



Watershed-Based Resource Management Strategy

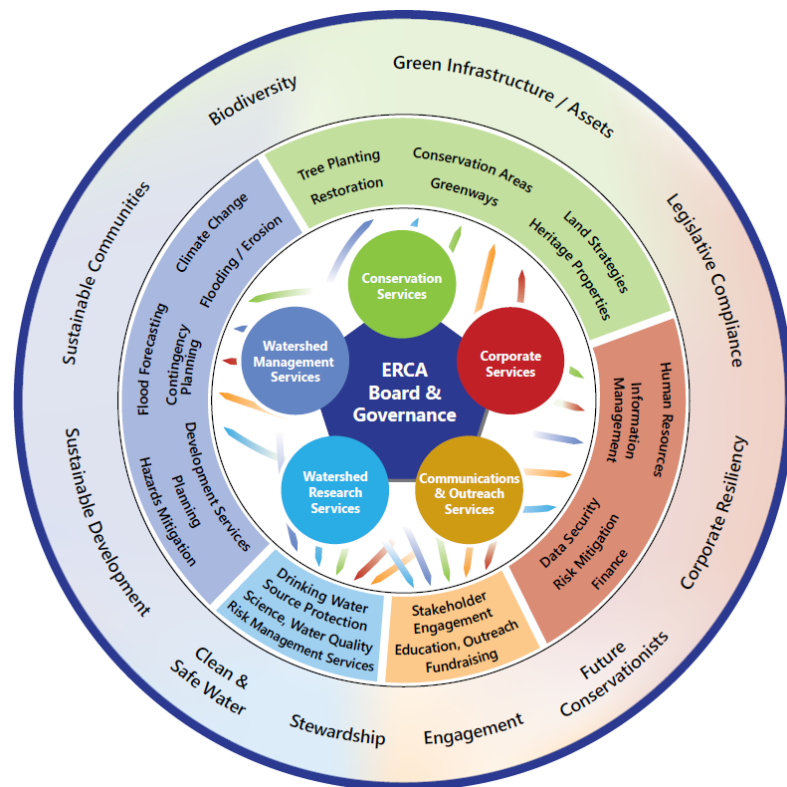
Short Title: Watershed Strategy

Preface

This document is currently in DRAFT. Should there be any requirements related to the Accessibility for Ontarians with Disabilities Act (AODA), please contact our office.

This Watershed Based Resource Management Strategy (“Watershed Strategy”) has been prepared by the Essex Region Conservation Authority to meet the provisions set out under Section 21.1 of the *Conservation Authorities Act* and *Ontario Regulation 686/21* under this Act. This Watershed Strategy was prepared using the Conservation Authorities Act and its Regulations, the Conservation Ontario Guidance Document, ERCA resources, and draft content from other conservation authorities. The considerable efforts by all of those across the province, within Conservation Ontario and other conservation authorities, is appreciated and helped form the foundation of ERCA’s strategy.

ERCA applies an Integrated Watershed Management (IWM) approach, which requires an understanding of the interactions between our environment, the economy, and society. At the core of everything that ERCA does to better understand, preserve, and enhance our region, is ERCA’s Board of Directors and ERCA’s five key service areas. Through the Board’s sound governance and oversight, along with Administration’s effort in delivering the various interconnected programs



within these service areas, ERCA continues to gain a better understanding of the watershed. It is through this approach that ERCA will continue to protect the region’s resources, people and property, and address the escalating environmental challenges the region faces now and will face in the future. The Program Integration Model above demonstrates the linkages between each of the various programs and services, both Mandatory and Non-Mandatory, which are all crucial to achieving a healthy, sustainable future for residents across Windsor-Essex and Pelee Island.

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Introduction

Purpose and Legislative Context

Essex Region Conservation Authority (ERCA) has prepared this Watershed-Based Resource Management Strategy (herein referred to as the “Watershed Strategy”) to meet the provisions set out under Section 21.1 of the [Conservation Authorities Act](#) (CA Act) and [Ontario Regulation 686/21 Mandatory Programs and Services](#). Components of the Watershed Strategy specified in Ontario Regulation 686/21 include:

- 1) Guiding principles and objectives that inform the design and delivery of ERCA’s programs and services.
- 2) A summary of existing technical studies, monitoring programs and other information on the natural resources that ERCA relies on to directly inform and support the delivery of programs and services.
- 3) A review of ERCA’s programs and services to:
 - a) Determine if the programs and services comply with the Regulations;
 - b) Identify and analyze issues and risks that limit the effectiveness of the delivery of these programs and services; and
 - c) Identify actions to address the issues and mitigate risks identified by the review and providing a cost estimate for the implementation of those actions.
- 4) A process for periodic review and updating of the Watershed Strategy that includes procedures to ensure stakeholders and the public are consulted during the review and updating process.

This Strategy sets out some guiding principles and objectives of the Authority, its *Mandatory Program and Services* (Category 1 Services), *Municipal Services* (Category 2 Services), and *Other Programs and Services* (Category 3 Services). The Strategy will assist ERCA with enhancing the delivery of its Mandatory Programs and Services by assessing any challenges, identifying risks that impact service delivery, and providing mitigative measures to ensure such challenges and risks are adequately addressed. Finally, this strategy also identifies desirable future programs, services, and actions that will help ERCA meet its objectives and long-term goals.

Background

In 2016, the ERCA Board of Directors approved the current Strategic Plan. This plan is a 10-year plan (2016 to 2025) and provides the foundation for ERCA’s direction as it relates to programs and services based on a complex hierarchy of Strategic Directions, Strategic Actions, Goals and Actions. This plan underwent extensive public consultation, where the feedback guided ERCA’s

focus to creating a future of sustainability for the organization and the region for the subsequent decade, ending in 2025.

On October 1, 2021, Ontario Regulation 687/21 under the Conservation Authorities Act came into effect. This regulation outlined the steps that were to be taken by all conservation authorities to develop an inventory of programs and services and to enter into agreements with participating municipalities to fund non-mandatory programs through municipal contribution agreements.

Shortly after the legislative changes occurred in October 2021, Ontario Regulation 686/21 was enacted on January 1, 2022. This regulation prescribes the mandatory programs and services that all conservations authorities must provide. All programs and services that a conservation authority delivers must be categorized into one or more of three categories, as described below.

Category 1 CAA Section 21.1 Mandatory Programs and Services	Category 2 CAA Section 21.1.1 Municipal Programs and Services	Category 3 CAA Section 21.1.2 Other Programs and Services
<ul style="list-style-type: none"> • Programs and services that all CAs must provide within their jurisdiction. • Eligible for costs to be apportioned to participating municipalities (levy) without an agreement. • Funded through municipal levy, user fees, and/or grants. 	<ul style="list-style-type: none"> • Programs and services that a CA agrees to provide on behalf of a municipality. • Eligible for costs to be apportioned to participating municipalities if there is a Memorandum of Understanding (MOU) or other agreement. • Funded through municipal service & contribution agreement, user fees, and/or grants. 	<ul style="list-style-type: none"> • Programs and services that a CA determines are advisable to further the purpose of the CA Act. • Eligible to be apportioned wholly or partially to a municipality through a cost apportionment agreement. • Funded through municipal service & contribution agreement, user fees, and/or grants.

Since the enactment of the above noted regulations, ERCA has completed the necessary Inventory of Programs and Services and executed the necessary agreements for Category 2 and 3 programs and services.

Further to the categorization of programs and services and execution of necessary agreements, and as required by Ontario Regulation 686/21, this Watershed Strategy includes a review of the programs and services to help inform administration and the Board of Directors of any gaps or risks in program or service delivery, actions to mitigate such gaps or risks, along with potential costs associated with implementing such actions. This strategy also consolidates the latest

scientific data and technical information as it relates to decision-making for natural hazard and resource management programs and services.

About the Essex Region Conservation Authority (ERCA)

The Essex Region Conservation Authority is empowered through provincial legislation to further the conservation, restoration, development and management of natural resources other than gas, oil, coal and minerals. ERCA was created in 1973 as one of the last Conservation Authorities in Ontario to work toward managing natural hazards and conservation issues.

