

Etobicoke Creek WATERSHED PLAN

2024 - 2034



The Land and Water

Etobicoke Creek Watershed is covered by Treaty 13 (Toronto Purchase), Treaty 14 (Head of the Lake Purchase), and Treaty 19 (Ajeteance Purchase) signed with the Mississaugas of the Credit. The land in the watershed is the territory of the Mississaugas of the Credit, and the traditional territory of the Haudenosaunee and the Wendat peoples, and is now home to many diverse First Nations, Inuit, and Métis peoples. Treaties 13 and 14 reserved Etobicoke Creek as a fishery for the Mississaugas of the Credit.

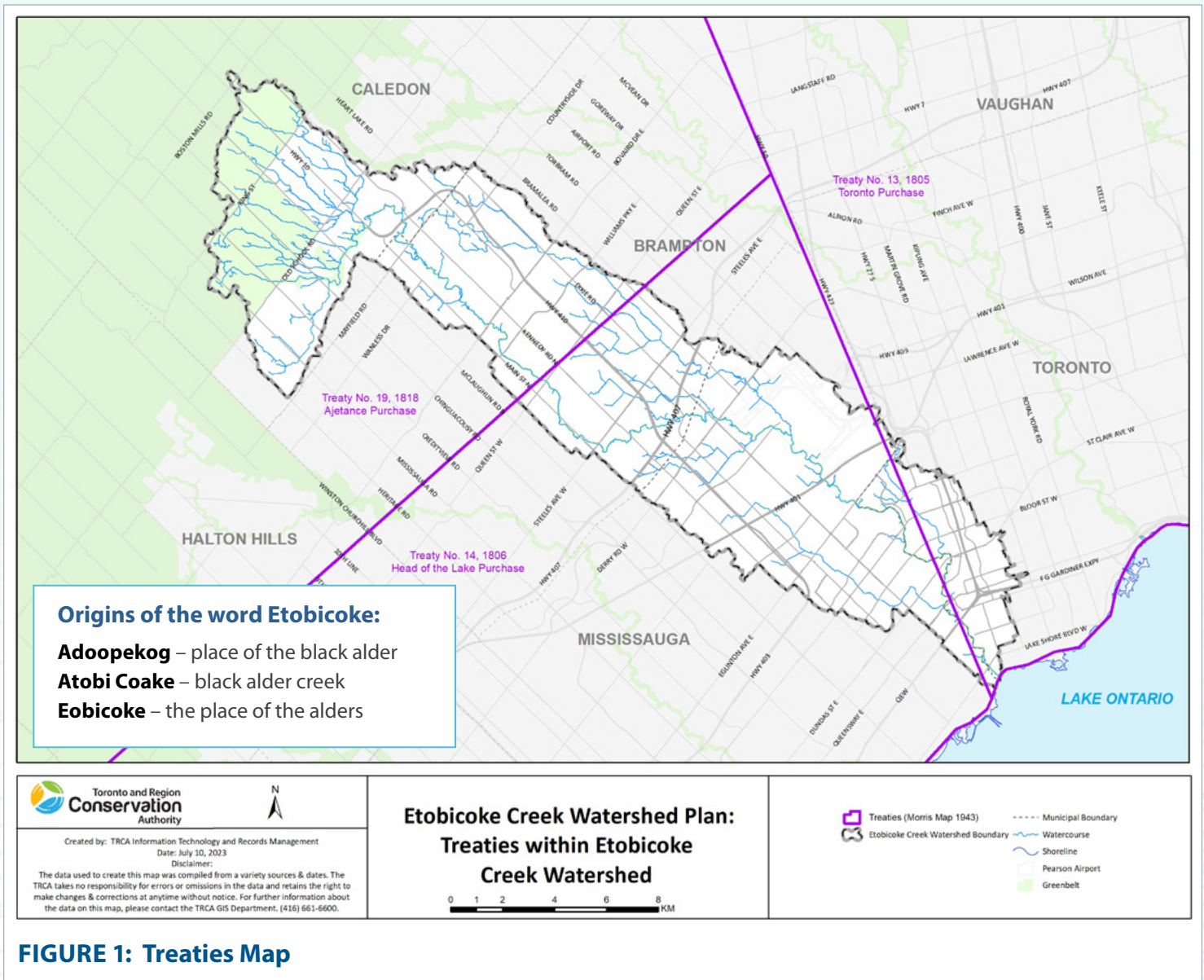


FIGURE 1: Treaties Map

The Mississauga peoples used the land around Etobicoke Creek seasonally and as a salmon fishery before being displaced by settlers. This led to a collapse of the traditional economy.

The Mississaugas’ relationship to water is embedded in their creation story, its teaching, and prophecies.

This story, Kiinwi Debaadjmowin, tells us that everything is interconnected as intricate systems. This interconnectedness is explained in the first seven fires of creation. Creation birthed life through the projection of first thought and heartbeat. The seven fires grew in succession – the stars, the sun, the moon, movement, seeds of life, Earth, and human beings.

The Land and Water

Rediscovering and reconnecting with cultural and spiritual relations to water



Regulating water policies, processes, and decisions

Reclaiming our Treaty and Aboriginal title water rights

FIGURE 2:
Mississaugas of the Credit First Nation Water Framework Principles for Reconciliation



Executive Summary

A watershed is an area that is drained by a river and its tributaries. Healthy watersheds provide numerous ecosystem services such as supporting biodiversity, providing clean drinking water, reducing flood and erosion hazards, protecting the quality and quantity of water, and improving climate resiliency. Due to the importance of healthy watersheds, they merit collaborative efforts to ensure their long-term sustainability.

Ontario's provincial planning framework recognizes that watershed planning is important to inform land use and infrastructure planning decisions. The purpose of a watershed plan is to understand current and potential future watershed conditions, and identify measures to protect, enhance, and restore watershed health. Watershed planning integrates natural systems into land use and infrastructure decision-making, and climate adaptation planning. It helps identify natural features and areas to protect and develop mitigation measures to minimize the impacts of various land use types and climate change.

The development of this watershed plan has been a collaborative effort between Toronto and Region Conservation Authority (TRCA), the City of Toronto, Region of Peel, City of Mississauga, City of Brampton,

Town of Caledon, Mississaugas of the Credit First Nation (MCFN), and the Greater Toronto Airports Authority (GTAA). Additional First Nations and Indigenous communities, stakeholders, and members of the public have been involved throughout the watershed planning process. Reflecting the collective input, a vision for the watershed was developed at the beginning of the watershed planning process which guided the development of the Etobicoke Creek Watershed Plan.

WATERSHED VISION:

Etobicoke Creek watershed is protected and restored to a cleaner, healthier, and more natural state, to sustain its waterways, ecosystems, and human communities.

Etobicoke Creek is a heavily urbanized watershed with eight subwatersheds at the western end of TRCA's jurisdiction. Urbanization and climate change continue to be major stressors for the health and resiliency of the watershed. This watershed plan recognizes these challenges and identifies actions to protect, enhance, and restore the health of the Etobicoke Creek watershed.

The Etobicoke Creek Watershed Plan focused on assessing four main components that are important for watershed health and identifies priorities for improving them:

Water Resource System

(i.e. aquatic habitat, in-stream barriers, and groundwater conditions)

Natural Heritage System and Urban Forest

(i.e. terrestrial habitat quantity, quality, and connectivity, tree canopy cover, and sensitive species)

Water Quality

(i.e. surface water quality)

Natural Hazards

(i.e. flooding and erosion)

The development of the Etobicoke Creek Watershed Plan was a multi-stage process that consisted of:

1 Watershed Characterization (i.e. Existing Conditions)

The key issues with the Etobicoke Creek watershed are:

- Aquatic habitat conditions are poor and the watershed has a high amount of runoff and in-stream barriers that affect aquatic ecosystem health.
- Natural cover is low, mostly of poor quality, and is vulnerable to climate changes.
- Surface water quality is generally poor compared to other TRCA watersheds.
- The watershed has six Flood Vulnerable Clusters with a total area of 508 hectares and can be categorized as medium or high erosion sensitivity.

2 Future Management Scenario Analysis (i.e. Future Conditions)

Four potential future management scenarios were assessed to understand the impacts of different levels of land uses, climate change (where possible), and watershed enhancements (e.g. improvements to natural cover, urban forest canopy, and stormwater management) on watershed health.

- **Scenario 1: Urban Expansion with Minimal Enhancements** – further urbanization in the Headwaters with no enhancements to natural cover and stormwater management.

- **Scenario 2: Urban Expansion with Mid-Range Enhancements** – further urbanization in the Headwaters with moderate enhancements to natural cover and stormwater management.
- **Scenario 3: Urban Expansion with Optimal Enhancements** – further urbanization in the Headwaters with optimal enhancements to natural cover and stormwater management.
- **Scenario 4: Existing Urban Boundary with Optimal Enhancements** – current urban boundary is maintained with optimal enhancements to natural cover and stormwater management.

These potential future management scenarios helped determine how the watershed may respond to potential future land use and climate changes (i.e. will conditions improve, stay the same, or deteriorate). Scenario analysis does not result in decisions about the type and configuration of land uses. Instead, scenario analysis helps to inform municipal planning decisions including land use and infrastructure planning decisions.

The scenario analysis results highlighted that, with changing land uses and climate, all four watershed components are negatively impacted, which affects overall watershed health. However, the watershed enhancements help mitigate these impacts and contribute to a safer, healthier, and more resilient watershed.



3 Implementation Planning

This stage involved the development of a realistic and achievable management framework with three goals, eight objectives, 10 indicators, and 36 management actions outlining how to protect, enhance, and restore watershed health and build resiliency to land use and climate changes. The management framework (including the management actions) was developed collaboratively by TRCA, the municipalities within the watershed, MCFN, and the GTAA. It is based on the results from the characterization and future management scenarios stages, and on engagement feedback.

The management framework is designed to address existing watershed issues and mitigate impacts from potential future land uses and climate changes at the watershed scale. Additional detailed site-level investigations and technical studies will be required (as appropriate and as part of subwatershed planning, environmental assessments, development and planning applications/approvals, etc.). Further studies will provide local/site level information to help inform and assess the suitability for implementation of some of the management actions (e.g. stormwater controls and the use of low impact development and green infrastructure techniques).

The management framework is focused on:

- Achieving more sustainable land use and infrastructure development patterns through the use of low impact development and green infrastructure, improved stormwater management, mitigating flood and erosion risk, and improving rural land stewardship.
- Protecting, enhancing, and restoring the Water Resource System and improving aquatic habitat connectivity.
- Protecting, enhancing, and restoring the Natural Heritage System and increasing urban forest cover.

An inventory, monitoring, and evaluation program will help track implementation progress, evaluate and report on whether watershed conditions are improving, and ensure mechanisms are in place to adjust and adapt approaches as needed.

Once final approvals and endorsements of the Etobicoke Creek Watershed Plan have been obtained in 2024 from municipal committees and Councils and from TRCA's Board of Directors, implementation of the watershed plan will begin. The Etobicoke Creek Watershed Plan is intended to be in effect for 10 years from when it is finalized and approved. Collaborative and comprehensive implementation, tracking, and reporting of all aspects of the management framework will be essential to fully realize the vision for the watershed and to improve watershed health and ensure sustainability of its ecosystem services for current and future generations.

An **Implementation Steering Committee** consisting of TRCA, the municipalities within the watershed, MCFN, and the GTAA will be established in 2024 to guide and support implementation and will be facilitated by TRCA. The Implementation Steering Committee will work together to create a detailed implementation, tracking, and reporting plan to ensure commitment to and accountability for implementation on the part of TRCA, our municipal partners, and other stakeholders.

Through the implementation of the Etobicoke Creek Watershed Plan, all watershed partners and stakeholders can contribute to a healthier, more sustainable, and more resilient watershed that can provide long-term benefits to all residents.

Explore the online interactive Etobicoke Creek Watershed Plan and a map viewer with useful mapping layers [here](#).

FIGURE 3:
Heart Lake Aerial Image



FIGURE 4:

What is a Watershed?

WHAT IS A WATERSHED?

An area that is drained by a river and its tributaries. Wherever you are right now, you are in a watershed.

WATERSHEDS DELIVER IMPORTANT BENEFITS

Human – provide safe drinking water and food, and help to reduce flooding and erosion.

Economic – produce energy, and supply water for agriculture, industry and homes.

Environment – promote a healthy water cycle, and provide vital habitat for wildlife and plants.

What is the Natural Heritage System?

Consists of natural features and areas, including wetlands, forests, meadows and valleylands, that are needed to maintain biodiversity and healthy ecosystems.

How can agriculture impact a watershed?

Agricultural areas provide valuable greenspace and reduce stormwater, since precipitation can penetrate the soil. On the other hand, agricultural fields can release harmful contaminants into waterways as excess nutrients (e.g. phosphorous) and pesticides. Soil erosion from fields can increase the amount of sediment in waterways negatively affecting aquatic ecosystems.

What is the Water Resource System?

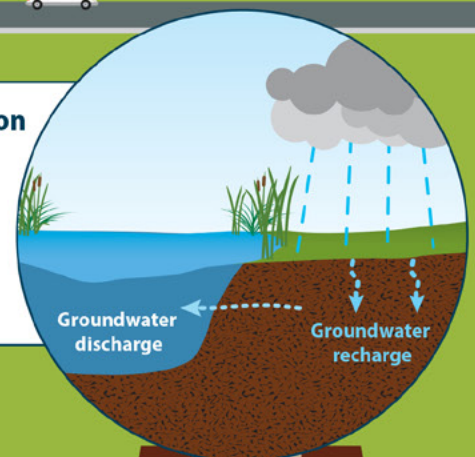
Consists of groundwater and surface water features and areas, including streams, lakes, groundwater recharge areas and springs, needed to sustain healthy aquatic and terrestrial ecosystems, and human water supply.

How can urbanization impact a watershed?

Since impervious surfaces (roads, buildings, parking lots) prevent water from penetrating into soil, stormwater runoff can carry contaminants into waterways and increase the likelihood of flooding. Infrastructure and land use development can degrade habitat, reducing the quality and quantity of natural systems and their connectivity.

Surface and Groundwater Interaction

Rain and melting snow penetrate the soil in permeable areas draining into an aquifer (i.e. groundwater recharge areas). That groundwater can then discharge at springs into streams, wetlands or other surface water features.



What causes flooding?

Rivers naturally flood with heavy rain or snowmelt, but flooding can become a problem when buildings and other structures are placed in floodplains. Climate change and urbanization can make flooding worse.

How can salt impact a watershed?

Chlorides can contaminate drinking water and negatively affect the health of aquatic species.



What is stormwater?

Rain and melting snow rushes off roofs, sidewalks and parking lots into pipes and pours into streams and lakes. Without proper stormwater control and treatment, flooding and erosion can increase, waterways can become polluted and local ecosystems can be damaged.

Benefits of the Urban Forest

All trees in a city collectively help to remove pollutants from air and water, reduce stormwater runoff, cool communities, save energy, and improve human health and well-being.

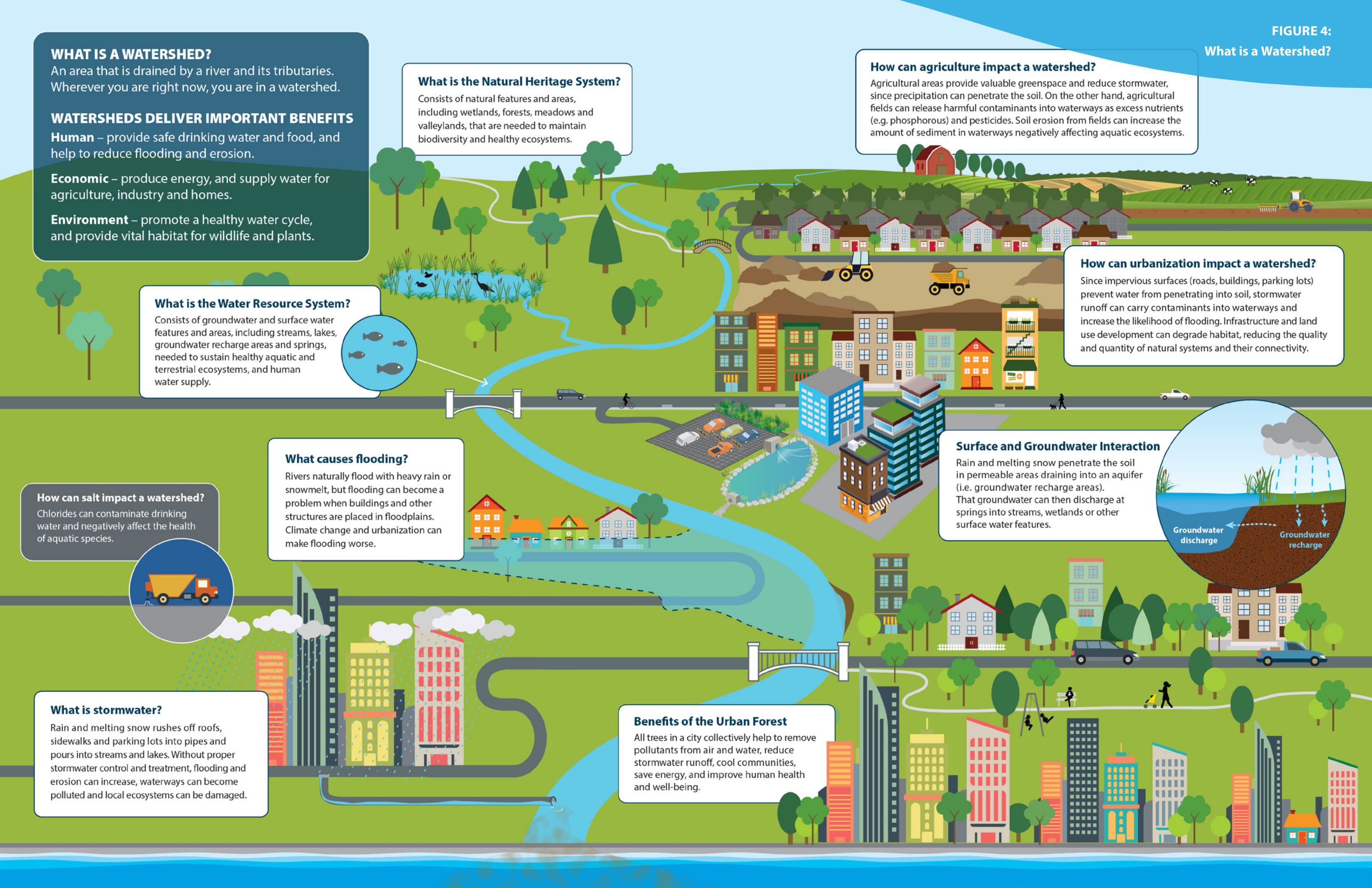


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ACRONYMS

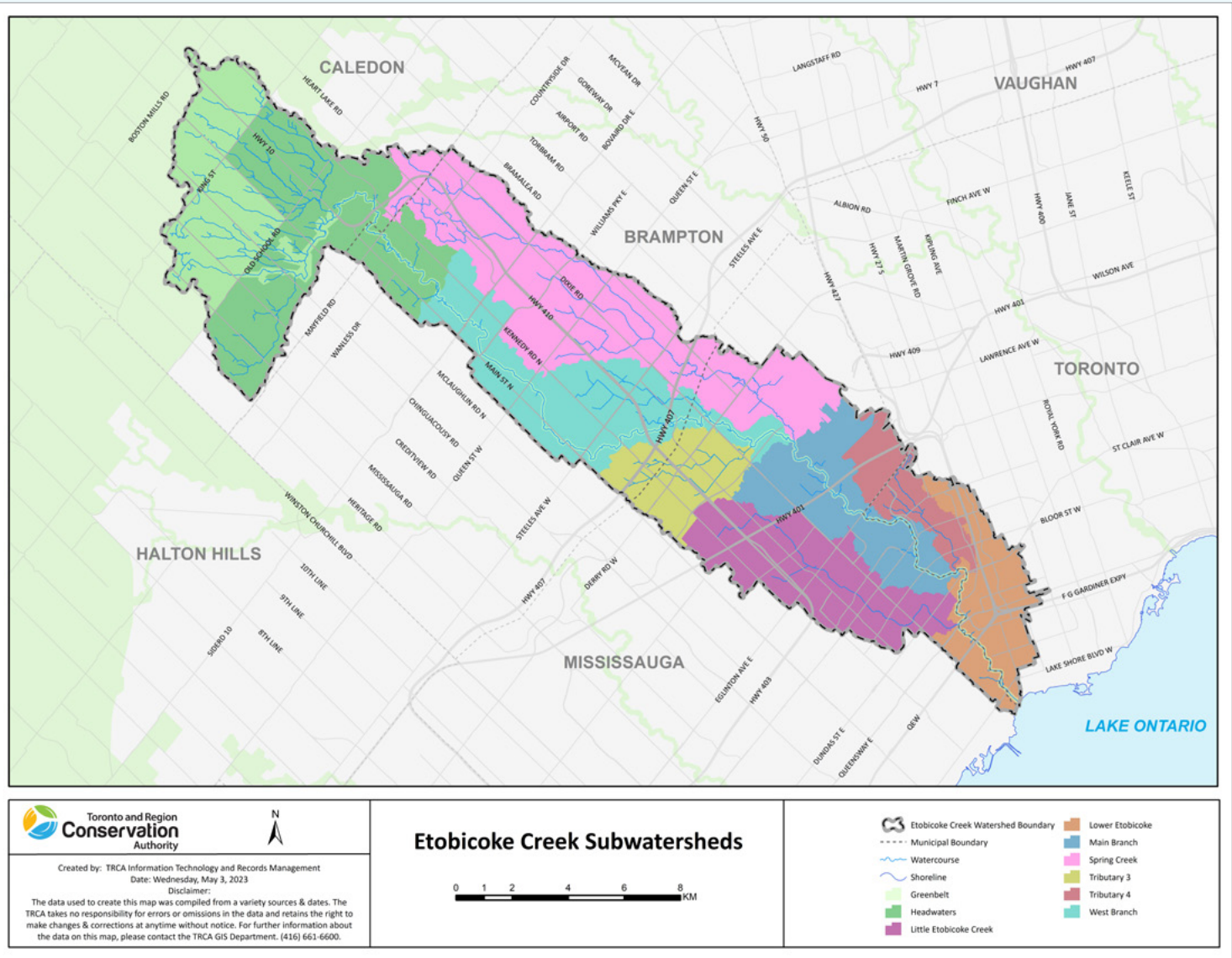
CEW	Cumulative Effective Work
CTC	Credit Valley – Toronto and Region – Central Lake Ontario
CWQG	Canadian Water Quality Guidelines
ECWP	Etobicoke Creek Watershed Plan
ELC	Ecological Land Classification
ESGRA	Ecologically Significant Groundwater Recharge Area
FBI	Family Biotic Index
FVC	Flood Vulnerable Cluster
GTA	Greater Toronto Area
GTAA	Greater Toronto Airports Authority
HDF	Headwater Drainage Feature
IBI	Index of Biotic Integrity
LAM	Landscape Analysis Model
LID	Low Impact Development
MCFN	Mississaugas of the Credit First Nation
NHS	Natural Heritage System
PPS	Provincial Policy Statement
PWQO	Provincial Water Quality Objectives
ROP	Regional Official Plan
SGRA	Significant Groundwater Recharge Area
TOE	Time of Exceedance
TRCA	Toronto and Region Conservation Authority
TSS	Total Suspended Solids
WRS	Water Resource System



1. Introduction and Background

The Etobicoke Creek watershed is at the western end of TRCA's jurisdiction and is heavily urbanized. The watershed begins in the Greenbelt in the Town of Caledon before flowing south through the City of Brampton and City of Mississauga, and ultimately entering Lake Ontario in the City of Toronto. The watershed consists of eight subwatersheds as shown in [Figure 5](#).

FIGURE 5:
Etobicoke Creek Subwatersheds



Created by: TRCA Information Technology and Records Management
 Date: Wednesday, May 3, 2023
 Disclaimer:

The data used to create this map was compiled from a variety of sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at any time without notice. For further information about the data on this map, please contact the TRCA GIS Department. (416) 663-6600.

Etobicoke Creek Subwatersheds



- Etobicoke Creek Watershed Boundary
- Municipal Boundary
- Watercourse
- Shoreline
- Greenbelt
- Headwaters
- Little Etobicoke Creek
- Lower Etobicoke
- Main Branch
- Spring Creek
- Tributary 3
- Tributary 4
- West Branch



The last watershed plan for Etobicoke Creek was developed in 2002, with some technical updates completed in 2010. Since then, watershed science has advanced, and provincial policies have explicitly recognized the importance of watershed planning in informing land use and infrastructure planning decisions.

This watershed plan represents a collaborative effort between TRCA, the City of Toronto, Region of Peel, City of Mississauga, City of Brampton, Town of Caledon, MCFN, and the GTAA, and outlines what needs to be done to improve the health of the Etobicoke Creek watershed and ensure the sustainability of its ecosystem services for current and future generations.

The development of the Etobicoke Creek Watershed Plan was a multi-stage process that consisted of:

- 1. Watershed Characterization (2020-2021)** – to determine current watershed conditions for four key components including the Water Resource System, Natural Heritage System and Urban Forest, Water Quality, and Natural Hazards (i.e. flooding and erosion).
- 2. Future Management Scenario Analysis (2021-2022)** – to assess potential future management scenarios to understand how watershed conditions may change including examining the impacts of different potential future land uses, varying levels of watershed enhancements (e.g. stormwater management improvements and increased natural and urban forest cover), and the implications of climate change (where possible).
- 3. Implementation Planning (2022-2024)** – to develop a realistic management framework with priority actions to protect, enhance, and restore watershed health and to ensure the long-term sustainability and resiliency of the watershed.

This watershed plan has a ten-year time frame. To fully realize the vision for the watershed plan, collaborative and comprehensive implementation by TRCA, the municipalities in the watershed, and other stakeholders of all aspects of the management framework (**outlined in Section 5 - Management Framework**) is essential.

Through regular inventory, monitoring, and evaluation, including adaptive management, the watershed plan will be updated or refined as needed on an ongoing basis.

Explore the online interactive Etobicoke Creek Watershed Plan and a map viewer with useful mapping layers [here](#).



1.1 RATIONALE AND POLICY BASIS

Watershed planning provides a comprehensive framework or road map for ensuring healthy watersheds and building resilience to land use and climate changes. Healthy watersheds provide numerous ecosystem services such as supporting biodiversity, providing clean drinking water, reducing flood and erosion hazards, protecting the quality and quantity of water, improving climate resilience, and generally contributing to community health and well-being and long-term sustainability.

Watershed planning is a vital process for understanding the current and potential future conditions of a watershed, and identifying measures to protect, enhance, and restore the health of a watershed. Watershed plans provide a comprehensive and integrated understanding of the form and function of the natural hazards, features, and areas that comprise the water resource and natural heritage systems. Although watershed plans do not make land use planning decisions, they do help to inform land use and infrastructure planning and other municipal initiatives, such as programs in greenlands acquisition, reforestation, and stormwater management retrofit. This subsection will explain the provincial policy basis for watershed planning and the roles of municipalities and TRCA in implementing the policy framework.

Provincial Watershed Planning Policy Basis

Ontario's planning policy framework recognizes the importance of watershed planning to inform land use and infrastructure decision-making. Policies in the Provincial Policy Statement, 2020 (PPS), the Growth Plan for the Greater Golden Horseshoe, 2020 (Growth Plan), and the Greenbelt Plan, 2017, provide direction related to watershed planning.

PPS policies encourage a coordinated approach to planning that recognizes the watershed as the ecologically meaningful scale for integrated and long-term planning. The PPS also emphasizes the importance of protecting, improving, and restoring the quality and quantity of water by minimizing potential negative impacts. Growth Plan and Greenbelt Plan policies also require watershed planning to be undertaken by municipalities, partnering with conservation authorities as appropriate, to support a comprehensive, integrated, and long-term approach to the protection, enhancement, or restoration of the quality and quantity of water within a watershed.

Watershed planning is also to be used to identify the Water Resource System (WRS), inform decisions on allocation of growth, and inform planning for water, wastewater, and stormwater infrastructure.

Provincial policies also recognize the importance of protecting, enhancing, and restoring the Natural Heritage System (NHS) to maintain long-term ecological and hydrologic functions. The integrated nature and importance of the natural heritage and water resource systems are discussed in greater detail in [Section 2 - Water Resource and Natural Heritage Systems](#).



The *Planning Act* requires that all decisions in respect of planning matters are consistent with the PPS and conform with applicable provincial plans.

