

Watershed-Based Resource Management Strategy

September 2024

Approved November 24, 2024
Resolution GRCA 62/24



Preface

This Watershed Based Resource Management Strategy has been prepared by the Ganaraska 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.

Land Acknowledgement

The Ganaraska Region Conservation Authority respectfully acknowledges that the land on which we gather is situated within the traditional and treaty territory of the Mississauga's and Chippewa's of the Anishinabek, known today as the Williams Treaties First Nations. Our work on these lands acknowledges their resilience and their longstanding contribution to the area. We are thankful for the opportunity to live, learn and share with mutual respect and appreciation.

Table of Contents

1.0 Introduction	5
1.1 Purpose of the Watershed-Based Resource Management Strategy.....	5
1.2 Regulatory Framework	5
1.3 Brief History of the Ganaraska Region Conservation Authority.....	6
2.0 Strategic Direction	8
2.1 GRCA’s Strategic Plan.....	8
2.2 Watershed-Based Resource Management Guiding Principles.....	9
2.3 Watershed-Based Resource Management Objectives.....	9
2.4 Annual Budget	11
3.0 Watershed Characterization.....	12
3.1 Physical Geography.....	12
3.2 Climate.....	13
3.3 Surface Water	13
3.4 Groundwater.....	15
3.5 Flooding and Erosion	16
3.6 Water Control Structures.....	17
3.7 Drought/Low Water.....	17
3.8 Natural Heritage	17
3.9 Land Use.....	18
3.10 Infrastructure.....	19
3.11 Protected Areas	19
4.0 Watershed Challenges	21
5.0 Programs and Services.....	24
5.1 Mandatory (Category 1) Programs and Services	24
5.1.1 Natural Hazard Management	24
5.1.2 Provincial Water Quality and Quantity Monitoring	26
Provincial Water Quality Monitoring Network (PWQMN)	27
Provincial Groundwater Monitoring Network (PGMN).....	27
5.1.3 Source Water Protection	28
5.1.4 Conservation Areas/Conservation Lands	28
5.1.5 Enabling/Support Services.....	29
Corporate Services.....	29
Financial Management	29

Legal Expenses	30
Governance.....	30
Communications and Outreach	30
Administration Buildings/Facilities	30
Information Technology/Remote Sensing/GIS	30
5.2 Municipal Programs and Services (Category 2)	34
Surface Water Quality Monitoring	34
Natural Heritage Mapping	34
Watershed Ecology	34
Technical Studies	35
5.3 Other Programs and Services (Category 3).....	36
Private Landowner Stewardship Program	36
Tree Planting Services	36
Fisheries Services	37
Stewardship Partner Projects	37
Outdoor Education	38
6.0 Future Considerations	38
7.0 Public Engagement	39
8.0 Periodic Review.....	39
Appendix 1 - Summary of Existing Technical Studies, Monitoring Programs, etc.....	40
Appendix 2 – Issues and Risks, Mitigation Measures, etc. related to GRCA Programs.....	44

1.0 Introduction

1.1 Purpose of the Watershed-Based Resource Management Strategy

The Watershed-based Resource Management Strategy (WBRMS) was undertaken by the Ganaraska Region Conservation Authority (GRCA) to meet requirements as outlined in the revised Conservation Authorities Act (CA Act) and release of [Ontario Regulation 686/21](#) (Regulation). The WBRMS will provide GRCA with guidance regarding continued programs and projects and the development and implementation of resource management programs on a watershed basis.

1.2 Regulatory Framework

The Regulation, specifically, subsection 12(1), paragraph 3 outlines that all conservation authorities must complete a Watershed-based Resource Management Strategy. The main requirements of the Watershed-based Resource Management Strategy per Section 12(4) of Ontario Regulation 686/21 are outlined below.

1. Guiding principles and objectives that inform the design and delivery of the programs and services that the authority is required to provide under section 21.1 of the Act.
2. A summary of existing technical studies, monitoring programs and other information on the natural resources the authority relies on within its area of jurisdiction or in specific watersheds that directly informs and supports the delivery of programs and services under section 21.1 of the Act.
3. A review of the authority's programs and services provided under section 21.1 of the Act for the purposes of,
 - i. determining if the programs and services comply with the regulations made under clause 40 (1) (b) of the Act,
 - ii. identifying and analyzing issues and risks that limit the effectiveness of the delivery of these programs and services, and
 - iii. identifying actions to address the issues and mitigate the risks identified by the review, and providing a cost estimate for the implementation of those actions.
4. A process for the periodic review and updating of the watershed-based resource management strategy by the authority that includes procedures to ensure stakeholders and the public are consulted during the review and update process.

1.3 Brief History of the Ganaraska Region Conservation Authority

The early days of conservation began in the late 1800s with the realization that ongoing deforestation was having devastating environmental, social and economic impacts. Many individuals, community groups and organizations were ringing alarm bells at local and regional levels. Numerous pieces of legislation, policies, and programs were developed in the late 1800s and early 1900s in an effort to improve land management practices, protect existing, and restore degraded landscapes. However, one of the most instrumental additions to the conservation movement was the passing of the *Conservation Authorities Act* in 1946.

The *Conservation Authorities Act* came to be in part by a group of conservationists who met to discuss shared conservation concerns at the Guelph Conference in 1941. In order to build a case for conservation in Ontario, members of the Guelph Conference decided that a pilot survey should be carried out and funded by the provincial and federal governments. The selected survey site was the Ganaraska River watershed, with the survey being conducted from 1942 to 1943. The Ganaraska River watershed survey, the work carried out by the founding conservation associations, and the *Conservation Authorities Act*, paved the way for the creation of the 36 Conservation Authorities that exist today.

The resulting report from the pilot study entitled "Ganaraska Watershed: A study in land use with recommendations for the rehabilitation of the area in the post war period" by A.H. Richardson, provided the necessary plan for managing the Ganaraska River watershed. Under the Conservation Authorities Act, the Ganaraska River Conservation Authority was formed on October 8, 1946, making it one of the first Authority's formed. While other Conservation Authorities were awaiting a conservation report from the Conservation Branch, the Ganaraska River Conservation Authority began implementing the recommendations from the Ganaraska Watershed report.

Locally, effects of land use changes and land cover were being realized in other watersheds. The Ontario Forestry Branch published "A Study in Forest Conservation and Land Use on the headwaters of Wilmot Creek" in 1940, two years before the survey work of the Ganaraska River.

In 1962 and under a requested expansion by local municipalities, Wilmot Creek, Graham Creek, and smaller streams flowing to Lake Ontario in the west were added to the responsibility of the Ganaraska River Conservation Authority. With this expansion, the Authority was re-named the Ganaraska Region Conservation Authority (GRCA). In 1970 Gage Creek, Cobourg Creek and streams flowing to Lake Ontario and Rice Lake in the east were added. With the final expansion, the GRCA covers an area of 935 square kilometres from Wilmot Creek in Clarington to east of Cobourg from the south shore of Rice Lake down to Lake Ontario.

Today, this area includes seven municipalities in whole or in part: Township of Cavan Monaghan, Town of Cobourg, Township of Alnwick/Haldimand, Township of Hamilton, Municipality of Port Hope, City of Kawartha Lakes, and Municipality of Clarington. The location of the municipal boundaries within the GRCA watershed are shown in **Figure 1**.

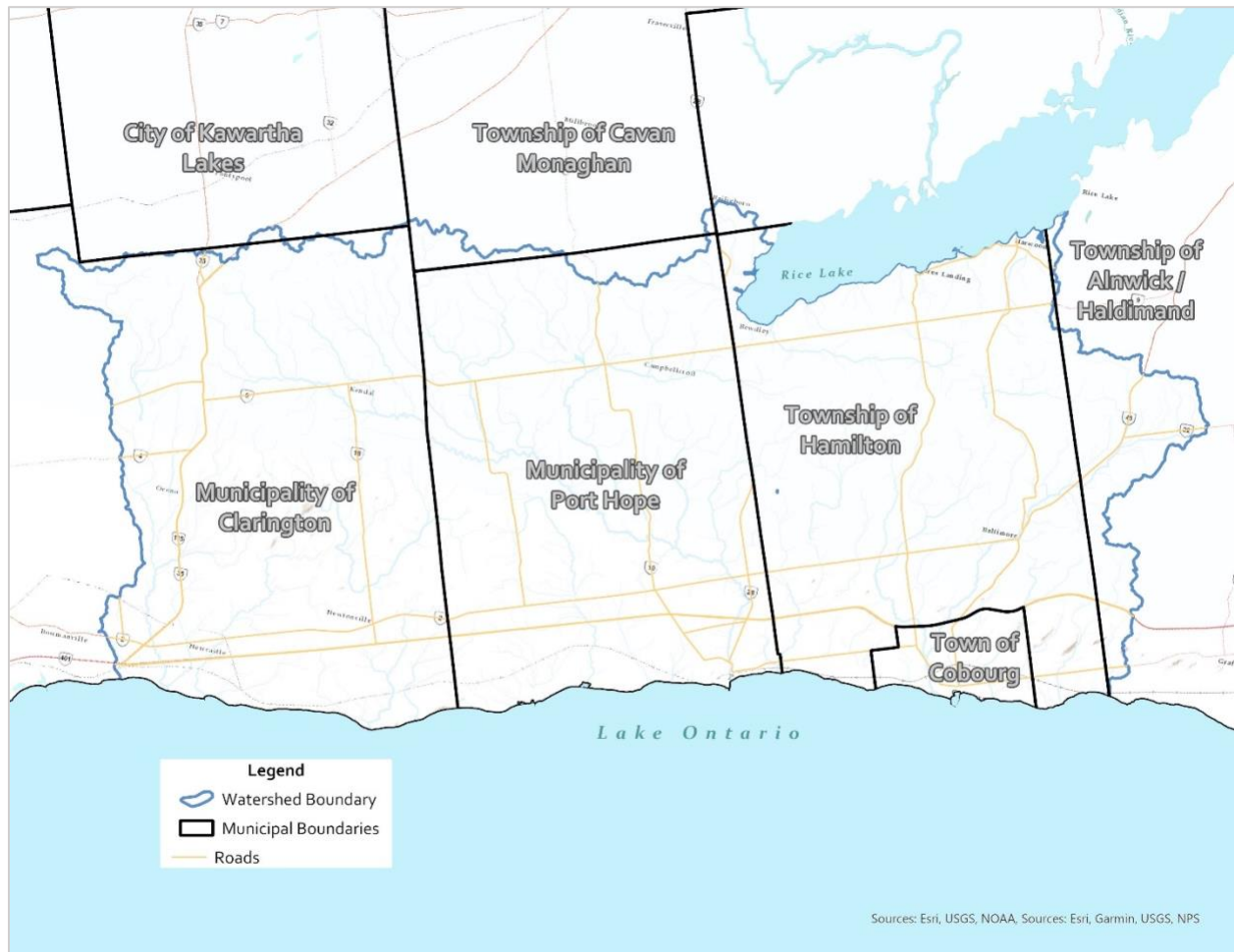


Figure 1 - Location of Municipal Boundaries in GRCA Watershed

The GRCA watershed is in the traditional and treaty territory of the Mississauga’s and Chippewa’s of the Anishinabek, known today as the Williams Treaties First Nations.

The GRCA operates under the requirements of the CA Act. Section 0.1 of the CA Act states that:

“The purpose of this 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 in Ontario.”

Governance of the GRCA is facilitated through the Board of Directors comprised of 11 Directors representing 7 municipalities. This includes 10 municipal Councillors and 1 agricultural representative. The GRCA works closely with our municipal partners as well local groups and agencies and both the Federal and Provincial governments.

2.0 Strategic Direction

2.1 GRCA's Strategic Plan

The GRCA developed a Strategic Plan called [Vision 2020](#) – to document GRCA's strategic organizational commitments and build on our legacy of conservation heritage to chart a path forward for 2015-2020 and beyond. The Strategic Plan was created over two years and involved a comprehensive consultation process with the GRCA Board of Directors, GRCA staff, member municipalities, partners, stakeholders, and the public. Vision 2020 illuminates important emerging areas of strategic priority and sets a course for ambitious, innovative and bold watershed management.