Located at the tip of Southern Ontario, ERCA has jurisdiction in nine municipalities. These include the City of Windsor, Township of Pelee and the seven municipalities in Essex County. Nineteen representatives from these communities make up the ERCA Board of Directors, which is responsible for making policy and budget decisions in accordance with the *CA Act*. ERCA's three main watersheds include Lake St. Clair, the Detroit River, and Lake Erie, with 26 subwatersheds across mainland Essex County, as shown in Figure 1. Within this area, ERCA's jurisdiction covers approximately 1,681 square kilometres of land and manages almost 1,800 hectares (roughly 4,400 acres) of natural lands to ensure long-term conservation of these important lands and features.



Detroit River and the City of Windsor and Detroit skylines

Holiday Beach Conservation Area

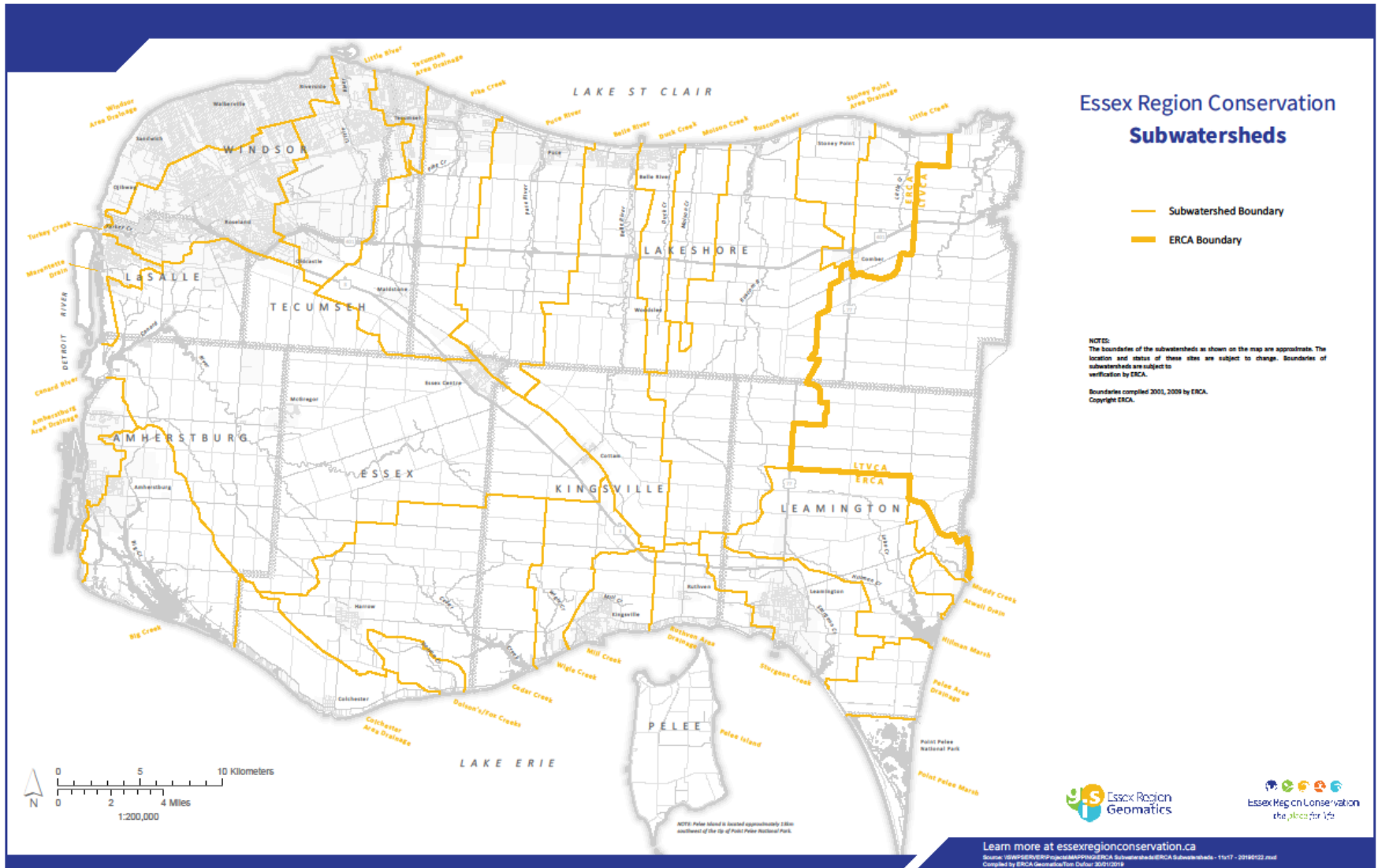


Figure 1: ERCA Jurisdictional Boundary, Member Municipalities, and Subwatersheds

Watershed Characterization

ERCA, like all Conservation Authorities, is uniquely organized on a watershed basis. A watershed is the area of land that drains to a river, creek or lake. Because we cross municipal boundaries, all environmental decisions can be assessed based on their impact on the entire watershed.

In general, ERCA has jurisdiction over approximately 1,681 square kilometers of land in southwestern Ontario, with the region comprised of the City of Windsor, most of Essex County, the Township of Pelee (Pelee Island), and several smaller Great Lakes islands, all in the most southern part of Canada. The region is an almost flat, low-lying clay plain with poorly defined divides between watersheds and poor natural drainage. Areas of sandy soil and broken topography are found in the Region's south (primarily around the community of Harrow in the Town of Essex), and southeast (primarily around the Municipality of Leamington). No single major river system drains the Region. Rather, the area is drained by numerous small rivers, streams, creeks. As a result, the Essex Region's drainage patterns is discretized into 26 subwatersheds. Figure 1 of this report provides a visual depiction of ERCA's jurisdictional boundary and the 26 subwatersheds.

Watershed Challenges/Vulnerabilities

Riverine and Shoreline Flooding

Along most of the Essex Region's watercourses and shorelines, periodic flooding is a natural occurrence. While property damage and flooding can be reduced, flooding cannot be prevented entirely. Roughly 10 percent of the Region's land area is susceptible to flooding from a 1:100-year flood, which has a 1 percent chance of occurrence in any given year. Compounding this problem is the fact that most of the Region's communities have historically been oriented to waterfront areas. Today, thousands of homes and other structures are located in floodprone areas, including roadways that could be rendered impassable during flood events.

Figure 2 below highlights the land areas susceptible to a 1:100-year flood event, both from riverine or pluvial sources and shoreline flooding caused by the wind events over the Great Lakes.

