million trees have been planted.
- Tree nurseries established by County administration.
- Education, partnerships and volunteerism are key components of the program. The success of the initiative is measured in the participation rates of County residents – there are approximately seven times the number of trees planted per person per year compared to the Province of Ontario as a whole.
- Currently, the local MPP is advocating for the use of the program as a template for a province-wide Green Legacy initiative, i.e. 150 million trees to be planted starting in 2017 (Seto, 2015).

Role of Green Infrastructure:

The Green Legacy Programme contributes many environmental functions and benefits to the surrounding environment, as well as residents of Wellington County. The program helps to increase forest cover, create climate change adaptations, as well as enhance and protect valuable agricultural soils throughout the County. Through the growing, distribution, and planting of trees, the County's forest ecosystems are dramatically enhanced. Forest ecosystems provide much needed tree cover that plays a crucial role in the hydrological cycle as well as protecting and enhancing water and soil resources. Other GI benefits include erosion control, air purification, and provision of a wide range of wildlife habitats. Significant community involvement nurtures a strong sense of place while enhancing the natural landscape throughout many areas of the County.

Economic Rationale:

- Strategic planting of trees near agricultural lands will ultimately help farmers in the long-term by:
    - Protecting soils from weather and erosion
    - Increasing nitrogen transfers (from fallen leaves) and organic carbon
    - Reducing runoff, which in turn reduces nitrate loading into streams
    - Increasing overall crop yields in comparison to conventional cropping systems.
- Timber sales
- Environmental resilience
- Cost savings to municipalities – living snow fences decrease the need for road maintenance and energy costs
- Jobs in the growing, distributing and planting of trees

Innovative Features:

- Encompasses many elements pertaining to social, economic, and environmental sustainability
- Green Legacy's framework and strategic document can be transferable to other counties and regions

- Wide community engagement and political support

Key Lessons to Share:

1) Important to gain support from the community and various levels of government; nurturing relationships with various stakeholders slowly evolves.
2) Community buy-in and acceptance will lead to voluntary participation, and education along the way (i.e. value of nature, addressing the impacts of climate change locally).
3) Acknowledgment and community prestige builds with recognition by others, i.e. the United Nations (UN) recognizes the County's program under the UN's International Billion Tree Campaign.

> "Community buy-in and participation leads to education on the value of nature." - Mark Van Patter

5.2.13 Initiative: *Wingham River Flats Ecological Park*
Theme: Biodiversity, Habitat and Species Protection
Additional Themes:

- Community Livability
- Culture, Education, Recreation, and Tourism
- Water and Stormwater Management
- Other (recycled lands)

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About:
The Wingham River Flats Ecological Park is a multi-purpose park. The restoration and naturalization of the floodplain was designed to improve the health of the river ecosystem, provide fish and wildlife habitat, and to reduce the amount of turf grass that had to be maintained in the park.

Context:
In 1991, the Maitland Valley Conservation Authority (MVCA), Ministry of Natural Resources (MNR), Wingham Horticultural Society, and the Town of Wingham partnered on a plan to restore the river and floodplain in a former mill pond area. The decision was made to restore the floodplain and river shore and to allow a natural forested area to grow in order to improve the ecological health of the river and flood plain as well as to improve fish and wildlife habitat, provide outdoor recreational opportunities to the community, and to reduce the cost of maintaining the park.

Motivating Factors:

- Improving the health of the Maitland River
- Enhance biodiversity and natural habitat and provide forested wildlife corridor
- Provide outdoor and nature-based recreational and learning opportunities for local residents and visitors

Process:

- Volunteer-based involvement
- Funding came from all three levels of government – federal, provincial, municipal
- Restoration of the river shore and flood plain
- Added a trail system
- Turf grass areas converted to tree/shrub islands

Role of Green Infrastructure:
The park is a good example of the multifunctional benefits of green infrastructure, as it offers benefits to the human population, wildlife, and the surrounding natural environment. It was constructed with community sustainability in mind – to build community resilience, restore a degraded ecosystem, adapt to the impacts of climate change, and to reduce the use of fossil fuels for grass cutting. The park and trail system provide naturalized public space for the local community and visitors to engage in recreational opportunities and active transportation. Additionally, the park has provided educational opportunities for residents of all ages to share and learn about nature and the river ecosystem. The

park provides the aesthetics of nature through a butterfly garden and forest, and imparts a sense of place and pride for the local community. In the event of a severe rainstorm, the forested area provides a natural buffer, while the flood plain filters and slows runoff. By eliminating the dam and mill pond, sediment flows, water quality, and the river's overall ecological health have been improved. Finally, the park has increased biodiversity and provides a wildlife corridor for numerous species, including some that had not been seen in the area in a long time (such as eagles and osprey). All together the park and river work together as a natural ecosystem and provide multiple benefits to its surroundings.

