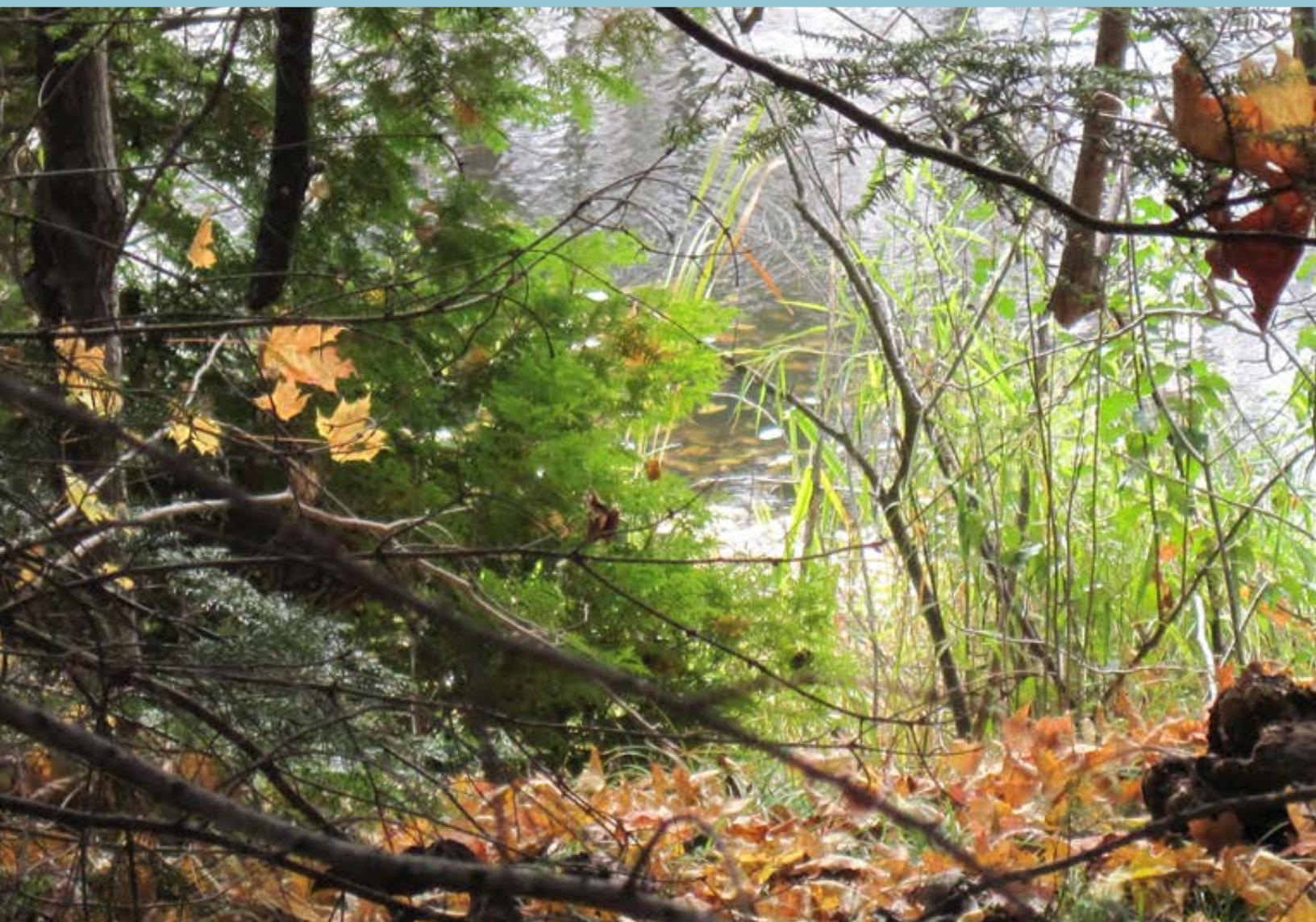




Nottawasaga Valley

Integrated Watershed Management Plan

June 2019



Acknowledgments

Nottawasaga Valley Conservation Authority (NVCA) acknowledges that the watershed is situated on the traditional land of the Anishnaabeg people. The Anishnaabeg include the Ojibwe, Odawa, and Pottawatomi nations, collectively known as the Three Fires Confederacy. We are dedicated to honouring Indigenous history and culture and committed to moving forward in the spirit of reconciliation and respect with all First Nation, Métis and Inuit people.

Thanks

We would like to acknowledge the contributions of all those who participated in the development of the Nottawasaga Valley Watershed Integrated Watershed Management Plan.

Funding for the 2019 IWMP was provided by the Federation of Canadian Municipalities (FCM) Municipal Climate Implementation Fund with additional in-kind contributions from the Nottawasaga Valley Conservation Authority (NVCA) and its 18 municipal partners.

About this Report

Authors: This report was prepared by the consultant team in conjunction with NVCA staff and with input from multiple stakeholders.

Consultant Team: Ecosystem Recovery - Wolfgang Wolter, Project Manager; Mariëtte Pushkar, Geomorphologist; Adam Spargo, Water Resource Specialist; Julia Howett, Fluvial Specialist; Arcadis - Brian Hindley, Fisheries Biologist, Environmental Studies Specialist; Green Analytics - Jeff Wilson, Natural Capital and Asset Management; Jennifer Lawrence & Associates - Jennifer Lawrence, Stakeholder Engagement and Policy Planning; North-South Environmental - Sarah Mainguy, Terrestrial/Natural Heritage Specialist

NVCA Technical Team: Doug Hevenor, Chief Administrative Officer; Chris Hibberd, Director, Watershed Management Services; Byron Wesson, Director, Conservation Services; Sheryl Flannagan, Director, Corporate Services; Fred Dobbs, Manager, Stewardship Services; Hendrik Amo, Manager GIS/IT; Heather Kepran, Communications Coordinator; Ryan Post, Senior Hydrogeologist; Mark Hartley, Senior Engineer; Ian Ockenden, Watershed Monitoring Specialist; Peter Alm, Water Resource Engineer; Emma Perry, Planner

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The preparation of this plan was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them."



Executive Summary

The Nottawasaga Valley watershed contains a mosaic of woodlands, wetlands, valleys and river systems situated amongst agricultural, rural and urban land uses. The headwaters of the Nottawasaga Valley watershed are in the forested landscapes associated with the Niagara Escarpment to the west, Oak Ridges Moraine to the south and the Oro Moraine/Simcoe Uplands to the east. In the centre lies the internationally significant Minesing Wetlands complex, and to the north Georgian Bay and Lake Huron.

The watershed's natural resources provide numerous ecosystem services to those who live, work and play in the watershed. Maintaining and enhancing these natural resources will be critical in ensuring that the features, and the ecosystem services that they provide, are resilient to climate change and the impacts of urban growth. This requires an integrated approach that brings together stakeholders from across the watershed to develop and implement strategies that achieve a sustainable and resilient system.

Given their broad resource management mandate and areas of jurisdiction, conservation authorities play a coordinating role in watershed planning and management. In keeping with this role, the Nottawasaga Valley Conservation Authority (NVCA) worked in cooperation with watershed municipalities, residents, the development industry, government organizations, non-governmental organizations, the agricultural community, special interest groups, and bordering conservation authorities to prepare this Integrated Watershed Management Plan (IWMP).

This plan is intended to inspire those who live, work and play in the Nottawasaga Valley watershed to appreciate and engage in actions to maintain and enhance the natural resources within the watershed. Through existing partnerships and new collaborations, the framework outlined in this plan will guide watershed management efforts to maintain and enhance the watershed's natural heritage resources.

This IWMP provides strategies to address the following key issues:

- water quality and quantity;
- flood and erosion management;
- resilient biodiversity and habitats;
- sustainable economic and recreation opportunities;

Integrated Watershed Management is the process of managing human activities and natural resources on a watershed basis considering social, economic and environmental factors to manage watershed resources sustainably.

- improved quality of life and neighbourhood desirability; and
- the ability of the watershed to adapt to stressors such as climate change and urban growth.

The strategies identified in this plan are presented below.

Issue: Water Quantity and Quality
Goal: Protect and enhance water quality and quantity of groundwater systems, headwater streams and wetlands, and restore degraded creeks, rivers and lakes.
<ul style="list-style-type: none"> • Promote water quality and natural heritage protection and enhancement through agricultural best management practices and stewardship. • Implement effective nutrient management plans and salt management plans to reduce potential for surface and ground water impacts. • Implement erosion mitigation programs for identified priority subwatersheds. • Complete an erosion and sediment management plan that identifies potential sources and impacts and guides erosion control efforts to reduce instream suspended sediment levels. • Advance the development and implementation of innovative erosion control practices on development sites. • Complete urban development-related monitoring. • Continue to implement a coordinated approach to drought management • Maintain pre-development recharge rates, with emphasis on significant and ecologically significant groundwater recharge areas and significant surface water contributing areas. • Improve understanding of groundwater/surface water interactions and from that, develop a water balance model as a water management tool.

Issue: Flooding
Goal: Identify and understand flood risks within the Nottawasaga Valley watershed to establish accurate development limits and provide flood forecasting and warning to protect existing development within flood hazard areas.
<ul style="list-style-type: none"> • Establish updated floodplain mapping to better assess and understand flood risk and identify flood prone areas, particularly in response to climate change trends. • Continue to advance flood monitoring and warning systems to increase accuracy and timeliness. • Continue to protect natural heritage features that provide water quantity control in flood prone catchments. • Manage and maintain flood and erosion control infrastructure.

Issue: Natural Heritage

Goal: Maintain, enhance, and protect a regenerative natural heritage system, consisting of wetlands, woodlands, valleylands, beaches, dunes, marshes, and other natural areas, that is resilient to climate change and the impacts of urban and rural development and that contributes to reversal of historical impacts, where feasible. This includes maintaining and enhancing the natural features of the Minesing Wetlands, the Niagara Escarpment, Wasaga Beach Provincial Park and other significant features.

- Implement strategies for protecting/enhancing forests, wetlands, dunes, beaches and their buffers in each subwatershed.
- Protect and enhance forest cover with emphasis on areas of significant hydrological and high groundwater recharge.
- Implement the recommendations from the NVCA's Minesing management plans and reports.
- Develop and implement an Ecological Net Gains policy to enhance and create natural heritage features where applicable and appropriate.
- Promote retention of a high diversity of natural heritage features and their functions as a natural capital asset.
- Implement a subwatershed-based program to improve the health and function of municipal drains for aquatic life and for agriculture uses.
- Manage water taking permits on a subwatershed basis to maintain instream flow/level requirements for aquatic life and ensure sustainable water supplies.
- Improve water quality and aquatic habitat through instream and stream corridor restoration best management practices.
- Incorporate measures to reduce road mortality of wildlife species where opportunities arise as a result of proposed road construction and road improvements.
- Implement measures to mitigate the effects of invasive species on natural heritage features.
- Support stewardship initiatives regarding best management practices for managing grassland, thicket, and dune habitats, as they require disturbance to persist.
- Identify the hydrological functions and features that are important in maintaining wetlands.
- Enhance local fisheries through continued implementation of the NVCA's Fisheries Habitat Management Plan.
- Support the development of natural heritage systems on municipal, subwatershed and watershed basis.
- Establish a policy for evaluated (PSW and non-PSW) and unevaluated wetlands and woodlands. Evaluate unevaluated wetlands and woodlands as well as those with existing, but dated, evaluations.
- Encourage municipalities to acquire natural heritage and natural hazard lands through the subdivision approval process in urban areas.