In 2020, GRCA prepared [“Vision 2020 - A Review that Illuminates the Future”](#) to summarize our accomplishments and will allow for reflection while determining how to continue this momentum into the future, while at the same time navigating the uncertainty imposed by the COVID-19 pandemic. The pause also allowed GRCA to consider the significant legislative changes to the *Conservation Authorities Act* brought forward by the province (15 amendments to the Act since 2018).

GRCA's Strategic Plan will be updated in the near future upon completion of the WBRMS.

GRCA's Vision and Mission Statements are summarized below.

Vision: Clean Water, healthy land for healthy communities

Mission: To enhance and conserve across the Ganaraska Region Watershed by serving, education, informing and engaging.

The Strategic Plan highlights the GRCA's commitment and shared corporate values as follows:

To Explore is to Value Knowledge: Knowledge has power. We value up to date knowledge and the wisdom of our staff and others. We are committed to working with others to build knowledge through research and information sharing.

To Learn is to Value Collaboration: We value the input of others. We listen and we learn from those who have an interest in how we carry out our responsibilities. We are a solution-focused organization. We promote teamwork because we value our partners and our partnerships.

To Lead is to Value Excellence: We value honesty, openness and accountability. We will focus on being accountable to ourselves and to one another. We are committed to service and business excellence, and we will be driven to earn the trust of those we serve.

To Evolve is to Value Innovation: Innovation comes from knowledge and critical thinking. Leading edge organizations are those that emphasize learning and focus on what they can do to foster a culture of innovation. We encourage innovation in order to continuously improve.

These values are foundational to the principles and objectives that GRCA developed within the WBRMS.

2.2 Watershed-Based Resource Management Guiding Principles

Section 12(4) of Ontario Regulation 686/21 notes that a Watershed-Based Resource Management Strategy shall include “Guiding principles and objectives that inform the design and delivery of the programs and services that the authority is required to provide under section 21.1 of the Act”.

Through a review of background documentation and GRCA’s strategic plan, the following guiding principles have been developed to meet the requirements of the CA Act and Ontario Regulation 686/21 and to inform the design and delivery of GRCA’s programs and services.

1. **Watershed-Based Management:** Conservation, restoration, development, and management of natural resources are most effective when implemented on a watershed basis, which provides a comprehensive framework for assessing and managing resource conditions and risks.
2. **Valuing Conservation Lands and Natural Assets:** Water and other natural resources are crucial for climate resilience, hazard mitigation, contaminant filtration, waste assimilation, biodiversity, and providing recreational spaces.
3. **Shared Responsibility:** Effective management of water and natural resources requires collaboration among Conservation Authorities, Municipalities, government agencies, First Nations, private landowners, and other stakeholders.
4. **Informed Decision-Making:** Watershed-based management strategies guide policies and decisions, ensuring they reflect community needs, ecosystem requirements, and a range of values.
5. **Integration and Transparency:** Resource management decisions should be integrated, transparent, and consider the diverse uses and values of the community, fostering trust and engagement among stakeholders.
6. **Community Engagement and Education:** Building strong relationships through collaboration, transparency, and public education promotes environmental stewardship and active participation in conservation efforts.
7. **Sustainable Management Goals:** Decision-making should be guided by clear, sustainable water management goals, targets, and risk prevention strategies that consider long-term environmental, economic, and community needs.
8. **Efficiency and Data Sharing:** Optimize benefits of sustainable water management with minimal cost, utilizing the best available scientific information and promoting data sharing among stakeholders and government levels for effective coordination.

2.3 Watershed-Based Resource Management Objectives

Flowing from the direction in the strategic plan and the principles identified above, the following objectives have been developed to meet the requirements of Ontario Regulation 686/21 and relate to Mandatory Programs and Services (Category 1) and support Municipal and Other Programs and Services (Category 2 and 3). Category 2 and Category 3 programs are essential to the support and delivery of Category 1 programs and services.

Priority 1: Water Management and Protection

- **Objectives:**

- Protect drinking water resources by implementing measures that reduce risks to water quality and availability.
- Characterize and monitor groundwater and surface water systems to support sustainable, clean water supply.
- Strengthen hydro-ecological functions to prepare for flood or drought conditions, reducing potential risks to public health and safety.
- Foster integrated planning for watershed management decisions to ensure the sustained beneficial uses of water resources.

Priority 2: Natural Hazard Risk Mitigation

- **Objectives:**

- Avoid, reduce, or mitigate potential risks to public health and safety, and to property from flooding and other natural hazards.
- Decrease local vulnerability to climatic extremes through adaptive and mitigation strategies.
- Work collaboratively with municipalities and stakeholders to develop and implement natural hazard prevention and management strategies.

Priority 3: Natural Heritage Conservation and Stewardship

- **Objectives:**

- Conserve and maintain Conservation Authority-owned lands to protect natural heritage, support outdoor recreation, and contribute to community well-being.
- Ensure the maintenance of biodiversity by protecting critical habitats and ecosystems within the watershed.
- Promote conservation and minimize degradation of natural resources through stewardship programs and community engagement.

Priority 4: Community Education and Engagement

- **Objectives:**

- Educate and engage the watershed community to raise awareness of natural hazards, watershed health, and the importance of protecting land and water resources.
- Inspire community action and participation in conservation efforts through targeted educational programs and stewardship initiatives.
- Support the development of environmental awareness and promote actions that contribute to the health and resilience of the watershed.

Priority 5: Sustainable Community and Economic Development

- **Objectives:**

- Support sustainable, healthy communities by integrating watershed knowledge into municipal and regional planning processes.

- Promote social and economic development that aligns with the conservation and sustainable use of natural resources.
- Identify and address key resource issues and stressors that impact the watershed, advocating for policies and funding that support sustainable management.

Priority 6: Advancing Watershed Knowledge

- **Objectives:**

- Advance watershed knowledge through research, monitoring, and data sharing to support evidence-based decision-making.
- Identify, understand, and prioritize key resource issues, and develop solutions that adapt programs and services to address emerging challenges.
- Promote the use of best available scientific information to guide the management and protection of watershed resources.

These priorities and objectives aim to guide the GRCA's strategic direction in effectively managing and protecting the watershed's natural resources while engaging and supporting the community.

2.4 Annual Budget

Each year the GRCA prepares a budget in consultation with the various municipal partners in order to reflect and align with the program priorities for the year. This approach equips the Conservation Authority to meet its goals and objectives and strive towards its corporate vision of Clean Water, healthy land for healthy communities. The budget categorizes the programs and services into Category 1, 2 and 3 (Mandatory, Municipal and Other) services.

3.0 Watershed Characterization

3.1 Physical Geography

The Ganaraska Region Conservation Authority (GRCA) oversees a watershed that is geographically diverse, encompassing approximately 935 square kilometers (km²) of land that extends from the Wilmot Creek watershed in the west to east of Cobourg Creek watershed, and from the crest of the Oak Ridges Moraine and Rice Lake in the north to Lake Ontario in the south. This watershed is in southeastern Ontario, nestled between the larger watersheds of the Trent River to the east and the Central Lake Ontario Conservation Authority watershed to the west. Its physiographical makeup is characterized by a variety of distinct landforms, including portions of the Oak Ridges Moraine, rolling drumlin fields, and flat, low-lying areas that extend toward Lake Ontario.

The Oak Ridges Moraine, which forms the headwaters of the Ganaraska River and many of its tributaries, is a prominent geomorphological feature within the region. This moraine is composed of sandy, well-drained soils, acting as a significant groundwater recharge area that sustains base flows in the watershed's rivers and streams. The major watersheds include Wilmot Creek, Graham Creek, the Ganaraska River, Gages Creek, and Cobourg Creek, all of which originate on the Oak Ridges Moraine and drain in a southerly direction to Lake Ontario, except for 107 km² of land in the northeast corner that drains to Rice Lake, which is a part of the larger Trent River watershed. The Oak Ridges Moraine rises to an elevation of about 358 masl within the GRCA watershed, its surface is hilly, and many areas have a knob and kettle type topography.

Drumlins are another key feature of the Ganaraska watershed, especially in the northern areas. These smooth, elongated hills formed by glacial action create a landscape of rolling terrain, interspersed with depressions that often host wetlands or small lakes. The region's glacial history has left a legacy of rich soil diversity, with clay loams and silt dominating the lower-lying southern areas near Lake Ontario, while sandier soils are more common in the northern, upland areas. The contrasting soil types significantly influence the region's hydrology, affecting surface water runoff, infiltration rates, and the distribution of wetlands and water bodies. Adjacent to the South Slope are the old shorelines of Lake Iroquois. This region is comprised of old underlying beaches and similar lacustrine features of varying depth overlaying the Paleozoic limestone that slopes toward Lake Ontario.

The Oak Ridges Moraine significantly contributes baseflow to the major watersheds within the Ganaraska region. Groundwater and surface water flows are governed by the underlying geology and ultimately drain into Lake Ontario. Wetlands within the Ganaraska watershed, though scattered, play a crucial role in flood regulation, groundwater recharge, and the provision of wildlife habitat. Many of these wetlands are located in low-lying areas between the drumlins and along river corridors. They act as natural buffers, absorbing excess water during periods of heavy rainfall and gradually releasing it, thus mitigating the risk of downstream flooding, especially in urbanized areas. The watershed also contains several small lakes and ponds, both natural and man-made, which are integral to the region's hydrological system.

GRCA relies on the important partnership with the [Oak Ridges Moraine Groundwater Program \(ORMGP\)](#) to provide additional technical support for various program areas, particularly in furthering the understanding of the complex interactions between groundwater and surface water resources within

the GRCA watershed.

3.2 Climate

The Ganaraska Region is characterized by hot summers and cool winters. Topography exerts a moderate influence on local temperature and precipitation with higher snowfall totals at higher elevations. The vast forests on the Oak Ridges Moraine have high snow retention leading to slow percolation as snow melts and replenishes groundwater aquifers. The year-round open water of Lake Ontario has a pronounced effect in moderating the climate close to the shoreline, particularly in spring when the water is colder than the air. With global warming, changes to the climate and hydrologic regime of the watershed region are inevitable. It is expected that average annual temperatures will increase, with the most warming occurring locally in winter. It is also anticipated that precipitation patterns will be altered with more extreme high intensity rainfall and more prolonged and severe drought conditions.

3.3 Surface Water

The GRCA watershed is bisected by the Oak Ridges Moraine in the east and is comprised of the watersheds that flow north of the Moraine, into Rice Lake, and those that flow south of the Moraine, into Lake Ontario. For reporting purposes, the watershed region has been divided into nine watersheds/watershed groupings. These are depicted in **Figure 2**.