The purpose of Ontario's *Clean Water Act, 2006* is to protect existing and future sources of drinking water. Under the Act, source protection committees are responsible for preparing source protection plans. The Credit Valley – Toronto and Region – Central Lake Ontario (CTC) Source Protection Plan applies in the Etobicoke Creek watershed. The CTC Source Protection Plan is a strategy and suite of policies developed by residents, businesses, and municipalities, which outlines how water quality and quantity for drinking water systems, not including private well owners, will be protected. The CTC Source Protection Plan includes its own set of policies that are not repeated in this watershed plan. The management actions identified in this watershed plan complement the requirements of the CTC Source Protection Plan by including the need to protect water resources, which will support clean and safe drinking water.

Finally, Ontario's planning policies recognize the importance of the Great Lakes. Etobicoke Creek flows into Lake Ontario. The various Great Lakes agreements, legislation, and policies set binational, national, and provincial commitments to protect and restore the Great Lakes. Municipalities must consider the Great Lakes Strategy, the targets and goals of the *Great Lakes Protection Act, 2015*, and any applicable Great Lakes agreements as part of watershed planning and coastal or waterfront planning initiatives. This watershed plan is intended to improve conditions in the Etobicoke Creek watershed, thereby reducing negative impacts to Lake Ontario.

Role of Municipalities

Municipalities in Ontario are organized into single-tier or two-tier systems. Upper-tier municipalities, such as the Region of Peel, are comprised of multiple lower-tier municipalities (e.g. City of Mississauga). The role of regional government is to address issues and concerns across broader geographic areas, as set out under the *Municipal Act* and other provincial legislation. The City of Toronto is a single-tier municipal government, which means it assumes all municipal responsibilities as set out under the *City of Toronto Act* and other provincial legislation.

Municipalities implement the watershed planning requirements of provincial legislation, plans, and the PPS. As noted above, watershed planning helps municipalities make informed decisions on where and how to grow in a way that minimizes and/or mitigates impacts to watershed health and also informs other municipal initiatives.



Role of TRCA

Conservation Authorities (CAs) are established and governed under the *Conservation Authorities Act*. The purpose of the Act is to provide for the organization and delivery of programs and services that further the conservation, restoration, development, and management of natural resources in watersheds. While conservation authorities are not the decision-makers in land use and infrastructure planning, they play an important role by advising municipalities and infrastructure providers on matters related to natural hazards, wetlands, and source protection, and by collecting and providing scientific data on watershed management and resilience to climate change outside the plan review function. Conservation authorities also administer a development activity permit process under section 28 of the Act for conservation authority regulated areas consisting of river and stream valleys, wetlands, watercourses, and shorelines.

Through its watershed expertise, TRCA, in collaboration with its partner municipalities, MCFN, and the GTAA, has developed this watershed plan to help inform municipal growth management and various other initiatives including ecosystem restoration planning, land management/acquisition, and low impact development and green infrastructure implementation.





1.2 LOCAL CONTEXT AND CONSIDERATIONS

The Etobicoke Creek watershed is approximately 22,404 hectares in size and is the westernmost watershed in TRCA's jurisdiction. It is bordered by the Credit River watershed to the west and the Mimico Creek and Humber River watersheds to the east.

Etobicoke Creek also forms the western boundary of the Toronto Purchase (Treaty #13 in 1805) and the eastern boundary of the Head of the Lake Purchase (Treaty #14 in 1806) and lies within the Ajetance Purchase (Treaty #19 in 1818). The Toronto Purchase reserved the Mississaugas' exclusive fishing rights in Etobicoke Creek.

The Etobicoke Creek watershed is heavily urbanized (approximately 60% as of 2019) and contains a large amount of industrial and commercial land uses, including the majority of Lester B. Pearson International Airport. The only remaining rural portions of the watershed fall within the Headwaters subwatershed in the Town of Caledon. This watershed has one of the lowest amounts of natural cover in TRCA's jurisdiction.

Mouth of Etobicoke Creek

Historically, the mouth of Etobicoke Creek was a wetland providing extensive habitat along the Lake Ontario shoreline. The first engineered alteration of the lower part of the Creek was in 1929, when the sandbar across the mouth was reinforced to allow the extension of an adjacent road.

When Hurricane Hazel hit in 1954, the water level in the channel was at least four times its capacity, destroying homes and causing seven deaths. Over the next few years, municipal and provincial governments purchased the land in the flood plain, converting the area into Marie Curtis Park. By 1959, no trace of the original creek mouth remained. Today, the flood plain lands are owned by TRCA, but managed by the City of Toronto.

Brampton Esker

The Etobicoke Creek watershed is home to the only esker in TRCA's jurisdiction. An esker is a long, winding ridge of sand and gravel deposited by glacial meltwaters, which flowed through crevasses and channels within or beneath an ice sheet.

The Brampton Esker's northern end is located just to the north of Mayfield Road and runs south for approximately eight kilometres to Queen Street. It is around 1.8 km wide with its eastern edge following Highway 410. The sands and gravels of the Brampton Esker hold and purify water as it percolates downward, making the esker an important groundwater resource and the source of Spring Creek, a tributary of Etobicoke Creek.

FIGURE 6: Open House on Watershed Plan, May 2022 (Mississauga) (left)



FIGURE 7: Open House on Watershed Plan, September 2023 (Brampton) (right)



1.3 ENGAGEMENT

The development of this watershed plan commenced in early 2020 through the establishment of a Steering Committee consisting of representatives from TRCA, the City of Toronto, Region of Peel, City of Mississauga, City of Brampton, Town of Caledon, MCFN, and the GTAA. The municipal staff members on the Steering Committee were responsible for providing input and guidance throughout the development of the watershed plan on behalf of their respective municipalities (including consolidating comments from various municipal teams). Credit Valley Conservation was also involved in the Steering Committee to ensure consistency in watershed planning approaches between neighbouring watersheds.

Throughout the watershed planning process, extensive engagement took place to increase awareness of watershed planning and to solicit feedback on components of the watershed plan.

The following First Nations and Indigenous communities were engaged:

- Mississaugas of the Credit First Nation (member of the Steering Committee as the Treaty holding First Nation within the watershed)

- Williams Treaties First Nations (including Beausoleil First Nation, Chippewas of Rama First Nation, Chippewas of Georgina Island First Nation, Curve Lake First Nation, Mississaugas of Scugog Island First Nation, Hiawatha First Nation, and Alderville First Nation)
- Huron-Wendat Nation
- Six Nations of the Grand River
- Métis Nation of Ontario

Engagement also took place with various stakeholders (including Building Industry and Land Development Association and other developers in the watershed, community/resident groups, golf courses, major private landowners, non-governmental organizations, etc.), watershed residents and the general public, project webpage subscribers, municipal Councillors with ward boundaries within the watershed, Regional Watershed Alliance members, and TRCA Board members. Further engagement opportunities were leveraged through various TRCA teams such as Education and Training, Sustainable Neighborhood Action Program (SNAP), Professional Access Into Employment (PAIE), Newcomer Youth Green Economy Project (NYGEP), Multicultural Connections Program (MCP), and Partners in Project Green (PPG).

EARLY 2020 – MID 2021

Engaged on watershed vision and key issues of concern to undertake watershed characterization.

Released comprehensive Watershed Characterization Report in June 2021.

MID 2021 – MID 2022

Developed potential future management scenarios and carried out technical analyses, culminating in the release of the Future Management Scenario Analysis Report in July 2022.

Engaged on the results of the watershed characterization and future management scenarios stages, and on the objectives and indicators for the watershed plan and priorities for action.

MID 2022 – MID 2023

Developed the management framework for the watershed plan and the draft watershed plan, and engaged on the draft watershed plan.

Feedback received from First Nations and Indigenous communities, partners, stakeholders, watershed residents, and the general public was invaluable to the development of this watershed plan. The Etobicoke Creek Watershed Plan reflects the diversity of issues and concerns raised throughout the process and represents an achievable plan to improve watershed conditions.

Engagement Summary Reports

Engagement Summary reports were prepared throughout the watershed planning process and provide details of the engagement activities. These reports are referenced in [Section 9 - References](#) and are publicly available on the [project webpage](#).



2. Water Resource and Natural Heritage Systems

The land (i.e. terrestrial) and water (i.e. aquatic) features and areas that maintain watershed and ecological health consist of two integrated systems: the Water Resource System (WRS) and the Natural Heritage System (NHS). Together, these systems provide essential ecosystems services, such as water storage and filtration, cleaner air, support to biodiversity and habitats, carbon storage, and improving resiliency to climate change. Maintaining extensive, connected, and high-quality features and areas of both systems is essential for the long-term health and sustainability of the watershed, as shown in [Figure 4](#).

Identifying, protecting, enhancing, and restoring both systems is a key policy requirement of the Growth Plan and the Greenbelt Plan.



Ecosystem Services

Ecosystem services are the benefits to humans provided by natural environments. These benefits cover a wide range of contributions essential for human well-being. They can be classified into four primary categories:

Provisioning services

These are the tangible resources provided by ecosystems including food, water, wood, and medicinal plants. Examples of provisioning services include the harvesting of timber from forests and the availability of various fruits for consumption.

Regulating services

Ecosystems play a crucial role in regulating life in the biosphere. Climate change mitigation/adaptation, water purification, pollination, disease management, and pest control are examples of these regulating benefits. For instance, wetlands contribute to water flow regulation, flood mitigation, and pollutant filtration, and forests sequester, or store, carbon in trees and soil.

Cultural services

These are the intangible benefits provided by ecosystems including recreational opportunities, spiritual fulfillment, and nature appreciation. An example of a cultural service is the recreational enjoyment gained by spending time in nature.

Supporting services

These are essential for enabling various functions within natural ecosystems. Examples include processes like soil formation, the cycling of nutrients, and primary production via photosynthesis. For instance, the cycling of nutrients ensures that vital elements are accessible for plant development.



Natural assets, such as forests, grasslands, and wetlands, are the physical components of ecosystems that support these services. The delivery of ecosystem services depends on the health and functionality of these natural assets. By preserving, enhancing, and sustainably managing these assets, we can ensure the continuous provision of ecosystem services that are essential for human well-being as well as for economic prosperity and ecological equilibrium.

Table 1 explains the features and areas of both systems.

TABLE 1:
Water Resource and Natural Heritage Systems

Water Resource System	Natural Heritage System
A system consisting of groundwater features and areas, surface water features (including shoreline areas), and hydrologic functions, which provide the water resources necessary to sustain healthy aquatic and terrestrial ecosystems and human water consumption.	A system made up of natural heritage features and areas, and linkages identified to provide habitat connectivity and support natural processes, which are necessary to maintain biodiversity and ecosystem functions.
<p>The WRS consists of:</p> <p>Key Hydrologic Areas</p> <ul style="list-style-type: none"> • Significant Groundwater Recharge Areas (SGRAs), including Ecologically Significant Groundwater Recharge Areas (ESGRAs) • Highly Vulnerable Aquifers • Significant Surface Water Contribution Areas <p>Key Hydrologic Features</p> <ul style="list-style-type: none"> • Permanent Streams • Intermittent Streams • Inland Lakes and their Littoral Zones • Seepage Areas and Springs • Wetlands* 	<p>The NHS consists of:</p> <ul style="list-style-type: none"> • Significant Wetlands* • Significant Coastal Wetlands • Other Coastal Wetlands in Ecoregions 5E, 6E, and 7E • Fish Habitat* • Significant Woodlands • Significant Valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary’s River) • Habitat of Endangered Species and Threatened Species • Significant Wildlife Habitat • Significant Areas of Natural and Scientific Interest (ANSIs) • Sand Barrens, Savannahs, Tallgrass Prairies, and Alvars • Federal or Provincial Parks, and Conservation Reserves
<p>*Notes:</p> <p>Wetlands are important features in both systems. Wetlands are shown as features in the mapping for the WRS and as natural cover in the NHS mapping in Section 7 - Maps. Fish habitat in the NHS overlaps with features and areas in the WRS.</p> <p>The majority of these terms are defined in the Growth Plan. Some, but not all the definitions, have been included in the Glossary (Section 8 - Glossary).</p> <p>Not all these features or areas are necessarily present in the Etobicoke Creek watershed.</p>	

The importance of these systems is reflected in the management framework in [Section 5 - Management Framework](#), as the protection, enhancement, and restoration of each system is a goal of this watershed plan.

See [Section 7 - Maps](#) for maps of each system.



How was the WRS delineated?

The key hydrologic areas and key hydrologic features of the WRS were delineated using various techniques and methodologies. The key hydrologic areas and key hydrologic features of the WRS shown in the maps in [Section 7. Maps](#) include updates/refinements made for the watershed plan (and are consistent with TRCA's updated 2022 WRS). There are some slight changes from the WRS maps presented in the Watershed Characterization Report which is referenced in [Section 9. References](#) and is publicly available on the [project webpage](#).

Highly Vulnerable Aquifers and SGRAs were delineated through Technical Rules established under the *Clean Water Act, 2006* for the purposes of source protection planning. ESGRAs were delineated using a model developed by the Oak Ridges Moraine Groundwater Program. The model results for ESGRAs were used to minimize the land area covered by these areas while still maintaining a high level of protection of hydrologic function for these ecosystems. Significant Surface Water Contribution Areas were delineated by overlaying SGRAs and ESGRAs to ensure areas of both volume contribution and recharge-discharge connections to sensitive features are a prevalent component of the WRS.

Each of the five key hydrologic features were delineated using a combination of satellite imagery, ArcHydro GIS, and field site verification.

While not a defined component of the WRS, Headwater Drainage Features (HDFs) are important surface water features that help maintain downstream aquatic health. HDFs are small, temporary streams, swales, or wetlands. HDFs were delineated through an assessment of existing data, satellite imagery, and field sampling. HDFs were classified according to TRCA's Evaluation, Classification, and Management of Headwater Drainage Features Guidelines as permanent (i.e. important hydrology functions), intermittent (i.e. valued or contributing hydrology functions), or unknown (i.e. either valued/contributing hydrology functions or limited hydrology

functions). The assessment of HDFs conducted as part of this watershed planning process should be considered preliminary, with additional field verification to be completed if there is to be alteration to lands in the Headwaters. This is reflected in the management actions identified in [Section 5 - Management Framework](#).

How was the Watershed Refined Enhanced NHS Delineated?

The features and areas of the watershed refined enhanced NHS were delineated using a robust systems-based methodology that incorporated multiple ecological criteria generated through models (e.g. habitat connectivity model, Landscape Analysis Model), information from recent satellite imagery, monitoring data, field site verification, and expert-based knowledge.

The features and areas of the watershed refined enhanced NHS were identified for their ecological value as existing natural cover and potential natural cover (i.e. areas targeted for restoration and enhancement) to:

- Increase natural cover (e.g. forests, wetlands, meadows, etc.) quantity and quality by improving habitat patch size, shape, and connectivity in and around natural areas.
- Protect and restore biodiversity by incorporating multiple habitat types and mitigating the impacts of urban development on habitat function.
- Incorporate natural system vulnerabilities to climate change in planning processes to build a watershed refined enhanced NHS that is more sustainable and resilient.

FIGURE 8:
Before and After, Kings Park Stream
Restoration (Mississauga)



FIGURE 9:
Etobicoke Creek, West of
Pearson International Airport



3. Existing Watershed Conditions

Watershed characterization is a vital stage of the watershed planning process, which helps to understand current conditions in the watershed and identify key issues to help inform the next stages of the watershed planning process. As part of this watershed planning process, a technical report on watershed characterization was developed focusing on four key components including the Water Resource System, Natural Heritage System and Urban Forest, Water Quality, and Natural Hazards. This section summarizes key components of those technical analyses.



Watershed Characterization Key Messages (i.e. Existing Conditions)

The Etobicoke Creek watershed is a highly urbanized watershed with a significant amount of impervious cover (i.e. hard surfaces) and low amounts of natural and rural land cover. This has resulted in a high amount of stormwater runoff, issues with flooding and erosion, and impacts to aquatic and terrestrial habitat quantity and quality and to water quality. Climate change including increased precipitation, annual average temperatures, and the intensity and frequency of extreme weather events will add additional strain on a watershed like Etobicoke Creek and will further impact watershed health.

Based on the technical analyses completed as part of watershed characterization, the key issues affecting the Etobicoke Creek watershed that will need to be addressed to improve watershed health include:

Water Resource System

Aquatic habitat conditions are poor, and the watershed has a high amount of runoff and in-stream barriers that affect aquatic ecosystem health.

Natural Heritage System and Urban Forest

There is a low amount of natural cover and habitat quality is generally 'poor'. The remaining natural cover is highly vulnerable to the effects of climate change.

Water Quality

Surface water quality is generally poor compared to other TRCA watersheds.

Natural Hazards

The watershed has six Flood Vulnerable Clusters (which means there are flood risks in these areas), and can be categorized as medium or high erosion sensitivity.

3.1 CONTEXT AND BACKGROUND

TRCA used the most recent available data and scientific methodologies to undertake watershed characterization. The complete Watershed Characterization Report is referenced in [Section 9 - References](#) and is publicly available on the [project webpage](#).

The technical components outlined in [Table 2](#) were assessed as part of watershed characterization.

TABLE 2:
Summary of Technical Analyses for Watershed Characterization

Water Resource System	Natural Heritage System and Urban Forest
<p>Involves the comprehensive delineation of the features and areas that comprise the WRS.</p> <p>Additionally, assessments of the condition and health of riparian corridors, fish and benthic communities, groundwater, streamflow, and aquatic habitat were undertaken. The presence of in-stream barriers was also characterized.</p>	<p>Involves the comprehensive delineation of the features and areas that comprise the NHS and urban forest.</p> <p>Habitat quantity, quality, terrestrial biodiversity, habitat connectivity, and climate vulnerabilities were assessed for the NHS.</p> <p>The amount of tree canopy, its composition, diversity, and health were assessed for the urban forest.</p>
Water Quality	Natural Hazards
<p>Involves the assessment of surface water quality parameters of concern and trends over time, as well as chemicals of emerging concern, microplastics, and spills.</p>	<p>Involves the characterization of flood and erosion risk in the watershed.</p>

In addition to the technical components outlined in [Table 2](#), watershed characterization also included the following technical analyses:

- **Stormwater management** - including an assessment of the proportion of the watershed with various levels of stormwater control (e.g. quantity or quality control).
- **Restoration planning** - including an assessment of completed restoration projects in the watershed and refinement of existing restoration opportunities.

Biodiversity

The term biodiversity describes the wide variety of living organisms that inhabit the earth. Biodiversity is an indicator of ecosystem health and helps ensure that ecosystems are functioning and providing valuable ecosystem services for human health and well-being.

Natural landscapes within the Etobicoke Creek watershed provide habitat for numerous species, which use these areas for breeding, feeding, roosting, and migrating. Based on limited inventory surveys conducted between 2010 and 2019, there are 139 fauna (i.e. animal) species (likely an underestimation of the actual number of fauna species) and 40 fish species found within the watershed. This shows that the watershed is capable of supporting a variety of species, though the presence of sensitive species is primarily

outside of the urban areas. Improvements to habitat quantity, quality, and connectivity would benefit these species throughout the watershed.

Some of the sensitive species present in the Etobicoke Creek watershed include Butternut (*Juglans cinerea*; threatened species in Ontario), Little Brown Myotis (*Myotis lucifugus*; endangered species in Ontario), American Eel (*Anguilla rostrata*; endangered species in Ontario; located at the mouth of Etobicoke Creek only), Bobolink (*Dolichonyx oryzivorus*; endangered species in Ontario), Snapping Turtle (*Chelydra serpentina*; special concern species in Ontario), and Pitcher-plant (*Sarracenia purpurea*; species of regional concern).



Little Brown Myotis (*Myotis lucifugus*)



Pitcher-plant (*Sarracenia purpurea*)

3.2 HISTORICAL AND CURRENT LAND USES

The Etobicoke Creek watershed is heavily urbanized, resulting in low amounts of natural and rural land cover. **Table 3** illustrates land use change in the watershed from 2002 to 2019 for three generalized land use classifications: urban, rural, and natural. The amount of impervious cover (i.e. hard surfaces that prevent precipitation from penetrating the ground) was also calculated for these time periods.

TABLE 3:
Land Use Change

	2002 (area% and ha)	2012 (area% and ha)	2002 – 2012 (% change)	2019 (area% and ha)	2012 – 2019 (% change)
URBAN	53% (11,969 ha)	56% (12,636 ha)	+6%	60% (13,222 ha)	+5.4%
RURAL*	33% (7280 ha)	31% (6916 ha)	-5%	28% (6328 ha)	-9%
NATURAL	14% (3156 ha)	13% (2853 ha)	-10%	12% (2755 ha)	-3%
IMPERVIOUS COVER (i.e. hard surfaces)	43% (9765 ha)	46% (10,374 ha)	+6%	48% (10,856 ha)	+5%

*Rural includes land use classifications such as agriculture, golf courses, open space, hydro corridors, etc. These types of land uses cannot be considered natural, nor can they be considered urban as they have low amounts of impervious surfaces.



3.3 CURRENT STATE OF THE WATERSHED

Based on the watershed characterization technical analyses conducted (discussed in [Subsection 3.1 - Context and Background](#)), there are four key issues in the Etobicoke Creek watershed:

1 WATER RESOURCE SYSTEM: aquatic habitat conditions are poor and the watershed has a high amount of runoff and in-stream barriers that affect aquatic ecosystem health.

Among larger watersheds in TRCA's jurisdiction (i.e. >200 km²), Etobicoke Creek has the second highest annual runoff at 402 mm/year, second only to the Don River.

The average habitat rating for fish is 'fair' and for benthic communities is 'poor'.

There has been little to no change in aquatic habitat quality since 2002. It is important to note that the amount of impervious surfaces in a watershed impacts the natural flow regime of watercourses, water temperature, and water quality which subsequently impacts aquatic species and ecosystems through changes in aquatic habitat quality. Environment Canada provides recommendations on impervious cover percentages and has defined the quality of aquatic habitat based on the amount of impervious cover in a catchment area where 'sensitive' quality habitat occurs when there is 0-10% impervious cover, and

declines in aquatic habitat quality are demonstrated when impervious cover is greater than 11% (with greater than 25% impervious cover being non-supporting) (Environment Canada 2013, Schueler 1994). Therefore, to minimize impacts to aquatic habitat health, it is recommended that the impervious cover percentage (effective impervious cover) remains below 25%. See [Appendix A](#) for more details.

Additionally, there are a large number of in-stream barriers that prevent the movement of species and only approximately 50% natural cover within the riparian corridor (i.e. within 30 metres of streams).

2 NATURAL HERITAGE SYSTEM AND URBAN FOREST: there is a low amount of natural cover and habitat quality is generally 'poor'. The remaining natural cover is highly vulnerable to the effects of climate change.

Only approximately 12% of the watershed consists of natural cover, well below recommended targets (at least 30%) for long-term sustainability and resiliency.

There are some 'fair' quality habitat patches in the Headwaters, which support some sensitive plant and animal species.

Urban forest canopy cover (i.e. trees and tall shrubs) is approximately 15% and has remained stable from 2009 to 2018.

3 WATER QUALITY:

surface water quality is generally poor compared to other TRCA watersheds.

Contaminants of particular concern include chlorides (e.g. from road salts), phosphorus (e.g. from fertilizers), *E. coli* bacteria (e.g. from sewage and animal wastes), and metals such as copper and zinc (e.g. from industrial sources and / or roadways).

Exceedances of chlorides and nitrates were also observed in groundwater.

4 NATURAL HAZARDS:

the watershed has six Flood Vulnerable Clusters (FVCs) with a total area of 508 hectares (see [Figure 10](#)) and can be categorized as medium or high erosion sensitivity.

[Table 4](#) provides a summary of certain watershed conditions and trends for each of these four key issues. Trends are assessed as changes from the baseline period (2002 – 2010) to current period (2011 – 2020). See the full [Watershed Characterization Report](#) and the [online Etobicoke Creek Watershed Plan](#) for more details and to explore some of the key characterization mapping layers.

TRCA's Watershed and Ecosystems Reporting Hub

TRCA's [Watershed and Ecosystems Reporting Hub](#) is another resource that provides interactive regional information about the watersheds (including the Etobicoke Creek watershed) and the waterfront in the Toronto region. The Reporting Hub identifies current conditions by theme and explains the importance of different environmental indicators for understanding watershed and ecosystem health. It also shows how conditions are changing over time and where we are relative to where we want to be. This helps to determine if watershed conditions are declining and what actions may be required to improve watershed health.





Difference between urban forest and natural cover

The term **urban forest** is used to describe the trees and woody shrubs located on all private and public property within a watershed, including urbanized spaces (i.e. along roads) and in forests. The percentage of urban forest cover is determined by the area covered by the canopies of all trees and shrubs in both built and natural areas.

Natural cover is the area of the watershed covered by natural habitats, including forests, meadows, and wetlands.

Natural cover includes habitats with varying amounts of trees and shrubs. Meadows for example are open habitats that do not contain trees. Although meadows are natural cover, they are not part of the urban forest. Conversely, the urban forest includes trees in built portions of the watershed that are not part of natural cover. For these reasons, the amount of natural cover and the amount of urban forest in a watershed will not be equal. Learn more about the differences between urban forest, natural cover, and forest cover [here](#).

TABLE 4:
Summary of Watershed Characterization Results

	Current Conditions	Trend Assessment Between Baseline (2002 – 2010) and Current (2011 – 2020)
WATER RESOURCE SYSTEM		
Riparian Corridors	50% natural cover within corridor	Slight improvement (+1%)
Fish Community Health	Average IBI ¹ Score: 22.7 (Fair)	No change
Benthic (e.g. insects, worms, molluscs) Community Health	Average FBI ² Score: 6.57 (Poor)	No change
NATURAL HERITAGE SYSTEM / URBAN FOREST		
Habitat Quantity (i.e. total natural cover)	2,617 hectares 12% of watershed	Decrease (-14%)
Habitat Quality	Average LAM ³ Score: 7.51 (Poor)	No change
Urban Forest (i.e. canopy cover for the entire watershed)	3,290 hectares 15% of watershed	No change
Urban Forest Health (only in urbanized portions of the watershed, excludes agricultural areas)	Average condition is 80% (good) 20% are in poor or critical condition, dying or dead	Average condition declined by 4%, with the proportion of trees in poor condition or dead increased by 6%
WATER QUALITY		
Total Suspended Solids (CWQG⁴ = 30 mg/L)	88% of samples met CWQG	Decrease (-6% or 6% fewer samples met objective in 2015-2019)
Chloride (CWQG, chronic = 120 mg/L, acute = 640 mg/L)⁵	7% of samples met chronic CWQG 70% of samples met acute CWQG	Decrease (-6%) for chronic Increase (+3%) for acute

¹IBI stands for Index of Biotic Integrity and measures a set of metrics (number of fish species, presence of sensitive species, abundance, and food chain classifications) to assign a rating of very good (>38), good (28-37.9), fair (20-27.9), or poor (<20).

²FBI refers to Family Biotic Index, which is often used to assess the quality of water in rivers and has a rating scale of excellent (0-3.75), very good (3.76-4.25), good (4.26-5.0), fair (5.01-5.75), fairly poor (5.76-6.50), poor (6.51-7.25), or very poor (7.26-10).

³LAM, known as Landscape Analysis Model, combines the metrics of patch size (larger patches support larger populations), patch shape (habitat fragmentation), and matrix influence (influence of surrounding land uses) to determine an average score. LAM has a rating scale of excellent (13-15), good (11-12), fair (9-10), poor (6-8), or very poor (0-5).

⁴Canadian Water Quality Guidelines are federal water quality guidelines for various parameters. In healthy ecosystems, 100% of samples meet guidelines.

⁵Chronic refers to long-term exposure, compared to acute, which refers to short-term exposure.

	Current Conditions	Trend Assessment Between Baseline (2002 – 2010) and Current (2011 – 2020)
WATER QUALITY <i>(continued)</i>		
Total Phosphorus (PWQO ⁶ = 30 ug/L)	29% of samples met PWQO	Decrease (-2%)
Copper (PWQO = 5 ug/L)	72% of samples met PWQO	Decrease (-26%)
Zinc (PWQO = 20 ug/L)	78% of samples met PWQO	Decrease (-27%)
<i>E. coli</i> (PWQO = 100 CFU / 100 mL)	21% of samples met PWQO	Increase (+8%)
NATURAL HAZARDS		
Flooding (peak flows) Based on 100-year⁷ inflow at points for each of the six FVCs	Brampton Central FVC = 78.8 m ³ /s	Range from -1% to +7% ⁸
	Avondale FVC, West Tributary = 23.5 m ³ /s	Range from -0.4% to +1% ⁹
	Avondale FVC, East Tributary = 29.8 m ³ /s	Range from +2% to +12%
	Little Etobicoke FVC = 37.1 m ³ /s	Increase (+2%)
	Dixie / Dundas FVC = 106.9 m ³ /s	Increase (+3%)
	Longbranch FVC = 359.0 m ³ /s	Increase (+1%)

⁶Provincial Water Quality Objectives refer to provincial water quality standards for various parameters. In healthy ecosystems, 100% of samples meet objectives.