Issue: Erosion

Goal: Identify and reduce erosion risk to protect natural form and function of watercourses, water quality and aquatic habitat, and to reduce loss of agricultural lands and private property.

- Examine and inspect erosion processes and their relationship with erosion hazard mapping.
- Identify opportunities to use approaches that optimize the natural form and function of watercourses to mitigate erosion risk.

Issue: Stormwater Management

Goal: Implement and enhance stormwater management using a treatment train approach that improves water quality, water quantity, erosion and water balance in existing and future urban areas.

- Advance the development and implementation of Low Impact Development (LID) practices.
- Inventory catchment areas lacking, or requiring upgraded, stormwater management facilities and implement appropriate retrofit measures.
- Ensure consistent application of stormwater management practices across jurisdictional (municipal) boundaries, on a watershed/subwatershed basis.
- Create natural features (i.e., man-made wetlands) that can store surface runoff; where possible, locate and design these features to add to overall wetland biodiversity.
- Protect natural wetland storage areas.

Issue: Policy and Protocols

Goal: Identify and implement planning and policy tools at the local level that proactively and collaboratively address current and anticipated future impacts to natural heritage and natural hazard features and functions from climate change, and urban and rural development.

- Develop and implement subwatershed plans.
- Provide local governments with assistance in incorporating environmental policy statements and guidelines (including the IWMP), into their planning documents.
- Implement NVCA's Climate Change Action Plan and Strategy.

This plan identifies the agencies and stakeholders that will need to work collaboratively to implement the recommended strategies. Once implemented, the strategies will need to be monitored, reported on, and updated to adapt to changing land use, new or increasing stressors, new information and/or different management approaches. This adaptive management approach will allow this IWMP to be a living document that can be revisited and updated to reflect the changing needs of the watershed.

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1

Introduction

Integrated Watershed Management

Water resources and natural heritage management are complex and inter-related processes that often extend across geopolitical boundaries. Such complex and inter-connected issues are best addressed through an integrated approach that brings together stakeholders to develop and drive solutions that achieve lasting change.

Integrated Watershed Management is the process of managing human activities and natural resources on a watershed basis considering social, economic and environmental issues to manage watershed resources sustainably (Conservation Ontario, 2010). Figure 1 shows the cornerstones of Integrated Watershed Management.

The Nottawasaga Valley Conservation Authority (NVCA) completed its most recent Watershed Management Plan in 1996 and successfully implemented most of the recommendations over the past 20 years. This updated plan looks forward to the next 20 years and builds upon the progress

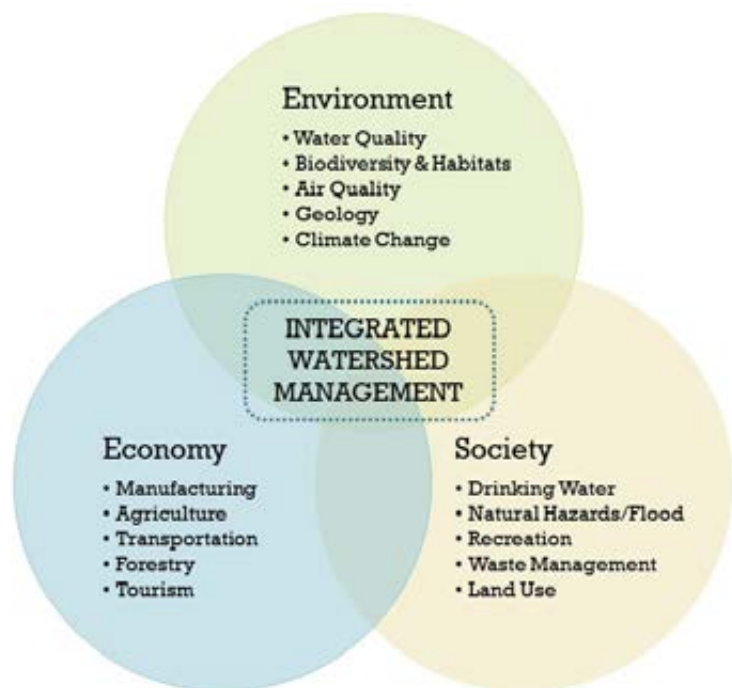


Figure 1: IWMP considers and supports the environment, economy and society

made towards the sustainable management of the Nottawasaga Valley watershed resources. This plan will ensure that watershed managers and decision-makers have the tools to make informed decisions that will protect our valuable water resources for the benefit and enjoyment of generations to come.

General Approach and Methods

The Integrated Watershed Management Plan (IWMP) process is one of understanding, collaboration, implementation and continued improvement (see Figure 2). This plan is intended to provide long-term (~20 year) direction with regular review and updates (~5 years).

The foundation of this plan is a thorough understanding of, and appreciation for, the Nottawasaga Valley watershed from each of the environmental, social and economic perspectives. A vast array of community interests had a voice in identifying the key issues impacting the watershed's resources and in recommending strategies to address the most significant issues and watershed stressors. Regular monitoring and reporting on implemented strategies will guide future updates to this plan. This adaptive

approach will facilitate a resilient system that can respond and adapt to future impacts related to urban growth, climate change and other unforeseen stressors. The schedule for the development of this plan is provided in Figure 3.

Understand the Watershed

A detailed review of background documents was completed by the consultant team. The review brought together the considerable efforts achieved by the NVCA's watershed reporting and the 1996 IWMP. This was reinforced and enhanced by the local insight and knowledge contributed by watershed stakeholders and local technical experts. The work was summarized in the Nottawasaga Valley Watershed Characterization Report (ERI, 2018).

Engage Stakeholders and the Public

The IWMP was developed through the participation and collaboration of a wide variety of stakeholders including federal, provincial and municipal government, the agricultural community, adjacent conservation authorities, environmental organizations, the development industry and residents. Engagement took place through in-person stakeholder meetings, focus group meetings



Figure 2: IWMP process

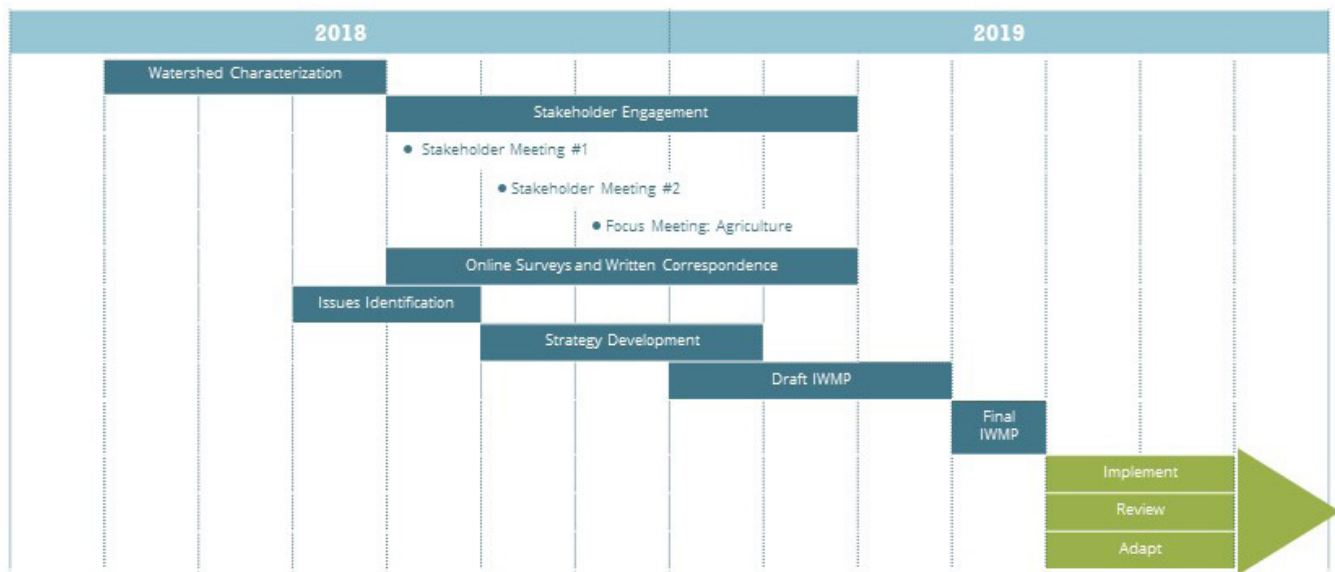


Figure 3: IWMP development timeline

and online surveys. Input received from these engagement activities assisted in identifying watershed issues and formed the basis for the strategies that are recommended in this plan. **Appendix A** provides a record of the stakeholders that participated in the IWMP process.

Develop Strategies

Based on the watershed characterization, key issues and stressors within the watershed were identified. Through the stakeholder engagement process strategies were developed to address the key issues and stressors and to guide the sustainable management of the natural resources within the Nottawasaga Valley watershed.

Implement the Plan

A path forward is critical to ensure the plan's goal is achieved. The recommended strategies represent the management priorities for maintaining and enhancing the watershed to protect the natural resources and provide resiliency to stressors such as climate change and urban growth. The Implementation Strategy will need to include direction on reporting and review required under the adaptive management approach. Additional details on implementation are provided in Section 4. NVCA and its partners in this IWMP will need to ensure that there is strong communication among the implementors of the strategy and that each partner incorporates the implementation measures into their respective planning, funding and capital works programs.

Guiding Principles

This IWMP process, from development to implementation, is guided by the following mission, vision and values statements established through the stakeholder engagement process.

Our Mission

Working together to deliver innovative, integrated watershed management that is responsive to the environmental, economic and social sustainability of the Nottawasaga Valley watershed.

Our Vision

A sustainable watershed that is resilient to the effects of climate change, urban growth and other stressors and provides for safe, healthy and prosperous people and communities.

What We Value

- An abundance of clean water, clean air and fertile soils that provide for healthy people and ecosystems.
- Natural heritage systems and the ecosystem services they provide, particularly as they support resilience to the effects of a changing climate.
- Distinctive landforms and waterways including the Georgian Bay coastline, Niagara Escarpment, Minesing Wetlands and others that give our watershed a unique sense of place.
- Quality recreational opportunities that our hills, forests, meadows, wetlands, waterways and coastline provide for residents and tourists alike.
- A wealth of resources within the capacity of our watershed to provide for thriving communities, successful economies and sustainable agriculture, now and in the future.

IWMP Goal

The goal of the IWMP is to provide a 20-year framework that coordinates, directs and provides guidance to current and future policy decisions related to watershed planning including natural heritage, water resource conservation, natural hazard management, climate change, biodiversity and resilience planning.