Economic Rationale:

- Reduction of municipal park maintenance costs
- Eliminates cost of repairing and maintaining the dam and mill pond
- Horticultural jobs for summer students – pruning, planting and invasive species control

Innovative Features:

- The park is an attempt to change people's attitudes about "natural" vs. "manicured"

Key Lessons to Share:

1) Need strong leadership and community support
2) Need good examples of naturalization projects for people to see in order to develop understanding and support for additional projects
3) Projects need to have aesthetic appeal to build support
4) There needs to be a cultural attitude shift – from utilitarian to co-existing with nature
5) The public good should be at the forefront of our consciousness

> "We need to make projects like this the norm, rather than the exception." - Phil Beard

Section 5.3 Matrix Summary of GI Case Studies

The following chart is a compilation of the case studies that have been discussed in the preceding section. The intent of the chart is to illustrate the multifunctional attributes that GI elements can have to build economic resilience in rural communities. The chart outlines the 13 cases covered in this report and then identifies the theme attributes covered by each of the cases. The dark green boxes are indicative of the principal attribute of GI that is discussed in the specific case. In totality, the chart provides a powerful illustration of the potential of GI to address many issues that are present and significant for rural places. An embedded premise in this report is the potential 'power' of using GI across many sectors with various stakeholders, i.e., cost efficiency and effectiveness in addressing multiple issues and priorities. The diagonal pattern of the dark green boxes illustrates the diversity of the multifunctional attributes that GI has to offer.

Figure 4: GI Matrix of Case Studies

GI Theme / **Case Study**	Community Liveability	Culture Education Recreation Tourism	Local Food, Soil Quality	Biodiversity, Habitat & Species Protection	Climate Change Adaptation & Mitigation	Water & SW Management	Woodlands, woodlots, street trees	Other: incl. brownfields, vacant lands, recycled lands, landfill
5.2.1 Sustainable Huron Take Action (HCDC)	**X**	x	x	x	x	x	x	x
5.2.2 Georgian Bay Township Official Plan	**X**	x		x		x		x
5.2.3 CWATS (Essex Region Health Unit)	x	**X**						x
5.2.4 Temagami Eco-Cultural Tourism	x	**X**		x				
5.2.5 Lower Maitland River Video (Huron Stewardship)	x	**X**						
5.2.6 Transition Perth Permaculture Projects	x	x	**X**					
5.2.7 Garvey Creek Glenn Drain (Healthy Lake Huron)	x		**X**			x		
5.2.8 Clean Water ~ Green Spaces (Essex Region CA)	x		x	**X**		x	x	x
5.2.9 Mississippi Valley CA Climate Change Adaptation	x	x			**X**	x		
5.2.10 Rainscaping & Phosphorous Offsetting (Lake Simcoe CA)	x				x	**X**		
5.2.11 Simcoe Forests (County of Simcoe)	x	x		x	x	x	**X**	x
5.2.12 Green Legacy (County of Wellington)	x	x	x	x	x	x	**X**	x
5.2.13 Wingham River Flats Ecological Park (Maitland ValleyCA)	x	x		x		x		**X**

6.0 How GI Can Contribute to Economic Development / Job Opportunities

Using green infrastructure to develop landscapes in rural areas has the potential to encourage and attract economic activities to many rural communities in Ontario. The use of GI investment can encourage and attract high value industry, entrepreneurs and workers to many rural communities. There are many economic benefits associated with implementing GI within rural communities. The list below highlights some of the various economic rationales that were revealed in the case studies.