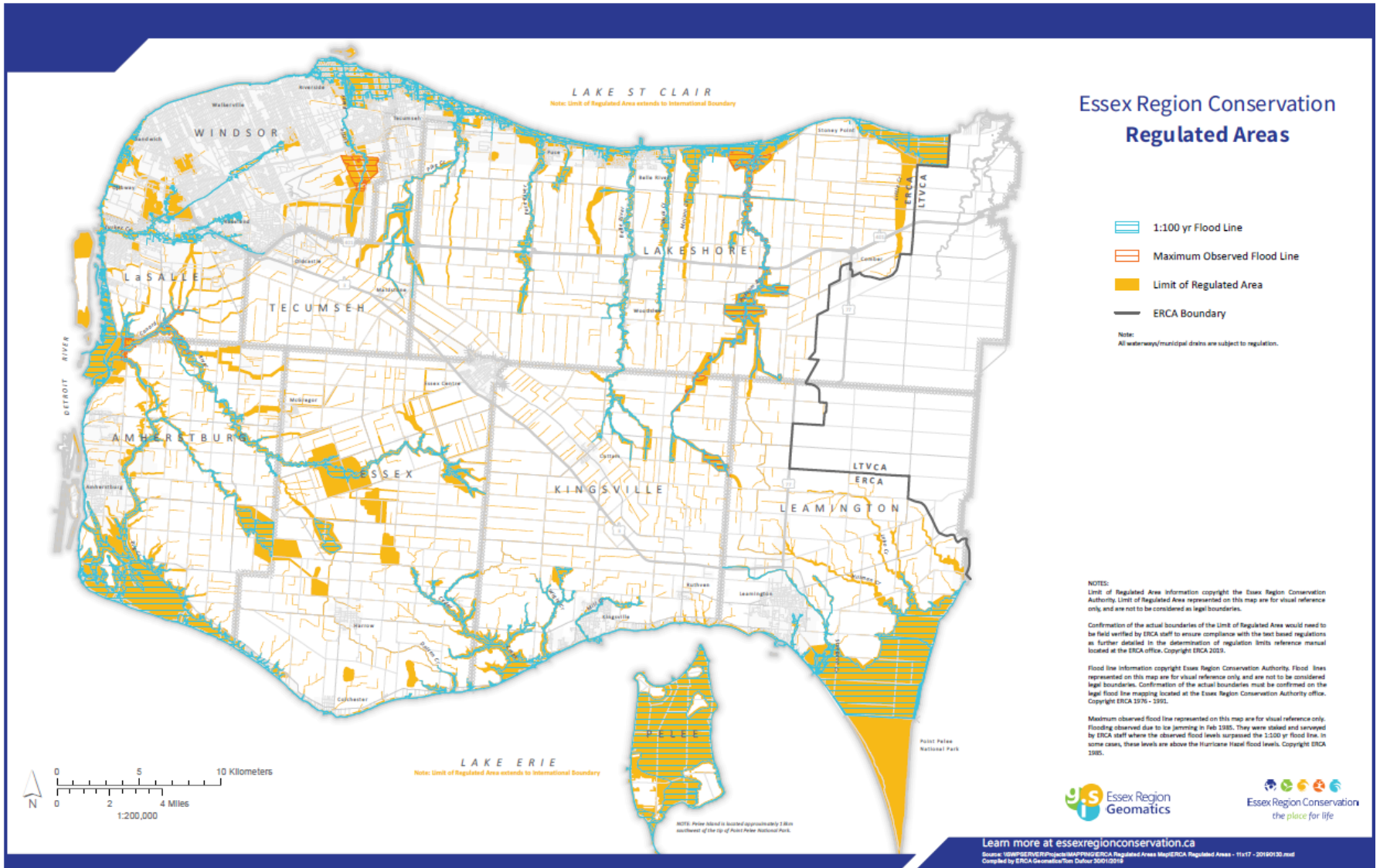


Figure 2: Areas susceptible to a 1:100-year flood event (riverine and shoreline)

The Essex Region has suffered extensive property damage and community disruption from flooding throughout its development history. Significant flood events and record high lake level periods are noted below. Flood events identified below caused either considerable property or structure damage, community disruption, or both.

Major Flood Events (1973-Present)	
Year	Description of Area
1973	The "St. Patrick's Day Flood" occurred in March 1973 which was a severe northerly wind event causing significant flooding along the south shore of Lake St. Clair. This was an abnormally long duration wind event combined with rain and snowmelt and resulted in roughly 3,000 residents evacuating their homes and an estimated \$5M in damages.
1981	Significant rainfall in the upper reaches of the Little River Watershed (Sandwich South lands) leading to "Maximum Observed" flood levels for Section 28 regulatory purposes. The area experienced roughly 30 mm of pre-wetting rainfall 24 hours before the main storm brought roughly 80 mm. The saturated ground conditions caused significant flooding throughout the agricultural lands upstream of the E.C. Row expressway.
1985	Significant ice jamming on Canard River and Ruscom River leading to "Maximum Observed" flood levels for Section 28 regulatory purposes. Impacts on the Canard River were experienced upstream of E.T.R. railway bridge, up to Kelly Road to the north and 5 th Concession North/Disputed Road to the east. Impacts on the Ruscom River were experienced along almost the entire channel starting at the VIA Rail bridge near Lake St. Clair down to County Road 8 and down to Road 10 Kingsville in Silver Creek.
1986	Record high Great Lakes water levels leading to shoreline flooding and erosion.
1989	The "Harrow Flood" occurred July 19 and 20, 1989, which caused widespread flooding across Harrow, Colchester, and Essex County due to an intense stationary thunderstorm centered over Colchester South. This storm brought roughly 450 mm of rain within 30 hours and caused an estimated \$13.8M in damages.
1998	The "Easter Flood" or "Good Friday Flood" occurred just before Good Friday in April 1998 and was caused by strong sustained east and northeast winds over both Lake Erie and Lake St. Clair. The event caused flooding in several areas across Windsor-Essex with 3 main damage centres: East Riverside and Riverside Drive in the City of Windsor, the Road 1 Dike protecting farmland in the Municipality of Leamington, and the north and east shorelines of Pelee Island which needed \$0.5 to \$1.0M in repairs.

2016	The “September 2016 Storm” brought between 80 mm within a 24-hour period (recorded at the Windsor Airport) and 190 mm with the most impacted area being the Town of Tecumseh. Both Windsor and Tecumseh declared states of emergency with abandoned cars across the urban landscape with many flooded and impassable streets.
2017	The “August 2017 Storm” was a storm that lasted about 48 hours and brought rainfall amounts ranging from 100 mm on the outer edges of the storm up to 285 mm in the storm’s centre, over the headwaters of the Turkey Creek Watershed. A circular area, fully urbanized, ranging from 4 to 6.5 km in diameter experienced rainfall amounts ranging from 200 to well over 250mm. This resulted in over 2,700 flood-related calls to Windsor’s 311 line with over \$173M in insurance payouts for basement flooding claims.
2018-2021	New record high lake levels. Several flood events along the Lake Erie shoreline occurred that were caused by a combination of high lake levels and strong winds. This impacted low lying areas along the shoreline across all of Windsor and Essex County. Many properties were impacted by waves, debris, flowing and standing floodwater, with some roadways washed out during significant east and northeast winds.
2023	“The August 2023 Storm” lasted for roughly 37 hours over August 23 rd to 25 th , and brought rainfall amounts of 100 mm up to 220 mm across the southern half of Essex County. The most impacted areas on the mainland included the communities of Harrow and Colchester, both in the Town of Essex, and the Town of Kingsville. Pelee Island received roughly 200 to 240 mm of rainfall with significant impacts to their pumping systems. Lengthy stretches of roadway were closed across Essex and Kingsville with many homes flooded. The Insurance Bureau of Canada reported over \$110M in losses. Ontario activated the Disaster Recovery Assistance Program for Essex, Amherstburg, and select areas of Kingsville and Lakeshore.

Flooding has cause-and-effect relationships with several other resource management issues. Floods contribute to shoreline erosion, stream and ditch bank erosion, and field erosion. In turn, eroded materials lead to impaired water quality in the Region’s inland watercourses and in the Great Lakes. The continued decline in water quality results in decreased or deteriorated outdoor recreation opportunities and fish and wildlife habitat.

Erosion (Rivers, Creeks, Streams, and Soil)

The Essex Region has an extensive artificial land drainage system that is susceptible to bank erosion. Poor design features such as excessively steep banks and improperly placed tile drainage outlets, together with a lack of bank vegetation and structural erosion control measures are major contributing factors to stream and ditch bank erosion. Depending on

channel velocities, eroded materials from fields and from streams and ditch banks may settle on stream beds or may be transported into the Great Lakes. In either event, channel capacity is slowly reduced through sedimentation of eroded material and water quality is reduced along with wildlife habitat and recreational activities that depend on clean water.

Soil or surface erosion is a natural process which wears away land through the actions of wind, water, ice and gravity. While soil erosion occurs in urban and rural areas, for example, lands being cleared for new development, soil erosion problems are most severe in agricultural areas. In the Essex Region, more than three quarters of the total land area is used for agriculture. To promote agriculture, the natural forest cover was removed and extensive tile drainage and artificial surface drainage was installed, such as farm tiles, ditches, and municipal drains under the *Drainage Act*. Early farming practices in the area included a mix of livestock and cash crop; however, over the decades, significant transitions have occurred in farming practices. Firstly, livestock was largely replaced by cash crops such as corn, wheat, and soybeans. More recently, farming has been industrialized through extensive greenhouse operations throughout the municipalities of Leamington and Kingsville. Such large greenhouses may reduce surface soil erosion as the land is covered with buildings, but these operations are significant contributors to in-stream erosion due to prolonged release of runoff from large stormwater management facilities. It is also well known that such greenhouses are significant contributors to nutrient loads within receiving watercourses and by extension, the Great Lake system.

Erosion Control (Shoreline)

Shoreline or coastal erosion is primarily driven by natural causes including high lake levels, wave action, and lake currents. In addition to this, development activities along shorelines can also contribute to this type of erosion. In general, the erosion can be combined with flooding of low-lying shoreline reaches, downcutting or lakebed deepening, and slope failure in the bluff areas of Essex County along the Lake Erie shoreline. As the shoreline is almost entirely urbanized or developed in some fashion, there is a greater likelihood of property damage caused by erosion than if these lands were undeveloped.