Planning Framework

This plan was prepared in accordance with Section 20 of the Conservation Authorities Act which enables a Conservation Authority to “establish and undertake, in the area over which it has jurisdiction, a program designed to further the conservation, restoration, development and management of natural resources.”

In addition to the Conservation Authorities Act and the NVCA’s Development, Interference with Wetlands and Alterations to Shorelines and Watercourses regulation (Ontario Regulation 172/06), the IWMP also addresses the requirements of multiple provincial policies and legislation including:

- Growth Plan (MAH, 2019)
- Greenbelt Plan (MAH, 2017)
- Niagara Escarpment Plan (MNRF, 2017)
- Oak Ridges Moraine Conservation Plan (MAH, 2017)
- Provincial Policy Statement (MAH, 2014)
- Municipal Official Plans

This plan will support member municipalities in responding to the climate change requirements in the Provincial Policy Statement (MAH, 2014) and the Growth Plan (MAH, 2019) and will also help implement the watershed management components now required under the Growth Plan (MAH, 2019).

This plan will be reviewed against current planning and policy documents as these documents are changed and updated by the Province and other levels of government.

2 Overview of the Watershed

The overview of Nottawasaga Valley watershed conditions was developed through a review of background documents and the insight and knowledge contributed by watershed stakeholders and local technical experts. This section of the report provides a brief summary of the watershed characterization. For more details, please refer to the Nottawasaga Valley Watershed Characterization Report (ERI, 2018).

What is a Watershed?

Water and other natural heritage resources are vital in the support of a sustainable and resilient economy and natural environment, and for the health and well-being of people. The inter-relationship between these elements is best seen at the watershed level.

A watershed is an area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater. Homes, farms, cottages, forests, small towns, big cities and more can make up watersheds. Some cross municipal, provincial and even international borders. Watersheds come in all shapes and sizes and can vary from millions of acres, like the land that drains into the Great lakes, to a few acres that drain into a pond. (Conservation Ontario, 2019a). A typical watershed cross-section is shown in Figure 4.

A watershed is an area of land that catches rain and snow and drains or seeps into a marsh, stream, river, lake or groundwater.

Fundamental to the success of this IWMP is the recognition of the substantial natural heritage resources of the watershed: landforms, waterbodies, water, land, fisheries, vegetation, wildlife and

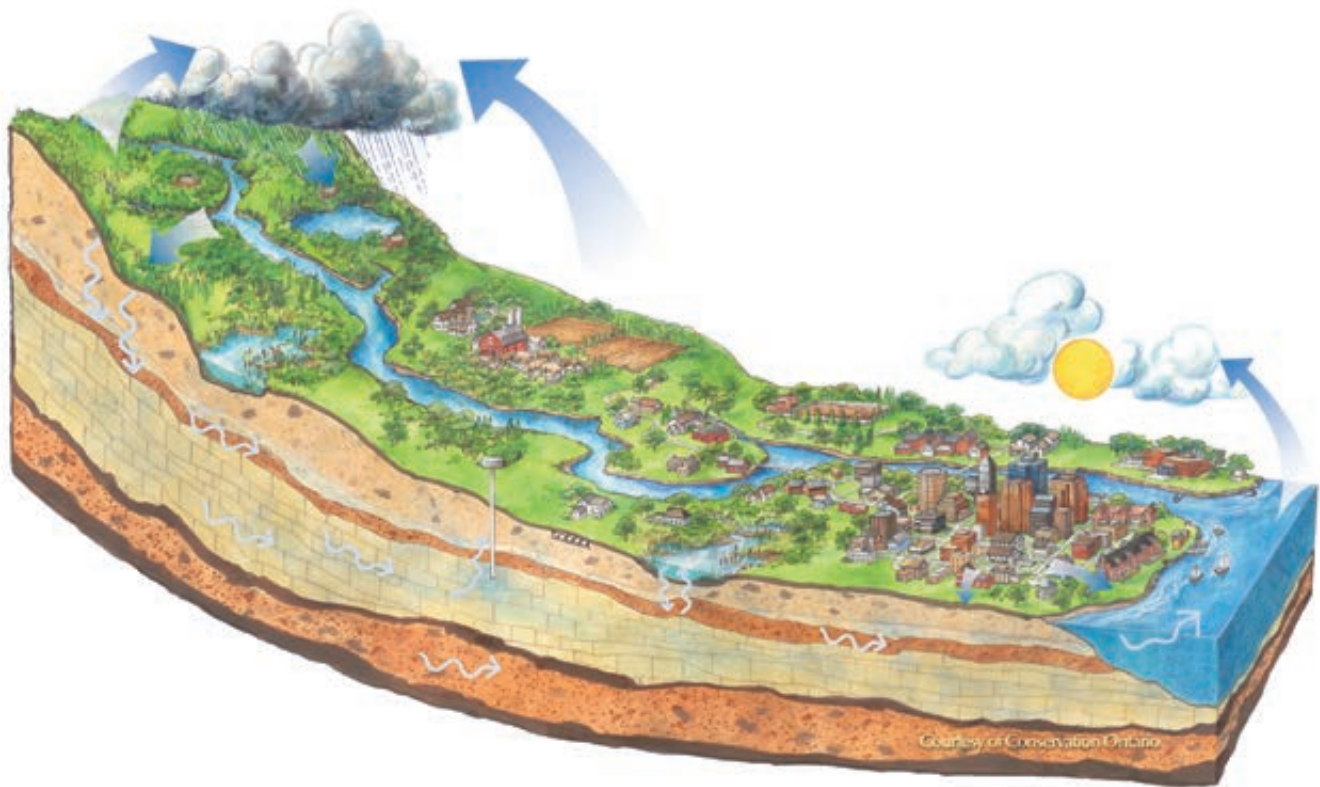


Figure 4: Cross-section of a watershed (Conservation Ontario, 2019)

the fact that the true value of these resources extends well beyond the boundaries of the watershed.

in the Nottawasaga Valley watershed and rely on the critical water and natural resources it provides.

The Nottawasaga Valley Watershed

The Nottawasaga Valley watershed is situated in South Central Ontario and drains northward to Nottawasaga Bay (Figure 5). The watershed is approximately 3,700 km² that includes the Nottawasaga River watershed, Blue Mountain watersheds, and a small portion of the Severn Sound watershed. Collectively the area is referred to as the Nottawasaga Valley watershed. It extends across the counties of Simcoe, Dufferin, and Grey and includes 18 lower-tier municipalities (Figure 6). Approximately 197,800 people live

Natural Environment

Physiography and Environment

The Nottawasaga Valley watershed is defined by its physiographic landscape that is best described as a three-sided, bowl-like formation (Figure 7).

The 'rim' or topographic highs of the bowl are defined by steep geologic features, including the Niagara Escarpment and the flatter Dundalk Till Plain in the west, the Oak Ridges Moraine in the south, and the Simcoe Uplands and Oro Moraine in the east. These



Figure 5: Location of the Nottawasaga Valley watershed in Ontario (courtesy of Conservation Ontario).

headwater areas feature extensive forest cover and forest interiors.

The centre of the bowl includes the flat Simcoe Lowlands, and is home to the Minesing Wetlands, one of the largest intact wetland complexes in southern Ontario.

The Nottawasaga Bay is the watershed's northern extent which includes extensive natural beaches and dunes and rare Great Lakes coastal wetlands.

The watershed's unique combination of physiographic regions results in an intricate system of streams, rivers and lakes that are home to unique terrestrial and aquatic habitats and vegetation communities. With its relatively large proportion of undeveloped and natural areas (for southern Ontario), the watershed supports a high diversity of plants, amphibians, reptiles and bird species.

Nottawasaga River

The headwaters for the Nottawasaga River and its tributaries originate from the Niagara Escarpment and the Oro and Oak Ridges Moraines. These areas, which are predominantly forest and wetland, provide cold water contributions to headwater streams, making them some of the healthiest streams for aquatic habitat in southern Ontario. The Nottawasaga River and the 5,330 km of streams, rivers, lakes and wetlands within the watershed are the heartbeat of this vibrant ecosystem.

Surface Water Quality

The headwaters, with their extensive forest and wetland cover, support the highest surface water quality within the Nottawasaga

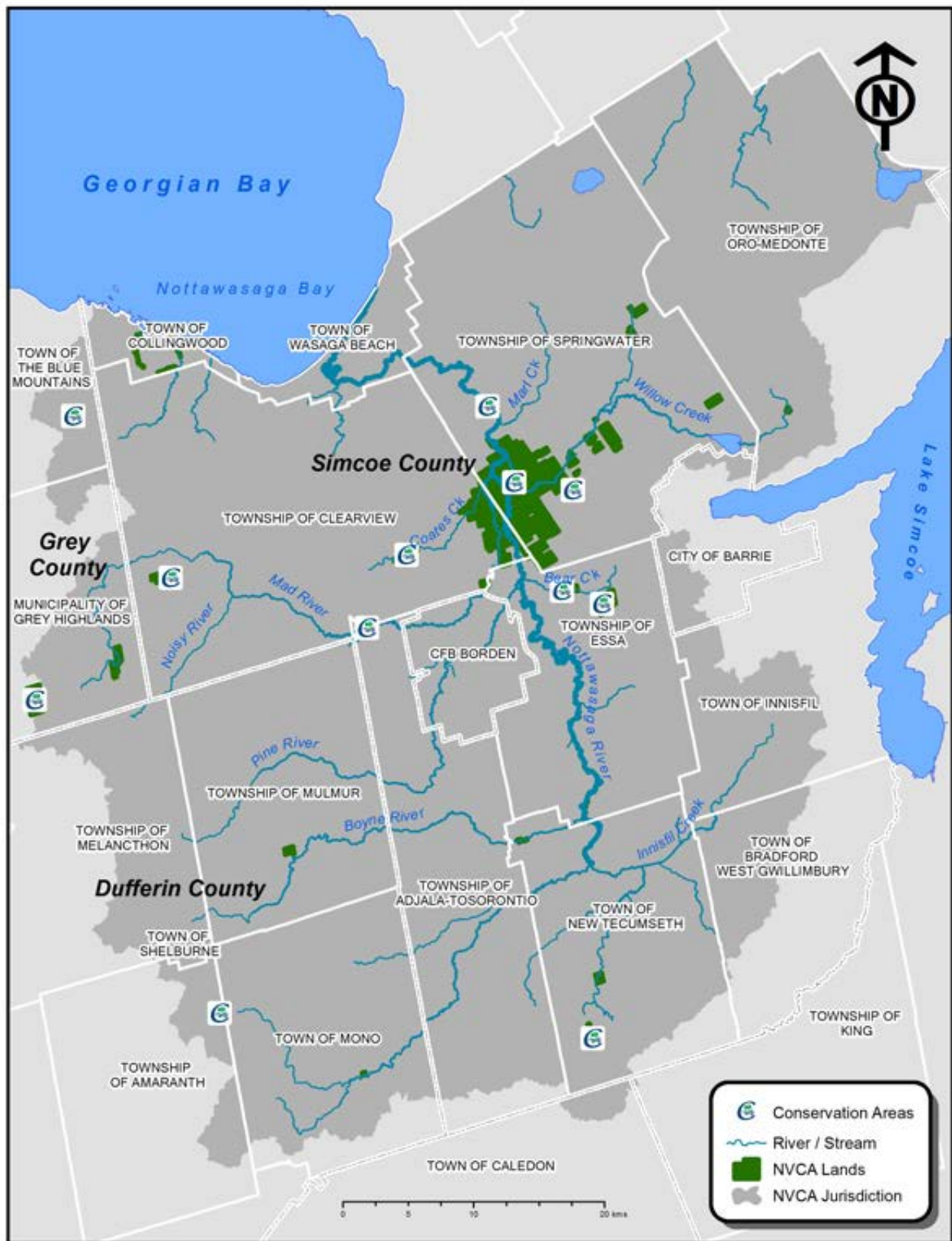


Figure 6: Jurisdictional map of the Nottawasaga Valley Watershed



Figure 7: Physiography of Nottawasaga Valley Watershed.