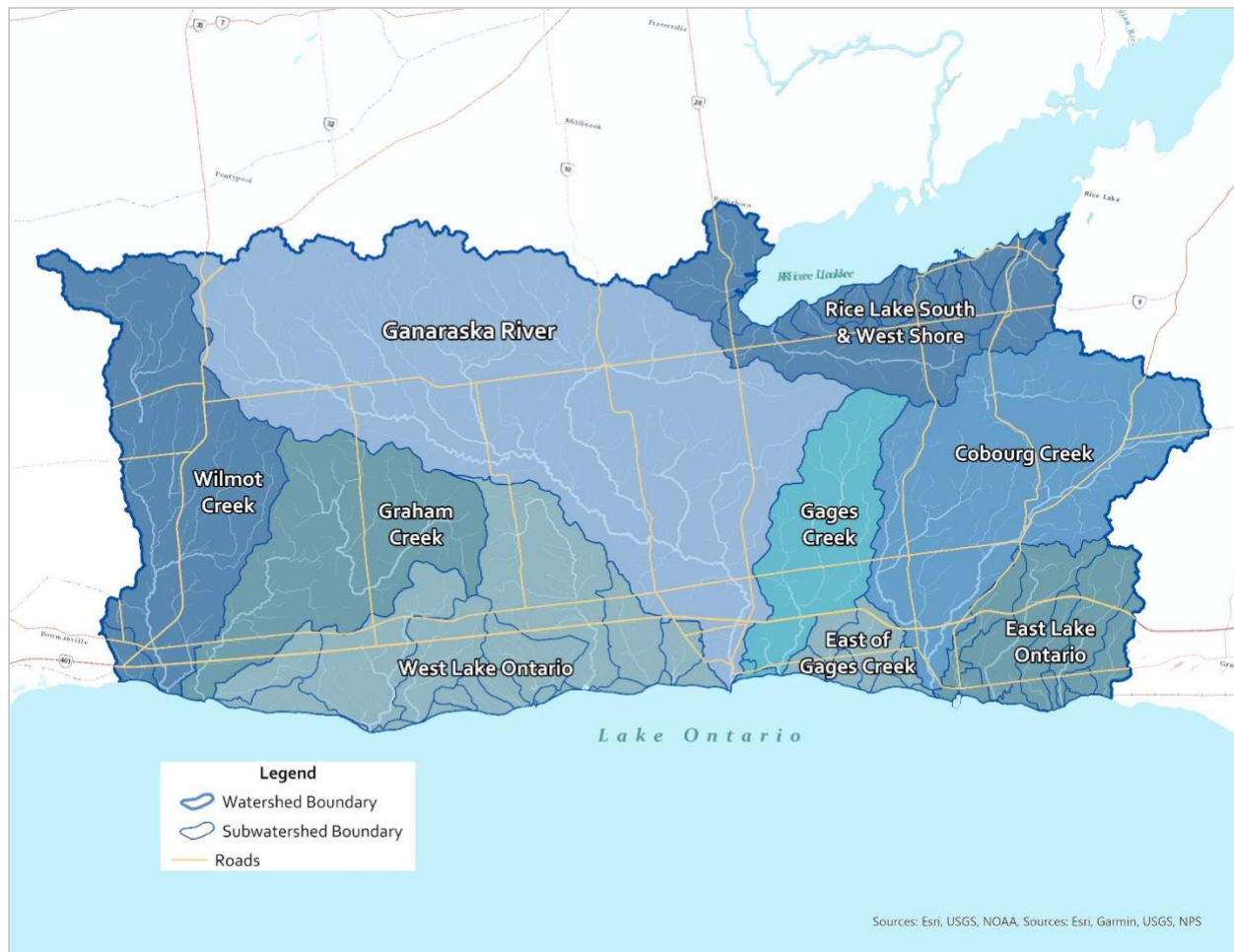


Figure 2 - GRCA Subwatersheds

One watershed flows into Rice Lake:

- Rice Lake South and West Shore – this includes:
 - Plainville Creek
 - Harwood/Goose Creek
 - Honey Creek
 - Small unnamed tributaries

Eight watersheds flow into Lake Ontario:

- Wilmot Creek
- Graham Creek
- West Lake Ontario – this includes:
 - Lovekin Creek
 - Bouchette Point Creek
 - Port Granby Creek
 - Wesleyville Marsh Creek
 - Wesleyville Creek
 - Port Britain Creek
 - Brand Creek
 - Littles Creek
 - Small unnamed tributaries
- Ganaraska River
- Gages Creek
- East of Gages Creek
 - Augustine Creek
 - Carr's Creek
 - Small unnamed tributaries
- Cobourg Creek
- East Lake Ontario – this includes
 - Midtown Creek
 - Brook Creek

- Massey Creek
- Spicer/Covert Creek
- Brookside Creek
- Small unnamed tributaries

3.4 Groundwater

Within the boundaries of the Ganaraska Region, the Oak Ridges Moraine (ORM) is the predominant landform in the northern area, with elevations ranging from approximately 150 to 395 meters above sea level (masl) (Ontario Geological Survey, 1999). The ORM is a provincially significant landform, serving as a critical resource for groundwater. Its complex internal structure, shaped by multiple advances and retreats of glacial ice, was likely formed in an area of concentrated meltwater flow between the Simcoe and Ontario Ice Lobes. The ORM deposits consist of ice-contact and outwash materials, glaciolacustrine silts and clays, and glaciofluvial sands and gravels, with textural characteristics varying both horizontally and vertically.

The ORM is vital for groundwater recharge, forming the headwaters of most creeks and rivers within the GRCA watershed. The dominant flow direction is southerly, off the Oak Ridges Moraine toward Lake Ontario, with a westerly component in some areas. Water table fluctuations observed at different monitoring wells, including those in the Provincial Groundwater Monitoring Network, exhibit two peaks and two recession patterns, resembling seasonal runoff variations. Recharge contributions, driven by climate parameters, depend on soil composition and topography. Recharge rates in the permeable Glacial Lake and Oak Ridges Moraine deposits are estimated at 250 to 350 mm/year. Infiltration within the till plains of the South Slope, and the glaciolacustrine clays and silts, was estimated to be 100 mm/year, or less. Extensive deposits of glacial till, characterized by low hydraulic conductivity due to their silt and clay content and heterogeneous particle sizes, also occur in the region. These till units act as aquitards, slowing groundwater flow and forming a protective confining layer overlying aquifers. The most significant till units in the area are the Halton Till and Newmarket Till. Deeper sedimentary units, known as Lower Sediments, contain several distinct geologic formations ranging from sand and gravel to silt and clay-textured soils. Bedrock is found at elevations of approximately 50 to 80 masl near the shores of Lake Ontario and about 200 masl in the northern boundaries of the watershed, generally yielding lower quantities of groundwater.

Groundwater plays a vital role in sustaining drinking water supplies and fisheries in the GRCA watershed. It serves as a critical source of potable water for its residents, especially in rural areas, where private wells are the primary source of drinking water. Municipalities also rely heavily on groundwater, drawing from aquifers to provide clean and safe water to their communities. Groundwater is naturally filtered through layers of soil, sand, and rock, which can remove many contaminants, making it a relatively clean and reliable water source. However, this natural filtration system is vulnerable to pollution from agricultural runoff, industrial activities, and improper waste disposal, which can introduce harmful chemicals and pathogens into groundwater supplies. Protecting groundwater from contamination is crucial for ensuring the continued availability of safe drinking water within the GRCA watershed.

In addition to its importance for human consumption, groundwater is essential for maintaining healthy aquatic ecosystems, including those that support fisheries. Many of the rivers, streams, and lakes in the watershed are fed by groundwater. Groundwater discharge provides a steady source of cool, oxygenated water critical for sustaining fish populations, particularly cold-water species such as trout and salmon. These species are highly sensitive to changes in water temperature and oxygen levels, and groundwater inflows help regulate these conditions, creating suitable habitats for spawning and growth. Moreover, during dry periods or droughts, groundwater contributions are often the only source of water sustaining aquatic ecosystems, making it indispensable for fisheries' health and biodiversity. GRCA has mapped the baseflow for the various creeks and rivers in the watershed to understand the contribution of groundwater to these features. Baseflow is depicted in **Figure 2**.



Figure 3 - Baseflow in the GRCA Watershed

3.5 Flooding and Erosion

Flooding is a natural occurrence along the streams of the Ganaraska Region and the shorelines of Lake Ontario and Rice Lake. The many forests and other natural areas of the Ganaraska Region help to slow the movement of water after it falls as rain or snow. This makes the watersheds more resilient to the heavy rainfalls that have become more common each summer and the rain on snow events that can occur during the winter and early spring. Nevertheless, excessive rainfall may cause flooding of low-lying areas – mostly unoccupied natural floodplains along the riverbanks. When this happens on dense

snowpacks or frozen ground, ice jams can occur at the lower end of the Ganaraska River. The river ice is broken up and transported downstream to the river mouth where it runs into slower moving water and more solid ice cover. The GRCA communicates the risk of ice-breakup to the town of Port Hope each year so that they can prepare in advance. The town has a contractor break up the ice cover at the mouth with heavy equipment when high flows begin. This allows an open channel to carry ice-flows out to Lake Ontario rather than having them jam further upstream where this can back up water and ice causing flooding along the lower reaches of the river.

3.6 Water Control Structures

The GRCA owns three dams or water control structures. Two are on the Ganaraska River and one is on Baltimore Creek (part of the Cobourg Creek watershed). These dams are historic and provide limited functions with respect to flood control or low flow augmentation. Corbett's Dam in Port Hope has a fish ladder with sampling station owned and operated by the MNR. The Ganaraska River channelization was built after a major flood in 1980 to improve the conveyance of flood waters through the town center. Significant amounts of effort and funding are needed to keep these structures operating in good condition. Numerous other privately owned dams still exist in the watersheds, which are remnants of a time when waterpower and milling were significant industries for the region. Some of these dams are in poor condition and are not being maintained. All dams create a barrier to fish migration reducing the potential productivity of these fisheries.

3.7 Drought/Low Water

Drought conditions can impact the Ganaraska Region in any given year during periods of low rainfall. Typically, impacts occur in the summer or fall when below average rainfall leads to low soil moisture and a high demand for water. Streamflow and groundwater in the region take longer to respond due to the buffering effect of the Oak Ridges Moraine. The aquifers of the moraine store water from snowmelt and spring rains and slowly release it into the streams that feed the larger systems (e.g. Ganaraska River, Cobourg Creek, Wilmot Creek). This strong and steady baseflow sustains the aquatic ecosystem through many shorter drought periods. When drought conditions continue through the fall months, the salmon runs don't receive the high flow pulses that are needed to achieve full spawning potential. Streams that originate off the moraine do not have the same baseflows and may be more susceptible to drying up during prolonged droughts. GRCA staff regularly evaluate watershed conditions and inform the Ganaraska Water Response Team who are responsible for declaring a low water condition.

GRCA plays an important role in monitoring and managing responses to drought conditions through the Ontario Low Water Program, which will be discussed in **Section 5.1.1**.

3.8 Natural Heritage

The GRCA watershed is characterized by a diverse array of natural heritage features, including extensive woodlands, wetlands, and riparian areas that contribute significantly to the ecological health and resilience of the region.

Within the GRCA watershed, natural vegetative cover includes approximately 44 km² of wetlands, which serve as critical habitats for a wide range of species, provide flood attenuation, and act as natural water filters. These wetlands are complemented by about 340 km² of woodlands, which are essential for

maintaining biodiversity, supporting wildlife habitats, and providing recreational opportunities. The woodlands and wetlands together form a vital network that supports the hydrological and ecological integrity of the watershed.

In addition to these, vegetated riparian areas—comprising lands within 120 meters of streams, rivers, lakes, and wetlands—cover about 209 km². These riparian zones play a crucial role in protecting water quality, reducing erosion, and providing essential corridors for wildlife movement. They also serve as buffers that help to mitigate the impacts of climate change and enhance the overall resilience of the watershed.

The natural heritage system of the GRCA watershed supports a variety of mammals, birds, reptiles, amphibians, insects, and aquatic species typical of southern Ontario. Cold and warm water streams flowing through the region support diverse fish populations, contributing to the rich aquatic biodiversity of the area. However, like many regions in Ontario, the GRCA watershed faces challenges from invasive species that threaten native habitats and compete with indigenous species, as well as pressures from urbanization and climate change.

Recent changes to the *Conservation Authorities Act* have changed the role of CAs in the management of natural heritage, particularly in the realm of development review. Natural Heritage information is used in other program areas and it is critical that Conservation Authorities continue to play a role in the mapping and management of natural heritage to ensure efficient delivery of other Mandatory/Category 1 services. This will be discussed further in **Section 5.2**.

Currently there is a regulation in effect that prevents conservation authorities from providing a plan review service on behalf of municipalities with respect to natural heritage, a role conservation authorities, including the GRCA, have been providing for decades.

3.9 Land Use

Areas of settlement in the GRCA watershed region are generally found along the shore of Lake Ontario and include the urban centers of Newcastle, Port Hope and Cobourg. There are a number of small villages and hamlets that include the settlement areas of Orono, Kendal, Canton, Bewdley, Gores Landing, Camborne and Baltimore in addition to rural residential areas throughout the watershed region. Additionally, cottage and trailer park development occurs adjacent to waterbodies, including Rice Lake and Lake Ontario. Most of this development occurred historically. The current trend of converting seasonal residences to permanent residences could result in negative impacts on water quality with increased septic system loading year-round. The population in the GRCA watershed is 75,606 as of 2024.

While the GRCA watershed is in the traditional and treaty territory of the Mississauga's and Chippewa's of the Anishinabek, known today as the Williams Treaties First Nations, there are no First Nations reserves located within the GRCA's watershed. However, Alderville, Hiawatha and Curve Lake First Nations are located north and east of the GRCA watershed area. Mississauga's of Scugog Island First Nation are located to the west of the GRCA watershed.