Water Quality

Water quality in the Essex Region's watercourses has been considered seriously degraded since before ERCA's inception in 1973. At that time, Turkey Creek in the Windsor/Sandwich West area had one of the worst water quality ratings in all of Ontario. Today, the worst water quality in Ontario/Canada can still be found in Essex County in Sturgeon Creek in the Municipality of Leamington. The degraded water quality can be attributed to both point and non-point source pollution.

Non-point source water pollution and erosion are closely related as the Essex Region has large land masses used for agricultural purposes with erodible finely-texture clay soils. Currently, the rapid expansion of industrial farming practices through large-scale greenhouse facilities has

caused a significant strain on water quality as evident by much higher nutrient loadings in some Essex County watercourses than the provincial average.

When water quality becomes degraded, other natural resources are adversely affected. Stormwater or spring runoff carrying abrasive sediments erodes stream banks and adds to the total sediment load. Excessive sediment reduces a stream's oxygen content, often killing aquatic life. Where excessive nutrients like nitrogen and phosphorous are present, unwanted weeds and algae growth ensues. Sediment disposition in watercourse reduces their stormwater carrying capacity and increases the likelihood of property damage from flooding. Bacterial and toxic pollutants also destroy aquatic life and may create public health hazards. Conversely, when water quality is improved, fish and wildlife habitat is improved and additional outdoor recreation opportunities, such as swimming and boating are enhanced or created. Finally, cleaner source water ultimately leads to cleaner drinking water.

Biological Resources, Natural Areas and Features

The Essex Region's biological resources were significantly depleted by past activities including fur trade, lumbering, agriculture, and urban development. Urbanization and deforestation have continued since 1973, despite ERCA's best efforts. Nonetheless, the Essex Region has grown from 3 percent land area covered by forest and scrubland to roughly 8.5 percent due to ERCA programming and public participation.



Deterioration of the Region's biological resources has negative implications for other resource management concerns. Forest and wetland removal has increased the extent and severity of flooding within the Region. Loss of tree cover contributes to high rates of field erosion, ditch and ditch bank erosion. Eroded materials contribute to degradation of water quality and deterioration of fish and wildlife habitat.

Outdoor recreation is also affected by the depletion of biological resources. The demand for waterfowl hunting greatly exceeds the supply of opportunities. A large deficit exists in the availability of such activities and nature viewing opportunities, which are directly related to the loss or deterioration of biological habitat.

Guiding Principles and Objectives

ERCA Strategic Plan

ERCA's Strategic Plan supports the Authority's responsibility in helping our region and communities to ensure that the places where we live in have clean water and landscapes, are protected from natural hazards like flooding and erosion, and support healthy living through recreation and conservation. Through the Strategic Plan, ERCA's Vision and Mission are as follows:

 <p style="text-align: center;">Vision</p> <p style="text-align: center;">The Essex Region is a sustainable, resilient, and vibrant place with healthy and thriving watersheds, Great Lakes and a green culture.</p>	 <p style="text-align: center;">Mission</p> <p style="text-align: center;">Improving our environment to enrich our lives.</p>
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In addition to ERCA's Vision and Mission statements, ERCA's current Strategic Plan identified five high level Strategic Actions which are summarized below. More detail can be found in the Strategic Plan.

 <p>The climate will continue to change.</p>	 <p>The Great Lakes are our most significant natural resource.</p>	 <p>Our landscapes and habitats are among the most significant in Canada.</p>	 <p>Our urban areas will continue to grow and expand.</p>	 <p>ERCA is a sustainable, resilient, and valued agency.</p>
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Supporting the above noted Strategic Actions, there are fifteen Goals and further sub-actions that guide the implementation of the Strategic Plan. Further to Strategic Plan hierarchy of Strategic Directives, Strategic Actions, Goals, and Actions, this Watershed Strategy provides new *Guiding Principles* and *Objectives* that inform the design and delivery of programs and services.

Guiding Principles

Guiding principles establish the fundamental approach that drives the decision-making of the Conservation Authority. These newly established guiding principles have been developed to meet the requirements of *Ontario Regulation 686/21* and provide the context for the objectives outlined in this Strategy.

	GUIDING PRINCIPLES
1	The conservation, restoration, development, and management of natural resources is best implemented on a watershed basis.
2	The health and safety of watershed residents is a primary consideration for all development.
3	Everyone deserves safe drinking water.
4	The management of water and other natural resources is a shared responsibility among conservation authorities, municipalities, government agencies, and other stakeholders.
5	Resource management decisions should take into consideration a broad range of community uses, needs, and values, including ecosystem needs.
6	Engagement and collaboration lead to better and stronger ideas, actions, and outcomes.
7	Water and other natural resources are vital natural assets; they buffer the impacts of climate change, mitigate natural hazards, filter contaminants, assimilate waste, sustain biodiversity, and provide green spaces for recreation, among other community benefits.
8	Natural greenspaces are critical to the community, providing environmental, economic, social, mental, and physical health benefits.
9	Community education leads to environmental stewardship with active participation in conservation efforts to protect land and water resources.

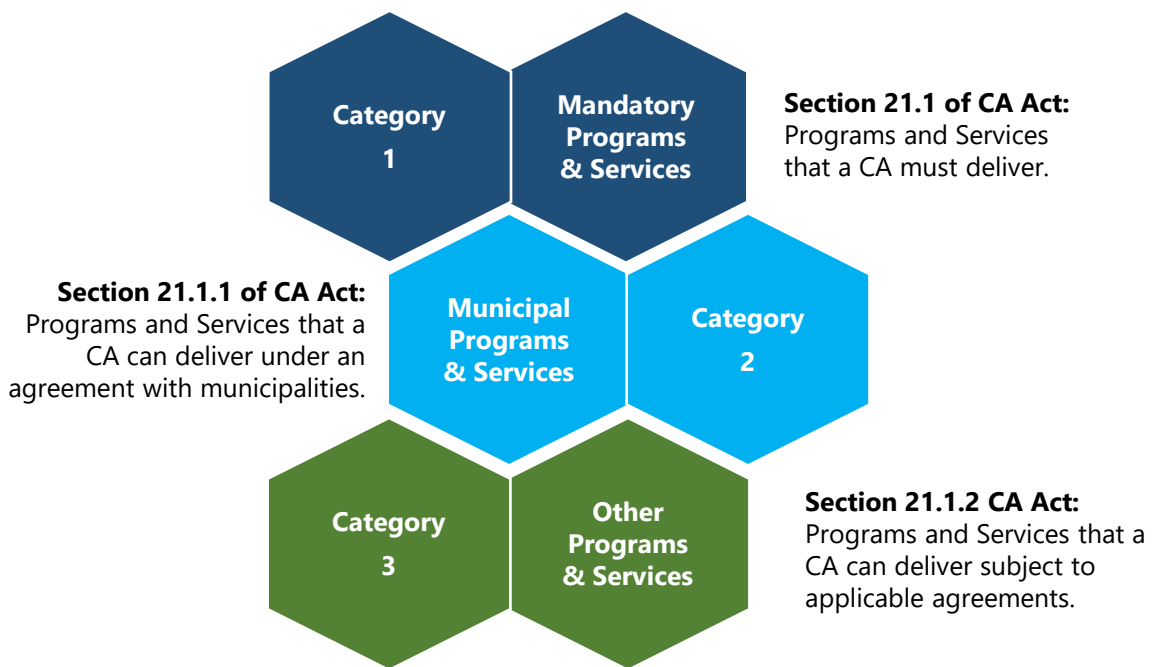
Objectives

The objectives listed below were developed to meet the requirements of *Ontario Regulation 686/21* and to further guide ERCA beyond the Strategic Plan in support of all programs and services.







	OBJECTIVES
1	To avoid, reduce, or mitigate potential risk to public health or safety or of property damage from flooding and other natural hazards and the impacts of climate change.
2	To mitigate potential risk to drinking water sources and ensure a sustainable and clean water supply for the entire watershed community and ecosystems.
3	To identify and understand key resource issues and the primary stressors that cause them.
4	To assign greater priority to the implementation of solutions which address a range of interrelated resource management concerns and have the greatest cost-benefit.
5	To characterize groundwater and surface water resource systems and other natural resources, which regulate natural hazard processes and support the hydrological and ecological integrity of the watershed.
6	To identify the causes of and potential solutions for addressing key issues.
7	To protect and maintain ERCA owned lands for public safety, natural heritage protection, outdoor recreation, and socio-economic health.
8	To research and identify potential solutions for addressing key resource issues, advocating for government funding and policies to address these issues, and adapting/developing programs and services as required.
9	To educate and engage the watershed community to promote awareness of natural hazards and watershed health, and to encourage the protection and restoration of land and water resources through stewardship action.