Valley watershed. As water flows downstream along the Nottawasaga River and its tributaries, the quality begins to deteriorate as runoff from urban and agricultural areas brings nutrients (e.g., phosphorous and nitrogen) and sediment to the system. This combination of deforestation and increasing intensity of land use leads to increased runoff, reduced baseflow and increasing water temperatures. The reduced water quality and warming stream temperature impacts aquatic habitat. Measures to counteract this phenomena will help reduce the impact of land use on surface water quality and create a more sustainable natural resource.

Groundwater

Groundwater is stored in, and moves through layers of underground, permeable rock called aquifers. The Nottawasaga Valley watershed is characterized by a series of four regional aquifers that represent the groundwater resource. Key groundwater recharge zones include the Oak Ridges Moraine, Oro Moraine, and the Niagara Escarpment. Areas of significant groundwater discharge occur at the base of the Niagara Escarpment, flanks of the Simcoe Uplands, the Minesing Wetlands, and the Osprey Wetlands. Groundwater monitoring at wells located throughout the watershed indicate groundwater quality is good (NVCA, 2013a). Protecting and preserving the recharge areas is critical in sustaining this integral resource.

Protected Species

The Nottawasaga River supports what is likely the largest inland spawning population of Lake Sturgeon (a threatened species) in Ontario south of the Canadian Shield (MNR, 2011). The watershed includes the second

Species of Special Concern are still relatively abundant, but vulnerable to ongoing threats that could put them at risk. Maintaining the Nottawasaga Valley habitat will “keep common species common,” one of the cornerstones of biodiversity conservation.

largest complex of coldwater trout stream habitats in Southern Ontario. Forty Species at Risk (SAR), including plants, fish, insects, reptiles and birds, have been identified within the Nottawasaga Valley watershed (NVCA, 2018). A large proportion of these species are associated with wetland habitats, emphasizing the importance of wetland protection. The watershed also offers abundant habitat for a wide diversity of species of Special Concern including the fish such as Northern Brook Lamprey and Silver Lamprey, reptiles such as Snapping Turtle, birds such as the iconic Wood Thrush, and many plant species. Maintaining this habitat helps ensure that species of Special Concern do not become further threatened.

Economic Environment

The Nottawasaga Valley watershed is home to a natural-resource-based economy with industries such as agriculture, aggregate extraction, and tourism and recreation.

Figure 8 presents the land uses within the watershed. The agricultural sector is the

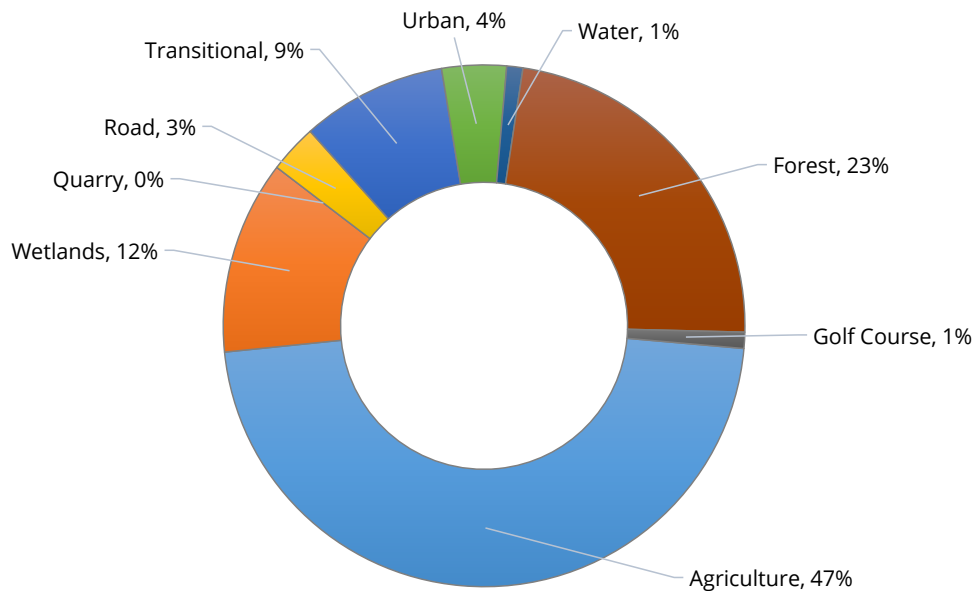


Figure 8: Land uses within the Nottawasaga Valley watershed (NVCA, 2018b)

dominant land use type within the watershed, with row crops, livestock and pastures, and sod farming. In addition to agriculture, the watershed supports a strong tourism and recreation industry that provides a wide variety of activities and attractions. Larger attractions within the Nottawasaga Valley

watershed include Wasaga Beach and ski hills and resorts. The economy is tied to, and dependent on, the quality and extent of natural capital. Protecting and enhancing the watershed's natural capital resources will lead to a more resilient economy.

A natural-resource-based economy is one where the regions goods and services primarily come from natural resources. The industries within the Nottawasaga Valley watershed rely on the natural resources it provides—clean surface water and groundwater, fertile soils and unique landscapes such as the Minesing Wetlands and Wasaga Beach Provincial Park.

Social Environment

Water Supply

The Nottawasaga Valley watershed provides a supply of water that is used for drinking and other residential uses, industrial and manufacturing processes, irrigation for crops and recreation. Figure 9 identifies where the water consumed within the watershed comes from (water sources). Figure 10 identifies where the water is used within the watershed.

Cultural and Spiritual Spaces

Indigenous Peoples and religious groups have an intrinsic tie to the living landscape.

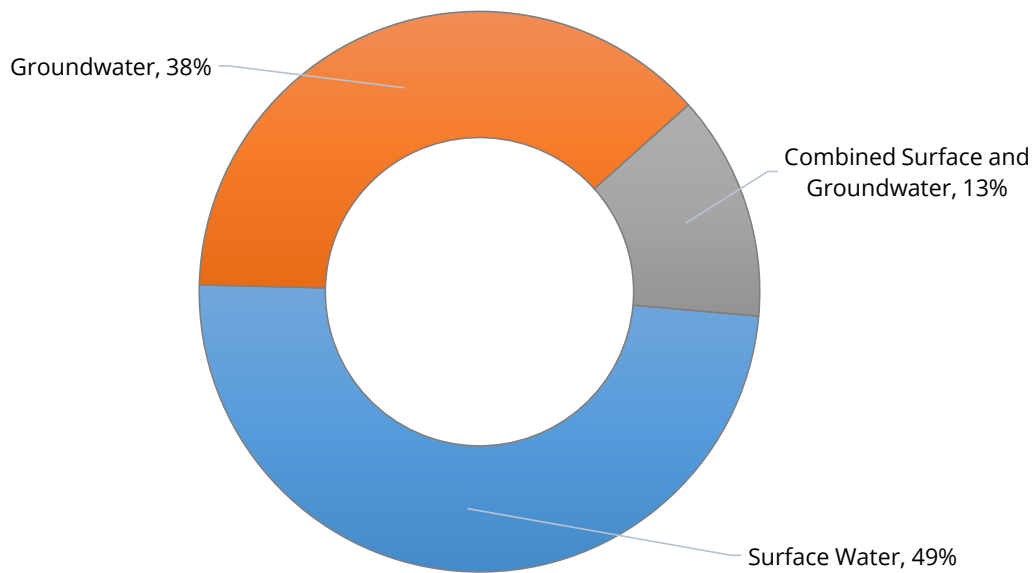


Figure 9: Water sources within the Nottawasaga Valley Watershed (NVCA, 2018a)

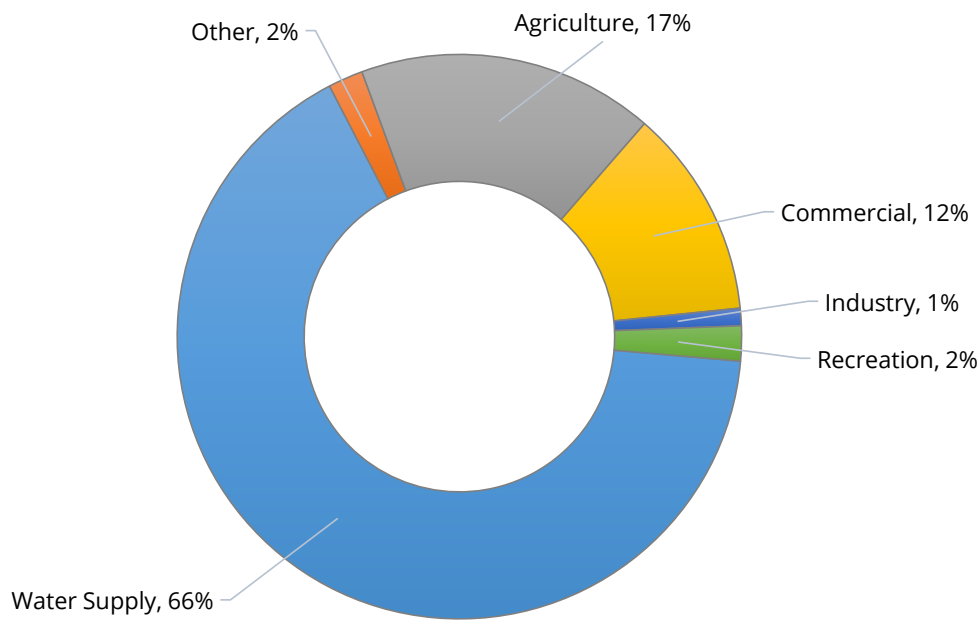


Figure 10: Water uses within the Nottawasaga Valley Watershed (NVCA, 2018a)

Recreation

Nature recreation is one of the most tangible ways in which people directly derive benefit from the natural environment. The Nottawasaga Valley watershed is a well-known hot spot for recreation in Ontario. Four season recreational opportunities within the watershed include beach activities, hunting and fishing, canoeing and kayaking, mountain biking, hiking, and winter sports

such as skiing and snowmobiling. The vast opportunities for recreation can be largely attributed to the natural capital throughout the watershed.