⁷100-year refers to a rainfall event that statistically has a one percent chance of occurring in any given year, at any given place. This does not mean it will only occur once every 100 years.

⁸The Brampton Central and Avondale FVCs are the furthest upstream and closest to the areas of urban expansion in recent years and thus more sensitive to flows, so the trend is reported as a range (best and worst case). All other FVCs are reported as a single percent change.

⁹See previous footnote.

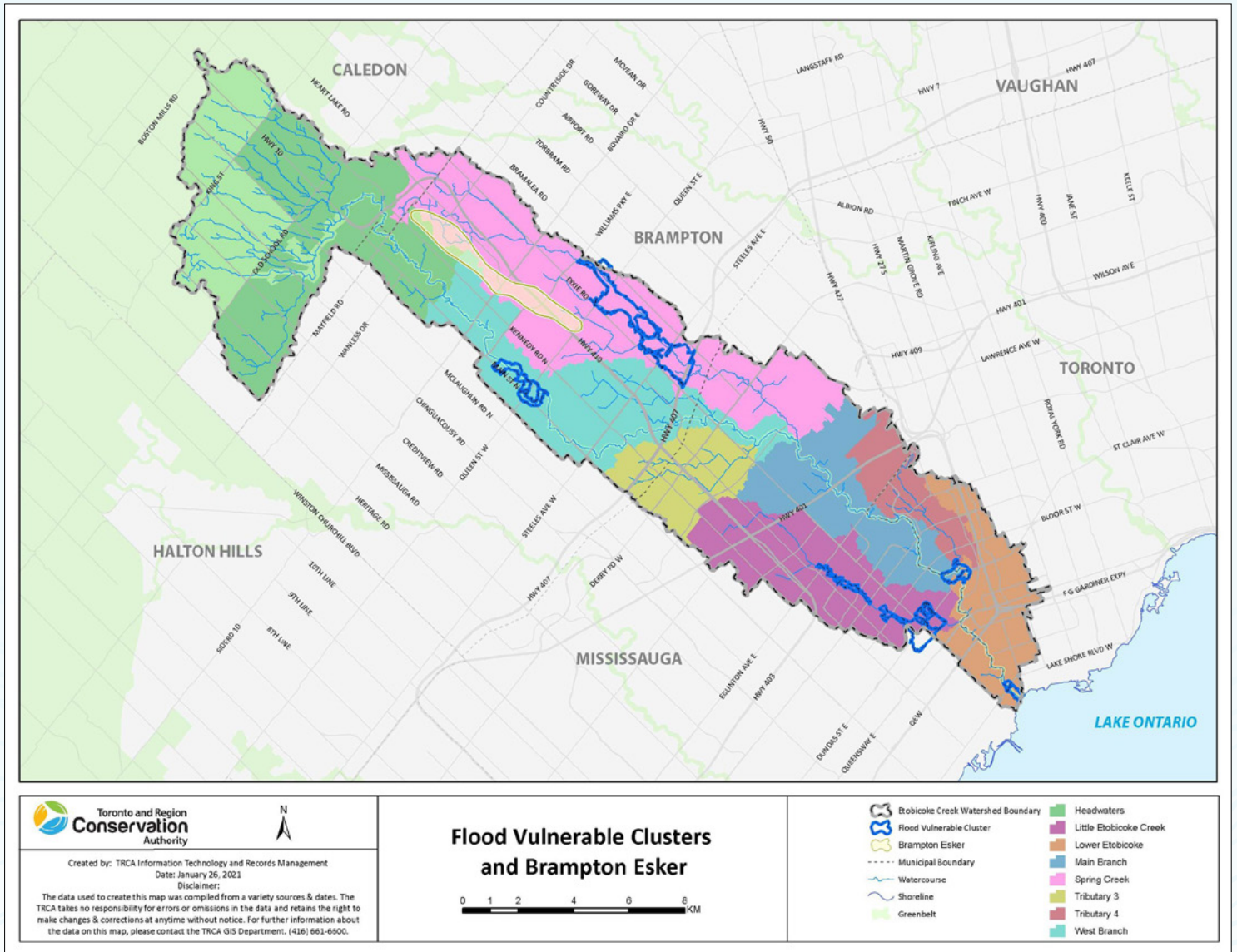
	Current Conditions	Trend Assessment Between Baseline (2002 – 2010) and Current (2011 – 2020)
NATURAL HAZARDS <i>(continued)</i>		
Flooding (peak flows) Based on 100-year⁷ inflow at points for each of the six FVCs	West Mall FVC, West Tributary = 304.7 m ³ /s	Increase (+1%)
	West Mall FVC, East Tributary = 36.5 m ³ /s	Increase (+1%)
Erosion Sensitive Stream Reaches¹⁰ (35 stream reaches were assessed)	22 'Highly' erosion sensitive stream reaches	Increase (+8) 'Highly' erosion sensitive stream reaches
	12 'Moderately' erosion sensitive stream reaches	Decrease (-8) 'Moderately' erosion sensitive stream reaches ¹¹

¹⁰Current conditions are based on erosion sensitivity for 2020, while the trend is compared to 2010.

¹¹Two of the stream reaches for 2010 are categorized as both moderate and high erosion sensitivity, and are thus included as both high and moderate in these numbers.



**FIGURE 10:
FVCs and Brampton Esker**



Historical Watercourses

Urbanization has resulted in extensive watercourse burial and diversion of water flows into sewers leading to substantial changes to natural drainage patterns, and hydrological and ecological functions. When watercourses are connected to sewers, heavy rain can cause more flashy and immediate flooding, reduced water quality, and changes in the nutrient cycling processes of the watercourse.

The loss of natural watercourses in Toronto, including within the Etobicoke Creek watershed, began in the 18th century and accelerated with increased development during the 19th and 20th centuries. Extensive and well documented mapping work has been completed to identify the location of historical watercourses in Toronto, mainly by community organizations such as the Toronto Green Community's Lost Rivers group.

The Etobicoke Creek Watershed Plan does not assess the hydrologic or ecological impacts of burying these historical watercourses or provide advice on potential restoration opportunities. However, TRCA and the City of Toronto are exploring the feasibility of potential restoration opportunities for certain historical watercourses (including within the southern portion of the Etobicoke Creek watershed). This collaborative work will examine areas within the alignment of historical watercourses where hydrologic functions could be improved and natural cover could be increased. As well, TRCA and the City of Toronto are investigating potential ways to better highlight the natural, cultural, and historical significance of historical watercourses, including through signage and improved mapping.

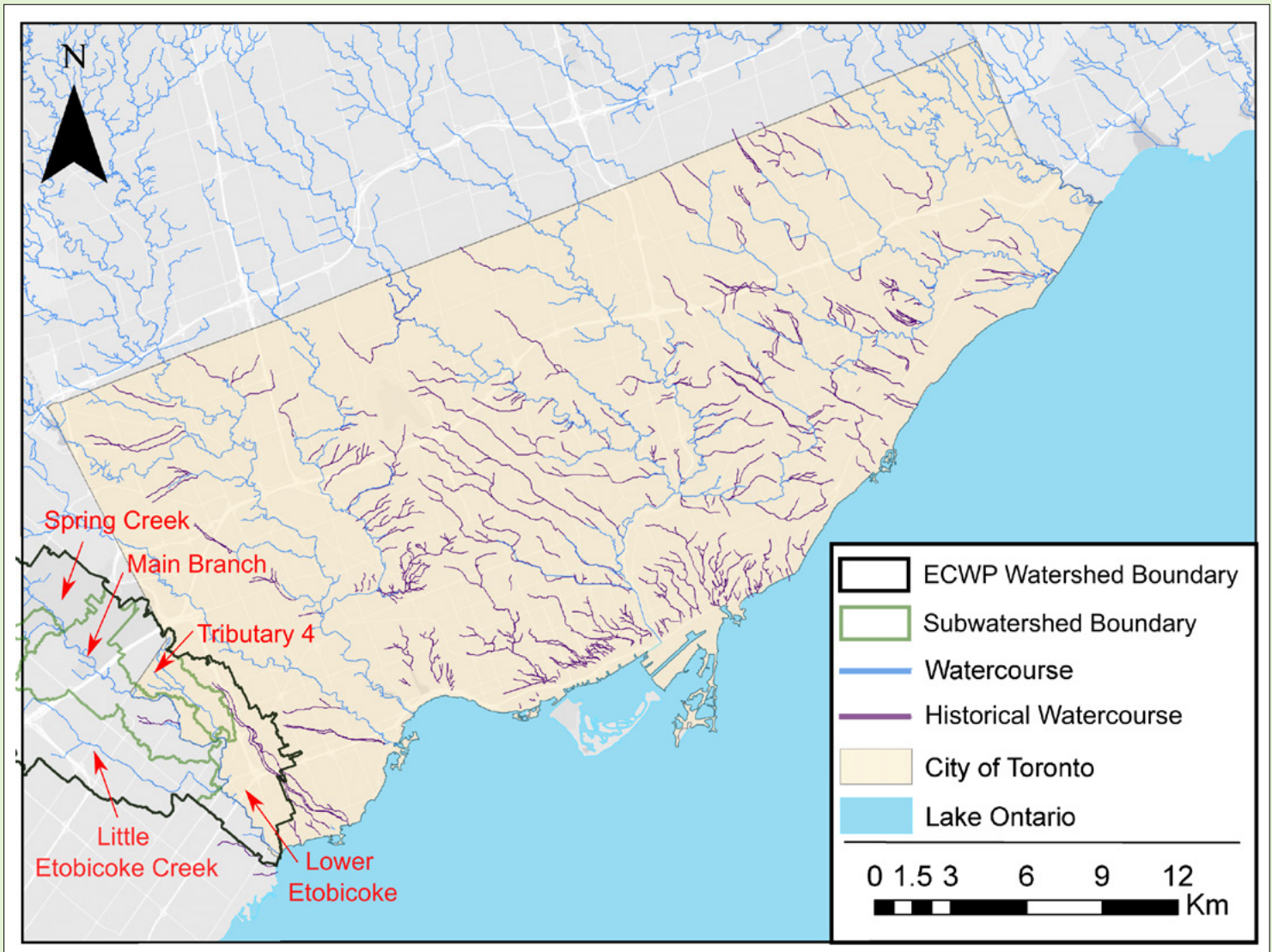


FIGURE 11:
Etobicoke Creek Just South of QEW



4. Future Watershed Conditions

Another important stage of the watershed planning process is assessing potential future conditions based on future land use scenarios and the impacts of climate change. The results of watershed characterization discussed in [Section 3 - Existing Watershed Conditions](#) informed the development of the future land use scenarios. An additional technical report documenting the results of the Future Management Scenario Analysis stage was produced, which is referenced in [Section 9 - References](#) and is publicly available on the [project webpage](#).



Future Management Scenarios

Analysis Key Messages (i.e. Future Conditions)

Future management scenario analysis is a technical exercise that involves assessing and comparing how different potential future land uses, climate changes, and varying levels of watershed enhancements/interventions may affect watershed conditions and overall watershed health. Scenario analysis is essentially a tool that can be used to compare the potential scenarios and does not constitute a land use decision, or a particular recommendation on land use patterns and specific management interventions. All of the scenario analysis information, along with the results of watershed characterization, were used to inform the development of the management framework described in [Section 5 - Management Framework](#). A management framework and associated actions are needed to protect, enhance, and restore watershed health and ensure a more sustainable and resilient watershed.

For the Etobicoke Creek watershed, four different potential future management scenarios (described in [Table 5](#)) were assessed to help understand how each of the key watershed components (i.e. Water Resource System, Natural Heritage System and Urban Forest, Water Quality, and Natural Hazards) may respond in the future (i.e. will conditions improve, stay the same, or deteriorate). TRCA conducted extensive watershed modelling and performed technical analyses to assess the impacts of different levels of land uses, climate change (where possible), and watershed enhancements (e.g. improvements to natural cover, urban forest canopy, and stormwater management) on watershed health.

The scenario analysis results highlighted that, with changing land uses and climate, all four watershed components are negatively impacted, which affects overall watershed health. However, the watershed enhancements help mitigate these impacts and contribute to a safer, healthier, and more resilient watershed.

4.1 FUTURE STRESSORS

To determine appropriate future land use scenarios, it is necessary to identify potential future stressors on a watershed. For Etobicoke Creek, the high levels of urbanization and low amounts of natural cover are key determinants of watershed health. Due to growth pressures in Peel Region, further urbanization in the currently rural part of the Headwaters of the Etobicoke Creek watershed is expected.

Climate change is expected to increase precipitation, annual average temperatures, and the frequency of extreme weather events, which will add further strain on a watershed like Etobicoke Creek. There are already six FVCs in this watershed and significant erosion risk, which is likely to increase with more frequent and intense precipitation events without significant watershed interventions. The fragmented and low quality and quantity of natural cover decreases the likelihood of ecosystem resilience to extreme weather events.

Climate change and further urbanization in the Headwaters were factored into the future management scenario analysis, as much as possible, to determine how these key stressors will potentially impact watershed health. For example, the flood risk analysis and water quality analysis included climate projections into watershed modelling, while climate vulnerabilities and the thermal regime were incorporated into the terrestrial and aquatic impact assessments respectively.

The management framework for the watershed plan outlined in [Section 5 - Management Framework](#) recognizes these two future stressors and identifies management actions to minimize and mitigate the impacts of urban development, while protecting, enhancing, and restoring ecosystems to improve climate adaptation and ecosystem resilience.

4.2 FUTURE SCENARIOS

An effective way to assess how a watershed will respond to potential future change is to develop, analyze, and compare several possible future management scenarios, each reflecting a different composition of land uses and mitigation measures. As a result, future management scenario analysis is a tool to compare how possible future land uses might affect watershed health.

Future management scenario analysis is a technical exercise to ensure management actions are based on the best available science. The results of modelling and technical impact assessments helped to guide the development of the management framework in [Section 5 - Management Framework](#), and will support municipalities in land use and infrastructure planning.

It is important to note that the future management scenarios analyzed are based on different potential future land uses only and do not represent specific municipal planning decisions or result in decisions about the type and configuration of land uses. In other words, **the scenarios do not constitute a land use decision, or a particular recommendation on land use patterns and specific management actions.** The aim was not to select one of these scenarios as the 'preferred scenario or approach' but, instead, the future management scenario analysis helped us understand how watershed conditions may change based on different potential future land uses (and varying amounts of urbanization), climate changes, and different levels of watershed enhancements/interventions.

For the Etobicoke Creek watershed, the future management scenarios were designed to:

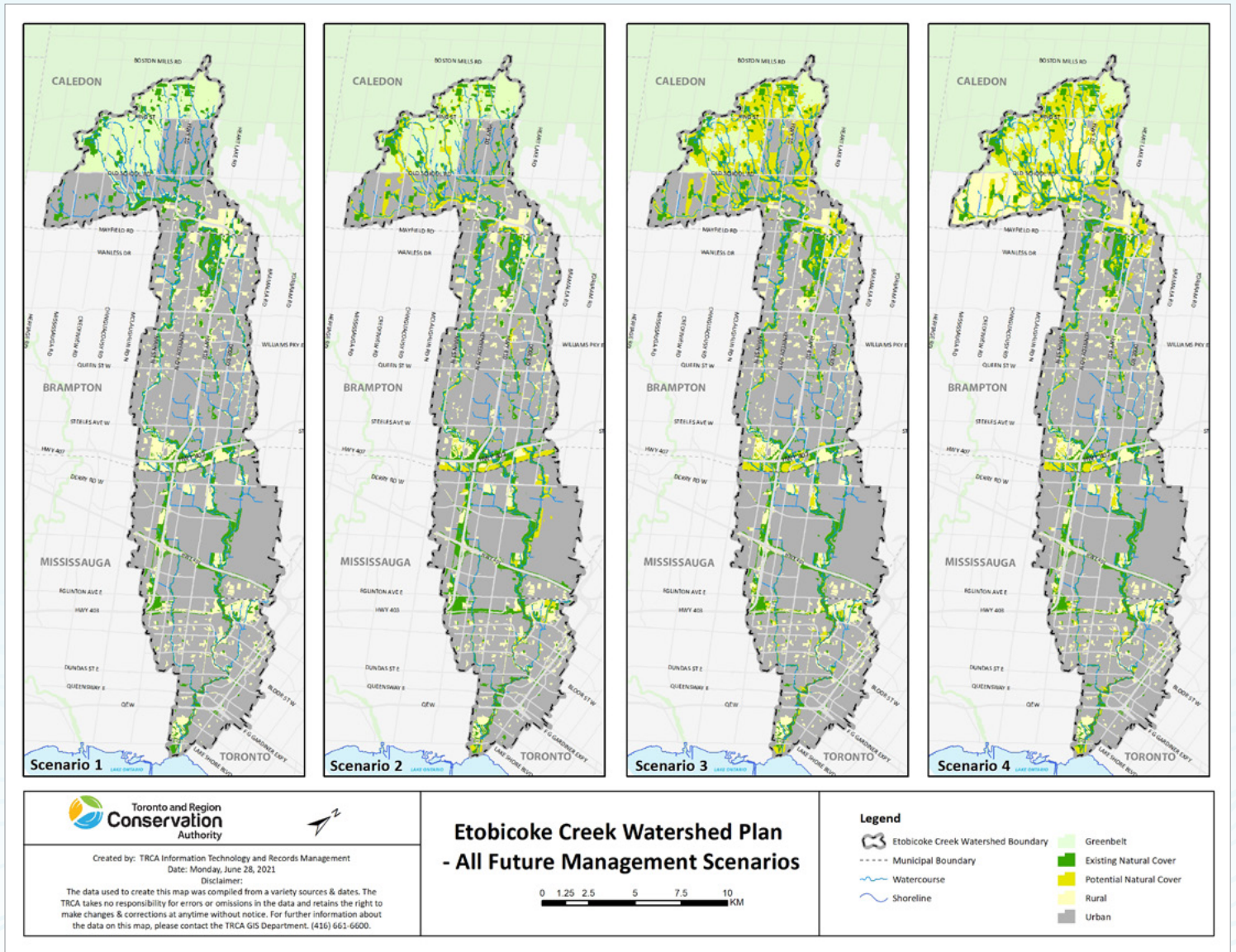
- Project potential future land use change based on growth projections by examining different land use and infrastructure planning scenarios to 2051 (i.e. planning horizon for municipal Official Plans).
- Assess the effects of different levels of ecosystem restoration and enhancement (e.g. increase in natural cover quantity and quality) on watershed conditions.
- Assess the effects of different levels of stormwater control on watershed conditions.
- Assess the potential impacts of climate change on watershed conditions, where possible.

Four future management scenarios were assessed (see [Figure 12](#)). The baseline for comparison is the current conditions of the watershed as identified in [Section 3 - Existing Watershed Conditions](#). [Table 5](#) provides a description and rationale for each of the four future management scenarios.

TABLE 5:
Summary of Future Management Scenarios

	Description	Rationale
Scenario 1: Urban Expansion with Minimal Enhancements	Assumes urbanization of the remaining whitebelt* lands in the Headwaters. No enhancements to natural cover or stormwater management.	Compares current conditions to further urbanization in the Headwaters with minimal other watershed enhancements.
Scenario 2: Urban Expansion with Mid-range Enhancements	Same as Scenario 1, with some enhancements to stormwater management, urban forest, and natural cover. Includes the potential Greater Toronto Area West Highway (i.e. Highway 413).	Compares additional watershed interventions to Scenario 1 to determine the relative benefits of the enhancements.
Scenario 3: Urban Expansion with Optimal Enhancements	Same as Scenario 1, with a greater level of enhancements to stormwater management, urban forest, and natural cover than Scenario 2.	Compares an even higher level of watershed interventions to Scenario 1 to determine the relative benefits of the enhancements.
Scenario 4: Existing Urban Boundary with Optimal Enhancements	Same as Scenario 3, except the current urban boundary is maintained in the Headwaters.	Compares the same high level of interventions as Scenario 3 without further urbanization to determine the relative benefits of the enhancements and maintaining the existing urban boundary.
<p>*Note: The whitebelt refers to lands between the built boundary of urban settlement areas and the boundary of the Greenbelt Plan Area.</p>		

FIGURE 12:
Future Management Scenarios







At the time that the future management scenarios were developed and analyzed, many municipalities were in the process of updating their Official Plans, thus mapping (including the projected urban boundaries) may differ from mapping in municipal Official Plans. However, these differences are not expected to change the key messages of the analyses, which still provide useful insights to inform decision-making.

See the full [Future Management Scenario Analysis technical report](#) for more information on the assumptions that went into each scenario.

4.3 SCENARIO ANALYSIS

The key findings of the Etobicoke Creek watershed future management scenario analyses are organized into four watershed components: WRS, NHS and Urban Forest, Water Quality, and Natural Hazards. **Table 6** provides further details on potential future watershed conditions associated with each future management scenario for each of these watershed components. Potential future conditions are expressed by percent change for each component.

For all the calculations of percent change, Scenario 1 is compared to current conditions, while Scenarios 2, 3, and 4 are compared to Scenario 1. This is to compare and assess the relative benefits of the different levels of enhancements in Scenarios 2, 3, and 4 against the minimal enhancements in Scenario 1. To aid in interpreting the results in **Table 6**, percent change is colour-coded to indicate whether watershed conditions improve, are roughly equal, deteriorate, or significantly deteriorate from a hydrological or ecological perspective.

-  **>+5% change**, watershed conditions improve
-  **0 to +5% or 0 to -5% change**, watershed conditions stay roughly the same
-  **-6% to -10% change**, watershed conditions deteriorate
-  **>-10% change**, watershed conditions significantly deteriorate

It is important to note that percent change is identified by the thresholds listed solely based on watershed conditions and not whether the report value is a positive or negative number. For example, a decrease in chloride concentrations or peak flows is a good thing from a hydrological or ecological perspective and would be presented as a positive percent change in **Table 6**.

As noted earlier, future management scenario analysis does not result in decisions about the type and configuration of land uses. Instead, future management scenario analysis helps to inform decisions through the municipal planning process.

It is the responsibility of the applicable municipality to determine the ultimate land use configuration for any future changes in the watershed.

Appropriate mitigation strategies are developed during the detailed planning strategies for new developments. These mitigation strategies may include assessments on the appropriate levels of stormwater controls, the use of green infrastructure, and opportunities for ecological restoration.

TABLE 6:
Summary of Future Management Scenario Results

WATER RESOURCE SYSTEM



Watershed Plan Component		CURRENT CONDITIONS (2019)	SCENARIO 1 Urban Expansion + Minimal Enhancements (compared to Current Conditions)	SCENARIO 2 Urban Expansion + Mid-range Enhancements (compared to Scenario 1)	SCENARIO 3 Urban Expansion + Optimal Enhancements (compared to Scenario 1)	SCENARIO 4 Existing Urban Boundary + Optimal Enhancements (compared to Scenario 1)
WATER RESOURCE SYSTEM						
Riparian Corridors	Area (ha)	600	600	758	797	797
	% change	N/A	0%	26%	33%	33%
Aquatic Habitat Quality ¹²	Area (ha)	10,719	11,663	11,531	11,220	10,538
	% change	N/A	-9%	1%	4%	10%
Groundwater recharge ¹³	mm/yr	133	119	124	128	138
	% change	N/A	-11%	4%	8%	16%
Groundwater discharge ¹⁴	mm/yr	118	107	111	114	122
	% change	N/A	-9%	4%	7%	14%

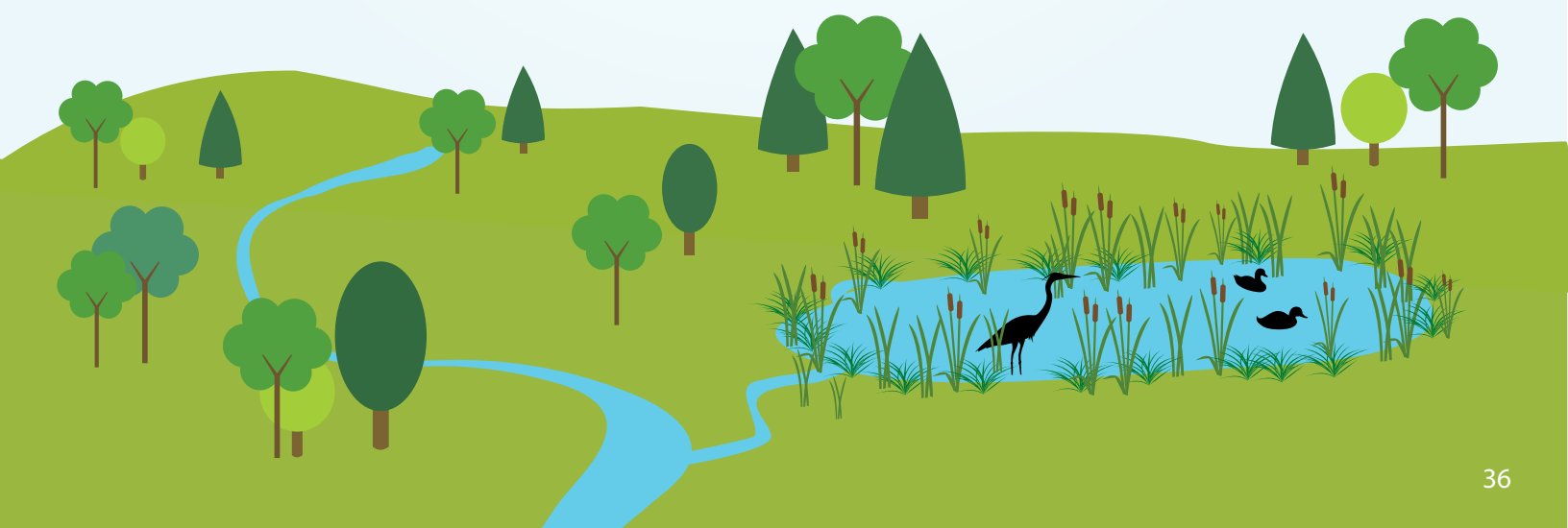
¹²This is based on the amount of impervious cover in the watershed as a metric of aquatic habitat quality. Aquatic habitat quality is expected to decrease as impervious cover increases (and it is recommended that effective impervious cover remains below 25%).

¹³The current conditions results for groundwater recharge are based on the model results from the future management scenario analysis rather than baseflow analysis completed during watershed characterization.

¹⁴See footnote 13.

NATURAL HERITAGE SYSTEM / URBAN FOREST

Watershed Plan Component		CURRENT CONDITIONS (2019)	SCENARIO 1 Urban Expansion + Minimal Enhancements (compared to Current Conditions)	SCENARIO 2 Urban Expansion + Mid-range Enhancements (compared to Scenario 1)	SCENARIO 3 Urban Expansion + Optimal Enhancements (compared to Scenario 1)	SCENARIO 4 Existing Urban Boundary + Optimal Enhancements (compared to Scenario 1)
NATURAL HERITAGE SYSTEM / URBAN FOREST						
Habitat quantity (natural cover)	Area (ha)	2,617	2,617	4,153	5,108	5,108
	% change	N/A	0%	59%	95%	95%
Habitat Quality	Average LAM score	7.56	7.33	7.47	7.74	7.91
	% change	N/A	-3%	2%	6%	8%
Urban forest (canopy cover)	Area (ha)	3,290	3,290	4,338	5,947	5,984
	% change	N/A	0%	32%	81%	82%



WATER QUALITY

Watershed Plan Component		CURRENT CONDITIONS (2019)	SCENARIO 1 Urban Expansion + Minimal Enhancements (compared to Current Conditions)	SCENARIO 2 Urban Expansion + Mid-range Enhancements (compared to Scenario 1)	SCENARIO 3 Urban Expansion + Optimal Enhancements (compared to Scenario 1)	SCENARIO 4 Existing Urban Boundary + Optimal Enhancements (compared to Scenario 1)
WATER QUALITY¹⁵						
Chlorides ¹⁶	% change	N/A ¹⁷	30%	-49%	-3%	-6%
TSS	% change	N/A ¹⁷	-21%	68%	135%	186%

¹⁵Percent change for water quality is based on averages for all stream segments. Results for chlorides are presented as winter season only, while TSS results are for all seasons.