Program and Service Areas

The Conservation Authorities Act identifies three types of services that can be delivered by conservation authorities; these include *Mandatory Programs and Services (S. 21.1)*, *Municipal Programs and Services (S. 21.1.1)*, and *Other Programs and Services (S. 21.1.2)*. Further to the Act, *Ontario Regulation 687/21: Transition Plans and Agreements for Programs and Services under Section 21.1.2 of the Act* required all conservation authorities to develop Transition Plans and an Inventory of Programs and Services. Additionally, *Ontario Regulation 687/21* also introduced the categorization of all programs and services into Categories 1, 2, and 3. More details are provided below with respect to the relationship between the type of category, the program and service areas, and the relevant section of the CA Act.



ERCA's Programs and Services have been reviewed, modified, and categorized to ensure conformity with the CA Act and regulations. ERCA developed its Inventory of Programs and Services, which was shared with municipal watershed partners and the Province for input throughout the Transition Period. It should be noted that, while the programs and services that are considered Category 1 are required by legislation, Category 2 and 3 programs and services are essential to Category 1 program areas. For example, watershed monitoring and public education are both integral to science-based watershed knowledge and decision-making processes. The final Inventory of Programs and Services includes comprehensive details with respect to categorization of programs and service areas, relevant rationale, and sources of funding. In general, the Inventory describes the program areas as follows:

 <p>Natural Hazards Management</p>	 <p>Conservation Lands Management</p>
 <p>Drinking Water Source Protection</p>	 <p>Core Watershed-Based Resource Management Programs</p>
 <p>Outreach / Education / Other Programs</p>	 <p>General / Corporate Services</p>

Note that the implementation of the program areas listed above are delivered through several departments within the Authority, as many initiatives require coordinated, multi-faceted approaches. In general, ERCA delivers its programs and services through the following program areas, with corporate (general) services, supporting all programs:

- Watershed Management Services
- Conservation Services
- Source Water Protection and Watershed Research
- Communications and Outreach Services

Program and Service Compliance Review

The suite of programs and services that are offered by ERCA are categorized in accordance with the regulations made under Section 40(1)(b) of the *Conservation Authorities Act*. More specifically, categorizations of programs and services, related agreements, and sources of funding are all compliant with applicable regulations and by extension, Clause 40(1)(b) of the Act.

Program and Service Effectiveness Review (Risk Review)

ERCA strives to deliver efficient, effective, and quality programs and services. Notwithstanding this, emerging environmental issues, legislative changes to roles and responsibilities, staffing and financial constraints can impact the Authority's delivery of programs and services, and therefore risks related to program delivery should be analyzed. Consistent with *Ontario Regulation 686/21*, all programs and services that are provided under Section 21.1 of the *CA Act* were evaluated to determine any issues and risks that may limit the effectiveness their delivery. Following the general description of each program area below, related risks, issues, and challenges are denoted with an R# and described in table format along with associated mitigation measures, which are denoted with an M#.

Watershed Management Services (WMS)

Watershed Management Services are mandatory services and ensures that development in the region progresses in a sustainable manner and directed away from natural hazards, while protecting existing development, water resources, and natural features that contribute to flood and erosion attenuation. In general, WMS is delivered through four programs:

- Development Services (mandatory service)
- Watershed/Water Resources Engineering (mandatory service)
- Flood Management/Flood Forecasting and Warning (mandatory service)
- Watershed Planning (mandatory service)

The priority of these programs is to reduce the risk to life, property, and social disruption resulting from natural hazards.

Development Services

ERCA administers Section 28 of the Conservation Authorities Act by implementing *Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permit*, enacted on April 1, 2024. Through this program, ERCA regulates development within hazardous lands through a permitting and development review process, to protect people and property from naturally occurring processes associated with flooding, erosion, unstable soils, dynamic beaches, or unstable slopes.

Watershed/Water Resources Engineering

The delivery of watershed/water resources engineering supports the management of flood and erosion risk through flood plain management studies (hazard mapping) and related technical studies, inspection of and planning for water and erosion control infrastructure, stormwater management, and water resources engineering input and advice to external stakeholders.

Flood Management / Flood Forecasting and Warning











ERCA maintains a “firehall model” for Flood Forecasting and Warning, which provides advanced warning of potential riverine and/or shoreline flooding. The Authority is integrated into the five pillars of Emergency Management: prevention, mitigation, preparedness, response, and recovery.









Watershed Planning

A ‘planning-first’ approach to natural hazards protection is implemented through the review of *Planning Act* applications that are circulated by the region’s municipalities. WMS reviews such planning applications to ensure consistency with Provincial Policy Statement and local natural hazard development policies. The ‘planning-first’ approach ensures that necessary Planning approvals are secured in advance of consideration of Section 28 approvals under the *CA Act*.

WMS Risks and Potential Mitigation Measures

Costs associated with mitigation measures in Watershed Management Services are estimated to range from \$500,000 to over \$1M. Projects are largely grant-dependent and subject to change based on development pressures, legislation, and ERCA and municipal priorities.

Risk/Issue		Potential Mitigation	
<p>R1</p> 	<p>Frequency and severity of unlawful Section 28 activities has been increasing, creating a strain on resources. Legal Fees are not recovered through fines or the court system, but rather general rate payers.</p>	<p>M1</p> 	<p>Engage Conservation Ontario and the Province to review the possibility of fines being directed to affected CAs/Municipalities. Alternatively, additional funding is required to support legal action. ERCA will continue to maintain a legal reserve to fund unbudgeted legal expenses.</p>
<p>R2</p> 	<p>Self-generated revenue is volatile, and often correlates with general economic conditions, such as interest rates and unemployment making it challenging to predict.</p>	<p>M2</p> 	<p>Plan and budget for more reliable funding sources, including annual fee-for-service projects to help stabilize revenue.</p> <p>Continue to maintain the revenue stabilization reserve with a sub-reserve for WMS to address short-term declines in revenues.</p>
<p>R3</p> 	<p>Frozen Fee Schedule for two years by Minister's Directive has reduced fee for service revenue. Continuation of such a Directive threatens the "user pay principle".</p>	<p>M3</p> 	<p>Review fees in anticipation that the Minister's Directive expires. An extension of the Minister's Directive will impact levy.</p>
<p>R4</p> 	<p>Administration of S.28 permitting and plan review lack available resources to ensure legislated and desired service delivery targets are satisfied.</p>	<p>M4</p> 	<p>Modernize and maintain up-to-date tools and review staffing capacity against expected service delivery targets.</p> <p>Continue to migrate to PIMS 2.0 and enhance self-serve functionality, to reduce administrative burden on staff.</p>
<p>R5</p> 	<p>Hazard mapping for the inland tributaries is out of date, impacting hazard related decision-making.</p>	<p>M5</p> 	<p>Engage with municipal and third parties to establish adequate funding to leverage grant opportunities. Consider implementing special levies to ensure mapping updates progress</p>

			when no external funding is available.
R6 	Baseline information on subwatersheds is insufficient to inform watershed plans, Master Plans, hazard modelling, and flood forecasting.	M6 	Expand climate station network and introduce flow monitoring and gauge station network. Partner with other departments to share resources to achieve shared benefits (e.g. partner with SWP on flow monitoring stations that collect water level and water quality data for shared benefits)
R7 	Rising costs of maintenance to flood and erosion control infrastructure and shortages of qualified staff, have limited the capacities of ERCA and the region's municipalities, to formulate a coordinated response to inspection, maintenance and repairs of this infrastructure.	M7 	Discuss annual investment, special benefitting levy, or reserves with applicable municipalities and explore more grant opportunities, such as WECL.
R8 	Not all development services users understand development review processes and the connectivity with other municipal processes (e.g. <i>Planning Act</i> applications vs. S.28 Applications and their relation to municipal processes). This creates real and perceived delays and other challenges.	M8 	Develop education/outreach campaign, factsheets, and process flowcharts for public consumption.
R9 	Natural Heritage Systems, which have a positive impact on natural hazards management through flood attenuation and reduction in sedimentation, are no longer protected through CA review comments as new provisions of the <i>CA Act</i> . The slow removal of natural heritage systems will have a negative impact on floodplains and hazard lands.	M9 	Bolster ERCA's study of subwatersheds to improve understanding of potential impacts associated with natural heritage degradation. Impacts could be seen in both water quantity and quality.