Food and Water Security

The existence of four major groundwater aquifers within the watershed, each of which extends beyond the watershed boundary, providing a source of water for watershed residents and large population centres to the south makes the Nottawasaga watershed unique as the key to preserving this vital and limited resource. Many municipalities to the south have switched from groundwater sources to Lake Ontario water to sustain growth and it is imperative that remaining groundwater sources be protected.

Agriculture in the watershed represents a major land use and agricultural products produced in the watershed represent a major food source for Ontario residents. In the face of dwindling lands available for agriculture in the province, agricultural lands in the watershed need to be protected and managed to ensure that sustainable forms of agriculture can continue.

Employment Associated with Ecotourism

As urban growth within the Greater Golden Horseshoe and beyond continues at its current rate, opportunities for recreation and enjoyment of nature are becoming scarce so close to these urban expansion areas. The Nottawasaga watershed is an oasis of natural heritage feature within this growing urban trend and demand for ecotourism can be expected to intensify in the future. This represents a substantial economic and employment growth opportunity and will

increase the value of natural capital in the watershed.

Health and Wellbeing

Natural areas offer opportunities for exercise, and being in nature has been shown to reduce stress, anxiety and depression, and increase concentration (Conservation Ontario, 2019b).

Natural Capital

The concept of natural capital recognizes the natural environment as an asset that is of value to environmental, social and economic systems.

Ecosystem Services are the goods and services provided to people by nature. Examples include food, water, clean air, flood control, recreation, and tourism.

The benefits provided by natural capital are called ecosystem services, and they sustain municipalities and support agriculture, industry, tourism, recreation and quality of life within the watershed. The extent and quality of the Nottawasaga Valley watershed's natural capital assets are among the best in south-central Ontario (NVCA, 2018a). An overview of the ecosystem services provided by the Nottawasaga Valley watershed is presented in Figure 11.

Growth and Development

The Growth Plan (2019) forecasts growth and population targets for municipalities within the plan area, which includes lands within the Nottawasaga Valley watershed. With an existing watershed population of 197,844, substantial population increases are expected in New Tecumseth, Collingwood and Innisfil based on the Growth Plan forecasts. Urban development is also expected to continue around Midhurst, Wasaga Beach, Barrie, and Bradford West Gwillimbury.

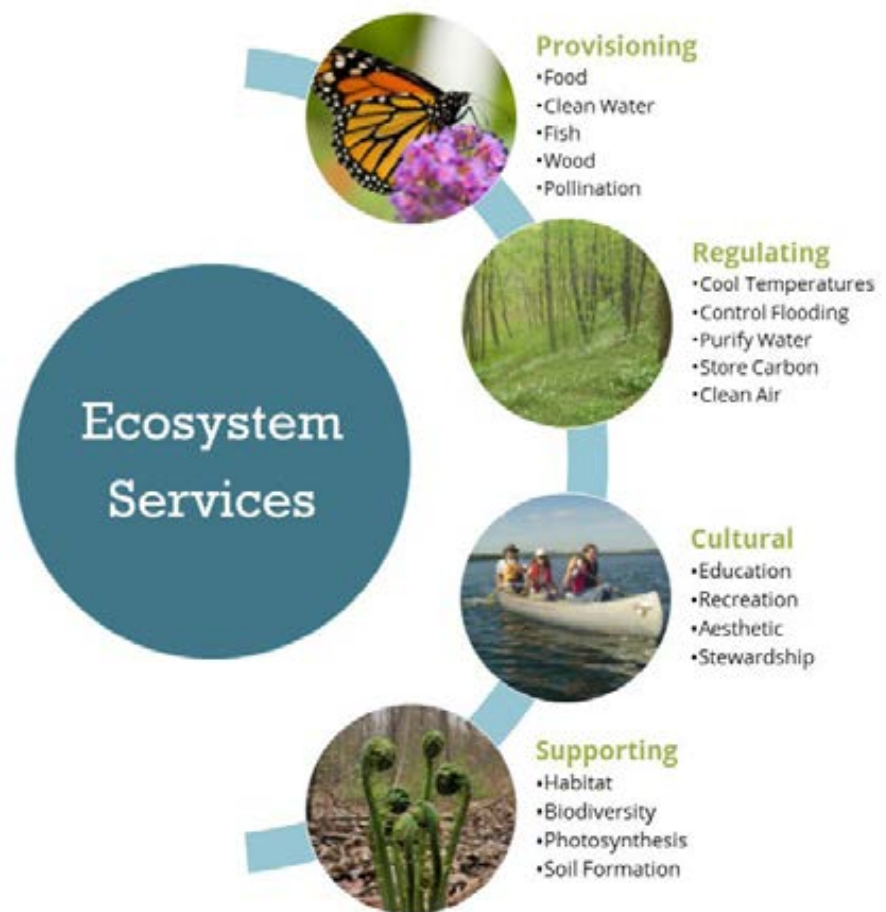


Figure 11: Ecosystem Services within the Nottawasaga Valley watershed (Defend Island Forests, 2019).

Climate Change

Detailed historical climate analysis of the Nottawasaga Valley watershed demonstrates that average yearly temperatures and total annual precipitation have increased over the past 40 years. Projections show these trends to be worsening into the future (NVCA, 2016). NVCA's Climate Change Strategy and Action Plan (NVCA, 2017) outlines strategies for climate change adaption and mitigation within the Nottawasaga Valley watershed. These are consistent with integrated watershed management and relevant to this IWMP.

Summary

The Nottawasaga Valley watershed is home to abundant natural heritage resources that support diverse natural habitats and species, urban and rural land uses, and provide for an array of outdoor recreational opportunities that promote health and well-being. This diverse natural environment also fuels the economy of the watershed. Sustaining the economy depends on the management of natural resources. The cumulative impact of urban development and climate change on the watershed's natural resources need to be anticipated to enable proactive management.

3 Strategies & Objectives

This section identifies the strategies developed through stakeholder consultation to address the six key issues facing the Nottawasaga Valley watershed.



Water Quality and Quantity



Flooding



Erosion



Stormwater Management



Natural Heritage



Policy and Protocols

For each issue, an overview is provided to explain the significance of that issue to the Nottawasaga Valley watershed. The strategic goal to address the issue is then stated followed by the anticipated outcomes and specific actions to be implemented. The issues and strategies are provided in greater detail in the Watershed Issues and Strategy Development Report (ERI et al, 2019).

For each strategic direction, those agencies that have a role in the implementation of the strategy are listed under 'Partners'. The role of each partner will vary from strategy to strategy, ranging from being circulated for information to funding partner to project lead. Such roles will be established through discussions with group members during the development of a future implementation plan.



Water Quality & Quantity

Overview

Surface water quality in the Nottawasaga Valley watershed is generally good to excellent in the headwaters where forests and wetlands predominate. Degraded (fair to poor) conditions have been observed in areas of urban and intensive rural land use. While groundwater is generally considered to be of good quality, reduced water quality has been observed in some locations.

Drought conditions do occur periodically in the Nottawasaga Valley watershed; this is expected to increase in frequency in the future due to climate change. Unless properly managed, groundwater volumes are anticipated to be adversely impacted by high groundwater extraction rates to support municipal drinking water supplies and industrial use. Increased impervious areas (roads, parking lots, buildings) will also reduce groundwater recharge rates and available groundwater supply throughout the watershed.

Future urban development and economic activities, along with climate change, will continue to alter the quality and quantity of the water resource system if mitigation measures are not proactively identified and implemented.

Stressors

- Urban runoff
- Water taking
- Erosion of creeks and channels
- Channel and floodplain alterations
- Vegetation loss and reduced infiltration
- Wetland loss
- Climate Change
- Algae growth
- Online ponds and weirs
- Septic systems
- Airborne contaminants

Strategic Goal

Protect and enhance water quality and quantity of groundwater systems, headwater streams and wetlands, and restore degraded creeks, rivers and lakes.

Water Quality & Quantity—Outcome 1

Surface and ground water quality is maintained or enhanced to meet or exceed Provincial Water Quality Objectives, Ontario Drinking Water Standards and/or to meet NVCA's Fisheries Management Plan objectives.

	Strategic Directions	Partners	Implementation Considerations
WQ1	Promote water quality and natural heritage protection and enhancement through agricultural best management practices and stewardship.	<ul style="list-style-type: none"> • NVCA • OMAFRA • Local Agricultural Federation 	<ul style="list-style-type: none"> • Continue on-going collaboration with agricultural community through stewardship programs.
WQ2	Implement effective nutrient management plans and salt management plans to reduce potential for surface and ground water impacts.	<ul style="list-style-type: none"> • NVCA • OMAFRA • Municipalities • Local Agricultural Federations 	<ul style="list-style-type: none"> • Encourage municipalities to investigate and implement alternatives to salt for winter road maintenance.
WQ3	Implement erosion mitigation programs for identified priority subwatersheds.	<ul style="list-style-type: none"> • NVCA • Municipalities 	<ul style="list-style-type: none"> • Complete erosion study to identify priority sites on private and public lands. • Develop a suite of alternatives that protect natural form and function of watercourses.
WQ4	Complete an erosion and sediment management plan that identifies potential sources and impacts and guides erosion control efforts to reduce instream suspended sediment levels.	<ul style="list-style-type: none"> • NVCA • Municipalities 	<ul style="list-style-type: none"> • Complete a comprehensive study to identify erosion, transport and sedimentation processes and define priority management actions.
WQ5	Advance the development and implementation of innovative erosion control practices on development sites.	<ul style="list-style-type: none"> • NVCA • Municipalities • MECP 	<ul style="list-style-type: none"> • Communicate and educate developers to existing regulations and provincial guideline documents. • Incorporate conditions into Planning Act approvals.
WQ6	Complete urban development-related monitoring.	<ul style="list-style-type: none"> • NVCA • Municipalities • Development Community 	<ul style="list-style-type: none"> • Incorporate conditions into Planning Act approvals. • Develop best management practices for monitoring implementation.

Water Quality & Quantity—Outcome 2

The supply of surface and ground water is secured and, where necessary, replenished to meet human, ecological, and economic needs.

	Strategic Directions	Partners	Implementation Considerations
WQ7	Continue to implement a coordinated approach to drought management	<ul style="list-style-type: none">• NVCA• MNRF• Municipalities• Landowners	<ul style="list-style-type: none">• Implement recommendations on drought management from NVCA's Climate Change Strategy.
WQ8	Maintain pre-development recharge rates, with emphasis on significant and ecologically significant groundwater recharge areas and significant surface water contributing areas.	<ul style="list-style-type: none">• NVCA• Municipalities	<ul style="list-style-type: none">• Education and communication programming to demonstrate LID technologies, water budget models for municipalities and developers.• Require water balance analysis as part of Planning Act approvals.• Coordination with municipalities, MECP and NVCA with respect to study requirements to avoid duplication and ensure efficiencies.
WQ9	Improve understanding of groundwater/surface water interactions and from that, develop a water balance model as a water management tool.	<ul style="list-style-type: none">• NVCA• Municipalities	<ul style="list-style-type: none">• Undertake a comprehensive study to improve understanding of ground/surface water interactions and incorporate findings into a more comprehensive water balance model for use by municipalities/ developers.