3.10 Infrastructure

Approximately 70% of the population in the Ganaraska Region Source Protection Area relies on six municipal drinking water systems, consisting of three groundwater and three Lake Ontario-based surface water systems. The groundwater systems include the Creighton Heights and Camborne Water Supply Systems in the Township of Hamilton, and the Orono Drinking Water System in Durham Region. Wellhead Protection Areas (WHPAs) were established for these systems using 3D groundwater models, covering a total area of 108.5 km². In addition to these municipal wells, there are around 42 smaller drinking water systems in the area, including trailer parks, schools, and public buildings, regulated under the Drinking-Water Systems Regulation (O. Reg. 170/03).

The three surface water systems—Cobourg, Port Hope, and Newcastle—draw from Lake Ontario, with Intake Protection Zones (IPZs) delineated to safeguard these sources. These zones are mapped based on distance and travel time of potential contaminants, with IPZs 1 and 2 delineated using lake-based models, while IPZ 3 is based on a modeled fuel pipeline spill.

Three pipelines, running parallel to Highway 401, traverse the Ganaraska Region watershed. The Trans-Northern pipeline carries refined oil, the Enbridge pipeline, crude oil, and the TransCanada pipeline, natural gas.

Newcastle, Port Hope and Cobourg are serviced by sanitary sewers and wastewater treatment plants. Rural areas are serviced by private septic systems.

The urban communities and settlement areas are serviced by storm sewer systems and roadside ditches.

Land use decisions are best made when integrated with a watershed plan/subwatershed study process in order to avoid unintended consequences on downstream communities and ecosystems.

3.11 Protected Areas

The Ganaraska Region Conservation Authority (GRCA) owns 4,648 hectares (11,486 acres) of land within and outside of the GRCA jurisdiction¹ (Figure 1), which represents approximately 5% of the watershed area. GRCA lands contribute to the local and regional natural heritage system and include natural features such as forests, tallgrass prairie, Provincially Significant Wetlands, watercourses, the Lake Ontario and Rice Lake shorelines, and the Oak Ridges Moraine. All lands owned by the GRCA also consist of natural hazards (e.g., floodplains, erosive soils, valleys). These lands are shown in **Figure 4**.

¹ Portions of the Ganaraska Forest extend beyond the GRCA jurisdiction into Otonabee Region Conservation Authority jurisdiction.

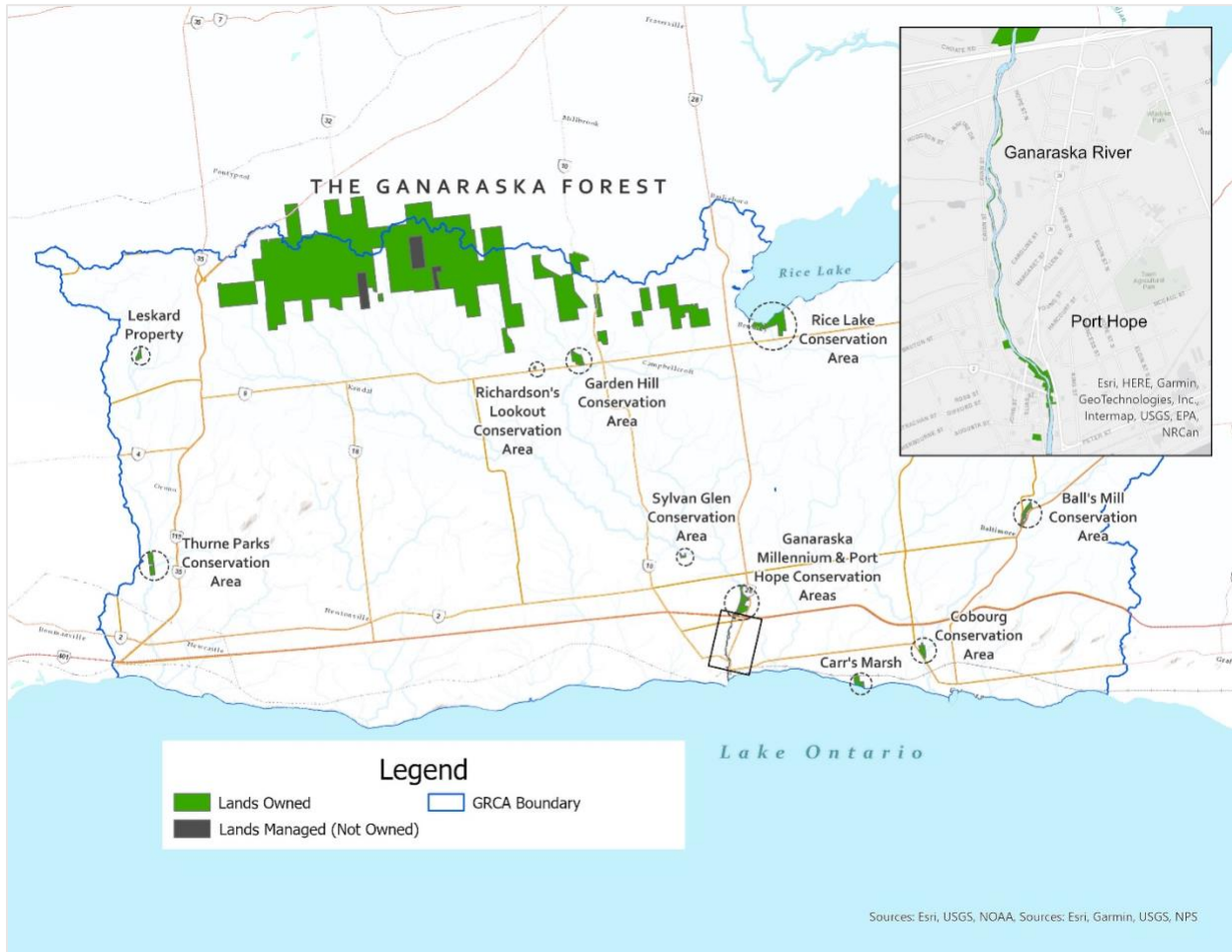


Figure 4 - GRCA Lands

4.0 Watershed Challenges

Through watershed knowledge and a review of background information, the following watershed challenges were identified that should be considered as part of the GRCA's program and services delivery in the coming years.

Increased development pressures: The Ganaraska Region faces a variety of watershed challenges that threaten the health and sustainability of its natural ecosystems. One of the primary concerns is the pressure from future development growth, especially in light of the Growth Plan for the Greater Golden Horseshoe, which encourages urban expansion and increased density in areas like Port Hope, Cobourg and Newcastle. The expansion of urban boundaries poses risks to natural areas, watercourses, and wetlands, as increased impervious surfaces lead to higher stormwater runoff, which can exacerbate flooding, erosion, and water quality issues.

Climate Change: Climate change poses a significant threat to the watershed, exacerbating issues such as extreme weather events, altered precipitation patterns, and rising temperatures. These changes disrupt the delicate balance between surface water (SW) and groundwater (GW) systems, which are crucial for maintaining both water quality and quantity. A major challenge is the lack of integrated management of groundwater and surface water, making it difficult to address climate variability effectively. One critical challenge is the missing link between groundwater and surface water management, which is essential for maintaining water quality and quantity in the face of climate variability. Altered groundwater recharge and flow can reduce the availability of surface water during dry periods, impacting aquatic ecosystems and community water supplies. This imbalance further complicates water resource management, particularly in the absence of clear provincial guidance. Without comprehensive provincial-level guidance, the burden of addressing these climate-induced challenges falls on local authorities, making coordinated, large-scale mitigation and adaptation efforts difficult and potentially more expensive. The long-term financial strain of responding to these challenges, coupled with the accelerating loss of biodiversity and ecosystem services, underscores the urgent need for a strategic and well-resourced approach to climate mitigation and adaptation. If unaddressed, the combined impacts of climate change on water systems, soil stability, and biodiversity will continue to increase the cost of managing natural resources and protecting communities from environmental hazards.

Invasive Species: Invasive species are another pressing concern, as they outcompete native flora and fauna, disrupt ecosystem balance, and degrade habitats. Species such as the emerald ash borer, phragmites, and dog-strangling vine have already impacted the region, and their continued spread poses ongoing risks to biodiversity and ecosystem function. An emerging invasive species to Southern Ontario is Oak Wilt (*Bretziella fagacearum*), which would/could have devastating effects on local forests if it were to be introduced.

Loss of biodiversity and species at risk: The Ganaraska Region is home to a variety of species at risk (SAR), whose habitats are increasingly threatened by development, invasive species, and climate change. Loss of biodiversity not only diminishes the ecological resilience of the watershed but also reduces the range of ecosystem services it provides, such as clean water, flood regulation, and recreational opportunities.

Soil Carbon: As temperatures rise, the increased heat accelerates microbial activity in the soil, leading to faster decomposition of organic matter, which releases stored carbon back into the atmosphere as carbon dioxide. Additionally, altered precipitation patterns—such as more intense rainfall or prolonged droughts—disrupt soil moisture levels, further reducing its capacity to retain carbon. In wetter conditions, soil can become saturated, limiting oxygen availability and creating anaerobic conditions that hinder plant growth and soil carbon sequestration. Conversely, in drier climates, soil becomes more prone to erosion and degradation, stripping away the top layers rich in organic carbon. These combined effects lead to a destabilization of carbon stored in the soil, weakening its role as a natural carbon sink and contributing to higher levels of atmospheric greenhouse gases, which perpetuate climate change.

Soil Erosion: The vulnerability of soil is heightened under shifting climate conditions, with heavy rains leading to erosion and droughts causing desiccation, making land less stable and less capable of supporting vegetation. This, in turn, contributes to increased sedimentation in water bodies, impacting water quality and raising the costs associated with water treatment for safe human consumption. Moreover, the erosion of natural buffers, such as wetlands and forests, further exacerbates flood risks and reduces the natural capacity of the environment to filter pollutants. The resulting degradation of ecosystems and increased pressure on water management systems come with significant financial implications, including higher costs for infrastructure repair, flood mitigation, and the maintenance of drinking water quality standards.

Agricultural Land Use: Agricultural land use covers approximately one-third of the Ganaraska Region watershed. The GRCA has historically had areas with severe erosion and soil degradation issues resulting from land clearing activities in the early 1900s. Although reforestation restored much of the landscape, there is a need to continue to take a proactive approach to controlling crop field erosion and improving soil health, in addition to the other best management practices agricultural producers implement. Recent history has proven that massive soil erosion and soil health degradation is possible within the GRCA due to intensive cropping practise. In the past decade, there has been an increase in row crop and vegetable farming across the GRCA, therefore assessment and rapid implementation of best management practices is needed, including erosion control measures, before further damage is done. Implementation of best management practices, supported by the GRCA will lead to reductions in nutrients loss within and to the Ganaraska Region watersheds, especially during high flows and bare soil conditions. Continued implementation of best management practices, and GRCA's ability to engage with producers in meaningful ways is needed to ensure soil health (productivity) is maintained or improved, riparian areas, watercourses are protected and impacts to water quality are minimised. Implementation activities that are required include planting vegetated buffers, installing livestock fencing along watercourses, innovative tillage methods, improved manure storage and handling, and cropland nutrient management.

The use of Subwatershed Planning in Land Use/Development Planning: A significant gap in current watershed management is the absence of comprehensive subwatershed planning in the development process. Subwatershed plans are critical for understanding the unique characteristics and needs of different areas within the watershed, guiding sustainable land use decisions, and ensuring that growth does not compromise the ecological integrity of the region. The lack of such planning can result in fragmented approaches that fail to address cumulative impacts, leading to degraded water quality, increased flood risks, and loss of natural heritage features.

Addressing these challenges requires a coordinated effort among municipalities, conservation authorities, stakeholders, and the community. Effective watershed management must integrate climate adaptation, watershed planning/subwatershed studies, sustainable development practices, habitat protection, and enhanced monitoring to safeguard the Ganaraska Region's natural resources for future generations.

5.0 Programs and Services

Ontario Regulation 687/21: Transition Plans and Agreements for Programs and Services detail requirements for Transition Plans and Agreements for Programs and Services. As per the CA Act and Ontario Regulation, on February 17, 2022 the GRCA's Board of Directors approved the GRCA's Inventory of Programs and Services. The approved Inventory of Programs and Services details GRCA Mandatory Programs and Services (Category 1), Municipal Programs (Category 2) undertaken by the GRCA under agreement with the partner municipality and Other Programs and Services (Category 3) the GRCA undertakes.