Conservation Services

ERCA's Conservation Services programs protect, restore, and manage natural heritage areas and systems within ERCA's watershed. This is accomplished through a system of land conservation through strategic and leveraged investment in land securement, and by identifying and implementing priority restoration projects. All Conservation Areas within the ERCA watershed are impacted on by natural hazards. Fundamental to the management of sites is the access to hazard areas for flood observation, and in the case of trails, physical access to reaches that would otherwise be inaccessible. In general, Conservation Services is delivered through the following programs:

- Conservation Land Management (mandatory service)
- Public Conservation Areas supporting passive recreation (mandatory service)
- Tree Planting & Restoration on ERCA-Owned Lands (mandatory service)
- Tree Planting and Habitat Restoration on other lands (non-mandatory service)
- Capital Projects (mandatory and non-mandatory service)
- Land Securement & Acquisition (non-mandatory service)
- Management of Holiday Beach Conservation Area (non-mandatory service)

Conservation Lands Management & Public Conservation Areas

Land management activities support the management of biological resources within the region, in line with the most current *Conservation Authorities Act*. Currently, ERCA owns or manages 18 publicly accessible properties totalling more than 1,800 hectares (roughly 4,400 acres) of land, and nearly 100 kilometres of trail. These areas help people lead healthy lifestyles by providing places to be active while connecting with nature. These areas also contribute to the local economy as tourist attractions, which continue to attract visitors to our region to experience birding, hiking, cycling and swimming.

Tree Planting & Restoration on ERCA-Owned Lands

Restoration and management of properties owned or controlled by ERCA are considered core responsibilities and categorized as mandatory activities, included in conservation of lands. ERCA has undertaken restoration such as tree planting, wetland creation and restoration, shoreline protection, prairie restoration and forest management on its properties for over 40 years. Additional details can be found in the Conservation Land Management Strategy, under a separate cover.

Tree Planting & Restoration on Other Lands

The natural resources of the Essex Region are significantly depleted as demonstrated in the Essex Region Natural Heritage Systems Strategy. To facilitate a sustainable natural heritage system, working with private land stewards is required. ERCA's private lands restoration efforts are funded by third party sources, including government, non-governmental organizations (NGOs), and through Category 3 non-mandatory municipal cost-apportioning agreements with all participating municipalities.

Capital Projects

Capital projects include various construction projects, which can be most often categorized as mandatory, such as bridge and culvert replacement, trail, roadway, and parking area rehabilitation and expansions, signage, and building upgrades. Other non-mandatory capital projects are managed through this program, such as the John R. Park building upgrades. A significant portion of the works included in capital projects is supported by grants when possible.

Land Securement & Acquisition







ERCA works towards the strategic purchase of lands that have the highest importance as per the most current Land Securement Strategy. The land acquisition objectives are more clearly defined in ERCA’s Conservation Land Management Strategy, under a separate cover.







Management of Holiday Beach Conservation Area

The Province of Ontario with the Ministry of Natural Resources and Forestry as its representative, is the legal owner of Holiday Beach Conservation Area, but the site is operated by the Authority via a thirty-year management agreement with the Province, which expires in the year 2031. The operational costs associated with this site are covered by user fees related to seasonal camping, hunting and cottage rentals; however, revenue generation is not sufficient to fund future capital replacement and major renovation costs. ERCA is not contractually or legislatively obligated to replace infrastructure. Recent trail and amenities improvements have been funded through government grants and contributions from the Essex Region Conservation Foundation (ERCF).

Conservation Services Risks and Potential Mitigation Measures

Costs associated with mitigation measures Conservation Services are estimated to range from \$500,000 to over \$1M. Many mitigation measures are grant-dependent and subject to change based on applicable legislation as well as ERCA and municipal priorities.

Risk/Issue		Potential Mitigation	
R1 	Dated or absent property management plans.	M1 	Update Conservation Area Management Plans
R2 	Costly maintenance and repairs to infrastructure	M2 	Update the 2010 Asset Management Plan. Strategically reduce built infrastructure, if appropriate.
R3 	Management of extreme weather or lake elevation events	M3 	Design of sustainable infrastructure that withstands/accounts for extreme weather

<p>R4</p> 	<p>Lack of grant funding to implement non mandatory programs and services</p>	<p>M4</p> 	<p>Engage municipalities to assist with additional funding or reduce the scope of programs and services.</p>
<p>R5</p> 	<p>Unforeseen biological threats such as new invasive species establish in Conservation Areas</p>	<p>M5</p> 	<p>Consider implementing an invasive species remediation reserve and build a network of partnerships to assist with unforeseen biological issues.</p>
<p>R6</p> 	<p>Limited staff capacity with appropriate skills, experience and credentials, to competently undertake required maintenance.</p>	<p>M6</p> 	<p>Analyze, review, and update roles, responsibilities, job descriptions, compensation grids, and related policies, to enhance the retention of qualified staff.</p>

Source Water Protection & Watershed Research

Watershed Research endeavors to improve the health of local watercourses through agricultural Best Management Practices (BMPs), monitoring at the watershed and collection of landscape information through Geographic Information Services (GIS). Enhanced water quality monitoring is undertaken only when external sources of funding are available. Strengthened relationships with academic and government scientists and active participation in several ongoing research programs allows solutions to be developed that are best suited to the region’s unique ecosystem. Additionally, local sources of drinking water are protected through the implementation of policies in the Source Protection Plan and its amendments. In general, Watershed Research is delivered through the following programs:

- Source Water Protection (mandatory service)
- Watershed Science and Water Quality (mandatory and non-mandatory service)

Drinking Water Source Protection

Administered under the Clean Water Act, the watershed-based mandatory Source Protection Program is the first step in a multi-barrier approach to protect drinking water. It complements municipal water treatment and supports sound land use planning decisions. ERCA, and other conservation authorities, have designated responsibilities under the Clean Water Act to work closely with stakeholders to ensure that sources of municipal drinking water are safe and abundant. ERCA’s Risk Management Services, a non-mandatory Category 2 fee-for service municipal program, implements a specific subset of policies on behalf of municipalities.





Watershed Science and Water Quality















As noted earlier in this report, our region’s water quality is significantly degraded and has some of the worst water quality scores in Ontario. Healthy rivers, headwaters, and species in our

watershed are key elements of a sustainable and healthy environment that we all rely on for our sources of drinking water, our economy and for recreation. The ability to track and report on changes to these indicators of healthy watersheds and share that knowledge helps assess and understand current health and emerging trends as a basis for setting environmental management priorities, identify research gaps to work with academic and other research partners to address, and manage, protect or enhance watershed resources. ERCA undertakes its watershed science programs through partnerships with the Provincial Water Quality Monitoring Network (PWQMN), and the Provincial Groundwater Monitoring Network (PGMN), both of which are mandatory programs in the CA Act. Additionally, ERCA works in partnership with Provincial and Federal programs and with universities, including the Great Lakes Institute for Environmental Research (GLIER), at the University of Windsor to bolster the existing mandatory program. This information is analysed and presented to the public every 5 years in ERCA's Watershed Report Card, which grades watersheds from A (Excellent) to F (Very Poor) in four categories: Surface Water Quality, Groundwater Quality, Forest Conditions, and Restoration Efforts.

Watershed Research Risks and Potential Mitigation Measures

Costs associated with mitigation measures are estimated to range from \$110,000 to \$220,000 and are largely grant-dependent, and subject based on applicable legislation as well as ERCA and municipal priorities.

Risk/Issue		Potential Mitigation	
R1 	Limited municipal capacity and high staff turnover affects implementation of the Source Protection Plan.	M1 	Provide annual training for municipal staff. Maintain ongoing communication with and provide support to municipal staff.
R2 	Provision of Part IV services (Risk Management Services) is built on a model of shared costs for all municipalities with a renewed agreement every three years. Also, the historical funding model has provided for cost recovery only, based on actual time & materials, rather than consideration of a more sustainable funding model	M2 	Ensure agreement is negotiated and renewed in a timely manner. Consider four-year agreements to coincide with terms of municipal councils. Ensure full program cost recovery as well as base-level/minimum funding support to enhance ongoing program delivery and sustainability.