¹⁶Based on modelling results, average chloride concentrations decreased overall under all future management scenarios. However, the magnitude of the decrease was variable, especially in the winter season. In Scenario 1, chloride concentrations decreased from current conditions (percent change by 30%) reflecting positive watershed conditions despite urbanization. This is largely due to implications of climate change that result in reduced salt use. In Scenario 2, chloride concentrations were higher than Scenario 1 due to the proposed GTA West Highway and the additional expected road salting in winter months. Lastly, Scenarios 3 and 4 had similar (but slightly greater) chloride concentrations than Scenario 1 again suggesting that changes in urbanization and enhancements had less of an impact compared to climate change implications resulting in reduced salt use. Please see the Etobicoke Creek Watershed Future Management Scenario Analysis technical report (referenced in Section 9 and publicly available) for more details on the water quality results. It is important to note that, although climate change seems to be driving a decrease in chloride concentrations in the watershed, concentrations are already high, affecting aquatic life.

¹⁷Due to the partially calibrated nature of the water quality model, absolute concentrations are not being reported. Instead, percent change observed in the model is reported for the future scenarios, with Scenario 1 still being compared to current conditions.





NATURAL HAZARDS - FLOODING

Watershed Plan Component		CURRENT CONDITIONS (2019)	SCENARIO 1 Urban Expansion + Minimal Enhancements (compared to Current Conditions)	SCENARIO 2 Urban Expansion + Mid-range Enhancements (compared to Scenario 1)	SCENARIO 3 Urban Expansion + Optimal Enhancements (compared to Scenario 1)	SCENARIO 4 Existing Urban Boundary + Optimal Enhancements (compared to Scenario 1)
NATURAL HAZARDS - FLOODING¹⁸						
Flood risk (100-year storm at Dixie/Dundas FVC without climate change)	Peak flow (m ³ /s)	107	108	106	91	91
	% change	N/A	-1%	3%	16%	16%
Flood risk (100-year storm at Dixie/Dundas FVC with climate change)	Peak flow (m ³ /s)	107	134	132	121	121
	% change	N/A	-26%	1%	10%	10%
Flood risk (5-year storm at Dixie/Dundas FVC without climate change)	Peak flow (m ³ /s)	63	64	59	42	42
	% change	N/A	-1%	8%	34%	34%
Flood risk (5-year storm at Dixie/Dundas FVC with climate change)	Peak flow (m ³ /s)	63	68	64	47	47
	% change	N/A	-9%	7%	31%	31%

¹⁸See the full Future Management Scenario Analysis technical report for full flood and erosion risk results. For the purposes of this watershed plan, a sample from two design storms at one FVC is used to illustrate changes in flood risk associated with the future management scenarios. For erosion risk, the Headwaters and Lower Etobicoke subwatersheds are shown with results for Cumulative Effective Work and Time of Exceedance.





NATURAL HAZARDS - EROSION

Watershed Plan Component		CURRENT CONDITIONS (2019)	SCENARIO 1 Urban Expansion + Minimal Enhancements (compared to Current Conditions)	SCENARIO 2 Urban Expansion + Mid-range Enhancements (compared to Scenario 1)	SCENARIO 3 Urban Expansion + Optimal Enhancements (compared to Scenario 1)	SCENARIO 4 Existing Urban Boundary + Optimal Enhancements (compared to Scenario 1)
NATURAL HAZARDS - EROSION¹⁸						
Erosion risk based on Cumulative Effective Work Index ¹⁹ (CEW) in Headwaters	% change	N/A ²⁰	-128%	18%	35%	58%
Erosion risk based on CEW in Lower Etobicoke	% change	N/A ²¹	-13%	35%	48%	53%
Erosion risk based on Time of Exceedance ²² (TOE) in Headwaters	% change	N/A ²³	-104%	17%	32%	48%
Erosion risk based on TOE in Lower Etobicoke	% change	N/A ²⁴	-8%	36%	51%	54%

¹⁹Cumulative Effective Work index, CEW, provides a measure of the energy expended by the channel above the threshold discharge, or critical shear stress value. Larger values of CEW imply greater potential for erosion of the channel material.

²⁰The continuous erosion modelling conducted calculated CEW in Newtons/metre, but only the results as percent change for the future management scenarios are shown here.

²¹See footnote 20.

²²Time of Exceedance, TOE, provides a measure of the total amount of time over which the threshold, or critical flow, is exceeded in the channel. Larger values of TOE imply a larger total time period during which the channel could erode.

²³The continuous erosion modelling conducted calculated TOE in hours, but only the results as percent change for the future management scenarios are shown here.

²⁴See footnote 23.

The following summary illustrates expected changes to watershed conditions based on available information and assessments conducted as part of this watershed planning process. The management framework in [Section 5 - Management Framework](#) identifies what is necessary to protect, enhance, and restore watershed conditions.

Summary of implications:

Water Resource System	<ul style="list-style-type: none"> Aquatic habitat quality will decrease as impervious surface amounts increase (and will likely become non-supporting if effective impervious cover exceeds 25%). With increasing urbanization, more sensitive fish species will be replaced with species more tolerant of disturbance, and benthic communities will shift towards more pollution tolerant species. With natural cover enhancements, the number of coolwater, coldwater, and stable temperature stream reaches could increase and make the system more resilient to climate change. Groundwater discharge and recharge will be negatively affected in the Headwaters without enhancements to natural cover, urban forest, stormwater management, and LID implementation.
Natural Heritage System and Urban Forest	<ul style="list-style-type: none"> Even with optimal natural cover enhancements, this watershed remains below recommended federal guidelines for natural cover quantity and TRCA’s terrestrial NHS target, but any increase will provide a benefit to biodiversity and other ecosystem services. There are opportunities to increase the quantity and quality of the urban forest to provide ecosystem goods and services, increase climate resiliency, and provide socio-economic benefits.
Water Quality	<ul style="list-style-type: none"> Changes in water quality parameters (e.g. TSS and chlorides) demonstrate the impact of urbanization and the benefits of improved stormwater management and natural cover enhancements in a changing climate.
Natural Hazards	<ul style="list-style-type: none"> Optimal enhancements to natural cover and stormwater management help reduce peak flow levels, though not as effectively when climate change is factored in. Land use changes can manage peak flows for all design storms through enhancements and interventions (if TRCA’s stormwater management criteria for the Etobicoke Creek Headwaters is applied), but climate change will cause peak flows to exceed current stormwater infrastructure design standards. Increasing enhancements to natural cover and stormwater management help mitigate erosion, which would otherwise increase with further urbanization.



What does this mean?

These results demonstrate the importance of ensuring that land use and infrastructure planning decisions are made to minimize and mitigate impacts to the watershed regardless of potential future land use configurations. The results also clearly demonstrate the benefits of increased watershed enhancements to the quantity of quality of natural cover and urban forest, improved stormwater management, and greater use of LID infrastructure.

The results of this future management scenario analysis emphasize the importance of protecting, enhancing, and restoring the WRS and NHS as identified in this watershed plan.

Climate change, combined with a heavily urbanized and already degraded watershed, has the potential to further reduce watershed health and increase the risk to watershed residents and infrastructure (i.e. through more frequent and intense flooding and erosion).

The management framework outlined in [Section 5 - Management Framework](#) is designed to address existing watershed issues and the implications of these future management scenarios by identifying actions to improve watershed conditions and increase resiliency to the impacts of climate change, by:

- Limiting impervious cover as much as possible, or mitigating it through the use of green infrastructure and LID.
- Increasing natural cover and improving terrestrial and aquatic habitat quality through targeted ecological restoration and urban forest canopy enhancements.
- Ensuring municipal policies and programs are in place to achieve best management practices and mitigate the impacts of urban development on watershed health.

FIGURE 13:
Etobicoke Creek Trail South of 401



5. Management Framework

The role of municipalities in watershed planning is to implement the watershed planning requirements/guidance of provincial legislation, plans, and the PPS. Watershed planning helps municipalities make informed decisions on where and how to grow in a way that minimizes and/or mitigates impacts to watershed health. Watershed plans can also be an excellent resource to municipalities to inform various initiatives including greenlands securement and management planning and green infrastructure and/or stormwater management retrofit planning, and to contribute to urban revitalization strategies where natural heritage restoration or flood remediation strategies may be needed.

The management framework for the Etobicoke Creek Watershed Plan represents what needs to be done to protect, enhance, and restore watershed health and build resiliency to land use and climate changes. Improving the health of the Etobicoke Creek watershed will have many co-benefits such as providing ecosystem services and improving community health and well-being.

The management framework consists of goals, objectives, indicators, and management actions (described in [Table 7](#)).

TABLE 7:
Management Framework Explanation

Management Framework Components	Description
GOALS	Represent the outcomes to achieve.
OBJECTIVES	Are the specific statements about desired results, or steps to be undertaken, to achieve the goal.
INDICATORS	Explain how progress on implementing the objectives is going to be tracked or measured.
MANAGEMENT ACTIONS	Specifically explain what needs to be done, and by what partner, to accomplish the relevant objective.

The management framework for the Etobicoke Creek Watershed Plan consists of three goals, eight objectives, 10 indicators, and 36 management actions (see **Figure 14**). The management framework was developed collaboratively by TRCA, the municipalities within the watershed, MCFN, and the GTAA, and based on feedback from stakeholders and the public to address the issues identified during the watershed characterization stage and to mitigate potential future stressors (i.e. urban expansion and climate change) as identified during the future management scenario analysis stage. Regardless of potential future land use, the management framework is designed to minimize and mitigate potential future watershed impacts.

Each of the goals in the management framework are complementary, with no one goal being more important than another. The management actions are numbered to correspond with their applicable goal and objective, and are also in no particular order. The management actions apply to the entire watershed, unless otherwise specified. For example, there are specific management actions for the Town of Caledon in the Headwaters subwatershed in the event of future urban expansion. The majority of the other management actions directed at municipal partners apply to areas of the watershed that already have urban land uses.

Additional detailed site-level investigations and technical studies will be required (as appropriate and as part of subwatershed planning, environmental assessments, development and planning applications/approvals, etc.). Further studies will provide local/site level information to help inform and assess the suitability for implementation of some of the management actions (e.g. stormwater controls and the use of low impact development and green infrastructure techniques based on site conditions).

To fully realize the vision for the Etobicoke Creek watershed and to improve watershed health and ensure sustainability of its ecosystem services for current and future generations, collaborative and comprehensive implementation of all aspects of this management framework is essential. Implementation of the management framework (and the specific management actions) will begin once final approvals and endorsements of the Etobicoke Creek Watershed Plan have been obtained from municipal committees and Councils and from TRCA’s Board of Directors in 2024. **Section 6 - Implementation, Monitoring and Evaluation** provides additional details about implementation of the Etobicoke Creek Watershed Plan including establishment of an Implementation Steering Committee and development of a detailed implementation, tracking, and reporting plan to ensure TRCA and the municipalities in the watershed, in particular, are committed to and held accountable for implementation.

FIGURE 14:
Overview of Management Framework

GOAL 1

Land Use

Achieve sustainable land use and infrastructure development patterns to improve watershed conditions and enhance climate resiliency.

OBJECTIVE 1

Minimize the impacts of human land uses through the adoption and implementation of sustainability policies, low impact development (LID), and green infrastructure.

Indicator:

Complete LID or green infrastructure projects in the recommended areas that would benefit most from LID or green infrastructure implementation (**Map 1**).

OBJECTIVE 2

Retrofit, upgrade, and install stormwater infrastructure using best available technologies to reduce the impacts of untreated runoff entering receiving waters.

Indicator:

Evaluate improvements to stormwater management across the watershed through municipal tracking and reporting on stormwater assets, drainage areas (i.e. sewersheds), and service levels.

OBJECTIVE 3

Reduce the risks associated with natural hazards through enhanced flood and erosion mitigation.

Indicators:

Flooding: implement risk reduction measures in 50% of Flood Vulnerable Clusters.

Erosion: continue monitoring and remediating infrastructure hazard sites for participating municipal partners, implementing the assessment and maintenance of erosion control asset systems.

OBJECTIVE 4

Encourage the use of agricultural best management practices to minimize agricultural runoff and improve rural land stewardship.

Indicator:

Track the number of landowners that implement best management practices.



GOAL 2

Water Resource System

Protect, enhance, and restore the areas and features that comprise the Water Resource System (including aquatic habitat) for ecosystem resilience and sustainability.

OBJECTIVE 1

Implement appropriate policies and programs that identify, protect, enhance, and restore the areas and features that comprise the Water Resource System.

Indicator:

Complete restoration projects at 75% of identified priority aquatic sites (**Maps 3A and 3B**).

OBJECTIVE 2

Improve aquatic habitat connectivity and reduce the impacts of pollutants on aquatic health.

Indicator:

Maintain, or improve, aquatic health rankings.



GOAL 3

Natural Heritage System and Urban Forest

Protect, enhance, and restore the Natural Heritage System and urban forest within the watershed to improve ecosystem resilience and sustainability.

OBJECTIVE 1

Improve the quality and quantity of the Natural Heritage System through ecosystem and biodiversity protection, enhancement, and restoration.

Indicators:

Habitat Quantity: increase total natural cover in the watershed.

Habitat Quality: maintain, or improve, terrestrial ecosystem quality rankings.

OBJECTIVE 2

Increase urban forest canopy cover throughout the watershed to improve social and environmental well-being.

Indicator:

Increase canopy cover in the watershed to achieve a minimum target of 16%.



5.1 LAND USE GOAL

GOAL 1

Achieve sustainable land use and infrastructure development patterns to improve watershed conditions and enhance climate resiliency.

This goal focuses on the policy, land use, and infrastructure planning processes that influence the health of the watershed. Management actions (outlined in [Table 8](#)) focus on mitigating the impacts of current urban development or agricultural lands uses and minimizing future impacts from potential urban expansion. Due to the heavily urbanized nature of this watershed, utilizing the highest urban development standards, improving stormwater management, mitigating natural hazards, and improving agricultural land uses will be essential to ensure the long-term health of watershed ecosystems and to improve climate resiliency.

The decision of whether to proceed with the construction of Highway 413 rests with the Province. Some municipalities have expressed differing positions about the proposed Highway 413 with calls for the Province to consider alternatives. This watershed plan includes a management action (1.1.3) intended to mitigate watershed impacts, as much as possible, which is directed at the Ministry of Transportation should construction of Highway 413 proceed.



Land Use Objective	Management Actions
<p>LAND USE OBJECTIVE 1</p> <p>Minimize the impacts of human land uses through the adoption and implementation of sustainability policies, low impact development (LID), and green infrastructure.</p>	<p>1.1.1</p> <p>Municipal partners, in collaboration with TRCA, to adopt green development policies, or standards, requiring new developments and redevelopments, to utilize low impact development and green infrastructure techniques to limit the impacts of impervious cover and maintain predevelopment water balance consistent with or exceeding provincial standards or guidance. Understanding that the provincial guidance has not yet been finalized, the current recommendation is:</p> <ul style="list-style-type: none"> a. through the control hierarchy of: <ul style="list-style-type: none"> i. retention (i.e. infiltration, reuse, or evapotranspiration) ii. LID volume capture and release (i.e. LID filtration) iii. stormwater volume detention and release (only once maximum control from steps i and ii have been exhausted) b. shall strive to meet the hydrology model recommended watershed runoff volume control target of the 90th percentile of a 12-hour event, where rainfall depth is approximately 27-29 mm c. shall adhere to best practices and standards for water quality, erosion, and sediment control
	<p>1.1.2</p> <p>Municipal partners, in collaboration with TRCA, to review and update existing policies/Official Plans, bylaws, guidelines, standards, secondary plans, and master plans to:</p> <ul style="list-style-type: none"> a. ensure consistency with the goals and objectives of this watershed plan b. ensure best practices are implemented and the highest standards applied across the watershed for matters related to: <ul style="list-style-type: none"> i. safeguarding against natural hazard risks ii. Water Resource System and Natural Heritage System protection, enhancement, and restoration iii. improving water quality and protecting water quantity for drinking water and ecological needs c. establish a policy evaluation process to assess the effectiveness of policy frameworks consistent with the monitoring of watershed and local trends (i.e. if indicators are not improving, what needs to be done?)
	<p>1.1.3</p> <p>Prior to the construction of Highway 413, if approved, the Ministry of Transportation should include in the design:</p> <ul style="list-style-type: none"> a. appropriate mitigation measures to ensure the natural hazard risks of flooding and erosion will not increase or are managed in accordance with Provincial guidelines and policies and TRCA's Voluntary Project Review process b. appropriate mitigation measures to demonstrate how the Natural Heritage System and Water Resource System will be protected and restored, including ecosystem compensation (once the protection hierarchy of avoid, minimize, and mitigate has been applied) c. appropriate mitigation measures to maintain ecological function and wildlife connectivity



Land Use Objective	Management Actions
<p>LAND USE OBJECTIVE 1</p> <p>Minimize the impacts of human land uses through the adoption and implementation of sustainability policies, LID, and green infrastructure.</p>	<p>1.1.4</p> <p>Municipal partners, in collaboration with other levels of government and TRCA, to work to reduce the amount of chlorides entering the watershed by:</p> <ul style="list-style-type: none"> a. continuing to implement best management practices for winter de-icing procedures on public property b. continuing education and outreach on salt management for private property
	<p>1.1.5</p> <p>TRCA, in collaboration with municipal partners, will:</p> <ul style="list-style-type: none"> a. update relevant stormwater management criteria guidance (consistent with the provincial standards/guidelines) to focus on retention (infiltration and reuse) and filtration to minimize the impacts of new development through the use of LIDs and green infrastructure b. continue to advocate to the Province to update the stormwater volume control guidelines and regulatory framework at the local level
<p>LAND USE OBJECTIVE 2</p> <p>Retrofit, upgrade, and install stormwater infrastructure using best available technologies to reduce the impacts of untreated runoff entering receiving waters.</p>	<p>1.2.1</p> <p>Municipal partners, in collaboration with TRCA, to prioritize on-site control through LID or green infrastructure implementation as much as possible based on site conditions (see Map 1 for areas in the watershed that would benefit the most from LID or green infrastructure implementation to help with natural/pre-development water balance) or as opportunities arise through municipal capital planning for linear projects (i.e. road improvements) or other initiatives (e.g. sustainable community retrofit projects such as TRCA's Sustainable Neighbourhood Action Program).</p>
	<p>1.2.2</p> <p>Municipal partners, in collaboration with TRCA, through stormwater master planning to continue to:</p> <ul style="list-style-type: none"> a. utilize best management practices for stormwater management and consistent design criteria to manage runoff quantity, quality, erosion, and water balance b. implement or continue to advance municipal stormwater cost recovery funding options (e.g. stormwater charges) to reduce effective impervious surfaces in the watershed c. examine opportunities to retrofit outdated stormwater infrastructure and install controls in areas without management through long-term planning and investment strategies (recommended target for watershed to be less than 25% effective impervious cover to minimize impacts to aquatic ecosystem health through the implementation of LIDs and green infrastructure) d. adaptively manage stormwater infrastructure through operation and maintenance schedules and procedures e. take a watershed approach to master planning by coordinating efforts and investment strategies with neighbouring watershed municipalities f. factor in the impacts of climate change on stormwater infrastructure



Land Use Objective	Management Actions
<p>LAND USE OBJECTIVE 2</p> <p>Retrofit, upgrade, and install stormwater infrastructure using best available technologies to reduce the impacts of untreated runoff entering receiving waters.</p>	<p>1.2.3</p> <p>For new developments, municipal partners to have regard for TRCA criteria that requires hydrologic analysis and erosion threshold assessments downstream of potential stormwater detention facilities (e.g. stormwater ponds) that need to demonstrate no negative, or adverse, downstream impacts, prior to municipal approvals.</p>
	<p>1.2.4</p> <p>The Greater Toronto Airports Authority, in collaboration with TRCA, to implement appropriate stormwater management measures to improve the quality and quantity of stormwater from airport lands.</p>
	<p>1.2.5</p> <p>Municipal partners, in collaboration with TRCA, to continue to advance stormwater infrastructure retrofit projects that minimize impacts to the NHS and are outside of the floodplain and identify opportunities for more natural infrastructure solutions.</p>
<p>LAND USE OBJECTIVE 3</p> <p>Reduce the risks associated with natural hazards through enhanced flood and erosion mitigation.</p>	<p>1.3.1</p> <p>TRCA, in collaboration with municipal partners, will:</p> <ul style="list-style-type: none"> a. focus first on Special Policy Areas to continue to characterize flood risk within Flood Vulnerable Clusters b. develop outreach initiatives to educate the public on roles and responsibilities when living in a flood risk area c. enhance flood forecasting and warning systems d. undertake detailed technical studies and Environmental Assessments e. support implementation of flood mitigation strategies in each Flood Vulnerable Cluster
	<p>1.3.2</p> <p>Municipal partners, in collaboration with TRCA, to implement appropriate flood mitigation measures at the six Flood Vulnerable Clusters as recommended in relevant studies and reports.</p>
	<p>1.3.3</p> <p>During planning for transportation infrastructure improvement projects, or new crossings, the City of Toronto, Region of Peel, and lower-tier municipalities to implement best management practices for siting and design in accordance with TRCA’s Valley and Stream Corridor Crossings Guideline, to facilitate hydraulic and hydrologic functions of crossings to avoid and / or mitigate flood risk, slope instability, and erosion risk.</p>



Land Use Objective	Management Actions
<p>LAND USE OBJECTIVE 3</p> <p>Reduce the risks associated with natural hazards through enhanced flood and erosion mitigation.</p>	<p>1.3.4</p> <p>TRCA and municipal partners will continue to prioritize the maintenance of their respective erosion and flood control assets and the remediation of infrastructure hazard sites based on erosion and flood risk.</p>
	<p>1.3.5</p> <p>TRCA will regularly collect Light Detection and Ranging (LiDAR) data (or data using other appropriate and available technology) to allow for robust geospatial analyses of significant terrain movement, and to monitor erosion hazards threatening essential infrastructure and degrading erosion control structures (TRCA assets), and will provide accurate base mapping for flood mapping and modelling projects.</p>
<p>LAND USE OBJECTIVE 4</p> <p>Encourage the use of agricultural best management practices to minimize agricultural runoff and improve rural land stewardship.</p>	<p>1.4.1</p> <p>In collaboration with the agricultural community and provincial ministries, TRCA, the Region of Peel, City of Brampton, and Town of Caledon, to identify opportunities to expand best management practices that reduce agricultural runoff and improve water management, such as:</p> <ul style="list-style-type: none"> a. using cover crops, and/or leaving crop residue b. adopting no till farm practices during the non-growing season c. conducting soil testing for nutrients and adjusting fertilizer application rates, if required
	<p>1.4.2</p> <p>In collaboration with the agricultural community, rural land owners, and provincial ministries, TRCA, the Region of Peel, City of Brampton, and Town of Caledon, to identify opportunities to improve rural land stewardship practices through:</p> <ul style="list-style-type: none"> a. improving education and outreach about the benefits of utilizing best management practices to improve habitat (e.g. meadows for sensitive bird species) and how efforts can have mutual benefits towards agricultural practices (e.g. windrows, reduced erosion, pollinator habitat, etc.) b. incentivizing increased tree canopy and naturalized vegetation buffers between agricultural lands and natural and/or Water Resource System features and areas c. incentivizing the implementation of Environmental Farm Plans and other rural land stewardship programs (e.g. TRCA’s Rural Clean Water Program)

5.2 WATER RESOURCE SYSTEM GOAL

GOAL 2

Protect, enhance, and restore the areas and features that comprise the Water Resource System (including aquatic habitat) for ecosystem resilience and sustainability.

This goal focuses on ensuring policies are in place for the long-term protection of the WRS, while implementing programs to enhance and restore aquatic habitat and riparian corridors. The WRS is presented in [Maps 2A](#) and [2B](#). The areas and features that comprise the WRS are to be protected in accordance with the management actions outlined below, and municipal and provincial policies.

The WRS in the Etobicoke Creek watershed is currently stressed, with limited natural cover, poor water quality, and poor aquatic habitat conditions. Implementing the management actions in [Table 9](#) will be essential to enhancing the health of the WRS and adapting to climate change.

TABLE 9:
WRS Management Actions

WRS Objective	Management Actions
<p>WRS OBJECTIVE 1</p> <p>Implement appropriate policies and programs that identify, protect, enhance, and restore the areas and features that comprise the Water Resource System.</p>	<p>2.1.1</p> <p>The City of Toronto, Region of Peel, and lower-tier municipalities, in collaboration with TRCA, to ensure the protection of the Water Resource System (Map 2A and Map 2B) and its functions by:</p> <ul style="list-style-type: none"> a. updating Official Plans and zoning bylaws to identify and protect the Water Resource System b. assessing existing standards, policies, and guidelines for land use and infrastructure development to ensure they reflect provincial policy direction to protect, enhance, and restore the quality and quantity of water c. avoiding development near key hydrologic features through the establishment of appropriate buffers d. requiring the implementation of appropriate mitigation measures where avoidance of key hydrologic areas is not possible, to maintain hydrologic functions
	<p>2.1.2</p> <p>The Town of Caledon, in collaboration with TRCA, to require Headwater Drainage Feature classification and relevant management approaches as per the Evaluation, Classification and Management of Headwater Drainage Features Guidelines, prior to planning approvals in the Headwaters subwatershed.</p>

WRS Objective	Management Actions
<p>WRS OBJECTIVE 1</p> <p>Implement appropriate policies and programs that identify, protect, enhance, and restore the areas and features that comprise the Water Resource System.</p>	<p>2.1.3</p> <p>The Town of Caledon, in collaboration with the Region of Peel and TRCA, to establish policies to ensure that the Headwaters of Etobicoke Creek maintains less than 25% effective impervious cover (in accordance with Appendix A) as urbanization increases to minimize impacts to aquatic ecosystem health, and to demonstrate through a subwatershed plan (or equivalent), prior to the approvals of any secondary plans in the Headwaters, that:</p> <ul style="list-style-type: none"> a. key hydrologic features will be protected and hydrologic functions maintained b. where avoidance of key hydrologic areas is not possible, appropriate mitigation measures are to be implemented to maintain downstream hydrologic functions c. there will be no negative or adverse downstream effects, such as increased flooding, erosion, or deteriorated water quality through a hydraulic analysis (to quantify and map depth and extent of impacts) and other relevant modelling
	<p>2.1.4</p> <p>TRCA, in collaboration with municipal partners, to prioritize the restoration of aquatic sites identified on Map 3A and Map 3B, which have been selected for contributing to the following:</p> <ul style="list-style-type: none"> a. enhancing habitat quality and watershed connectivity b. enhancing natural cover within riparian corridors c. ensuring biodiversity persists d. improving watershed resiliency to climate change <p>Note: Municipalities may have their own restoration priorities (outlined in various municipal strategies and park plans) in addition to these priority restoration sites. This watershed plan encourages restoring as much habitat as possible across the watershed.</p>
	<p>2.1.5</p> <p>The City of Brampton to ensure development applications for high density on the Brampton Esker (Map 4) include a hydrogeological study to confirm foundation stability and groundwater control, prior to planning approvals.</p>
	<p>2.1.6</p> <p>The City of Brampton and TRCA, in collaboration with the Region of Peel, to develop an alternative groundwater control strategy for the Highway 410/ Bovaird Drive area to prepare for the potential situation that dewatering by the Turnberry Golf Club ceases or becomes ineffective.</p>

WRS Objective	Management Actions
<p>WRS OBJECTIVE 2</p> <p>Improve aquatic habitat connectivity and reduce the impacts of pollutants on aquatic health.</p>	<p>2.2.1</p> <p>TRCA, in collaboration with municipal partners and landowners, to remove the priority barriers to fish movement identified on Map 5.</p>
	<p>2.2.2</p> <p>TRCA and municipal partners, in collaboration with industrial and commercial landowners and the province, to:</p> <ul style="list-style-type: none"> a. identify high risk spill areas and implement effective spill prevention and contingency plans in accordance with provincial regulations b. educate commercial and industrial property owners on effective maintenance of oil and grit separators, and other pollution control infrastructure
	<p>2.2.3</p> <p>TRCA and municipal partners to participate in research initiatives to identify sources of microplastics and emerging chemicals of concern, and to work with other levels of government to manage and ideally remove these pollutants from the environment.</p>



5.3 NATURAL HERITAGE SYSTEM AND URBAN FOREST GOAL

GOAL 3

Protect, enhance, and restore the Natural Heritage System and urban forest within the watershed to improve ecosystem resilience and sustainability.

This goal focuses on policies and programs to protect, enhance, and restore the quantity and quality of the NHS and urban forest within the watershed. The watershed refined enhanced NHS is shown in [Map 6](#) and the management actions are outlined in [Table 10](#). The priority areas for urban forest canopy enhancements are shown in [Map 9](#).