The required agreements for Category 2 and Category 3 Programs and Services were completed with the various municipal partners during the fall of 2023. The costs associated for all Category 1, 2 and 3 programs and services are included in the Inventory of Programs and Services.

A summary of the programs and services is provided in the following sections. The final version of the Inventory of Programs and Services is provided at this [link](#).

GRCA relies on a range of technical studies, monitoring programs and other information to guide work planning and decision making in the delivery of programs and services. These include policy documents, technical guidelines, hazard mapping studies, etc., some of which have been completed by staff, and others contracted to consultants. These resources are described in **Appendix 1**

5.1 Mandatory (Category 1) Programs and Services

5.1.1 Natural Hazard Management

Natural hazard management is a key program area for the GRCA. The priority in this regard is the protection of life and property from flooding and erosion hazards. This is a mandatory, watershed wide program that applies to the Lake Ontario shoreline as well as area floodplains, valley and stream systems, wetlands and hazardous lands such as unstable soil or bedrock.

The Natural Hazard Management Program includes the following:

Municipal plan input and review and regulation – Municipal Plan Input and Review is a preventative program that aims to ensure that new development will not result in increased risks to public safety or property damage from natural hazards. GRCA undertakes the municipal plan input and review program to provide advice to its member municipalities and watershed residents, both through the commenting process under the *Planning Act* and through general inquiries and pre-consultation meetings.

This program includes municipal official plan related comments and proponent driven applications such as subdivisions, condominiums, severances, official plan and zoning by-law amendments, minor variances, and site plan control. The GRCA also regulates development under Section 28 of the CA Act and Ontario Regulation 41/24, Prohibited Activities, Exemptions and Permits. The intent of the regulation is to direct new development away from natural hazards to ensure that development is not impacted by flooding and erosion and that new development does not aggravate or create new hazards or create conditions which would jeopardize health and safety of people or result in damage to

property. The GRCA regulates the Lake Ontario shorelines, dynamic beaches, watercourses, ravine and stream systems, and wetlands.

Floodplain mapping – A lot of the mapping for the watershed is rather dated and GRCA has been working with local municipal partners to leverage resources to obtain federal funding through the National Disaster Mitigation Program (NDMP) and the Flood Hazard Identification and Mapping Program (FHIMP) to undertake floodplain mapping updates. This has been done for Wilmot and Graham Creek watersheds in addition to smaller creeks within Durham Region, including Lovekin, Bouchette Point and Port Granby Creeks and the northwest portion of the Ganaraska River watershed.

Further flood plain mapping will be undertaken for the remaining watercourses in the watershed as funding becomes available.

***Risks:** Updating and maintaining watershed models and floodplain mapping does not have a source of sustainable funding. There has been no provincial funding since 1990s but some recent federal funding has been made available through the NDMP and FHIMP programs. GRCA cannot meet the obligations of new provincial regulation to update mapping annually as some of our models are not in a digital format. Provincial guidance has not been provided regarding how to incorporate climate change impacts in flood and erosion risks. Interaction between groundwater and surface water is critical to understand in hydrologic models that support mapping however, the assessment of groundwater resources is not considered a mandatory/Category 1 program area.*

GRCA Owned Flood and Erosion Control Infrastructure – GRCA owns and manages the Ball’s Mill Dam, Garden Hill Dam and Corbett’s Dam.

The Ball’s Mill Dam is located on Baltimore Creek within the Ball’s Mill Conservation Area, upstream of the village of Baltimore, in the Township of Hamilton. The original dam was constructed in the mid-1800s with upgrades undertaken by the GRCA in 1975. The dam provides limited flood control and low flow augmentation.

The Garden Hill Dam is located on the North Ganaraska River within the Garden Hill Conservation Area in the village of Garden Hill/Municipality of Port Hope. Constructed in 1959, the dam provides recreational opportunities and fish habitat in addition to some limited flood control and low flow augmentation.

Corbett’s Dam is located on the Ganaraska River within the Municipality of Port Hope and was a former grist mill, sawmill and electric generating plant.

In 1973, conservation groups worked with the MNR and constructed the fish ladder in the dam to allow for fish passage. Previous to the installation of the fishway, migratory fish were manually transported over the dam.

Since 1974, the Ganaraska Fishway has been in operation at Corbett’s Dam. Corbett’s Dam is the first barrier on the river preventing fish from migrating upstream. The fishway is a pool and weir style, consisting of a concrete channel 90 feet long and 5 feet wide.

Following the 1980 flood in Port Hope, the channelization project was completed to improve the conveyance of flood waters through the town. The bedrock river channel was made deeper and wider in

key places adjacent to downtown Port Hope to prevent the river from exceeding the confines of its channel, overtopping bridges and causing extensive damages to adjacent properties as was the case during previous major flood events. In addition, vertical walls were constructed to prevent erosion along the riverbanks, railings were installed for safety and several pools were created in the bedrock channel for fish to rest as they migrate upstream. The new river channelization's conveyance capacity is 425 m³/s, enough to contain the 1980 flood. Since construction, no flooding has occurred in the downtown area.

Risks: *All infrastructure is subject to gradual weathering and deterioration. In addition to seasonal operations and maintenance activities, consistent inspections and funding for upgrades or repairs are needed to continue to maintain these structures. Annual funding applications to the Water and Erosion Control Infrastructure program are the main source of funding for conservation authorities to maintain their structures. However, the funding can often be allocated to just a few large projects and must be matched by the applicant from local/municipal funds. This means that conservation authorities must approach municipal councils to seek additional funds for each project. A significant level of staff resources are used each year to manage these structures and apply for necessary funding.*

Flood forecasting and warning – GRCA's flood forecasting and warning program monitors watershed conditions to provide agency and public awareness of flood conditions and to provide an early warning regarding possible flood risks. The GRCA provides municipal partners, other agencies and the public, notice of potential flood events and associated issues to allow time to prepare and respond. This program involves collection and interpretation of rain and watercourse flow data, weather forecasts, watershed conditions, snow surveys, ice conditions/frazil ice, wind direction related to Lake Ontario, site conditions, watershed knowledge of susceptible areas, and provincial forecasts. This information is utilized to provide safety notices and flood warnings and to liaise with provincial and municipal departments and the public.

Risks: *After decades of zero increases in funding, the Provincial Section 39 cuts of 50% in 2019 has downloaded these costs to the municipalities and negatively impacted GRCA's ability to modernize the program.*

Ontario Low Water Response Program – The GRCA delivers the Ontario Low Water Response Program for the GRCA watershed. This includes monitoring watershed conditions for potential drought conditions and liaising with a Low water Response Committee that consists of municipal, agriculture, industry, business, recreation, government representatives and other decision makers from the watershed.

Risks: *The provincial funding that is available is helpful but does not cover the full costs of the program.*

5.1.2 Provincial Water Quality and Quantity Monitoring

GRCA, in partnership with Ministry of Environment, Climate Change and Parks (MECP), has established long term sites to monitor surface and ground water conditions. This is also an investment in long-term monitoring of climate change trends.

Provincial Water Quality Monitoring Network (PWQMN)

Through a partnership with the MECP, GRCA undertakes stream water quality monitoring at nine sites. The Conservation Authority collects water samples eight times per year and MECP is responsible for the laboratory analysis and data management. The results are made available to GRCA. The data is used to prepare watershed report cards and report on overall watershed health. It also helps to identify and prioritize the need for watershed restoration projects.

Provincial Groundwater Monitoring Network (PGMN)

GRCA has a long-standing partnership with the MCEP for groundwater level and water quality monitoring at 17 stations (12 sites) across the watershed (eight are monitored for water quality). GRCA costs include data collection, internal data management, and reporting. The province funded the installation of the network and continues to fund equipment replacements. Information collected has facilitated the creation of a database on groundwater levels and groundwater quality which is used in the preparation of watershed report cards.

A map indicating various monitoring stations is shown in **Figure 5**.



Figure 5 - GRCA Monitoring Sites

5.1.3 Source Water Protection

The Ontario *Clean Water Act* sets out a framework for drinking water source protection on a watershed basis. Thirty-eight source protection areas and authorities were established by the Province, based on Conservation Authority watersheds, and grouped into 19 Source Protection Regions. GRCA's watershed region is within the [Trent Conservation Coalition \(TCC\)](#) Source Protection Region. The TCC Drinking Water Source Protection Region is a complex regional grouping of five Source Protection Areas including Lower Trent, Crowe, Otonabee-Peterborough, Kawartha-Haliburton and Ganaraska Source Protection Areas. Kawartha-Haliburton and Otonabee-Peterborough Source Protection Areas include areas to the north in Haliburton and Peterborough Counties, outside of Conservation Authority jurisdiction.

GRCA disseminates information and provides advice to local municipalities to facilitate implementation of the Source Protection Plan and to identify local priorities for future updates to the Assessment Report and Source Protection Plan. GRCA is responsible for administering the Ganaraska Region Source Protection Authority – governance, administration, meetings, reports and the delivery of other activities required by the *Clean Water Act* and its regulations.

Risks: *Properly funding of the source water protection planning program ensures the ability to monitor and safeguard the quality of drinking water sources, such as aquifers, rivers, and lakes. Without continuous funding, the ability to protect these resources may be compromised. Contaminants, like nitrates, sodium, phosphorus, bacteria, and other pollutants from agricultural runoff, road salt, industrial discharge, and urban development could go unchecked, leading to potential contamination of drinking water supplies. This could increase the risk of health issues, such as waterborne diseases, nitrate poisoning, and exposure to harmful chemicals. The loss of this program could also increase long term costs for municipalities that would need to invest in more expensive water treatment solutions and emergency responses to water contamination events, threatening both community resilience and environmental sustainability.*

5.1.4 Conservation Areas/Conservation Lands

GRCA is responsible for the management of 4,648 hectares (11,486 acres) of land, of which the Ganaraska Forest represents 96% of this land base. The remaining land comprises 9 conservation areas and other lands owned for protection and flood infrastructure requirements. Although the primary purpose of ownership is for the protection of these lands, many of these properties allow for educational and recreational programming and enjoyment. The Ganaraska Forest itself has hundreds of kilometers of multi-use trails. Management of these lands includes restoration, passive and active recreation programming and infrastructure and carrying costs associated with taxes, insurance and capital asset replacement.

Elements of land management that are considered Category 1 activities include the following, of which some programs have links to Category 2 and 3 activities.

- Section 29 enforcement and compliance: Conservation Areas/Ganaraska Forest/ regulation enforcement and compliance. GRCA staff and a contracted company patrol the 11,000 acres Ganaraska Forest and conservation areas to ensure that the regulations are being adhered to by the users.

- Ganaraska Forest: Year-round activities include recreation, forest management, risk management program, hazard tree management, gates, fencing, signage, communications, pedestrian bridges, trails, parking lots, picnic shelters, road, restoration, ecological monitoring, carrying costs such as taxes and insurance. Management of the Ganaraska Forest is guided by the Ganaraska Forest Management Plan. The plan's primary goal is "to conserve, enhance and where feasible restore the forest ecosystem to reflect the native biodiversity of the Ganaraska Forest while at the same time embracing recreational, education and social activities that support the health and sustainability of the forest." Timber management of the Ganaraska Forest is a Category 3 program.
- Conservation Areas and other lands: The GRCA is responsible for the management and maintenance of 9 conservation areas, as well as other lands that are not formal conservation areas. This includes passive recreation, forest management, risk management program, hazard tree management, gates, fencing, signage, communications, pedestrian bridges, trails, parking lots, picnic shelters, road, restoration, ecological monitoring, carrying costs such as taxes, insurance and capital asset replacement.
- Major maintenance and capital improvements: Maintenance and improvements occur to support public access, safety, and environmental protection such as pedestrian bridges, boardwalks, pavilions, trails. These expenses are covered by the capital asset reserve in most cases.
- Land Acquisition: strategic acquisition of environmentally significant properties is a Category 2 and/or 3 project.
- Development and/or update of a Conservation Lands Strategy, lands inventory and land acquisition and disposition policy based following Ontario Regulation 686/21.