Flooding

Overview

It is estimated that over \$1 billion in property and more than 33,000 people within the Nottawasaga Valley watershed are at risk due to flooding and erosion hazards. Flood hazard mapping is incomplete or outdated for many areas of the Nottawasaga Valley watershed. Loss of woodlands and wetlands to urban development increases runoff and peak flows that cause flooding. Climate change is predicted to bring more intense storms and longer periods of drought which will exacerbate flood risk.

Stressors

- Loss of headwater drainage features and channel length
- Lack of stormwater management
- Vegetation loss and reduced infiltration resulting from urbanization and development
- Climate change

Strategic Goal

Identify and understand flood risks within the Nottawasaga Valley watershed to establish accurate development limits and provide flood forecasting and warning to protect existing development within flood hazard areas.

Flooding—Outcome 1

Flooding risk is identified to inform warning protocols and proactive flood management is achieved through the planning and regulatory approvals process.

	Strategic Directions	Partners	Implementation Considerations
FL1	Establish updated floodplain mapping to better assess and understand flood risk and identify flood prone areas, particularly in response to climate change trends.	<ul style="list-style-type: none"> • NVCA • MNRF • Municipalities • County • Public Safety Canada 	<ul style="list-style-type: none"> • Update floodplain mapping where it is incomplete or outdated. • Support of information systems (GIS) to undertake mapping updates. • Continue to develop understanding about the impacts of climate change on storm event characteristics (including IDF curves) and establish protocols for implementation into floodplain mapping studies and flood protection. • Develop targeted public awareness/education program for residents in flood-prone areas.
FL2	Continue to advance flood monitoring and warning systems to increase accuracy and timeliness.	<ul style="list-style-type: none"> • NVCA • MNRF • Conservation Authorities 	<ul style="list-style-type: none"> • Continue and optimize storm and stream flow monitoring. • Review and update flood forecasting models to reflect climate change impacts. • Review the effectiveness of existing surface water monitoring networks in establishing understanding of flood conditions and flood risk. • Maintain and update emergency response partnership with local municipalities and other stakeholders
FL3	Continue to protect natural heritage features that provide water quantity control in flood prone catchments.	<ul style="list-style-type: none"> • NVCA • Municipalities • Landowners • NGO • Development Community 	<ul style="list-style-type: none"> • Identify and protect wetland features that provide water storage within flood prone catchments. • Continue to protect headwater catchments that reduce runoff in flood prone catchments. • Identify areas for source control within urban development boundaries.
FL4	Manage and maintain flood and erosion control infrastructure.	<ul style="list-style-type: none"> • NVCA, Municipalities • MECP • MNRF 	<ul style="list-style-type: none"> • NVCA maintains three dams, two flood control conveyances (dyke and floodway) and numerous erosion control structures which require safety studies and periodic safety reviews consistent with provincial guidelines.



Erosion

Overview

Urban development erosion impacts are driven by increased runoff volume and altered surface water flow regimes that expose creeks and rivers to more frequent erosive forces. This can exacerbate natural channel development processes. Urban development that occurred prior to the mid-1980s replaced portions of the surface drainage network with a subsurface pipe system that has contributed to downstream flood and erosion risk. Riparian vegetation clearing for urban and agricultural land uses weakens channel banks, causes bank instability and increased erosion hazard. Climate change impacts on precipitation patterns are expected to further increase erosion hazard.

Stressors

- Altered surface water regimes
- Urbanization and increase in runoff
- Vegetation clearing along channel banks
- Weight and vibration along top of bank
- Climate change

Strategic Goal

Identify and reduce erosion risk to protect natural form and function of watercourses, water quality and aquatic habitat, and to reduce loss of agricultural lands and private property.

Erosion—Outcome 1

Erosion hazard is defined, and proactive natural hazard management is achieved at the individual site and regional scale through the planning and regulatory approvals process.

	Strategic Directions	Partners	Implementation Considerations
ER1	Examine and inspect erosion processes and their relationship with erosion hazard mapping.	<ul style="list-style-type: none">• NVCA• Municipalities	<ul style="list-style-type: none">• Complete a comprehensive study to identify erosion, transport and sedimentation processes and define priority management actions.• Implement source controls in stormwater management, for all new development and retrofit existing development where feasible/necessary, using a treatment train approach as required by Provincial guidelines.
ER2	Identify opportunities to use approaches that optimize the natural form and function of watercourses to mitigate erosion risk.	<ul style="list-style-type: none">• NVCA• Municipalities• Conservation Authorities	<ul style="list-style-type: none">• Complete erosion study to identify priority sites.• Develop a suite of alternatives that protect natural form and function of watercourses.



Stormwater Management

Overview

In general, management of stormwater was not considered prior to the mid-1980s, resulting in uncontrolled runoff from urban areas discharging into the rivers and creeks of the Nottawasaga Valley watershed. Existing developed areas with little to no stormwater management controls continue to discharge poor quality water and contribute to erosion and flood risk. Climate change is expected to increase the frequency and intensity of extreme precipitation events and existing infrastructure will not be able to handle the resulting increase in peak flows. Traditional stormwater management ponds do not address water balance by maintaining pre-development runoff volumes. This leads to increased frequency of erosive conditions. Low Impact Development (LID) can be used to improve source controls and support traditional stormwater management.

What is LID? Low Impact Development (LID) uses “green infrastructure” such as infiltration basins, engineered wetlands, and rain gardens that improves quality and reduces stormwater runoff normally directed to support traditional storm sewer pipes and ponds.

Stressors

- Lack of stormwater management in historic developed areas
- Loss of property and risk to life due to uncontrolled flows resulting in erosion and flooding
- Degrade aquatic habitat from nutrient, thermal and sediment loading

Strategic Goal

Implement and enhance stormwater management using a treatment train approach that improves water quality, water quantity, erosion and water balance in existing and future urban areas.

Stormwater Management—Outcome 1

Stormwater management is required for new developed areas and land uses. Stormwater management is enhanced in existing developed areas where feasible.

	Strategic Directions	Partners	Implementation Considerations
SM1	Advance the development and implementation of Low Impact Development (LID) practices.	<ul style="list-style-type: none"> NVCA Municipalities MECP Development Community 	<ul style="list-style-type: none"> Undertake LID pilot programs to provide stormwater management controls within existing developed areas. Determine opportunities and constraints for LID application through subwatershed studies. Utilize the planning process to require LID practices, where appropriate, in new developments as part of a treatment train approach, in consultation with municipality. Develop public awareness/education program to promote LID practices/technologies.
SM2	Inventory catchment areas lacking, or requiring upgraded, stormwater management facilities and implement appropriate retrofit measures.	<ul style="list-style-type: none"> NVCA Municipalities MECP 	<ul style="list-style-type: none"> Undertake and review stormwater management compliance monitoring. Develop consistent stormwater management monitoring requirements across municipalities through conditions of approval in the planning process.
SM3	Ensure consistent application of stormwater management practices across jurisdictional (municipal) boundaries, on a watershed/ subwatershed basis.	<ul style="list-style-type: none"> NVCA Municipalities MECP 	<ul style="list-style-type: none"> Review and update municipal design standards to include best management practices for stormwater management. Coordinate stormwater management requirements between watershed municipalities.
SM4	Create natural features (i.e., man-made wetlands) and restore drained wetlands that can store surface runoff and provide flood attenuation in areas with high rates of wetland loss; where possible, locate and design these features to add to overall wetland biodiversity.	<ul style="list-style-type: none"> NVCA Municipalities Development Community Local Agricultural Federations 	<ul style="list-style-type: none"> Inventory publicly owned lands with opportunities for wetland restoration through topographic and spatial analysis. Explore opportunities for wetland creation through the planning process. Continue to assess wetland health and diversity through Watershed Report Cards.
SM5	Protect natural wetland storage areas.	<ul style="list-style-type: none"> NVCA Municipalities 	<ul style="list-style-type: none"> Develop policies that protect wetlands that contribute to natural stormwater attenuation. Apply existing policies and regulations to prohibit development in wetlands. Offset encroachment of development into wetland buffers through compensation projects (where appropriate).



Natural Heritage

Overview

The extensive and diverse natural heritage that supports nationally, provincially and regionally rare species within the Nottawasaga Valley watershed is extraordinary in southern Ontario. The watershed's natural heritage includes internationally recognized features such as the Minesing Wetlands, the Niagara Escarpment and Wasaga Beach Provincial Park.

Loss of biodiversity and a decline in some Species at Risk is occurring throughout the watershed due to habitat fragmentation by urban development, disruption of surface and ground water and recreational use.

Current land use management practices have the potential to cause further deterioration and loss of habitat if proactive mitigation measures are not implemented.

There remains a number of subwatersheds and land tracts with little information on natural heritage features, Species at Risk and their habitats, and other special status species; this represents a key knowledge gap.

Deterioration or loss of aquatic habitat, and a decline in certain fish species has occurred along most rivers and creeks due to degraded stream health and altered channel conditions.

Strategic Goal

Maintain, enhance, and protect a regenerative natural heritage system, consisting of wetlands, woodlands, valleylands, beaches, dunes, marshes, and other natural areas, that is resilient to climate change and the impacts of urban and rural development and that contributes to reversal of historical impacts, where feasible.

This includes maintaining and enhancing the natural features of the Minesing Wetlands, the Niagara Escarpment, Wasaga Beach Provincial Park and other significant features.

Stressors

Natural Heritage Features Stressors

- Nutrient and contaminant inputs to wetlands
- Urban and rural development and expansion
- Loss of connectivity between features
- Change in water -sources to features
- Non-native invasive species
- Climate change

Aquatic Habitat Stressors

- Fish barriers
- Urban and rural development and expansion
- Degraded water quality and increased sedimentation
- Presence of dams and their stagnant head ponds
- Change in channel bank vegetation
- Dredging, straightening or piping channels
- Climate change

Natural Heritage—Outcome 1

The proportion of each subwatershed covered by natural heritage features is maintained and, where possible, enhanced.