- Growth of green industry: jobs in design, construction, maintenance
- Horticultural/landscaping jobs
- Less spending by municipalities – lower capital/operating expenses with 'low tech' solutions to issues (e.g. living snow fences)
- Decreased energy costs through passive energy mechanisms
- Avoids cost of flooding, road repair
- Mitigates drought costs
- Attracting visitors – spending in local economy
- Eco-tourism
- Economic spinoffs
- Attracting young professionals
- Attracting & retaining residents
- Increased property values
- Timber sales
- Reduced health care costs – clean air & water, green space, increased physical activity
- Local food production
- Generates money from fees
- Creates niche markets – i.e. permaculture
- Environmental resilience
- Cost savings to farmers (inputs)
- Safeguarding soils
- Increased farm field yields
- Education
- Preserves wildlife habitat and payments received for ecological goods and services
- Leverages funding received from others outside the local community (foundations, senior governments)
- Complements 'grey' infrastructure provision

To meet the economic rationales mentioned above, the following points are a summary of the aspects of implementing GI that resonate with many participants in this research. The action items listed have been identified from both survey respondents as well as key informants.

1) **We need to change the way we think (view) nature, and we need to think on a system- or landscape-level.**

The Township of Georgian Bay's Official Plan exemplifies this way of thinking. The Plan includes policies that encourage the integration of GI elements into all aspects of development and natural area preservation within the community. As presented, the protection of the environment gives life and wellbeing to both human and natural communities. In another case study example, the Garvey Creek-Glenn Drain project demonstrates that when the health of an entire sub-watershed basin is given attention to, priority actions can be set to reduce erosion and surface drainage impacts of common farming practices in that area. The incorporation of GI structural and non-structural elements can pay significant environmental dividends.

2) **We need broad thinking that goes beyond the environment, taking into consideration the economic and social benefits**.
The Windsor-Essex County Health Unit has played a crucial role in creating an active transportation plan that does an excellent job at linking various social, economic and environmental forces while promoting healthy active lifestyles for County inhabitants. The eco-cultural tourism case study from the Temagami First Nation is another example where cultural conditions and beliefs can blend with educational and economic aspirations within a protected and revered natural heritage system.

3) **You need strong community leadership (aka Community Champions).**
As demonstrated in the Tay Valley Township's *Transition Perth Permaculture Project*, keen residents drove the project forward to address local community needs. The municipal Township leaders assisted by helping to co-ordinate action and getting involved in the project.

4) **You need public buy-in, community support.**
As illustrated through the Garvey Creek-Glenn Drain case study, the local Conservation Authority worked with willing-host landowners within the sub-watershed to implement beneficial environmental actions. As farmers began to recognize the benefits of the project, it triggered a chain reaction where more farmers began to participate and reap the benefits of the project.

5) **You need political leaders on board (local, provincial, and, in some cases, federal).**
Several case studies point to the implementation of GI actions through the significant leadership contributions of local politicians. The planting of forests within Simcoe County has made significant contributions to environmental stewardship as well as economic and social

beneficial gains. The Green Legacy Programme in Wellington County has provided a platform whereby political officials from all levels of government can extol the virtues of this very successful municipal tree planting programme.

6) **Partnership creation and collaboration are key.**
The Lake Simcoe Region Conservation Authority's low impact development and phosphorous offsetting programs involve a vast amount of collaboration between land developers and municipal partners within the area. In addition, funding from senior levels of government assist in implementation activities that ensures the success of the various lake clean-up programs.

7) **There needs to be incentives for risks – seed funding is often required for 'pilot' projects.**
In the Essex Region Conservation Authority case study, landowners are provided incentives to assist in implementing the *Clean Water ~ Green Spaces* environmental stewardship program. The funding that is provided leverages action on the ground. Study funding was advanced to the Mississippi Valley Conservation Authority from the Provincial Government and the other local Conservation Authority in the area to complete a *Climate Change Adaptation Strategy* The impetus for change was the experience of a significant summer drought with the availability of seed funding that was external from the local area.