Risks: Sustainable funding is required to ensure implementation occurs to protect lands and offer recreational opportunities. In addition, increasing pressure on publicly accessible spaces can increase degradation and non-permitted uses on GRCA lands.

5.1.5 Enabling/Support Services

The following support services enable GRCA to deliver the programs and services to its municipal partners and watershed residents.

Corporate Services

Administrative, human resources, operating and capital costs which are not directly related to the delivery of any specific program or service, but are the overhead and support costs of a conservation authority. Includes health and safety program, overseeing programs and policies.

Financial Management

Annual budget, accounts payable and receivable, payroll, financial analysis, financial audit, administration of reserves and investments, financial reports for funding agencies, preparing and submitting reports to CRA, benefits program administration.

Legal Expenses

Costs related to agreements/contracts, human resources, etc.

Governance

Supporting CA Boards, Advisory Committees, Office of the CAO/Secretary Treasurer

Communications and Outreach

Public awareness-natural hazards, flood forecasting and warning, permitting requirements, natural hazard identification, mitigation, readiness and response, governance, policy, municipal and public relations and engagement, conservation lands.

Administration Buildings/Facilities

Administrative office and millennium building used to support staff, programs, and services. Includes utilities, routine and major maintenance, property taxes. Included is a charge out for capital asset replacement.

Information Technology/Remote Sensing/GIS

This service includes data management and records retention for all program areas within the Conservation Authority. Development and use of systems to collect and store data and to provide spatial geographical representations of data. The GIS and remote sensing services provide essential support to all other program areas within GRCA.

GRCA IT department provides full onsite and off site redundancy across all of GRCA's areas of business. A high-level overview/schematic of GRCA IT infrastructure is shown in **Figure 6**.

GRCA High-Level Diagram of Production / DR infrastructure

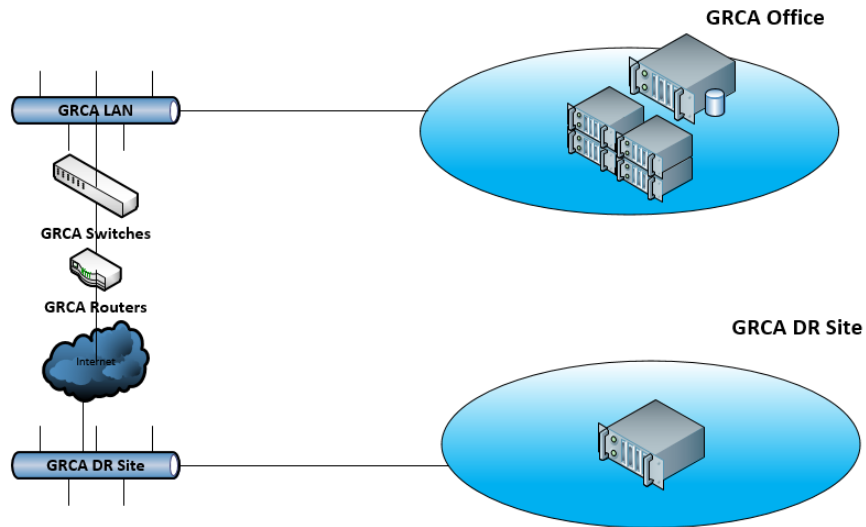


Figure 6 - GRCA IT Infrastructure

The GRCA IT Department also provides access to all the GRCA mapping data (GIS and Remote Sensing) to all staff who require access to it. This includes GIS staff who manage and disseminate base data, desktop applications and mobile applications as well as the GRCA staff who utilize those applications.

Any data collection follows the same process where the GIS staff prepare a mobile application with the input of the supervisor of the field staff who will be collecting the data. This mobile application will contain the appropriate types of fields to allow for data input in the field including map locations, numbers, text and photos. This data is then reviewed buy supervisory staff and used to update the enterprise database.

The Standardized ESRI solution for this type of environment would look similar to the following image in **Figure 7**.

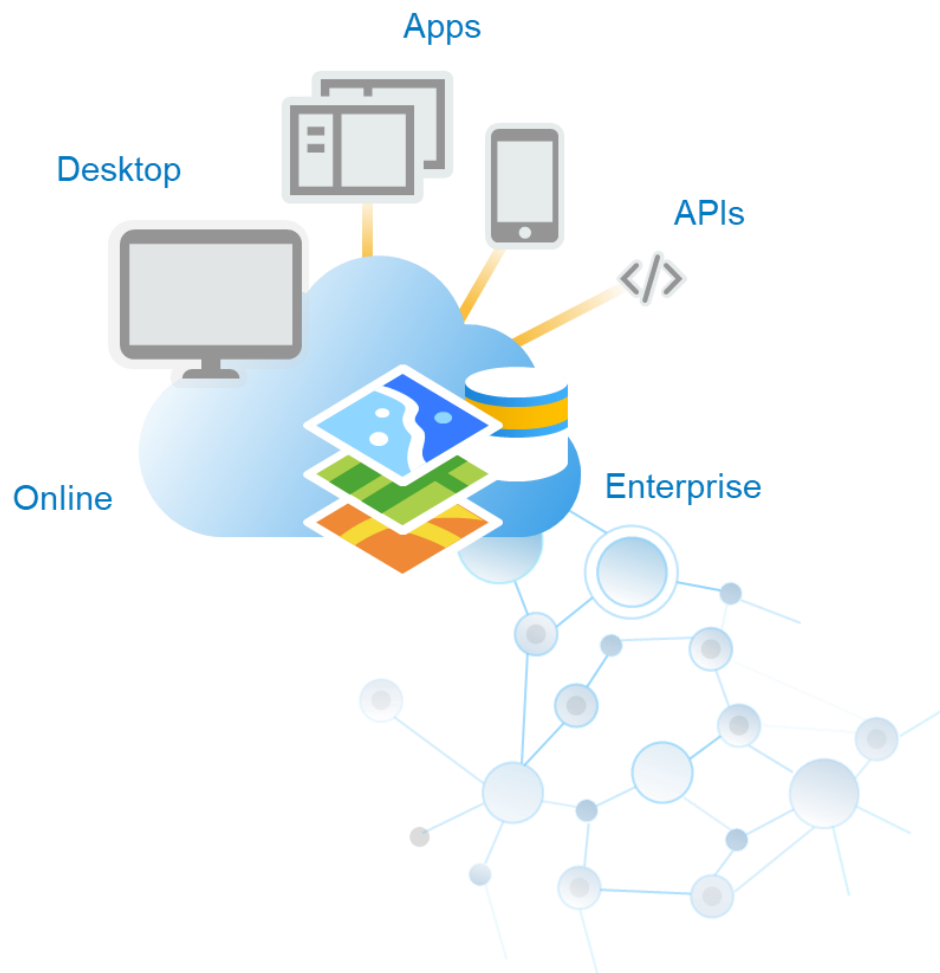


Figure 7 - GIS Infrastructure Schematic (adapted from ESRI)

The GRCA has followed this same process to implement our ArcGIS Enterprise environment. See the logical architecture diagram in **Figure 8** below.

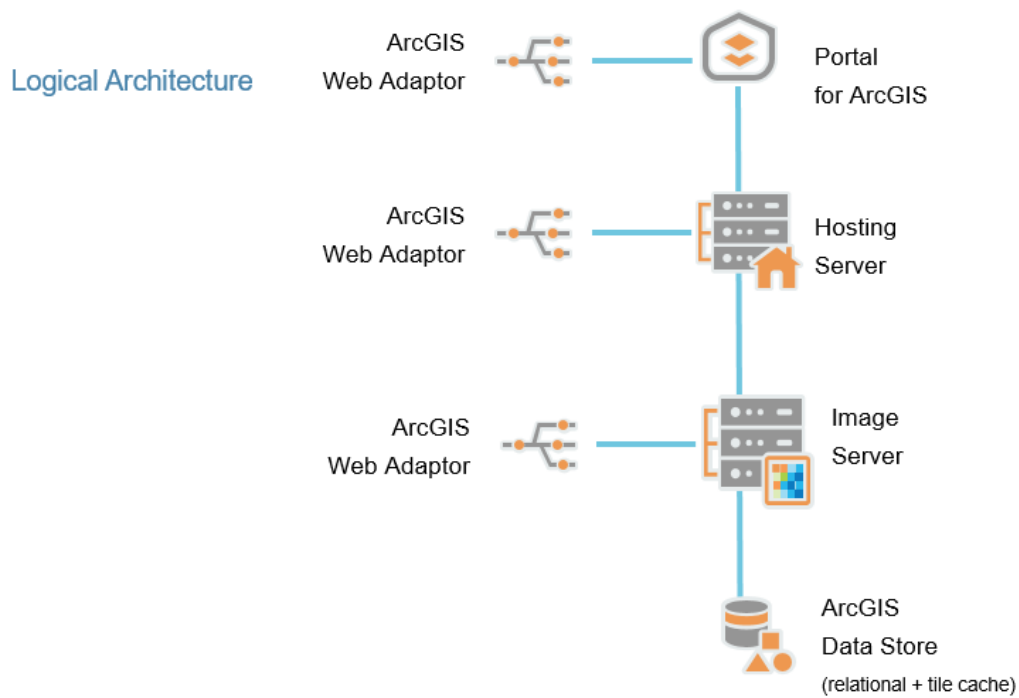


Figure 8 - GRCA ArcEnterprise Architecture

Risks: Staffing costs for IT, GIS and Remote Sensing are not fully covered under the general levy and require support from Category 2 projects which are not a consistent funding source and vary from year to year in availability.

5.2 Municipal Programs and Services (Category 2)

GRCA delivers some of its programs on behalf of its member municipalities. Memorandums of Understanding (MOUs) have been established with the participating municipalities for these programs. Funding is provided through these MOU agreements and is reflected in annual budgets.

Surface Water Quality Monitoring

Surface water quality monitoring at 18 surface water sites, (in addition to PWQMN), water quantity measurements at 80 baseflow sites and water quality samples collect at 4 auto sampler sites supporting Lake Ontario nearshore water monitoring. This supplementary monitoring work fills in the gaps between the provincial water quality stations and assists in providing a more accurate assessment of watershed health. Costs include sampling, analysis, equipment maintenance and reporting.

Natural Heritage Mapping

The GRCA offers comprehensive natural heritage mapping services to support the management and protection of the watershed's natural resources. These services include the collection, analysis, and application of ecological data, with a particular focus on wetlands and other significant habitats, to inform planning, regulatory, and conservation efforts. GRCA's mapping supports municipal partners by identifying critical natural assets, assisting in land-use planning, and integrating natural heritage considerations to ensure sustainable community growth and ecological integrity.

GRCA's natural heritage mapping plays a key role in flood and erosion hazard mitigation by identifying ecologically significant areas like wetlands that act as natural flood buffers. This data informs hydrologic and hydraulic models used in floodplain mapping, watershed plans, and subwatershed studies, helping to reduce the impact of extreme weather events. Using the Ecological Land Classification (ELC) system, GRCA categorizes ecosystems based on vegetation, soil, and topography, providing a detailed understanding of diverse habitats such as forests, wetlands, and riparian zones. Additionally, GRCA includes species-specific data through monitoring efforts in the Ganaraska Forest and Conservation Areas, focusing on habitats for species at risk and areas of high conservation value. These efforts support targeted conservation actions, helping to preserve the region's ecological health against the pressures of climate change and urbanization.

Risks: *Recent changes to the Conservation Authorities Act have changed the role of CAs in the management of natural heritage. Natural Heritage information is used in other program areas such as evaluating watershed health, confirming land use layers and quantifying input parameters for hydrologic and hydraulic models that produce floodplain mapping, water budgets, etc. This information is also utilized in assessing carbon sequestration data in addition to quantifying the value of natural assets and ecological goods and services within the GRCA watershed. It is critical that Conservation Authorities continue to play a role in the mapping and management of natural heritage to ensure efficient delivery of other Mandatory/Category 1 services.*

Watershed Ecology

The GRCA provides a range of watershed ecology services focused on monitoring, protecting, and enhancing the ecological health of the watershed. These services are crucial for maintaining diverse

natural habitats, supporting biodiversity, and ensuring sustainable management of natural resources. GRCA's efforts include monitoring wildlife populations, tracking habitat health, managing invasive species, and evaluating the overall function of natural ecosystems. By collecting and analyzing data on species populations, habitat conditions, and environmental changes, GRCA can guide targeted conservation actions to protect and restore the watershed's natural resources.