<p>R3</p> 	<p>Dated watershed characterization information hinders ability to refine source protection policies as required to protect sources of drinking water.</p>	<p>M3</p> 	<p>Create a method by which drainage features can be updated at least annually using up to date municipal drain information and detailed GIS products (e.g. DEM, large scale hydrology).</p>
<p>R4</p> 	<p>Extensive highly vulnerable aquifers and significant groundwater recharge areas but no ability to apply source protection outside of municipal residential surface water intake protection zones.</p>	<p>M4</p> 	<p>Explore the use of the MECP's Best Practices for private wells. Ensure proponents with projects that could impact groundwater are aware of these sensitive areas.</p>
<p>R5</p> 	<p>Limited internal staff capacity can cause delays in delivery of some source water activities.</p>	<p>M5</p> 	<p>Increase capacity to include support staff. Refer to M9 for other mitigation strategies.</p>
<p>R6</p> 	<p>Available resources to respond to emerging concerns (e.g. pesticides, PFAS).</p>	<p>M6</p> 	<p>Continue to seek out partnerships and apply for grants.</p>
<p>R7</p> 	<p>Ongoing financial support for watershed monitoring (e.g. PWQMN, PGMN, special projects).</p>	<p>M7</p> 	<p>Continue to seek out partnerships and apply for grants to maintain and enhance monitoring programs.</p>
<p>R8</p> 	<p>Ongoing financial and administrative support for stewardship and outreach programs targeting the implementation of Best Management Practices to improve water quality.</p>	<p>M8</p> 	<p>Continue to seek out partnerships and apply for grants. Cross-promote provincial and federal incentive programs locally. Provide ongoing education to landowners and additionally, to municipal stakeholders and decision-makers, on the importance of BMPs in improving downstream water quality.</p>
<p>R9</p> 	<p>Retention of highly qualified personnel is difficult to achieve due to classification of most research-related programs as non-mandatory, resulting in an over reliance on term-</p>	<p>M9</p> 	<p>Include the water quality program in the ERCF's Partners in Sustainability campaign and actively promote the WQ research program to corporate donors.</p>

<p>limited government project grants. The mandatory Drinking Water Source Protection program does not require full-time positions and ERCA must rely on the third-party/gov't funded term-limited projects to fund a full-time position(s).</p>	<p>Continue to lobby the provincial government through Conservation Ontario, for a re-classification of water quality programs which support the DWSP program, to mandatory programs.</p> <p>Include a higher level of financial support in the next iteration of Category 3 municipal cost apportionment agreements, to support a .5 FTE water quality specialist position, on an ongoing basis , which could be matched by funding from the ERCF.</p>
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Communications & Outreach Services

Communications and Outreach Services support all business units of the Authority. This includes supporting flood messaging, disseminating natural hazard information, engaging landowners in conservation practices and climate action, educating students of all ages about environmental sustainability, promotion of and engagement in tree planting and restoration, connecting people to nature through a variety of programs and events, identifying the value of natural connections to our health, and communicating broadly with stakeholder groups and watershed residents.

Communications efforts also support revenue-generating activities for conservation areas and other programs. Providing stewardship and educational opportunities to residents living within our watersheds is important and critical to conservation success across the region. Providing hands on opportunities for people to connect with nature and take action for the environment will raise awareness about broader local environmental needs, including but not limited to expanding natural areas coverage and protecting mature forests. In general, Communications & Outreach Services is delivered through the following programs:

- Communications (mandatory service)
- Outdoor Education (non-mandatory service)
- Outreach & Engagement (non-mandatory)
- JRP Museum Operations & Programming (non-mandatory)

Communications

Corporate communication is included as a mandatory service as it supports the communication needs of the Authority's mandatory functions, including critical flood messaging, to various audiences across multiple platforms. This includes annual reporting, stakeholder relations,

engagement through traditional and social media, media relations and other communications priorities.

Outdoor Education

ERCA’s Outdoor Education programs provide experiential environmental programs and services for kindergarten to grade 12 students and teachers, meeting the objectives of the provincial curriculum. While outdoor education is identified as non-mandatory, significant fundraising through the ERCF has significantly reduced the reliance on cost apportionment, to continue to deliver these vital conservation education programs.

Outreach & Engagement



ERCA provides opportunities for the region’s communities to engage in environmental restoration activities such as tree planting events on private, municipal, and on ERCA-owned lands. Grants and funding opportunities are continuously explored to support this non-mandatory yet vital program.







JRPH Museum Operations & Programming





While passive recreation and related maintenance costs, for conservation areas, are eligible within the mandatory cost apportionment category, the operation and preservation of the John R. Park Homestead (JRPH) Museum and other heritage buildings are identified as non-mandatory services. The property was transferred from the Province of Ontario to ERCA in 2008; however, the transfer contained several restrictive covenants and obligations, including that it be operated in accordance with the Community Museum Standards, as defined in the Ontario Heritage Act.

Communications & Outreach Services Risks and Potential Mitigation Measures

Costs associated with mitigation measures in Community & Outreach Services are estimated to range from \$135,000 to \$220,000, with most of the measures being grant-dependent or identified as fundraising opportunities for the Essex Region Conservation Foundation. Funds to offset museum operations at the John R. Park Homestead, which is being explored by the Essex Region Conservation Foundation through the potential creation of an endowment or long-term fund.

Risk/Issue		Potential Mitigation	
R1 	Capacity for responding to communications’ demands, related to informing and educating stakeholders and communities, is challenging due to staff capacity and budget constraints (including limitations associated with	M1 	Seek innovative ways to increase capacity and continue to improve efficiencies in meeting organizational communications needs.

	mandatory vs non-mandatory programming).		
R2 	Lack of comprehensive understanding of ERCA mandatory and non-mandatory programs and services, is often a barrier to obtaining financial support and collaboration with partners.	M2 	<p>Continue to communicate with watershed stakeholders through a variety of channels to build knowledge and awareness of ERCA's programs and their importance to this region's environmental sustainability.</p> <p>Utilize and capitalize on the membership of ERCA's two appointed ERCF board members to promote and champion ERCA's funding needs for non-mandatory programs.</p>
R3 	Busing can be cost prohibitive for students to partake in experiential education programs at conservation areas. Bussing availability and providers are limited.	M3 	<p>Continue to innovate experiential programs like Nature Near You, delivered at schools that cannot afford bussing. Engage the Essex Region Conservation Foundation in seeking support for bussing cost offsets to remove barriers to participation.</p>
R4 	Ability to maximize operations and generate revenue at the JRPH is limited by staff capacity and budget constraints (including limitations associated with mandatory vs non-mandatory programming).	M4 	<p>Continue to seek partnerships and apply for grants.</p> <p>Replace part-time casual staff capacity with one permanent role to facilitate continuity, accountability, and meet program and operational requirements, in accordance with the Standards for Community Museum Operations in Ontario.</p>
R5 	Technology updates are required for digitization of collections records/collections management at the JRPH to allow public access in a virtual format, which will be required	M5 	<p>Develop a digitization strategy; pursue grant opportunities to support investment in specialized software and required hardware to digitization collections.</p>

	to stay current with provincial standards.		
R6 	Poorly maintained and deteriorating heritage buildings at the JRPH limits potential operations and strains budget.	M6 	<p>Update and account for ongoing repairs to heritage assets to be preserved in perpetuity, and other non-heritage assets through a site-specific Asset Management Plan and regular asset condition reporting.</p> <p>Engage the ERCF in support of ongoing museum operations, in addition to periodic capital campaigns.</p> <p>Consider engaging architectural and structural engineering consultants every ten years, to assess condition of heritage assets and to update the JRPH AMP.</p>
R7 	On-the-ground stewardship activities such as tree planting and watershed cleanups are funded through year-to-year grant programs and individual and corporate donations, rendering this important Category 3 program at risk.	M7 	<p>Seek longer term funding partners and multi-year donations through the ERCF to ensure continuity of stewardship and outreach programming.</p>

Public Consultation

Following the release of the draft Watershed Strategy on September 12, 2024, the document was made available on ERCA's website until December 1, 2024, where the public could provide comments by email at watershedstrategy@erca.org.