	Strategic Directions	Partners	Implementation Considerations
NH1	Implement strategies for protecting/enhancing forests, wetlands, dunes, beaches and their buffers in each subwatershed.	<ul style="list-style-type: none"> • NVCA • Municipalities • MNRF • Development Community • Local Agricultural Federations 	<ul style="list-style-type: none"> • Improve understanding of buffer functions adjacent to wetlands. • Seek opportunities for private / public partnerships in natural heritage protection and enhancement. • Increase the use of land acquisition, where appropriate and feasible, as a means of securing sensitive natural heritage features.
NH2	Protect and enhance forest cover with emphasis on areas of significant hydrological and high groundwater recharge.	<ul style="list-style-type: none"> • NVCA • Municipalities 	<ul style="list-style-type: none"> • Identify lands with opportunities to restore or enhance forest cover within areas of significant hydrologic functions and high groundwater recharge. • Emphasize actions in riparian zones.
NH3	Implement the recommendations from the NVCA's Minesing management plans and reports.	<ul style="list-style-type: none"> • NVCA • Municipalities • NGOs 	<ul style="list-style-type: none"> • Continue to acquire and protect lands in the Minesing Wetlands Complex and as identified in NVCA's Land Acquisition Strategy.
NH4	Develop and implement an Ecological Net Gains policy to enhance, connect and create natural heritage features where applicable and appropriate.	<ul style="list-style-type: none"> • NVCA • Municipalities • Development Community 	<ul style="list-style-type: none"> • Continue to develop the NVCA's Ecological Net Gains policy through consultation with stakeholders. Upon approval by the board of directors, promote the implementation of the policy through plan review. • Identify opportunities for site-specific ecological offsetting. • Implement as a condition of approval of planning applications
NH5	Promote retention of a high diversity of natural heritage features and their functions as a natural capital asset.	<ul style="list-style-type: none"> • NVCA • Municipalities 	<ul style="list-style-type: none"> • Account for, manage and maintain natural heritage as municipal assets to recognize their benefits associated with climate change mitigation, carbon sequestration, flood and erosion prevention, wastewater assimilation, recreation and tourism, and health and well-being. • Conduct a natural capital assessment for the Nottawasaga Valley watershed to quantify the natural resources needed to maintain, or enhance, the existing ecosystem services.

Natural Heritage—Outcome 2

Aquatic habitat quality, extent, and connectivity is maintained and restored.

	Strategic Directions	Partners	Implementation Considerations
NH6	Improve water quality and aquatic habitat through instream and stream corridor restoration best management practices.	<ul style="list-style-type: none"> • NVCA • Municipalities • Landowners • Development community 	<ul style="list-style-type: none"> • Continue to develop habitat restoration strategies for specific aquatic species (e.g., core fish, migrating fish, (Rainbow Trout, Brown Trout, Chinook Salmon, Walleye), Resident Brook Trout, Species at Risk (Lake Sturgeon). • Continue to develop habitat restoration strategies for all watercourses / lakes. • Continue to develop species-specific fish habitat restoration strategies including strategies for restoring habitat for species at risk. • Implement strategies as a condition of approval for planning applications
NH7	Manage water taking permits on a subwatershed basis to maintain instream flow/level requirements for aquatic life and ensure sustainable water supplies.	<ul style="list-style-type: none"> • MECP • NVCA • Municipalities • Local Agricultural Federations • Development community 	<ul style="list-style-type: none"> • Protect existing function by creating offline ponds to facilitate water taking. • Assess future water taking demands through population forecasts.
NH8	Implement a subwatershed-based program to improve the health and function of municipal drains for aquatic life and for agriculture uses.	<ul style="list-style-type: none"> • NVCA • Municipalities • Agricultural community 	<ul style="list-style-type: none"> • Continue on-going collaboration with agricultural community through stewardship programs. • Note that health and function of municipal drains for aquatic life, providing assimilative capacity for water quality enhancement and agricultural uses.

Natural Heritage—Outcome 3

Natural heritage habitat connectivity (including connectivity between individual patches and connectivity between ground- and surface-water, aquatic and terrestrial systems) is maintained and restored.

	Strategic Directions	Partners	Implementation Considerations
NH9	Incorporate measures to reduce road mortality of wildlife species where opportunities arise as a result of proposed road construction and road improvements.	<ul style="list-style-type: none"> • NVCA • Municipalities • MTO • MNRF • Development Community 	<ul style="list-style-type: none"> • Promote wildlife protection measures in planning policies for road rehabilitation and widening projects. • Environmental Assessments or Environmental Impact Assessments to identify areas with need for wildlife movement considerations.
NH10	Implement measures to mitigate the effects of invasive species on natural heritage features.	<ul style="list-style-type: none"> • NVCA • Municipalities • Local Agricultural Federations • Development community • ENGOS 	<ul style="list-style-type: none"> • Inventory invasive species. • Develop Invasive Species Management focusing on protected features, transportation corridors, and natural heritage features. • Require the preparation and implementation of Invasive Species Management Plan as a condition of approval for planning applications, where appropriate.
NH11	Support stewardship initiatives regarding best management practices for managing grassland, thicket, and dune habitats, as they require disturbance to persist.	<ul style="list-style-type: none"> • NVCA • Municipalities • Local Agricultural Federations • Landowners 	<ul style="list-style-type: none"> • Continue on-going collaboration with agricultural community through stewardship programs. • Enhance partnerships across federal, provincial and municipal jurisdictions. • Map potential successional areas that could be targeted for protection and incorporation into natural heritage system design.
NH12	Identify the hydrological functions and features that are important in maintaining wetlands.	<ul style="list-style-type: none"> • NVCA • MNRF 	<ul style="list-style-type: none"> • Review historic changes in hydrological functions and features and how these have impacted wetland loss. • Minimize wetland loss within the watershed through conditions of approval for planning applications, implementation of NVCA regulation and, where appropriate, use of offsetting. • Increase stewardship of the wetland's hydrological setting and features.

	Strategic Directions	Partners	Implementation Considerations
NH13	Enhance local fisheries through continued implementation of the NVCA's Fisheries Habitat Management Plan.	<ul style="list-style-type: none"> • NVCA • Municipalities • Fisheries and Oceans Canada 	<ul style="list-style-type: none"> • Identify healthy fish communities and sensitive fish species/ habitats to be monitored as barometers of watershed health. • Protect groundwater recharge areas to mitigate altered thermal regimes. • Implement aquatic habitat restoration including priority actions such as establishing and reforesting riparian buffers, stream bank stabilization, livestock exclusion fencing, flood plain restoration, nutrient management, removal of dams and retrofitting barriers to fish migration.
NH14	Support the development of natural heritage systems on municipal, subwatershed and watershed basis.	<ul style="list-style-type: none"> • NVCA • Municipalities • MMAH 	<ul style="list-style-type: none"> • Create Official Plan policies and Zoning By-Laws that identify and protect natural heritage features, functions and their associated natural heritage system as required through Provincial Plans and policy. • Implement the policies and zoning by-law requirements through review of planning applications.
NH15	Establish a policy for evaluated (PSW and non-PSW) and unevaluated wetlands and woodlands. Evaluate unevaluated wetlands and woodlands as well as those with existing, but dated, evaluations.	<ul style="list-style-type: none"> • NVCA • Municipalities • MNRF 	<ul style="list-style-type: none"> • Continue to update wetland inventories. • Require the evaluation of wetlands through subwatershed studies, environmental assessments and the planning process. • Enhance partnerships with provincial agencies. • Ensure that provincial policies/implementation guidelines for woodland/wetland evaluation are followed.
NH16	Encourage municipalities to acquire natural heritage and natural hazard lands through the subdivision approval process in urban areas.	<ul style="list-style-type: none"> • NVCA • Municipalities • Development Community 	<ul style="list-style-type: none"> • Identify priority areas for acquisition. • Continue to promote the protection of natural heritage and hazard lands through public ownership including the implementation NVCA's Land Acquisition Strategy.



Policy & Protocols

Overview

The Province has established specific requirements related to natural resource protection through several Provincial Plans and policies. Local planning instruments, such as Official Plans and Zoning By-Laws, are required to be consistent with and conform to these Provincial Plans. As a result, the local planning tools are some of the most important vehicles for the implementation of natural heritage and natural hazard policies.

Conservation Authority regulations, which manage development and site alteration within natural hazard lands, are also important vehicles for the implementation of natural resource hazard management.

In order for many of the recommendations within this IWMP to come to fruition, it will be necessary for the strategies and actions to be reflected in local planning and regulatory approval requirements.

Stressors

- Timely implementation of provincial and regional policies
- Appropriate planning of future development and growth areas
- Coordination of planning tools across 18 lower-tier municipalities
- Changing provincial and federal policy and funding direction
- Uncertainty related to future climate conditions

Strategic Goal

Identify and implement planning and policy tools at the local level that proactively and collaboratively address current and anticipated future impacts to natural heritage and natural hazard features and functions from climate change, and urban and rural development.

Outcome 1

To support and enable a coordinated and integrated approach to watershed management that mitigates the potential cumulative impacts of development and climate change on the natural heritage system and incorporates natural hazard management to provide for the creation of more resilient communities.

	Strategic Directions	Partners	Implementation Considerations
PP1	Develop and implement subwatershed plans.	<ul style="list-style-type: none">• NVCA• Municipalities	<ul style="list-style-type: none">• Development of subwatershed management plans through collaboration between conservation authorities, municipalities and other stakeholder groups.• Prepare subwatershed studies to inform natural heritage and natural hazard management, servicing and urban growth needs as part of Municipal Comprehensive Reviews.• Implement the recommendations of subwatershed studies through Secondary Plan and/or Official Plan policy and the planning approval process.
PP2	Provide local governments with assistance in incorporating environmental policy statements and guidelines (including the IWMP), into their planning documents.	<ul style="list-style-type: none">• NVCA• Municipalities• MECP• MNRF	<ul style="list-style-type: none">• Continue to update local planning instruments (Official Plans, Zoning By-Laws) to be consistent with Provincial Plans and policies.• Explore opportunities to incorporate recommendations within the IWMP into local planning instruments.• Create and implement minimum design standards to account for future uncertainty in climate change impacts.
PP3	Implement NVCA's Climate Change Action Plan and Strategy.	<ul style="list-style-type: none">• NVCA• Municipalities	<ul style="list-style-type: none">• Implement the actions in collaboration with municipal partners and other watershed stakeholders.

4 Implementation

Strong and collaborative partnerships will be necessary to ensure the successful implementation of this IWMP. The stakeholders that came together to develop the Plan are clearly engaged and committed to enhancing the health and resiliency of the Nottawasaga Valley watershed. Through the stakeholder engagement process, areas of common interest were discovered among the participants leading to the potential for new and exciting collaborations.

While much can be achieved through municipal, agency and regulatory support, a strategic shift to more sustainable use of land and water clearly cannot be achieved without landowner participation. The recommended management strategies encourage continued improvements in land use practices on agricultural, urban, and urbanizing lands, and place greater emphasis on reducing contamination of surface waters and protecting and enhancing the health of aquatic and terrestrial communities throughout the watershed. While the success of strategy implementation will be clear for those issues where there are already established targets (e.g., water quality), measures of success for other strategies will need to be established, based on consideration of specific subwatershed characteristics.

Strategies into Action

For each of the recommended management strategies outline, a detailed action plan should be developed. Each of these action plans will include sections on lead agencies, partnerships, monitoring and evaluation, information management, communications, and funding developed for the specific management strategy.

Lead Agencies

Each strategy will require a lead agency to drive implementation through the planning, funding and execution phases. The lead agencies will be determined through the development of the implementation plan.

- In cases where an agency is already responsible for the strategy, that agency would continue to lead the implementation.
- In cases where a new strategy is identified, the lead agency will be determined based on several criteria including, but not limited to, funding availability, accountability to implement strategies, and existing legislative and policy tools to enforce the strategies.

Many other factors will help determine the appropriate lead agency.