8) Be creative with limited resources.
Several case studies document the financial feasibility and reasonableness of working with nature/natural systems rather than against it. The *Wingham River Flats Ecological Park* case study documents the lessened municipal expenditures needed in the restoration of a river corridor. The alternative expensive capital cost of reinstating a failed former industrial mill pond dam did not make economic. Another case study, the *Take Action for a Sustainable Huron* planning effort is a good example of leveraging multiple results from a single community initiative. In this instance, funding was derived from external sources to the community – the Municipal Greenfund grant program from the Federation of Canadian Municipalities. The strategic planning process for the community identified the importance of protecting scarce environmental features in the area, and promoting planning initiatives that could identify and conserve these areas. This initiative was instrumental in providing knowledge in the local community to the importance of planning for the protection of natural heritage features on the landscape.

9) **Communicate, share information, engage, educate and enable community members, landowners, etc.**
The *Lower Maitland River Video* case study is an excellent example of raising awareness pertaining to ecological importance. The intentions of the video are to ultimately increase the number of visitors to the area. In addition, the *Take Action for a Sustainable Huron* case study had similar goals of increasing environmental awareness throughout the region by mobilizing outreach efforts in means such as newsletters, surveys, and questionnaires to members of the community.

10) **Demonstrate your successes, lead by example.**
In the *Mississippi Valley Conservation Authority Climate Change Adaptation Strategy* case study, MVCA stated that it was thought to be the first Climate Change modeling project east of Toronto to ever exist. Groundbreaking efforts such as this strategy ultimately support local capacity and resilience against the impacts of climate change. In addition, the County of Wellington's *Green Legacy Programme* is one of the few municipal tree planting and distribution programs that exist in the Province. There is a huge opportunity for other municipalities to adopt a similar framework.

11) Borrow other good ideas
As mentioned by Rachel White in the *Lower Maitland River Video* case study, "Do not reinvent the wheel – if other people are doing amazing things, follow their lead." This case study borrowed ideas from various stewardship projects to increase stakeholder collaboration and ultimately raise awareness about the Maitland River to ensure the long-term protection of the area.

7.0 Recommendations and Concluding Thoughts

The research demonstrates that the use of green infrastructure has the potential to transform rural infrastructure developments by adding many economic, social and environmental values. The research included in this document illustrates several Ontario municipalities that have already implemented and benefited from green integrated infrastructure practices. Furthermore, the research indicates that the use of green infrastructure must become a recognized shift in rural planning designs direction to offer the potential for significant environmental, social and economic benefits for municipalities throughout Ontario. Investigating an appropriate methodology that integrates GI into

an overall planning strategy may be the answer to solving many challenges that rural communities face in Ontario.

The following list highlights recommendations-the researchers believe are important for rural community members to consider implementing GI mechanisms.

- Identify areas of interest, opportunities or areas capable of being protected or transformed
- Consider the overall context of the local area – what is at risk and what are the tradeoffs for in-action?
- Identify community interests and needs; consider what stakeholder groups are natural aligned to further GI planning notions
- Approach decision-makers, or learn about their interests and figure out what puts their interests in line with yours
- Create goals to strive for at the local, community and system-area levels
- Envision your area 20 or more years from now – what is your 'legacy'?
- Recognize what impacts can occur in your area from not addressing GI needs, e.g. climate change impacts on stormwater systems.
- Share with, and assist, other communities interested in nature-based planning and development tools (knowledge mobilization through KTT efforts, further research)
- Get the community involved in the planning for GI
- Offer incentives for landowners to integrate GI onto private property
- Demonstrate incentives and cost savings to land owners through analysis and proven practices
- Educate Council members and decision makers within communities on the benefits of GI

Tremendous opportunities are available to further the objectives of GI planning in the Province today. For example, the 2014 Provincial Policy Statement requires that natural heritage system plans be implemented in communities across southern Ontario (Policy 2.1 in MMAH, 2014). These plans would serve as key foundational elements that could stitch together existing natural features on the landscape and identify new opportunities for connected natural or semi-natural areas. In addition, there are many recent initiatives that point towards the importance of efforts to enhance the quality of our air, land and water resources. Often the multi-functional attributes of green infrastructure elements are at the nexus of implementation actions, e.g., integrated watershed management, source water protection measures, low impact development stormwater management, agricultural stormwater

quantity/quality control mechanisms, natural area protection efforts, local food and tree planting community initiatives.

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Appendix 1 Survey Instrument

Green Infrastructure for Ontario's Rural Communities

Introduction to Survey

This survey is being distributed to planners and other rural leaders and practitioners within Ontario to identify innovative ways in which green infrastructure is currently being used to achieve economic prosperity objectives, build communities, save money, and enhance the environment.