Periodic Review

This Strategy should be reviewed every four (4) years to stay current with evolving political and socio-economic matters and to address emerging watershed challenges and environmental issues. An annual review of this document by Administration will facilitate a comprehensive review every four years and will also help inform annual departmental workplans and budgets.

Stakeholders and the public should be consulted during the four-year review cycle, in a manner that aligns with the degree of revisions and meets applicable regulatory requirements.

Resources

Appendix A includes an inventory of studies that are necessary and relevant to the implementation of ERCA's mandatory programs and services and to the development of ERCA's Watershed Strategy.

Appendices

Appendix A – Study Inventory

The table below is current to the date on the cover of this report, which is the last date it was reviewed. Note that ERCA relies on a plethora of technical information, data, and reports to ensure quality service delivery across service all program areas. Some or part of that information may not have been captured within the inventory listed below.

No.	Report Title	Year of Most Recent Publication	Primary Author	Report Type
1	Essex Region Coastal Flood Hazard Mapping and Data Sharing Project	2024	Zuzek	Hazard Mapping
2	Erosion and Dynamic Beach Hazard Mapping: Supplement to the Essex Region Coastal Flood Hazard Mapping Report	2024	Zuzek	Hazard Mapping
3	Windsor Essex Region Stormwater Manual – Amendment 1	2024	Stantec / Landmark	Design Guideline
4	Howard Bouffard Master Drainage Study	2024	Dillon	Class EA Master Drainage Study
5	Turkey Creek Watershed Hydrologic and Hydraulic Modelling Study	2023	Dillon / Landmark	Technical Study
6	Little River Floodline Mapping	2023	Dillon	Hazard Mapping
7	Sandwich South Master Servicing Plan	2023	Dillon	Class EA Master Drainage Study
8	Upper Little River Watershed Drainage & Stormwater Master Plan	2023	Stantec	Class EA Master Drainage Study
9	Essex Region Watershed Report Card	2023	ERCA	Technical Report
10	Essex Region Phosphorous Management Plan	2023	ERCA	Technical Study
11	Expanding greenhouse sector in Essex Couty, ON and downstream water quality degradation	2023	ERCA	Technical Study
12	Lebo Creek Master Drainage Study	2022	Landmark / N.J. Peralta	Flood Hazard Technical Study
13	Oldcastle Stormwater Master Plan	2022	Landmark	Class EA Master Drainage Study

No.	Report Title	Year of Most Recent Publication	Primary Author	Report Type
14	Town of Tecumseh Coastal Flood Risk Assessment – Shoreline Management Plan	2022	Zuzek	Shoreline Management Plan
15	Municipality of Lakeshore Shoreline Management Plan	2022	Stantec / Zuzek / SJL	Shoreline Management Plan
16	Essex County Floodplain Prioritization Study	2021	Dillon	Flood Risk Study
17	Town of Lakeshore Stormwater Master Plan - Phase 1	2020	Stantec	Class EA Master Drainage Study
18	Leamington Stormwater Master Drainage Study for Reid Drain, Silver Creek and Bick Creek Watersheds	2019	Stantec	Class EA Master Drainage Study
19	Grand Marais Hydrologic and Hydraulic Models	2019	Landmark	Technical Study
20	Detroit River Shoreline Management Strategy	2018	ERCA	Management Strategy
21	Source Protection Plan (and associated technical appendices)	2015	ERCA	Technical Report
22	Detroit River Shoreline Assessment	2012	ERCA	Assessment
23	Detroit River Canadian Shore Restoration Alternatives Selection Manual	2012	DRCC	Manual
24	Colchester to Southeast Shoal Littoral Cell Study	2008	Baird	Technical Study
25	Sustainable Management Strategy for Southeast Leamington	2007	W.F. Baird and Associates	Management Strategy
26	Fish Habitat Management Plan for the Essex Region	2005	ERCA	Environmental
27	Essex Region Chatham-Kent Region Ground Water Study Volume 2	2004	Dillon	Study
28	Essex Region Chatham-Kent Region Ground Water Study Volume 1	2004	Dillon	Study
29	Essex Region Biodiversity Conservation Strategy	2002	ERCA	Environmental

No.	Report Title	Year of Most Recent Publication	Primary Author	Report Type
30	Comprehensive Encroachment Analysis of Detroit and St. Clair Rivers	2000	ERCA and Partners	Technical Study
31	East Riverside Planning Area Stormwater Management and Flood Protection Plan	1999	Dillon	Class EA Master Plan
32	Township of Mersea Shoreline Study	1998	M.M. Dillon	Shoreline Management Plan
33	Proposed Selkirk Drain Enclosure	1998	BTS	Technical Study
34	South Cameron Planning Area - Functional Design Report Sanitary and Storm	1993	Dillon	Technical Study
35	Channel Improvements Turkey Creek Plans	1993	Lafontaine Cowie Buratto and Associates	Technical Study
36	Canard River Basin Study	1992	Marshall Macklin Monaghan Limited	Technical Study
37	East Windsor Shoreline Management Plan	1991	Becker	Shoreline Management Plan
38	Flood Reduction Alternatives for Turkey Creek Watershed	1991	MacLaren	Flood Risk Technical Study
39	Master Drainage Plan for Sturgeon Creek and Selkirk Drian	1990	MMM	Master Drainage Study
40	Master Drainage Study, Harrow Colchester Area Watershed	1990	MMM	Master Drainage Study
41	Flood Control Project for Belle River Phase II & III	1989-1990	McLaren	Flood Management Technical Study
42	Township of Malden Shoreline Management Plan	1989	Becker	Shoreline Management Plan
43	Master Drainage Plan for Sturgeon Creek and Selkirk Drian	1988	MMM	Master Drainage Study
44	Township of Sandwich West Shoreline Management Plan	1988	Becker	Master Drainage Study
45	ERCA Floodway Study	1988		Flood Hazard Technical Study

No.	Report Title	Year of Most Recent Publication	Primary Author	Report Type
46	Master Drainage Plan - Township of Sandwich South	1987	Becker	Master Drainage Study
47	Lake St. Clair Shoreline Management Plan	1986	Becker	Shoreline Management Plan
48	Village of Erie Beach - Shore Protection Study	1986	Becker, Sullo & Associates	Shoreline Technical Study
49	Little River Floodline Mapping	1985	MacLearen	Hazard Mapping
50	Pelee Shoreline Protection Engineering Study	1984	MacLearen	Shoreline Management Plan
51	Addendum Engineering Study for Little River Dyke Repairs	1983	Lafontaine, Cowie, Buatto and Associated	Flood Risk / Drainage Technical Study
52	Engineering Study for Little River Dyke Repairs	1982	Lafontaine, Cowie, Buatto and Associated	Drainage
53	Canard River and Big Creek Flood and Fill Line Study Technical Report	1982	ERCA/MNR	Hazard Mapping
54	Floodline Studies , Town of Belle River, Maidstone and Rochester	1981	MNR	Hazard Mapping
55	Sturgeon Creek Fill and Floodline Study General Report	1981	MMM	Hazard Mapping
56	Sturgeon Creek Technical Report	1981	MMM	Hazard Mapping
57	Fill and Floodline Mapping Cedar, Wigle and Mill Technical Report	1981	MNR	Hazard Mapping
58	Kingsville Shoreline Management Plan	1980	Becker	Shoreline Management Plan
59	McKee Creek Watershed Study	1978	M.M. Dillon	Technical Study
60	Minister Approval for Inland Flood Calculations	1978	ERCA	Flood Hazard Technical Study
61	Essex Region Drainage Report	1977	Stan Taylor	Technical Study
62	Essex County Shoreline Erosion Inventory Data Sheets	1976	MM Dillon	Hazard Mapping Technical Study
63	Essex County Shoreline Report on Erosion, Fill and Floodline MAIN Report	1976	MM Dillon	Hazard Mapping

No.	Report Title	Year of Most Recent Publication	Primary Author	Report Type
64	Essex County Shoreline Report on Erosion, Fill and Floodline - Summary	1976	MM Dillon	Hazard Mapping
65	Essex County Shoreline - Soils Report on Bluff Areas	1976	Dillon	Hazard Mapping Technical Study
66	Grand Marais Drain Report and Bylaws	1966	Armstrong	Flood Risk / Drainage Report