Key initiatives include participation in the Durham Region Coastal Wetland Monitoring Program, which tracks the health of coastal wetlands vital for water filtration, flood control, and habitat provision. GRCA also conducts breeding bird surveys in the Ganaraska Forest to monitor avian populations as indicators of ecosystem integrity and performs roadside frog surveys for the Species at Risk (SAR) chorus frog to assess water quality and habitat conditions. Additionally, invasive species monitoring along roadsides and trails helps manage threats to biodiversity and ecosystem function. Through these comprehensive watershed ecology services, GRCA aims to protect the ecological integrity of the Ganaraska region, ensuring it continues to provide essential benefits such as clean water, flood mitigation, carbon sequestration, and recreational opportunities for the community.

Technical Studies

The GRCA undertakes various projects and supporting technical studies that serve our municipal partners and provide critical information and guidance to various program areas. These include the following:

- Watershed Plans
- Watershed Monitoring Reports
- Floodplain Mapping Studies/Updates
- Erosion assessments
- Shoreline Management Plans
- Stormsewer capacity assessments to support municipal asset management obligations
- Flood mitigation strategies
- Culvert and bridge hydraulic capacity analyses and risk assessments for roadways and linear infrastructures within flood susceptible areas, etc.
- Soil vulnerability assessments for rural lands
- Source protection technical assessments
- Water balance and baseflow studies
- Dam safety reviews
- Feasibility studies for dam removals/alterations

The completion of these Category 2 services are *essential* for effective operation and delivery of Category 1 program areas. The various technical studies are normally funded by municipal partners with benefitting levy dollars which are leveraged to access provincial and federal funding programs. Unfortunately, provincial and federal funding sources are dependent on politics and are not consistently available.

Additionally, to offset the impact of provincial downloading, and the burden this creates on municipalities, GRCA must explore other funding sources to accomplish watershed management and

restoration objectives identified by the community. These efforts are ongoing and include alternative funding sources for regenerative financing such as [the Legacy Project](#).

Risks: *Costs associated with completing critical technical studies are not covered under the general levy and require support from Category 2 projects which are not a consistent funding source and vary from year to year in availability.*

5.3 Other Programs and Services (Category 3)

GRCA delivers other programs to Municipal partners and watershed residents that are not considered Mandatory or Municipal Programs and Services. These programs are either funded through municipal agreements and/or through self-generated funds.

The following programs and services listed under Category 3 are integral to implementing actions required or recommended by Category 1 and 2 program and services. To undertake implementation of watershed and sub-watershed plans, natural heritage strategies, fisheries management plans, climate adaptation and mitigation plans, programs related to private landowner stewardship and tree planting services are required. In addition, partnering with local, regional, provincial and federal organizations and agencies to implement programs and projects with similar goals is beneficial to implementation actions.

Private Landowner Stewardship Program

The Clean Water-Healthy Land Financial Assistance Program, offered by the GRCA in partnership with the Municipality of Clarington/Regional Municipality of Durham, Municipality of Port Hope, Township of Hamilton and Lakefront Utility Services Inc., provides watershed residents with technical and financial support to implement environmentally beneficial projects on their properties. This program is available to residents, businesses, schools, and service clubs within the GRCA's jurisdiction and participating municipalities. By equipping landowners with the tools, information, and funding necessary to undertake conservation projects, the program promotes sustainable land management practices that contribute to the overall health of the watershed.

The program is synergistic with broader initiatives such as low water response, flood mitigation, and water quality improvement. For example, one project might involve the installation of rain gardens or permeable pavements that help reduce surface runoff, thus lowering the risk of localized flooding and improving groundwater recharge. Another example could be the implementation of riparian buffer zones along waterways on private properties, which help filter pollutants from surface water, reduce erosion, and enhance water quality downstream. By encouraging private land stewardship, the Clean Water-Healthy Land program not only supports individual property owners but also plays a crucial role in enhancing the resilience and sustainability of the entire watershed ecosystem.

Tree Planting Services

GRCA offers a comprehensive Tree Planting Services program designed to enhance the region's natural landscape and promote sustainable land management. Through the GRCA Tree Seedling Program, property owners can purchase bare root native tree and shrub seedlings at a minimal cost to plant on their own properties, making it accessible for individuals to contribute to environmental stewardship.

For those seeking more support, GRCA provides a full-service tree planting option, which includes the development of tailored planting plans and the complete implementation of the project on behalf of the landowner.

Additionally, GRCA partners with member municipalities to deliver targeted tree planting initiatives, such as the Trees for Rural Roads program. These partnerships not only increase tree cover across the watershed but also help achieve broader environmental objectives like improving air quality, enhancing wildlife habitat, and reducing soil erosion. By offering these services, GRCA empowers landowners to actively participate in conservation efforts, supporting both individual property goals and the ecological health of the broader Ganaraska region.

Fisheries Services

The GRCA provides essential fisheries services to manage and preserve aquatic ecosystems within the Ganaraska region. These services include monitoring fish populations, assessing habitat conditions, and implementing measures to protect native fish species while controlling invasive species. GRCA collaborates with various partners, including Fisheries and Oceans Canada (DFO), Ontario Power Generation (OPG), and Hydro One Inc., to ensure the health and sustainability of the region's fisheries, which are critical for biodiversity, recreational fishing, and the overall ecological balance of the watershed. The partner programs are also highly cost-effective, offering significant savings for the partners involved by leveraging GRCA's local expertise, existing infrastructure, and collaborative resources to achieve shared conservation goals efficiently.

Key initiatives include the management of the Cobourg Creek Lamprey Weir in partnership with DFO's Sea Lamprey Control Centre, which helps prevent invasive sea lampreys from accessing spawning habitats and threatening native fish species. GRCA also conducts fisheries assessments on OPG and Hydro One properties to evaluate fish populations and habitat conditions, informing management decisions to mitigate environmental impacts. Additionally, GRCA runs a long-term fisheries monitoring program on Wilmot Creek, which has been in place since the 1970s, providing valuable data on fish population trends and guiding adaptive conservation strategies. Through these efforts, GRCA aims to protect native fish species, manage invasive threats, and maintain healthy aquatic habitats, contributing to the ecological integrity and resilience of the watershed.

The cost effectiveness of the program is tremendously beneficial to GRCA's provincial and federal partners.

Stewardship Partner Projects

The GRCA collaborates with various partners through its stewardship program to deliver impactful environmental projects and initiatives. These partnerships are time-limited and focus on enhancing the region's natural resources through initiatives such as tree planting and habitat restoration. Notable projects include the Highway of Heroes Tree Campaign in partnership with Trees for Life, the East Central Farm Stewardship Collaborative, Forests Ontario, and the Durham Collaborative Tree Program – Durham TREES. These initiatives are highly cost-effective and leverage GRCA's expertise to achieve

significant environmental benefits while optimizing resources through shared responsibilities and funding.

These stewardship programs also create synergies with other conservation efforts, including land cover enhancement, natural asset protection, and flood mitigation strategies. By working with partners, GRCA extends its reach and impact, contributing to broader environmental goals such as biodiversity conservation, climate resilience, and improved watershed health. The collaborative nature of these programs ensures that diverse stakeholders can contribute to and benefit from the sustainable management of natural resources in the Ganaraska region.

Outdoor Education

The Ganaraska Forest Centre (GFC), nestled in the heart of the Ganaraska Forest, serves as the hub for the GRCA's outdoor education program. Each year, thousands of students visit the Centre for immersive day or overnight experiences designed to deepen their understanding of environmental stewardship and their ecological footprint. Led by Ontario-certified teaching staff, the GFC offers a variety of curriculum-based educational programs tailored for elementary and secondary students. These programs explore local watersheds, ecosystems, and pressing environmental issues, providing students with hands-on learning opportunities that connect them with the natural world.

In addition to on-site programs, the GFC extends its educational reach by offering programs at schools, both indoors and outdoors, and through online learning platforms. These diverse educational approaches help foster a greater awareness of watershed health and environmental conservation among young learners, equipping them with the knowledge and skills to contribute positively to their communities and the environment. Through these programs, GRCA aims to inspire the next generation to recognize their role in protecting and enhancing the natural world.

***Risks:** Category 3 programs can be at risk given that the financial mechanism to support these programs are through specific agreements with member municipalities, partners or through self-generated revenues., all of which can have fluctuating financial stability. Category 3 programs and services delivered by the GRCA are integral to Category 1 or 2 programs and/or support implementation resulting from mandatory program and services.*

6.0 Future Considerations

The GRCA has a rich history of watershed management and is dedicated to the conservation and enjoyment of watershed lands and water resources. Through the development and approval of the GRCA's Inventory of Programs and Services, Agreement for Services with the municipal partners and the development of Watershed-based Resource Management Strategy, issues, costs and risks related to these programs were considered (see **Appendix 2**). These programs include the mandatory Category 1 services, i.e. natural hazard management, conservation areas and lands, drinking water source protection and water quality and quantity monitoring, in addition to Category 2 and 3 services, such as technical studies, stewardship and environmental education. The GRCA's programs and services comply with regulatory requirements and provide value and experiences for municipal partners, watershed residents and landowners and the broader community.

It can be expected that new issues and challenges will arise in the future and program areas will need to be adaptive to support our municipal partners and watershed residents in meeting these new challenges. Finding solutions to complex issues is best done together in a collaborate way to ensure efficient and cost-effective use of resources in addition to capitalizing on the synergies that exist between program areas and various partners. It is important to continue to explore the development of increased partnerships with municipalities to enhance natural hazard management, protection of drinking water sources, watershed planning, monitoring programs, etc. A key component in future efforts will involve engagement with indigenous partners to build deeper working relationships and learn from their knowledge and experiences of their traditional territory.

As program areas evolve into the future, GRCA's Strategic Plan will provide overall guidance regarding the delivery of programs and services. The Watershed-based Resource Management Strategy will provide a finer level of guidance and will be updated regularly based on overall strategic priorities and community input to address these changes, opportunities and effectiveness of programs as required.

7.0 Public Engagement

Public engagement for the Watershed-Based Resource Management Strategy involved review by the GRCA's Board of Directors prior to the strategy being made available for broader consultation. The intent of the circulation of the draft strategy was to provide an overview of the regulatory requirements and how GRCA staff had completed the document to incorporate these requirements. At this stage, the document will benefit from a broader review and will incorporate comments received through the consultation to complete a final strategy.

The initial version of the document represents a foundation upon which future engagement and input will be consolidated and incorporated into future versions. The document will be viewed as a working document which will evolve and improve with each successive update and revision.

8.0 Periodic Review

Ontario Regulation 686/21 requires a process for the periodic review and updating of the Watershed-Based Resource Management Strategy including procedures to ensure stakeholders and the public are consulted during the review and update process. In this regard, the Watershed-Based Resource Management Strategy should be reviewed and updated internally by GRCA staff regularly so that it remains a current working document for staff. When a new Board of Directors for the GRCA has been appointed, Indigenous partners, stakeholders and watershed residents should be engaged for input and feedback regarding the WBRMS. This allows for consideration of environmental, social and economic impacts while also aligning with the municipal election cycle in Ontario.

Stakeholder and public consultation will be undertaken during the above noted review periods to ensure awareness and transparency regarding the Watershed-Based Resource Management Strategy.

Appendix 1 - Summary of Existing Technical Studies, Monitoring Programs, etc.