Partnerships

As outlined throughout this IWMP, addressing complex and inter-related issues within the natural, economic and social environments requires collaboration and partnerships between watershed stakeholders. Each strategy will require a unique partnership mix, including funding and technical resources, to implement.

During the creation of this IWMP, stakeholders noted that many of the strategies, or components of strategies, are already the responsibility of specific agencies. The intent of each strategy is not to duplicate efforts but to coordinate the efforts of all stakeholders under the “umbrella” of an integrated plan. Such integration will ensure not only that there is no duplication of effort, but also that nothing is missed. This plan looks to identify synergies and

joint opportunities among the various stakeholders and their programs.

Partnerships amongst the stakeholders to implement the recommendations in this plan will take many forms, including funding, technical support, policy creation, communication and monitoring resources. Where a study has been identified within the strategic directions, the specific project terms of reference and funding mechanisms will be developed and approved in consultation with the applicable stakeholders.

Monitoring and Evaluation

A specific monitoring and evaluation approach will be required for each specific action. This will include gathering the necessary baseline data against which success can be measured.

Existing NVCA monitoring programs, such as precipitation, surface and ground water quantity and quality, fish and fish habitat and benthic monitoring will need to continue and/or be enhanced to track the success of many of the strategies identified in this plan.

Additions to monitoring, including terrestrial species and habitats, should be considered. Monitoring of erosion, stream morphology, and terrestrial habitats will need to be added to the monitoring program.

New programs will also need to be created to track the success of strategies related to policy creation and the implementation of new and better technologies. Monitoring should be supported by remote sensing tools to address larger spatial scales. For example, wetland loss throughout the watershed is better estimated at the regional scale using remote sensing data sets such as aerial photos and digital terrain models (Serran and Creed, 2015). Targeted field inspections can

be used to verify remote sensing analysis and calibrate models.

Numerous agencies and NGOs undertake monitoring in the watershed, however, this monitoring is not coordinated in a way that would maximize the use of the data and optimize the value of the information collected. This is a key weakness of current monitoring efforts that should be addressed.

Information Management

Implementation of the strategies will rely heavily on availability of data management systems. These include databases to store monitoring data and Geographic Information Systems (GIS) to organize, analyze and disseminate spatial data.

New and improved data collection, data analysis and data sharing will be required. Appropriate modeling software and expertise will be required to implement many strategies such as floodplain mapping and 2D hydraulic modeling. In addition to modeling software for water quantity, there is also a wealth of software available to assist in managing water quality, fisheries/aquatic habitat and natural heritage species and habitats. These software tools often integrate GIS, numeric models and qualitative assessment data, and can assist in assimilating and analyzing different databases to help interpret habitat conditions and extrapolate locally collected intensive data to regional scales. Examples include HSI, PHABSIM and CASiMiR for fish management.

Capacity is needed to evaluate natural resources and environmental change in a strategic planning context. GIS use analysis functions and models to understand the linkages between multiple data sets and assess the benefit of policy decisions.

Adequate funding and support for GIS and collaboration between agencies will be key to the successful monitoring and tracking of strategy implementation and outcomes.

Communication and Education

Communication and education programming are closely tied to the successful implementation of each of the individual strategies.

Effective communication and education plans will need to be designed to reach the target audience and should be tailored to optimize uptake of the strategy as part of its implementation.

Given the diverse array of management strategies and target audiences, each strategy will require a communication and education component, the nature of which will depend on the specifics of that strategy. Opportunities to utilize existing partnerships and the creation of new partnerships for effective communication and education should be explored as each action plan is developed.

Implementation Priorities

It is expected that prioritizing the recommended strategies in this report will be fluid and based on environmental and policy changes including funding sources, state of the natural resources, stressors and the needs of the communities within in the watershed.

Adaptive Management

The recommended strategies in this report will need to be integrated into the business plans, strategic plans and operational strategies of each of the agencies/ organizations that have been identified with an implementation role. To accomplish this, there needs to be strong support/ endorsement of the IWMP and a concerted effort by all agencies to convert the strategies into actions.

To do this, the lead agency for each strategy will need to clearly outline the role(s) and responsibilities of the watershed stakeholders, required resources and measures of success. Implementation should build upon the management strategy tables

in Section 4 to provide further direction in terms of specific actions, resources, timelines and monitoring requirements.

It is recommended that following endorsement of the IWMP by all the agencies/organizations, each agency be requested to outline how it will fulfill its role in implementing the strategy. In addition to outlining its implementation strategy, each agency should commit to a regular (annual/ biannual) reporting of progress.

The adaptive management approach used in integrated watershed management is shown in Figure 12.



Figure 12: Adaptive approach to watershed management

Tracking Action Plans and Implementation

A strategy will need to be created, through collaboration with those agencies/groups responsible for implementation of the various actions which will identify:

- who is responsible for tracking the implementation of each strategy;
- the monitoring requirements to evaluate success;
- the process whereby new actions can be identified to address emerging issues; and,
- a protocol for documenting and reporting the implementation status of each strategy.

Periodic reporting on the successes, and challenges, of implementation will provide opportunities to re-engage and energize the stakeholders. An implementation strategy should also identify a protocol for documenting and reporting the implementation status of the strategies.

The Cost of Implementation

The cost of undertaking some of these recommended strategies are significant but are expected to be implemented over a multi-year time frame (10 - 20 years). While there will be a cost to implementing the strategies, if the current and future impacts are allowed to continue unchecked, the cost of not implementing the strategies will be much higher. Additional costs could include increased infrastructure repairs due to damage caused by increased frequency of flooding and erosion, loss of life and/or property, reduced agricultural capacity, loss of tourism revenue and increased health care costs.

Next Steps

The creation of this plan is the result of a collaborative engagement that built upon the watershed characterization to identify issues facing the Nottawasaga Valley watershed and strategy development process to address these issues. The strategies that have been identified, if implemented, are expected to result in a watershed that is healthy, more resilient to climate change and urban development and continues to support the critical ecosystem services that our communities rely upon.

This plan is intended to be a living document that will be assessed on a regular basis and updated as necessary to adapt to the results and findings of the monitoring program and to address emerging issues.

Regular monitoring and reporting will assist in keeping stakeholders engaged and may result in opportunities for new partnerships and collaborations.

References

Supporting Documents

The content of this plan is supported by two documents that were prepared as part of the IWMP process. These two documents provide detail and supporting information for this plan and also document the stakeholder engagement process:

- Nottawasaga Valley Conservation Authority: Integrated Watershed Management Plan - Watershed Characterization Report (June, 2018). Prepared by Ecosystem Recovery, Arcadis, Green Analytics, Jennifer Lawrence & Associates, and North-South Environmental.
- Nottawasaga Valley Conservation Authority: Integrated Watershed Management Plan – Watershed Issues and Strategy Development (January 2019). Prepared by Ecosystem Recovery, Arcadis, Green Analytics, Jennifer Lawrence & Associates, and North-South Environmental.

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Appendices

Appendix A: List of Participants

The creation of this IWMP would not have been possible without the participation of stakeholders from across the watershed. The following is a list of agencies and organizations that participated in one or more of the engagement sessions to assist in identifying issues, strategies and measures for implementation.

Agency / Organization	Sector
Christian Farmers Federation of Ontario	Agriculture
Dufferin Federation of Agriculture	Agriculture
Grey County Federation of Agriculture	Agriculture
National Farmers Union	Agriculture
North Simcoe Crop Improvement Association	Agriculture
Ontario Farmland Preservation	Agriculture
Ontario Federation of Agriculture	Agriculture
Simcoe County Federation of Agriculture	Agriculture
WD Potato	Agriculture
Grey Sauble Conservation Authority	Conservation Authority
Lake Simcoe Region Conservation Authority	Conservation Authority
Nottawasaga Valley Conservation Authority	Conservation Authority
Cole Engineering	Development
Dillon Consulting	Development
DunnCap	Development
SCS Consulting	Development
Simcoe County District School Board	Education
Simcoe Muskoka Catholic School Board	Education
AWARE Simcoe	Environment and Natural Heritage
Blue Mountain Watershed Trust	Environment and Natural Heritage
Ducks Unlimited Canada	Environment and Natural Heritage
Dufferin Simcoe Land Stewardship Network	Environment and Natural Heritage
Essa Healthy Communities Network	Environment and Natural Heritage
Georgian Bay Forever	Environment and Natural Heritage
Georgian Triangle Anglers Association	Environment and Natural Heritage
Headwaters Streams Committee - Mono	Environment and Natural Heritage
Nature Barrie	Environment and Natural Heritage
Nottawasaga Steelheaders	Environment and Natural Heritage
Nottawasaga Watershed Improvement Project Steering Committee	Environment and Natural Heritage
Oak Ridges Moraine Land Trust	Environment and Natural Heritage
Severn Sound Environmental Association	Environment and Natural Heritage

Agency / Organization	Sector
South Simcoe Streams Network	Environment and Natural Heritage
CF Base Borden	Government, Municipal
City of Barrie	Government, Municipal
County of Dufferin	Government, Municipal
County of Grey	Government, Municipal
County of Simcoe	Government, Municipal
Town of Collingwood	Government, Municipal
Town of Innisfil	Government, Municipal
Town of Mono	Government, Municipal
Town of New Tecumseth	Government, Municipal
Town of Shelburne	Government, Municipal
Town of the Blue Mountains	Government, Municipal
Town of Wasaga Beach	Government, Municipal
Township of Adjala-Tosorontio	Government, Municipal
Township of Amaranth	Government, Municipal
Township of Clearview	Government, Municipal
Township of Essa	Government, Municipal
Township of Melancthon	Government, Municipal
Township of Mulmur	Government, Municipal
Township of Oro-Medonte	Government, Municipal
Township of Springwater	Government, Municipal
Ministry of Environment, Conservation and Parks	Government, Provincial
Ministry of Municipal Affairs and Housing	Government, Provincial
Niagara Escarpment Commission	Government, Provincial
Simcoe Muskoka District Health Unit	Public Health

List of Invited Participants

In addition to the list of attendees, the following groups were invited to participate, but were unable to take part:

Bruce Trail Conservancy; Environment and Climate Change Canada; Environment Network; Forests Ontario; Georgian College; Huronia Land Trust; Ministry of Agriculture, Food and Rural Affairs; Ministry of Natural Resources and Forestry; Municipality of Grey Highlands; Nature Conservancy of Canada; Ontario Federation of Anglers and Hunters; Ontario Stone, Sand and Gravel; Rama First Nations; Saugeen First Nation; Tourism Simcoe; Town of Bradford West Gwillimbury; Wasaga Beach Healthy Communities Network; Wasaga Beach Provincial Park

Appendix B: Acronyms

- MECP – Ministry of Environment, Conservation and Parks
- MAH – Ministry of Municipal Affairs and Housing
- MNRF – Ministry of Natural Resources and Forestry
(previously MNR, Ministry of Natural Resources)
- MTO – Ministry of Transportation Ontario
- NGO – Non-Governmental Organization
- NVCA – Nottawasaga Valley Conservation Authority
- OMAFRA – Ontario Ministry of Agriculture, Food and Rural Affairs
- SAR - Species at Risk