While there are many definitions for green infrastructure, for the purpose of this survey, green infrastructure is defined as "natural vegetative systems and green technologies that collectively provide society with a multitude of environmental, social and economic benefits" (Green Infrastructure Ontario Coalition, 2012, p. 2).

Further background information can be found at the Green Infrastructure Ontario Coalition website: http://www.greeninfrastructureontario.org/report

Our central focus lies in the ways that green infrastructure can benefit rural areas of Ontario by identifying how the goods and services of nature can be used in a sustainable fashion to create economic and employment opportunities, provide cost savings to rural municipalities, and thereby enhance community resilience and health. The information gathered from the survey will be used to assist in identifying innovative practices that will be widely profiled across the province.

UNIVERSITY of GUELPH
SCHOOL OF ENVIRONMENTAL DESIGN AND RURAL DEVELOPMENT

*** 1. Please provide the region or municipality you represent.**

*** 2. Please provide the organization you represent.**

Municipality	
Health Unit	
Conservation Authority	
First Nations	
Community Futures	
Other	

3. Please consider the following categories. We would like to identify innovative programs, policies, and uses of nature that contribute to economic prosperity objectives, community building, saving money, and/or enhancing the environment. Please identify any programs, policies, or uses that you are aware of within your area (including First Nations lands if applicable). You are welcome to provide more than one response per category.

Community Liveability (including environmental aesthetics, health and well-being, community cohesion, sense of place)

Culture, Education, Recreation, and Tourism

Local Food Production, Soil Quality Enhancement

Biodiversity, Habitat and Species Protection

Climate Change Adaptation and Mitigation

Water and Stormwater Management

Woodlands, Woodlots, and Street Trees

Other (including vacant lands and/or recycled lands, landfills, brownfields)

4. Considering your answers to the above question, are there any examples within your area that are so innovative that you think they should be shared with other areas of the Province. Please describe below.

*** 5. We will be conducting several interviews. Would you be willing to be contacted to discuss any of your responses to this survey?**