It is the responsibility of municipalities to adopt a NHS that is consistent with provincial policy and informed by the goals and objectives of the Etobicoke Creek Watershed Plan. The watershed refined enhanced NHS, developed as part of this watershed plan, includes areas with existing natural cover and areas that are targeted to be potential natural cover through restoration. It also includes contributing areas, which are built or unbuilt areas that can provide additional habitat and connectivity benefits through the use of green infrastructure.

Assuming that the potential natural cover areas are restored, the watershed refined enhanced NHS achieves approximately 23% natural cover across the watershed (up from approximately 12% currently). This is still below recommended guidelines (at least 30%) and the scientific literature for a sustainable and resilient system. However, given the heavily urbanized nature of this watershed, the watershed refined enhanced NHS represents a significant and realistic improvement that will have significant benefits for overall watershed health, biodiversity, and climate resiliency.

Urban forests provide valuable terrestrial habitat, help manage stormwater, provide clean air, and have other socio-economic benefits (e.g. regulating temperatures, improving personal well-being). Including the urban forest under this goal recognizes the integrated nature of natural areas and the ecological value of additional tree canopy in parks, on streets, or on private property. See [Appendix B](#) for more details on the tiered enhancement opportunities identified in the management actions related to urban forestry.

TABLE 10:
NHS and Urban Forest Management Actions

NHS and Urban Forest Objective	Management Actions
<p>NHS AND URBAN FOREST OBJECTIVE 1</p> <p>Improve the quality and quantity of the Natural Heritage System through ecosystem and biodiversity protection, enhancement, and restoration.</p>	<p>3.1.1 Municipal partners, in collaboration with TRCA, to establish habitat targets through programs and policies to increase natural cover within the watershed as follows:</p> <ul style="list-style-type: none"> a. increase forest cover to at least 14% of total watershed area b. increase wetland cover to at least 3% of total watershed area c. increase meadow cover to at least 5% of total watershed area <p>3.1.2 The City of Toronto, Region of Peel, and lower-tier municipalities, to ensure the protection, enhancement, and restoration of a watershed refined enhanced Natural Heritage System consistent with the goals and objectives of this watershed plan (Map 6) by:</p> <ul style="list-style-type: none"> a. designating in their Official Plans, at a minimum, existing natural cover as identified in Map 6 b. including policies in their Official Plans to identify enhancement and restoration opportunities for potential natural cover areas as identified in Map 6 c. assessing existing standards, guidelines, and policies for land use and infrastructure development to ensure they reflect best practices to maintain, restore, or enhance the designated Natural Heritage System d. avoiding infrastructure development (i.e. buildings and structures) and minimizing infrastructure linear feature crossings in a designated Natural Heritage System e. adopting municipal policies for ecosystem compensation that meet or exceed TRCA’s Guideline for Determining Ecosystem Compensation, where development in a designated Natural Heritage System is unavoidable f. applying a minimum vegetation protection zone along natural heritage features at the boundary of a designated Natural Heritage System (a minimum 30 metre vegetation protection zone is recommended, unless otherwise determined through an appropriate environmental study or provincial policy) g. requiring development and site alterations be designed and approved to prevent encroachment into a designated Natural Heritage System.

NHS and Urban Forest Objective	Management Actions
<p>NHS AND URBAN FOREST OBJECTIVE 1</p> <p>Improve the quality and quantity of the Natural Heritage System through ecosystem and biodiversity protection, enhancement, and restoration.</p>	<p>3.1.3</p> <p>TRCA, in collaboration with municipal partners, and the Greater Toronto Airports Authority, to prioritize the restoration and enhancement of the terrestrial sites identified on Map 3A and Map 3B (while ensuring aviation safety), which have been selected for contributing to:</p> <ul style="list-style-type: none"> a. increasing habitat quantity b. enhancing habitat quality and connectivity c. ensuring biodiversity persists d. reducing climate vulnerabilities <p>Note: Municipalities may have their own restoration priorities (outlined in various municipal strategies and park plans) in addition to these priority restoration sites. This watershed plan encourages restoring as much habitat as possible across the watershed.</p>
	<p>3.1.4</p> <p>TRCA, in collaboration with municipal partners, to explore opportunities to secure the sites identified on Map 7 for ecological protection and to increase the public land ownership and connectivity within the watershed.</p>
	<p>3.1.5</p> <p>All municipalities, in collaboration with TRCA and the Greater Toronto Airports Authority, are to expand the trail network in the Etobicoke Creek watershed to create a connected and safe active recreation network from Lake Ontario to the Headwaters and to neighbouring watersheds (based on TRCA’s Trail Strategy for the Greater Toronto Region 2019, the Province-wide Cycling Network, and municipal trail and active transportation strategies) that minimizes potential impacts to the Natural Heritage System by:</p> <ul style="list-style-type: none"> a. ensuring proper trail management and signage b. engaging trail users by providing education and outreach on the importance of the Natural Heritage System along the trail network c. promoting community stewardship to maintain and monitor the Natural Heritage System for improper trail usage (e.g. off-trail compaction and erosion), illegal dumping, and invasive species, while encouraging community restoration programs (e.g. tree plantings) d. collaborating, when possible, to manage problematic invasive species e. engaging with MCFN to develop interpretative trail signage on the importance of water and the relationship between Treaties and the Etobicoke Creek, and include appropriate Indigenous placemaking

NHS and Urban Forest Objective	Management Actions
<p>NHS AND URBAN FOREST OBJECTIVE 1</p> <p>Improve the quality and quantity of the Natural Heritage System through ecosystem and biodiversity protection, enhancement, and restoration.</p>	<p>3.1.6 Municipal partners, in collaboration with TRCA, to improve wildlife passage at priority road crossings identified on Map 8.</p>
	<p>3.1.7 Municipal partners, in collaboration with TRCA, to include in green development standards or guidelines, urban design requirements to improve conditions for biodiversity and habitat, such as green roofs, bird safe windows, wildlife crossings, etc., especially within contributing areas of the Natural Heritage System.</p>
<p>NHS AND URBAN FOREST OBJECTIVE 2</p> <p>Increase urban forest canopy cover throughout the watershed to improve social and environmental well-being.</p>	<p>3.2.1 The City of Toronto, Region of Peel, and lower-tier municipalities, in collaboration with TRCA, will undertake strategic tree planting as per the priority planting areas identified on Map 9 to achieve tree canopy cover targets for each subwatershed, or municipality, as follows:</p> <ul style="list-style-type: none"> - Lower Etobicoke = 23.3% - Main Branch = 15% - West Branch = 19.6% - Tributary 3 = 12.2% - Tributary 4 = 14.7% - Little Etobicoke Creek = 15.1% - Spring Creek = 16% - Headwaters (Greenbelt portion) = 13.3% <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>City of Toronto = 24%</p> <p>City of Mississauga = 12.5%</p> <p>City of Brampton = 20%</p> <p>Town of Caledon = 11.3%</p> </div> <p>Note: See management action 3.2.2 for the non-Greenbelt portion of the Headwaters. Municipalities may have specific canopy cover targets that exceed these watershed targets. This watershed plan encourages achieving the highest possible amount of canopy cover across the watershed.</p>
	<p>3.2.2 The Town of Caledon, in collaboration with the Region of Peel, will require a minimum of 30% canopy cover target for any new developments in areas of the Headwaters subwatershed outside of the Greenbelt by:</p> <ol style="list-style-type: none"> a. requiring developments to submit tree planting plans prior to planning approvals that are based on area specific data b. adopting tree preservation by-laws to retain mature trees c. ensuring green development standards contain progressive planting policies for all aspects of a development (e.g. right-of-ways, lots, parks, etc.).

NHS and Urban Forest Objective	Management Actions
<p>NHS AND URBAN FOREST OBJECTIVE 2</p> <p>Increase urban forest canopy cover throughout the watershed to improve social and environmental well-being.</p>	<p>3.2.3</p> <p>The City of Toronto, Region of Peel, and lower-tier municipalities, in collaboration with TRCA, will develop, or update, urban forest management plans or strategies that:</p> <ul style="list-style-type: none"> a. enhance tree and soil conservation in accordance with Preserving and Restoring Healthy Soil: Best Practices for Urban Construction at all public and private property b. implement the tree canopy cover targets as identified in management action 3.2.1 by focusing planting in the priority areas identified on Map 9 c. identify and promote opportunities for sustainable community retrofits (for example through TRCA’s Sustainable Neighbourhood Action Program) in the priority areas identified on Map 9 d. encourage an urban forest with diverse and native (or non-invasive) tree species and class sizes e. ensure consistent policies and bylaws for tree conservation on public and private lands f. develop, or expand, programs for native tree planting on public and private lands

FIGURE 15:
Etobicoke Creek at Centennial Park (Toronto)



6. Implementation, Monitoring and Evaluation

The following sections provide an overview of the process that will be used for implementation, tracking, and reporting of the Etobicoke Creek Watershed Plan, and provide information on the inventory, monitoring, and evaluation that will take place to continue to evaluate the health of the Etobicoke Creek watershed as well as the adaptive management plan.

6.1 IMPLEMENTATION, TRACKING AND REPORTING OF THE ETOBICOKE CREEK WATERSHED PLAN

The successful implementation of the Etobicoke Creek Watershed Plan will require the commitment, collaboration, support, and engagement of TRCA, the municipalities in the watershed, other partners, and watershed stakeholders/residents.

Once final approvals and endorsements of the Etobicoke Creek Watershed Plan have been obtained in 2024 from municipal committees and Councils and from TRCA's Board of Directors, implementation of the watershed plan will begin. The Etobicoke Creek Watershed Plan is intended to be in effect for 10 years from when it is finalized and approved. Collaborative and comprehensive implementation, tracking, and reporting of all aspects of the management framework outlined in [Section 5 - Management Framework](#) will be essential to fully realize the vision for the watershed and to improve watershed health and build resiliency to land use and climate changes.

An **Implementation Steering Committee** consisting of TRCA, the municipalities within the watershed, MCFN, and the GTAA will be established in 2024 to guide and support implementation and will be facilitated by TRCA. The Implementation Steering Committee will work together to create a detailed implementation, tracking, and reporting plan to ensure commitment to and accountability for implementation on the part of TRCA, our municipal partners, and other stakeholders. This will include:

- Identifying implementation timelines and clear responsibilities for each management action.
- Developing specific measures/metrics to track and report on implementation of each management action.

- Developing tracking and reporting mechanisms specific to the Etobicoke Creek Watershed Plan. This could include an interactive and user-friendly implementation and tracking platform to be developed by TRCA. This tool would track and report on implementation progress using dashboards, story maps, visual tools, etc.
- Identifying the resources required for implementation, including funding, to support actions such as restoration, in-stream barrier removal, and research/monitoring.
- Ensuring each Implementation Steering Committee member coordinates with their respective organizations to champion implementation of the Etobicoke Creek Watershed Plan including advocating for effective implementation and exploring opportunities for funding.

TRCA and our partner municipalities (along with a few other stakeholders) will play key roles in the implementation of the management actions. Although the Etobicoke Creek Watershed Plan will not make land use and infrastructure planning decisions, it is intended to inform municipal initiatives and processes. Many of the management actions will be implemented through municipal plans, processes, guidelines, and strategies such as Official Plans, Secondary Plans, zoning by-laws, subwatershed studies, stormwater master planning and stormwater control measures, best management practices, and urban forest and climate change strategies.

The Implementation Steering Committee will also establish mechanisms to continue to receive input from First Nations and Indigenous communities and from watershed stakeholders (including provincial partners, landowners, developers, agricultural organizations, NGOs), residents, and the public. The Implementation Steering Committee will provide updates on implementation progress and ways to participate and engage more directly in various implementation activities.

As part of the implementation of this watershed plan, TRCA and its partners will continue to conduct annual reporting on watershed health and plan implementation progress. Annual reporting through TRCA's Watershed and Ecosystems Reporting Hub will track watershed health trends through the inventory/monitoring discussed below and the indicators identified in **Section 5 - Management Framework**.

Some components of the watershed plan may not be reported on annually (e.g. aquatic and terrestrial), since stations are not inventoried/monitored annually.

Through the implementation of the Etobicoke Creek Watershed Plan, all watershed partners and stakeholders can contribute to a healthier, more sustainable, and more resilient watershed that can provide long-term benefits to all residents.

6.2 INVENTORY, MONITORING AND EVALUATION

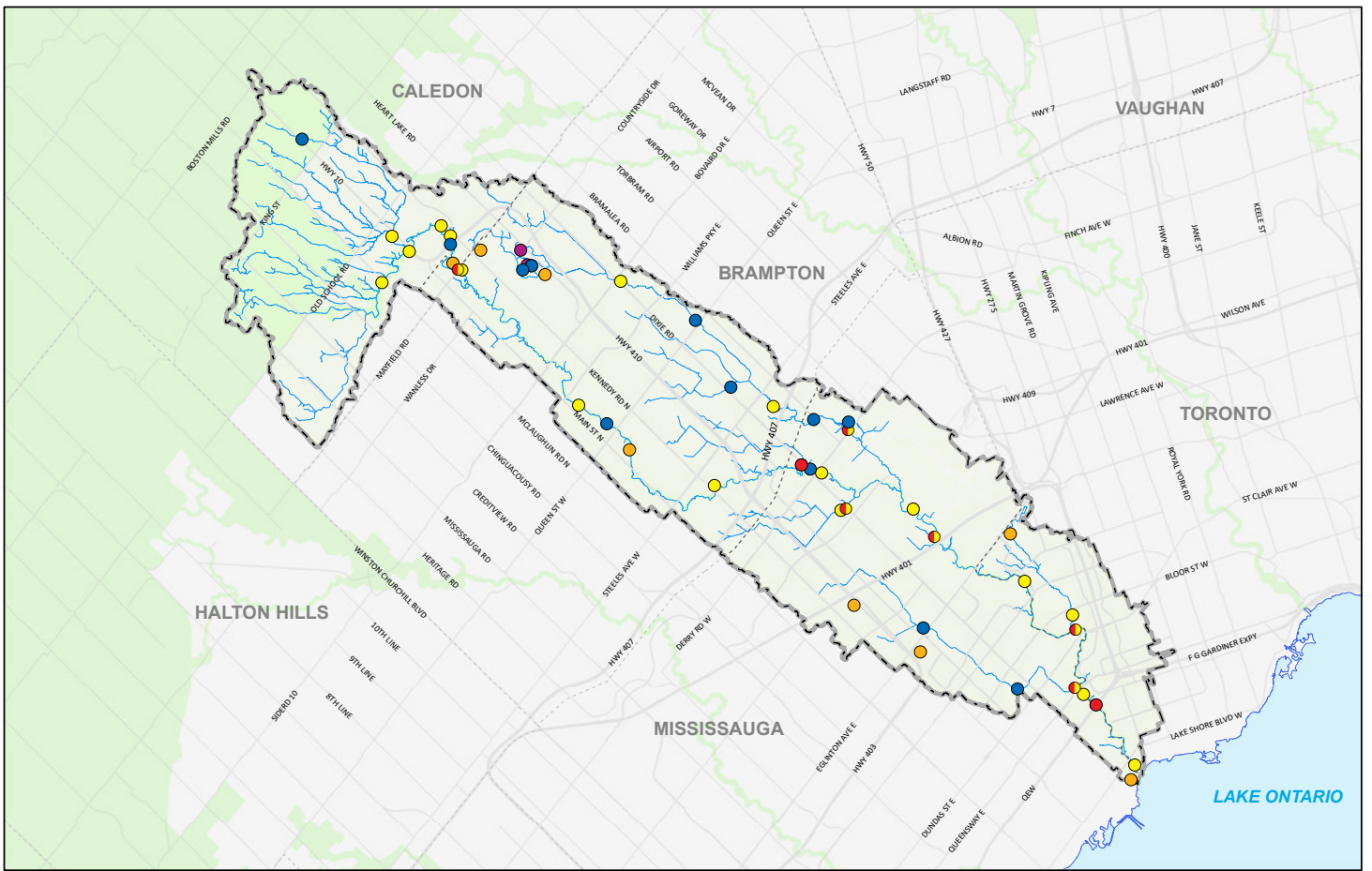
Regular and ongoing inventory, monitoring, and research of watershed conditions (to be undertaken by TRCA with support from partner municipalities) will help assess trends and track implementation of this watershed plan. This will help determine what is working to maintain or improve conditions and what, if necessary, needs to change should conditions deteriorate.



Inventory and monitoring for the Etobicoke Creek watershed is designed to help evaluate watershed health and specific indicators associated with the objectives of this watershed plan.

The location of the various types of monitoring stations is identified on the map in **Figure 16**.

Table 11 identifies the monitoring frequency, what is monitored, and why monitoring is important for the various types of stations identified, and provides some information about the inventory work for the ECWP.

**FIGURE 16:
Monitoring Stations**



 <p>Created by: TRCA Information Technology and Records Management Date: July 8, 2023 Disclaimer: The data used to create this map was compiled from a variety sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at anytime without notice. For further information about the data on this map, please contact the TRCA GIS Department. (416) 661-6600.</p>	<h3>Etobicoke Creek Watershed Plan: Monitoring Stations</h3> 	<ul style="list-style-type: none"> ● Water Quality ● Water Quantity ● Water Quality / Aquatic ● Groundwater ● Aquatic ● Terrestrial Municipal Boundary — Watercourse — Shoreline Pearson Airport Greenbelt Etobicoke Creek Watershed Boundary
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Note:

Inventory locations are not shown on this map as they will be determined on a yearly basis based on where data updates are required.

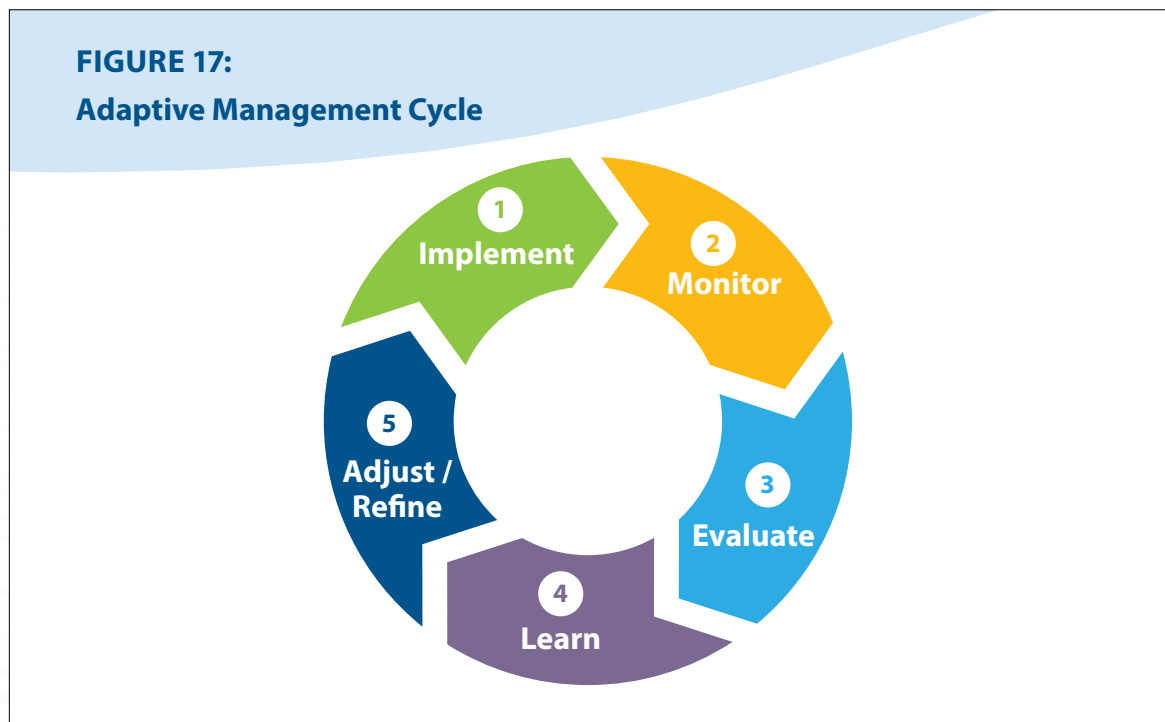
TABLE 11:
Monitoring / Inventory Program

Monitoring Station	Frequency	What is monitored?	Why do we monitor it?
WATER QUANTITY	Continuous measurement every 15 minutes for stream gauges and every 5 minutes for precipitation gauges	Stream level, discharge, and temperature, and/or rainfall/snowfall amount	<p>Applicable to overall watershed health and trends to know whether hydrology conditions are improving or not.</p> <p>Water quantity monitoring supports flood plain mapping, flood forecasting and warning, low water response, and infrastructure design.</p> <p>Real-time precipitation and stream monitoring information supports timely flood messaging.</p>
WATER QUALITY	Monthly samples and/or event-based samples (i.e. heavy rainfall)	Water chemistry (e.g. nutrients, metals, bacteria, etc.)	<p>Applicable to overall watershed health and trends to know whether water quality conditions are improving or not.</p> <p>Monitoring water quality helps to understand the impacts of land uses on local water quality that ultimately flows into Lake Ontario.</p>

Monitoring Station	Frequency	What is monitored?	Why do we monitor it?
GROUNDWATER	Hourly groundwater level and temperature, and quarterly manual groundwater level measurements, sampled annually for water quality	Water levels	<p>Applicable to overall watershed health and trends to know whether hydrogeology conditions are improving or not.</p> <p>Groundwater and surface water interactions are essential for a functioning WRS. Understanding groundwater conditions is vital to understanding the nature of these interactions.</p>
AQUATIC HEALTH	Every three years	Fish community, aquatic habitat, and benthic invertebrate community	Applicable to the health of the aquatic ecosystem.
TERRESTRIAL HEALTH	Annually	Vegetation and forest birds	Applicable to the health of the terrestrial ecosystem.
<p>Note: Inventory work is determined on a yearly basis based on where data updates are required, and can include vegetation community polygon mapping, flora and fauna species of concern mapping, and full species site lists.</p>			

6.3 ADAPTIVE MANAGEMENT

Adaptive management is a systematic process for continually improving practices by learning and applying updated knowledge to improve plan implementation (see [Figure 17](#)). In the context of this watershed plan, adaptive management, in conjunction with inventory, monitoring, and research programs, may lead to refinements of the management framework, or the number of monitoring stations, throughout the life of this watershed plan. For example, if water quality continues to deteriorate, management actions may need to be modified to focus on this particular issue.



Wildlife Movement and Habitat Connectivity

Many native wildlife species actively move between different habitats (forests and wetlands, for example) at different times of year for breeding, foraging, or hibernation. The Toronto region is expected to continue urbanizing as the population grows, necessitating further construction, expansion, and upgrading of roadways and railways. This transportation infrastructure reduces habitat size and severs the connections between different habitats, limiting the ability of species to safely access resources and leading to road mortality and/or population isolation.

An important aspect of TRCA’s work is applied research on wildlife movement and habitat connectivity. One example of this is the work that was conducted along Heart Lake Road from Mayfield Road to Sandalwood

Parkway in the City of Brampton within the Etobicoke Creek watershed. Through road ecology surveys conducted by TRCA, the City of Brampton, the Toronto Zoo’s Ontario Road Ecology Group, and over 40 community volunteers, it was determined that portions of this roadway were hotspots for road mortality. This led to the installation of dedicated wildlife culverts under Heart Lake Road in 2016 and 2020 to allow safe passage for wildlife. To facilitate access to the passages, directional wildlife fencing has also been installed so wildlife is channeled towards the culvert. Turtle nesting habitats were also created to allow turtles, such as Snapping Turtle (*Chelydra serpentina*; special concern species in Ontario), to lay their eggs in a safe wetland environment.

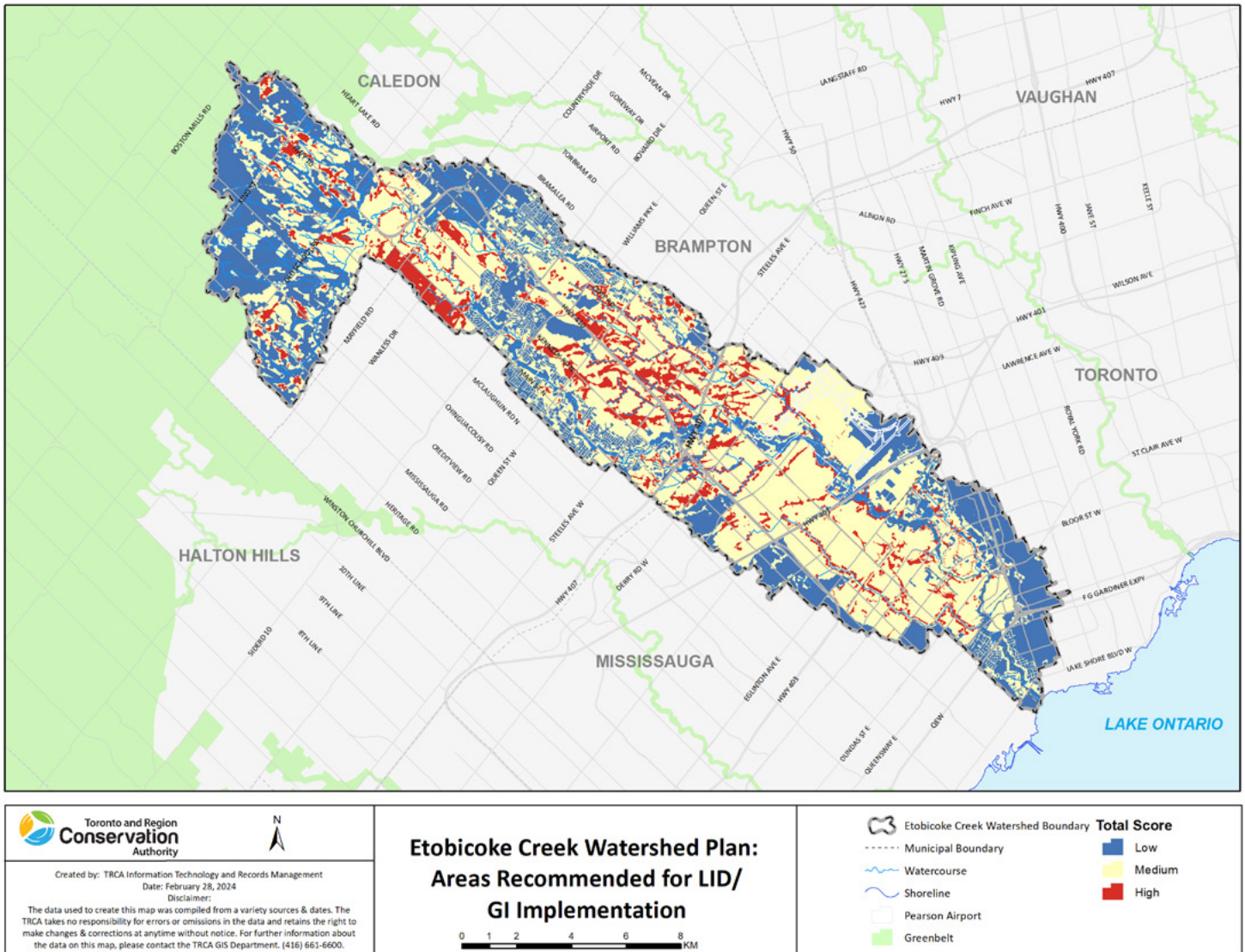


FIGURE 18:
Before and After, Stream Restoration at
Conservation Drive Park (Brampton)



7. Maps

The maps in this section, along with a map viewer showing many of the mapping layers, can be viewed in the online interactive Etobicoke Creek Watershed Plan [here](#).