Flood Plain Studies and Mapping

- GRCA Fill Line Mapping Phase IV, 1978
- Little's Creek Water Management Master Plan, 1998
- Ganaraska River Town of Port Hope Floodline Study, TSH, 1986
- West Gages Creek Master Drainage Plan, 2007
- Hamilton Township Floodline Mapping Study, Dillon, 1977
- Cobourg Creek Floodline Mapping Study, GRCA 2008
- Midtown Creek Floodline Mapping Study, GRCA 2008
- Brook Creek Floodline Mapping Study, GRCA 2008
- Massey Creek Floodline Mapping Study, GRCA 2008

Flood Plain Studies Updates

- Wilmot and Graham Creek Floodplain Update Study (2022)
- Region of Durham Floodplain Mapping Update Study (2024)

Key Geographic Information Data

- MNR or provincial data:
 - PWQMN Sites
 - PGMN Wells
 - Water Quality Index Stations
 - Ontario Road Network
 - Waterbodies
 - Watercourse
- Central Geodatabases
 - Digital Ortho Imagery: 2008, 2013, 2018, 2023
 - Ontario Hydro Network
 - Digitized and Vector Floodlines
 - LiDAR high resolution terrains
 - Drinking Water Source Protection assessment report database
- Archived Aerial Photographs: 1953/54, 1982, 1989, 1993, 2002
 - The aerial photographs are a mixture of black and white and various scales. Some sets provide complete watershed coverage and others only partial coverage.
- Ontario Provincial Digital Data (Ontario GeoHub)
 - Coverage of the watershed region at a scale of 1:10,000
- Federal National Topographic Series Maps
 - Complete coverage of the watershed at a scale of 1:50,000 and partial coverage at a scale of 1:25,000
- GRCA Data
 - Flood Damage Centres (1998)
 - Rain Gauges (2013 & 2020)
 - Staff Gauges

- Benthic Rapid Bio Sites
- Wilmot Creek Electrofishing Sites
- Wesleyville Creek Electrofishing Sites
- Cobourg Lamprey Barrier
- FFW Stream Gauges
- Groundwater Monitoring Network
- Stream Gauges
- Long Term Baseflow Stations
- Piezometers
- GRCA Lands Owned
- GRCA Admin Boundary
- Subwatersheds

Strategic Plans

- 2015-2020 Strategic Plan: A Roadmap for the Future, 2015
- Vision 2020: A Review that Illuminates the Future, 2020

Lake Ontario Shoreline Management Plan

- Lake Ontario Shoreline Management Plan, 2020
 - This Plan was prepared by Zuzek Inc. for GRCA, CLOCA and LTC.

Flood Forecasting and Warning

- Provincial Flood Forecasting and Warning Program – Implementation Guidelines for Conservation Authorities and the MNRF, MNRF 2023
- Flood Contingency Plan, 2024
- Flood Operations Manual, 2024

Low Water Response

- Terms of Reference – Ganaraska Region Water Response Team, 2024

Plan Review Reports

- Policies for the Implementation of Ontario Regulation 168/06: Development, Interference with Wetlands and Alterations to Shoreline and Watercourses Regulation, 2014
- Technical & Engineering Guidelines for Stormwater Management Submissions, 2014
- GRCA Plan Review and Permit Fees, 2022
- Erosion & Sediment Control Inspection Guide, 2008
 - This Guide was prepared by TRCA for the Greater Golden Horseshoe Area Conservation Authorities
- Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications, 2013
 - This report was prepared by Shelly Cuddy, Gayle Soo Chan and Ryan Post and various other Conservation Authority staff
- Low Impact Development Stormwater Management Planning and Design Guide, 2010
 - Prepared by CVC and TRCA

Subwatershed Plans

- Foster Creek Subwatershed Planning Study, 2001
 - This study was prepared by Gartner Lee Ltd. and Greenlands International Consulting Inc. for GRCA.

Master Drainage Plans

- Cobourg/Midtown Creeks Master Drainage Plan Study, 1992
 - This Plan was prepared by R.V Anderson Associated Ltd. for the Town of Cobourg, the Township of Hamilton and GRCA
- Port Hope West Community Water Management Master Plan, 1998
 - This Plan was prepared by Gartner Lee Ltd. and D.G Biddle and Associates for the Town of Port Hope and GRCA
- West Gage Creek Master Drainage Plan, 2007
 - This Plan was prepared by Urban Watershed Group Ltd. for the Town of Port Hope and GRCA

Watershed Plans

- Cobourg Creek Background Report: Abiotic, Biotic and Cultural Features, 2008
- Cobourg Creek Watershed Plan, 2008
- Ganaraska River Background Report: Abiotic, Biotic and Cultural Features, 2009
- Graham Creek Background Report: Abiotic, Biotic and Cultural Features, 2009
- Lovekin Creek, Bouchette Point Creek and Port Granby Background Report: Abiotic, Biotic and Cultural Features, 2009
- Wilmot Creek Background Report: Abiotic, Biotic and Cultural Features, 2009
- Ganaraska River Watershed Plan, 2010
- Graham Creek Watershed Plan, 2010
- Lovekin Creek, Bouchette Point Creek and Port Watershed Plan, 2010
- Wilmot Creek Watershed Plan, 2010

Watershed Monitoring

- Ganaraska Region Watershed Monitoring Plan towards an integrated approach, 2014
- Ganaraska Region Monitoring Report, 2018

Natural Heritage Strategy

- Terrestrial Natural Heritage Strategy, 2013

Climate Change

- GRCA Climate Change Strategy, 2014
- Conducting a Climate Change Analysis Across the Ganaraska Region Conservation Authority, 2020
 - This document was prepared by Ontario Climate Consortium for the GRCA

Conservation Lands Reports

- Ganaraska Forest Trails Project, Final Report for the Ganaraska Region Conservation Authority, 1997
 - This document was prepared by Marsh and Warfield for the GRCA

- Cobourg Conservation Area Master Plan, 2002
- Ganaraska Forest Management Plan, 2017
 - This document was prepared by Madawaska Forestry Inc. for the GRCA
- Conservation Lands Strategy (draft), 2024

Dam Operation, Maintenance, Safety and Surveillance Manuals

- Operations Manual Corbett's Dam, 1995
- Operations Manual Ball's Mill Dam, 2004
- Operations Manual Garden Hill Dam, 2004
- Public Safety Assessment Ball's Mill Dam, 2013
- Public Safety Assessment Corbett's Dam, 2013
- Public Safety Assessment Garden Hill Dam, 2013
- Background Report- Ganaraska Region Conservation Authority- Dam Safety Reviews, 2016
- Public Safety Plan Ball's Mill Dam, 2017
- Public Safety Plan Corbett's Dam, 2017
- Public Safety Plan Garden Hill, 2017

Drinking Water Source Protection Reports

- Ganaraska Assessment Report, updated 2018
- Ganaraska Source Protection Plan (updated September, 2023)

Appendix 2 – Issues and Risks, Mitigation Measures, etc. related to GRCA Programs

GRCA has reviewed the issues and risks documented in this strategy and has described preliminary proposed mitigation measures. The amount of funding required to mitigate the risks are generally noted as “To be Determined (TBD)” as the issue may not arise or be able to be addressed in the foreseeable future and may be outside of the review period for this document. Additionally, degree of needed investment has been represented by dollar signs to show order of magnitude costs.

\$ - tens of thousands

\$\$ - hundreds of thousands

\$\$\$ - millions

Mandated Programs and Services: Category 1		
Issues and Risks	Mitigation Measures	Costs (TBD)
5.1.1 Natural Hazard Management		
Floodplain mapping		
Updating and maintaining watershed models and floodplain mapping does not have a source of sustainable funding. There has been no provincial funding since 1990s but some recent federal funding has been made available through the NDMP and FHIMP programs. GRCA cannot meet the obligations of new provincial regulation to update mapping annually as some of our models are not in a digital format. Provincial guidance has not been provided regarding how to incorporate climate change impacts in flood and erosion risks. Interaction between groundwater and surface water is critical to understand in hydrologic models that support mapping however, the assessment of groundwater resources is not considered a mandatory/Category 1 program area.	Continue to work with municipal partners to request support from provincial and federal funders. Apply to Flood Hazard Identification and Mapping Program (FHIMP). Encourage municipalities to establish hazard mapping reserves so that matching local dollars are available to leverage provincial and federal funding as it becomes available. Provincial mapping guidelines are currently being updated by MNR. Work with ORMGP to develop local models to further understanding of how groundwater and surface water interact within the GRCA watershed to plan for future growth.	\$\$\$
GRCA Owned Flood and Erosion Control Infrastructure		
All infrastructure is subject to gradual weathering and deterioration. In addition to	Continue to work with municipal partners to request support from	\$\$\$

<p>seasonal operations and maintenance activities, consistent inspections and funding for upgrades or repairs are needed to continue to maintain these structures. Annual funding applications to the Water and Erosion Control Infrastructure (WECI) program are the main source of funding for conservation authorities to maintain their structures. However, the funding can often be allocated to just a few large projects and must be matched by the applicant from local/municipal funds. This means that conservation authorities must approach municipal councils to seek additional funds for each project. A significant level of staff resources are used each year to manage these structures and apply for necessary funding.</p>	<p>WECI program to maintain flood and erosion control infrastructure.</p> <p>Encourage municipalities to establish reserves so that matching local dollars are available to leverage WECI funding as it becomes available.</p>	
Flood Forecasting and Warning		
<p>After decades of zero increases in funding, the Provincial Section 39 cuts of 50% in 2019 has downloaded these costs to the municipalities and negatively impacted GRCA's ability to modernize the program.</p>	<p>Request that the funding be restored. Seek additional funding sources.</p> <p>Encourage municipalities to establish reserves so that matching local dollars are available to leverage funding as it becomes available.</p>	\$\$
Ontario Low Water Response Program		
<p>The provincial funding that is available is helpful but does not cover the full costs of the program.</p>	<p>Work with the Province and local partners to request additional funding.</p>	\$
5.1.3 Source Water Protection		
<p>The need for proper funding for the Source Water Protection Planning Program. Without this program the municipalities would be responsible for the water treatment solutions.</p>	<p>Work with the Trent Conservation Coalition (TCC), the MECP to protect/maintain and potentially increase funding.</p>	\$\$
5.1.4 Conservation Areas/Conservation Lands		
<p>Sustainable funding is required to ensure implementation occurs to protect lands and</p>	<p>Seek additional funding and revenue opportunities.</p>	\$\$\$

offer recreational opportunities. In addition, increasing pressure on publicly accessible spaces can increase degradation and non-permitted uses on GRCA lands.		
5.1.5 Enabling/Support Services		
Staffing costs for IT, GIS and Remote Sensing are not fully covered under the general levy and require support from Category 2 (benefitting levy) projects which are not a consistent funding source and vary from year to year in availability.	Explore sustainable, ongoing funding sources to secure support services.	\$\$
Municipal Programs and Services: Category 2		
Issues and Risks	Mitigation Measures	Cost
Natural Heritage		
Recent changes to the Conservation Authorities Act have changed the role of CAs in the management of natural heritage. Natural Heritage information is used in other program areas such as evaluating watershed health, confirming land use layers and quantifying input parameters for hydrologic and hydraulic models that produce floodplain mapping, water budgets, etc. This information is also utilized in assessing carbon sequestration data in addition to quantifying the value of natural assets and ecological goods and services within the GRCA watershed. It is critical that Conservation Authorities continue to play a role in the mapping and management of natural heritage to ensure efficient delivery of other Mandatory/Category 1 services.	Continue to work with municipal partners to provide support and expertise that best serves them. Coordinate mapping and management of natural heritage data on a watershed scale for use in program areas and special projects. Collaborate with municipal partners so that data is prepared and openly shared in an efficient and cost effective manner (avoids duplication of effort) that serves multiple program areas Demonstrate value of natural heritage data for use in developing land cover GIS layers for watershed models. Explore funding opportunities to develop and maintain natural heritage and land cover data for projects that benefit watershed residents.	\$ - \$\$
Technical Studies		
Costs associated with completing critical technical studies are not fully covered under the general levy and require support from	Encourage municipalities to establish reserves for watershed plans, subwatershed studies, etc. to	\$\$ - \$\$\$

Category 2 projects which are not a consistent funding source and vary from year to year in availability.	support the monitoring of watershed health and to strategically position municipalities for future growth. These matching local dollars would be used to leverage additional funding as it becomes available.	
Category 3		
Issues and Risks	Mitigation Measures	Cost
Category 3 programs can be at risk given that the financial mechanism to support these programs are through specific agreements with member municipalities, partners or through self-generated revenues., all of which can have fluctuating financial stability. Category 3 programs and services delivered by the GRCA are integral to Category 1 or 2 programs and/or support implementation resulting from mandatory program and services.	Work with municipal partners to demonstrate value and cost effectiveness of Category 3 programs to watershed residents. Explore funding and revenue opportunities.	\$ - \$\$\$