Yes

No

*** 6. Are you interested in receiving our final results?**

Yes

No

7. If you answered yes to question 5 or 6, please provide your contact information below.

Name

Title

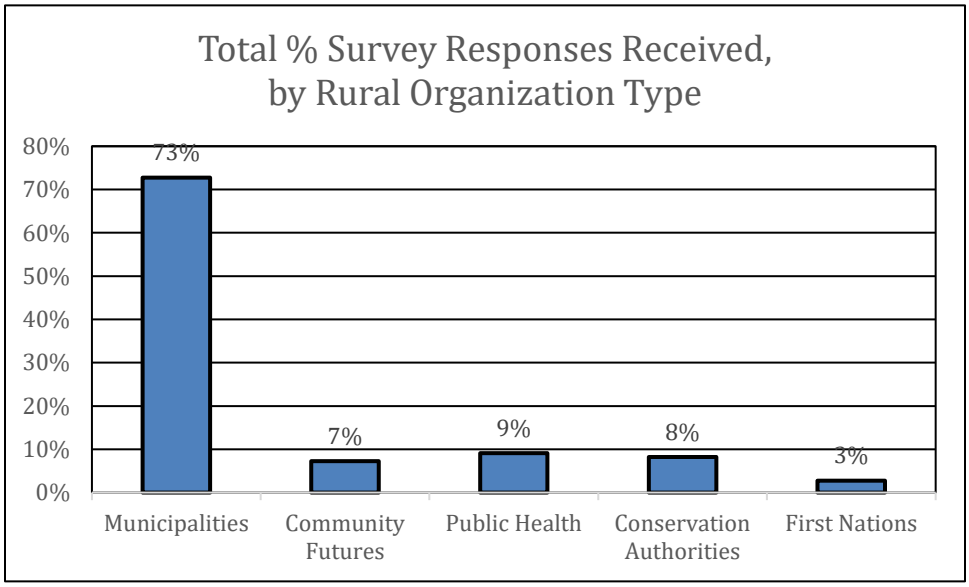
Email

Phone

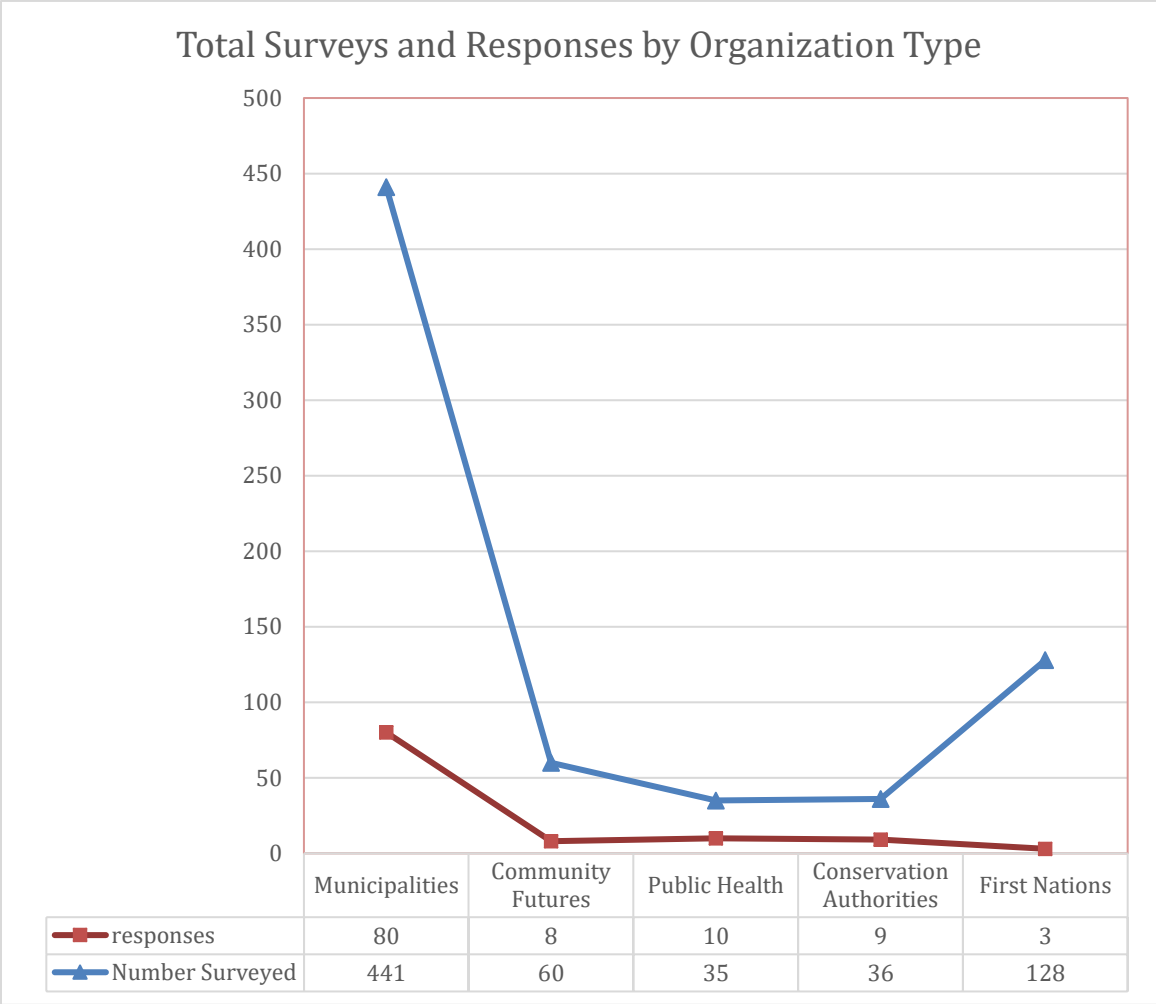
Thank you for taking the time to participate in our survey.

Done

Appendix 2 – Survey Statistics of Rural Community Leaders Participating in the Green Infrastructure Practices Study



Rural Organizations	Responses	%
Municipalities	80	73%
Community Futures	8	7%
Public Health	10	9%
Conservation Authorities	9	8%
First Nations	3	3%
Total	110	100%



	Municipalities	Community Futures	Public Health	Conservation Authorities	First Nations
responses	80	8	10	9	3
Number Surveyed	441	60	35	36	128