Map 1

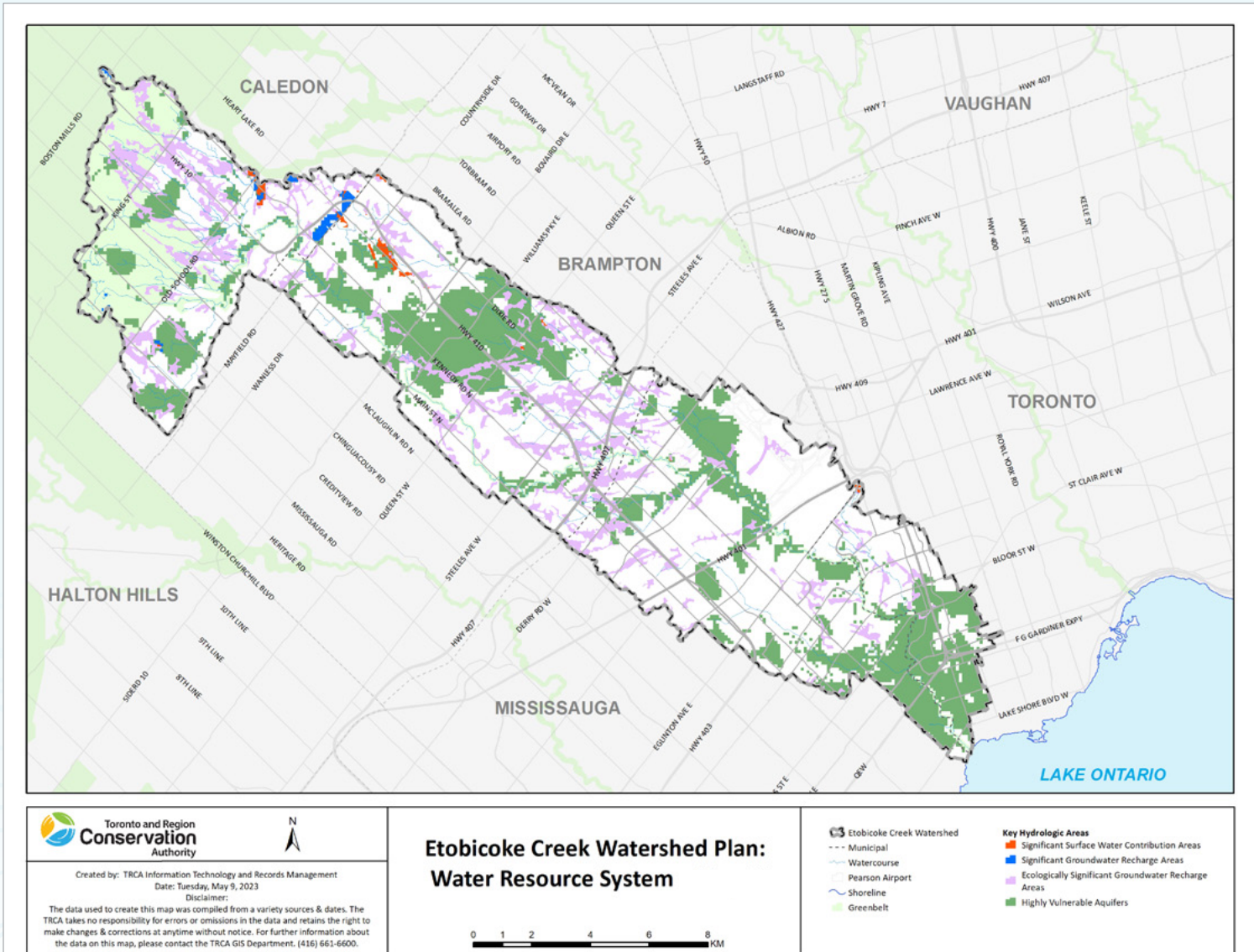
This map shows areas in the watershed that would benefit the most from low impact development (LID) or green infrastructure (GI) implementation to help regain natural or pre-development water balance. Areas in red are those that would benefit the most from the use of LID or green infrastructure implementation.

Appendix B contains information on how the areas were determined.

This map is meant to be used as a preliminary screening tool. Additional detailed site-level investigations and technical studies will be required to obtain local/site level information to help assess the suitability of the use of LIDs or green infrastructure in these areas based on site conditions.

MANAGEMENT ACTION

1.2.1 refers to this map.



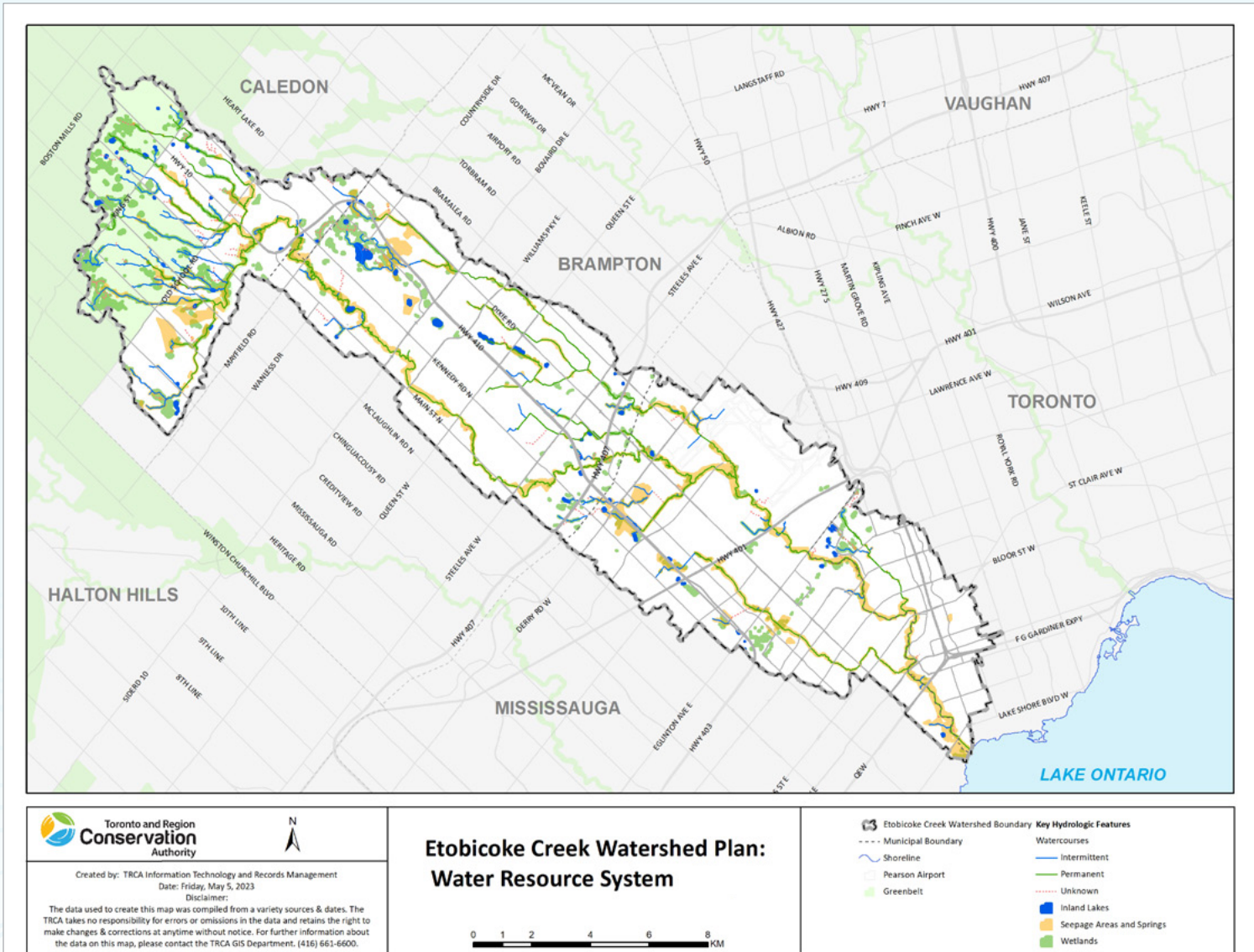
Map 2A

This map shows the Key Hydrologic Areas of the WRS. The WRS is essential for maintaining long-term ecosystem resilience and sustainability.

MANAGEMENT ACTION

2.1.1 refers to this map.

Map 2B shows the Key Hydrologic Features of the WRS.



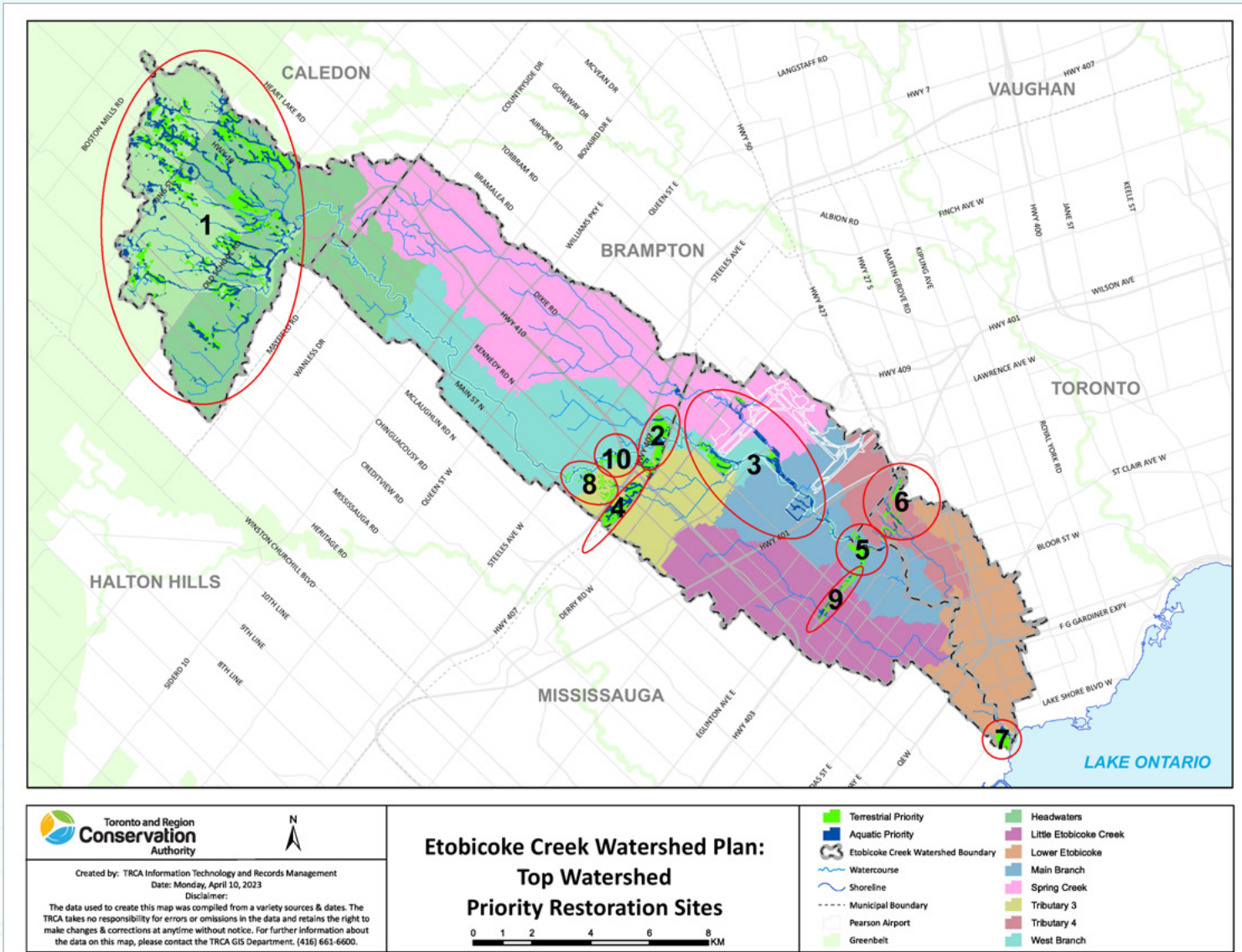
Map 2B

This map shows the Key Hydrologic Features of the WRS. The WRS is essential for maintaining long-term ecosystem resilience and sustainability.

MANAGEMENT ACTION

2.1.1 refers to this map.

Map 2A shows the Key Hydrologic Areas of the WRS.



Map 3A

This map shows the top 10 watershed priority restoration sites based on aquatic and terrestrial criteria and total size.

MANAGEMENT ACTIONS

2.1.4 and 3.1.3 refer to this map. See [Table 12](#) for more details on each priority site.

[Appendix B](#) contains information on how the priority restoration areas were determined.

TABLE 12:
Top 10 Watershed Priority Restoration Sites

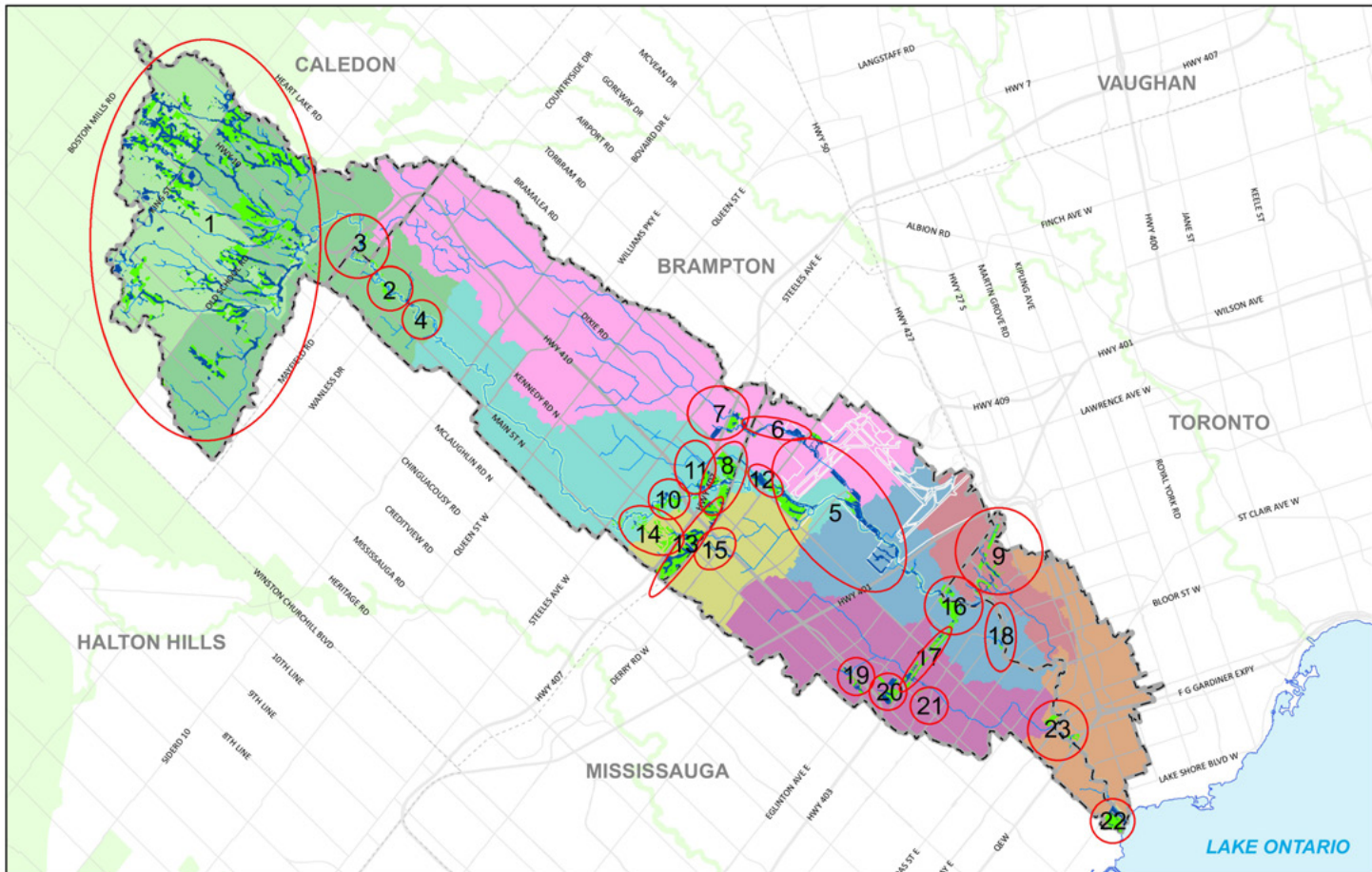
Name of Site (Subwatershed)	Existing Natural Cover to Enhance (in hectares)	Potential Natural Cover to Restore (in hectares)	Total Size (in hectares)	By Habitat Type (in hectares)
1. Headwaters 1* (Headwaters) Town of Caledon	130.2	550.4	680.6	Forest (357.2), Riparian (159.4), Wetland (164 ha)
2. Hwy 407 Hydro (East of 410) (Tributary 3 / West Branch / Spring Creek) City of Brampton	30.3	50.1	80.3	Forest (25.5), Meadow (34.1), Riparian (12.4), Wetland (8.3)
3. Pearson 1 (West Branch / Spring Creek / Main Branch) City of Mississauga	52.2	14.8	67.3	Forest (11.4), Riparian (50.8), Wetland 5.1)
4.Hwy 407 Hydro (West of 410) (Tributary 3) City of Brampton	9.2	57.0	66.1	Forest (10.0), Meadow (30.8), Riparian (20.0), Wetland (5.3)
5. Wood Creek (Main Branch) City of Mississauga	11.4	25.2	36.6	Forest (22.4), Meadow (5.9), Riparian (6.4), Wetland (1.8)
6. Centennial Park Etobicoke (Tributary 4) City of Toronto	2.3	22.7	25.1	Forest (8.2), Meadow (8.6), Riparian (3.8), Wetland (3.5)

Name of Site (Subwatershed)	Existing Natural Cover to Enhance (in hectares)	Potential Natural Cover to Restore (in hectares)	Total Size (in hectares)	By Habitat Type (in hectares)
7. Marie Curtis / Arsenal (Lower Etobicoke) City of Toronto and City of Mississauga	7.3	15.9	23.2	Forest (17), Riparian (5.3), Wetland (0.6), Shoreline (0.3)
8. Brampton Golf Club / Peel Village Golf Club (Tributary 3 / West Branch) City of Brampton	5.5	22.1	27.6	Forest (24.2), Meadow (1.1), Riparian (2.0), Wetland (0.3)
9. Eastgate Transitway (Little Etobicoke Creek / Main Branch) City of Mississauga	12.1	13.3	25.4	Forest (10.1), Meadow (9.6), Riparian (2.5), Wetland (3.3)
10. CAA Centre (West Branch / Tributary 3) City of Brampton	7.8	9.2	17.0	Forest (10.6), Meadow (3.0), Riparian (2.9), Wetland (0.4)
TOTALS	268.3	780.7	1,049.2	Forest (496.6), Meadow (93.1), Riparian (265.5), Wetland (192.6), Shoreline (0.3)

Notes:

*If there is urban expansion in the headwaters, most of the restoration opportunities will be through stewardship, and areas with high ecological function should be included in the NHS.

There may be some minor discrepancies between total size, existing + potential, and by habitat type due to rounding, overlap of restoration opportunities, and the exclusion of restoration opportunities like green infrastructure.



 <p>Created by: TRCA Information Technology and Records Management Date: Monday, April 10, 2023 Disclaimer: The data used to create this map was compiled from a variety sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at anytime without notice. For further information about the data on this map, please contact the TRCA GIS Department: (416) 661-6600.</p>	<p>Etobicoke Creek Watershed Plan: Top Subwatershed Priority Restoration Sites</p> 	<table border="0"> <tr> <td> Terrestrial Priority</td> <td> Headwaters</td> </tr> <tr> <td> Aquatic Priority</td> <td> Little Etobicoke Creek</td> </tr> <tr> <td> Etobicoke Creek Watershed Boundary</td> <td> Lower Etobicoke</td> </tr> <tr> <td> Watercourse</td> <td> Main Branch</td> </tr> <tr> <td> Shoreline</td> <td> Spring Creek</td> </tr> <tr> <td> Municipal Boundary</td> <td> Tributary 3</td> </tr> <tr> <td> Pearson Airport</td> <td> Tributary 4</td> </tr> <tr> <td> Greenbelt</td> <td> West Branch</td> </tr> </table>	Terrestrial Priority	Headwaters	Aquatic Priority	Little Etobicoke Creek	Etobicoke Creek Watershed Boundary	Lower Etobicoke	Watercourse	Main Branch	Shoreline	Spring Creek	Municipal Boundary	Tributary 3	Pearson Airport	Tributary 4	Greenbelt	West Branch
Terrestrial Priority	Headwaters																	
Aquatic Priority	Little Etobicoke Creek																	
Etobicoke Creek Watershed Boundary	Lower Etobicoke																	
Watercourse	Main Branch																	
Shoreline	Spring Creek																	
Municipal Boundary	Tributary 3																	
Pearson Airport	Tributary 4																	
Greenbelt	West Branch																	

Map 3B

This map shows the priority restoration sites by subwatershed based on aquatic and terrestrial criteria and total size.

MANAGEMENT ACTIONS

2.1.4 and 3.1.3 refer to this map. See [Table 13](#) for more details on each priority site.

[Appendix B](#) contains information on how the priority restoration areas were determined.

TABLE 13:
Priority Restoration Sites by Subwatershed

Name of Site (Subwatershed)	Existing Natural Cover to Enhance (in hectares)	Potential Natural Cover to Restore (in hectares)	Total Size (in hectares)	By Habitat Type (in hectares)
1. Headwaters 1* (Headwaters) Town of Caledon	130.2	550.4	680.6	Forest (357.2), Riparian (159.4), Wetland (164 ha)
2. Conservation Drive Park (Headwaters) City of Brampton	8.4	3.2	11.6	Forest (5.5), Riparian (1.4), Wetland (1.2)
3. Summer Valley (Headwaters) Town of Caledon	2.8	2.2	5.0	Forest (1.4), Riparian (0.8), Wetland (0.8)
4. Loafers Lake (Headwaters) City of Brampton	2.9	0.1	3.0	Riparian / Wetland (3.0)
5. Pearson 1 (Spring Creek Portion) City of Mississauga	19.0	8.8	27.8	Forest (0.4), Riparian (21.1), Wetland (1.6)
5. Pearson 1 (West Branch Portion) City of Mississauga	13.2	2.9	16.2	Forest (5.1), Riparian (10.3), Wetland (0.8)
5. Pearson 1 (Main Branch Portion) City of Mississauga	19.0	8.8	27.8	Forest (0.4), Riparian (21.1), Wetland (1.6)

***Note:**

If there is urban expansion in the headwaters, most of the restoration opportunities will be through stewardship, and areas with high ecological function should be included in the NHS.

Name of Site (Subwatershed)	Existing Natural Cover to Enhance (in hectares)	Potential Natural Cover to Restore (in hectares)	Total Size (in hectares)	By Habitat Type (in hectares)
6. Wildfield Park (Spring Creek) City of Mississauga	8.6	5.1	13.7	Forest (0.8), Riparian (11.6), Wetland (1.3)
7. Hwy 407 Median (Spring Creek) City of Brampton and City of Mississauga	13.0	0.5	13.5	Forest (8.6), Riparian (2.2), Wetland (2.7)
8. Hwy 407 Hydro (East of 410) (Spring Creek Portion) City of Brampton	4.9	0.1	5.0	Forest (0.7), Riparian (1.4), Wetland (2.6)
8. Hwy 407 Hydro (East of 410) (West Branch Portion) City of Brampton	22.9	27.1	50.0	Forest (22.5), Meadow (16.7), Riparian (5.4), Wetland (5.5)
8. Hwy 407 Hydro (East of 410) (Tributary 3 Portion) City of Brampton	2.4	22.8	25.2	Forest (2.4), Meadow (17.0), Riparian (5.6), Wetland (0.3)
9. Centennial Park Etobicoke (Tributary 4) City of Toronto	2.3	22.7	25.1	Forest (8.2), Meadow (8.6), Riparian (3.8), Wetland (3.5)
10. CAA Centre (West Branch) City of Brampton	7.6	9.1	16.7	Forest (10.3), Meadow (3.0), Riparian (2.9), Wetland (0.4)
11. Westcreek Trailhead (West Branch) City of Brampton	7.5	7.6	15.1	Forest (10.0), Riparian (4.5), Wetland (0.6)

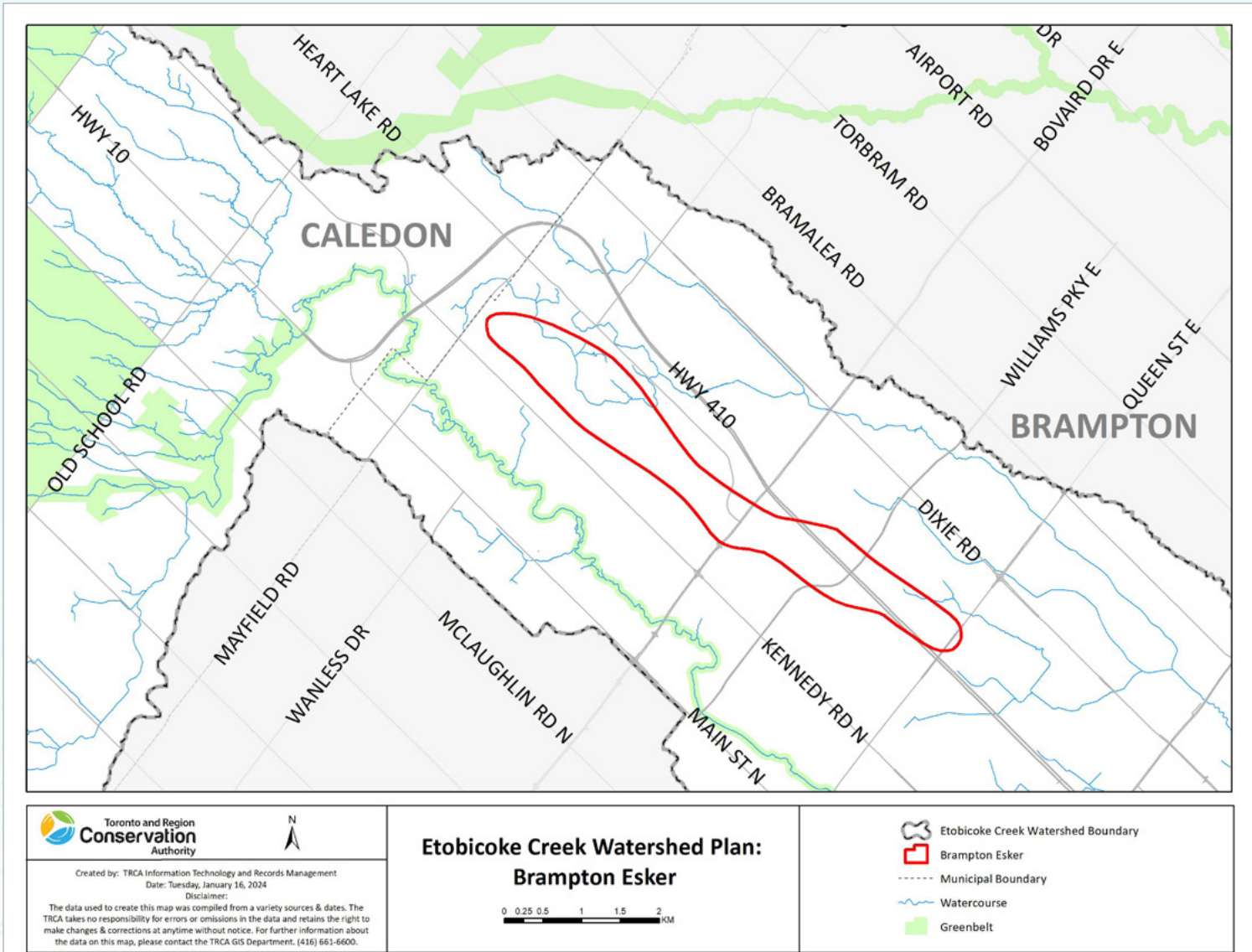
Name of Site (Subwatershed)	Existing Natural Cover to Enhance (in hectares)	Potential Natural Cover to Restore (in hectares)	Total Size (in hectares)	By Habitat Type (in hectares)
12. King's Park (West Branch) City of Mississauga	3.2	0.4	3.6	Forest (1.4), Riparian (2.2)
13. Hwy 407 Hydro (West of 410) (Tributary 3) City of Brampton	9.2	57.0	66.1	Forest (10), Meadow (30.8), Riparian (20), Wetland (5.3)
14. Brampton Golf Club / Peel Village Golf Club (Tributary 3) City of Brampton	3.4	16.5	19.9	Forest (19), Riparian (0.9)
15. SWMP Derry Road (Tributary 3) City of Mississauga	2.4	0.3	2.7	Riparian (2.7)
16. Wood Creek (Main Branch) City of Mississauga	11.4	25.2	36.6	Forest (22.4), Meadow (5.9), Riparian (6.4), Wetland (1.8)
17. Eastgate Transitway (Main Branch) City of Mississauga	2.7	4.1	6.8	Forest (2.6), Meadow (3.1), Wetland (1.1)
17. Eastgate Transitway (Little Etobicoke Creek) City of Mississauga	9.4	9.3	18.7	Forest (7.5), Meadow (6.5), Riparian (2.5), Wetland (2.2)
18. Fleetwood Park (Main Branch) City of Mississauga	0.7	1.7	2.4	Forest (1.5), Riparian (0.4), Wetland (0.4)

Name of Site (Subwatershed)	Existing Natural Cover to Enhance (in hectares)	Potential Natural Cover to Restore (in hectares)	Total Size (in hectares)	By Habitat Type (in hectares)
19. Iceland Forest (Little Etobicoke Creek) City of Mississauga	3.0	6.0	9.0	Forest (4.8), Riparian (1.6), Wetland (2.6)
20. Hwy 403 Eglinton (Little Etobicoke Creek) City of Mississauga	1.3	2.2	3.5	Forest (3.0), Wetland (0.5)
21. Rathwood Park 1 (Little Etobicoke Creek) City of Mississauga	0.8	0.8	1.6	Forest (0.7), Riparian (0.5), Wetland (0.3)
22. Marie Curtis / Arsenal (Lower Etobicoke) City of Toronto and City of Mississauga	7.3	15.9	23.2	Forest (17), Riparian (5.3), Wetland (0.6), Shoreline (0.3)
23. Etobicoke Creek Valley Park North (Lower Etobicoke) City of Toronto	4.4	4.5	9.0	Forest (7.6)

Notes:

There may be some minor discrepancies between total size, existing + potential, and by habitat type due to rounding, overlap of restoration opportunities, and the exclusion of restoration opportunities like green infrastructure and invasives management.

There is intentional overlap between the Top 10 watershed sites and the priority restoration sites by subwatershed, since the Top 10 by watershed are the largest sites by amount of restoration opportunity, which would also be the top sites for the relevant subwatershed. Sites that are also Top 10 watershed sites are in **bold**.

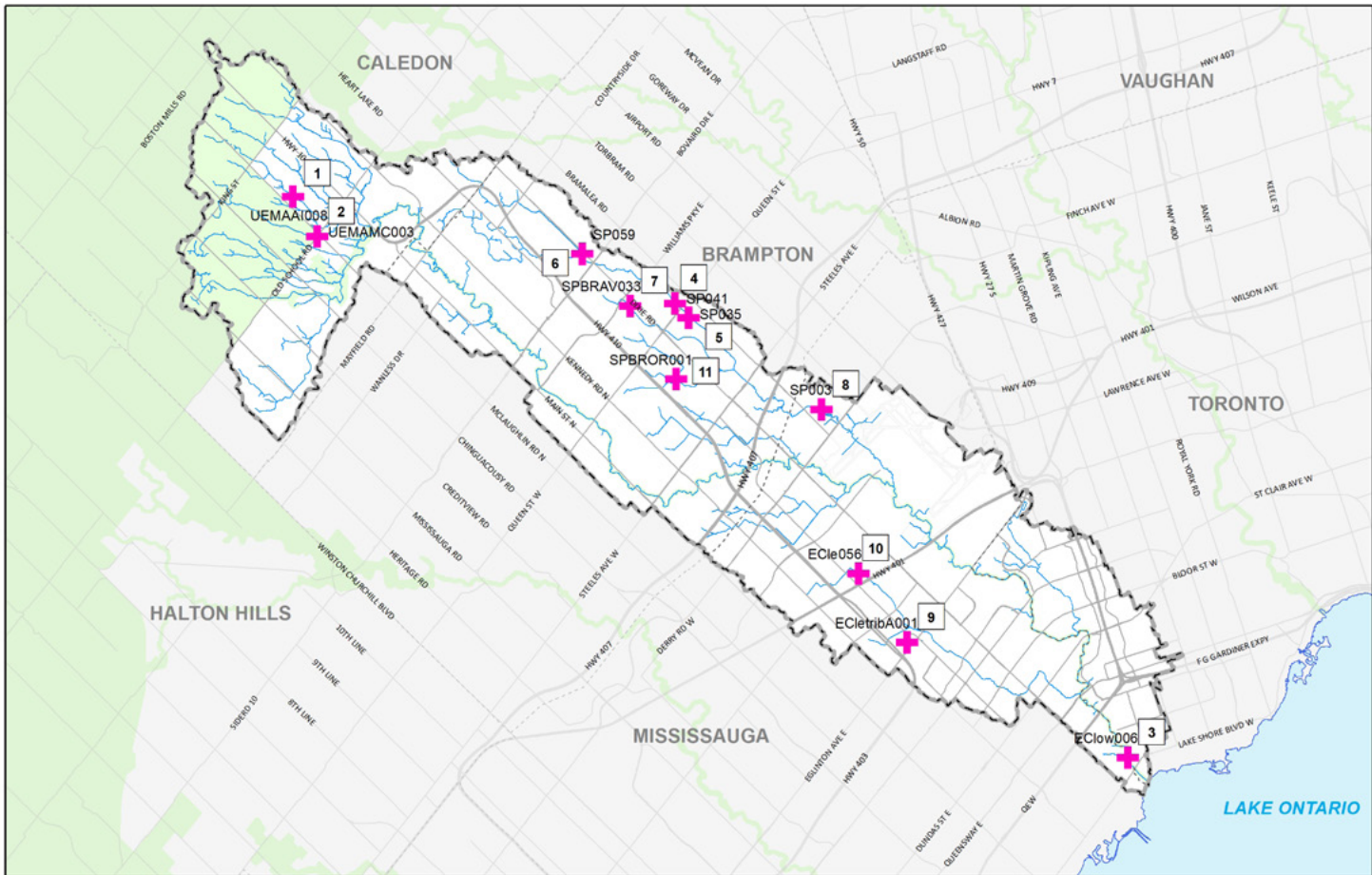



Map 4

This map shows the location of the Brampton Esker.

MANAGEMENT ACTION


2.1.5 refers to this map.












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Etobicoke Creek Watershed Plan: Priority Aquatic Barriers



-  Priority Barriers
-  Etobicoke Creek Watershed Boundary
-  Municipal Boundary
-  Watercourse
-  Shoreline
-  Pearson Airport
-  Greenbelt

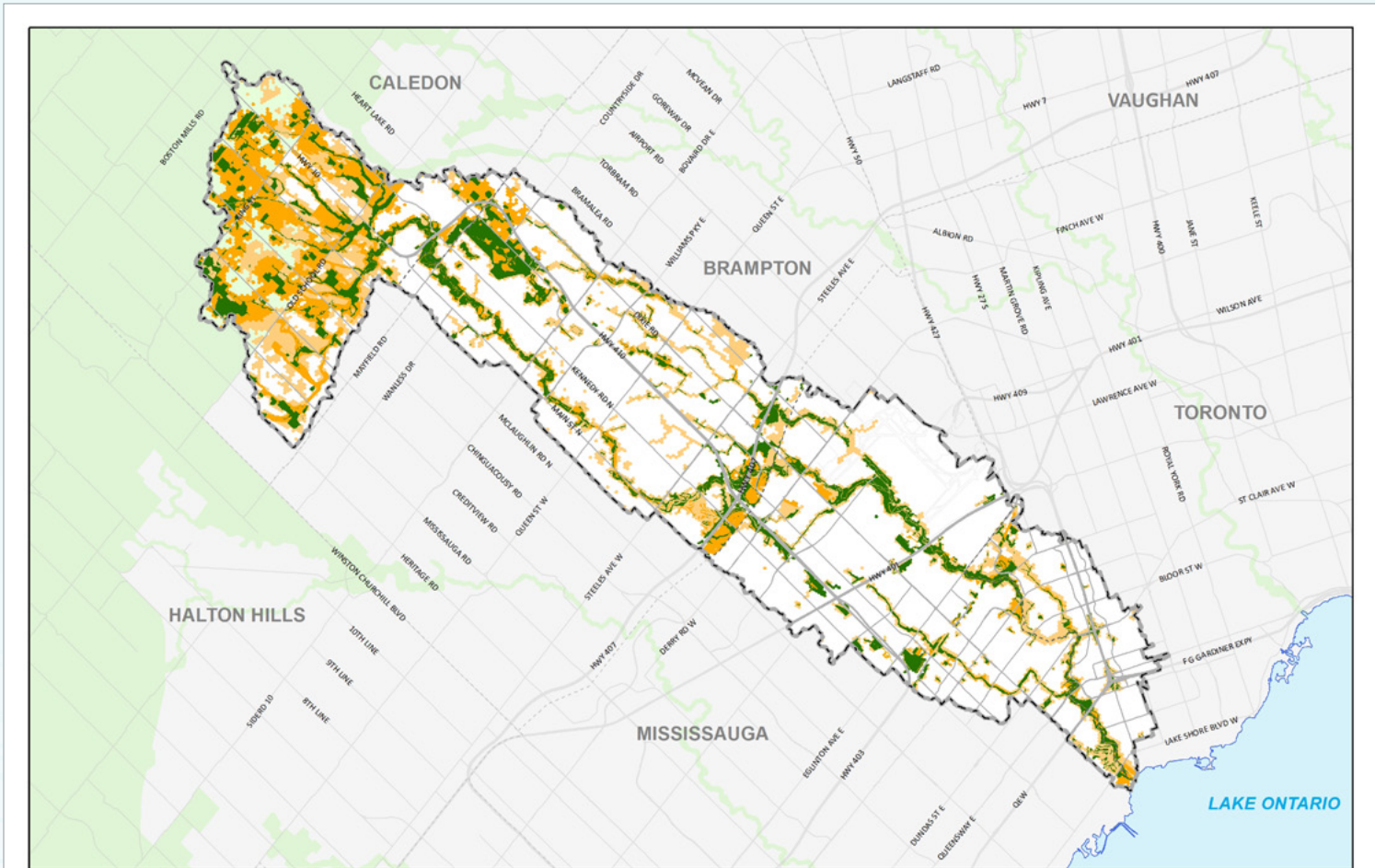
Map 5



























This map shows the priority aquatic barriers for removal to restore in-stream habitat connectivity.

MANAGEMENT ACTION

2.2.1 refers to this map.

Barrier #	Type of Barrier
1	Weir
2	Road crossing
3	Weir
4	Dam
5	Weir
6	Stormwater weir
7	Weir
8	Stormwater culvert
9	Weir
10	Natural erosion step
11	Weir



 <p>Created by: TRCA Information Technology and Records Management Date: Friday, May 5, 2023 Disclaimer: The data used to create this map was compiled from a variety of sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at any time without notice. For further information about the data on this map, please contact the TRCA GIS Department. (416) 663-6600.</p>	<p align="center">Etobicoke Creek Watershed Plan: Natural Heritage System</p> 	<table border="0"> <tr> <td> Etobicoke Creek Watershed Boundary</td> <td> Greenbelt</td> </tr> <tr> <td> Municipal Boundary</td> <td> Pearson Airport</td> </tr> <tr> <td> Shoreline</td> <td></td> </tr> </table> <table border="0"> <tr> <td colspan="2">Watershed Refined Enhanced NHS</td> </tr> <tr> <td> Existing Natural Cover</td> <td> Potential Natural Cover</td> </tr> <tr> <td> Contributing Areas</td> <td></td> </tr> </table>	 Etobicoke Creek Watershed Boundary	 Greenbelt	 Municipal Boundary	 Pearson Airport	 Shoreline		Watershed Refined Enhanced NHS		 Existing Natural Cover	 Potential Natural Cover	 Contributing Areas	
 Etobicoke Creek Watershed Boundary	 Greenbelt													
 Municipal Boundary	 Pearson Airport													
 Shoreline														
Watershed Refined Enhanced NHS														
 Existing Natural Cover	 Potential Natural Cover													
 Contributing Areas														

Map 6

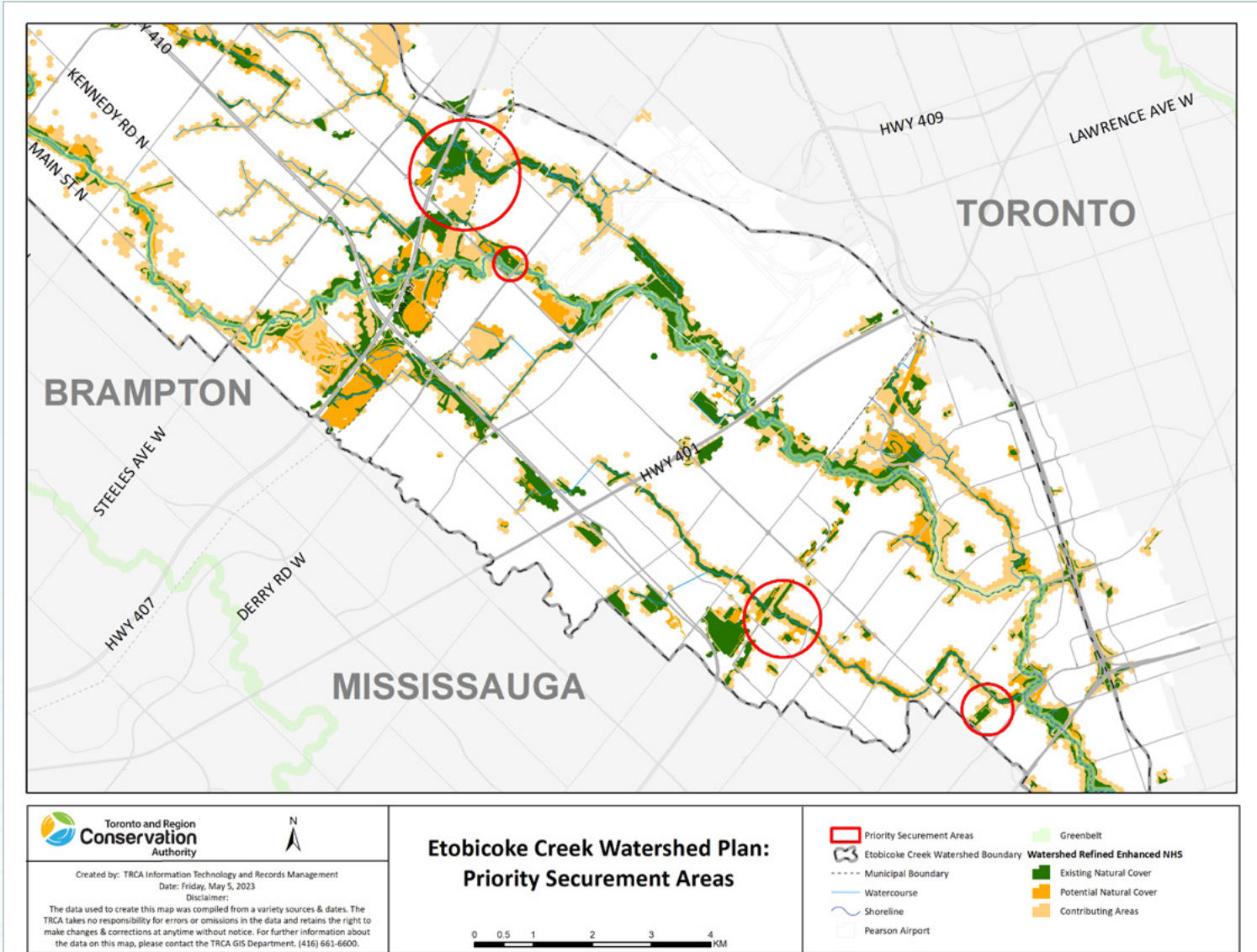
This map shows the watershed refined enhanced NHS, consisting of existing natural cover, potential natural cover, and contributing areas.

Potential natural cover are areas that could be restored to provide ecosystem and habitat benefits.

Contributing areas are built or unbuilt areas that can provide additional habitat and connectivity benefits through the use of green infrastructure.

MANAGEMENT ACTION

3.1.2 refers to this map.



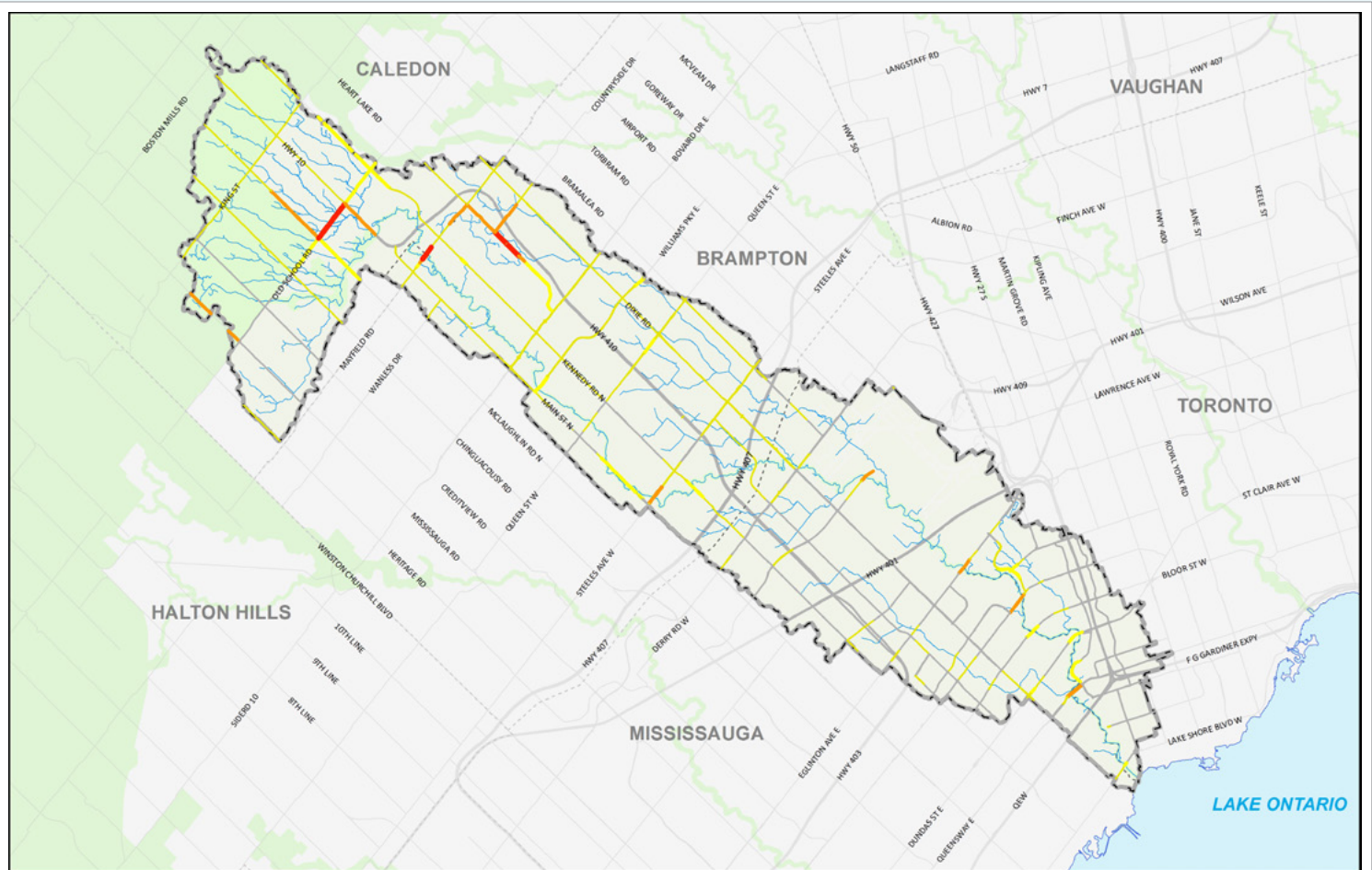
Map 7









This map shows priority areas for land securement based on lands where restoration priorities intersect with Flood Vulnerable Clusters (on both private land and some public land such as Hydro ROWs not in municipal or TRCA ownership). These areas are priorities to use nature-based solutions as part of flood risk mitigation. For land already in public ownership, the focus would be on conservation efforts (i.e. meadow habitat restoration) when opportunities arise.

Other lands outside these areas may be secured by municipalities or TRCA to increase public land ownership to achieve habitat objectives associated with this watershed plan.

MANAGEMENT ACTION

3.1.4 refers to this map.



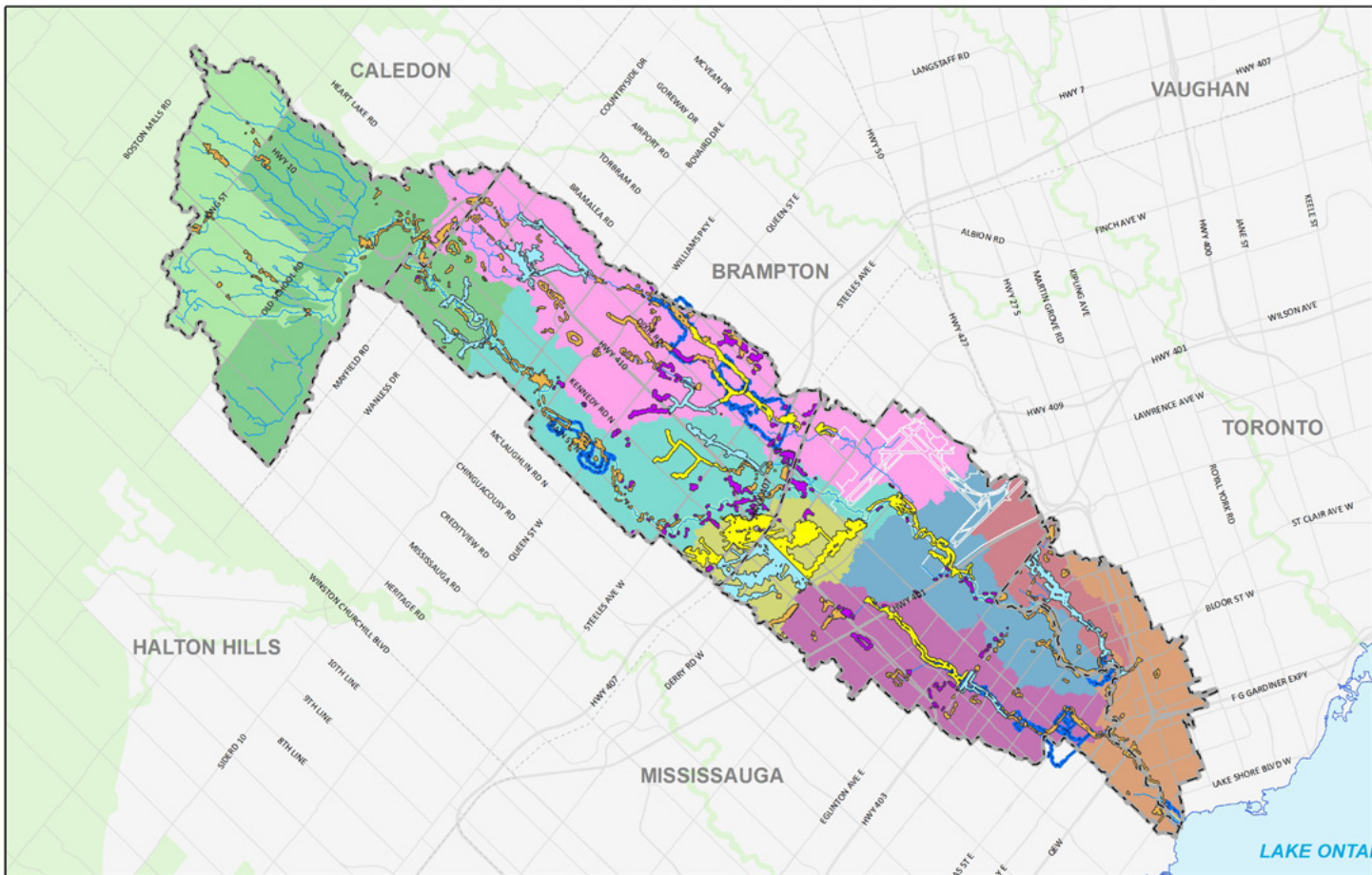
 <p>Created by: TRCA Information Technology and Records Management Date: Wednesday, September 28, 2022</p> <p><small>Disclaimer: The data used to create this map was compiled from a variety of sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at anytime without notice. For further information about the data on this map, please contact the TRCA GIS Department, (416) 661-6600.</small></p>	<p>Etobicoke Creek Watershed Plan: Priority Crossings</p> 	<p>Priority Crossing</p> <ul style="list-style-type: none"> █ 4 (high) █ 3 █ 2 █ 1 █ 0 (low) <p>Legend</p> <ul style="list-style-type: none">  Etobicoke Creek Watershed Boundary  Watercourse  Shoreline  Municipal Boundary  Pearson Airport  Greenbelt
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Map 8

This map shows priority road crossings to enhance connectivity for wildlife to pass safely.

MANAGEMENT ACTION

3.1.6 refers to this map.



 Created by: TRCA Information Technology and Records Management Date: May 9, 2023 Disclaimer: The data used to create this map was compiled from a variety sources & dates. The TRCA takes no responsibility for errors or omissions in the data and retains the right to make changes & corrections at anytime without notice. For further information about the data on this map, please contact the TRCA GIS Department. (416) 663-6600.	<h3>Etobicoke Creek Watershed Plan: Urban Forest Priority Planting Areas</h3> 	<p>Priority Planting Tiers</p> <ul style="list-style-type: none">  Tier 1a  Tier 1b  Tier 2a  Tier 2b  Etobicoke Creek Watershed Boundary <p>Legend</p> <ul style="list-style-type: none">  Flood Vulnerable Cluster  Municipal Boundary  Watercourse  Shoreline  Pearson Airport  Greenbelt  Headwaters  Little Etobicoke Creek  Lower Etobicoke  Main Branch  Spring Creek  Tributary 3  Tributary 4  West Branch
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Map 9

This map shows the priority planting areas to increase tree canopy cover (i.e. urban forest) within the watershed.

See [Appendix B](#) for more information on each tier and how the priority areas were determined.

MANAGEMENT ACTIONS

3.2.1 and 3.2.3 refer to this map.

8. Glossary

Biodiversity

The variability among organisms from all sources including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species and ecosystems.

Detention

The temporary storage of stormwater to control discharge rates and allow for sedimentation.

Ecological Function

The natural processes, products, or services that living and non-living environments provide or perform within or between species, ecosystems, and landscapes, including hydrologic functions and biological, physical, chemical, and socio-economic interactions.

Green Infrastructure

Natural and human-made elements that provide ecological and hydrologic 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.

Headwater Drainage Features

Ill-defined, non-permanently flowing drainage features that may not have defined beds and banks.

Highly Vulnerable Aquifer

Aquifers, including lands above the aquifers, on which external sources have, or are likely to have, a significant adverse effect.

Hydrologic Function

The functions of the hydrologic cycle that include the occurrence, circulation, distribution, and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water's interaction with the environment including its relation to living things.



Impervious Cover

EFFECTIVE IMPERVIOUS AREA/COVER

Represents a portion of the total impervious area that sheds stormwater directly into a water body or a storm drain system without being treated (e.g. by low impact development, green infrastructure, filtration, sedimentation, or other conventional techniques).

TOTAL IMPERVIOUS AREA/COVER

A measure of all the hard impermeable surfaces in the landscape that prevent precipitation from penetrating the ground in a catchment.

UNTREATED IMPERVIOUS COVER

Areas where runoff from impervious surfaces is conveyed directly to waterbodies without being treated (e.g., by low impact development, green infrastructure, filtration, sedimentation, or other conventional techniques).

Infiltration

The entry of water into site soils or material.

Key Hydrologic Areas

Significant groundwater recharge areas, highly vulnerable aquifers, significant surface water contribution areas, and ecologically significant groundwater recharge areas, that are necessary for the ecological and hydrologic integrity of a watershed.

Key Hydrologic Features

Permanent streams, intermittent streams, inland lakes and their littoral zones, seepage areas and springs, and wetlands.

Low Impact Development

An approach to stormwater management that seeks to manage rain and other precipitation as close as possible to where it falls to mitigate the impacts of increased runoff and stormwater pollution. It typically includes a set of site design strategies and distributed, small-scale structural practices to mimic the natural hydrology to the greatest extent possible through infiltration, evapotranspiration, harvesting, filtration, and detention of stormwater. Low impact development can include, for example: bio-swales, vegetated areas at the edge of paved surfaces, permeable pavement, rain gardens, green roofs, and exfiltration systems. Low impact development often employs vegetation and soil in its design, however, that does not always have to be the case and the specific form may vary considering local conditions and community character.



Natural Hazards *(Consisting of Erosion Hazard and Flooding Hazard)*

EROSION HAZARD

Means the loss of land, due to human or natural processes, that poses a threat to life and property.

FLOODING HAZARD

Means the inundation of areas adjacent to a shoreline or a river or stream system not ordinarily covered by water.

Natural Heritage System

A system made up of natural heritage features and areas, and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems. The system can include key natural heritage features, key hydrologic features, federal and provincial parks and conservation reserves, other natural heritage features and areas, lands that have been restored or have the potential to be restored to a natural state, associated areas that support hydrologic functions, and working landscapes that enable ecological functions to continue.

Predevelopment

Is defined as follows for the various development conditions:

NEW DEVELOPMENT (I.E. GREENFIELD DEVELOPMENT AND/OR AGRICULTURAL CONVERSION TO URBAN)

The predevelopment impervious condition shall correspond to the current conditions present in the field at the project onset or to an undisturbed forested condition.

REDEVELOPMENT (I.E. EXISTING URBAN AREAS)

The predevelopment impervious condition shall correspond to the current conditions present in the field at the project onset, or the least urbanized conditions (i.e. lowest total impervious percentage for the site) prior to the project onset.

LINEAR DEVELOPMENT AND RETROFITS

The predevelopment impervious condition for the right-of-way shall correspond to the current conditions present at the project onset.

Riparian

The areas adjacent to water bodies such as streams, wetlands, and shorelines. Riparian areas form transitional zones between aquatic and terrestrial ecosystems.



Sustainable Community Retrofits

Focus on public and private land actions in older, urban neighbourhoods by retrofitting buildings and infrastructure, regenerating habitats and urban ecology, and revitalizing a community's social fabric. TRCA's Sustainable Neighbourhood Action Program provides examples of sustainable community retrofits.

Urban Forest

All trees, shrubs, and understory plants, as well as the soils that sustain them, occurring on public and private property in natural, urban, and rural areas.

Water Balance

The accounting of inflow and outflow of water in a system according to the components of the hydrologic cycle.

Water Resource System

A system consisting of ground water features and areas and surface water features (including shoreline areas), and hydrologic functions, which provide the water resources necessary to sustain healthy aquatic and terrestrial ecosystems and human water consumption. The water resource system is comprised of key hydrologic features and key hydrologic areas.

Whitebelt

Refers to lands between the built boundary of urban settlement areas and the boundary of the Greenbelt Plan Area.

9. References

ECWP Technical Reports

Toronto and Region Conservation Authority, 2022. *Etobicoke Creek Watershed Future Management Scenario Analysis Report*.

Toronto and Region Conservation Authority, 2021. *Etobicoke Creek Watershed Characterization Report*.

ECWP Engagement Summaries

Toronto and Region Conservation Authority, 2024. *ECWP: Engagement Summary 3 – August 2022 – March 2024*.

Toronto and Region Conservation Authority, 2022. *ECWP: Engagement Summary 2 – July 2021 – July 2022*.

Toronto and Region Conservation Authority, 2021. *ECWP: Engagement Summary 1 – July 2020 – June 2021*.

Provincial / Federal Policies / Plans / Guidelines

Canadian Council of Ministers of the Environment, no date. *Water Quality Guidelines for the Protection of Aquatic Life*.

CTC Source Protection Committee, 2019. *Approved Source Protection Plan: CTC Source Protection Region*. Amendment (Version 2.0) effective March 25, 2019.

Environment Canada, 2013. *How Much Habitat is Enough?* Third Edition.

Ontario, 2020. *A Place to Grow: Growth Plan for the Greater Golden Horseshoe*.

Ontario, 2020. *Provincial Policy Statement*.

Ontario, 2017. *Greenbelt Plan*.

Ontario, 2016. *Water Management: Policies, Guidelines, Provincial Water Quality Objectives*.

Ontario, 2013. *Ontario's Cycling Strategy - Province Wide Cycling Network*.

Schueler, T, 1994. *The Importance of Imperviousness*. *Watershed Protection Techniques 2*: 100-111.



Great Lakes Agreement and Policies

Government of Canada and Government of Ontario, 2021. *Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health*.

Government of Canada and Government of the United States of America, 2012. *Great Lakes Water Quality Agreement*.

Ontario, 2016. *Ontario's Great Lakes Strategy*.

TRCA Guidelines

Credit Valley Conservation and Toronto and Region Conservation Authority, 2014. *Evaluation, Classification and Management of Headwater Drainage Features Guidelines*.

Toronto and Region Conservation Authority, 2019. *Trail Strategy for the Greater Toronto Region*.

Toronto and Region Conservation Authority, 2018 (updated June 2023). *Guideline for Determining Ecosystem Compensation (after the decision to compensate has been made)*.

Toronto and Region Conservation Authority, 2017. *Wetland Water Balance Risk Evaluation*.

Toronto and Region Conservation Authority, 2016. *Wetland Water Balance Monitoring Protocol*.

Toronto and Region Conservation Authority, 2015. *Crossings Guideline for Valley and Stream Corridors*.

Toronto and Region Conservation Authority, 2012. *Stormwater Management Criteria*.

Relevant Municipal Plans / Strategies / Guidelines

Note: *this is not an exhaustive list of potentially relevant municipal plans, strategies, or policies with relevance to this watershed plan. It does not include Official Plans, Secondary Plans, Master Plans, or Bylaws, which may need to be updated as part of implementation of this watershed plan.*

Instead, the list below includes complementary Strategies, Plans, or Guidelines related to water management, biodiversity, environmental protection, etc.

CITY OF TORONTO

Biodiversity Strategy. October 2019.

Parkland Strategy. Adopted November 2019.

Ravine Strategy. Adopted October 2017.

Toronto Green Standard, Version 4. Adopted July 2021.

TransformTO: Net Zero Strategy, A Climate Action Pathway to 2030 and Beyond. November 2021.

Toronto's Strategic Forest Management Plan. Adopted February 2012.

Wet Weather Flow Master Plan. Adopted September 2003.

REGION OF PEEL

Climate Change Master Plan, 2020 – 2030. Adopted 2019.

Scoped Subwatershed Study (Part A – Existing Conditions and Characterization, Part B – Detailed Studies and Impact Assessment, and Part C – Implementation Plan), Settlement Area Boundary Expansion. 2022.

CITY OF MISSISSAUGA

City of Mississauga Climate Change Action Plan. Adopted November 2021.

Living Green Master Plan. Adopted January 2012.

Natural Heritage and Urban Forest Strategy. Adopted January 2014.

Parks and Forestry Master Plan. Adopted February 2019.

CITY OF BRAMPTON

Brampton Eco Park Strategy. Adopted in 2019.

Brampton Grow Green Environmental Master Plan. Adopted in 2014.

Brampton One Million Trees Program. Adopted in 2019.

Lake Enhancement Strategy. Adopted in 2021.

Natural Heritage and Environmental Management Strategy. Adopted December 2015.

Our 2040 Energy Transition: Community Energy and Emissions Reduction Plan. Adopted in 2020.

TOWN OF CALEDON

Community Climate Change Action Plan. Adopted January 2020.

Other References

Toronto and Region Conservation Authority. *Ecosystem Services and Valuation Webpage*: <https://trca.ca/conservation/creating-green-infrastructure/ecosystem-services-valuation/>.

Toronto and Region Conservation Authority. *Wildlife Movement and Habitat Connectivity Webpage*: <https://trca.ca/conservation/terrestrial-ecosystems/wildlife-movement-and-habitat-connectivity/>.

Toronto Green Community. *Lost Rivers Webpage*: <https://www.torontogreen.ca/what-we-do/lost-rivers/>.

APPENDIX A

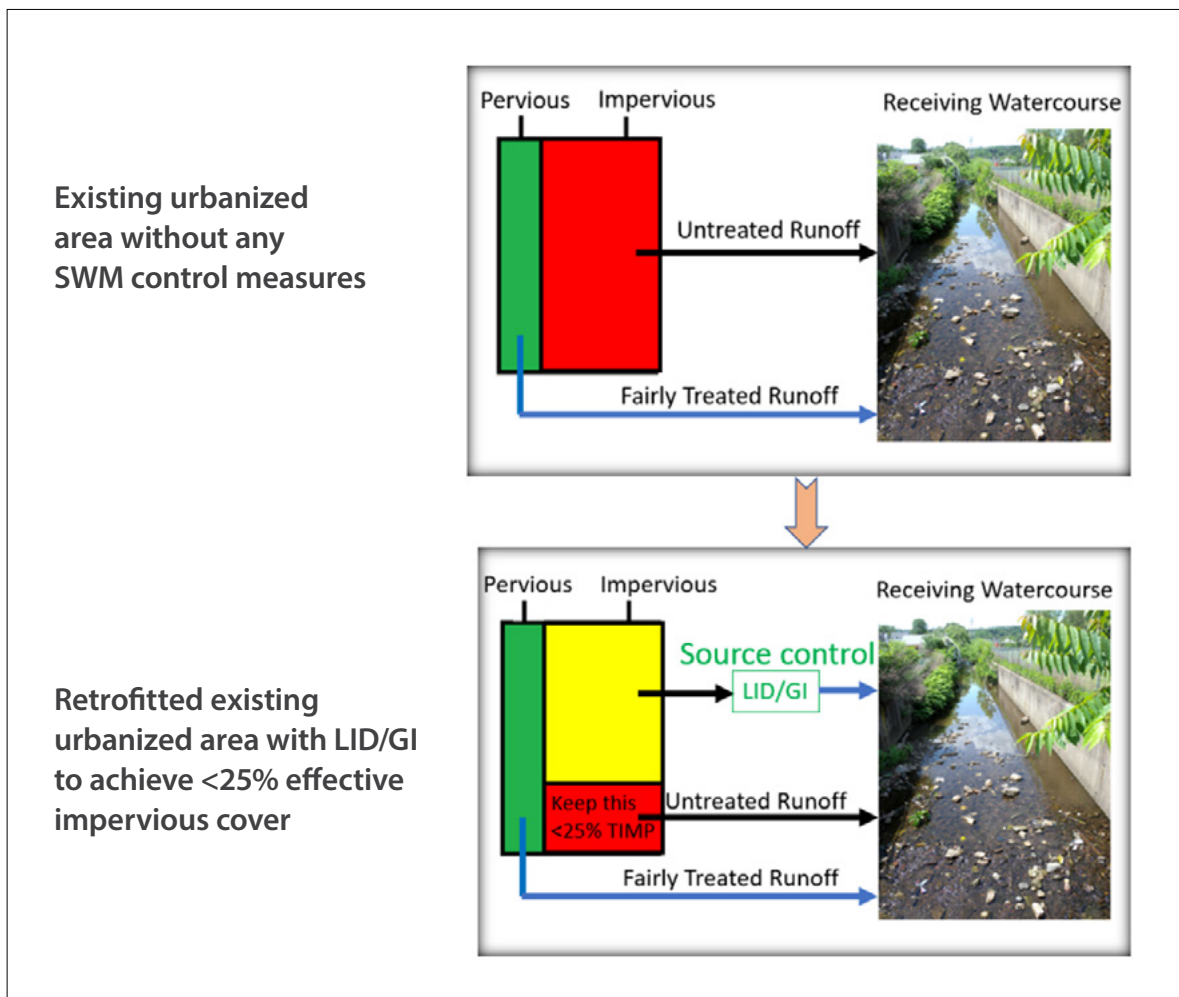
As outlined in [Section 3.3 - Current State of the Watershed](#), aquatic habitat quality is expected to decrease as impervious cover increases. Environment Canada provides recommendations on impervious cover percentages and has defined the quality of aquatic habitat based on the amount of impervious cover in a catchment area where 'sensitive' quality habitat occurs when there is 0-10% impervious cover, and declines in aquatic habitat quality are demonstrated when impervious cover is between 11-25% (impacted/urbanizing), greater than 25% (non-supporting), and greater than 60% (urban drainage). Therefore, to minimize impacts to aquatic habitat health, it is recommended that the impervious cover percentage (effective impervious cover) for the Headwaters subwatershed (and the watershed in general) remains below 25%. This is reflected in management actions 1.2.2 (c) and 2.1.3.

The following provides additional details about total impervious cover and effective impervious cover (see [Section 8 - Glossary](#) for definitions), the need for a 25% effective impervious cover target, and various stormwater management control measures in existing urbanized and urban expansion areas.



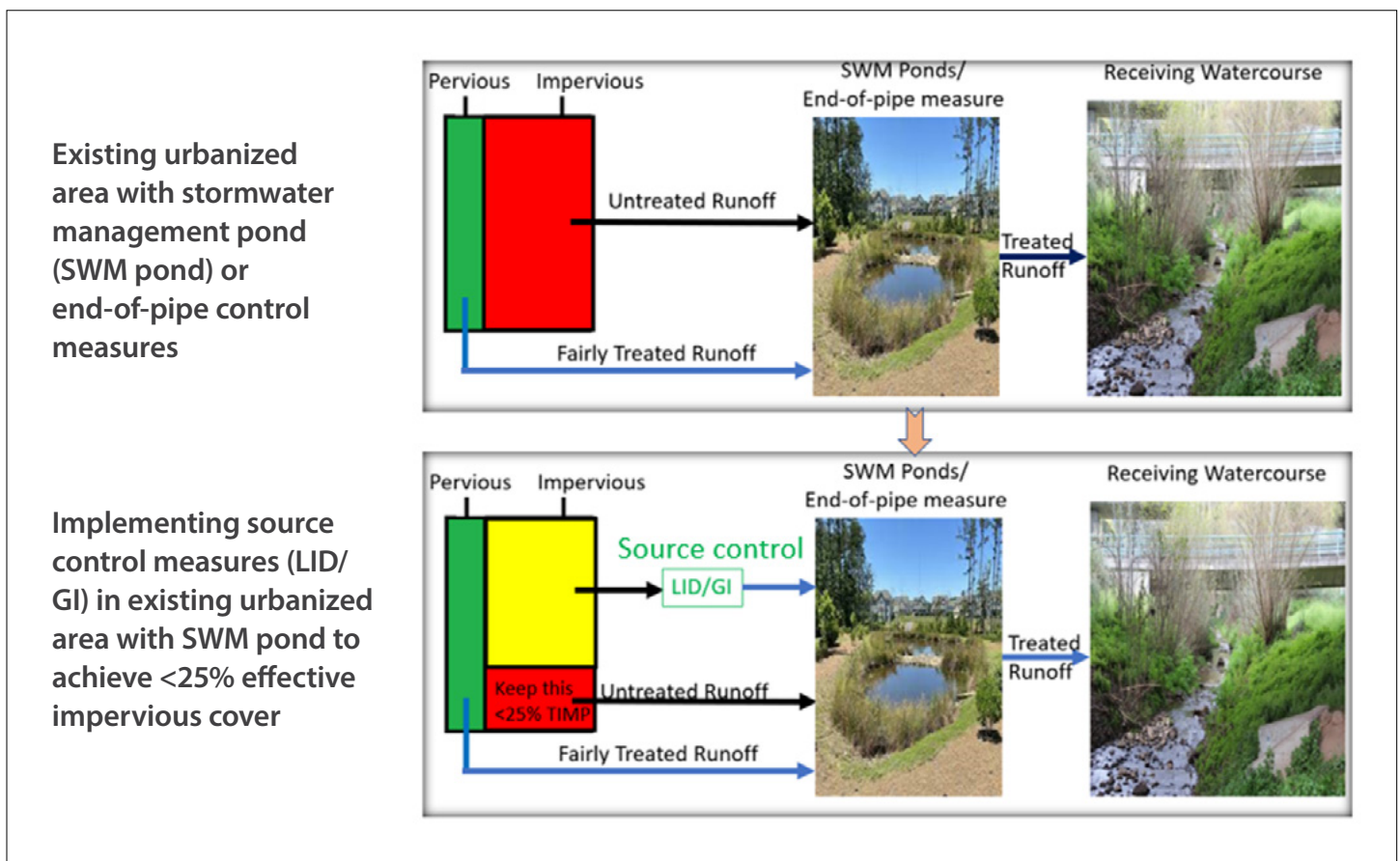
1 Existing urbanized area without any control measures:

Decreasing the impervious area that is directly connected to the storm sewer network to 25% of the total impervious area (TIMP) by connecting the remaining impervious area back to the ground via implementation of green infrastructure is crucial to reverse impacts of uncontrolled runoff generated from impervious cover. By doing so, we can mitigate the impacts of impervious cover on the watershed’s hydrological cycle (the amount of runoff, peak discharge rates, and baseflow are altered), stream morphology, stream temperature, stream water quality (nutrient and pollutant loads increase), and stream biodiversity.



2 Existing urbanized area with some end-of-pipe control measures:

Managing stormwater at the source (source controls) is widely effective for limiting the negative hydrological effects of urbanization. Decreasing the impervious area directly connected to the storm sewer network to 25% of total impervious area by connecting the remaining impervious area back to the ground via implementation of green infrastructure is recommended to further enhance the health of the watershed. This illustrates a recommendation/opportunity to go beyond the minimum requirements of stormwater management treatment criteria to help minimize impacts to the health of the receiving watercourse.



APPENDIX B

This appendix contains more details on prioritization exercises for LID, restoration, and urban forest that form a key part of the management framework.

LID Implementation Case Study

Map 1 shows areas in the watershed that would benefit the most from LID or green infrastructure implementation to help regain natural or pre-development water balance. These areas were identified based on a multi-hit analysis of various criteria (including the results from the erosion and water quality modelling, and other data layers including imperviousness, ESGRAs, sensitive fish species, NHS Contributing Areas, and the Brampton Esker) to determine the highest scoring areas that could benefit from LID or green infrastructure implementation at the watershed-scale. Areas in red are those that would benefit the most from the use of LID or green infrastructure implementation.

A case study of the cost and benefits of particular LIDs is presented to demonstrate how watershed enhancements such as this can address issues related to flooding, water quality, and erosion in developed portions of the watershed.

The LID implementation case study uses the **Treatment Train Tool** to assess the costs/benefits of LID implementation at the southeast corner of Bovaird Drive and Hurontario Street (West Branch subwatershed). This case study assumed three bioretention sites (two at the Walmart, and one at the row houses), one vegetated strip near the school, and two infiltration trenches by the Walmart.

The focus of this case study was a return to pre-development water balance.

The modelled LIDs were designed with a rainfall depth control target of 25 mm and a volume control target of 3,142.5 m².

For the chosen site, the results are shown in **Table 14**.

TABLE 14:
LID Modelling Results Pre and Post Retrofit

Site	Total (mm)
Site Rainfall	753
Infiltration Pre-retrofit	318
Infiltration Post-retrofit	463
External Outflow Pre-retrofit	263
External Outflow Post-retrofit	92
Rainfall Retention On-site Pre-retrofit	490 (65%)
Rainfall Retention On-site Post-retrofit	662 (88%)

The modelling results demonstrate that widespread LIDs designed to retain 25 mm of rainfall would prevent 90% of annual rainfall events from generating runoff.

Table 15 identifies the construction and maintenance costs associated with the modelled LIDs. The total life-cycle costs consist of the construction and 25-year maintenance costs for each LID. Costs provided in **Table 15** are an approximation based on 2023 construction/maintenance prices for the LIDs – and would vary based on market prices/conditions.

TABLE 15:
LID Implementation Case Study Costing

LID Type	Construction Cost	25-year Maintenance Cost	Total Lifecycle Cost
Bioretention	\$794,124.80	\$554,288.30	\$1,348,413.10
Vegetated Strips	\$122,455.00	\$176,890.00	\$299,345.00
Infiltration Trenches	\$726,926.70	\$372,727.50	\$1,099,654.20
TOTALS	\$1,643,506.50	\$1,103,905.80	\$2,747,412.30

FOR CONSIDERATION:

It is important to note that extreme events greater than 25 mm cannot be retained. Existing stormwater infrastructure is built to a standard of conveying and controlling the 100-year or Regional storm (current rainfall volume of 88.5 mm). With climate change, this rainfall volume is projected to increase to 107 mm, resulting in a need for additional storage of 18.9 mm. It will be necessary to factor climate change into stormwater asset management planning, including the implementation of LIDs as a volume control form of infrastructure.

ADDITIONAL RESOURCES:

The [Sustainable Technologies Evaluation Program](#) has guidance and resources on Low Impact Development that can inform municipal and development planning.



Priority areas for ecological restoration (as shown in [Maps 3A](#) and [3B](#)) were determined through a multiple hit analysis of various terrestrial and aquatic criteria overlaid with the NHS. This exercise accounted for existing policy designations and future plans, while trying to ensure geographic distribution across the watershed. The purpose of this prioritization exercise was to increase habitat quality and quantity, address biodiversity needs, and improve climate resiliency. Costing for restoration has not been provided as it is contingent on current market prices and conditions and can change significantly from year to year (but can be provided upon request).

In terms of the criteria identified in [Table 16](#), terrestrial and aquatic criteria were equally weighted to determine the highest scoring areas based on ecological function that should be targeted for further restoration to improve both the NHS and WRS.

TABLE 16:
Criteria for Restoration Priorities

Category	Aquatic Criteria	Terrestrial Criteria
Habitat Quantity	ESGRA HDF Riparian Corridor	Natural Cover Habitat Patch (L-rank)
Habitat Quality and Biodiversity	Benthic Species Diversity Fish Species Diversity	Vegetation Communities of Concern (ELC) Species Abundance (avian L1-L4) Species Richness (avian L1-L4) Habitat Suitability (avian and amphibians)
Habitat Connectivity	Stream Connectivity	Regional Connectivity (Top 50%) Watershed Connectivity (Top 50%) Local Connectivity (Forest-Wetland) Local Connectivity (Forest-Forest)
Climate Change Vulnerability	Thermal Regime – Max Temperature Thermal Regime – Stability	Climate Change Vulnerability

Municipalities may have their own restoration priorities (outlined in various municipal strategies and park plans) in addition to the priority restoration sites identified in [Map 3A](#) and [Map 3B](#). This watershed plan encourages restoring as much habitat as possible across the watershed. TRCA will continue to work collaboratively with our partner municipalities during implementation of the ECWP to investigate opportunities and alignments throughout the watershed for various projects including restoration and channel naturalization, plantings, and the creation of outdoor classrooms and natural style playgrounds, some of which could also become ‘signature watershed sites’. This collaborative work will help meet the goals and objectives of the ECWP to enhance and restore the natural heritage system in the watershed.

Priority areas for planting to enhance the urban forest canopy in the Etobicoke Creek watershed are not proposed in natural areas. Instead, the urban forest priority planting areas are focused on areas outside of the NHS (i.e. outside of existing and potential natural cover areas) within the contributing areas of the NHS (areas not suitable for restoration but areas that can still provide additional habitat/connectivity through use of LIDs/GI), within ESGRAs and areas with lower canopy cover percentages, and in proximity to the WRS. Social and municipal criteria was also used to identify priority planting areas including heat vulnerability and known municipal priorities like Brampton no-mow areas.

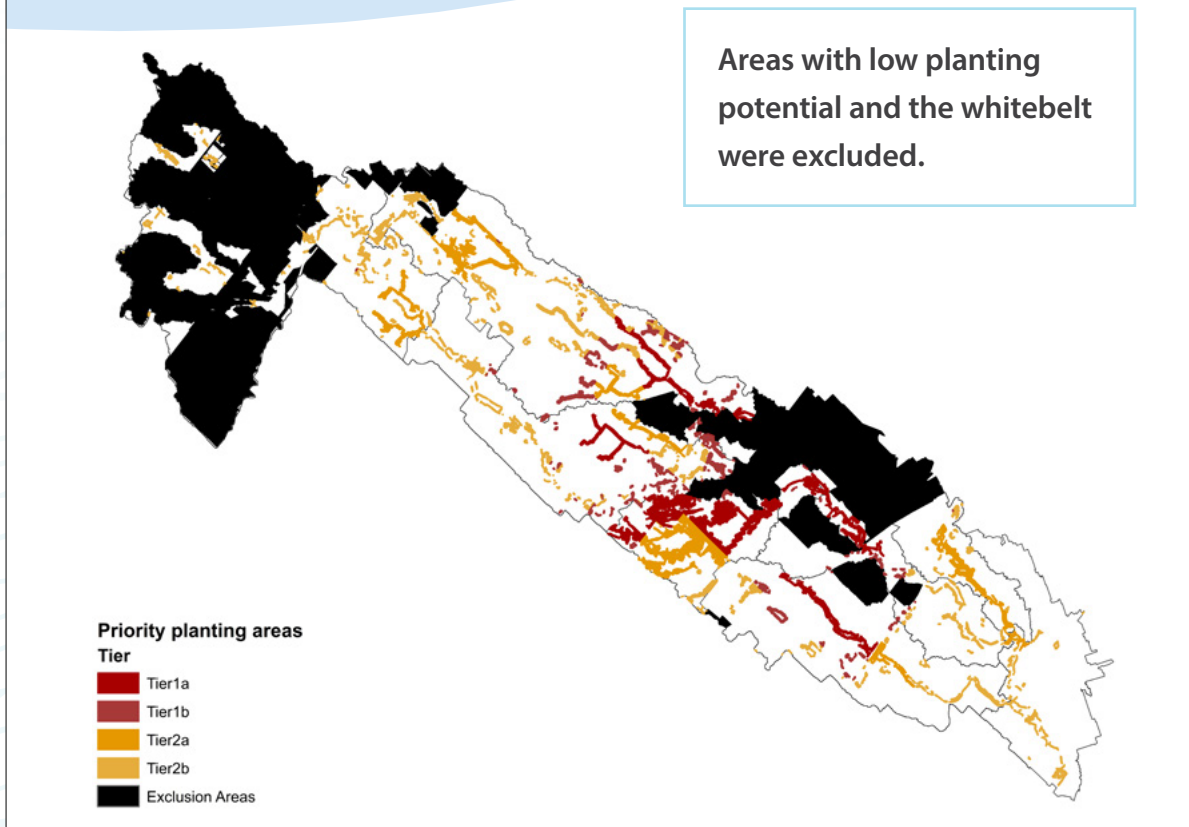
Restoration opportunities in natural areas of the Etobicoke Creek watershed are identified as part of the watershed refined enhanced NHS (generally in potential natural cover areas shown in [Map 6](#)) and the priority restoration sites (including plantings/enhancement of forest, riparian, wetland, and shoreline habitat) as shown in [Maps 3A](#) and [3B](#).

Priority areas for planting to enhance the urban forest canopy used a multiple criteria analysis with equally weighted scoring. [Figure 19](#) shows the results of the multiple criteria analysis.

The first set of criteria were ecological / hydrological, which consisted of:

1. Within the contributing areas of the NHS (i.e. to improve buffers)
2. Proximity to the Water Resource System (i.e. the closer to the system the higher the score)
3. Lower canopy cover of the subwatershed (i.e. needs more trees)
4. Within ESGRAs (i.e. to improve infiltration)

FIGURE 19:
Results of Urban Forest Priority Multiple Criteria Analysis



The social / municipal criteria consisted of the heat vulnerable mapping from Peel Region and known municipal priorities like Brampton no-mow areas and Peel climate change priority areas. The whitebelt was excluded from the analysis because of potential urbanization there. Additionally, areas with low planting potential based on land use (e.g. airport), and land cover (e.g. industrial) were excluded. Assumptions were made for each land use type on the amount of trees planted with impervious areas being more limited.

A tiered approach was chosen to represent priority canopy cover enhancement (see [Map 9](#) and the results in [Table 17](#)). Tier 1 represents priority areas based on ecological, hydrological, social, and municipal criteria. Tier 1a represents the top 10 areas by number of trees planted. Tier 2 represents priority areas based on ecological and hydrological criteria. Tier 2a represents the top 10 areas by number of trees planted. Tier 1b and 2b represent the remainder of plantable areas meeting the specified criteria. The number of potential trees to be planted was computed using planting densities specific to each land use type and the assumption that a medium-stature tree would be planted. The canopy cover enhancements do not include increases through underplanting. The [Etobicoke Creek Watershed Future Management Scenario Analysis Report](#) ([Table 18](#) Urban Forest Planting Assumptions) provides further information on tree planting assumptions and densities.

Available planting areas vary greatly if social and municipal criteria are considered in addition to ecological and hydrological criteria. For example, and as shown in [Table 17](#), the Headwaters has a much lower number of trees in Tier 1 compared to Tier 2.

A total of 288.6 hectares of additional canopy cover can be added based on this tiered approach.

TABLE 17:
Canopy Cover Enhancements by Tier

Subwatershed	Current Canopy Cover	Tier 1 and 2 Canopy Cover	Tier 1 (Number of Trees)	Tier 2 (Number of Trees)
Headwaters	12.9%	13.3%	16	3,808
Little Etobicoke	14.0%	15.1%	1,779	5,337
Lower Etobicoke	22.9%	23.3%	–	2,809
Main Branch	14.2%	15.0%	2,924	2,741
Spring Creek	14.5%	16.0%	5,326	6,822
Tributary 3	6.5%	12.2%	6,864	3,395
Tributary 4	13.3%	14.7%	10	2,222
West Branch	17.9%	19.6%	10,288	3,757
TOTALS	14.6% (watershed)	15.9% (watershed)	27,208	30,891

Note:

Urban tree planting costs are contingent on current market prices of stock and market conditions.

